

Central Queensland Coal Project

Appendix 3 – Land, Soil and Geochemistry

Central Queensland Coal

CQC SEIS, Version 3

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Horizon Soil Survey & Evaluation



Prepared for

CENTRAL QUEENSLAND COAL



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| | Signature | Date |
|--------|-------------------|------------|
| Author | Ian Hollingsworth | 8 May 2020 |

Horizon Environmental Soil Survey and Evaluation ABN 49 579 813 830 www.horizonesse.com 38 Witherden Street Nakara NT 0810 Phone (0457 717858) Email: ian.hollingsworth@horizonesse.com

Summary

This agricultural land capability and soil suitability assessment was applied to planned disturbed areas on ML80187 and ML700022, Ogmore, 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 reestablish 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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- Map 1 Central Queensland Coal Soil Map Units
- Map 2 Central Queensland Coal Soil Stripping Depths and Stockpile Locations

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- Appendix A: Soil Profile Descriptions
- Appendix B: Site Photographs
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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**).

| 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 |

Table 1 Project infrastructure disturbed areas (Mine Plan 190923)

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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.

| Stat. | J | F | М | Α | М | J | J | Α | S | 0 | Ν | 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 |

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

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 Strathmiur Synclinorium, which contains the Permian Bowen Basin strata. The Styx Basin plunges to the northnorthwest, with an elongate shape bounded by the half-graben fault to the east and onlapping the Permian Back Greek Group to the west.

2 Site Description



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.

| Land | Landform and geology | Major Soils | Remnant Native |
|---------------------|-----------------------------|------------------------------|----------------------------|
| System | | | Vegetation |
| | Plateaus, S | edimentary Rocks, Eucalyp | t Woodland |
| Ws – | Dissected low plateaus | Red, massive, gradational | Eucalypt woodland |
| Woodstock | gently dipping | loams and clay loams | (narrow-leaved ironbark, |
| (309 ha) | sedimentary rocks | | pink bloodwood, wattles) |
| Class C2 | | | |
| | Hills, Sedimentary | Rocks, Eucalypt Open For | est and Woodland |
| Rd – | Rolling low hills and rises | Bleached sandy and | Rosewood open forest |
| Rosewood | sedimentary rocks | loamy surface, brown and | with narrow-leaved |
| (54 ha) | | grey, sodic duplex soils | ironbark; Queensland |
| Class C2 | | | peppermint |
| | Undulating rises and | I plains, Sedimentary Rocks | Eucalypt woodland |
| TI – Torilla | Undulating rises and low | Red, structured | Eucalypt woodland |
| (54 ha) | hills deeply weathered | gradational clay loams | (narrow-leaved ironbark, |
| Class C2 | sedimentary and | and uniform clays | pink bloodwood) |
| | metamorphic rocks | | |
| Tb – | Gently undulating plains | Bleached sandy and | Eucalypt woodland |
| Tooloomba | and rises sedimentary | loamy surface, brown and | (narrow-leaved ironbark, |
| (305 ha) | rocks | grey, sodic duplex soils | Queensland peppermint) |
| Class C2 | | | |
| | Undulating rises and p | plains, Unconsolidated sedi | ments, Brigalow scrub |
| BI – | Level to gently undulating | Grey, brown and black | Brigalow scrub |
| Blackwater | plains and rises on | cracking clays | |
| Class A | cracking clay sediments; | | |
| • | melonhole microrelief | | 5 |
| So – | Level to gently undulating | Grey and brown, strongly | Brigalow scrub |
| Somerby | plains and rises on | sodic cracking clay and | |
| (692 na) | cracking clay sediments | auplex solls | |
| Class C1 | | wiene and plaine. Evenhunt | weedlend |
| Dv | Conthu undulating to loval | J rises and plains, Eucalypt | Fuerburgt woodland (nonlar |
| Pv - | Genily undulating to level | Black and grey, strongly | Eucarypt woodiand (popiar |
| (1.626 ba) | fine and modium toxtured | sourc auplex sous; | box, narrow-leaved |
| (1,020 Ha) | | loomy ourfood brown and | ITOTIDATK) |
| Class CZ | seaments | arov andia duplox acila | |
| ۸r _ | Undulating low hills rises | Bloached sandy and | Eucolypt woodland |
| Artillon/ | and fans on fine grained | loamy brown and grey | Eucarypt woodiand. |
| Close C2 | sodimentary rocks | alkaling sodia duplex soils | |
| 01855 02 | Sedimentary focks | and the source duplex source | |
| | | sedimentary rocks: | |
| | Floodolaine a | nd Local Alluvial Plains Gra | dational Soils |
| Sx - Stvx | Narrow floodplains along | Brown massive fine | Fucalypt woodland (blue |
| (31 ha) | the Styx river and | sandy loams | gum, Moreton Bay ash) |
| Class A | Wellington Creek | | gam, mereten bay aerij |

Table 3 Land Systems in and adjacent to the lease area

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. Ogmore 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**.

| Land Class | Area (Ha) | Land Capability | Soils |
|---------------|--------------|--|--|
| 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 |

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

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2 Site Description



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 | GQAL/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 |
| CaPO4 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 |
| CI (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 physicochemical 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.

| | 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 | Brigalow vegetation; appropriate for fattening beef cattle; good grazing on sown pastures and can withstand ground disturbance. | | | | |
| | 2 | Land with minor limitations | | pasture improvement | 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. | | | | |

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

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).

| Soil map unit | Area⁺ | Reference sites | Detailed profile descriptions | Check and exclusion sites | Survey intensity (Ha/site) | Proportion of mining disturbed area (%) |
|------------------|-------|--------------------|-------------------------------------|---------------------------------|----------------------------------|--|
| 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 | |

Table 8 Soil survey mapping coverage

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

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

| CONCEPT | 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 | DETAILED Reference sites SS01, SS07 and SS04 in Appendix A. | | | | | | | | | | |
| DESCRIPT | ION: | TIES: Infortile | soils form | nod on do | on woathord | nd codimont | any and | | | | |
| metamorphic rocks on hillslopes & rises, slope <5%, 26<36% gravel throughout | | | | | | | | | | | |
| EFFEC | TIVE ROO | Т | <1 m | | PAWC | <50 m | Im | | | | |
| LAND (| | TY SCL | CAPABI | LITY S | UITABILITY | AG LA | ND | GQAL | | | |
| | | NO | I | | S1 | B | 3 | YES | | | |
| LIMITATIO | NS | BICARE | BP, PAWO | C, WATEF | REROSION | | | | | | |
| RANGE IN (| CHARACT | ERISTICS | | F 0 | | Chlorida | Dieerk | | | | |
| cm | | worphology | рп | dS/m | ESP (%) | mg/kg | P mg/kg | Erosion risk | | | |
| 0 | | | | | | | | | | | |
| 10 | | A1 LS-SL | 5.3 | 0.02 | 2 | <10 | <5 | DI=3 | | | |
| 20 | | | | | | | | K=0.03 | | | |
| 30 | | | | | | | | | | | |
| 40 | $\backslash \backslash$ | | | | | | | | | | |
| 50 | | B1 SL-LC | 5.69 | 0.6 | | <10 | | DI=3 | | | |
| 60 | | | | | | | | K=0.03 | | | |
| 70 | | B3 SL-SCL | 5.6-6.6 | 0.03 | 4-6 | <10 | | | | | |
| 80 | | | | | | | | | | | |
| 90 | | | | | | | | | | | |
| 100 | | | | | | | | | | | |
| 110 | | | | | | | | | | | |
| 150 | | | | | | | 6 | | | | |

LIMITATIONS

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

| CONCEPT: DETAILED DESCRIPTION: | Alluvia overba floodpl Basic (deep; \$ Clastic Refere | 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 Moderatel deep; Stratic Rudosol Non-gravelly Loamy Shallow; Basic Fluvic Clastic Rudosol Non-gravelly Clayey Shallow Reference sites 007, 008, 011, SS05 in Appendix A. | | | | | | |
|--------------------------------------|--|---|--------------------------------|-------------------|--------------|--|--|--|
| SURFACE PROPERTIES: | River fl | lats and terraces ectly drained, slo | s, cleared for past ope <1% | ure, no rocks, no | microrelief, | | | |
| EFFECTIVE ROOT DEPTH | · | 1.5 m | PAWC | 75<100 mm | | | | |
| LAND CAPABILITY | SCL | CAPABILITY | SUITABILITY | AG LAND CLASS | GQAL | | | |
| | NO | I | S1 | В | YES | | | |

DRAINAGE, WATER EROSION, PAWC

| Depth cm | | Morphology | рН | 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 | $\backslash \backslash$ | | | | | | | |
| 50 | | B2w | 7.9 | 0.6 | | 10 | 2 | DI=3 |
| 60 | | SL-MHC | | | | | | K=0.03 |
| 70 | | С | | | | | | |
| 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

| Depth cm | Morphology | / Gravel % | рН | EC dS/m | ESP | Chloride ma/ka | Bicarb P | Erosion | |
|---|---|------------|----------|------------|---------|-------------------|----------------------|---------|--|
| RANGE IN CHAR/ | ACTERISTICS |) | | | | | | | |
| LIMITATIONS | RC | CK, PAWC | , PH, DF | RAINAGE | , WATEF | R EROSION | , WIND E | ROSION | |
| | 1 | NO | I | S | 61 | CLASS D | | NO | |
| LAND CAPAE | BILITY S | CL CAP | ABILITY | SUITA | BILITY | AG LAN | D | GQAL | |
| EFFECTIVE F DEPTH | ROOT | <0.5 r | n | PA | WC | <50 mm | 1 | | |
| DESCRIPTION: 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% | | | | | | parian 0% | | | |
| sediments on Tooloomba and Deep Creek narrow floodplains. Basic Grey-Orthic Tenosol Medium Non-gravelly Silty Silty Mo deep; Stratic Rudosol Gravelly Loamy Shallow; Basic Fluvic C Rudosol Gravelly Clayey ShallowDETAILED DESCRIPTION:Exclusion sites 060, 115, 126, 080 in Appendix A. | | | | | | | oderately Clastic | | |
| CONCEPT | ONCEPT: Alluvial Soils with minimal profile development associated with channel | | | | | | | | |

| cm | | worphology | % | рп | dS/m | ESP (%) | mg/kg | 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 | 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 | | | | | | | | |
|--|---|---------------|----------|--------------|-------------|-------------------|----------------------|-----------------|--|
| DETAILEDReference sites 001, 002, 020, 041, 042, 048, 052, 066, 067, 113 inDESCRIPTION:Appendix ASURFACETerraces, cleared for pasture, gravelly, melonhole gilgai microrelief, imperfectly drained, slope <1% | | | | | | | 8 in ef, | | |
| LAND C | APABILI | TY SQL | CAPA | BILITY SU | ITABILITY | AG. LAND | GC | QAL | |
| | | NO | , | V | 2 | CLASS C1 | Y | ES | |
| | NS | BICAR | 3 P, PAW | C, GILGAI, E | C, pH, DRAI | NAGE, WAT | ER EROS | SION | |
| Depth cm | | Morphology | рН | EC dS/m | ESP % | Chloride mg/kg | Bicarb P mg/kg | Erosion risk | |
| 0 | | A1 | | | | | iiig/kg | | |
| 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- | | | | | | | | |
|--|------------------------|---|---|---|---|---|-----------------------|---------------------|
| DETAILED DESCRIPT SURFACE PROPERTI | ION: ES: | loamy C Reference SS06; S Terraces imperfec | layey Mod ce sites 14 S08, SS09 s, cleared f ttly to poor | erately deep , 22, 26, 28,); SS10, SS1 or pasture, g ly drained, s | 29; 31, 3 1 in Appo gravelly, c lope <1% | 5, 36, 49, 56 endix A crabhole gilg | 65, SSC ai microre |)2; SS03; elief, |
| DE | EPTH | 51 | 0.5 m | F. | AVVC | 5057511 | 1111 | |
| LAND C | APABILI | TY SQL | CAPABIL | LITY SUIT | ABILITY | AG. LAN CLASS | ND S | GQAL |
| | | NO | VI | | 4 | C2 | | NO |
| | NS | PAWC, I | ESP, EC, p | oH, WIND & | WATER | EROSION, I | DRAINAG | E |
| RANGE IN C | HARAC | Morphology | nH | FC | | Chloride | Bicarb | Frosion |
| cm | | Morphology | | dS/m | ESP % | mg/kg | P mg/kg | 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 | $\backslash \setminus$ | to black | | | | | | K=0.02 |
| 30 | \setminus | A2e FSL | 6.9-8.8 | 0.1-0.7 | | 60-860 | | |
| 40 | \setminus | | | | | | | |
| 50 | | B2ss | 8-9.3 | 0.2-0.9 | 11-32 | 20-1130 | | DI=1 |
| 60 | | MHC-HC | | | | | | K=0.04 |
| 70 | $\setminus \setminus$ | yellowish | brown | | | | | |
| 80 | $\setminus \setminus$ | to greyish | brown | | | | | |
| 90 | $\setminus \setminus$ | grey | 6.4-9.3 | 0.1-1.1 | | 120-1520 | | |
| 100 | \setminus | 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.

| Unit | Map unit | Australian Soil Classification | | | | | | | | |
|------|--|---|--|--|--|--|--|--|--|--|
| ID | Description | | | | | | | | | |
| | Woodstock, Ws Dissected low | plateaus on gently dipping sedimentary rocks: red and | | | | | | | | |
| | brown, massive, gradational loams and clay loams supporting Eucalypt woodland | | | | | | | | | |
| | (narrow-leaved ironbark nink bloodwood wattles) | | | | | | | | | |
| 4 | fostelono | C2. Estais Os dis Dustraubis Dasure Kaudas al Thisle Manus annually | | | | | | | | |
| 1 | lootslope | C2; Ferric-Sodic Dystrophic Brown Kandosol Thick Very gravely | | | | | | | | |
| | | Sandy Loamy Deep | | | | | | | | |
| | I orilla, TI 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) | | | | | | | | | |
| 1 | hillslope | C2: Ferric Dystrophic Red Kandosol Medium Moderately gravelly | | | | | | | | |
| | • | Clav-loamy Clavey Deep | | | | | | | | |
| | Tooloomba. Th Gently undula | ting plains and rises on sedimentary rocks: Bleached | | | | | | | | |
| | candy and loamy surface, over brown and groy, alkaling sodic clay subsoils | | | | | | | | | |
| | supporting Euclynt woodla | nd (norrow looved ironbark. Queencland perpermint) | | | | | | | | |
| 4 | | nu (nanow-leaved nonbark, queensianu peppennint) | | | | | | | | |
| 1 | nilisiope | C2; Ferric Dystrophic Red Kandosol Medium Moderately gravelly | | | | | | | | |
| | | Clay-loamy Clayey Deep | | | | | | | | |
| | Styx, Sx Narrow floodplains along the Styx river; brown massive loams supporting | | | | | | | | | |
| | Eucalypt woodland (blue gum, Moreton Bay ash) | | | | | | | | | |
| 2 | alluvial plain | A; Alluvial Soils Non-gravelly Deep (Tenosols, Rudosols, | | | | | | | | |
| | | Vertosols) Sandy Loam to Clay textures | | | | | | | | |
| 3 | valley flat | D; Alluvial Soils <i>Gravelly</i> Shallow (Tenosols, Rudosols, | | | | | | | | |
| | | Vertosols) Sandy Loam to Clay textures | | | | | | | | |
| | Blackwater, Bl Level to gently | undulating alluvial plains and rises on clay sediments | | | | | | | | |
| | with melonhole microrelief: | grey and brown cracking clay soils supporting Brigalow | | | | | | | | |
| | woodland. | 5 · J · · · · · · · · · · · · · · · · · | | | | | | | | |
| | alluvial plain | C1 [,] Brown and Grev Sodic Vertosols Non-gravelly Medium Clay | | | | | | | | |
| 4 | | over Medium Heavy Clay: C1 | | | | | | | | |
| | Somerby So I evel to gently u | ndulating terrace plains and rises on cracking clay | | | | | | | | |
| | sediments with melonhole m | hicrorelief: arey and brown strongly sodic soils | | | | | | | | |
| | Seaments with melonitole in | nd | | | | | | | | |
| | supporting Brigatow woodia | IIU. C1. Brown and Cray Sadia Vartagala Nan grovally Madium Clay | | | | | | | | |
| 4 | alluvial terrace plain | C I, Brown and Grey Sodic Vertosols Non-gravelly Medium Clay | | | | | | | | |
| | | | | | | | | | | |
| | Plainview, Pv Gently undulatin | g to level terrace plains on sediments; black and grey, | | | | | | | | |
| | strongly sodic bleached loar | ny and clay loamy surface, over brown and grey, alkaline | | | | | | | | |
| | sodic subsoils. | | | | | | | | | |
| 5 | terrace plain | C2; Vertic Mesonatric Grey Sodosols Medium Non-gravelly Clay- | | | | | | | | |
| | | loamy Clayey Moderately deep | | | | | | | | |

Table 9 Land unit descriptions including land system associations

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).

| Limitations | | | Soil Map Unit | | | |
|---------------------------------------|----|----|---------------|----|----|--|
| | 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 | |

Table 10 Land capability limitations for soil map units

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**.

| 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 | 3 | 3 |
| TOTAL | | | 100 | | | 12 | |
| SITE DENSITY | | | | | | 9 Ha/site | 12 |

| Table 11 Site numbers and comp | liance with SCL gu | idance for detailed survey |
|--------------------------------|--------------------|----------------------------|
|--------------------------------|--------------------|----------------------------|

*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.

| Parameter | Units | Threshold | Map unit 2 (Rudosol) | | | | | |
|----------------------|----------|-----------|----------------------|-------|-------|-------|-------|-------|
| 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 | | | 5 | 5 | 5 | 5 | 5 | 5 |
| corrected | | | | | | | | |
| Effective rooting | mm | | 1000 | | | | | |
| depth | | | | | | | | |
| Total SWS | mm | ≥75 | 50 | | | | | |
| Criterion 6 | | | OK | | | | | |
| compliance | | | | | | | | |
| Criterion 7 | | | OK | | | | | |
| compliance | | | | | | | | |
| Criterion 8 | | | Non-compl | iant | | | | |
| compliance | | | - | | | | | |

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

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



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 preexisting 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.

5 Soil Management Plans

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

| SOIL MAP UNIT | TOPSOIL DEPTH | SUBSOIL DEPTH | LAND CLASS | AREA | SUBSOIL VOLUME | TOPSOIL VOLUME | | |
|---|------------------|------------------|---------------|------------|---------------------------|---------------------|--|--|
| | (m) | (m) | | (m²) | (<i>m</i> ³) | (m³) | | |
| 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 soils (Vertosols) | | | | | | | | |
| UNIT 4 | 0.3 | 0.5 | C1 | 610,101 | 305,050 | 183,030 | | |
| TOTAL | | | | | 7.0M m ³ | 1.6M m ³ | | |

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.
| Factor | Representative Soil Types | | | | |
|---|---------------------------|-----------------|--|--|--|
| | SODIC DUPLEX SOILS | SODIC VERTOSOLS | | | |
| R | 5750 | 5750 | | | |
| К | 0.02 | 0.02 | | | |
| LS - flat | 1.82 | 1.82 | | | |
| LS - slope | 7.59 | 7.59 | | | |
| Ρ | 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 14 Primary Media RUSLE Results

Table 15 Secondary Media RUSLE Results

| Factor | Representative Soil Types | | | | |
|---|---------------------------|-----------------|--|--|--|
| | SODIC DUPLEX SOILS | SODIC VERTOSOLS | | | |
| R | 5750 | 5750 | | | |
| К | 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 | | | |

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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.

Glossary

8. Glossary

| Abbreviation/Term | Description |
|-------------------|------------------|
| ATP | Authority To |
| / \11 | Prospect |
| ACARP | Australian Coal |
| / (6/ 11 1 | Association |
| | Research |
| | Program |
| ADWG | Australian |
| 1010 | Drinking Water |
| | Guidelines |
| АНП | Australian |
| 7.118 | Height Datum |
| ALS | Australian |
| , AEO | 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 |
| | Svstem |
| 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 |

Horizon Soil Survey & Evaluation



| Abbrovistion/Torm | Description |
|----------------------|-----------------|
| | (formor) |
| DEKIVI | (IUIIIIeI) |
| | Environment |
| | |
| | and Resource |
| | ivianagement |
| 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) |
| FMR | Environmental |
| EIMIX | Management |
| | Dogiotor |
| EDC | Evolution |
| EPC | |
| EDC 1020 | Fermit for Coal |
| EFG 1029 | Exploration |
| | |
| EPM | Exploration |
| F0.4 | |
| ESA | |
| - `` <i>i</i> | 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 |
| Mbal | Meters below |
| | around level |

Horizon Soil Survey & Evaluation



| Abbreviation/Term | Description |
|-------------------|-----------------------------|
| MDI | Mineral |
| MBE | development |
| | licence |
| MIA | Mine Industrial |
| | Area |
| ML | Mining lease – |
| | refers to the |
| | proposed ML |
| | the subject of |
| | this application |
| Mtpa | Mega (1 million) |
| I | 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 |
| 0.5 | the |
| QK | Queensland |
| | Kall |
| QKN | |
| | Rall (QR) |
| | Queeneland |
| QVVQG | Wotor Ouglity |
| | |
| | |
| DE | (DERIVI, 20090) Regional |
| NE | Ecosystem |
| REMD | Receiving |
| | Environment |
| | Monitoring |
| | Program |
| ROM | Run-of-mine |
| RRC | Rockhampton |
| | Regional |
| | Council |
| | Jourion |

| Abbreviation/Term | Description |
|-------------------|-----------------|
| 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



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

🔶 Drain ----- Infrastructure 🚫 Detailed Site 🔶 Rail

8 Reference Site

imes Check Site

(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 Hypernatic Grey and Brown Sodosols Gravelly Clay-loamy Clayey

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🔶 Drair ----- Infrastructure 🔶 Rail

🚫 Detailed Site

imes Check Site

(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

(5) Class C2 - Vertic Hypernatic Grey and Brown Sodosols Gravelly Clay-loamy Clayey



🔶 Rail

imes Check Site





Appendix A

Soil Profile Descriptions



| Project Project Agency | Name: Code: Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 001 O | ND CAPAE | BILITY ID: 1 | | | |
|---|--|---|---|---|---|--|--|---------|
| Site Inf | ormation | | | | | | | |
| Desc. By | y: | I. Hollingsworth 1,2,3 | Locality: | Bar H - imp | proved p | asture, Melon | hole microrelief, | photo |
| Date Des Map Ref Northing Easting/ | sc.: .: g/Long.: 'Lat.: | 08/05/12 GPS S.A. Off 7494590 AMG zone: 55 770230 Datum: GDA94 | Elevation: Rainfall: Runoff: Drainage: | 21 metres 756 No runoff Imperfectly | drained | I | | |
| Geolog Exposur Geol. Re | <u>V</u> reType: ef.: | Soil pit Qa , Alluvium | Conf. Sub. is Pare Substrate Material | nt. Mat.: A : S | Almost c Soil pit, 1 | ertain or certa 1 m deep,Frag | in mental, Bedded, | Porous, |
| | | | | | | | | |
| Land Fo | orm e Class: | Gently undulating plains <9m 1-39 | % | Pattern Ty | pe: | Terraced land | (alluvial) | |
| Morph. 1 Elem. Ty Slope: | Гуре: /pe: | Flat Terrace plain 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 100 degree | es | | | |
| Surface | e Soil Cor | ndition Cracking | | | | | | |
| Erosior | <u>1:</u> No she gully e | eet erosion (sheet) No rill erosion (r rosion (gully) | ill) No /licrorelief: Melonh | ole gilgai | Vert.(m |) 1 Horiz.(n | n) 20 | |
| Soil Cla | assificatio | <u>on</u> | | | | , , , , , , , , , , , , , , , , , , , | | |
| Australia Endohyp | an Soil Cla ersodic Ep erately dee | issification: ipedal Grey Vertosol Non-gravelly p | Mappin Fine Medium Princip Great | ng Unit: bal Profile Fo Soil Group: | orm: | So Ug5.25 Grey clay | | |
| All nece | ssary analy | /tical data are available. | Land 0 | Class: | | Land Class: | C1 | |
| <u>Site</u> | | Complete clearing. Pasture, nativ | ve or improved, but n | ever cultivate | ed | | | |
| Vegetat | tion: | Low Strata - Tussock grass, 0.26 | -0.5m, Closed or der | nse. *Species | s include | es - Chloris ga | yana | |
| | | Tall Strata - Tree, 3.01-6m, Isolat | ted plants. *Species i | includes - Ac | acia ha | rpophylla | | |
| Surface | <u>Coarse</u> | 2-10%, medium gravelly, 6-20mn | n, rounded, Ferricrete | e | | | | |
| Profile | | | | | | | | |
| 1A11 | 0 - 0.1 m | Very dark grey (10YR3/1-Moist); Moderate grade of structure, 20-5 crack; Few (<1 per 0.01m2) mac Subplastic; Moderately sticky; Fie change to - | Mottles, 7.5YR44, 2- 50 mm, Subangular b propores, Moderately ald pH 5.5 (Raupach) | 10% , 0-5mn blocky; Rougl moist; Weak); Common, f | n, Distin h-ped fa c consist fine (1-2 | ict; Fine sandy abric; Medium, tence; Modera mm) roots; Dif | r clay loam; (5 - 10) mm tely plastic; fuse, Smooth | |
| 1A12 | 0.1 - 0.3 m | n Dark greyish brown (10YR4/2-Mc crack; Many (>5 per 100mm2) m Normal plasticity; Moderately sti Field pH 6.5 (Raupach); Many, fi | bist); , 0-0% ; Mediun nacropores, Moderate cky; Very few (0 - 2 % ne (1-2mm) roots; Dif | n clay; Rougł ely moist; Ve 6), Manganife ffuse, Smoot | h-ped fa ry firm c erous, F h chang | bric; Medium, consistence; M fine (0 - 2 mm) le to - | (5 - 10) mm oderately plastic;), Concretions; | |
| 1B1ss | 0.3 - 0.6 m | .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. | | | | | | |
| 1B2 | 0.6 - 0.9 m | Brown (10YR5/3-Moist); , 0-0%; macropores, Moderately moist; S Common cutans, 10-50% of ped roots; Clear, Smooth change to | Clay loam; Earthy fa Strong consistence; S faces or walls coated | bric; Fine, (0 Slightly plasti d, distinct; Fie |) - 5) mn c; Norm eld pH 8 | n crack; Few (< al plasticity; Sl (Raupach); F | <1 per 100mm2) lightly sticky; ew, fine (1-2mm) | |
| 1C1 | 0.9 - 1.5 m | Brown (10YR5/3-Moist); , 0-0% ; macropores, Moderately moist; \ sticky; Soil matrix is Slightly calca | Clay loam; Earthy fa /ery strong consister areous; Field pH 8.5 | bric; Fine, (0 nce; Slightly p (Raupach); |) - 5) mn plastic; I | n crack; Few (• Normal plastici | <1 per 100mm2) ity; Slightly | |
| Morpho | ological N | lotes | | | | | | |
| <u>Obser</u> v | ation Not | iusty root mottles | | | | | | |



Project Name:STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:001Observation ID:1Agency Name:Horizon Soil Survey (NT)

Detailed site, samples 1-5

Site Notes

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

| Project Nan Project Coc Agency Nar | ne: le: ne: | STYX SOUTH COAL PROJECT SO J000019 Site ID: 001 Horizon Soil Survey (NT) | | | | OIL AND LAND CAPABILITY Observation 1 | | | | | |
|--|--------------------------|--|----------|---------|------|--|-----------|-------|-------|--|--|
| Laboratory | Laboratory Test Results: | | | | | | | | | | |
| Depth | pН | 1:5 ECExcha | ingeable | Cations | | | CEC | ESP | CI | | |
| cm | | Ca dS/m | Mg | К | Na | Cm | ol (+)/kg | % | 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 | 208A170* | | | | | | | | | |
| 1.1 - 1.2 | 8.4A | 254A | 2.2* | 3.8 | <0.1 | 1.1 | 7.2* | 15.28 | 200* | | |

| Depth | Organio | c Total | Avail. | Total | Extr. | | 1 | Trace Elements | | | |
|------------------------|---------|--------------------|--------|--------------------|-------|------|-----|----------------|-----------|------|--|
| cm | с % | N P mg/kg mg/kg | | K S mg/kg mg/kg | | Cu | Fe | Mn mg/ | Zn ′kg | В | |
| 0-0.1 02-03 | 0.8D | 1740E | 161J | 290 | 6* | 3.67 | 216 | 140 | 5.8 | <0.2 | |
| 0.5 - 0.6 0.8 - 0.9 | 280E | <2J | 340 | 11* | | | | | | | |
| 1.1 - 1.2 | 160E | <2J | <200 | | | | | | | | |



| Project Na Project Co Agency Na | ame: ode: ame: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 002 | | ND CAP | ABILITY on ID: 7 | , 1 | |
|---|---|---|--|--|---|--|---|---|
| Site Inform Desc. By: Date Desc.: Map Ref.: Northing/Lot Easting/Lat | mation : ong.: t.: | I. Hollingsworth 08/05/12 GPS S.A. Off 7493595 AMG zone: 55 770150 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Bar H, ph 24 metres 756 Very slow Imperfect | oto 4,5,6 s v ly draine | d | |
| ExposureT Geol. Ref.: | ype: | Soil pit Qpa , Alluvium | Conf. Sub. Substrate I | is Pare Material | nt. Mat.: : | Almost Soil pit, | certain or certai 1 m deep,Frag | in mental, Bedded, Porous, |
| Land Forn Rel/Slope C | <u>n</u> Class: | Gently undulating plains <9m 1-39 | % | | Pattern 1 | Гуре: | Terraced land | (alluvial) |
| Morph. Typ Elem. Type Slope: |)e: | Flat Terrace plain 0.5 % | Relief: Slope Cate Aspect: | gory: | 5 metres Level 100 degre | ees | | |
| Surface Se | oil Cor | ndition Cracking | | | | | | |
| Soil Class | ificatio | on N | licrorelief: | Melonh | ole gilgai | Vert.(m | n) 1 Horiz.(n | n) 20 |
| Australian Endohypers fine Modera ASC Confi | Soil Cla odic Ep tely dee dence: | assification: ipedal Grey Vertosol Non-gravelly p | Fine Medium | Mappin Princip Great | ng Unit: bal Profile Soil Group | Form: o: | So Ug5.25 Grey clay | |
| All necessa | ary analy | rtical 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 bathophylla | | | | | | yana | | |
| Surface C | oarse | No surface coarse fragments | | | | | | |
| <u>Profile</u> 1A11 0 - | 0.1 m | Very dark grey (10YR3/1-Moist); structure, 10-20 mm, Subangula (1-5 per 0.01m2) Medium (2-5mr plasticity; Moderately sticky; Field change to - | Mottles, 7.5\ ir blocky; ; ; ; n) macropore d pH 8 (Raup | (R44, 2- Rough- _l es, Mois each); At | 10% , 0-5r oed fabric; ;; Weak co oundant, fir | nm, Disti Coarse, nsistence ne (1-2mr | nct; Clay loam; (10 - 20) mm cr e; Moderately pl m) roots; Diffuse | Strong grade of ack; Common lastic; Normal e, Smooth |
| 1A3 0.1 | 1 - 0.3 m | n Dark greyish brown (10YR4/2-M ; Rough-ped fabric; Medium, (5 Moist; Firm consistence; Very pla Field pH 8 (Raupach); Many, fine | oist); ; Mediui - 10) mm crae astic; Normal e (1-2mm) roo | m clay; I ck; Few plasticit ots; Diffu | Moderate g (<1 per 0.0 y; Very stic ise, Smoot | jrade of s)1m2) Me ky; Soil r h change | structure, 20-50 edium (2-5mm) matrix is Slightly e to - | mm, Lenticular; macropores, y calcareous; |
| 1B2tss 0.3 | 3 - 0.6 m | 3 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 | 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 | 9 - 1.5 m | Brown (10YR5/3-Moist); ; Heavy fabric; Fine, (0 - 5) mm crack; Ma consistence; Very plastic; Norma roots; | clay; Modera any (>5 per 1 I plasticity; V | ate grade 00mm2) ery stick | e of structu Fine (1-2r y; Field p⊢ | re, 20-50 nm) mac I 8.5 (Rai |) mm, Lenticula ropores, Moist; upach); Few, fir | r; Smooth-ped Firm ne (1-2mm) |
| Morpholog | gical N | lotes ant nest at 500 mm | | | | | | |
| Observati | on Not | es | | | | | | |
| Detailed site | e, sampl | les 6-10 | | | | | | |



| Project Name: | STYX SOUT | H COAL PROJ | ECT SC | DIL AND LAND CAPABILITY |
|---------------|-------------|---------------|--------|-------------------------|
| Project Code: | J000019 | Site ID: | 002 | Observation ID: 1 |
| Agency Name: | Horizon Soi | l Survey (NT) | | |

Site Notes

cleared brigalow woodland, REFERENCE SITE, samples 6-10

| Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY | | | | | | | | |
|--|--------|--------------------|-----------------|-----------|--------------------|-------------|-----|-------|
| Project Code | e: | J000019 Horizon | Soil Sur | Site ID: | D: 002 Observation | | 1 | |
| Laboratory | Test l | Results: | Son Su | vey (III) | | | | |
| Depth | рН | 1:5 ECExcl | hangeable Mg | Cations | Na | CEC | ESP | CI |
| cm | | dS/m | wig | ĸ | ina | Cmol (+)/kg | % | 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 | Organic | Total | Avail. | Total | Extr. | | Trace Elements | | | | | | |
|----------------------|---------|------------|------------|------------|------------|----|----------------|-----------|----------|------|--|--|--|
| cm | C % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg/ | Zn kg | В | | | |
| 0 - 0.1 0 2 - 0 3 | 0.5A | 1080E | 10J | 230 | 8* | 2 | 50.7 | 25.5 | <1 | <0.2 | | | |
| 0.5 - 0.6 | 490E | <2J | <200 | 76* | | | | | | | | | |
| 1.1 - 1.2 | 310E | <2J | 240 | 163* | | | | | | | | | |



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 003 | ND LAND (Observ | CAPABILITY vation ID: | Y 1 | |
|---|---|--|---|--|--|---|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 08/05/12 GPS S.A. Off 7493634 AMG zone: 55 770840 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Bar 27 n 756 Very Impe | H, photo 7,8,9 netres ⁷ slow erfectly draine | 9 ed | |
| <u>Geology</u> ExposureType: Geol. Ref.: | Soil pit Qpa , Alluvium | Conf. Sub. Substrate M | is Parent. Ma Aaterial: | at.: Almost Soil pit, | certain or certaiı , 1 m deep,Fragr | n nental, Bedded, Porous, |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Patt | ern Type: | Terraced land (| (alluvial) |
| Morph. Type: Elem. Type: Slope: Surfaco Soil Co | Flat Terrace plain 0.5 % | Relief: Slope Cate Aspect: | 5 m gory: Leve 100 | etres el degrees | | |
| Erosion: | Tidition Cracking | | | | | |
| Soil Classificati | on N | Microrelief: | Melonhole gi | lgai Vert.(r | m) 1 Horiz.(m |) 20 |
| Australian Soil Cl Endohypersodic E fine Moderately de ASC Confidence | assification: pipedal Grey Vertosol Non-gravelly ep : | Fine Medium | Mapping Un Principal Pr Great Soil C | lit: ofile Form: Group: | So Ug5.25 Grey clay | C1 |
| | Complete clearing Desture neti | | | | Lanu Glass. | 01 |
| <u>Site</u> Vegetation: | Tall Strata - Tree, 6.01-12m, Isol | ated plants. * | a, but never a Species inclu | des - Acacia I | harpophylla | |
| Surface Coarse | No surface coarse fragments | · | | | , | |
| <u>Profile</u> 1A11 0 - 0.1 m | Very dark grey (2.5Y3/1-Moist); M structure, 10-20 mm, Subangula 0.01m2) Medium (2-5mm) macro Moderately sticky; Field pH 8 (Ra | Mottles, 7.5YI Ir blocky; ; ; R ppores, Moist; aupach); Com | R44, 10-20% ough-ped fab Weak consis imon, coarse | , 0-5mm, Fair ric; Medium, tence; Moder (>5mm) roots | nt; Clay loam; Mo (5 - 10) mm crac ately plastic; No ;; Diffuse, Wavy | oderate grade of k; Few (<1 per rmal plasticity; change to - |
| 1B21k 0.1 - 0.5 i | n Greyish brown (2.5Y5/2-Moist); , Lenticular; Rough-ped fabric; Me macropores, Moist; Weak consis (0 - 2 %), Calcareous, Fine (0 - 2 roots; Diffuse, Irregular change to | 0-0% ; Light dium, (5 - 10) tence; Moder ? mm), Nodule o - | medium clay;) mm crack; N ately plastic; es; Field pH 8 | Moderate gra lany (>5 per 1 Normal plastic .5 (Raupach); | ade of structure, 100mm2) Mediur city; Moderately ; Common, medi | 20-50 mm, m (2-5mm) sticky; Very few ium (2-5mm) |
| 1B22kss 0.5 - 0.6 i | n Greyish brown (2.5Y5/3-Moist); , Smooth-ped fabric; Fine, (0 - 5) r Moist; Firm consistence; Very pla (0 - 2 mm), Concretions; Soil ma Irregular change to - | 0-0% ; Heav nm crack; Co astic; Subplas atrix is Modera | y clay; Moder mmon (1-5 po stic; Very stick ately calcarec | ate grade of s er 100mm2) F y; Few (2 - 10 us; Field pH 8 | structure, 20-50 r Fine (1-2mm) ma 0 %), Ferromang 8.5 (Raupach); D | mm, Lenticular; icropores, janiferous, Fine Diffuse, |
| 1B3 0.6 - 0.9 i | n Light olive brown (2.5Y5/4-Moist, Smooth-ped fabric; Fine, (0 - 5) r Moist; Very firm consistence; Ver Ferromanganiferous, Fine (0 - 2 (Raupach); |); , 0-0% ; He nm crack; Fe ry plastic; Nor mm), Concre | avy clay; Wea w (<1 per 100 mal plasticity tions; Soil ma | ak grade of str 0mm2) Very fi ; Very sticky; trix is Slightly | ructure, 20-50 m ne (0.075-1mm) Very few (0 - 2 % calcareous; Fiel | m, Lenticular; macropores, %), d pH 9 |
| 1C1 0.9 - 1.2 i | Light olive brown (2.5Y5/4-Moist) Earthy fabric; Fine, (0 - 5) mm craconsistence; Very plastic; Norma (Raupach); |); , 0-0% ; He ack; Few (<1 Il plasticity; Ve | avy clay; Wea per 100mm2 ery sticky; So | ak grade of str) Fine (1-2mm il matrix is Sliq | ructure, 20-50 m ı) macropores, N ghtly calcareous; | m, Lenticular; ⁄loist; Firm ; Field pH 9 |
| Morphological I | Notes | | | | | |
| Observation No | rusty root mottles | | | | | |

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: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 004 | ND LAND CAP/ Observatio | ABILITY on ID: 1 | , I | |
|--|---|---|---|---|---|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: Geology | L I. Hollingsworth 08/05/12 GPS S.A. Off 7493560 AMG zone: 55 771408 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Bar H, ph 26 metres 756 Very slow Imperfect | noto 10-12 s v tly draineo | 2 | |
| ExposureType: Geol. Ref.: | Soil pit Qpa , Alluvium | Conf. Sub. Substrate M | is Parent. Mat.: Material: | Almost o Soil pit, | certain or certaiı 1 m deep,Fragr | n nental, Bedded, Porous, |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern 1 | Гуре: | Terraced land (| (alluvial) |
| Morph. Type: Elem. Type: Slope: Surface Soil Co | Flat Terrace plain 0.5 % ndition Surface crust | Relief: Slope Cate Aspect: | 5 metres gory: Level 100 degro | ees | | |
| Erosion: Soil Classificati | on N | Microrelief: | Melonhole gilgai | Vert.(m | n) 1 Horiz.(m |) 20 |
| Australian Soil Cl Endohypersodic E fine Moderately de ASC Confidence | assification: pipedal Grey Vertosol Non-gravelly ep | Fine Medium | Mapping Unit: Principal Profile Great Soil Group | Form: p: | So Ug5.25 Grey clay | ~ |
| Analytical data are | Complete but reasonable confide | ence. | Land Class: | atad | Land Class: | C1 |
| Vegetation: | Tall Strata Tree 6.01.12m Isol | ated plants * | | | arpophylla Cas | suarina cristata |
| Surface Coarse | No surface coarse fragments | aleu plants. | opecies includes - | | arpopriyila, Cas | Suanna Chstata |
| Profile 1A11 0 - 0.1 m | Very dark grey (10YR3/1-Moist); blocky; ; Rough-ped fabric; Coars macropores, Moderately moist; V Field pH 7.5 (Raupach); Abundar | , 0-0% ; Clay se, (10 - 20) r Veak consiste nt, fine (1-2m | v loam; Strong grad mm crack; Commo ence; Moderately p m) roots; Diffuse, \$ | de of struc on (1-5 pe olastic; Su Smooth cl | cture, 10-20 mm r 0.01m2) Medii bplastic; Moder hange to - | n, Subangular um (2-5mm) ately sticky; |
| 1B1 0.1 - 0.3 i | m Dark greyish brown (10YR4/2-Mc Subangular blocky; Moderate gra 10) mm crack; Many (>5 per 100 plastic; Normal plasticity; Very st is Moderately calcareous; Field | oist); , 0-0% ; ade of structu mm2) Mediur icky; Few cut pH 8 (Raupad | Light clay; Modera re, 20-50 mm, Len m (2-5mm) macrop ans, <10% of ped t ch); Many, fine (1-2 | ate grade iticular; Re pores, Mo faces or v 2mm) root | of structure, 20 ough-ped fabric ist; Firm consist valls coated, dis ts; Diffuse, Wav | -50 mm, ;; Medium, (5 - tence; Very stinct; Soil matrix ry change to - |
| 1B2kss 0.3 - 0.6 (| n Brown (10YR4/3-Moist); , 0-0% ; Smooth-ped fabric; Fine, (0 - 5) Moist; Firm consistence; Very pla faces or walls coated, distinct; So 2mm) roots; Diffuse, Irregular cha | Medium hea mm crack; Co astic; Normal bil matrix is S ange to - | vy clay; Moderate g ommon (1-5 per 10 plasticity; Very stic lightly calcareous; | grade of s 00mm2) F cky; Comr Field pH | structure, 20-50 ïine (1-2mm) ma non cutans, 10- 9 (Raupach); Fe | mm, Lenticular; acropores, 50% of ped ew, fine (1- |
| 1B3ss 0.6 - 0.9 i | m Brown (10YR4/3-Moist); , 0-0%; Smooth-ped fabric; Medium, (5 - Moist; Firm consistence; Very pla faces or walls coated, distinct; So 2mm) roots; | Heavy clay; 10) mm crac astic; Normal pil matrix is M | Moderate grade of k; Common (1-5 pe plasticity; Very stic loderately calcareo | structure er 100mm cky; Comr ous; Field | , 20-50 mm, Le n2) Fine (1-2mm non cutans, 10- pH 9 (Raupach | nticular; n) macropores, -50% of ped); Few, fine (1- |
| 1C1 0.9 - 1.2 i | n Brown (10YR4/3-Moist); , 0-0%; fabric; Fine, (0 - 5) mm crack; Fe consistence; Very plastic; Norma distinct; Soil matrix is Slightly cal | Heavy clay; w (<1 per 100 Il plasticity; Vo careous; Field | Weak grade of stru 0mm2) Fine (1-2m ery sticky; Few cut d pH 9 (Raupach); | ucture, 20 m) macro ans, <109 | -50 mm, Lenticu pores, Moist; V % of ped faces o | ular; Rough-ped ery firm or walls coated, |
| Morphological I | <u>Notes</u> . <u>tes</u> | | | | | |



| Project Na Project Co Agency Na | me: de: me: | STYX SOL J000019 Horizon S | JTH CO oil Surv | AL PROJ Site ID: vey (NT) | ECT S 004 | OIL AN | D LANI Obs | O CAPAB ervation I | ILITY D: 1 | |
|---------------------------------------|--------------------|----------------------------------|--------------------|---------------------------------|--------------|-----------|---------------|-----------------------|---------------|---------------|
| Detailed site, | sample | es 11-15 | | | | | | | | |
| <u>Site Notes</u> samples 11-1 | l5; cleai | red brigalow | belah wo | odland, bro | wn cra | cking cla | y, melon | hole micror | elief, R | EFERENCE SITE |
| Project Na Project Co Agency Na | me: de: ime: | STYX SOL J000019 Horizon S | JTH CO oil Surv | AL PROJ Site ID: vey (NT) | ECT S 004 | OIL AN | D LANI Obs | O CAPAB ervation | ility 1 | |
| Laboratory | Test | Results: | | | | | | | | |
| Depth | рН | 1:5 ECExcha | ngeable (| Cations | Na | | CEC | ESP | C | |
| cm | | dS/m | Mg | ĸ | Na | Cmo | l (+)/kg | % | mç | g/kg |
| 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' | k | | | | | | | |
| 1.1 - 1.2 | 8.6A | 1660A2390* | k | | | | | | | |
| | | | | | | | | | | |

| Depth cm | Organi | c Total Avail. N P mg/kg mg/kg | al Avail. | Total K mg/kg | l Extr. S g mg/kg | | Trace Elements | | | | | | |
|---|--------|--------------------------------------|------------|---------------------|-------------------------|------|----------------|-----------|-----------|------|--|--|--|
| | с % | | P mg/kg | | | Cu | Fe | Mn mga | Zn /kg | В | | | |
| 0 - 0.1 0.2 - 0.3 0.5 - 0.6 0.8 - 0.9 1.1 - 1.2 | 1.2A | 2050E | 52J | 380 | 8* | 3.51 | 116 | 84.7 | 1.77 | <0.2 | | | |



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | CT SOIL AND LA 005 O | ND CAPA bservatio | ABILITY n ID: | Ү 1 | | | |
|---|--|---|---|--|---|---|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 08/05/12 GPS S.A. Off 7493541 AMG zone: 55 771909 Datum: GDA94 | Locality:Melonhole rElevation:25 metresRainfall:756Runoff:Very slowDrainage:Imperfectly | | e microre s ly draine | elief, Bar H, phot d | o 13,14,15 | | |
| ExposureType: Geol. Ref.: | Soil pit Qpa , Alluvium | Conf. Sub. is Parent. Mat.: Almost c Substrate Material: Soil pit, 7 | | | certain or certain , 1 m deep,Fragmental, Bedded, Porous | | | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-39 | % | Pattern T | уре: | Terraced land (| alluvial) | | |
| Morph. Type: Elem. Type: Slope: Surface Soil Co | Flat Terrace plain 0.5 % ndition Surface crust | Relief: Slope Category: Aspect: | 5 metres Level 100 degre | ees | | | | |
| Erosion: | | | | | | | | |
| Soil Classificati Australian Soil Cl Endohypersodic E | on M assification: pipedal Grey Vertosol Non-gravelly | Aicrorelief: Melonh Mappi Fine Medium Princij Groat | nole gilgai ng Unit: pal Profile Soil Groun | Vert.(n | n) 1 Horiz.(m So Ug5.25 Grev clav |) 20 | | |
| ASC Confidence No analytical data | ep : are available but confidence is fair. | Land | Class: | | Land Class: | C1 | | |
| <u>Site</u> | Complete clearing. Pasture, nativ | ve or improved, but n | ever cultiva | ated | | | | |
| <u>Vegetation:</u> Surface Coarse | Tall Strata - Tree, 6.01-12m, Isola No surface coarse fragments | ated plants. *Species | s includes - | Acacia ł | harpophylla, Cas | uarina cristata | | |
| 1A1 0 - 0.1 m | Very dark grey (10YR3/1-Moist); blocky; ; Rough-ped fabric; Coars macropores, Moist; Weak consis 7.5 (Raupach); Many, fine (1-2m | , 0-0% ; Clay loam; s se, (10 - 20) mm crad tence; Moderately pl m) roots; Clear, Wav | Strong grad ck; Commo astic; Norm y change to | le of stru n (1-5 pe al plastic) - | icture, 10-20 mm er 0.01m2) Mediu city; Moderately s | ı, Subangular ım (2-5mm) sticky; Field pH | | |
| 1B1 0.1 - 0.3 i | n Very dark greyish brown (10YR3, Lenticular; Rough-ped fabric; Co- macropores, Moist; Weak consis 50% of ped faces or walls coated Irregular change to - | /2-Moist); , 0-0% ; Liq arse, (10 - 20) mm ci tence; Very plastic; N I, distinct; Field pH 8 | ght clay; Sti rack; Few (• lormal plas (Raupach); | rong gra <1 per 0 ticity; Ve ; Many, f | de of structure, 1 .01m2) Medium (ery sticky; Comm fine (1-2mm) roo | 0-20 mm, (2-5mm) on cutans, 10- ts; Diffuse, | | |
| 1B2kss 0.3 - 0.5 i | n Dark greyish brown (2.5Y4/2-Moi Lenticular; Smooth-ped fabric; M macropores, Moist; Firm consiste 50% of ped faces or walls coated Common, fine (1-2mm) roots; Dif | ist); , 0-0% ; Medium edium, (5 - 10)mm c ence; Very plastic; No I, distinct; Soil matrix fuse, Irregular chang | clay; Stron crack; crach ormal plasti is Slightly o ge to - | g grade k; Many city; Ver calcareo | of structure, 20-{ (>5 per 100mm2 y sticky; Commo us; Field pH 9 (F | 50mm,) Fine (1-2mm) n cutans, 10- Raupach); | | |
| 1B3kss 0.5 - 0.9 i | n Dark greyish brown (2.5Y4/3-Moi Lenticular; Smooth-ped fabric; Fi macropores, Moist; Firm consiste ped faces or walls coated, distinct fine (1-2mm) roots; | ist); , 0-0% ; Medium ne, (0 - 5) mm crack; ence; Very plastic; No et; Soil matrix is Sligh | heavy clay Many (>5 ormal plasti tly calcared | r; Strong per 100r city; Ver ous; Field | grade of structur nm2) Fine (1-2m y sticky; Many cu d pH 9 (Raupach | re, 20-50 mm, m) utans, >50% of ı); Common, | | |
| 1C1 0.9 - 1.2 i | n Olive brown (2.5Y4/4-Moist); , 0- Lenticular; Smooth-ped fabric; Fi macropores, Moist; Firm consiste cutans, 10-50% of ped faces or v | 0% ; Medium heavy ne, (0 - 5) mm crack ence; Moderately pla valls coated, distinct; | clay; Strong ; Few (<1 p stic; Norma Field pH 9 | g grade o er 100m I plastici (Raupao | of structure, 20-5 m2) Very fine (0. ty; Moderately st ch); | 0 mm, 075-1mm) icky; Common | | |
| Morphological I | <u>Notes</u> | | | | | | | |

Observation Notes

Check site, similar to site 002, not sampled

<u>Site Notes</u>cleared brigalow woodland, brown cracking clay, melonhole microrelief, DETAILED SITE



| Project Project Agency | Name: Code: Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | CT SOIL AI 006 | ND LAI Ot | ND CAPA oservation | BILITY n ID: / | (1 | | |
|--|--|--|---|---|--|---|--|---|------------|
| Site Info Desc. By Date Des Map Ref Northing Easting/ | ormation /: sc.: .: g/Long.: Lat.: | I. Hollingsworth 08/05/12 GPS S.A. Off 7493673 AMG zone: 55 772399 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Bar H, pho 24 metres 756 Very slow Imperfectl | oto 16,1 y draine | 7,18 d | | |
| <u>Geolog</u> Exposur Geol. Re | <u>V</u> eType: f.: | Soil pit Qpa , Alluvium | Conf. Sub. i Substrate M | s Paren laterial: | t. Mat.: | Almost Soil pit, | certain or certain 1 m deep,Fragr | n nental, Beddeo | d, Porous, |
| <u>Land Fo</u> Rel/Slop | orm e Class: | Gently undulating plains <9m 1-3% | 6 | | Pattern T | ype: | Terraced land (| (alluvial) | |
| Morph. 1 Elem. Ty Slope: | Type: vpe: | Flat Terrace plain 0.5 % | Relief: Slope Cateo Aspect: | gory: | 5 metres Level 100 degre | es | | | |
| Surface | Soll Col | Self-mulching | | | | | | | |
| Soil Cla | <u>i:</u> Issificatio | <u>on</u> N | licrorelief: | Melonho | ole gilgai | Vert.(n | n) 1 Horiz.(m |) 20 | |
| Australia Endohyp fine Mode ASC Co Analytica | an Soil Cla ersodic Ep erately dee nfidence: al data are | i ssification: ipedal Grey Vertosol Non-gravelly p incomplete but reasonable confide | Fine Medium nce. | Mappin Princip Great S Land C | g Unit: al Profile I Soil Group lass: | Form: : | So Ug5.25 Grey clay Land Class: | C1 | |
| Site | | Complete clearing. Pasture, nativ | e or improved | d, but ne | ever cultiva | ted | | | |
| <u>Vegetat</u> Surface | <u>ion:</u> Coarse | Tall Strata - Tree, 6.01-12m, Isola No surface coarse fragments | ated plants. *S | Species | includes | Acacia h | narpophylla, Cas | suarina cristata | |
| <u>Profile</u> 1A11 | 0 - 0.1 m | Very dark grey (10YR3/1-Moist); blocky; Rough-ped fabric; Coarse macropores, Moist; Weak consist 7.5 (Raupach); Many, fine (1-2mr | , 0-0% ; Clay e, (10 - 20) mr ience; Modera m) roots; Clea | loam; S n crack; ately pla ir, Tongi | trong grade Common stic; Norma ued change | e of stru (1-5 per al plastic e to - | cture, 10-20 mm 0.01m2) Mediu city; Moderately | n, Subangular m (2-5mm) sticky; Field pł | 1 |
| 1A12 | 0.1 - 0.3 m | Very dark greyish brown (10YR3/ Lenticular; Smooth-ped fabric; Comacropores, Moist; Firm consister >50% of ped faces or walls coater Many, fine (1-2mm) roots; Diffuser | (2-Moist); , 0-(parse, (10 - 20 ence; Very pla ed, distinct; Sc e, Irregular che | 0% ; Silt 0) mm c stic; No bil matrix ange to | y clay loan rack; Few (rmal plastic (is Slightly - | n; Strong <1 per (city; Moo calcare | g grade of struct 0.01m2) Medium derately sticky; N ous; Field pH 8 | ure, 20-50mm n (2-5mm) ⁄Iany cutans, (Raupach); | , |
| 1B2kss | 0.3 - 0.5 m | Dark greyish brown (2.5Y4/2-Moi Lenticular; Smooth-ped fabric; Mu macropores, Moist; Firm consiste ped faces or walls coated, distinct fine (1-2mm) roots; Diffuse, Irregu | st); , 0-0% ; M edium, (5 - 10 ence; Very pla t; Soil matrix i ular change to | /ledium () mm cr stic; No is Slight o - | clay; Strong ack; Many rmal plastic ly calcareo | g grade (>5 per city; Very us; Field | of structure, 20- 100mm2) Fine (y sticky; Many c d pH 9 (Raupach | 50 mm, (1-2mm) utans, >50% of ı); Common, | f |
| 1B3ss | 0.5 - 0.9 m | Dark greyish brown (2.5Y4/3-Moi Lenticular; Smooth-ped fabric; Fii macropores, Moist; Firm consiste ped faces or walls coated, distinct fine (0-1mm) roots; Diffuse, Wavy | st); , 0-0% ; M ne, (0 - 5) mm nce; Very pla t; Soil matrix i / change to - | ledium l n crack; stic; No is Slight | heavy clay; Many (>5 p rmal plastic ly calcareo | ; Strong ber 100n city; Very us; Field | grade of structu nm2) Fine (1-2m y sticky; Many c d pH 9 (Raupact | ודפ, 20-50 mm, וזה) utans, >50% of ו); Few, very | f |
| 1C1 | 0.9 - 1.2 m | Olive brown (2.5Y4/4-Moist); , 0-1 Lenticular; Smooth-ped fabric; Fin macropores, Moist; Very firm con >50% of ped faces or walls coate | 0% ; Medium ne, (0 - 5) mm sistence; Ver d, distinct; Sc | heavy c i crack; y plastic pil matrix | lay; Strong Few (<1 pe ; Normal p ; is Slightly | grade c er 100mi lasticity; calcare | of structure, 20-5 m2) Very fine (0 Very sticky; Ma ous; Field pH 9 | 50 mm, .075-1mm) iny cutans, (Raupach); | |
| Observ | ation Not | ies Inled | | | | | | | |
| CHECK SI | ie, not sam | ipieu | | | | | | | |

Site Notes

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



| Project N Project C Agency I | Name: Code: Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | CT SOIL A 007 | ND LAI Ob | ND CAPA servatio | BILITY n ID: 1 | | | | | |
|--|--|--|---|--|--|--|--|--------------------------------------|---|---------------|--|
| Site Infor Desc. By: Date Desc Map Ref.: Northing/I Easting/La Geology | rmation c.: 0 (Long.: 7 at.: 7 | . Hollingsworth)8/05/12 GPS S.A. Off /493721 AMG zone: 55 /73070 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Bar H, pho 19 metres 756 Very slow Moderatel | oto 28-30 y well dra | 0 rained | | | | |
| Exposure Geol. Ref. | Type: 3 | Soil pit Qa , Alluvium | Conf. Sub. i Substrate M | is Paren Iaterial: | t. Mat.: | Almost c Soil pit, 1 | ertain 1 m de | or certai ep,Fragi | in mental, Bec | lded, Porous, | |
| <u>Land For</u> Rel/Slope | r <u>m</u> Class: (| Gently undulating plains <9m 1-3% | 6 | | Pattern T | ype: | Flood | plain | | | |
| Morph. Ty Elem. Typ Slope: | /pe: be: (| Flat Backplain 0.5 % | Relief: Slope Cates Aspect: | gory: | 5 metres Level 100 degre | es | | | | | |
| Surface S | Soil Con | dition Firm | | | | | | | | | |
| Erosion: Soil Clas | sificatio | n N microrelief | licrorelief: | Zero or | no | Vert.(m |) | Horiz.(m | ו) | | |
| Australian Basic Gre Moderately ASC Con | n Soil Cla ey-Orthic T y deep fidence: | ssification: enosol Medium Non-gravelly Silty Great Soil Group: tical data are available | Silty | Mappin Principa Alluvia | g Unit: al Profile I I soil Iass: | Form: | Sx Um5. | 52 Class: | Δ | | |
| 0:4a | bary analy | | | | | 4I | Lana | eluce. | | | |
| <u>Site</u> Vegetatio | on. | Complete clearing. Pasture, nativ | e or improve | a, but ne | ver cultiva | ted | | | | | |
| | <u></u> | Tall Strata - Tree, 20.01-35m, Iso | lated plants. | *Species | s includes - | - Eucalyp | otus sp | ecies | | | |
| Surface (| <u>Coarse</u> | No surface coarse fragments | | | | | | | | | |
| Profile | | | | | | | | | | | |
| 1A11 0 |) - 0.1 m | Dark grey (10YR4/1-Moist); , 0-0 Rough-ped fabric; Fine, (0 - 5) m Moderately moist; Weak consiste (Raupach); Many, fine (1-2mm) ro | % ; Silty loam m crack; Cor nce; Slightly pots; Diffuse, | n; Strong mmon (1 plastic; N Wavy cl | grade of s -5 per 0.01 Normal plas nange to - | tructure, m2) Fine sticity; Sli | 10-20 e (1-2n ightly s | mm, Sul nm) mac sticky; Fi | bangular blo ropores, eld pH 6.5 | ocky; | |
| 1A12 0 |).1 - 0.3 m | Dark greyish brown (10YR4/2-Mo Subangular blocky; Rough-ped fa macropores, Moderately moist; Fi pH 7 (Raupach); Many, fine (1-2n | iist); , 0-0% ; ıbric; Fine, (0 irm consisten nm) roots; Dit | Silty loan - 5) mm nce; Sligh ffuse, Wa | m; Strong g crack; Con ntly plastic; avy change | grade of s mmon (1- Normal e to - | structu -5 per plastic | ıre, 10-20 0.01m2) ity; Sligh | 0 mm,) Fine (1-2m itly sticky; F | ım) ield | |
| 1B2w 0 | 0.3 - 0.6 m | Dark yellowish brown (10YR4/4-M Subangular blocky; Rough-ped fa macropores, Moderately moist; Fi pH 7.5 (Raupach); Common, fine | Aoist); , 0-0% bric; Fine, (0 irm consisten (1-2mm) roo | ; Silty lo - 5) mm nce; Sligh nts; Diffus | am; Mode crack; Co ntly plastic; se, Wavy c | rate grad mmon (1- Normal hange to | le of st -5 per plastic | ructure, 0.01m2) ity; Sligh | 10-20 mm,) Fine (1-2m itly sticky; F | im) ield | |
| 1C1 0 |).6 - 0.9 m | Dark yellowish brown (10YR4/4-N Subangular blocky; Earthy fabric; macropores, Moderately moist; Fi pH 7.5 (Raupach); Common, fine | /loist); , 0-0% Fine, (0 - 5) irm consisten (1-2mm) roo | ; Silty Ic mm crac nce; Sligh nts; Diffus | am; Mode k; Commo ntly plastic; se, Tongue | rate grad n (1-5 pe Normal d change | le of st er 0.01 plastic e to - | ructure, m2) Fine ity; Sligh | 10-20 mm, e (1-2mm) ttly sticky; F | ield | |
| 1C2 0 |).9 - 1.2 m | Dark yellowish brown (10YR4/4-M Subangular blocky; Earthy fabric; macropores, Moderately moist; Fi pH 7.5 (Raupach); Common, fine | Noist); , 0-0% Fine, (0 - 5) irm consisten (1-2mm) roo | ; Silty Ic mm crac nce; Sligh nts; | am; Weak k; Commo ntly plastic; | grade of n (1-5 pe Normal | f struct er 0.01 plastic | ture, 10-2 m2) Fine ity; Sligh | 20 mm, e (1-2mm) ttly sticky; F | ield | |
| <u>Morphol</u> | ogical N | <u>otes</u> | | | | | | | | | |
| Detailed si | ite sample | <u>es</u> 25 16 20 | | | | | | | | | |

Detailed site, samples 16-20

Site Notes

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

| Agency Na | me: F | lorizon S | Soil Sur | vey (NT) | 007 | | Obs | ervation | 1 |
|------------|--------|-----------|----------|----------|-----|------|-----------|----------|-------|
| Laboratory | Test R | esults: | | | | | | | |
| Depth | pH 1 | :5 ECExch | angeable | Cations | Na | | CEC | ESP | CI |
| cm | | dS/m | Ng | ĸ | INa | Cm | ol (+)/kg | % | 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* |

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY Project Code: J000019 Site ID: 007 Observation 1

| Depth | Organic | c Total | Avail. | Total | Extr. | | Trace Elements | | | | | | |
|------------------------|---------|------------|------------|------------|------------|------|----------------|-----------|----------|------|--|--|--|
| cm | С % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg/ | Zn kg | в | | | |
| 0-0.1 02-03 | 1A | 1960E | 120J | 880 | 6* | 3.03 | 196 | 102 | 4.21 | <0.2 | | | |
| 0.5 - 0.6 0.8 - 0.9 | 480E | 22J | <200 | 3* | | | | | | | | | |
| 1.1 - 1.2 | 470E | 21J | <200 | 30* | | | | | | | | | |



| Project I Project (Agency | Name: Code: Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 008 | ND LA O | ND CAPA | ABILITY on ID: 1 | r 1 | | | |
|---|---|---|---|---|--|--|--|---|---|--------------------------------|
| Site Info Desc. By: Date Desc Map Ref.: Northing/ Easting/L Geology | ormation : c.: : /Long.: ₋at.: | I. Hollingsworth 08/05/12 GPS S.A. Off 7492815 AMG zone: 55 772632 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Bar H, ph 22 metres 756 Very slow Imperfect | oto 22-24 s / ly drained | 4 d | | | |
| Exposure Geol. Ref | eType: f.: | Soil pit Qpa , Alluvium | Conf. Sub. Substrate M | is Pare Naterial | nt. Mat.: : | Almost o Soil pit, | certain 1 m de | or certair ep ,Fragi | n mental, Be | dded, Porous, |
| <u>Land Fo</u> Rel/Slope | e <u>rm</u> e Class: | Gently undulating plains <9m 1-3 | % | | Pattern T | ype: | Terrac | ed land (| alluvial) | |
| Morph. Ty Elem. Typ Slope: <u>Surface</u> | ype: pe: <u>Soil Co</u> | Flat Terrace plain 0.5 % ndition Firm | Relief: Slope Cate Aspect: | gory: | 5 metres Level 100 degre | ees | | | | |
| Soil Clas | <u>:</u> ssificatio | on I microrelief | Microrelief: | Zero or | no | Vert.(m | n) | Horiz.(m |) | |
| Australian Basic Gree Moderatel ASC Con | n Soil Cla ey-Orthic ly deep nfidence: | assification: Tenosol Medium Non-gravelly Silty Great Soil Group: | r Silty | Mappin Princip Alluvia | ng Unit: Dal Profile al soil | Form: | BI Um5 | .52 Classy | ٨ | |
| All neces: | sary anai | Complete clearing. Pasture, nativ | ve or improve | ed, but n | ever cultiva | ated | Land | Class: | A | |
| <u>Vegetati</u> Surface | ion: Coarse | Tall Strata - Tree, 20.01-35m, Iso No surface coarse fragments | olated plants. | *Specie | es includes | - Eucaly | ptus sp | ecies | | |
| <u>Profile</u> 1A11 (| 0 - 0.1 m | Very dark grey (10YR3/1-Moist); blocky; Moderate grade of struc Subangular blocky; Rough-ped macropores, Moderately moist; F pH 5.5 (Raupach); Abundant, me | , 0-0% ; Silty ture, 10-20 m fabric; Mediur Firm consister edium (2-5mn | r Ioam; N m, Suba m, (5 - 1 nce; Slig n) roots; | Aoderate gr angular blo 0) mm crao htly plastic Diffuse, W | rade of st cky; Wea ck; Few (; Normal /avy char | tructure ak grad <1 per plastic nge to | e, 10-20 n e of struc 0.01m2) sity; Slight | nm, Suban ture, 50-10 Fine (1-2m tly sticky; F | gular 10 mm, im) ield |
| 1A12 (| 0.1 - 0.3 n | n Very dark grey (10YR3/1-Moist); Rough-ped fabric; Fine, (0 - 5) m moist; Firm consistence; Slightly Abundant, medium (2-5mm) root | , 0-0% ; Silty im crack; Few plastic; Norm ts; Diffuse, Wa | v loam; V v (<1 pe nal plast avy cha | Veak grade r 0.01m2) F icity; Slight nge to - | e of struct Fine (1-2i ly sticky; | ture, 50 mm) m Field p |)-100 mm acropores bH 5.5 (Ra | n, Prismatic s, Moderate aupach); | ;; ely |
| 1B2t (| 0.3 - 0.6 n | n Very dark greyish brown (10YR3 Subangular blocky; Earthy fabric macropores, Moist; Very firm cor Slightly calcareous; Field pH 8 (| a/2-Moist); , 0- ;; Fine, (0 - 5) nsistence; Slig Raupach); Ma | -0% ; Sil mm cra ghtly pla any, fine | lty clay loar ick; Many (i istic; Norma e (1-2mm) r | m; Weak >5 per 10 al plastici roots; Diff | grade 00mm2 ity; Slig fuse, V | of structu ?) Fine (1- htly sticky /avy char | re, 50-100 -2mm) y; Soil matr nge to - | mm, ix is |
| 1B3 (| 0.6 - 0.9 n | n Very dark greyish brown (10YR3 Subangular blocky; Earthy fabric macropores, Moist; Very firm cor (Raupach); Few, fine (1-2mm) ro | /2-Moist); , 0- ;; Fine, (0 - 5) nsistence; Sliq pots; Diffuse, V | -0% ; Sil mm cra ghtly pla Wavy cł | Ity clay loar ick; Many (i istic; Norma nange to - | n; Weak >5 per 10 al plastici | grade 00mm2 ity; Slig | of structu !) Fine (1- htly sticky | re, 50-100 -2mm) y; Field pH | mm, 8 |
| 1C1 (| 0.9 - 1.2 n | n Dark brown (10YR3/3-Moist); , 0 blocky; Earthy fabric; Fine, (0 - 5 macropores, Moist; Very firm cor (Raupach); Few, fine (1-2mm) ro | -0% ; Silty cla) mm crack; (nsistence; Slig pots; | ay loam; Commor ghtly pla | Weak grac n (1-5 per 1 stic; Norma | de of stru 00mm2) al plastici | icture, Very f ity; Slig | 50-100 m ine (0.075 htly sticky | m, Subang 5-1mm) y; Field pH | ular 8 |
| Morphol | logical No | <u>lotes</u> tes | | | | | | | | |
| Detailed s | site, samp | les 21-25 | | | | | | | | |



| Project Name: | STYX SOUTH | COAL PROJ | ECT SOIL AND | LAND CAPABILI | ΓY |
|---------------|----------------|------------|--------------|-----------------|----|
| Project Code: | J000019 | Site ID: | 008 | Observation ID: | 1 |
| Agency Name: | Horizon Soil S | urvey (NT) | | | |

Site Notes

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

| Project Name: | STYX SOL | JTH COAL PROJ | ECT SOI | L AND LAND CAPABILI | ΓY |
|-----------------|-----------|-----------------|---------|---------------------|----|
| Project Code: | J000019 | Site ID: | 008 | Observation | 1 |
| Agency Name: | Horizon S | oil Survey (NT) | | | |
| Laboratory Test | Results: | | | | |

| Depth | pH 1: | 5 ECExch | angeable | Cations | ĸ | Na | CEC | ESP | CI |
|-----------|-------|----------|----------|---------|-----|------|-----------|------|-------|
| Cm | | µS/cm | Ca | wig | n | Cm | ol (+)/kg | % | mg/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 | Organ | ic Total | Avail. | Total | Extr. | | | Trace Elen | nents | |
|------------------------|--------|------------|------------|------------|------------|------|-----|------------|-----------|------|
| cm | С % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg/ | Zn ′kg | В |
| 0 - 0.1 0 2 - 0 3 | 0.8A | 1860E | 41J | 560 | 8* | 1.86 | 210 | 225 | 9.74 | <0.2 |
| 0.5 - 0.6 0.8 - 0.9 | | 540E | 2J | <200 | 3* | | | | | |
| 1.1 - 1.2 | | 270E | 6J | <200 | 54* | | | | | |



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 009 | ND LA Ol | ND CAPA oservatio | ABILITY n ID: 1 | , 1 | | | |
|---|--|---|---|--|--|--|--|--|----------------------|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | L I. Hollingsworth 08/05/12 GPS S.A. Off 7491948 AMG zone: 55 772287 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | ocality:Bar H, photos 29-31evation:26 metresainfall:756unoff:Very slowrainage:Imperfectly drained | | | | | | |
| ExposureType: Geol. Ref.: | Soil pit Qpa , Alluvium | Conf. Sub. Substrate M | is Parer Aaterial: | nt. Mat.: | Almost o Soil pit, | certain 1 m de | or certai ep,Fragi | n mental, Bo | edded, Porous, |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | | Pattern T | уре: | Terrac | ed land | (alluvial) | |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Cate Aspect: | gory: | 5 metres Level 100 degre | es | | | | |
| Erosion: | ndition Surface crust | | | | | | | | |
| Soil Classificati | on I | Microrelief: | Melonh | ole gilgai | Vert.(m | n) 1 | Horiz.(m | n) 20 | |
| Australian Soil Cl Endohypersodic E fine Moderately de ASC Confidence | assification: bipedal Grey Vertosol Non-gravelly ep | Fine Medium | Mappir Princip Great \$ | ig Unit: al Profile Soil Group | Form:): | BI Ug5.2 Grey | 25 clay | | |
| Analytical data are | e incomplete but reasonable confide | ence. | Land C | lass: | | Land | Class: | A | |
| <u>Site</u> Vegetation: | Complete clearing. Pasture, nativ | ve or improve ated plants. * | d, but ne Species | ever cultiva includes - | ited Acacia h | arpoph | ylla | | |
| Surface Coarse | No surface coarse fragments | | | | | | | | |
| <u>Profile</u> 1A1 0 - 0.1 m | Very dark grey (2.5Y3/1-Moist); , blocky; Rough-ped fabric; Very c macropores, Moist; Weak consis (Raupach); Many, fine (1-2mm) r | , 0-0% ; Clay coarse, (20 - 5 stence; Very p roots; Diffuse, | loam; St i0) mm c lastic; N Wavy c | rong grade rack; Com ormal plas hange to - | e of struct mon (1-5 ticity; Mo | ture, 10 5 per 0. oderatel | 0-20 mm 01m2) M y sticky; | , Subangı ledium (2 Field pH | ular -5mm) 8 |
| 1B1 0.1 - 0.3 i | n Very dark grey (2.5Y3/1-Moist); , Subangular blocky; Rough-ped f Medium (2-5mm) macropores, M matrix is Slightly calcareous; Fiel change to - | , 0-0% ; Light abric; Very co loist; Weak co ld pH 8.5 (Rai | medium barse, (2 bnsisten upach); | clay; Mod 0 - 50) mm ce; Very pl Many, fine | erate gra crack; C astic; No (1-2mm) | ide of s Commo rmal pl) roots; | tructure, n (1-5 pe asticity; ['] Diffuse, | 20-50 mi er 0.01m2 Very stick Irregular | n,) y; Soil |
| 1B2kss 0.3 - 0.6 i | n Very dark greyish brown (2.5Y3/: Lenticular; Smooth-ped fabric; C macropores, Moist; Firm consiste calcareous; Field pH 8.5 (Raupa | 2-Moist); , 0-0 oarse, (10 - 2 ence; Very pla ch); Common | 0% ; Hea 0) mm c astic; No , fine (1- | ivy clay; M rack; Few rmal plasti 2mm) root | oderate ((<1 per 0 city; Very s; Diffuse | grade o).01m2 / sticky e, Irreg | f structu) Mediun ; Soil ma ular chai | re, 20-50 n (2-5mm atrix is Slig nge to - | mm,) jhtly |
| 1B3kss 0.6 - 0.9 i | n Greyish brown (2.5Y5/3-Moist); , Smooth-ped fabric; Coarse, (10 Moist; Firm consistence; Very pla Field pH 9 (Raupach); Few, coar | 0-0% ; Heavy - 20) mm crac astic; Normal rse (>5mm) rc | y clay; M k; Many plasticity oots; Diff | loderate gi (>5 per 10 /; Very stic use, Irregu | rade of st)0mm2) I ky; Soil r lar chang | tructure Fine (1- natrix is ge to - | e, 20-50 -2mm) m s Slightly | mm, Lenti nacropore / calcareo | icular; s, us; |
| 1C1k 0.9 - 1.2 i | 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 I | Notes | | | | | | | | |
| Observation No Check site, flat on | tes undulating terrace plain, not sampl | ed | | | | | | | |

Site Notes

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



| Project Project Agency | Name: Code: Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | CT SOIL AND 010 | LAND CAPABIL Observation ID | ITY : 1 |
|--|--|---|--|--|--|
| Site Info | ormation | 11 W 0 | | | |
| Desc. By | ': I | . Hollingsworth 008 | Locality: | Bar H, photos | 43,44, same as site |
| Date Des Map Ref. Northing Easting/I | sc.: (: (/Long.:) Lat.: | 08/05/12 GPS S.A. Off 7489673 AMG zone: 55 771493 Datum: GDA94 | Elevation: Rainfall: Runoff: Drainage: | 35 metres 756 Slow Poorly drained | |
| Exposure Geol. Ref | <u>v</u> eType: f.: | Auger boring Qpa Porous, , Alluvium | Conf. Sub. is P Substrate Mate | arent. Mat.: Almo rial: Aug | ost certain or certain er boring, 1 m deep,Fragmental, Bedded, |
| Land Fo Rel/Slope | orm e Class: | Gently undulating plains <9m 1-3% | 6 | Pattern Type: | Terraced land (alluvial) |
| Morph. T Elem. Ty Slope: | ype: pe: | Lower-slope Slope Category: 0 % | Relief: Level Aspect: | 5 metres | |
| Surface | Soil Cor | ndition Firm | | | |
| <u>Erosion</u> Soil Cla | <u>:</u> ssificatio | <u>on</u> N | licrorelief: Cra | bhole gilgai Vei | t.(m) 1 Horiz.(m) 5 |
| Australia Endohype fine Mode ASC Con Analytica | an Soil Cla ersodic Ep erately dee nfidence: al data are | ssification: ipedal Grey Vertosol Non-gravelly I p incomplete but reasonable confide | Ma Fine Medium Pri Gro nce. La | pping Unit: ncipal Profile Forn eat Soil Group: nd Class: | BI n: Ug5.25 Grey clay Land Class: A |
| Site | | Complete clearing. Pasture, nativ | e or improved, b | ut never cultivated | |
| Vegetat | ion: | Tall Strata - Tree, 3.01-6m, Isolat | ed plants. *Spec | ies includes - Acacia | a harpophylla |
| Surface | Coarse | No surface coarse fragments | | | |
| Profile 1A11 | 0 - 0.1 m | Very dark grey (10YR3/1-Moist); blocky; Rough-ped fabric; Fine, (Moderately moist; Firm consisten (Raupach); Abundant, fine (1-2mi | , 0-0% ; Silty loar 0 - 5) mm crack; ce; Slightly plasti m) roots; Clear, S | m; Moderate grade o Few (<1 per 0.01m ic; Normal plasticity; Smooth change to - | of structure, 10-20 mm, Subangular 2) Fine (1-2mm) macropores, Slightly sticky; Field pH 5.5 |
| 1A12 | 0.1 - 0.3 m | Very dark grey (10YR3/1-Moist); blocky; Rough-ped fabric; Fine, (Moist; Firm consistence; Slightly Abundant, fine (1-2mm) roots; Cle | , 0-0% ; Silty loar 0 - 5) mm crack; plastic; Normal p ear, Smooth char | m; Moderate grade o Few (<1 per 0.01m lasticity; Slightly stic nge to - | of structure, 10-20 mm, Subangular 2) Fine (1-2mm) macropores, ky; Field pH 6.5 (Raupach); |
| 1B2kss | 0.3 - 0.6 m | Very dark greyish brown (10YR3/ of structure, 50-100 mm, Lenticu Fine (1-2mm) macropores, Moist; matrix is Slightly calcareous; Field change to - | 2-Moist); Mottles lar; Smooth-ped Very firm consis d pH 8 (Raupach | ; 2-10% , 0-5mm, D fabric; Fine, (0 - 5) ; tence; Very plastic;); Many, very fine (0 | istinct; Silty clay loam; Weak grade nm crack; Few (<1 per 0.01m2) Normal plasticity; Very sticky; Soil I-1mm) roots; Diffuse, Wavy |
| 1B3kss | 0.6 - 0.9 m | Very dark greyish brown (10YR3/ Lenticular; Earthy fabric; Fine, (0 Moist; Very firm consistence; Ver calcareous; Field pH 6.5 (Raupac | 2-Moist); , 0-0% - 5) mm crack; M y plastic; Normal h); Many, very fi | ; Silty clay loam; We lany (>5 per 100mm plasticity; Very sticl ne (0-1mm) roots; D | eak grade of structure, 50-100mm, i2) Fine (1-2mm) macropores, sy; Soil matrix is Slightly iffuse, Irregular change to - |
| 1C1 | 0.9 - 1.2 m | Dark brown (10YR3/3-Moist); , 0- Fine, (0 - 5) mm crack; Common consistence; Very plastic; Normal (Raupach); Few, medium (2-5mm | 0% ; Weak grade (1-5 per 100mm2 I plasticity; Very s ı) roots; | e of structure, 50-10 2) Very fine (0.075-1 sticky; Soil matrix is | 0 mm, Lenticular; Earthy fabric; mm) macropores, Moist; Very firm Slightly calcareous; Field pH 6.5 |
| Morpho | logical N | <u>otes</u> | | | |

Observation Notes exclusion site, not sampled



| Project Name: | STYX SOUTH | H COAL PROJ | ECT SOI | L AND LAND CAPABILITY |
|-------------------------------|-------------------------|-------------------------|---------|-----------------------|
| Project Code: Agency Name: | J000019 Horizon Soil | Site ID: Survey (NT) | 010 | Observation ID: 1 |

Site Notes

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

| Project Name: | STYX SOUTH C | OAL PROJ | ECT SOIL AND | LAND CAPABILI | ΓY |
|-----------------|-----------------|-----------|--------------|---------------|----|
| Project Code: | J000019 | Site ID: | 011 | Observation | 1 |
| Agency Name: | Horizon Soil Su | rvey (NT) | | | |
| Laboratory Test | <u>Results:</u> | | | | |

| Depth | pН | 1:5 ECExcha | ingeable C | ations | | _ | | CEC | ESP | CI |
|-----------|------|-------------|------------|--------|----|----|-------|-----------|-----|-------|
| cm | | dS/m | Mg | ĸ | Ni | a | Cmc | ol (+)/kg | % | 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 | Organic | Total | Avail. | Total | Extr. | | | Trace Elem | nents | |
|------------------------|---------|------------|------------|------------|------------|----|----|------------|----------|------|
| cm | C % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg/ | Zn kg | В |
| 0 - 0.1 0.1 - 0.3 | 0.8A | 1670E | 25J | 300 | 6* | <1 | 28 | 28.4 | 1.55 | <0.2 |
| 0.5 - 0.6 0 8 - 0 9 | 420E | 5J | <200 | <3* | | | | | | |
| 1.1 - 1.2 | 380E | 6J | 300 | 4* | | | | | | |

Project Name: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY



| Project Agency | t Code: y Name: | J000019 Horizon Soil Su | Site ID: rvey (NT) | 011 | Observatio | n ID: | 1 | | | |
|--|--|---|---|--|--|---|---|--|--|---------------------|
| Site Inf Desc. B Date De Map Re Northin Easting | ormation y: sc.: f.: g/Long.: /Lat.: | I. Hollingsworth 09/05/12 GPS S.A. Off 7497068 AMG zone: 771484 Datum: GD/ | 55 \94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Bar H, pho 19 metres 756 Very slow Moderately | otos 48- y well d | -50 Irained | | | |
| Exposu Geol. R | <u>IV</u> reType: ef.: | Soil pit Qa , Alluvium | | Conf. Sub. Substrate M | is Parent. Mat.: Iaterial: | Almost Soil pit | certain , 1 m de | or certai eep,Fragi | n mental, Beo | dded, Porous, |
| <u>Land F</u> Rel/Slop | orm pe Class: | Gently undulating pla | ains <9m 1-3 | 3% | Pattern T | ype: | Terrac | ced land | (alluvial) | |
| Morph. Elem. T Slope: | Туре: уре: | Lower-slope Slope Category: 0 % | | Relief: Level Aspect: | 5 metres 80 degree | s | | | | |
| Surfac | e Soil Co | ndition So | ft | | | | | | | |
| Erosio Soil Cla | <u>n:</u> assificatio | on microrelief | | Microrelief: | Zero or no | Vert.(ı | m) | Horiz.(m | 1) | |
| Australi Stratic R ASC Co All nece | an Soil Cla Rudosol Nor onfidence: essary analy | assification: n-gravelly Loamy Sha Great Soil Group: _v tical data are availal | allow ble. | | Mapping Unit: Principal Profile F Alluvial soil Land Class: | orm: | Sx Um5 Land | .52 Class: | A | |
| <u>Site</u> | | Complete clearing. | Pasture, nat | ive or improve | d, but never cultivat | ted | | | | |
| <u>Vegeta</u> | <u>tion:</u> | Tall Strata - Tree, 2 | 20.01-35m, Is | olated plants. | *Species includes - | - Eucaly | /ptus sp | ecies | | |
| Surfac | e Coarse | No surface coarse | fragments | | | - | | | | |
| <u>Profile</u> 1A11 | 0 - 0.1 m | Very dark grey (7.5 blocky; Rough-ped Moist; Loose consi Abundant, fine (1-2 | YR3/1-Moist fabric; Fine, stence; Slight 2mm) roots; D |); , 0-0% ; San (0 - 5) mm cra tly plastic; Nor Diffuse, Smootl | dy loam; Strong gra .ck; Common (1-5 p mal plasticity; Sligh n change to - | ade of s er 0.01 tly stick | structure m2) Fir xy; Field | e, 2-5 mn ie (1-2mr ⊢pH 8 (R | n, Subangu n) macropo aupach); | lar ores, |
| 1A12 | 0.1 - 0.5 n | n Dark brown (7.5YR blocky; Rough-ped Moist; Very weak o Abundant, fine (1-2 | 3/2-Moist); , fabric; Fine, onsistence; S 2mm) roots; D | 0-0% ; Sandy (0 - 5) mm cra Slightly plastic; Diffuse, Smootl | loam; Moderate gra ick; Common (1-5 p Normal plasticity; \$ n change to - | ade of s er 0.01 Slightly | tructure m2) Fir sticky; I | e, 2-5 mm ne (1-2mr Field pH | n, Subangu n) macropo 8 (Raupach | lar ores, ı); |
| 1C1 | 0.5 - 0.8 n | n Dark brown (7.5YR blocky; Weak grad Common (1-5 per (plasticity; Slightly s | 3/3-Moist); , e of structure).01m2) Fine ticky; Field pl | 0-0% ; Sandy , 5-10 mm, Su (1-2mm) mac H 8 (Raupach) | loam; Weak grade bangular blocky; Ea ropores, Moist; Wea); Many, fine (1-2mr | of struc arthy fa ak cons n) roots | eture, 5- bric; Fir sistence s; Diffus | 10 mm, S ne, (0 - 5) ; Slightly e, Smoo | Subangular) mm crack plastic; No th change t | ; rmal o - |
| 1C2 | 0.8 - 1.1 n | Dark brown (7.5YF blocky; Earthy fabr Moist; Firm consist Common, fine (1-2 | 3/3-Moist); , ic; Fine, (0 - 5 ence; Slightly mm) roots; D | 0-0% ; Sandy 5) mm crack; (/ plastic; Norm iffuse, Smooth | loam; Weak grade Common (1-5 per 0. al plasticity; Slightly a change to - | of struc 01m2) / sticky | ture, 5- Fine (1- ; Field p | 10 mm, \$ -2mm) m oH 8 (Rau | Subangular acropores, upach); | |
| 1C3 | 1.1 - 1.2 n | n Dark brown (7.5YF 0.01m2) Fine (1-2r sticky; Field pH 8 (| 3/3-Moist); , nm) macropo Raupach); Co | 0-0% ; Massiv res, Moist; Fin ommon, fine (1 | e grade of structure m consistence; Slig I-2mm) roots; | e; Fine, htly pla | (0 - 5) ı stic; No | mm crack ormal plas | k; Few (<1∣ sticity; Sligh | per Itly |
| Morph | ological N | lotes | | | | | | | | |
| Observ | vation Not | tes river leem en eers " - | loin commit | 26.20 | | | | | | |
| Site No | sile, aeep otes | nver loam on scroll p | iam, samples | 5 20-30 | | | | | | |
| deep riv | er loam, str | eam channels, bank | and levee on | flood plain, sa | amples 26-309, REF | EREN | CE SIT | E | | |



| Project Project Agency | Name: Code: V Name: | STYX SOUTH COAL PRO J000019 Site ID: Horizon Soil Survey (NT) | JECT SOIL A 012 | AND LAND CAPA Observatio | ABILITY on ID: | 1 | |
|--|---|--|--|---|--|---|-----------------------------------|
| Site Inf Desc. B Date De Map Ref Northing Easting Geolog Exposu Geol. Re | formation y: sc.: g/Long.: /Lat.: IV reType: ef.: | I. Hollingsworth 09/05/12 GPS S.A. Off 7496613 AMG zone: 55 771321 Datum: GDA94 Soil pit Qpa | Locality: Elevation: Rainfall: Runoff: Drainage: Conf. Sub. Substrate I | Bar H, ph 20 metres 756 Slow Poorly dra is Parent. Mat.: Material: | otos 51-l s ained Almost Soil pit, | 53 certain or certain 1 m deep,Fragmental, B | edded, Porous, |
| Land F | orm | , Alluvium | 20/ | Pattorn T | -vno: | Torroood land (alluvial) | |
| Morph. ¹ Elem. Ty | Type: ype: | Lower-slope Slope Category: | Relief: Level | 5 metres | ype. | | |
| Surface | e Soil Co n: Active | ndition Surface crust , Minor (gully) | Aspeet. | 40 degree | | | |
| Soil Cla Australi Endohyp fine Mod ASC Co Analvtic | assification an Soil Cla bersodic Ep lerately dee confidence: cal data are | on assification: bipedal Grey Vertosol Non-grave ep incomplete but reasonable confi | Microrelief: Ily Fine Medium idence. | Melonhole gilgai Mapping Unit: Principal Profile Great Soil Group Land Class: | Vert.(n Form: o: | 1) 1 Horiz.(m) 5 So Ug5.25 Brown clay Land Class: C1 | |
| <u>Site</u> <u>Vegeta</u> <u>Surface</u> <u>Profile</u> 1A1 | <u>tion:</u> e <u>Coarse</u> 0 - 0.1 m | Complete clearing. Pasture, na Tall Strata - Tree, 6.01-12m, Is No surface coarse fragments Dark grey (2.5Y4/1-Moist); , 0- Rough-ped fabric; Coarse, (10 Moist: Loose consistence: Mor | ative or improve solated plants. * -0% ; Light clay - 20) mm craci derately plastic; | ed, but never cultiva *Species includes - ; Strong grade of st k; Common (1-5 pe Normal plasticity: 1 | ated Acacia h ructure, r 0.01m2 Moderate | 1arpophylla 10-20 mm, Subangular b 2) Fine (1-2mm) macropc elv sticky Field nH f | locky; ires, |
| 1B1 | 0.1 - 0.2 n | (Raupach); Abundant, fine (1-2 n Dark grey (2.5Y4/1-Moist); , 0- Rough-ped fabric; Coarse, (10 Weak consistence; Moderately fine (1-2mm) roots; Diffuse, W | 2mm) roots; Dif -0% ; Light clay) - 20) mm cracl / plastic; Norma avy change to - | fuse, Wavy change ; Strong grade of st k; Few (<1 per 0.01 al plasticity; Modera | to - ructure, m2) Fine itely stick | 10-20 mm, Subangular b e (1-2mm) macropores, N (y; Field pH 7 (Raupach) | locky; ⁄loist; ; Many, |
| 1B2ss | 0.2 - 0.3 n | n Dark greyish brown (2.5Y4/3-M Lenticular; Smooth-ped fabric macropores, Moist; Firm consi 8 (Raupach); Many, very fine (| Moist); , 0-0% ; ; Coarse, (10 - stence; Modera (0-1mm) roots; | Light medium clay; 20) mm crack; Man ately plastic; Norma Diffuse, Wavy chan | Moderat y (>5 pe l plasticit ge to - | e grade of structure, 10- r 100mm2) Fine (1-2mm ty; Moderately sticky; Fie | 20 mm,) ld pH |
| 1B2kss | 0.3 - 0.6 n | n Dark greyish brown (2.5Y4/3-M Lenticular; Smooth-ped fabric; 1mm) macropores, Moist; Firm %), Calcareous, Medium (2 -6 Common, very fine (0-1mm) r | Moist); , 0-0% ; Medium, (5 - 1 n consistence; \ mm), Nodules; oots; Diffuse, V | Medium clay; Mode 0) mm crack; Comr /ery plastic; Norma Soil matrix is Sligh Vavy change to - | erate gra mon (1-5 l plasticit tly calca | de of structure, 20-50 mr per 100mm2) Very fine (ıy; Very sticky; Very few (reous; Field pH 8.5 (Rau | n, (0.075- (0 - 2 pach); |
| 1B3ss | 0.6 - 0.9 n | n Olive brown (2.5Y4/4-Moist); , fabric; Medium, (5 - 10) mm cr Moist; Firm consistence; Very Field pH 9 (Raupach); Commo | 0-0% ; Heavy o ack; Common (plastic; Normal on, very fine (0- | clay; Weak grade of (1-5 per 100mm2) \ plasticity; Very stic 1mm) roots; Diffuse | f structur /ery fine ky; Soil i e, Wavy o | e, 20-50 mm, Lenticular; (0.075-1mm) macropore matrix is Slightly calcarec change to - | Earthy s, ous; |
| 1Css | 0.9 - 1.2 n | n Olive brown (2.5Y4/4-Moist); , Few (<1 per 100mm2) Very fir plasticity; Very sticky; Soil ma roots; | 0-0% ; Massive ne (0.075-1mm) trix is Slightly c | e grade of structure macropores, Moist alcareous; Field pH | ; Earthy t; Firm co I 9 (Raup | fabric; Fine, (0 - 5) mm c onsistence; Very plastic; oach); Few, very fine (0-1 | rack; Normal mm) |

Morphological Notes



Project Name:STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:012Observation ID:1Agency 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 Project Agency | Name: Code: Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 013 | ND LAND Obser | CAPABILITY vation ID: | , 1 | | |
|--|---|--|---|--|---|---|---|--|
| Site Info Desc. By Date Des Map Ref Northing Easting/ Geolog | ormation y: sc.: () y/Long.: Lat.: | . Hollingsworth 09/05/12 GPS S.A. Off 7491406 AMG zone: 55 772073 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Bar 28 r 756 Slov Poo | H, no photo netres v rly drained | | | |
| Exposur Geol. Re | eType: of.: | Existing vertical exposure Qpa deep,Fragmental, Bedded, Porou | Conf. Sub. i Substrate N us, , Alluvium | s Parent. M laterial: | at.: Almost Existing | certain or certair ı vertical exposu | ו re, 1 m | |
| <u>Land Fo</u> Rel/Slop | orm e Class: | Gently undulating plains <9m 1-3 ^r | % | Pat | tern Type: | Terraced land (| alluvial) | |
| Morph. 1 Elem. Ty Slope: | Гуре: /ре: | Lower-slope Slope Category: 0 % | Relief: Level Aspect: | 5 m 100 | etres degrees | | | |
| Surface | Soil Cor | dition Surface crust | | | | | | |
| Erosion | <u>ı:</u> | | | | | | | |
| Soil Cla | ssificatio | on I | licrorelief: | Melonhole g | ilgai Vert.(n | n) 1 Horiz.(m |) 10 | |
| Australia Endohyp fine Mode | an Soil Cla ersodic Ep erately dee | ssification: ipedal Grey Vertosol Non-gravelly p | Fine Medium | Mapping U Principal P Great Soil | nit: rofile Form: Group: | Bl Ug5.25 Grey clay | | |
| Analytica | al data are | incomplete but reasonable confide | ence. | Land Class | : | Land Class: | C1 | |
| <u>Site</u> Vegetat | tion: | Complete clearing. Pasture, nativ | /e or improve | d, but never | cultivated | | | |
| Surface | Coarco | Tall Strata - Tree, 6.01-12m, Isol | ated plants. * | Species inclu | ides - Acacia h | arpophylla | | |
| Drofilo | Coarse | No surface coarse fragments | | | | | | |
| 1A1 | 0 - 0.1 m | Dark grey (2.5Y4/1-Moist); , 0-09 Rough-ped fabric; Medium, (5 - 1 Moist; Weak consistence; Mode (Raupach); Abundant, fine (1-2m | 6 ; Light clay; 0) mm crack; rately plastic; m) roots; Diffi | Strong grade Common (1 Normal plas use, Wavy cl | e of structure, -5 per 0.01m2 ticity; Moderate nange to - | 10-20 mm, Suba) Medium (2-5m ely sticky; Field p | ngular blocky; m) macropores, bH 6.5 | |
| 1B1 | 0.1 - 0.2 m | Dark grey (2.5Y4/1-Moist); , 0-0% ped fabric; Medium, (5 - 10) mm consistence; Moderately plastic; walls coated, distinct; Field pH 7 | 6 ; Light clay; crack; Few (< Normal plastic (Raupach); N | Strong grade 1 per 0.01m city; Moderat lany, fine (1- | e of structure, 2) Fine (1-2mr ely sticky; Mar 2mm) roots; D | 10-20 mm, Lenti n) macropores, l ny cutans, >50% iffuse, Wavy cha | cular; Smooth- Moist; Weak of ped faces or ange to - | |
| 1B2ss | 0.2 - 0.3 m | Dark greyish brown (2.5Y4/3-Mo Lenticular; Smooth-ped fabric; M macropores, Moist; Firm consiste >50% of ped faces or walls coate Diffuse, Wavy change to - | ist); , 0-0% ; L edium, (5 - 10 ence; Very pla ed, distinct; Fie | ight medium)) mm crack; istic; Normal eld pH 8 (Ra | clay; Strong g Many (>5 per plasticity; Moc upach); Many, | rade of structure 100mm2) Fine (lerately sticky; N very fine (0-1mi | e, 10-20 mm, 1-2mm) lany cutans, m) roots; | |
| 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- Smooth-ped fabric; Fine, (0 - 5) r Moist; Firm consistence; Very pla faces or walls coated, distinct; So fine (0-1mm) roots; Gradual, War | 0% ; Heavy cl nm crack; Fev astic; Normal bil matrix is SI vy change to - | ay; Moderato w (<1 per 10 plasticity; Ve ightly calcare | e grade of stru 0mm2) Very fir ry sticky; Com eous; Field pH | cture, 20-50 mm ne (0.075-1mm) mon cutans, 10- 9 (Raupach); Co | a, Lenticular; macropores, 50% of ped pmmon, very | |



Project Name:STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:013Observation ID:1Agency 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

Site Notes

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



| Project Project Agency | Name: Code: Name: | STYX SOUTH COAL PRO- J000019 Site ID: Horizon Soil Survey (NT) | JECT SOIL A 014 | ND LA OI | ND CAPA | ABILITY n ID: 1 | , | | | |
|---|--------------------------|--|--|--|---|-----------------------------------|---|---|-------------|--|
| Site Information Desc. By: Date Desc.: () Map Ref.: () Northing/Long.: Easting/Lat.: C Geology ExposureType: Geol. Ref.: | | I. Hollingsworth 09/05/12 GPS S.A. Off 7490114 AMG zone: 55 769645 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Locality: Elevation: Rainfall: Runoff: Drainage: | | photos s | 54-56 d | | | |
| | | Soil pit Kx ,Coal | Conf. Sub. Substrate I | Conf. Sub. is Parer Substrate Material: | | Almost o Soil pit, | certain or certa 1 m deep,Frag | in mental, Bedde | ed, Porous, | |
| <u>Land F</u> Rel/Slop | orm be Class: | Undulating low hills 30-90m 3-10 |)% Pattern Ty | pe: | Hills | | | | | |
| Morph. Type: Elem. Type: Slope: | | Lower-slope Footslope 0.5 % | Relief: Slope Cate Aspect: | Relief: Slope Category: Aspect: | | s clined es | | | | |
| Surface | e Soil Co | ndition Firm | | | | | | | | |
| Soil Cla | <u>n:</u> assificatio | <u>on</u> | Microrelief: | | | | | | | |
| Australian Soil Cla Magnesic Mottled-H gravelly Sandy Clay ASC Confidence: All necessary analy | | assification: Hypernatric Brown Sodosol Thick yey Moderately deep soil ytical data are available. | Slightly | Mappir ightly Princip Great S Land C | | Form: : | Tb Db4.42 Yellow podzolic Land Class: C2 | | | |
| <u>Site</u> | | No effective disturbance other | No effective disturbance other than grazing by hoofed animals | | | | | | | |
| Vegetation: Surface Coarse | | Tall Strata - Tree, 6.01-12m, Mid-dense. *Species includes - Melaleuca species 0-2%, cobbly, 60-200mm, subrounded, Shale | | | | | | | | |
| 1A11 | 0 - 0.1 m | Very dark grey (10YR3/1-Mois Subangular blocky; Rough-pec macropores, Moderately moist Many, fine (1-2mm) roots; Clea | 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 n | n Greyish brown (10YR5/2-Moist Subangular blocky; Rough-pec macropores, Moist; Very weak (1-2mm) roots; Clear, Smooth | 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) nacropores, 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 n | 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 n | n Yellowish brown (10YR5/6-Moi grade of structure, 20-50 mm, 100mm2) Very fine (0.075-1mr plasticity; Slightly sticky; Many Ferricrete, Uncemented, Disco | 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 olasticity; 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 n | Light brownish grey (10YR6/2- grade of structure; Earthy fabri macropores, Moist; Very firm c 8.5 (Raupach); Gradual, Wavy | Moist); Mottles, c; Fine, (0 - 5) onsistence; Mo change to - | , 10YR5 mm crac oderately | 6, 10-20% , k; Few (<1 plastic; Nc | , 30-mm, per 100r ormal pla | Faint; Light cla mm2) Fine (1-2 sticity; Slightly | ay; Massive 2mm) sticky; Field pł | н | |
| 1C1 | 0.9 - 1.5 n | Light brownish grey (10YR6/2- structure; Earthy fabric; Few (< consistence; Moderately plastic | Moist); Mottles, 1 per 100mm2 c; Normal plast | , 10YR5) Very fii icity; Sliç | 6, 10-20% , ne (0.075-1 ghtly sticky; | 30-mm, mm) ma Field pH | Faint; Massive cropores, Mois I 8.5 (Raupacl | e grade of it; Very firm n); | | |

Morphological Notes



Project Name: Project Code: STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY J000019

Site ID: 014 Observation ID: 1

Agency Name: Horizon Soil Survey (NT)

bleached, rusty root mottles

Observation Notes

Detailed site, samples 31-35

Site Notes

1A2e

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

Laboratory Test Results:

| Depth | pH 1:5 | 5 EC | | Exchangeable Ca | Cations Mg | к | CEC Na | ESP | CI |
|-----------|--------|--------|-------|--------------------|---------------|------|-----------|-------|-------|
| cm | | dS/m | | | | Cmc | ol (+)/kg | % | 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 | 280* |
| 0.8 - 0.9 | 8A 25 | 8A260* | | | | | | | |
| 1.1 - 1.2 | 8.1A | 320A | <0.1* | 1.5 | <0.1 | 1.1 | 2.7* | 40.74 | 280* |

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


| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND I 015 | AND CAPA | BILITY n ID: 1 | , 1 | |
|--|--|--|--|---|---|--------|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: Goology | L I. Hollingsworth 09/05/12 GPS S.A. Off 7489637 AMG zone: 55 770363 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | melonhole 41 metres 756 No runoff Very poorl | microre y draine | ilief, Bar H, photo 57 d | |
| ExposureType: Geol. Ref.: | Auger boring Qpa Porous, , Alluvium | Conf. Sub. is Pa Substrate Mater | rent. Mat.: ial: | Almost o Auger b | certain or certain oring, 1 m deep,Fragmental, B | edded, |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern Ty | ype: | Terraced land (alluvial) | |
| Morph. Type: Elem. Type: Slope: Surface Soil Co | Flat Swamp 0.5 % Poached | Relief: Slope Category: Aspect: | 5 metres Level 45 degree | s | | |
| Erosion: | | Minungualiaf, Mala | nhele silvei | Mant (m | -) <u>1 </u> () <u>10</u> | |
| Australian Soil CI Endohypersodic Ep fine Moderately de ASC Confidence: | on assification: pipedal Grey Vertosol Non-gravelly ep | Microreller: Meio Map Fine Medium Prin Grea | nnole gligal ping Unit: cipal Profile F at Soil Group: | Form: | Bl Ug5.25 Grey clay | |
| Analytical data are | ncomplete but reasonable confide Complete clearing. Pasture, nativ | ve or improved, but | d Class: | ted | Land Class: A | |
| Vegetation: Surface Coarse Profile | No surface coarse fragments | | | | | |
| 1A11 0 - 0.1 m | Very dark greyish brown (10YR3 sandy; Moderate grade of structu mm crack; Many (>5 per 100mm Normal plasticity; Very sticky; Ve Field pH 8 (Raupach); Many, me | /2-Moist); Mottles, ure, 20-50mm, Sut 2) Medium (2-5mm ary few (0 - 2%), Fe dium (2-5mm) root | 7.5YR44, 10-2 bangular block i) macropores erromanganife s; Gradual, Wa | 20% , 0- xy; Roug , Moist; rous, Fii avy chai | 5mm, Distinct; Clay loam, fine h-ped fabric; Coarse, (10 - 20) Firm consistence; Very plastic; ne (0 - 2 mm), Concretions; nge to - | |
| 1A1g 0.1 - 0.3 r | n Very dark grey (10YR3/1-Moist); Moderate grade of structure, 20- Common (1-5 per 100mm2) Fine plasticity; Very sticky; Common (8 (Raupach); Common, medium | Mottles, 7.5YR44, 50 mm, Lenticular; e (1-2mm) macropo 10 - 20 %), Ferrom (2-5mm) roots; Gr | 10-20% , 0-5r Rough-ped fa res, Wet; Firm anganiferous, adual, Wavy c | mm, Dist Ibric; Me I consist Fine (0 change t | tinct; Clay loam, fine sandy; dium, (5 - 10) mm crack; tence; Very plastic; Normal - 2 mm), Concretions; Field p⊢ o - | ł |
| 1B2g 0.3 - 0.5 r | n Dark grey (10YR4/1-Moist); , 0-0 Lenticular; Smooth-ped fabric; Fi macropores, Wet; Firm consister Ferromanganiferous, Fine (0 - 2 (Raupach); Few, fine (1-2mm) ro | % ; Light medium (ne, (0 - 5) mm crac nce; Very plastic; N mm), Concretions; pots; Gradual, Wav | clay; Moderate ck; Few (<1 pe ormal plasticit Soil matrix is y change to - | e grade o er 100mr sy; Very s Slightly | of structure, 20-50 mm, m2) Very fine (0.075-1mm) sticky; Common (10 - 20 %), calcareous; Field pH 8 | |
| 1C 0.5 - 1.5 r | n Brown (10YR4/3-Moist); , 0-0% ; Fine, (0 - 5) mm crack; Moist; Fir 2 %), Ferromanganiferous, Fine (Raupach); | Moderate grade o m consistence; Ve (0 - 2 mm), Concre | f structure, 20- ry plastic; Nori tions; Soil ma | -50 mm, mal plas trix is Sl | Lenticular; Smooth-ped fabric; ticity; Very sticky; Very few (0 - ightly calcareous; Field pH 8.5 | - |
| Morphological N | <u>lotes</u> | | | | | |
| Observation No Check site, not san Site Notes | <u>tes</u> npled | | | | | |

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



| Project Project Agency | Name: Code: / Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 016 | ND LA Ot | ND CAPA oservatio | ABILIT` n ID: | Y 1 |
|---|---|---|--|---|---|---|---|
| Site Inf Desc. By Date Des Map Ref Northing Easting/ Geolog Exposur | ormation y: sc.: g/Long.: /Lat.: <u>IV</u> reType: | I. Hollingsworth 09/05/12 GPS S.A. Off 7488925 AMG zone: 55 770659 Datum: GDA94 Auger boring | Locality: Elevation: Rainfall: Runoff: Drainage: Conf. Sub. | is Parer | Bar H, ph 44 metres 756 Slow Imperfecti | oto 58 y draine Almost | ed certain or certain |
| Geol. Re | et.: | Porous, , Alluvium | Substrate i | viateriai: | | Auger | boring, 1 m deep,Fragmental, Bedded, |
| <u>Land Fo</u> Rel/Slop | orm be Class: | Gently undulating plains <9m 1-3 | % | | Pattern T | ype: | Terraced land (alluvial) |
| Morph. Elem. Ty Slope: | Туре: /pe: | Flat Terrace plain 0.5 % | Relief: Slope Cate Aspect: | gory: | 5 metres Level 20 degree | es | |
| Surface Erosior | Soil Country Soil Country Soil Country | <u>ndition</u> Cracking (sheet) Stable Moderate (gully) | | | | | |
| Soil Cla | assificatio | on N | Microrelief: | Normal | gilgai | Vert.(r | m) 0.3 Horiz.(m) 10 |
| Australia Bleachea Clay-loar ASC Co | an Soil Cla d-Vertic Eu my Clayey onfidence: | assification: trophic Grey Chromosol Medium N Moderately deep podzolic soil | lon-gravelly | Mappir Princip Great \$ | ig Unit: al Profile Soil Group | Form: : | Bl Dy3.83 Grey-brown |
| No anal | ytical data | are available but confidence is fair. | | Land C | lass: | | Land Class: C1 |
| Site Complete clearing. Pasture, native or improved, cultivated at some stage Vegetation: Vegetation: | | | | | | | |
| Surface | e Coarse | No surface coarse fragments | ated plants. * | Species | includes - | Acacia | narpopnylla |
| Profile | | ···· ····· - ···· - ···· - ···· - ···· - ···· - ···· - ···· - ···· - ···· - ··· ··· | | | | | |
| 1A11 | 0 - 0.1 m | Very dark grey (10YR3/1-Moist); blocky; Rough-ped fabric; Mediu macropores, Moist; Very firm cor (Raupach); Abundant, fine (1-2m | , 0-0% ; Clay m, (5 - 10) mi nsistence; Ve m) roots; Gra | v loam; S m crack; ry plastic adual, W | trong grad Common ; Normal p avy change | e of stru (1-5 per lasticity e to - | ucture, 10-20 mm, Subangular 0.01m2) Medium (2-5mm) ; Moderately sticky; Field pH 7 |
| 1A12 | 0.1 - 0.3 n | Very dark grey (10YR3/1-Moist); blocky; Rough-ped fabric; Mediu macropores, Moist; Very firm cor (Raupach); Many, fine (1-2mm) r | , 0-0% ; Clay m, (5 - 10) mi nsistence; Vei roots; Gradua | v loam; S m crack; ry plastic I, Wavy | trong grad Common ; Normal p change to | e of stru (1-5 per lasticity - | ucture, 10-20 mm, Subangular 0.01m2) Medium (2-5mm) ; Very sticky; Field pH 7.5 |
| 1B2kss | 2kss 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 - | | | | | | ate grade of structure, 20-50 5 per 100mm2) Medium (2-5mm) ry sticky; Few (2 - 10 %), areous; Field pH 8.5 |
| 1C1k | 0.5 - 0.9 n | Im 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 n | Brown (10YR4/3-Moist); , 0-0%; Rough-ped fabric; Fine, (0 - 5) m macropores, Moist; Firm consiste Slightly calcareous; Field pH 9 (F | Medium clay m crack; Con ence; Very pla Raupach); Co | r; Modera nmon (1- astic; No mmon, N | ate grade c -5 per 100r rmal plasti very fine (0 | of structu mm2) Ve city; Moe -1mm) r | ure, 50-100mm, Lenticular; ery fine (0.075-1mm) derately sticky; Soil matrix is roots; |
| Morpho Observ Check si | ological N ation Not te, not sam | lotes ies ipled | | | | | |
| Call are d | | - 1. 1114 | | | | | Decise at 1000004 |



| Project Name: | STYX SOUT | 'H COAL PROJ | ECT SC | DIL AND LAND CAPABILIT | Υ |
|---------------|-------------|----------------|--------|------------------------|---|
| Project Code: | J000019 | Site ID: | 016 | Observation ID: | 1 |
| Agency Name: | Horizon Soi | il Survey (NT) | | | |

Site Notes

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

| Project Name: | STYX SOUTH | I COAL PROJ | ECT SOIL | AND LAND CAPABIL | ITY | |
|------------------|--------------|-------------|----------|------------------|-----|--|
| Project Code: | J000019 | Site ID: | 017 | Observation | 1 | |
| Agency Name: | Horizon Soil | Survey (NT) | | | | |
| l aboratory Test | Rosults: | | | | | |

| Depth | pН | 1:5 ECExcha | ngeable C | ations | Na | CEC | ESP | CI |
|-----------|------|-------------|-----------|--------|----|-------------|-----|-------|
| cm | | dS/m | wg | N | na | Cmol (+)/kg | % | mg/kg |
| 0 - 0.1 | 7.8A | 68A 20* | | | | | | |
| 0.1 - 0.3 | 8.6A | 209A20* | | | | | | |
| 0.5 - 0.6 | 9.2A | 530A340* | | | | | | |
| 0.8 - 0.9 | 9.3A | 931A980* | | | | | | |
| 1.1 - 1.2 | 9.3A | 1050A1210 | * | | | | | |



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 017 | ND LA OI | ND CAPA pservatio | ABILITY on ID: ⁄ | , 1 |
|---|---|---|---|--|---|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: Geology | I. Hollingsworth 09/05/12 GPS S.A. Off 7488817 AMG zone: 55 771931 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Mamelon 31 metres 756 Very slow Poorly dra | , photo 5 s , ained | 8-60 |
| ExposureType: Geol. Ref.: | Soil pit Qpa Bedded, Porous, , Alluvium | Conf. Sub. is Parent. Mat.:Almost ofSubstrate Material:Soil pit, | | Almost Soil pit, | certain or certain 1 m deep,<0.06mm mm,Fragmental, | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-39 | % | | Pattern T | уре: | Terraced land (alluvial) |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Cate Aspect: | gory: | 5 metres Level 30 degree | es | |
| Surface Soil Co | ndition Surface crust | | | | | |
| Erosion: Partia Partia Horiz. | l, Minor scalding (scald) Partial, Mir al, Moderate (rill) Partial, Moderate ((m) 1 | nor (sheet) (gully) 0 | Microre | elief: | Meloni | nole gilgai Vert.(m) 1 |
| Soil Classification Mapping Unit: Pv Australian Soil Classification: Mapping Unit: Pv Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy Principal Profile Form: Dy2.33 Clayey Moderately deep Grey-brown ASC Confidence: podZolic soil Land Class: Land Class: C1 | | | | | | |
| Site Vegetation: Surface Coarse | 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 | | | | | |
| <u>Profile</u> 1A11 0 - 0.1 m | Very dark grey (10YR3/1-Moist); blocky; Rough-ped fabric; Coarse macropores, Moist; Very firm con pH 8 (Raupach); Abundant, fine (| , 0-0% ; Clay e, (10 - 20) m isistence; Mo (1-2mm) roots | / loam; S im crack oderately s; Gradu | strong grad ; Common plastic; No ial, Wavy c | le of stru (1-5 per ormal pla change to | cture, 10-20 mm, Subangular 0.01m2) Coarse (>5mm) sticity; Moderately sticky; Field > - |
| 1A12 0.1 - 0.3 r | n Very dark grey (10YR3/1-Moist); blocky; Rough-ped fabric; Coarse macropores, Moist; Very firm con (Raupach); Many, fine (1-2mm) r | , 0-0% ; Clay e, (10 - 20) m isistence; Vei oots; Clear, V | / loam; S im crack ry plastic Navy cha | Strong grad ; Common c; Normal p ange to - | le of strue (1-5 per blasticity; | cture, 10-20 mm, Subangular 0.01m2) Coarse (>5mm) Very sticky; Field pH 7.5 |
| 1B2kss 0.3 - 0.5 r | 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 - | | | | | te grade of structure, 20-50 per 0.01m2) Medium (2-5mm) / sticky; Common cutans, 10- s, Fine (0 - 2 mm), Concretions; mm) roots; Gradual, Wavy |
| 1B3kss 0.5 - 0.9 r | n Brown (10YR4/3-Moist); , 0-0% ; Smooth-ped fabric; Fine, (0 - 5) Firm consistence; Very plastic; N walls coated, distinct; Soil matrix roots; Gradual, Wavy change to - | Medium hea mm crack; M ormal plastic is Slightly ca | vy clay; any (>5 ity; Very Icareous | Moderate g per 100mn sticky; Co s; Field pH | grade of n2) Fine mmon cu 8.5 (Rau | structure, 20-50mm, Lenticular; (1-2mm) macropores, Moist; ıtans, 10-50% of ped faces or pach); Few, fine (1-2mm) |
| 1Css 0.9 - 1.5 r | n Brown (10YR4/3-Moist); , 0-0% ; Rough-ped fabric; Fine, (0 - 5) m macropores, Moist; Firm consiste <10% of ped faces or walls coate | Medium clay m crack; Con ence; Very pla ed, distinct; Fi | r; Modera nmon (1 astic; No ield pH 9 | ate grade o -5 per 100 rmal plasti) (Raupach | of structu mm2) Ve city; Mod ı); | re, 50-100 mm, Lenticular; ry fine (0.075-1mm) lerately sticky; Few cutans, |
| Marphalagiaal | 1.4 | | | | | |

Morphological Notes



Project Name:STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:017Observation ID:1Agency Name:Horizon Soil Survey (NT)

Observation Notes

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

Site Notes

2

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

| Project Name: | STYX SOUTH CO | DAL PROJE | ECT SOIL AND | LAND CAPABILI | ΓY |
|---------------|------------------|-----------|--------------|---------------|----|
| Project Code: | J000019 | Site ID: | 017 | Observation | 1 |
| Agency Name: | Horizon Soil Sur | vey (NT) | | | |
| | | | | | |

| Depth | pН | 1:5 ECExcha | angeable C | ations | Na | CEC | ESP | CI |
|-----------|------|-------------|------------|--------|-----|-------------|-----|-------|
| cm | | dS/m | wig | ĸ | ina | Cmol (+)/kg | % | mg/kg |
| 0 - 0.1 | 7.8A | 68A 20* | | | | | | |
| 0.1 - 0.3 | 8.6A | 209A20* | | | | | | |
| 0.5 - 0.6 | 9.2A | 530A340* | | | | | | |
| 0.8 - 0.9 | 9.3A | 931A980* | | | | | | |
| 1.1 - 1.2 | 9.3A | 1050A1210 | * | | | | | |
| | | | | | | | | |



| Project N Project C Agency N | ame: ode: lame: | STYX SOUTH CC J000019 Horizon Soil Sur | DAL PROJE Site ID: vey (NT) | CT SOIL A 018 | ND LAI Ob | ND CAPA servatio | BILITY n ID: 1 | | | | |
|---|--|--|---|--|--|---|---|--|---|---|---------|
| Site Infor Desc. By: Date Desc. Map Ref.: Northing/L Easting/La | <u>mation</u> .: (.ong.:) | . Hollingsworth 09/05/12 GPS S.A. Off 7489023 AMG zone: 5 772503 Datum: GDA | 55 94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Mamelon, 35 metres 756 Slow Poorly dra | photo 61 ined | I-63 | | | |
| <u>Geology</u> ExposureT Geol. Ref.: | Гуре: | Soil pit Qpa Bedded, Porous, , A | lluvium | Conf. Sub. i Substrate N | Conf. Sub. is Parent. Mat.: Almost ce Substrate Material: Soil pit, 1 | | | ertain 1 m de | or certair ep,<0.06 | n Smm mm,Fragr | mental, |
| Land For Rel/Slope | <u>m</u> Class: | Undulating low hills 3 | 0-90m 3-10% | Pattern Typ | e: | Terraced I | and (allu | vial) | | | |
| Morph. Typ Elem. Type Slope: | pe: e: | Lower-slope Footslope 0.5 % | | Relief: Slope Categ Aspect: | gory: | 31 metres Very gentl 200 degre | y sloped es | | | | |
| Surface S | Soil Cor | ndition Firm | ı | | | | | | | | |
| Erosion: | Partial Stable Preser | Minor scalding (scald Minor (rill) Stable, M t (stbank) | d) Stable, Min oderate (gully | or (sheet) /) Active, | Microre microrel | lief: ief | Zero or | no | Vert.(m) Horiz.(m | Horiz.(m)) | |
| Soil Class | sificatio | on | | | | | | | | | |
| Australian Vertic Meso Clayey Moo ASC Conf Analytical o | Soil Cla onatric G derately (idence: data are | ssification: rey Sodosol Medium deep podzolic soil incomplete but reaso | Non-gravelly nable confide | Clay-loamy nce. | Mappin Princip Great S Land C | g Unit: al Profile F coil Group lass: | Form: : | Pv Dy2.4 Grey- Land | l3 ·brown 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 C | Coarse | No surface coarse f | ragments | | | | | | ., | | |
| <u>Profilo</u> | | | agnionio | | | | | | | | |
| 1A1 0 | - 0.1 m | Dark grey (10YR4/1 blocky; Rough-ped 1 macropores, Modera Field pH 6 (Raupact | -Moist); , 0-09 fabric; Coarse ately moist; V n); Abundant, | % ; Loamy sa e, (10 - 20) mi ery firm consi fine (1-2mm) | ind; Stro m crack; istence;) roots; C | ng grade o Common (Slightly pla Clear, Smoo | f structur (1-5 per (astic; Nor oth chang | re, 10-2 0.01m2 mal pla ge to - | 20 mm, S 2) Mediur asticity; S | Subangular m (2-5mm) Slightly sticky; | |
| 1A2e 0. | 1 - 0.3 m | Light grey (10YR7/1 Coarse, (10 - 20) m Weak consistence; Ferromanganiferous Clear, Smooth chan | -Moist); , 0-0 ⁰ m crack; Man Slightly plastic s, Fine (0 - 2 r ge to - | % ; Fine sand y (>5 per 100 c; Normal pla nm), Concret | ly loam;)mm2) N sticity; S ions; Fie | Single grai ledium (2-5 lightly stick eld pH 6.5 (| n grade (5mm) ma (y; Comm Raupach | of strue icropor non (10 n); Mar | cture; Ea res, Mode 0 - 20 %) ny, fine (1 | rthy fabric; erately moist; , I-2mm) roots; | |
| 1B21ss 0. | 3 - 0.5 m | Dark grey (10YR4/1 Prismatic; Rough-pe macropores, Moist; cutans, 10-50% of p coated, distinct; Fiel | -Moist); , 0-0 ⁶ ed fabric; Fine Very firm con ved faces or w d pH 6 (Raup | %; Light med e, (0 - 5) mm o sistence; Ver /alls coated, o pach); Few, fir | lium clay crack; Co y plastic distinct; (ne (1-2m | r; Moderate ommon (1- ; Normal pl Common c nm) roots; (| e grade o 5 per 100 lasticity; l utans, 10 Gradual, | of struc 0mm2) Moder 0-50% Smoot | ture, 10-2) Very fin ately stic of ped fa h change | 20 mm, e (0.075-1mm) ky; Common ces or walls e to - |) |
| 1B22ss 0. | 5 - 1 m | Very dark grey (10Y fabric; Medium, (5 - Moist; Very firm con of ped faces or walk change to - | R3/1-Moist); 10) mm crach sistence; Ver s coated, disti | , 0-0% ; Medi x; Common (1 y plastic; Nor nct; Field pH | ium heav 1-5 per 1 mal plas 7.5 (Rat | vy clay; Ma 00mm2) V ticity; Mode upach); Fe | ssive gra ery fine (erately st w, fine (1 | ade of (0.075- ticky; C -2mm) | structure ·1mm) ma Common) roots; A | ; Rough-ped acropores, cutans, 10-509 brupt, Smooth | % |
| 2C 1 | - 1.5 m | Dark grey (10YR4/1 Coarse, (10 - 20) m consistence; Non-pl | -Moist); , 0-09 m crack; Few astic; Non-sti | % ; Medium c (<1 per 0.01ı cky; Field pH | elay; Sing m2) Ver 6 (Raup | gle grain gr y fine (0.07 bach); | ade of st 5-1mm) | ructure macro | e; Earthy pores, M | fabric; oist; Weak | |
| Morpholo | gical N | otes | | | | | | | | | |
| Project N Project C | ame: ode: | STYX SOUTH CC J000019 | DAL PROJE Site ID: | CT SOIL A | ND LAI Ob | ND CAPA servatio | BILITY n ID: 1 | | | | |
| | | | | | | | | | | | |



Agency Name: Horizon Soil Survey (NT)

1A2ebleached, rusty root mottles1B22ssClay 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 PROJ | ECT SOIL | AND LAND CAPABIL | ITY | | |
|-------------------------|----------------|------------|----------|------------------|-----|--|--|
| Project Code: | J000019 | Site ID: | 018 | Observation | 1 | | |
| Agency Name: | Horizon Soil S | urvey (NT) | | | | | |
| Laboratory Test Results | | | | | | | |

| Depth | pH 1:5 ECExchangeable Cations | CEC | ESP | CI |
|-----------|-------------------------------|-------------|-----|-------|
| cm | dS/m | Cmol (+)/kg | % | mg/kg |
| 0 - 0.1 | 6.3A 53A 20* | | | |
| 0.1 - 0.3 | 6.8A 27A 10* | | | |
| 0.5 - 0.6 | 7.1A 167A120* | | | |
| 0.8 - 0.9 | 7.4A 397A380* | | | |
| 1.1 - 1.2 | 7.6A 23A 10* | | | |



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | CT SOIL AND LA 019 C | AND CAP/ bservatio | ABILIT on ID: | Y 1 | |
|---|---|---|--|---|---|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 10/05/12 GPS S.A. Off 7489188 AMG zone: 55 773062 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon 35 metres 756 Very slow Very pool | , photo s / ly drain | 64-66 ied | |
| <u>Geology</u> ExposureType: Geol. Ref.: | Soil pit Qpa Bedded, Porous, , Alluvium | Conf. Sub. is Pare Substrate Materia | ent. Mat.: I: | Almos Soil pi | t certain or certain t, 1 m deep,<0.06mm mm,Fragmental, | |
| <u>Land Form</u> Rel/Slope Class: | Gently undulating plains <9m 1-39 | % | Pattern 1 | уре: | Terraced land (alluvial) | |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0 % | Relief: Slope Category: Aspect: | 5 metres Level 250 degre | ees | | |
| Surface Soil Co | ndition Surface crust | | | | | |
| Erosion: Stable | e, Minor scalding (scald) Stable, Mir Microrelief: N | nor (sheet) ⁄Ielonhole gilgai | | Vert.(| m) 1 Horiz.(m) 10 | |
| Soli Classificati | on | | | | | |
| Australian Soil CI Endohypersodic Ep fine Moderately de ASC Confidence: | assification: pipedal Grey Vertosol Non-gravelly ep | Mapp Fine Medium Princi Great | ing Unit: pal Profile Soil Group | Form:): | So Ug5.25 Grey clay | |
| Analylical data are | incomplete but reasonable confide | nce. Land | Class: | | | |
| <u>Site</u> | Complete clearing. Pasture, nativ | e or improved, but r | never cultiva | ated | | |
| <u>Vegetation:</u> Surface Coarse | <u>/egetation:</u> Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla <u>Surface Coarse</u> No surface coarse fragments | | | | | |
| <u>Profile</u> 1A11 0 - 0.1 m | Very dark grey (2.5Y3/1-Moist); , blocky; Rough-ped fabric; Very c macropores, Moderately moist; V sticky; Field pH 6.5 (Raupach); N | 0-0% ; Clay loam; N oarse, (20 - 50) mm ⁄ery firm consistence lany, fine (1-2mm) r | Aoderate gra crack; Com e; Slightly pl oots; Gradu | ade of s imon (1 astic; N al, Wav | structure, 10-20 mm, Subangular -5 per 0.01m2) Medium (2-5mm) ormal plasticity; Moderately y change to - | |
| 1A12 0.1 - 0.3 r | n Very dark greyish brown (2.5Y3/2 Subangular blocky; Rough-ped fa (2-5mm) macropores, Moderately Moderately sticky; Field pH 7 (Ra | 2-Moist); , 0-0% ; Cla abric; Coarse, (10 - 2 y moist; Very firm co aupach); Many, fine | ay loam; Mc 20) mm crao nsistence; \$ (1-2mm) roo | oderate ck; Com Slightly ots; Gra | grade of structure, 10-20mm, imon (1-5 per 0.01m2) Medium plastic; Normal plasticity; dual, Wavy change to - | |
| 1B1k 0.3 - 0.5 r | B1k 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 r | n Dark greyish brown (2.5Y4/2-Moi mm, Lenticular; Smooth-ped fabr 1mm) macropores, Moist; Firm or 10-50% of ped faces or walls co Few, fine (1-2mm) roots; Gradua | ist); , 0-0% ; Mediun ic; Fine, (0 - 5) mm onsistence; Very pla ated, distinct; Soil m al, Irregular change t | n heavy clay crack; Many istic; Norma iatrix is Sligl io - | r; Mode / (>5 pe l plastic ntly calc | rate grade of structure, 50-100 r 100mm2) Very fine (0.075- sity; Very sticky; Common cutans, careous; Field pH 8.5 (Raupach); | |
| 1C 0.9 - 1.5 r | n Dark greyish brown (2.5Y4/2-Moi Fine, (0 - 5) mm crack; Common Very plastic; Normal plasticity; Ve | ist); , 0-0% ; Medium (1-5 per 100mm2) F ery sticky; Field pH § | n clay; Mass Fine (1-2mm (Raupach) | sive gra n) macro l; | de of structure; Earthy fabric; opores, Moist; Firm consistence; | |
| Morphological I | Notes | | | | | |
| | 4 | | | | | |

Observation Notes Detailed site, samples 46-50



| Project Co Agency Na | de: me: | J00001 Horizo | 9 n Soil : | Site Survey | ∋ ID: (NT) | 019 | Observati | | n 1 | |
|---|------------|------------------|---------------|----------------|---------------|------------|-------------|-----|-------------------------|---|
| Laboratory | Test | Results | : | | | | | | | |
| Depth | pН | 1:5 ECE | change | able Catio | ons | | CEC | ESP | CI | |
| cm | | dS/m | Mg | ĸ | | Na | Cmol (+)/kg | % | mg/kg | |
| 0 - 0.1 | 6.6A | 41A <1(|)* | | | | | | | |
| 0.1 - 0.3 | 8.3A | 58A 10 | * | | | | | | | |
| 0.5 - 0.6 | 9A | 169A80 | * | | | | | | | |
| 0.8 - 0.9 | 9.2A | 665A63 | 0* | | | | | | | |
| 1.1 - 1.2 | 9A | 864A11 | 30* | | | | | | | |
| Depth | | Organic C | Total N | Avail. P | Total K | Extr. S | Cu | Fe | Trace Elements Mn Zn | в |
| cm | | % | mg/kg | mg/kg | mg/kg | mg/kg | | | mg/kg | |
| 0 - 0.1 0.1 - 0.3 0.5 - 0.6 0.8 - 0.9 1.1 - 1.2 | | | | | | | | | | |

STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY Project Name:



| Project Project Agency | Name: Code: Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 020 | ND LA O | ND CAP bservatic | ABILITY on ID: ⁄ | 1 | |
|--|---|---|--|--|--|--|---|---|
| Site Info Desc. By Date Des Map Ref.: Northing/ Easting/L | ormation : c.: : /Long.: _at.: | I. Hollingsworth 10/05/12 GPS S.A. Off 7489402 AMG zone: 55 773575 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Mamelon 35 metres 756 Very slow Very poo | , photo 6 s v rly draine | 7-69 .d | |
| Geology Exposure Geol. Ref | <u>/</u> eType: f.: | Soil pit Qpa Bedded, Porous, , Alluvium | Conf. Sub. Substrate I | is Pare Naterial | nt. Mat.: : | Almost Soil pit, | certain or certain 1 m deep,<0.06n | nm mm,Fragmental |
| Land Fo Rel/Slope | erm e Class: | Gently undulating plains <9m 1-3% | % | | Pattern 1 | Гуре: | Terraced land (a | lluvial) |
| Morph. T Elem. Tyj Slope: | ype: pe: | Flat Terrace plain 0 % | Relief: Slope Category: Aspect: | | 5 metres Level 270 degrees | | | |
| Surface Erosion | Soil Cor | <u>ndition</u> Firm Minor (sheet) Stable Minor (gully |) | | | | | |
| Soil Cla | ssificatio | <u>on</u> N | / /licrorelief: | Norma | gilgai | Vert.(m | n) 0.2 Horiz.(m) | 5 |
| Australia Endohype fine Mode | n Soil Cla ersodic Ep erately dee | assification: ipedal Grey Vertosol Non-gravelly ap | Fine Medium | Mappi Princij Great | ng Unit: bal Profile Soil Grouj | Form: o: | So Ug5.25 Grey clay | |
| All neces | sary analy | ytical data are available. | | Land | Class: | | Land Class: | C1 |
| <u>Site</u> | | Complete clearing. Pasture, nativ | /e or improve | d, but n | ever cultiva | ated | | |
| <u>Vegetati</u> | ion: | T " 0' ' T 0 0' ' 0 1 1 | | | | | | |
| Surface | Coarse | I all Strata - Tree, 6.01-12m, Isola No surface coarse fragments | ated plants. * | Species | includes - | Acacia h | harpophylla | |
| <u>Profile</u> 1A11 (| 0 - 0.1 m | Very dark grey (2.5Y3/1-Moist); M structure, 10-20 mm, Subangula (1-5 per 0.01m2) Fine (1-2mm) m plastic; Normal plasticity; Slightly Wavy change to - | Mottles, 7.5Yl ar blocky; Rou nacropores, M sticky; Field | R44, 10 ugh-ped Moderate pH 6.5 | -20% , 0-5ı fabric; Ver ely moist; \ (Raupach); | mm, Disti y coarse, /ery firm ; Many, fi | nct; Clay loam; S , (20 - 50) mm cra consistence; Moo ne (1-2mm) roots | trong grade of ick; Common lerately ; Diffuse, |
| 1A12 (| 0.1 - 0.3 m | Dark grey (2.5Y4/1-Moist); , 0-0% blocky; Rough-ped fabric; Very comacropores, Moderately moist; V sticky; Field pH 7 (Raupach); Ma | 6 ; Clay loam oarse, (20 - 5 ⁄ery firm cons ny, fine (1-2r | ; Moder 50) mm sistence nm) roo | ate grade o crack; Com ; Moderate ts; Diffuse, | of structur mon (1-5 ly plastic Wavy ch | re, 10-20 mm, Su 5 per 0.01m2) Fin ; Normal plasticity ange to - | bangular e (1-2mm) /; Slightly |
| 1B2kss(| 0.3 - 0.5 n | Dark greyish brown (2.5Y4/2-Moi Lenticular; Smooth-ped fabric; Co macropores, Moist; Firm consiste Slightly calcareous; Field pH 8.5 | ist); , 0-0% ; oarse, (10 - 2 ence; Very pla (Raupach); (| Light cla 20) mm (astic; No Commor | y; Moderat crack; Few ormal plast n, fine (1-2r | te grade ((<1 per (icity; Mod mm) roots | of structure, 20-50).01m2) Very fine lerately sticky; Sc s; Diffuse, Irregula |) mm, (0.075-1mm) ill matrix is ar change to - |
| 1B3ss (| 0.5 - 0.9 m | n Dark greyish brown (2.5Y4/2-Moi mm, Lenticular; Smooth-ped fabr 1mm) macropores, Moist; Firm co (Raupach); Common, fine (1-2mr | ist); , 0-0% ; ic; Coarse, (onsistence; \ m) roots; Diff | Medium 10 - 20) /ery plas use, Irre | heavy clay mm crack; stic; Norma gular chan | /; Modera Many (> Il plasticit ge to - | ate grade of struc 5 per 100mm2) V y; Very sticky; Fie | ture, 20-50 ery fine (0.075- કોd pH 9 |
| 1Css (| 0.9 - 1.5 m | 5 m Dark greyish brown (2.5Y4/2-Moist); , 0-0%; Medium clay; Massive grade of structure; Earthy f Medium, (5 - 10) mm crack; Common (1-5 per 100mm2) Very fine (0.075-1mm) macropores, M consistence; Very plastic; Normal plasticity; Very sticky; Field pH 9 (Raupach); | | | | | thy fabric; ∋s, Moist; Firm | |
| Morphol | logical N | lotes | | | | | | |
| | | rusty root motiles | | | | | | |

Observation Notes



| Project Name: | STYX SOUTI | H COAL PROJ | ECT SC | DIL AND LAND CAPABILI | ΓY |
|---------------|--------------|-------------|--------|-----------------------|----|
| Project Code: | J000019 | Site ID: | 020 | Observation | 1 |
| Agency Name: | Horizon Soil | Survey (NT) | | | |

| Laboratory | Test Results: | | | | | | | |
|------------|----------------|----------|---------|------|-------|-----------|-------|-------|
| Depth | pH 1:5 ECExcha | ingeable | Cations | NI- | | CEC | ESP | CI |
| cm | Ca dS/m | мg | ĸ | Na | Cmo | ol (+)/kg | % | 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 203A7.8* | 9.1 | 0.1 | 3.6 | | 20.6* | 17.48 | 100* |
| 0.8 - 0.9 | 9.4A 916A1040* | | | | | | | |
| 1.1 - 1.2 | 9.1A 1200A7.4* | 8.4 | 0.2 | 3.9 | | 19.8* | 19.70 | 1700* |

| Depth | Organi | : Total | : Total | : Total | c Total | ic Total | ic Total | : Total | Avail. | Total | Extr. | | ٦ | Frace Elen | nents | |
|------------------------|--------|------------|------------|------------|------------|----------|----------|-----------|----------|-------|-------|--|---|------------|-------|--|
| cm | C % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg/ | Zn kg | В | | | | | | |
| 0 - 0.1 0.1 - 0.3 | 0.9D | 2190E | 48J | 360 | 5* | 2.29 | 194 | 82.3 | 1.76 | <0.2 | | | | | | |
| 0.5 - 0.6 0.8 - 0.9 | 450E | <2J | 490 | 5* | | | | | | | | | | | | |
| 1.1 - 1.2 | 290E | 15J | <200 | 68* | | | | | | | | | | | | |



| Project Name: | STYX SOUTH COAL PROJE | ECT SOIL A | ND LA | ND CAP | ABILITY | / |
|---------------------|---|-----------------|-----------|--------------|--------------|-----------------------------------|
| Project Code: | J000019 Site ID: | 021 | Ob | oservatio | n ID: ′ | 1 |
| Agency Name: | Horizon Soil Survey (NT) | | | | | |
| Site Information | | | | | | |
| Desc. By: | L Hollingsworth | Locality: | | Mamelon | photo 7 | 0-72 |
| Date Desc.: | 10/05/12 | Elevation: | | 30 metres | | |
| Map Ref.: | GPS S A Off | Rainfall: | | 756 | • | |
| Northing/Long.: | 7490298 AMG zone: 55 | Runoff: | | Verv slow | r | |
| Easting/Lat.: | 773672 Datum: GDA94 | Drainage: | | Poorly dra | ained | |
| Geology | | · · | | | | |
| ExposureType: | Soil pit | Conf. Sub. | is Parer | nt. Mat.: | Almost | certain or certain |
| Geol. Ref.: | Qpa | Substrate M | Aaterial: | | Soil pit, | 1 m deep,<0.06mm mm,Fragmental |
| | Bedded, Porous, , Alluvium | | | | - | |
| Land Form | | | | | | |
| Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | | Pattern T | vne. | Terraced land (alluvial) |
| | | ,,, | | i uttoini i | J P0. | |
| Morph. Type: | Flat | Relief: | | 5 metres | | |
| Elem. Type: | Swamp | Slope Cate | gory: | Level | | |
| Slope: | 0 % | Aspect: | | 300 degre | es | |
| Surface Soil Co | ndition_ | | | | | |
| Erosion: Stable | e, Moderate (sheet) Stable, Modera | te (rill) | | | | |
| Partia | l, Moderate (gully) | Microrelief: | Normal | gilgai | Vert.(n | n) 0.1 Horiz.(m) 3 |
| Soil Classificati | on | | | | | |
| Australian Soil Cla | assification: | | Mappin | g Unit: | | Pv |
| Vertic Mesonatric C | Grey Sodosol Medium Non-gravelly | Clay-loamy | Princip | al Profile | Form: | Dy2.33 |
| Clayey Moderately | deep | | Great S | Soil Group |): | Grey-brown |
| ASC Confidence: | podzolic soil | | | | | -) |
| Analytical data are | incomplete but reasonable confide | ence. | Land C | lass: | | Land Class: C1 |
| 0.44 | | | | | | |
| Site | Complete clearing. Pasture, nativ | ve or improve | d, but ne | ever cultiva | ited | |
| Vegetation: | T H O (A A A A A A A A A A | | *** | | . . | |
| | Tall Strata - Tree, 6.01-12m, Clo | sed or dense. | *Specie | es includes | - Acacia | a harpophylla |
| Surface Coarse | No surface coarse fragments | | | | | |
| Profile | | | | | | |
| 1A11 0 - 0.1 m | Very dark grey (2.5Y3/1-Moist); , | 0-0% ; Clay | loam; St | rong grade | of struc | ture, 10-20 mm, Subangular |
| | blocky; Rough-ped fabric; Very c | oarse, (20 - 5 | i0) mm c | rack; Few | (<1 per (| 0.01m2) Medium (2-5mm) |
| | macropores, Moist; Firm consiste | ence; Very pla | astic; No | rmal plasti | city; Mod | lerately sticky; Field pH 6.5 |
| | (Raupach); Many, fine (1-2mm) r | roots; Diffuse, | Wavy c | hange to - | | |
| 1A2 01-02r | n Very dark grey (2.5¥3/1-Moist): | 0-0% · Clav | loam: St | rona arade | ofstruc | ture 10-20 mm Subangular |
| 1AZ 0.1-0.21 | blocky: Rough-ped fabric: Very c | oarse (20 - 5 | i0am, 01 | rack: Few | /<1 ner (| $0.1m^2$) Medium (2-5mm) |
| | macropores Moist Firm consiste | ence: Verv pla | astic: No | rmal plasti | city: Mod | lerately sticky: Field pH 6.5 |
| | (Raupach): Many, fine (1-2mm) | roots: Clear. V | Vavv cha | ange to - | ,, | |
| | | , - , | , | 5 | | |
| 1B2kss 0.2 - 0.3 r | n Dark grey (2.5Y4/1-Moist); , 0-0% | % ; Light med | um clay | Moderate | grade o | f structure, 20-50 mm, |
| | Lenticular; Smooth-ped fabric; M | ledium, (5 - 10 | D) mm cr | ack; Few (| <1 per 0 | .01m2) Medium (2-5mm) |
| | macropores, Moist; Firm consiste | ence; Very pla | astic; No | rmal plasti | city; Very | y sticky; Soil matrix is Slightly |
| | calcareous; Field pH 8 (Raupach | i); Common, i | ine (1-2) | nm) roots; | Diffuse, | Irregular change to - |
| | | | | | | |
| 1B3kss 0.3 - 0.5 r | n Dark grey (2.5Y4/1-Moist); , 0-0% | % ; Medium h | eavy cla | y; Moderat | e grade (| of structure, 20-50 mm, |
| | Lenticular; Smooth-ped fabric; M | ledium, (5 - 10 | D) mm cr | ack; Comr | non (1-5 | per 100mm2) Fine (1-2mm) |
| | macropores, Moist; Firm consiste | ence; Very pla | astic; No | rmal plasti | city; Very | y sticky; Soil matrix is Slightly |
| | calcareous; Field pH 8 (Raupach | n); Common, v | very fine | (0-1mm) r | oots; Dif | fuse, Irregular change to - |
| | | | | | | |
| 1D1ss 05-06r | n Dark grev (2.5Y4/1-Moist) 0_00 | % · Medium b | eavy cla | v. Moderat | e arade i | of structure, 50-100 mm |
| 12100 0.0 - 0.01 | Lenticular: Smooth-ned fabric: M | ledium (5 - 10 |)) mm cr | ack: Comr | non (1-5 | per 100mm2) Fine (1-2mm) |
| | macropores. Moist: Firm consiste | ence: Verv nla | astic: No | rmal plasti | city: Mod | lerately sticky: Field pH 6.5 |
| | (Raupach); Common. verv fine (| 0-1mm) roots | ; Diffuse | , Irregular | change t | 0 - |
| | , , , , , , , , , , , , , , , , , , , | , | | | 5 | |



| Project Name: | STYX SOUT | H COAL PROJ | ECT SC | DIL AND LAND CAPABILITY |
|---------------|-------------|---------------|--------|-------------------------|
| Project Code: | J000019 | Site ID: | 021 | Observation ID: 1 |
| Agency Name: | Horizon Soi | l Survey (NT) | | |

0.6 - 1.5 m Greyish brown (2.5Y5/2-Moist); Mottles, 2.5YR41, 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 1D2 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 SOUTI | H COAL PROJ | ECT SOIL | AND LAND CAPABIL | ITY. |
|---------------|-------------------------|-------------|----------|------------------|------|
| Project Code: | J000019 Horizon Soil | Site ID: | 021 | Observation | 1 |
| Agency Name. | Regulte: | Survey (NT) | | | |

Laboratory Test Results:

| Depth | pН | 1:5 ECExcha | angeable C | ations | Na | CEC | ESP | CI |
|-----------|------|-------------|------------|--------|-----|-------------|-----|-------|
| cm | | μS/m | wig | ĸ | ina | Cmol (+)/kg | % | mg/kg |
| 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 N | ame: | STYX SOUTH COAL PROJE | CT SOIL A | ND LA | ND CAP | ABILITY | 1 | |
|-------------|---------------------------|---|--|--------------------------------|---|-----------------------|--|------------------------------------|
| Project C | ode: | J000019 Site ID: | 022 | 0 | bservatio | on ID: | 1 | |
| Agency N | lame: | Horizon Soil Survey (NT) | | | | | | |
| Site Infor | mation | | | | | | | |
| Desc. By: | | . Hollingsworth | Locality: | | photo 73- | 75 | | |
| Date Desc. | .: ' | 10/05/12 | Elevation: | | 32 metres | 3 | | |
| Map Ref.: | (| GPS S.A. Off | Rainfall: | | 756 | | | |
| Northing/L | .ong.: | 7490471 AMG zone: 55 | Runoff: | | Very slow | 1 | | |
| Easting/La | it.: 7 | 774255 Datum: GDA94 | Drainage: | | Poorly dra | ained | | |
| Geology | | 0 1 1 | | | | | | |
| Exposure I | ype: | | Cont. Sub. | IS Pare | nt. Mat.: | No Data | a Intal Raddad D | |
| Geol. Rel | | Qpa | Substrate | nateriai | • | Flayine | niai, beuueu, r | orous, , Anuvium |
| Land For | <u>m</u> | | | | _ | _ | | |
| Rel/Slope | Class: | Gently undulating plains <9m 1-3% | 6 | | Pattern 1 | Гуре: | Terraced land | (alluvial) |
| Morph. Typ | pe: | Flat | Relief: | | 5 metres | | | |
| Elem. Type | e: | Terrace flat | Slope Cate | gory: | Level | | | |
| Slope: | | 0.5 % | Aspect: | | 100 degre | ees | | |
| Surface S | Soil Con | ndition_ | | | | | | |
| Erosion: | | | | | | | | |
| Soil Class | sificatio | on N | licrorelief: | | | | | |
| Australian | Soil Cla | ssification: | | Mappi | ng Unit: | | Pv | |
| Vertic Meso | onatric G | rey Sodosol Medium Non-gravelly | Clay-loamy | Princip | oal Profile | Form: | Dy2.33 | |
| Clayey Mod | derately o | deep | | Great | Soil Group |) : | Grey-brown | |
| ASC Conf | idence: | podzolic soil | | | - | | - | |
| All necessa | ary analy | rtical data are available. | | Land C | Class: | | Land Class: | C2 |
| Profile | | | | | | | | |
| 1A1 0 | - 0.1 m | Very dark grey (2.5Y3/1-Moist); N Moist; Moderately plastic; Normal change to - | lottles, 7.5Yf I plasticity; M | R44, 10- oderate | -20% , 0-5r ly sticky; F | nm, Dist ield pH 5 | inct; Fine sandy 5.5 (Raupach); C | clay loam; Clear, Smooth |
| 140- 0 | 1 0 0 m | Linkt and (2 EVZ/4 Maint) - Fina | | | ist. Madau | atalı i nla | atia. Namaal mla | |
| 1A2e U. | 1 - 0.2 m | Moderately sticky; Field pH 7.5 (F | Raupach); Cl | ear, Sm | ooth chang | je to - | suc; Normai pias | sucity; |
| 1B21 0. | 2 - 0.5 m | Very dark greyish brown (2.5Y3/2 Field pH 7.5 (Raupach); Abrupt, S | 2-Moist); ; Lig Smooth chan | ht clay; ge to - | Moist; Ver | y plastic; | Normal plastici | ty; Very sticky; |
| 1B22 0. | 5 - 0.8 m | Dark greyish brown (2.5Y4/2-Moi sticky; Field pH 6.5 (Raupach); C | st); ; Medium lear, Smooth | heavy change | clay; Moist e to - | ; Very pla | astic; Normal pla | asticity; Very |
| 1C 0. | 8 - 1.5 m | Dark greyish brown (2.5Y4/3-Moi Moist; Very plastic; Normal plastic Concretions; Field pH 7 (Raupac | st); Mottles, 2 city; Very stic ch); Clear, Sn | 2.5YR41 ky; Con nooth ch | l, 10-20% , nmon (10 - nange to - | , 5-15mn 20 %), N | n, Distinct; Medi ⁄Ianganiferous, I | um heavy clay; Fine (0 - 2 mm), |
| Morpholo | ogical N | otes | | | | | | |
| 1A2e | | bleached, rusty root mottles | | | | | | |
| Observati | ion Not | <u>es</u> es 61-65 | | | | | | |
| | .c, sampi e | | | | | | | |
| Mamalar | <u>ə</u> ələ ə mərdiri | | lambala mi | analiaf F | | OLTE | | |
| mameion, | cleared | wooulanu, brown cracking clay, me | ionnoie micro | Jiellel, L | | | | |



| Project Nam Project Cod Agency Nam | ect Name: STYX SOUTH COAL PROJ ect Code: J000019 Site ID: ncy Name: Horizon Soil Survey (NT) | | | | ECT SO 022 | ГҮ 1 | | | |
|--|--|----------|------|------------|---------------|-----------|----------|-------|-------|
| Laboratory | Test I | Results: | | | | | | | |
| Depth | pН | 1:5 EC | Ex | changeable | Cations | | CEC | ESP | CI |
| ст | | μS/m | Ca | Mg | K | Na Cmo | l (+)/kg | % | 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 | Organic | Total | Avail. | Total | Extr. | | | Trace Elements | | | |
|----------------------|---------|------------|------------|------------|------------|-----|-----|----------------|----------|------|--|
| cm | С % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg/ | Zn kg | в | |
| 0 - 0.1 0.1 - 0.3 | 0.5D 1 | 1100E | 89J | 930 | 3* | 2.4 | 128 | 78.6 | 1.55 | <0.2 | |
| 0.5 - 0.6 | 600E | 7J | | <200 | 47* | | | | | | |
| 1.1 - 1.2 | 380E | 10J | | <200 | 144* | | | | | | |



| Project I Project (Agency | Name: Code: Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 023 | ND LA Ol | ND CAPA oservatio | ABILITY on ID: | Y 1 |
|--|---|---|---|--|--|---|---|
| Site Info Desc. By Date Des Map Ref.: Northing/ Easting/L | ormation : : : /Long.: _at.: | L I. Hollingsworth 10/05/12 GPS S.A. Off 7488800 AMG zone: 55 773572 Datum: GDA94 | Locality:Mamelon, photoElevation:39 metresRainfall:756Runoff:Very slowDrainage:Poorly drained | | | | 76-78 |
| Geology Exposure Geol. Ref | <u>/</u> eType: f.: | Soil pit Qpa , Alluvium | Conf. Sub. Substrate M | is Parer Aaterial: | nt. Mat.: | certain or certain , 1 m deep,Fragmental, Bedded, Porous, | |
| <u>Land Fo</u> Rel/Slope | o <u>rm</u> e Class: | Gently undulating plains <9m 1-36 | % | | Pattern T | уре: | Terraced land (alluvial) |
| Morph. Ty Elem. Ty Slope: | ype: pe: | Flat Terrace flat 0.5 % | Relief: Slope Cate Aspect: | Relief: Slope Category: Aspect: | | ees | |
| Surface Erosion | Soil Co | ndition Hardsetting | Moderate | | | | |
| Soil Clas | (sheet ssificati | t) Microrelief: Non | Aelonhole gilo | gai | | Vert.(r | m) 1 Horiz.(m) 20 |
| Australia Vertic Mes Clayey Mo ASC Cor Analytica | n Soil Classonatric (oderately nfidence: | assification: Grey Sodosol Medium Non-gravelly deep podzolic soil incomplete but reasonable confide | Clay-loamy | Mappir Princip Great S | ng Unit: bal Profile Soil Group Class: | Form:): | Pv Dy2.33 Grey-brown |
| <u>Site</u> | | Complete clearing. Pasture, nativ | /e or improve | d, but ne | ever cultiva | ated | |
| <u>Vegetati</u> | ion: | Tall Strata - Tree, 6.01-12m, Isola | ated plants. * | Species | includes - | Acacia I | harpophylla |
| <u>Surface</u> | Coarse | No surface coarse fragments | | | | | |
| <u>Profile</u> 1A1 (| 0 - 0.1 m | Very dark grey (2.5Y3/1-Moist); , blocky; Rough-ped fabric; Fine, (Moist; Firm consistence; Modera 6-20mm, subrounded, dispersec (1-2mm) roots; Clear, Smooth ch | 0-0% ; Clay 0 - 5) mm cra tely plastic; N I, Conglomera ange to - | loam; Ma ick; Few lormal pl ate, coai | oderate gra (<1 per 0. lasticity; Me rse fragme | ade of st 01m2) F oderatel nts; Fiel | tructure, 2-5 mm, Subangular Fine (1-2mm) macropores, y sticky; 0-2%, medium gravelly, d pH 6.5 (Raupach); Many, fine |
| 1A2 (| 0.1 - 0.3 r | n Dark grey (2.5Y4/1-Moist); , 0-0% mm crack; Many (>5 per 100mm Normal plasticity; Moderately sti Conglomerate, coarse fragments change to - | 6 ; Clay loam 2) Fine (1-2m cky; 0-2%, m ; Field pH 6.5 | ; Massiv ım) mac edium g 5 (Raupa | e grade of ropores, M ravelly, 6-2 ach); Comn | structur loist; Vei 20mm, si non, fine | e; Earthy fabric; Fine, (0 - 5) ry firm consistence; Very plastic; ubrounded, dispersed, e (1-2mm) roots; Clear, Wavy |
| 1B21ss (| 0.3 - 0.5 r | n Dark greyish brown (2.5Y4/2-Moi Polyhedral; Moderate grade of st crack; Common (1-5 per 100mm; Normal plasticity; Very sticky; 0-2 coarse fragments; Common cuta 50% of ped faces or walls coated Diffuse, Wavy change to - | ist); , 0-0% ; L ructure, 10-2/ 2) Fine (1-2m 2%, medium g ns, 10-50% o I, distinct; Fie | Light me 0 mm, L m) mac gravelly, of ped far Id pH 7. | dium clay; enticular; S ropores, M 6-20mm, s ces or wall 5 (Raupacl | Modera Smooth- loist; Firr subround s coated h); Com | te grade of structure, 5-10 mm, ped fabric; Fine, (0 - 5) mm m consistence; Very plastic; ded, dispersed, Conglomerate, d, distinct; Common cutans, 10- mon, fine (1-2mm) roots; |
| 1B22kss (| 0.5 - 0.7 r | n Dark greyish brown (10YR4/2-Mc Lenticular; Smooth-ped fabric; Fi macropores, Moist; Very firm cor gravelly, 6-20mm, subrounded, d Calcareous, Medium (2 -6 mm), I change to - | bist); , 0-0% ; ne, (0 - 5) mn nsistence; Ver lispersed, Co Nodules; Fiele | Heavy o n crack; ry plastio nglomer d pH 9 (l | clay; Moder Few (<1 p c; Normal p ate, coarse Raupach); | rate grac er 100m blasticity e fragme Few, fin | de of structure, 10-20mm, im2) Very fine (0.075-1mm) ; Very sticky; 0-2%, medium ents; Very few (0 - 2%), ie (1-2mm) roots; Diffuse, Wavy |
| 1C1 (| 0.7 - 0.9 r | n Dark yellowish brown (10YR4/4-I Lenticular; Smooth-ped fabric; Fi macropores, Moist; Very firm cor gravelly, 6-20mm, subrounded, d Calcareous, Medium (2 -6 mm), I | Moist); , 0-0% ne, (0 - 5) mn sistence; Ver lispersed, Co Nodules; Fiel | o ; Heavy n crack; ry plastic nglomer d pH 9 (l | / clay; Moc Few (<1 p ; Normal p ate, coarse Raupach); | derate gr er 100m blasticity e fragme Diffuse, | rade of structure, 10-20mm, im2) Very fine (0.075-1mm) ; Very sticky; 0-2%, medium ents; Few (2 - 10%), Wavy change to - |
| 1C2 (| 0.9 - 1.5 r | n Dark yellowish brown (10YR4/4-I | Moist); Mottle | s, 2.5YF | R41, 10-20 | % , 5-15 | mm, 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 Torrertic Natrustalf

| Project Name: Project Code: Agency Name: | | STYX SOU J000019 Horizon S | JTH CO Soil Surv | AL PROJ Site ID: vey (NT) | ECT SO 023 | ECT SOIL AND LAND CAPABILI 023 Observation | | | | | |
|--|------|----------------------------------|---------------------|---------------------------------|---------------|---|-----|-------|--|--|--|
| Laboratory Test Results: | | | | | | | | | | | |
| Depth | pН | 1:5 ECExcha | ingeable | Cations | | CEC | ESP | CI | | | |
| cm | | Ca dS/m | Mg | к | Na | Cmol (+)/kg | % | mg/kg | | | |
| 0 - 0.1 | 6.5A | 61A 20* | | | | | | | | | |
| 0.1 - 0.3 | 8.9A | 238A30* | | | | | | | | | |
| 0.5 - 0.6 | 9.3A | 580A400* | | | | | | | | | |
| 0.8 - 0.9 | 9.2A | 1010A1160 | * | | | | | | | | |
| 1.1 - 1.2 | 9.3A | 1080A1350 | * | | | | | | | | |

Soil and Land Suitability Central Queensland Coal Project



| Project N Project C Agency I | lame: Code: Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | CT SOIL AND LA 024 O | ND CAPAB bservation I | BILITY ID: 1 | | | |
|---|-------------------------------------|--|---|--|-------------------------|------------------------------------|---------------------------------|--|
| Site Infor | rmation | | | | | | | |
| Desc. By: Date Desc Map Ref.: Northing/I Easting/La | Long.: | . Hollingsworth 10/05/12 GPS S.A. Off 7488299 AMG zone: 55 773576 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, photos 79-81 34 metres 756 Very slow Poorly drained | | | | |
| <u>Geology</u> Exposure Geol. Ref. | Type: | Soil pit Qpa , Alluvium | Conf. Sub. is Parent. Mat.: Almost of Substrate Material: Soil pit, | | | ertain or certair m deep,Fragn | i nental, Bedded, Porous, | |
| Land For Rel/Slope | r <u>m</u> Class: | Gently undulating plains <9m 1-39 | 6 | Pattern Typ | be: T | erraced land (| alluvial) | |
| Morph. Ty Elem. Typ Slope: Surface \$ | vpe: ie: Soil Cor | Flat Terrace flat 0.5 % I dition Hardsetting | Relief: Slope Category: Aspect: | 5 metres Level 90 degrees | | | | |
| Erosion: | Stable | Minor scalding (scald) Stable Min | or (sheet) | | | | | |
| Soil Clas | sificatio | Microrelief: M | lelonhole gilgai | V | Vert.(m) | 0.5 Horiz.(m) |) 20 | |
| Australian Vertic Mes Clayey Mo ASC Cont | onatric Bi oderately fidence: | ssification: rown Sodosol Medium Non-gravell deep podzolic soil | Mappi y Clay-loamy Princij Great | ng Unit: pal Profile Fo Soil Group: | F orm: [(| Dy2.33 Grey-brown | | |
| Analytical | data are | Incomplete but reasonable confide Complete clearing. Pasture, nativ | re or improved, but n | class: ever cultivated | d | Land Class: | C1 | |
| Surface (| <u>Coarse</u> | Tall Strata - Tree, 6.01-12m, Isola No surface coarse fragments | ated plants. *Species | s includes - Ac | cacia ha | rpophylla | | |
| 1A1 0 | - 0.1 m | Very dark grey (2.5Y3/1-Moist); ; sticky; Field pH 6 (Raupach); Cle | Clay loam; Moist; M ar, Smooth change t | oderately plas o - | stic; Nor | mal plasticity; I | Moderately | |
| 1A2e 0 | .1 - 0.3 m | Dark grey (2.5Y4/1-Moist); ; Clay 6.5 (Raupach); Clear, Smooth ch | loam; Moist; Very pl nange to - | astic; Normal | plasticit | ty; Moderately s | sticky; Field pH | |
| 1B21 0 | .3 - 0.5 m | Dark greyish brown (2.5Y4/2-Moi sticky; Field pH 7.5 (Raupach); D | st); ; Light medium c iffuse, Wavy change | lay; Moist; Vei to - | ery plasti | ic; Normal plas | ticity; Very | |
| 1B22 0 | .5 - 0.7 m | Dark greyish brown (10YR4/2-Mc Field pH 8 (Raupach); Diffuse, W | bist); ; Heavy clay; M avy change to - | oist; Very plas | stic; Nor | mal plasticity; | Very sticky; | |
| 1C1 0 | .7 - 0.9 m | Dark yellowish brown (10YR4/4-N Field pH 8.5 (Raupach); Diffuse, | /loist); ; Heavy clay; Wavy change to - | Moist; Very pla | lastic; N | ormal plasticity | ; Very sticky; | |
| 1C2 0 | .9 - 1.5 m | Dark yellowish brown (10YR4/4-M Common (10 - 20 %), Manganifer Wavy change to - | /loist); ; Heavy clay; rous, Fine (0 - 2 mm | Moist; Very pla), Concretions | lastic; N s; Field p | ormal plasticity oH 8.5 (Raupad | ; Very sticky; ch); Diffuse, | |
| Morpholo 1A2e | ogical N | <u>otes</u> bleached, rusty root mottles | | | | | | |
| Observat | tion Not | es | | | | | | |
| Detailed si | te, sampl | es 71-75 | | | | | | |
| Site Note | 26 | | | | | | | |

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

| Project Name: Project Code: Agency Name: | | STYX SOU J000019 Horizon S | STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY J000019 Site ID: 024 Observation ID: 1 Horizon Soil Survey (NT) | | | | | | | | | | |
|--|--------------------------|--|--|----------------------------------|-----------------|--------------------|---------------------|-----------|--|--|--|--|--|
| Project Name: Project Code: Agency Name: | | STYX SOUTH CC J000019 Horizon Soil Sur | | AL PROJE Site ID: vey (NT) | ECT SOII 024 | L AND LAND Obse | CAPABII ervation | LITY 1 | | | | | |
| Laboratory | Laboratory Test Results: | | | | | | | | | | | | |
| Depth | pН | 1:5 ECExcha | ngeable (| Cations | No | CEC | ESP | CI | | | | | |
| cm | | dS/m | wg | n | INd | Cmol (+)/kg | % | mg/kg | | | | | |
| 0 - 0.1 | 6.7A | 42A 20* | | | | | | | | | | | |
| 0.1 - 0.3 | 8.4A | 128A80* | | | | | | | | | | | |
| 0.5 - 0.6 | 8.6A | 416A480* | | | | | | | | | | | |
| 0.8 - 0.9 | 9.2A | 935A1140* | | | | | | | | | | | |
| 1.1 - 1.2 | 8.6A | 911A1260* | | | | | | | | | | | |



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 025 | ND LA OI | ND CAPA oservatio | ABILITY n ID: | (1 | | | |
|---|---|--|---|---|---|---|--|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: Geology ExposureType: | I. Hollingsworth 10/05/12 GPS S.A. Off 7487645 AMG zone: 55 773602 Datum: GDA94 Soil pit | Locality: Elevation: Rainfall: Runoff: Drainage: Conf. Sub. | Locality: Mamelon, photos & Elevation: 34 metres Rainfall: 756 Runoff: Very slow Drainage: Poorly drained Conf. Sub. is Parent. Mat.: Almost c | | | 82-85 certain or certain | | | |
| Geol. Ref.: | Qpa , Alluvium | Substrate M | /laterial: | | Soil pit, | 1 m deep,Fragmental, Bedded, Porous, | | | |
| <u>Land Form</u> Rel/Slope Class: | Gently undulating plains <9m 1-39 | % | | Pattern T | ype: | Terraced land (alluvial) | | | |
| Morph. Type: Elem. Type: Slope: Surface Soil Con Erosion: Partial | Flat Terrace flat 0.5 % ndition Hardsetting I, Minor scalding (scald) Partial, Min | Relief: Slope Cate Aspect: | gory: | 5 metres Level 300 degre | es | | | | |
| Soil Classification | Microrelief: N <u>on</u> | /lelonhole gilo | gai | | Vert.(n | n) 0.5 Horiz.(m) 20 | | | |
| Australian Soil Cla Vertic Mesonatric C Clayey Moderately ASC Confidence: | assification: Grey Sodosol Medium Non-gravelly deep podzolic soil incomplete but reasonable confide | Mapping Unit: Clay-loamy Principal Profile Form: Great Soil Group: | | | Form: : | Pv Dy2.43 Grey-brown | | | |
| Sito | Complete dui reasonable conide | ence. | | ver cultiva | tod | | | | |
| <u>Surface Coarse</u> <u>Profile</u> 1A1 0 - 0.1 m | Complete clearing. Pasture, native or improved, but never cultivated Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Eucalyptus crebra 0-2%, medium gravelly, 6-20mm, subrounded, Conglomerate 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 n | n Light grey (2.5Y7/1-Moist); Mottle of structure; Earthy fabric; Fine, (Moist; Firm consistence; Very pla 20mm, subrounded, dispersed, C Ferromanganiferous, Medium (2 roots; Clear, Smooth change to - | es, 10YR44, 2 (0 - 5) mm cra astic; Normal Conglomerate -6 mm), Cond | 2-10% , (ack; Few plasticity , coarse cretions; | 0-5mm, Dis (<1 per 0.1 /; Moderate fragments Field pH 8 | stinct; Fi 01m2) F ely sticky ; Comm 5.5 (Rauj | ne sandy loam; Massive grade Fine (1-2mm) macropores, y; 0-2%, medium gravelly, 6- on (10 - 20 %), pach); Common, fine (1-2mm) | | | |
| 1B2ss 0.2 - 0.3 n | n Dark greyish brown (2.5Y4/2-Moi Moderate grade of structure, 10-2 Medium, (5 - 10) mm crack; Com consistence; Very plastic; Norma dispersed, Conglomerate, coarse distinct; Field pH 7 (Raupach); C | roots; Clear, Smooth change to - 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 n | n Dark greyish brown (2.5Y4/3-Moi Lenticular; Smooth-ped fabric; Fi macropores, Moist; Very firm cor gravelly, 6-20mm, subrounded, d ped faces or walls coated, distin 8.5 (Raupach); Few, fine (1-2mm | ist); , 0-0% ; H ne, (0 - 5) mn isistence; Ver lispersed, Co ct; Few (2 - 1 n) roots; Diffus | Heavy cl n crack; ry plastic nglomer 0 %), Ca se, Wavy | ay; Modera Common (c; Normal p ate, coarse alcareous, l y change to | ate grade 1-5 per lasticity; fragme Medium 0 - | e of structure, 10-20 mm, 100mm2) Fine (1-2mm) ; Very sticky; 0-2%, medium nts; Common cutans, 10-50% of (2 -6 mm), Nodules; Field pH | | | |
| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 025 | ND LA OI | ND CAPA oservatio | NBILITY n ID: | / 1 | | | |
| 283k 05-08n | n Dark grevish brown (2.5V4/4 Moi | ist). 0_0% · 4 | | av: Modera | nto arode | e of structure, 10-20 mm | | | |



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 CAPABILITYProject Code:J000019Site ID:025Observation1Agency Name:Horizon Soil Survey (NT)

| | Depth | pН | 1:5 ECExcha | ngeable C | geable Cations | | CEC | ESP | CI |
|---|-----------|------|-------------|-----------|----------------|----|-------------|-----|-------|
| | cm | | dS/m | wg | n | Na | Cmol (+)/kg | % | mg/kg |
| | 0 - 0.1 | 6.8A | 94A 70* | | | | | | |
| | 0.1 - 0.3 | 7.3A | 91A 70* | | | | | | |
| | 0.5 - 0.6 | 8.3A | 813A230* | | | | | | |
| | 0.8 - 0.9 | 9.2A | 813A970* | | | | | | |
| 2 | 1.1 - 1.2 | 9.1A | 905A1120* | | | | | | |



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 026 | ND LA Ol | ND CAPA | ABILITY n ID: | r 1 | | | |
|---|---|---|--|--|--|--|--|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | <u>n</u> I. Hollingsworth 10/05/12 GPS S.A. Off 7487430 AMG zone: 55 773244 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, 31 metres 756 Very slow Poorly dra | photos ained | 86-88 | | | | |
| <u>Geology</u> ExposureType: Geol. Ref.: | Soil pit Qpa , Alluvium | Conf. Sub. is Parent. Mat.: Almost of Substrate Material: Soil pit, | | | | certain or certain 1 m deep,Fragmental, Bedded, Porous, | | | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | | Pattern T | ype: | Terraced land (alluvial) | | | |
| Morph. Type: Elem. Type: Slope: | Flat Terrace flat 0.5 % | Relief: Slope Cate Aspect: | Relief:5 metresSlope Category:LevelAspect:250 degrees | | | | | | |
| Surface Soil Co | ondition Hardsetting | (abaat) | | | | | | | |
| Erosion: Partia | Microrelief: | nor (sneet) Crabhole gilga | ai | | Vert.(r | n) 0.3 Horiz.(m) 10 | | | |
| Soil Classificat | ion | | | | | 5 | | | |
| Vertic Mesonatric | lassification: Grev Sodosol Medium Non-gravelly | / Clav-loamv | Princin | ng Unit: bal Profile | Form: | PV Dv2.43 | | | |
| Clayey Moderately | / deep | , - , , | Great | Soil Group |): | Grey-brown | | | |
| ASC Confidence | : podzolic soil | | l and (| lass. | | Land Class: C2 | | | |
| Sito | Complete clearing Basture nati | vo or improvo | | over cultive | tod | | | | |
| Vegetation: | Complete cleaning. Pasture, nati | | u, but m | | lieu | | | | |
| | Tall Strata - Tree, 12.01-20m, Is | olated plants. | *Specie | s includes | - Eucaly | rptus crebra | | | |
| Surface Coarse | 0-2%, medium gravelly, 6-20mm | 1, subrounded, | , Conglo | omerate | | | | | |
| 1A1 0 - 0.1 m | Black (2.5Y4/2-Moist); , 0-0% ; F blocky; Rough-ped fabric; Fine, Moist; Firm consistence; Modera gravelly, 6-20mm, subrounded, Many, fine (1-2mm) roots; Clear | Fine sandy loa (0 - 5) mm cra ately plastic; N dispersed, Cor , Smooth chan | m; Mod ck; Man ormal p nglomer nge to - | erate grade iy (>5 per 1 lasticity; Mo rate, coarse | e of struc 00mm2 oderatel e fragme | cture, 2-5 mm, Subangular) Medium (2-5mm) macropores, y sticky; 2-10%, medium ınts; Field pH 6.5 (Raupach); | | | |
| 1A2e 0.1 - 0.2 | m Light grey (2.5Y7/1-Moist); Mottl of structure; Earthy fabric; Fine, Moist; Firm consistence; Very pl 20mm, subrounded, dispersed, (1-2mm) roots; Clear, Smooth c | les, 10YR44, 2 (0 - 5) mm cra astic; Normal Conglomerate change to - | 2-10% , ick; Few plasticit; , coarse | 0-5mm, Dis v (<1 per 0. y; Moderate fragments | stinct; Fi 01m2) F ely sticky ;; Field p | ne sandy loam; Massive grade Fine (1-2mm) macropores, y; 2-10%, medium gravelly, 6- iH 6.5 (Raupach); Common, fine | | | |
| 1B2ss 0.2 - 0.3 | m Dark greyish brown (2.5Y4/2-Mc Moderate grade of structure, 5-1 Smooth-ped fabric; Fine, (0 - 5) firm consistence; Very plastic; N subrounded, dispersed, Conglor coated, distinct; Common cutan Manganiferous, Medium (2 -6 m Diffuse, Wavy change to - | bist); Mottles, 1 0 mm, Polyhe mm crack; Fey Normal plastici nerate, coarse is, 10-50% of p m), Concretior | I0YR44 edral; Mo w (<1 pe ty; Very e fragme bed face ns; Field | , 2-10% , 5 oderate gra er 100mm2 sticky; 0-2 ents; Comm es or walls d pH 7.5 (R | -15mm, ide of str) Fine (1 %, medi non cuta coated, aupach) | Distinct; Medium heavy clay; ructure, 10-20 mm, Lenticular; I-2mm) macropores, Moist; Very um gravelly, 6-20mm, ns, 10-50% of ped faces or walls distinct; Common (10 - 20 %), ; Common, fine (1-2mm) roots; | | | |
| 1B3ss 0.3 - 0.5 | m Dark greyish brown (2.5Y4/3-Mc Lenticular; Smooth-ped fabric; F macropores, Moist; Very firm co gravelly, 6-20mm, subrounded, ped faces or walls coated, distin change to - | 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-Mc Lenticular; Smooth-ped fabric; F macropores, Moist; Very firm co gravelly, 6-20mm, subrounded, ped faces or walls coated, distin change to - | bist); , 0-0% ; H ïine, (0 - 5) mm nsistence; Ver dispersed, Cor nct; Field pH 8 | Heavy cl n crack; y plastio nglomer .5 (Rau | lay; Modera Common (c; Normal p rate, coarse pach); Few | ate grade 1-5 per plasticity e fragme r, fine (1- | e of structure, 10-20 mm, 100mm2) Fine (1-2mm) ; Very sticky; 0-2%, medium ents; Common cutans, 10-50% of -2mm) roots; Diffuse, Wavy | | | |



0.8 - 1.5 m Dark greyish brown (2.5Y4/4-Moist); Mottles, 2.5YR41, 10-20%, 5-15mm, Distinct; Heavy clay; 1C2 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

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

| Laboratory | Test Results: | |
|-------------------|----------------------|--|
| | | |

| Depth | рН | 1:5 EC | _ | Exchangeable | e Cations | | CEC | ESP | CI |
|-----------|---------|--------|-------|--------------|-----------|-----------|-----------|-------|-------|
| cm | | dS/m | Ca | Mg | к | Na Cmo | ol (+)/kg | % | mg/kg |
| 0 - 0.1 | 6.2A 3′ | 1A | 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 | Total | Avail. | Total | Extr. | | Trace Elements | | | | | |
|----------------------|-------------------|------------|------------|------------|------------|------|----------------|-----------|-----------|------|--|--|
| cm | C % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg/ | Zn ′kg | В | | |
| 0 - 0.1 0.2 - 0.3 | 0.6D ² | 1020E | 10J | 560 | 4* | 1.08 | 206 | 80.1 | 1.19 | <0.2 | | |
| 0.5 - 0.6 | 440E | <2J | <200 | 6* | | | | | | | | |
| 1.1 - 1.2 | 270E | 16J | <200 | 9* | | | | | | | | |



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | CT SOIL A 027 | ND LA Ot | ND CAPA oservatio | ABILITY n ID: 1 | , 1 | | | |
|--|---|--|--|---|--|--|---|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: Geology ExposureType: Cool. Bef. | 1 I. Hollingsworth 10/05/12 GPS S.A. Off 7486865 AMG zone: 55 773519 Datum: GDA94 Soil pit | Locality: Elevation: Rainfall: Runoff: Drainage: Conf. Sub. | Mamelon, photos 89-91 37 metres 756 Slow E: Imperfectly drained b. is Parent. Mat.: Almost certain or certain | | | | | | |
| Land Form | Qpa , Alluvium | nateriai: | Dottorn T | Soli pit, | Torraced land | (ollunial) | rous, | | |
| Morph. Type: Elem. Type: Slope: Surface Soil Co | Flat Terrace flat 0.5 % <u>ndition</u> Hardsetting | ⁷⁰ Relief: Slope Cate Aspect: | gory: | 5 metres Level 10 degree | ype. es | | (anuviai) | | |
| Erosion: Stable | e, Minor scalding (scald) Stable, Min | or (sheet) | | | | | | | |
| Microrelief: Soil Classification Mapping Unit: Pv Australian Soil Classification: Principal Profile Form: Dy2.43 Vertic Mesonatric Grey Sodosol Medium Non-gravelly Clay-loamy Great Soil Group: Grey-brown ASC Confidence: podzolic soil Land Class: C2 | | | | | | | | | |
| <u>Site</u> Vegetation: | - | | 10 | | | | | | |
| Surface Coarse | 2-10%, medium gravelly, 6-20mn | n, subrounde | *Specie d, Congl | s includes omerate | - Eucaly | ptus crebra | | | |
| <u>Profile</u> 1A1 0 - 0.1 m | Dark grey (10YR4/1-Moist); , 0-0 blocky; Rough-ped fabric; Fine, (Moist; Firm consistence; Moderat gravelly, 6-20mm, subrounded, d Many, fine (1-2mm) roots; Clear, | % ; Fine sand (0 - 5) mm cra tely plastic; N ispersed, Co Smooth char | dy loam; ack; Cor lormal pl nglomer nge to - | Moderate (nmon (1-5 asticity; Mo ate, coarse | grade of per 0.01 oderately fragmer | structure, 2-5 n m2) Fine (1-2m / sticky; 2-10%, nts; Field pH 5.9 | nm, Subangular m) macropores, medium 5 (Raupach); | | |
| 1A2e 0.1 - 0.3 | n Light grey (10YR7/1-Moist); Mottl structure; Earthy fabric; Fine, (0 - Moist; Firm consistence; Very pla 20mm, subrounded, dispersed, C (1-2mm) roots; Clear, Wavy chan | les, 10YR44, 5) mm crack stic; Normal Conglomerate ige to - | 2-10% , c; Comm plasticity c, coarse | 0-5mm, Di on (1-5 per /; Moderate fragments | istinct; S r 0.01m2 ely sticky ; Field pl | ilty loam; Mass) Fine (1-2mm) ; 2-10%, mediu H 6 (Raupach); | ive grade of macropores, m gravelly, 6- Common, fine | | |
| 1B21ss 0.3 - 0.5 | n Dark yellowish brown (10YR4/4-M mm, Polyhedral; Moderate grade crack; Common (1-5 per 100mm2 Very plastic; Normal plasticity; Ve Conglomerate, coarse fragments Common cutans, 10-50% of ped Medium (2 -6 mm), Concretions; to - | Moist); , 0-0% of structure, 2) Very fine ((ery sticky; 0-2 ; Common cu faces or wall Field pH 6 (F | 5; Mediu 10-20 m 0.075-1r 2%, med utans, 10 s coated Raupach | m heavy cl im, Lenticu nm) macro ium gravell I-50% of pe , distinct; C); Few, fine | lay; Mod Ilar; Smo pores, M ly, 6-20m ed faces Common e (1-2mm | erate grade of s ioth-ped fabric; loist; Very firm of m, subrounded or walls coated (10 - 20 %), Ma) roots; Diffuse | structure, 5-10 Fine, (0 - 5) mm consistence; I, dispersed, , distinct; anganiferous, , Wavy change | | |
| 1B22ss 0.5 - 0.8 | n Dark yellowish brown (10YR4/4-M Lenticular; Smooth-ped fabric; Fin macropores, Moist; Very firm con gravelly, 6-20mm, subrounded, d ped faces or walls coated; Comr pH 7.5 (Raupach); Few, fine (1-2 | Moist); , 0-0% ne, (0 - 5) mr sistence; Ver ispersed, Co non (10 - 20 mm) roots; D | o ; Mediu n crack; ry plastic nglomer %), Man iiffuse, V | m clay; Mc Common (;; Normal p ate, coarse ganiferous /avy chang | oderate g 1-5 per 1 lasticity; fragmer , Medium ge to - | rade of structur 100mm2) Fine (Very sticky; 0-2 nts; Common co n (2 -6 mm), Co | re, 10-20 mm, 1-2mm) 2%, medium utans, 10-50% of ncretions; Field | | |
| 1C1 0.8 - 1.1 | n Dark yellowish brown (10YR4/6-M Lenticular; Smooth-ped fabric; Fii macropores, Moist; Very firm con gravelly, 6-20mm, subrounded, d ped faces or walls coated; Comm pH 8.5 (Raupach); Diffuse, Wavy | Moist); , 0-0% ne, (0 - 5) mr isistence; Ver ispersed, Co non (10 - 20 change to - | o; Mediu n crack; ry plastic nglomer %), Man | m clay; Mc Common (s; Normal p ate, coarse ganiferous | oderate g 1-5 per 1 lasticity; e fragmer , Medium | grade of structur 100mm2) Fine (Very sticky; 0-2 nts; Common cr n (2 -6 mm), Co | re, 10-20 mm, 1-2mm) 2%, medium utans, 10-50% of ncretions; Field | | |



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 1C2 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

Observation Notes

Detailed site, samples 86-90

Site Notes

cleared woodland, brown cracking clay, crabhole microrelief

| Project Name: | STYX SOUTH C | OAL PROJ | ECT SOIL | AND LAND CAPABILI | TΥ |
|---------------|-----------------|-----------|----------|-------------------|----|
| Project Code: | J000019 | Site ID: | 027 | Observation | 1 |
| Agency Name: | Horizon Soil Su | rvey (NT) | | | |

Laboratory Test Results:

| Depth | pH 1:5 ECExcha | CExchangeable Cations Mg K Na | | Na | CEC | ESP | СІ |
|-----------|----------------|----------------------------------|-----|------|-------------|-----|-------|
| cm | dS/m | wig | ĸ | 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 122A70* | | | | | | |
| 0.8 - 0.9 | 8.7A 285A280* | | | | | | |
| 1.1 - 1.2 | 9.3A 727A670* | | | | | | |
| | | | | | | | |

| Depth | Organic | Total | Avail. | Total | Extr. | | | Trace Elem | nents | |
|--|----------|------------|------------|------------|------------|------|-----|------------|----------|------|
| cm | C % n | N ng/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg/ | Zn kg | В |
| 0 - 0.1 0.2 - 0.3 0.5 - 0.6 0.8 - 0.9 | <0.5D 10 | 060E | 24J | <200 | 7* | 1.34 | 177 | 136 | <1 | <0.2 |

1.1 - 1.2



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 028 | ND LA OI | ND CAPA bservatio | ABILITY n ID: ′ | , 1 |
|--|---|--|---|---|---|---|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: Geology | 1 I. Hollingsworth 10/05/12 GPS S.A. Off 7486440 AMG zone: 55 773878 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Mamelon, 36 metres 756 Very slow Imperfect | photos s | 92-94 d |
| ExposureType: Geol. Ref.: | Soil pit Qpa , Alluvium | Conf. Sub. Substrate M | is Pareı Material | nt. Mat.: : | Almost Soil pit, | certain or certain 1 m deep,Fragmental, Bedded, Porous, |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-39 | % | | Pattern T | уре: | Terraced land (alluvial) |
| Morph. Type: Elem. Type: Slope: | Flat Terrace flat 0.5 % | Relief: Slope Cate Aspect: | gory: | 5 metres Level 20 degree | es | |
| Surface Soil Co | ndition Hardsetting | | | | | |
| Erosion: Stable (shee | e, Minor scalding (scald) Stable, Mo t) Microrelief: | derate Crabhole gilga | ai | | Vert.(m | n) 0.1 Horiz.(m) 5 |
| Australian Soil Cl Vertic Subnatric Br Clayey Moderately ASC Confidence: All necessary anal | on assification: own Sodosol Medium Non-gravelly deep : podzolic soil lytical data are available. | Clay-loamy | Mappir Princip Great S Land C | ng Unit: bal Profile Soil Group Class: | Form:): | Pv Dy2.42 Grey-brown Land Class: C2 |
| <u>Site</u> Vegetation: | Complete clearing. Pasture, nativ | ve or improve | d, but ne | ever cultiva | ited | |
| regetation | Tall Strata - Tree, 6.01-12m, Isola | ated plants. * | Species | includes - | Eucalyp | tus crebra |
| Surface Coarse | 0-2%, medium gravelly, 6-20mm | , subrounded | , Conglo | omerate | | |
| <u>Profile</u> 1A1 0 - 0.1 m | Very dark grey (7.5YR3/1-Moist); Subangular blocky; Rough-ped fa macropores, Moist; Firm consiste medium gravelly, 6-20mm, subro (Raupach); Many, fine (1-2mm) r | ; , 0-0% ; Fine abric; Fine, (0 ence; Modera ounded, dispe roots; Clear, S | e sandy) - 5) mn tely plas rsed, Co Smooth o | loam; Mod n crack; Ma stic; Norma onglomerat change to - | erate gra any (>5 p I plasticit e, coarse | nde of structure, 5-10 mm, er 100mm2) Fine (1-2mm) y; Moderately sticky; 2-10%, e fragments; Field pH 6.5 |
| 1A2e 0.1 - 0.4 r | n Pinkish grey (7.5YR4/6-Moist); M grade of structure; Earthy fabric; macropores, Moist; Firm consiste gravelly, 2-6mm, rounded, coarse Concretions; Field pH 6.5 (Raupa | lottles, 7.5YR Fine, (0 - 5) r ence; Very pla e fragments; ach); Commo | 844, 10-2 mm crac astic; No Few (2 - n, fine (⁻ | 20% , 0-5m k; Commol ormal plasti 10 %), Fe 1-2mm) roo | im, Distir n (1-5 pe city; Mod rromanga ots; Clear | nct; Fine sandy loam; Massive er 100mm2) Fine (1-2mm) lerately sticky; 0-2%, fine aniferous, Fine (0 - 2 mm), r, Wavy change to - |
| 1B21ss 0.4 - 0.5 r | n Dark yellowish brown (10YR4/6-1 mm, Polyhedral; Moderate grade crack; Few (<1 per 100mm2) Fin Normal plasticity; Very sticky; 0-2 coarse fragments; Common cuta 50% of ped faces or walls coated Wavy change to - | Moist); , 0-0% e of structure, e (1-2mm) m 2%, medium (ns, 10-50% c d, distinct; Fie | ; Mediu 10-20 m acropore gravelly, of ped fa ld pH 6. | um heavy c nm, Lenticu es, Moist; \ 6-20mm, s ces or wall 5 (Raupacl | lay; Mod lar; Smo /ery firm subround s coated n); Few, | lerate grade of structure, 5-10 hoth-ped fabric; Fine, (0 - 5) mm consistence; Very plastic; led, dispersed, Conglomerate, , distinct; Common cutans, 10- fine (1-2mm) roots; Diffuse, |
| 1B22ss 0.5 - 0.7 r | n Dark yellowish brown (10YR4/6-1 Lenticular; Smooth-ped fabric; Fi macropores, Moist; Very firm coi gravelly, 6-20mm, subrounded, d ped faces or walls coated, distin change to - | Moist); , 0-0% ne, (0 - 5) mr nsistence; Ve lispersed, Co ct; Field pH 6 | 5 ; Mediu n crack; ery plasti nglomer 5.5 (Rauj | um clay; Mo Common (ic; Normal rate, coarse pach); Few | oderate g 1-5 per 2 plasticity fragment , very fin | rade of structure, 10-20 mm, 100mm2) Very fine (0.075-1mm) ; Very sticky; 0-2%, medium nts; Common cutans, 10-50% of le (0-1mm) roots; Diffuse, Wavy |
| 1C1 0.7 - 0.9 r | n Dark yellowish brown (10YR4/6-I Lenticular; Smooth-ped fabric; Fi macropores, Moist; Very firm cor gravelly, 6-20mm, subrounded, d ped faces or walls coated, distin | Moist); , 0-0% ne, (0 - 5) mr nsistence; Ver lispersed, Co ct; Field pH 6 | 5; Mediu n crack; ry plastio nglomer 5.5 (Rauj | um clay; Mo Common (c; Normal p rate, coarse pach); Diffu | oderate g 1-5 per 2 lasticity; e fragmen use, Wav | grade of structure, 10-20 mm, 100mm2) Fine (1-2mm) Very sticky; 0-2%, medium nts; Common cutans, 10-50% of y change to - |



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 1C2 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: Project Code: Agency Name: Laboratory Test | | STYX SO J000019 Horizon S | JTH C Soil Su | COAL PROJE Site ID: Jrvey (NT) | ECT SC 028 | DIL AI | ND LAN Obs | D CAPABI ervation | LITY 1 |
|---|------|---------------------------------|------------------|--------------------------------------|---------------|---------|-----------------|----------------------|-----------|
| Laboratory | Test | Results: | | | | | | | |
| Depth | рН | 1:5 EC | | Exchangeable | Cations | | CEC | ESP | CI |
| cm | | dS/m | | Ca | Mg | K Cm | Na ol (+)/kg | % | 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 | 20* |
| 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 | 680* |

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



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND I 029 | AND CAPAE | BILITY ID: 1 | | | |
|--|---|--|---|--|--|---|-------------------------|
| Site Informatio Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | <u>n</u> I. Hollingsworth 10/05/12 GPS S.A. Off 7486004 AMG zone: 55 774473 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, p 40 metres 756 Slow Poorly drair | ohotos 93 ned | 3-95 | | |
| <u>Geology</u> ExposureType: Geol. Ref.: | Soil pit Qpa , Alluvium | Conf. Sub. is Pa Substrate Mater | rent. Mat.: A ial: S | Almost ce Soil pit, 1 | ertain or certair ⊢m deep,Fragn | n nental, Bedded | , Porous, |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern Ty | pe: 7 | Ferraced land (| (alluvial) | |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Category: Aspect: | 5 metres : Level 120 degree | es | | | |
| Surface Soil Co | Distribution Hardsetting | | | | | | |
| Soil Classificat | e, Minor scalding (scald) Stable, Mo et) Microrelief: ion | oderate Crabhole gilgai | | Vert.(m) | 0.2 Horiz.(m | i) 10 | |
| Australian Soil C Vertic Mesonatric Clayey Moderately ASC Confidence | Grey Sodosol Medium Non-gravelly (deep : podzolic soil | Map Clay-loamy Prin Grea | ping Unit: cipal Profile Fo at Soil Group: | orm: [| Pv Dy2.33 Grey-brown | | |
| All necessary and | lytical data are available. | Lan | d Class: | I | Land Class: | C2 | |
| <u>Site</u> Vegetation: | Complete clearing. Pasture, nati | ve or improved, bu | t never cultivate | ed | | | |
| | Tall Strata - Tree, 6.01-12m, Iso | lated plants. *Spec | ies includes - E | lucalyptu | is crebra | | |
| Surface Coarse | No surface coarse fragments | | | | | | |
| 1A1 0 - 0.1 m | Dark grey (10YR4/1-Moist); , 0-0 Subangular blocky; Rough-ped f macropores, Moist; Firm consist medium gravelly, 6-20mm, subro (Raupach); Many, fine (1-2mm) | 0% ; Fine sandy loa fabric; Fine, (0 - 5) f ence; Moderately p bunded, dispersed, roots; Clear, Smoo | m; Moderate gr mm crack; Few lastic; Normal p Conglomerate, th change to - | rade of s v (<1 per plasticity , coarse | structure, 5-10 0.01m2) Fine (; Moderately st fragments; Fie | mm, (1-2mm) ticky; 2- 10%, ild pH 5.5 | |
| 1A2e 0.1 - 0.3 Massive | m Greyish brown (10YR7/2-Moist); | Mottles, 10YR44, | 2-10% , 0-5mm | n, Distinc | t; Clay loam, s | andy; | |
| | grade of structure; Earthy fabric; macropores, Moist; Firm consist gravelly, 6-20mm, subrounded, Common, fine (1-2mm) roots; Cl | Fine, (0 - 5) mm ci ence; Very plastic; dispersed, Conglon ear, Wavy change | rack; Few (<1 p Normal plasticit nerate, coarse f to - | ber 0.01n ty; Mode fragment | n2) Fine (1-2m erately sticky; 2 ts; Field pH 6 (| ım) 2-10%, mediu Raupach); | m |
| 1B2ss 0.3 - 0.5 20 | m Dark greyish brown (10YR4/2-M | oist); , 0-0% ; Light | medium clay; N | Moderate | e grade of strue | cture, 10- | |
| | mm, Polyhedral; Moderate grade crack; Few (<1 per 100mm2) Fir Normal plasticity; Very sticky; 0- coarse fragments; Common cuta 50% of ped faces or walls coated Wavy change to - | e of structure, 10-20 ne (1-2mm) macrop 2%, medium grave ans, 10-50% of ped d, distinct; Field pH | 0 mm, Lenticula ores, Moist; Ve lly, 6-20mm, su faces or walls 7.5 (Raupach) | ar; Smoo ery firm c ibrounde coated, c i; Few, fir | oth-ped fabric; I consistence; Ve ed, dispersed, distinct; Comm ne (1-2mm) roo | Fine, (0 - ery plastic; Conglomerate non cutans, ots; Diffuse | 5) mm , 10- e, |
| 1B3kss 0.5 - 0.8 Lenticula | m Brown (10YR4/3-Moist); , 0-0% ; | ; Light medium clay | ; Moderate gra | de of str | ucture, 10-20 r | mm, | |
| 2011000 | Smooth-ped fabric; Fine, (0 - 5) macropores, Moist; Very firm co gravelly, 6-20mm, subrounded, ped faces or walls coated, distir pH 8.5 (Raupach); Few, fine (1-2) | mm crack; Commo nsistence; Very pla dispersed, Conglon nct; Very few (0 - 2 2mm) roots; Diffuse | n (1-5 per 100n stic; Normal pla nerate, coarse f %), Calcareous e, Wavy change | mm2) Ve asticity; \ fragment s, Mediur e to - | ry fine (0.075- /ery sticky; 0-2 ts; Common cu m (2 -6 mm), N | 1mm) !%, mediu utans, 10- lodules; Field | m 50% of |
| 1C1 0.8 - 1 m | Brown (10YR4/3-Moist); , 0-0% Smooth-ped fabric; Fine, (0 - 5) macropores, Moist; Very firm co gravelly, 6-20mm, subrounded, (| ; Light medium clay mm crack; Commo nsistence; Very pla dispersed, Conglon | r; Moderate grad n (1-5 per 100n stic; Normal pla nerate, coarse f | ide of stro nm2) Ve asticity; V fragment | ucture, 10-20 r ry fine (0.075-´ /ery sticky; 0-2 ts; Common cu | mm, Lenticular; 1mm) ?%, medium utans, 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

| Depth | рН | 1:5 EC | Ca E | xchangeable | Cations | Na | | CEC | ESP | CI |
|-----------|------|--------|------|-------------|---------|-----|-----------|-------|-------|-------|
| cm | | dS/m | Ca | | | na | Cmol (+)/ | | g % | mg/kg |
| 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 | Organic | Total | Avail. | Total | Extr. | | 1 | race Elen | nents | |
|----------------------|---------|------------|------------|------------|------------|----|-----|-----------|----------|------|
| cm | С % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg/ | Zn kg | В |
| 0 - 0.1 0 2 - 0 3 | 0.6D | 980E | 21J | 700 | 10* | <1 | 174 | 163 | 1.2 | <0.2 |
| 0.5 - 0.6 | 620E | 2J | | <200 | 28* | | | | | |
| 1.1 - 1.2 | 340E | <2J | | <200 | 74* | | | | | |



| Project Na Project Co Agency N | ame: ode: lame: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | CT SOIL A 030 | ND LA Ot | ND CAPA Diservatio | ABILITY on ID: 1 | , I | | | |
|---|-----------------------------|--|--|--|---|--|---|---|---------------------------|--|
| Site Inform Desc. By: Date Desc. Map Ref.: Northing/L Easting/La | mation : ong.: t.: | l I. Hollingsworth 10/05/12 GPS S.A. Off 7489035 AMG zone: 55 773535 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Mamelon, 32 metres 756 Moderate Imperfect | , photos S S ly rapid ly drained | 96-100 d | | | |
| Geology ExposureT Geol. Ref.: | уре: | Soil pit Qpa Porous, , Alluvium | Conf. Sub. is Parent. Mat.:Almost certain or cSubstrate Material:Outcrop, 1 m deep. | | | certain or certai , 1 m deep,Frag | n gmental | l, Bedded, | | |
| Land Forr Rel/Slope (| <u>m</u> Class: | Gently undulating plains <9m 1-3% | % | | Pattern T | уре: | Terraced land | (alluvial |) | |
| Morph. Typ Elem. Type Slope: Surface S | be: a: Soil Co | Simple-slope Terrace plain 1 % ndition Hardsetting | Relief: Slope Cate Aspect: | gory: | 5 metres Very gent 0 degrees | tly sloped s | I | | | |
| Erosion: Active, Moderate scalding (scald) Active, Moderate (sheet) Active, Moderate (gully) Active, Present Horiz.(m) Microrelief: Melonhole gilgai Vert.(m) 0.5 (stbank) 10 Vert.(m) Horiz.(m) 10 | | | | | | | | 0.5 | | |
| Soil Classification Mapping Unit: Pv Australian Soil Classification: Principal Profile Form: Dy2.43 Clayey Moderately deep Great Soil Group: Grey-brown ASC Confidence: podzolic soil Not be below for the below fo | | | | | | | | | | |
| <u>Site</u> <u>Vegetatio</u> | <u>n:</u> | Complete clearing. Pasture, nativ | e or improve | d, but ne | ever cultiva | ated | | 01 | | |
| Surface C | oarse | 2-10%, medium gravelly, 6-20mn | n, subrounde | Species d, Congl | omerate | Acacia n | larpopnylla | | | |
| 1A1 0 - | - 0.1 m | Dark grey (10YR4/1-Moist); , 0-0 blocky; Rough-ped fabric; Fine, (Moist; Moderately plastic; Norma subrounded, dispersed, Conglom change to - | % ; Clay loam 0 - 5) mm cra I plasticity; M lerate, coarse | n; Moder lick; Man oderatel e fragme | rate grade y (>5 per 0 y sticky; 2- nts; Field p | of structu).01m2) F -10%, me pH 5.5 (R | ure, 2-5 mm, Su Fine (1-2mm) m edium gravelly, Raupach); Clear | ibangula acropo 6-20mn ; Smoo | ar res, 1, th | |
| 1A3 0. ⁻ | 1 - 0.3 n | n Greyish brown (10YR5/2-Moist); blocky; Rough-ped fabric; Fine, (Moist; Very plastic; Normal plasti dispersed, Conglomerate, coarse | , 0-0% ; Clay 0 - 5) mm cra city; Moderate fragments; F | loam; M ick; Man ely stick ⁻ ield pH | loderate gi y (>5 per 1 y; 2-10%, r 6 (Raupac | rade of st 100mm2) medium g ch); Diffus | tructure, 5-10 m Fine (1-2mm) i gravelly, 6-20m se, Wavy chang | im, Ang macrop m, subr je to - | jular ores, ounded, | |
| 1B21 0.3 | 3 - 0.5 n | n Dark greyish brown (10YR4/2-Mc Angular blocky; Smooth-ped fab macropores, Moist; Very plastic; subrounded, dispersed, Conglom coated, distinct; Common cutans Diffuse, Wavy change to - | 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) nacropores, 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 0.4 | 5 - 0.7 n | Diffuse, Wavy change to - 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: Project Code: Agency Name: | STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY J000019 Site ID: 030 Observation ID: 1 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 locky, | 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 No | <u>otes</u> as |

Observation Notes Check site, not sampled

Site Notes

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



| Project Project Agency | Name: Code: Name: | STYX SOUTH COAL PRO J000019 Site ID: Horizon Soil Survey (NT) | JECT SOIL A 031 | ND LAI Ot | ND CAPA servatio | ABILITY on ID: | r 1 | | |
|---|---|--|---|--|---|--|--|--|--|
| Cita Inf | ormotion | | | | | | | | |
| Desc. By Date De Map Ref Northing Easting/ | y: sc.: g/Long.: 'Lat.: | 1. Hollingsworth 11/05/12 GPS S.A. Off 7485720 AMG zone: 55 773623 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Brussels, 37 metres 756 Slow Imperfect | photos s ly draine | 101-104 ed | | |
| <u>Geolog</u> Exposu Geol. Re | <u>V</u> reType: ef.: | Soil pit Qpa | Conf. Sub. Substrate I | is Paren Material: | nt. Mat.: | Almost Soil pit, , Alluviu | certain or certa 1 m deep,Frag um | in mental, Bedde | d, Porous, |
| <u>Land F</u> Rel/Slop | orm e Class: | Gently undulating plains <9m 1- | -3% | | Pattern T | уре: | Terraced land | (alluvial) | |
| Morph. ⁻ Elem. Ty Slope: <u>Surface</u> | Гуре: /pe: e Soil Coi | Flat Terrace plain 0.5 % ndition Hardsetting | Relief: Slope Cate Aspect: | gory: | 5 metres Level 10 degree | es | | | |
| Erosior | <u>1:</u> Stable | e, Minor scalding (scald) Stable, N | linor (sheet) Microrelief: | Crabhol | e gilgai | Vert.(r | n) 0.2 Horiz.(n | ר) 10 | |
| Soil Cla Australia Vertic Hy Ioamy Cl ASC Co | an Soil Cla pernatric E ayey Mode onfidence: | <u>on</u> assification: Brown Sodosol Medium Non-grav erately deep | elly Clay- | Mappin Princip Great S | g Unit: al Profile Soil Group | Form:): | Pv Dy2.43 Grey-brown podzolic soil | | |
| All nece | ssary anal | ytical data are available. | | Land C | lass: | | Land Class: | C2 | |
| Site | | Complete clearing, Pasture, n | ative or improv | ed. but n | ever cultiv | vated | | | |
| Vegeta | tion: | • - · · · · · · · · · · · · · · · · · · | | , | | | | | |
| Surface | e Coarse | Tall Strata - Tree, 6.01-12m, 2-10%. medium c | lsolated plants. aravellv. 6-20m | *Specie m. subro | s includes unded. Co | - Eucaly | ∕ptus crebra ∵ate | | |
| Profile | | , | ,,, - <u>_</u> | , | , | | | | |
| 1A1 | 0 - 0.1 m | Grey (10YR5/1-Moist); , 0 Subangular blocky; Rougl macropores, Moist; Firm o medium gravelly, 6-20mm (Raupach); Many, fine (1- | -0%; Fine sam n-ped fabric; Fin consistence; Mo n, subrounded, r 2mm) roots; Cl | dy clay lo ne, (0 - 5 oderately disperse ear, Smo | oam; Mode) mm crac plastic; N d, Conglor ooth chang | erate gra k; Comr ormal pl merate, o je to - | de of structure, non (1-5 per 0.0 asticity; Modera coarse fragment | 5-10 mm, 1m2) Fine (1-2 tely sticky; 2-10 s; Field pH 6 | 'mm) 0%, |
| TAZe | 0.1 - 0.2 h | grade of structure; Earthy macropores, Moist; Firm of gravelly, 6-20mm, subrou Common, fine (1-2mm) ro | v fabric; Fine, (C consistence; Ve nded, disperse lots; Clear, Sm | , 7.51R4) - 5) mm ery plastic d, Congle ooth chai | 4, 10-20% n crack; Fe c; Normal omerate, c nge to - | ew (<1 pe plasticity coarse fra | r; Distinct, Fine er 0.01m2) Fine r; Moderately sti agments; Field p | (1-2mm) cky; 2-10%, me bH 6 (Raupach | edium); |
| 1B21ss | 0.2 - 0.4 n | n Brown (10YR4/3-Moist); , Moderate grade of structu per 100mm2) Fine (1-2mr Very sticky; 2-10%, mediu Common cutans, 10-50% walls coated, distinct; Fiel | 0-0% ; Sandy I ire, 10-20 mm, n) macropores, im gravelly, 6-2 of ped faces of d pH 6 (Raupad | light clay Lenticula Moist; V Omm, su r walls co ch); Com | ; Moderate ar; Smooth /ery firm co ibrounded bated, disti imon, fine | e grade o i-ped fab onsisten , dispers inct; Cor (1-2mm | of structure, 5-10 pric; Fine, (0 - 5) ce; Very plastic; ed, Conglomera nmon cutans, 10) roots; Diffuse, | 0 mm, Polyhed mm crack; Fev Normal plastic ate, coarse frag 0-50% of ped fa Wavy change f | ral; w (<1 sity; jments; aces or to - |
| 1B22ss | 0.4 - 0.6 n | n Brown (7.5YR4/3-Moist); Lenticular; Smooth-ped fa macropores, Moist; Very f gravelly, 6-20mm, subrou ped faces or walls coated change to - | , 0-0% ; Mediur bric; Fine, (0 îrm consistence nded, dispersed I, distinct; Field | n heavy 5) mm cr e; Very p d, Conglo pH 8 (Ra | clay; Mode ack; Comi lastic; Nor omerate, c aupach); F | erate gra mon (1-5 mal plas coarse fra Few, fine | ide of structure, 5 per 100mm2) l ticity; Very stick agments; Comm (1-2mm) roots; | 10-20 mm, Fine (1-2mm) y; 2-10%, med non cutans, 10- Diffuse, Wavy | ium 50% of |
| 1B3ss | 0.6 - 0.9 n | n Brown (7.5YR4/3-Moist); Lenticular; Smooth-ped fa macropores, Moist; Very f gravelly, 6-20mm, subrou ped faces or walls coated change to - | , 0-0% ; Mediur bric; Fine, (0 - irm consistence nded, disperse I, distinct; Field | n heavy 5) mm cr e; Very p d, Conglo pH 8 (Ra | clay; Mode ack; Comi lastic; Nor omerate, c aupach); F | erate gra mon (1-5 mal plas coarse fra Few, fine | ide of structure, 5 per 100mm2) l ticity; Very stick agments; Comn (1-2mm) roots; | 10-20 mm, Fine (1-2mm) y; 2-10%, med non cutans, 10- Diffuse, Wavy | ium 50% of |
| 1C2 | 1 - 1.5 m | Brown (7.5YR4/3-Moist); | , 0-0% ; Mediur | n clay; N | loderate g | rade of s | structure, 10-20 | mm, Lenticular | -; |
| Soil and | Land Suit | ability | , | , , | 3 | | , | Project J000 | 081 |

oje



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

bleached, rusty root mottles

Observation Notes

Detailed site, ponded pasture site, samples 101-105

Site Notes

1A2e

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

| Depth cm | рН | 1:5 EC dS/m | Са | Exchangeable Mg | Cations K | Na Cmo | CEC ol (+)/kg | ESP % | CI 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 | Organic | Total | Avail. | Total | Extr. | | Trace Elements | | | | | |
|-----------|---------|------------|------------|------------|------------|------|----------------|------------|---------|------|--|--|
| cm | C % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg/k | Zn g | В | | |
| 0-0.1 | 1.2D | 1680E | 18J | 280 | 6* | 1.01 | 441 | 142 | 2.6 | <0.2 | | |
| 0.5 - 0.6 | | 50E | <2J | <200 | 77* | | | | | | | |
| 1.1 - 1.2 | | 470E | <2J | <200 | 72* | | | | | | | |



| Project Project Agency | Name: Code: V Name: | STYX SOUTH COAL PR J000019 Site ID Horizon Soil Survey (N | OJECT SOIL A 9: 032 F) | ND LAI Ot | ND CAPA servatio | ABILIT` n ID: | Y 1 | |
|--|---|---|---|--|---|---|--|--|
| Site Inf Desc. B Date De Map Ref Northing Easting | ormation y: sc.: f.: g/Long.: /Lat.: | I. Hollingsworth 11/05/12 GPS S.A. Off 7486010 AMG zone: 55 772968 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Brussels, 41 metres 756 Slow Poorly dra | photos | 105-107 | |
| Exposu Geol. Re | I <u>V</u> reType: əf.: | Soil pit Qpa | Conf. Sub. Substrate M | is Paren Iaterial: | t. Mat.: | Almost Soil pit , Alluvi | certain or certain , 1 m deep,Fragmental, Bedded, Porous, um | |
| <u>Land F</u> Rel/Slop | orm oe Class: | Gently undulating plains <9m | 1-3% | | Pattern T | уре: | Terraced land (alluvial) | |
| Morph. ⁻ Elem. Ty Slope: | Туре: уре: | Flat Terrace plain 0.5 % | Relief: Slope Cate Aspect: | gory: | 5 metres Level 10 degree | es | | |
| Surface Erosion Soil Cla | e Soil Con <u>n:</u> Partial (sheet assification | ndition Hardsetting, Moderate scalding (scald) Pa Partial, Moderate (gully) | Cracking artial, Moderate Microrelief: | Crabhol | e gilgai | Vert.(r | n) 0.2 Horiz.(m) 10 | |
| Australi Vertic Hy Clayey M ASC Co | an Soil Cla ypernatric (Aoderately onfidence: | issification: Grey Sodosol Medium Non-gra deep | avelly Clay-loamy | Mappin Princip Great S | g Unit: al Profile I soil Group | Form: : | Pv Dy2.43 Grey-brown podzolic soil | |
| Analytic <u>Site</u> Vegeta | al data are <u>tion:</u> | Incomplete but reasonable co Complete clearing. Pasture | nfidence. , native or improve | Land C ed, but n | lass: ever cultiv | ated | Land Class: C2 | |
| Surface | e Coarse | 2-10%, mediur | n gravelly, 6-20mr | n, round | ed, Ferricr | ete | ypius ciebia | |
| Profile 1A1 | 0 - 0.1 m | Very dark grey (2.5Y3/ Subangular blocky; Roi 5mm) macropores, Moi 10%, medium gravelly, (Raupach); Many, fine | 1-Moist); , 0-0% ; I ugh-ped fabric; Me ist; Firm consisten 6-20mm, subroun (1-2mm) roots; Cle | Fine san edium, (5 ce; Mod ded, dis ear, Smo | dy clay loa 5 - 10) mm erately plas persed, Co oth chang | m; Mod crack; I stic; Noi onglome e to - | erate grade of structure, 10-20mm, Many (>5 per 100mm2) Medium (2- rmal plasticity; Moderately sticky; 2- rrate, coarse fragments; Field pH 5.5 | |
| 1A2e | 0.1 - 0.2 n | n 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 100mm2) 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 n | 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 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; 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 n | 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 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%), 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 n | Greyish brown (2.5Y5/3 Lenticular; Smooth-ped macropores, Moist; Firr gravelly, 6-20mm, subr ped faces or walls coa Field pH 8 (Raupach); | 3-Moist); , 0-0% ; N I fabric; Fine, (0 - { m consistence; Ve ounded, dispersed ted, distinct; Few (Few, fine (1-2mm) | Medium 5) mm cr ry plastic d, Congle (2 - 10 % roots; D | neavy clay ack; Few (c; Normal p omerate, co), Mangan iffuse, Wa | ; Moder <1 per blasticity oarse fra iferous, vy chan | ate grade of structure, 20-50 mm, 100mm2) Medium (2-5mm) r; Very sticky; 2-10%, medium agments; Common cutans, 10-50% of Medium (2 -6 mm), Concretions; ge to - | |
| 1C1 | 0.8 - 1.1 n | Greyish brown (2.5Y5/3 | 3-Moist); , 0-0% ; N | Medium | clay; Mode | rate gra | ade 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

bleached, rusty root mottles

Observation Notes

Detailed site, samples 106-110

Site Notes

1A2e

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

| Project Na | me: | STYX SO | JTH | COAL PROJE | ECT SC | IL A | ND LAN | D CAPABIL | .ITY |
|-------------------|----------|-----------------|-------|--------------|---------|------|--------|-----------|------|
| Project Co | de: | J000019 | | Site ID: 032 | | | Obs | 1 | |
| Agency Na | ame: | Horizon S | oil S | urvey (NT) | | | | | |
| Laboratory | / Test F | <u>Results:</u> | | | | | | | |
| Depth | pН | 1:5 EC | | Exchangeable | Cations | | CEC | ESP | CI |
| | | | Са | Mg | к | Na | | | |

| cm | | dS/m | 9 | Cmol (+)/kg | % | mg/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 | Total | Avail. | Total | Extr. | | | Trace Eler | nents | |
|-------|---------|-------|--------|-------|-------|----|----|------------|-------|---|
| | С | Ν | Р | к | S | Cu | Fe | Mn | Zn | в |
| cm | % | mg/kg | mg/kg | mg/kg | mg/kg | | | mg | /kg | |

0 - 0.1 0.2 - 0.3 0.5 - 0.6 0.8 - 0.9 1.1 - 1.2



| Project Project Agency | Name: Code: v Name: | STYX SOUTH COAL PRO. J000019 Site ID: Horizon Soil Survey (NT) | JECT SOIL A 033 | ND LAI Ob | ND CAPA servatio | ABILITY n ID: | r 1 | | |
|--|---|---|--|--|---|---|--|--|--|
| Site Info Desc. By Date Des Map Ref Northing Easting/ | ormation y: sc.: :: g/Long.: Lat.: | I. Hollingsworth 11/05/12 GPS S.A. Off 7486062 AMG zone: 55 772255 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Mamelon, 45 metres 756 Slow Imperfectl | photos y draine | 108-110 d | | |
| Exposur Geol. Re | <u>Y</u> reType: ef.: | Soil pit Qpa | Conf. Sub. Substrate M | is Paren Aaterial: | t. Mat.: | Almost Soil pit, , Alluviu | certain or certain 1 m deep,Fragmental, Bedded, Porous, im | | |
| <u>Land Fo</u> Rel/Slop | orm e Class: | Gently undulating plains <9m 1- | 3% | | Pattern T | ype: | Terraced land (alluvial) | | |
| Morph. 1 Elem. Ty Slope: | Гуре: /pe: | Flat Terrace plain 0.5 % | Relief: Slope Cate Aspect: | gory: | 5 metres Level 10 degree | es | | | |
| Surface | Soil Co | ndition Surface crust | | | | | | | |
| Erosior Soil Cla | <u>1:</u> Partial (sheet | , Moderate scalding (scald) Partia)) | al, Moderate Microrelief: | Crabhol | e gilgai | Vert.(n | n) 0.1 Horiz.(m) 5 | | |
| Australia Vertic Su Clayey M ASC Co Analytica | an Soil Cla Ibnatric Gro Ioderately Infidence: al data are | issification: sy Sodosol Medium Non-gravelly deep incomplete but reasonable confid | Clay-loamy dence. | Mappin Principa Great S Land C | g Unit: al Profile coil Group lass: | Form: : | Pv Dy2.33 Grey-brown podzolic soil Land Class: C2 | | |
| Site | | Complete clearing Pasture n | ative or improv | ed but n | ever cultiv | ated | | | |
| Vegetat Surface Profile 1A1 | t <mark>ion:</mark> • Coarse 0 - 0.1 m | Tall Strata - Tree, 6.01-12m, I 2-10%, cobbly, 60 Dusky red (2.5Y3/1-Moist) Subangular blocky: Bound | solated plants.)-200mm, roun); , 0-0% ; Fine | *Species ded, Con sandy cl | s includes glomerate ay loam; M | - Eucaly | ptus crebra grade of structure, 5-10 mm, common (1-5 per 0.01m2) Fine (1- | | |
| | | 2mm) macropores, Moist; Field pH 5.5 (Raupach); M | Firm consisten lany, fine (1-2n | nm) roots | erately pla s; Clear, Si | stic; Nor mooth cl | mal plasticity; Moderately sticky; nange to - | | |
| 1A2 | 0.1 - 0.3 n | Weak red (2.5Y4/1-Moist) 5) mm crack; Few (<1 per Normal plasticity; Moderat Concretions; Field pH 6.5 | 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 n | 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 n | Reddish brown (2.5Y4/4-N Lenticular; Smooth-ped fa macropores, Moist; Very fi 10-50% of ped faces or wa Concretions; Soil matrix is Wavy change to - | Aoist); , 0-0% ; bric; Fine, (0 - ; irm consistence alls coated, dis s Slightly calcar | Medium 5) mm cr e; Very p tinct; Cor eous; Fie | heavy clay ack; Few (lastic; Nori nmon (10 eld pH 9 (F | /; Moder <1 per 1 mal plas - 20 %), Raupach | ate grade of structure, 10-20mm, 00mm2) Very fine (0.075-1mm) ticity; Very sticky; Common cutans, Manganiferous, Medium (2 -6mm),); Few, fine (1-2mm) roots; Diffuse, | | |

Morphological Notes


Project Name:STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:033Observation ID:1Agency 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 Nar Project Co Agency Na | me: de: me: | STYX SOI J000019 Horizon S | JTH (ioil S | COAL PROJE Site ID: urvey (NT) | ECT SC 033 | DIL AI | ND LANI Obs | O CAPAB ervation | ILITY 1 |
|--|-------------------|----------------------------------|-----------------|--------------------------------------|---------------|----------|----------------|---------------------|------------|
| Laboratory | Test | <u>Results:</u> | | | | | | | |
| Depth | рН | 1:5 EC | | Exchangeable | Cations | | CEC | ESP | CI |
| cm | | dS/m | Ca | Mg | ĸ | Na Cm | ol (+)/kg | % | mg/kg |
| 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 Project Agency | Name: Code: / Name: | STYX SOUTH COAL PRC J000019 Site ID: Horizon Soil Survey (NT) | DJECT SOIL AND 034 | LAND CAPA Observatio | ABILIT on ID: | Y 1 |
|---|---|---|--|--|---|---|
| Site Inf Desc. By Date Des Map Ref Northing Easting/ | ormation y: sc.: g/Long.: 'Lat.: | 1 I. Hollingsworth 11/05/12 GPS S.A. Off 7485719 AMG zone: 55 771491 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, 57 metres 756 Moderate Imperfect | , photos s ly rapid ly draine | s 111-113 ed |
| Exposul Geol. Re | reType: ef.: | Soil pit Qpa | Conf. Sub. is F Substrate Mate | Parent. Mat.: erial: | Almost Soil pit , Alluvi | t certain or certain t, 1 m deep,Fragmental, Bedded, Porous, um |
| Land For Rel/Slop | orm oe Class: | Gently undulating plains <9m 1 | I-3% | Pattern T | Гуре: | Terraced land (alluvial) |
| Morph. ⁻ Elem. Ty Slope: | Гуре: /ре: | Crest Terrace plain 1 % | Relief: Slope Categor Aspect: | 5 metres y: Very gent 60 degree | tly slope es | ed |
| Surface | e Soil Co | ndition Hardsetting | | | | |
| <u>Erosior</u> Soil Cla | <u>1:</u> Stable No gu | e, Minor scalding (scald) Stable, lly erosion (gully) on | Minor (sheet) Microrelief: Cra | abhole gilgai | Vert.(| m) 0.1 Horiz.(m) 5 |
| Australia Vertic Me Clayey I ASC Co Analytic | an Soil Cla esonatric E Moderately onfidence: al data are | assification: Brown Sodosol Medium Non-gra 7 deep Lincomplete but reasonable com | Ma velly Clay-loamy Pri Gr fidence La | opping Unit: incipal Profile eat Soil Group nd Class: | Form: D: | Pv Dy2.43 Grey-brown podzolic soil Land Class: C2 |
| <u>Site</u> Vegetat | tion: | Complete clearing. Pasture, | native or improved, | but never cultiv | /ated | |
| ~ ~ | ~ | Tall Strata - Tree, 12.01-20n | n, Isolated plants. *S | Species include | s - Euca | alyptus crebra |
| Surface | e Coarse | 0-2%, medium g | ravelly, 6-20mm, ro | unded, Ferricre | ete | |
| <u>Profile</u> 1A11 | 0 - 0.1 m | Dark grey (10YR4/1-Moi Subangular blocky; Roug 5mm) macropores, Mois Field pH 6 (Raupach); M | st); , 0-0% ; Fine sa gh-ped fabric; Mediu t; Firm consistence; any, fine (1-2mm) ro | ndy clay loam; l ım, (5 - 10) mm Moderately pla pots; Clear, Sm | Modera i crack; istic; No iooth ch | te grade of structure, 5-10mm, Many (>5 per 100mm2) Medium (2- rmal plasticity; Moderately sticky; ange to - |
| 1A2e | 0.1 - 0.3 r | n Light grey (10YR7/2-Moi grade of structure; Earth macropores, Moist; Wea 20 %), Ferromanganifero 2mm) roots; Clear, Smoo | st); Mottles, 7.5YR4 y fabric; Medium, (5 k consistence; Very pus, Coarse (6 - 20 r oth change to - | 4, 10-20% , 0-5 - 10) mm crack plastic; Norma nm), Concretio | ōmm, Di k; Comn l plastic ns; Fiel | stinct; Fine sandy loam; Massive non (1-5 per 100mm2) Fine (1-2mm) ity; Moderately sticky; Common (10 - d pH 6 (Raupach); Common, fine (1- |
| 1B2ss | 0.3 - 0.5 r | n Brown (10YR4/3-Moist); of structure, 20-50 mm, L Very fine (0.075-1mm) m Common cutans, 10-50% Coarse (6 - 20 mm), Cor change to - | Mottles, 10YR41, 0 .enticular; Smooth-p lacropores, Moist; F 6 of ped faces or wa locretions; Field pH 7 | 2% , 5-15mm, ped fabric; Fine irm consistence ills coated, disti .5 (Raupach); f | Faint; F , (0 - 5) e; Very inct; Col Few, fin | ine sandy clay loam; Moderate grade mm crack; Few (<1 per 100mm2) plastic; Normal plasticity; Very sticky; mmon (10 - 20 %), Manganiferous, e (1-2mm) roots; Diffuse, Wavy |
| 1B3ss | 0.5 - 0.8 r | n Dark greyish brown (10Y mm, Lenticular; Smooth- 1mm) macropores, Mois 10-50% of ped faces or mm), Concretions; Field | R4/2-Moist); , 0-0% ped fabric; Fine, (0 t; Firm consistence; walls coated, distinc pH 8.5 (Raupach); I | ; Medium heav - 5) mm crack; Very plastic; N t; Common (10 Few, fine (1-2m | vy clay; Commo ormal p) - 20 % im) roots | Moderate grade of structure, 20-50 in (1-5 per 100mm2) Very fine (0.075- lasticity; Very sticky; Common cutans,), Manganiferous, Coarse (6 - 20 s; Diffuse, Wavy change to - |
| 1C1 | 0.8 - 1.1 r | n Brown (10YR4/3-Moist); Smooth-ped fabric; Med macropores, Moist; Firm 50% of ped faces or wall Concretions; Field pH 8.5 | , 0-0% ; Medium he ium, (5 - 10) mm cra consistence; Very p s coated, distinct; M 5 (Raupach); Diffuse | avy clay; Mode ack; Common (plastic; Normal lany (20 - 50 % e, Wavy change | erate gra 1-5 per plasticit), Mang e to - | de of structure, 20-50mm, Lenticular; 100mm2) Very fine (0.075-1mm) y; Very sticky; Common cutans, 10- aniferous, Coarse (6 - 20mm), |
| 1C2 | 1.1 - 1.5 r | n Brown (10YR4/3-Moist); Smooth-ped fabric; Fine Moist; Firm consistence; | , 0-0% ; Medium he , (0 - 5) mm crack; I Very plastic; Norma | avy clay; Mode Few (<1 per 10 Il plasticity; Ver | erate gra 0mm2) ' y sticky | ade of structure, 20-50 mm, Lenticular; Very fine (0.075-1mm) macropores, ; Common cutans, 10-50% of ped |



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

Morphological Notes

bleached, rusty root mottles 1A2e

Observation Notes

Project Name:

Detailed site, samples 116-120

Site Notes

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

| Project Co Agency Na | de: me: | J000019 Horizon S | oil S | Site ID: urvey (NT) | 034 | | Obs | ervation | 1 |
|-------------------------|------------|----------------------|-------|------------------------|---------|----------|-----------|----------|-------|
| Laboratory | Test | Results: | | | | | | | |
| Depth | рН | 1:5 EC | - | Exchangeable | Cations | | CEC | ESP | CI |
| cm | | dS/m | Са | Mg | к | Na Cm | ol (+)/kg | % | mg/kg |
| 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* |

STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITY



| Project Project Agency | t Name: Code: y Name: | STYX SOUTH COA J000019 Si Horizon Soil Surve | L PROJECT SOIL / te ID: 035 y (NT) | AND LA Ot | ND CAPA servatio | ABILITY n ID: 1 | , 1 |
|--|--|--|--|--|---|--|--|
| Site Inf Desc. B Date De Map Re Northin Easting | ormation y: sc.: f.: g/Long.: /Lat.: | I. Hollingsworth 11/05/12 GPS S.A. Off 7486119 AMG zone: 55 771215 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | : | Mamelon, 56 metres 756 Slow Imperfectl | photos | 114-116 d |
| Exposu Geol. Re | I <u>V</u> reType: ef.: | Soil pit Kx | Conf. Sub Substrate | . is Parer Material: | ıt. Mat.: | Almost o Soil pit, , Alluviu | certain or certain 1 m deep,Fragmental, Bedded, Porous, m |
| <u>Land F</u> Rel/Slop | orm oe Class: | Gently undulating plains | <9m 1-3% | | Pattern T | ype: | Terraced land (alluvial) |
| Morph. Elem. T Slope: | Туре: уре: | Crest Terrace plain 0.5 % | Relief: Slope Cate Aspect: | egory: | 5 metres Level 80 degree | es | |
| Surface | e Soil Co | ndition Hardse | tting, Hardsetting | | | | |
| Erosio | <u>n:</u> Stable | , Minor scalding (scald) S | Stable, Minor (sheet) Microrelief: | Crabhol | e gilgai | Vert.(m | n) 0.1 Horiz.(m) 10 |
| Soil Cla Australi Vertic M Clayey ASC Co | assification an Soil Cla esonatric E Moderately onfidence: | <u>on</u> assification: irown Sodosol Medium N ⁱ deep | on-gravelly Clay-loam | Mappin y Princip Great S | g Unit: al Profile Soil Group | Form:): | Pv Dy2.43 Grey-brown podzolic soil |
| All nece | ssary anal | ytical data are available. | | Land C | lass: | | Land Class: C2 |
| <u>Site</u> Veqeta | tion: | Complete clearing. Pa | asture, native or improv | ved, but r | ever cultiv | ated | |
| | | Tall Strata - Tree, 12. | 01-20m, Isolated plant | ts. *Speci | es includes | s - Eucal | yptus crebra |
| Surface | e Coarse | 0-2%, coa | arse gravelly, 20-60mr | n, subrou | nded, Basa | alt | |
| Profile | | | | | | | |
| 1A1 | 0 - 0.1 m | Dark grey (10YR4 Subangular blocky 2mm) macropores 2%, medium grave (Raupach); Abunc | /1-Moist); , 0-0% ; Fin y; Rough-ped fabric; M s, Moist; Firm consiste elly, 6-20mm, subroun lant, fine (1-2mm) root | e sandy le ledium, (f nce; Mod ided, disp ts; Clear, | oam; Mode 5 - 10) mm erately plas ersed, Cor Smooth ch | erate grad crack; C stic; Nori nglomera nange to | de of structure, 5-10mm, common (1-5 per 0.01m2) Fine (1- mal plasticity; Moderately sticky; 0- ite, coarse fragments; Field pH 6 - |
| 1A2 | 0.1 - 0.3 n | n Dark grey (10YR4 of structure, 5-10 per 0.01m2) Fine Moderately sticky; fragments; Few (2 (Raupach); Many, | /1-Moist); Mottles, 10 mm, Subangular block (1-2mm) macropores, ; 0-2%, medium gravel 2 - 10%), Ferromanga fine (1-2mm) roots; D | YR44, 2-1 ky; Rough Moist; Fii Ily, 6-20m niferous, viffuse, Wa | 0% , 5-15r -ped fabric m consiste m, subrou Coarse (6 avy change | mm, Dist ; Mediur ence; Ve nded, dis - 20 mm e to - | inct; Fine sandy loam; Weak grade n, (5 - 10) mm crack; Common (1-5 ry plastic; Normal plasticity; spersed, Conglomerate, coarse), Concretions; Field pH 6 |
| 1A2e | 0.3 - 0.4 n | n Light grey (10YR7 mm crack; Few (< Normal plasticity; pH 6.5 (Raupach) | 7/2-Moist); ; Sandy ligh :1 per 0.01m2) Fine (1 Very sticky; Few (2 - 1 ; Many, fine (1-2mm) r | nt clay; Ma -2mm) ma I0 %), Ma roots; Cle | assive grac acropores, nganiferou ar, Wavy c | le of stru Moist; V ıs, Coars hange to | cture; Earthy fabric; Fine, (0 - 5) ′ery firm consistence; Very plastic; se (6 - 20 mm), Concretions; Field o - |
| 1B2ss | 0.4 - 0.6 n | n Yellowish brown (Polyhedral; Moder crack; Few (<1 pe Normal plasticity; cutans, 10-50% of mm), Concretions | 10YR5/4-Moist); ; Mec rate grade of structure r 100mm2) Fine (1-2n Very sticky; Common f ped faces or walls co ; Field pH 6.5 (Raupad | dium heav , 10-20 m nm) macro cutans, 1 pated, dist ch); Comr | ry clay; Mo m, Lenticu opores, Mo 0-50% of p inct; Few (non, fine (| derate g llar; Smo pist; Very ped faces 2 - 10 % 1-2mm) r | rade of structure, 5-10 mm, ooth-ped fabric; Fine, (0 - 5) mm r firm consistence; Very plastic; s or walls coated, distinct; Common), Manganiferous, Coarse (6 - 20 roots; Diffuse, Wavy change to - |
| 1B3ss | 0.6 - 0.8 n | n Yellowish brown (Lenticular; Smootl macropores, Mois 10-50% of ped fac Concretions; Field | 10YR5/6-Moist); ; Mec h-ped fabric; Fine, (0 - t; Very firm consistenc ses or walls coated, dia pH 7.5 (Raupach); Co | dium heav 5) mm cr ce; Very p stinct; Fev ommon, f | ry clay; Mo rack; Comr lastic; Norr w (2 - 10 % ine (1-2mn | derate g non (1-5 mal plast b), Manga n) roots; | rade of structure, 10-20mm, per 100mm2) Fine (1-2mm) ticity; Very sticky; Common cutans, aniferous, Coarse (6 - 20mm), Diffuse, Wavy change to - |
| 1C1 | 0.8 - 1.1 n | n Yellowish brown (| 10YR5/6-Moist); Mottle | es, 2.5YR | 41, 10-209 | % , 5-15r | mm, 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 | рН | 1:5 EC dS/m | Ca | Exchangeable Mg | Cations K | Na Cmo | CEC | ESP % | Cl ma/ka |
|-----------|------|----------------|------|--------------------|--------------|-----------|------|----------|-------------|
| 0 - 0.1 | 5.8A | 22A | 0.9* | 1.1 | 0.1 | <0.1 | 2.1* | ,, | <10* |
| | 0.74 | 10.4 | | | | | | | 40* |
| 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 | Organic | Total | Avail. | Total | Extr. | | ٦ | Frace Elen | nents | |
|-----------|---------|------------|------------|------------|------------|----|-----|------------|----------|------|
| cm | C % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg/ | Zn kg | В |
| 0-0.1 | <0.5D | 530E | <2J | <200 | 8* | <1 | 112 | 145 | <1 | <0.2 |
| 0.5 - 0.6 | | 240E | <2J | <200 | 13* | | | | | |
| 1.1 - 1.2 | | 90E | <2J | <200 | 10* | | | | | |



| Project Project Agency | t Name: t Code: y Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | CT SOIL AN 036 | D LAI Ob | ND CAPA servatio | BILITY n ID: | r 1 | | | | |
|--|---|---|---|---|--|--|--|---|--|--|---|
| Site Inf Desc. B Date De Map Ref Northing Easting | formation y: sc.: f.: g/Long.: /Lat.: | L I. Hollingsworth 11/05/12 GPS S.A. Off 7484450 AMG zone: 55 776355 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | crabhole 43 metres 756 Slow Poorly dra | microrel | ief, ; Brus | sels, ph | notos 1 ⁻ | 17-119 | |
| <u>Geolog</u> Exposu Geol. Re | <u>IV</u> reType: ef.: | Soil pit Qpa | Conf. Sub. is Substrate Ma | Paren terial: | t. Mat.: | Almost Soil pit, , Alluviu | certain or 1 m deep ım | certain o,Fragm | ental, E | Bedded, Porous | , |
| <u>Land F</u> Rel/Slop | orm pe Class: | Gently undulating plains <9m 1-3% | % | | Pattern T | ype: | Terraceo | l land (a | alluvial) | | |
| Morph. Elem. Ty Slope: | Type: ype: | Flat Terrace plain 0.5 % | Relief: Slope Catego Aspect: | ory: | 5 metres Level 80 degree | s | | | | | |
| Surrace Erosio | <u>e Soli Co</u> <u>n:</u> Active | ndition Surface crust, Ha e, Moderate scalding (scald) Active, | Moderate | | | | | | | | |
| | (sheet Horiz. (stbar | t) Active, Moderate (gully) Áctive, Pi (m) 5 (k) | resent M | icrore | lief: | Crabho Vert.(n | ole gilgai n) H | Ve oriz.(m) | rt.(m) 5 | 0.1 | |
| Soil Cla | assificati | on | | | | , | , | () | | | |
| Australi Vertic Hy loamy C ASC Co | an Soil Cla ypernatric l layey Mode onfidence: | assification: Brown Sodosol Medium Non-gravel erately deep | M ly Clay- P G | lappin rincip Great S | g Unit: al Profile I Soil Group | Form: : | Pv Dy2.43 Grey-bi podzoli | rown c soil | C2 | | |
| Sito | Soary ana | Complete clearing Bastura pat | L ivo or improvod | | over cultiv | atod | Land | | 02 | | |
| <u>Vegeta</u> Surface Profile | <u>tion:</u> e Coarse | Tall Strata - Tree, 3.01-6m, Ver 10-20%, , rounded, | y sparse. *Spec Ferricrete | cies inc | cludes - Me | elaleuca | viridiflora | I | | | |
| 1A1 | 0 - 0.1 m | Very dark grey (10YR3/1-Mo Subangular blocky; Earthy fa macropores, Moist; Firm cor medium gravelly, 6-20mm, r Common, fine (1-2mm) roots | bist); , 0-0% ; Fi abric; Medium, nsistence; Mode ounded, dispers s; Clear, Smoot | ine sar (5 - 10 erately sed, F th char | ndy loam; l) mm crac plastic; No erricrete, c nge to - | Moderate k; Many ormal pla oarse fra | e grade o (>5 per 1 asticity; M agments; | f structu 00mm2 loderate Field pl | ure, 10-) Mediu ely stick H 6.5 (F | 20 mm, um (2-5mm) :y; 2-10%, Raupach); | |
| 1A2 | 0.1 - 0.2 r | n Dark grey (10YR4/1-Moist); Subangular blocky; Smooth- 2mm) macropores, Moist; V 10%, medium gravelly, 6-20 fine (1-2mm) roots; Diffuse, | , 0-0% ; Fine sa -ped fabric; Meo ery firm consist mm, rounded, F Wavy change to | andy lo dium, (ence; ' Ferricro o - | oam; Mode 5 - 10) mn Very plasti ete, coarse | rate gra n crack; c; Norma e fragme | de of stru Common al plastici nts; Field | cture, 1 (1-5 pe ty; Mode pH 6.5 | 0-20 m r 100m erately (Raupa | im, im2) Fine (1- sticky; 2- ach); Few, | |
| 1B1 | 0.2 - 0.5 r | n Dark grey (10YR4/1-Moist); Lenticular; Smooth-ped fabr macropores, Moist; Very firm of ped faces or walls coated Field pH 8 (Raupach); Few, | , 0-0% ; Mediur ic; Fine, (0 - 5) n consistence; \ , distinct; Comm fine (1-2mm) ro | m heav mm cr Very p mon cu pots; D | vy clay; Mo ack; Few (lastic; Norr itans, 10-5 iffuse, Wa | oderate o <1 per 1 nal plas 0% of pe vy chano | grade of s 00mm2) ticity; Ver ed faces o ge to - | tructure Very fin y sticky; or walls | e, 20-50 e (0.07 ; Few c coated |) mm, 5-1mm) utans, <10% , distinct; | |
| 1B2ss | 0.5 - 0.8 r | n Dark greyish brown (10YR4, mm, Lenticular; Smooth-ped macropores, Moist; Strong o 50% of ped faces or walls o Concretions; Field pH 9 (Ra | /2-Moist); , 0-0% I fabric; Fine, (0 consistence; Ve pated, distinct; \ upach); Diffuse | % ; Me) - 5) m ry plas Very fe y, Wavy | dium heav nm crack; F stic; Norma ew (0 - 2 % / change to | y clay; N ⁻ ew (<1 I plastici), Mang) - | /loderate per 100m ity; Very s aniferous | grade o ım2) Ve sticky; C , Mediui | f struct ry fine commoi m (2 -6 | ure, 20-50 (0.075-1mm) n cutans, 10- mm), | |
| 1B3ss | 0.8 - 1.1 r | n Dark greyish brown (10YR4, mm, Lenticular; Smooth-ped macropores, Moist; Strong c 50% of ped faces or walls co Concretions; Field pH 9 (Ra | /2-Moist); , 0-0% I fabric; Fine, (0 consistence; Ve pated, distinct; I upach); Diffuse | % ; Me) - 5) m ry plas Few (2 , Wavy | dium heav nm crack; F stic; Norma 2 - 10 %), N / change to | y clay; N ⁻ ew (<1 I plastici /langanif | /loderate per 100m ity; Very s ferous, M | grade o nm2) Ve sticky; C edium (2 | f struct ry fine commoi 2 -6 mr | ure, 20-50 (0.075-1mm) n cutans, 10- n), | |
| 1C1 | 1.1 - 1.5 r | n Dark greyish brown (10YR4, Moderate grade of structure | /2-Moist); Mottle , 20-50 mm, Le | es, 10` nticula | YR44, 10-2 ir; Smooth- | 20% , 5- ⁻ ped fab | 15mm, Di ric; Fine, | stinct; L (0 - 5) n | ight me | edium clay; ck; 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

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 Nar Project Coo Agency Nar | ne: de: me: | STYX SOL J000019 Horizon So | ITH C oil Su | COAL PROJI Site ID: urvey (NT) | ECT SC 036 | DIL AI | ND LANI Obs | D CAPABI ervation | LITY 1 |
|--|-------------------|-----------------------------------|-----------------|--------------------------------------|---------------|----------|----------------|----------------------|-----------|
| Depth | pH | 1:5 EC | | Exchangeable | Cations | | CEC | ESP | СІ |
| cm | | dS/m | Ca | Mg | к | Na Cm | ol (+)/kg | % | 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 | Organic | Total | Avail. | Total | al Extr. | | | Trace Elements | | |
|-----------|---------|------------|------------|------------|------------|----|----|----------------|----------|------|
| cm | C % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg/ | Zn kg | В |
| 0-0.1 | 0.5D | 730E | <2J | <200 | 3* | <1 | 14 | 65.8 | <1 | <0.2 |
| 0.5 - 0.6 | | 390E | <2J | <200 | 47* | | | | | |
| 1.1 - 1.2 | | 220E | <2J | <200 | 18* | | | | | |



| Project Name: | STYX SOUTH COAL PROJ | ECT SOIL AND | LAND CAP | ABILIT | Y |
|------------------------------|--|-----------------------|-----------------|-----------------------|--|
| Project Code: | J000019 Site ID: | 037 | Observatio | on ID: | 1 |
| Agency Name: | Horizon Soil Survey (NT) | | | | |
| Site Informatio | <u>n</u> | | | | |
| Desc. By: | I. Hollingsworth | Locality: | crabhole | microre | lief; Brussels, photos 120-123 |
| Date Desc.: | 11/05/12 | Elevation: | 40 metre | s | |
| Map Ref.: Northing/Long : | GPS S.A. UTT 7484468 AMC zone: 55 | Rainfail: | 750 Moderate | alv ranid | |
| Easting/Lat.: | 776228 Datum: GDA94 | Drainage: | Imperfec | tlv draine | ed |
| Geology | | | | , | |
| ExposureType: | Existing vertical exposure | Conf. Sub. is P | arent. Mat.: | Almost | certain or certain |
| Geol. Ref.: | Qpa | Substrate Mate | rial: | Existing | g vertical exposure, 1 m |
| | | | | deep,F | ragmental, Bedded, Porous, , Alluvium |
| | | | | | |
| Land Form | | | | | |
| Rel/Slope Class: | Gently undulating plains <9m 1-3 | 3% | Pattern | Туре: | Terraced land (alluvial) |
| Morph Type: | Flat | Roliof. | 5 metres | | |
| Elem. Type: | Terrace plain | Slope Category | r: Level | • | |
| Slope: | 0.5 % | Aspect: | 200 degi | rees | |
| Surface Soil Co | Distribution Hardsetting | | | | |
| Erosion: Activ | e, Moderate scalding (scald) Active | , Severe | | | |
| (she | et) Active, Severe (gully) | Microrelief: Cra | ohole gilgai | Vert.(r | m) 0.1 Horiz.(m) 5 |
| Soil Classificat | ion | | | | |
| Australian Soil C | lassification: | Ma | oping Unit: | | Pv |
| Vertic Hypernatric | Brown Sodosol Medium Gravelly L | oamy Clayey Pri | ncipal Profile | Form: | Dy2.43 |
| Moderately deep | | Gre | at Soil Grou | p: | Grey-brown |
| ASC Confidence |): | | | | |
| No analytical data | a are available but confidence is fair | r. Lar | id Class: | | Land Class: C2 |
| <u>Site</u> | Complete clearing. Pasture, na | ative or improved, b | out never culti | vated | |
| Vegetation: | | | | | |
| | Tall Strata - Tree, 6.01-12m, S | parse. *Species in | cludes - Mela | leuca vir | idiflora |
| Surface Coarse | <u>2</u> 2-10%, medium g | gravelly, 6-20mm, | subangular, | Ferricre | ete; 2-10%, medium gravelly, 6-20mm, |
| | | | | | |
| <u>Profile</u> | Vory dark grov (10VP2/1) | | a and u la ami | Magaive | arado of structure: Forthy fobries |
| IAI 0-0.11 | Fine (0 - 5) mm crack: cra | ack: Common (1-5 | per 100mm2) | Fine (1- | 2mm) macropores Moist: Verv firm |
| | consistence; Moderately pl | astic; Normal plast | icity; Moderat | tely stick | y; 2-10%, medium gravelly, 6-20mm, |
| | rounded, dispersed, Ferricr | rete, coarse fragm | ents; Few (2 - | 10 %), F | erruginous, Medium (2 -6 mm), |
| | Nodules; Field pH 6.5 (Rau | ipach); Common, f | ine (1-2mm) r | roots; Cle | ear, Smooth change to - |
| | | | | | |
| 1A2 0.1 - 0.2 | m Dark grey (10YR4/1-Moist) | ; , 0-0% ; Medium | heavy clay; N | lassive g | rade of structure; Earthy fabric; Fine, |
| | (0 - 5) mm crack; Few (<1 | per 100mm2) Very | fine (0.075-1 | mm) ma | cropores, Moist; Very firm |
| | consistence; very plastic; l' | Normal plasticity; N | noderately stic | CKY; Z-10 n cutans | %, medium gravelly, 6-20mm, 10-50% of ped faces or walls coated |
| | distinct: Few (2 - 10 %). Fe | erruginous. Mediur | n (2 -6 mm). I | Nodules: | Field pH 6.5 (Raupach): Few, fine |
| | (1-2mm) roots; Diffuse, Wa | avy change to - | | , | |
| 1B1 02 05 | m Dark grey (10VR4/1 Moist) | · 0.0% · Medium | heavy clay: M | Iodorato | grade of structure 20 50 mm |
| 101 0.2 - 0.3 | Lenticular: Smooth-ped fab | ric: Fine. (0 - 5) m | m crack: Few | (<1 per | 100mm2) Verv fine (0.075-1mm) |
| | macropores, Moist; Very fir | rm consistence; Ve | ry plastic; No | rmal plas | sticity; Very sticky; Common cutans, |
| | 10-50% of ped faces or wa | Ils coated, distinct | Common (10 |) - 20 %) | , Calcareous, Medium (2 -6 mm), |
| | Nodules; Field pH 8 (Raup | ach); Few, fine (1- | 2mm) roots; E | Diffuse, V | Vavy change to - |
| | | | | | |
| 1B2 0.5 - 0.8 | m Dark greyish brown (10YR4 | 4/2-Moist); , 0-0% | ; Medium hea | ivy clay; l | Moderate grade of structure, 20-50 |
| | mm, Lenticular; Smooth-pe | ed fabric; Fine, (0 - | 5) mm crack; | Few (<1 | per 100mm2) Very fine (0.075-1mm) |
| | macropores, Moist; Very fir | m consistence; Ve | ry plastic; No | rmal plas | Sticity; Very sticky; Common cutans, |
| | Nodules: Field pH 9 (Raun | ach): Diffuse Wav | v change to - | ,-∠∪ %) | , Jaicareous, Joarse (0 - 20 MM), |
| | | , 511450, 1147 | , shango to - | | |
| 1B3 0.8 - 1.1 | m Dark greyish brown (10YR4 | 4/2-Moist); , 0-0% | , Medium hea | ivy clay; l | Moderate grade of structure, 20-50 |
| | mm, Lenticular; Smooth-pe | ed fabric; Fine, (0 - | 5) mm crack; | Few (<1 | per 100mm2) Very fine (0.075-1mm) |
| | macropores, Moist; Very fir | III consistence; Ve | Few (2 - 10 ° | mai pias | areous Medium (2 -6 mm) Nodules |
| | Field pH 9 (Raupach); Diffu | use, Wavy change | to - | , 5), Calc | a soud, modium (2 -0 mm), Noduics, |
| | · · · // // // // · · · · | | | | |



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 -</p>

Morphological Notes

1A1 eroded surface

Observation Notes

Check site, not sampled,gully wall

Site Notes

1C1

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



| Project Project Agency | Name: Code: Name: | STY J000 Hori | X SOUTH COAL PROJ 0019 Site ID: zon Soil Survey (NT) | ECT SOIL A 038 | ND LAI Ot | ND CAPA servatio | ABILIT` n ID: | Y 1 | | |
|--|--|---|---|--|--|---|---|--|---|-----|
| Site Info Desc. By Date Des Map Ref Northing Easting/ Geolog | ormation /: sc.: /: g/Long.: Lat.: v | I. Hollir 11/05/1 GPS S 748501 776359 | ngsworth 2 .A. Off 4 AMG zone: 55 9 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Brussels, 37 metres 756 Very slow Poorly dra | photos | 124-126; crabhole | microrelief | |
| Exposur Geol. Re | eType: of.: | Soil pit Pb | | Conf. Sub. Substrate M | is Paren Aaterial: | nt. Mat.: | Almost Soil pit , Alluvii | certain or certain , 1 m deep,Fragme um | ental, Bedded, Porou | JS, |
| Land Fo Rel/Slop | orm e Class: | Gently | undulating plains <9m 1-3 | 3% | | Pattern T | ype: | Terraced land (al | lluvial) | |
| Morph. 1 Elem. Ty Slope: | Type: /pe: | Flat Swamp 0.5 % | | Relief: Slope Cate Aspect: | gory: | 5 metres Level 100 degre | es | | | |
| Soil Cla | <u>:</u> Partial (sheet (shite tight) | l, Mode t) No gu on | rate scalding (scald) Partia illy erosion (gully) | l, Moderate Microrelief: | Crabhol | e gilgai | Vert.(r | m) 0.2 Horiz.(m) | 3 | |
| Australia Vertic Su Clayey M ASC Co | an Soil Cla Ibnatric Gr Ioderately Infidence: | assifica ey Sodo deep | ation: osol Medium Non-gravelly | Clay-loamy | Mappin Princip Great S | g Unit: al Profile Soil Group | Form: : | Pv Dy2.42 Grey-brown podzolic soil | | |
| Analytica <u>Site</u> | al data are | incomp Com | olete but reasonable confid nplete clearing. Pasture, na | ence. itive or improv | Land C ed, but n | lass: ever cultiv | ated | Land Class: (| 22 | |
| <u>Vegetat</u> Surface | tion: Coarse | Tall | Strata - Tree, 6.01-12m, Is No surface coarse | solated plants. fragments | *Specie | s includes | - Eucaly | yptus platyphylla, N | Melaleuca viridiflora | |
| <u>Profile</u> 1A2e | 0 - 0.1 m | | Grey (2.5Y6/1-Moist); , 0-0 10) mm crack; Many (>5 p Moderately plastic; Normal roots; Clear, Smooth chang | % ; Fine sand er 100mm2) Fi plasticity; Moo ge to - | y loam; I ine (1-2n derately | Massive gr nm) macro sticky; Fiel | ade of s pores, M d pH 5 (| structure; Earthy fa Moist; Very firm col (Raupach); Comm | bric; Medium, (5 - nsistence; on, fine (1-2mm) | |
| 1B21 | 0.1 - 0.3 n | n | Dark grey (2.5Y4/1-Moist); blocky; Smooth-ped fabric; 1mm) macropores, Moist; ¹ cutans, <10% of ped faces -6 mm), Concretions; Field | , 0-0% ; Heav Medium, (5 - Very firm cons or walls coate pH 6 (Raupac | y clay; N 10) mm istence; ed, distine ch); Few, | loderate g crack; Con Very plasti ct; Very fev fine (1-2n | rade of s nmon (1 c; Norm w (0 - 2 nm) root | structure, 5-10 mm I-5 per 100mm2) V nal plasticity; Mode %), Ferromangani ts; Diffuse, Wavy c | n, Subangular 'ery fine (0.075- rately sticky; Few ferous, Medium (2 hange to - | |
| 1B22ss | 0.3 - 0.5 n | n | Dark grey (2.5Y4/1-Moist); Smooth-ped fabric; Fine, ((Moist; Very firm consistenc faces or walls coated, distii Field pH 6 (Raupach); Few | , 0-0% ; Heav 0 - 5) mm crac æ; Very plastic nct; Few (2 - 1 v, fine (1-2mm) | y clay; M k; Few (· c; Norma 0 %), Fe) roots; D | loderate g <1 per 100 l plasticity; rromangai)iffuse, Wa | rade of s mm2) V Very st niferous vy chan | structure, 20-50 mi /ery fine (0.075-1m ticky; Common cut , Medium (2 -6 mm ige to - | m, Lenticular; im) macropores, ans, 10-50% of ped i), Concretions; | |
| 1B33ss | 0.5 - 0.8 n | n | Dark grey (2.5Y4/1-Moist); Smooth-ped fabric; Fine, ((Moist; Firm consistence; V faces or walls coated, disti | , 0-0% ; Heav) - 5) mm crac ery plastic; No nct; Field pH 6 | y clay; M k; Few (• rmal plas 6 (Raupa | loderate g <1 per 100 sticity; Ver ch); Few, f | rade of s mm2) V y sticky; ine (1-2 | structure, 20-50 m /ery fine (0.075-1m ; Common cutans, /mm) roots; Diffuse | m, Lenticular; m) macropores, 10-50% of ped e, Wavy change to - | |
| 1C1 | 0.8 - 1.1 n | n | Dark grey (2.5Y4/1-Moist); Smooth-ped fabric; Fine, (0 Moist; Firm consistence; V faces or walls coated, disti change to - | , 0-0% ; Heav) - 5) mm crac ery plastic; No nct; Field pH 5 | y clay; M k; Few (· rmal plas 5.5 (Raup | loderate g <1 per 100 sticity; Ver bach); Corr | rade of s mm2) V y sticky; imon, fir | structure, 20-50 m /ery fine (0.075-1m ; Common cutans, ne (1-2mm) roots; | m, Lenticular; m) macropores, 10-50% of ped Diffuse, Wavy | |
| 1C1 | 1.1 - 1.5 n | n | Dark grey (2.5Y4/1-Moist); Smooth-ped fabric; Fine, ((Moist; Firm consistence; V | , 0-0% ; Heav) - 5) mm crac ery plastic; No | y clay; № k; Few (• rmal pla | loderate g <1 per 100 sticity; Ver | rade of s mm2) V y sticky; | structure, 20-50 m /ery fine (0.075-1m ; Field pH 5 (Raupa | m, Lenticular; nm) macropores, ach); Diffuse, Wavy | |



change to -

Morphological Notes 1A2e 1B21 bleached, rusty root mottles gleyed Observation Notes Detailed site, samples 131-135

Site Notes

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

| Project Name: | STYX SOUT | H COAL PROJ | ECT SOI | L AND LAND CAPABILI | ΤY |
|-----------------|-------------|---------------|---------|---------------------|----|
| Project Code: | J000019 | Site ID: | 038 | Observation | 1 |
| Agency Name: | Horizon Soi | l Survey (NT) | | | |
| Laboratory Test | Results: | | | | |

| Depth | рН | 1:5 EC | Ca | Exchangeable Cations | CEC | ESP | CI |
|-----------|------|--------|----|----------------------|-------------|-----|-------|
| cm | | dS/m | ou | ing it | 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 | Total | Avail. | Total | Extr. | | | Trace Elem | ents | |
|-----------|---------|------------|------------|------------|------------|----|----|------------|----------|---|
| cm | С % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg/l | Zn kg | В |
| 0 - 0.1 | | | | | | | | | | |
| 0.2 - 0.3 | | | | | | | | | | |
| 0.5 - 0.6 | | | | | | | | | | |
| 0.8 - 0.9 | | | | | | | | | | |
| 1.1 - 1.2 | | | | | | | | | | |



 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</td>







Project Name:STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:039Observation ID:1Agency 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 Project Agency | Name: Code: Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 040 OI | ND CAPABII | LITY D: 1 | |
|--|--|--|--|---|--|---------------|
| Site Inf Desc. By Date Des Map Ref Northing Easting | ormation y: sc.: f.: g/Long.: /Lat.: | 1 I. Hollingsworth 11/05/12 GPS S.A. Off 7486803 AMG zone: 55 774610 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, pho 33 metres 756 Very slow Very poorly dr | otos 131 rained | |
| <u>Geolog</u> Exposu Geol. Re | I <u>V</u> reType: əf.: | Soil pit Qpa | Conf. Sub. is Parer Substrate Material | nt. Mat.: No Fra | Data Igmental, Bedded, Porous, , Alluviu | ım |
| Land For Rel/Slop | orm be Class: | Gently undulating plains <9m 1-39 | % | Pattern Type | : Terraced land (alluvial) | |
| Morph. ⁻ Elem. Ty Slope: | Туре: уре: | Flat Terrace plain 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 149 degrees | | |
| Surface | e Soil Co | ndition_ | | | | |
| Erosior Soil Cla | <u>n:</u> assificati | on M | licrorelief: | | | |
| Australia Vertic Su Clayey M ASC Co Analytic | an Soil Claubnatric Bru Moderately Sonfidence: | assification: own Sodosol Medium Non-gravelly deep incomplete but reasonable confide | Clay-loamy Mappir Clay-loamy Princip Great s Ince. Land C | ng Unit: al Profile Forr Soil Group: Class: | Pv m: Dy2.33 Grey-brown podzolic soil Land Class: C2 | |
| <u>Site</u> Vegetat Surface | <u>tion:</u> e Coarse | Tall Strata - Tree, 6.01-12m, Isc | plated plants. *Specie | s includes - Ac | acia harpophylla | |
| <u>Profile</u> 1A1 | 0 - 0.1 m | Grey (2.5Y5/1-Moist); ; Fine sticky; Field pH 6 (Raupach | sandy clay loam; Mc); Clear, Smooth char | ist; Moderately nge to - | / plastic; Normal plasticity; Moderat | tely |
| 1A2 | 0.1 - 0.3 r | n Dark greyish brown (2.5Y4/: Moderately sticky; Field pH | 3-Moist); ; Medium he 6 (Raupach); Diffuse, | avy clay; Mois Wavy change | t; Very plastic; Normal plasticity; to - | |
| 1B1 | 0.3 - 0.4 r | n Dark greyish brown (2.5Y4/3 sticky; Few (2 - 10 %), Mang Wavy change to - | 3-Moist); ; Medium he ganiferous, Coarse (6 | avy clay; Mois - 20 mm), Cor | t; Very plastic; Normal plasticity; V ncretions; Field pH 6 (Raupach); D | ery iffuse |
| 1B2 | 0.4 - 0.6 r | n Dark greyish brown (2.5Y4/2 sticky; Few (2 - 10 %), Mang Wavy change to - | 2-Moist); ; Medium he ganiferous, Coarse (6 | avy clay; Mois - 20 mm), Cor | t; Very plastic; Normal plasticity; V ncretions; Field pH 6 (Raupach); D | ery iffuse |
| 1B3 | 0.6 - 0.8 r | n Dark greyish brown (2.5Y4/2 Few (2 - 10 %), Manganifer Wavy change to - | 2-Moist); ; Medium cla ous, Coarse (6 - 20 m | ay; Moist; Very im), Concretion | plastic; Normal plasticity; Very stic ns; Field pH 7.5 (Raupach); Diffuse | sky; , |
| 1C1 | 0.8 - 1.1 r | n Dark greyish brown (2.5Y4/2 Field pH 8 (Raupach); Diffu | 2-Moist); ; Medium cla se, Wavy change to - | ay; Moist; Very | plastic; Normal plasticity; Very stic | sky; |
| 1C1 | 1.1 - 1.5 r | n Dark greyish brown (2.5Y4/2 Field pH 8.5 (Raupach); Difl | 2-Moist); ; Medium cla fuse, Wavy change to | ay; Moist; Very - | plastic; Normal plasticity; Very stic | ky; |
| Morpho | ological N | <u>lotes</u> | | | | |

Observation Notes Detailed site, samples 136-140

Site Notes

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



| Agency Na | ame: | Horizon S | soil S | urvey (NT) | | | | |
|-----------|--------|-----------|--------|-------------------|------|-------------|-----|-------|
| Laborator | y Test | Results: | | | | | | |
| Depth | рН | 1:5 EC | 6. | Exchangeable Cati | ions | CEC | ESP | CI |
| cm | | dS/m | Ca | wig K | , | 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* |

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

| Depth | Organic | Organic | Total | Avail. | Total | Extr. | | | Trace Eler | nents | |
|---|---------|------------|------------|------------|------------|-------|----|----------|------------|-------|--|
| cm | С % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg | Zn /kg | В | |
| 0 - 0.1 0.2 - 0.3 0.5 - 0.6 0.8 - 0.9 1.1 - 1.2 | | | | | | | | | | | |



- 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 -</td>
- 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 -</td>

Observation Notes

Detailed site, samples 141-142

Site Notes

melonhole microrelief, cleared brigalow woodland, good improved pasture, brown clay Laboratory Test Results:

| Depth | рН | 1:5 EC | Ca | Exchangeable | Cations | Na | CEC | ESP | CI |
|-----------|------|--------|-------|--------------|---------|-----|-----------|-------|-------|
| cm | | dS/m | 0u | ing | N | | ol (+)/kg | % | 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 | Organic | Total | Avail. | Total | Extr. | ctr. | | Trace Elements | | | | | |
|----------------------|---------|---------------|------------|------------|------------|------|------|----------------|-----------|------|--|--|--|
| cm | C % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg/ | Zn ′kg | в | | | |
| 0 - 0.1 0.5 - 0.6 | <1.1D | 1690E 450E | <2J <2J | <200 | 5* 21* | 2.29 | 59.6 | 57.6 | 1.41 | <0.2 | | | |



| Project Name Project Code Agency Nam | e: S1 : J0 e: Ho | TYX SOUTH COAL PROJE 000019 Site ID: orizon Soil Survey (NT) | ECT SOIL A 042 | ND LA OI | ND CAP | ABILITY on ID: | Y 1 | | |
|--|---|---|---|---|---|---|---|--|--|
| Site Informat Desc. By: Date Desc.: Map Ref.: Northing/Long Easting/Lat.: | ion I. Ho 12/0 GPS .: 7495 7749 | ollingsworth 15/12 S S.A. Off 5972 AMG zone: 55 928 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Corona - 34 metres 756 Slow Imperfect | good qua s Iy draine | ality pasture; photos 134-136 d | | |
| Geology ExposureType Geol. Ref.: Porous, | : Soil Qpa | pit a | Conf. Sub. Substrate M | is Pareı Iaterial | nt. Mat.: : | Almost Soil pi | certain or certain t, 1 m deep,Fragmental, Bedded, | | |
| Land Form Rel/Slope Clas | s : Gen | ntly undulating plains <9m 1-3° | % | | Pattern 1 | , Alluviu Type: | um Terraced land (alluvial) | | |
| Morph. Type: Elem. Type: Slope: | Flat Terr 0.5 ° | race plain % | Relief: Slope Cate Aspect: | gory: | 5 metres Level 200 degre | ees | | | |
| Surface Soil Erosion: No str | Conditi scalding eam bar | tion Surface crust g (scald) No sheet erosion (sh nk erosion (stbank) N | eet) No Microrelief: | Melonh | ole gilgai | Vert.(r | n) 1 Horiz.(m) 20 | | |
| Soil Classific Australian Soi Endohypersodi fine Very fine M ASC Confider | ation Classif Crusty oderatel ce: | fication: Brown Vertosol Non-gravelly F ly deep | Fine Medium | Mappir Princip Great S | ng Unit: bal Profile Soil Group | Form: p: | So Ug5.25 Brown clay | | |
| All necessary a <u>Site</u> <u>Vegetation:</u> | All necessary analytical data are available. Land Class: Land Class: C1 Site Complete clearing. Pasture, native or improved, but never cultivated Vegetation: | | | | | | | | |
| Surface Coa | T Se | Tall Strata - Tree, 6.01-12m, Iso No surface coarse t | plated plants. fragments | *Specie | es includes | - Acacia | a harpophylla | | |
| Profile 1A1 0 - 0.2 | m | Very dark grey (2.5Y3/1-Mo Subangular blocky; Rough-ţ 5mm) macropores, Moist; F Field pH 6.5 (Raupach); Abı | iist); , 0-0% ; L ped fabric; Co irm consisten undant, medit | ₋ight me barse, (1 ce; Mod um (2-5r | edium clay; 0 - 20) mn lerately pla mm) roots; | ; Modera n crack; l astic; Nor Clear, S | te grade of structure, 5-10mm, Many (>5 per 0.01m2) Medium (2- mal plasticity; Moderately sticky; Smooth change to - | | |
| 1A3 0.2 - 0 | .3 m | Olive brown (2.5Y3/3-Moist) Lenticular; Smooth-ped fabr macropores, Moist; Firm co 10-50% of ped faces or wal roots; Diffuse, Wavy change |); , 0-0% ; Me ric; Coarse, (1 nsistence; Ve Ils coated, dis e to - | dium he 0 - 20) ry plasti stinct; Fi | avy clay; M mm crack; c; Normal eld pH 7.5 | Moderate Many (> plasticity (Raupac | e grade of structure, 10-20mm, 5 per 100mm2) Medium (2-5mm) ; Moderately sticky; Common cutans, ch); Abundant, medium (2-5mm) | | |
| 1B1ss 0.3 - 0 | .6 m | Dark greyish brown (2.5Y4/ mm, Lenticular; Smooth-peo macropores, Moist; Firm co 50% of ped faces or walls c change to - | 3-Moist); , 0-0 d fabric; Mediu nsistence; Ve oated, distinc | 0% ; Meo um, (5 - ry plasti t; Field µ | dium heav 10) mm cr c; Normal pH 9 (Raup | y clay; M rack; Mai plasticity pach); Fe | loderate grade of structure, 20-50 ny (≻5 per 100mm2) Fine (1-2mm) r; Very sticky; Common cutans, 10- ew, fine (1-2mm) roots; Diffuse, Wavy | | |
| 1C1 0.6 - 0 | .9 m | Dark greyish brown (2.5Y4/3 mm, Lenticular; Smooth-peo macropores, Moist; Firm co 50% of ped faces or walls c change to - | 3-Moist); , 0-0 d fabric; Mediu nsistence; Ve oated, distinc | 0% ; Meo um, (5 - ry plasti t; Field µ | dium heav 10) mm cr c; Normal pH 9 (Raup | y clay; M rack; Fev plasticity pach); Fe | oderate grade of structure, 20-50 v (<1 per 100mm2) Fine (1-2mm) r; Very sticky; Common cutans, 10- ew, fine (1-2mm) roots; Diffuse, Wavy | | |
| 1C2 0.9 - 1 | .5 m | Dark greyish brown (2.5Y4/ mm, Lenticular; Smooth-peo macropores, Moist; Firm co 50% of ped faces or walls c change to - | 3-Moist); , 0-0 d fabric; Fine, nsistence; Ve oated, distinc |)% ; Me (0 - 5) r ry plasti t; Field µ | dium heav mm crack; c; Normal oH 9 (Raup | y clay; M Few (<1 plasticity pach); Fe | oderate grade of structure, 20-50 per 100mm2) Very fine (0.075-1mm) r; Very sticky; Common cutans, 10- ew, fine (1-2mm) roots; Diffuse, Wavy | | |



Project Name:STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:042Observation ID:1Agency 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 | pН | 1:5 EC | Ca | Exchangeat | ble Cations | Na | CEC | ESP | CI |
|-----------|------|--------|-------|------------|-------------|-------------|-------|-------|-------|
| cm | | dS/m | ou | ing | ĸ | Cmol (+)/kg | | % | 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 | Organic | Total | Avail. | Total | Extr. | | т | race Eler | nents | |
|----------------------|---------|---------------|------------|--------------|------------|------|------|-----------|-----------|------|
| cm | C % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg | Zn /kg | В |
| 0 - 0.1 0.5 - 0.6 | 1.5D | 2930E 370E | <2J <2J | <200 1020 | 8* 9* | 1.17 | 62.2 | 115 | 1.82 | <0.2 |



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | IECT SOIL AND LA 043 C | AND CAPAE | BILITY ID: 1 | | | |
|--|---|--|---|---|--|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | <u>n</u> I. Hollingsworth 12/05/12 GPS S.A. Off 7492800 AMG zone: 55 776318 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Corona - go 50 metres 756 Moderately Imperfectly | ood quality pasture; photos 137-140 rapid drained | | | |
| Geology ExposureType: Geol. Ref.: Bedded, | Soil pit Qpa | Conf. Sub. is Pare Substrate Materia | ent. Mat.: A I: A | Nmost certain or certain Nuger boring, 1 m deep,Fragmental, Porous Alluvium | | | |
| <u>Land Form</u> Rel/Slope Class: | Gently undulating plains <9m 1-3 | 3% | Pattern Ty | pe: Terraced land (alluvial) | | | |
| Morph. Type: Elem. Type: Slope: | Simple-slope Terrace plain 2 % | Relief: Slope Category: Aspect: | 5 metres Level 200 degree | s | | | |
| Surface Soil Co Erosion: Active Soil Classificat | onditionHardsetting e, Moderate (sheet) Active, Modera ion | ate (gully) Microrelief: Meloni | nole gilgai | Vert.(m) 1 Horiz.(m) 20 | | | |
| Australian Soil Classification: Mapping Unit: Rd Vertic Subnatric Brown Sodosol Medium Slightly gravelly Clay- loamy Clayey Moderately deep Principal Profile Form: Dy2.42 Great Soil Group: Grey-brown podzolic soil Grey-brown No analytical data are available but confidence is fair. Land Class: C2 | | | | | | | |
| Site Vegetation: Surface Coarse Profile 1A1 0 - 0.1 m | Complete clearing. Pasture, na Tall Strata - Tree, 6.01-12m, ls No surface coarse Very dark grey (2.5Y3/1-M Moderately sticky; 2-10%, Field pH 6.5 (Raupach); Al | ative or improved, but solated plants. *Speci fragments oist); , 0-0% ; Sandy of medium gravelly, 6-20 bundant, fine (1-2mm | never cultivat es includes - , clay loam; Mo Omm, subrour) roots; Clear, | ted Acacia harpophylla nist; Moderately plastic; Normal plasticity; nded, dispersed, Shale, coarse fragments; Smooth change to - | | | |
| 1A2e 0.1 - 0.2 | m Light grey (2.5Y7/1-Moist); Normal plasticity; Moderate coarse fragments; Commo pH 6.5 (Raupach); Commo | Mottles, 10YR44, 2- ely sticky; 2-10%, mea n (10 - 20 %), Ferrom on, fine (1-2mm) roots | 10% , 0-5mm, dium gravelly, nanganiferous ; Clear, Smoo | Distinct; Sandy loam; Moist; Very plastic; 6-20mm, subrounded, dispersed, Shale, , Medium (2 -6 mm), Concretions; Field th change to - | | | |
| 1B21ss 0.2 - 0.3 | m Very dark greyish brown (2 Very sticky; Common (10 - (Raupach); Common, fine | 2.5Y3/2-Moist); ; Medi · 20 %), Ferromangan (1-2mm) roots; Diffus | um heavy cla iferous, Mediu e, Wavy chan | y; Moist; Very plastic; Normal plasticity; um (2 -6 mm), Concretions; Field pH 6.5 ge to - | | | |
| 1B22ss 0.3 - 0.5 | m Dark greyish brown (2.5Y4 sticky; Field pH 6.5 (Raupa | /3-Moist); ; Medium h ach); Few, fine (1-2mr | eavy clay; Mo n) roots; Diffu | oist; Very plastic; Normal plasticity; Very se, 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 Very sticky; Field pH 6.5 (F | //3-Moist); , 0-0% ; Me Raupach); Diffuse, Wa | edium heavy o avy change to | clay; Moist; Very plastic; Normal plasticity; - | | | |
| Morphological 1A2e | Notes bleached, rusty root mottles | 6 | | | | | |

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: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 044 C | ND CAP | ABILITY on ID: | Y 1 | | |
|---|---|---|---|--|---|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 12/05/12 GPS S.A. Off 7491963 AMG zone: 55 776464 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Corona, p 47 metres 756 Moderate Imperfect | ohotos 14 s ly rapid ly draine | 41-143 ed | | |
| Geology ExposureType: Geol. Ref.: Porous, | Soil pit Qpa | Conf. Sub. is Pare Substrate Materia | ent. Mat.: I: | Almost Soil pi | t certain or certain oit, 1 m deep,Fragmental, Bedded, | | |
| | | | | , Alluviı | um | | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern 1 | Гуре: | Terraced land (alluvial) | | |
| Morph. Type: Elem. Type: Slope: | Simple-slope Terrace plain 2 % | Relief: Slope Category: Aspect: | 5 metres Level 200 degre | ees | | | |
| Surface Soil Co | ndition Hardsetting | | - | | | | |
| Erosion: Active Soil Classificati | e, Moderate (sheet) Active, Modera I <mark>on</mark> | te (gully) Microrelief: Melonl | nole gilgai | Vert.(r | n) 1 Horiz.(m) 20 | | |
| Australian Soil Cl Vertic Subnatric Br Ioamy Clayey Mod ASC Confidence | assification: rown Sodosol Medium Slightly grav erately deep : | Mappi elly Clay- Princi Great | ng Unit: pal Profile Soil Group | Form: o: | Rd Dy2.42 Grey-brown podzolic soil | | |
| No analytical data | are available but confidence is fair | Land | Class: | | Land Class: 02 | | |
| <u>Site</u> Vegetation: Surface Coarse | Tall Strata - Tree, 6.01-12m, Is 2-10%, medium gra | olated plants. *Speci avelly, 6-20mm, subr | es includes ounded, Sh | /ated - Acacia iale | a harpophylla | | |
| Profile 1A1 0 - 0.1 m | Dark grey (10YR4/1-Moist): blocky; Rough-ped fabric; F Moist; Firm consistence; Mo gravelly, 6-20mm, subround (1-2mm) roots; Clear, Smoo | ; , 0-0% ; Sandy clay Fine, (0 - 5) mm crack oderately plastic; Nor ded, dispersed, Shal oth change to - | loam; Mode k; Few (<1 p mal plastic e, coarse fra | erate gra per 0.01r ity; Mode agments | ade of structure, 2-5mm, Subangular m2) Fine (1-2mm) macropores, erately sticky; 2-10%, medium ; Field pH 6.5 (Raupach); Many, fine | | |
| 1A2e 0.1 - 0.2 i | m Light grey (10YR7/2-Moist) mm crack; Few (<1 per 0.0 Normal plasticity; Moderate coarse fragments; Field pH | ; , 0-0% ; Sandy loan 1m2) Fine (1-2mm) r ly sticky; 2-10%, me 6.5 (Raupach); Com | n; Massive nacropores dium gravel imon, fine (| grade of , Moist; F ly, 6-20n 1-2mm) i | structure; Earthy fabric; Fine, (0 - 5) Firm consistence; Very plastic; nm, subrounded, dispersed, Shale, roots; Clear, Wavy change to - | | |
| 1B21ss 0.2 - 0.4 i | m Brown (10YR4/3-Moist); , 0 Moderate grade of structure per 100mm2) Fine (1-2mm) Very sticky; 2-10%, mediun Common cutans, 10-50% o walls coated, distinct; Field | 0-0% ; Medium heavy e, 10-20 mm, Lenticu) macropores, Moist; n gravelly, 6-20mm, s f ped faces or walls o pH 6.5 (Raupach); F | clay; Mode lar; Smooth Very firm c subrounded coated, disti ew, fine (1- | erate grad n-ped fab onsisten , dispers inct; Con 2mm) ro | de of structure, 5-10 mm, Polyhedral; pric; Fine, (0 - 5) mm crack; Few (<1 ce; Very plastic; Normal plasticity; sed, Shale, coarse fragments; nmon cutans, 10-50% of ped faces or nots; Diffuse, Wavy change to - | | |
| 1B22ss 0.4 - 0.6 i | m Brown (10YR4/3-Moist); , 0 Smooth-ped fabric; Fine, ((Very firm consistence; Very subrounded, dispersed, Sh distinct; Field pH 6.5 (Raup | I-0% ; Medium heavy 0 - 5) mm crack; Few / plastic; Normal plas ale, coarse fragment vach); Few, fine (1-2n | clay; Mode (<1 per 10 ticity; Very s; Common nm) roots; E | erate grac 0mm2) F sticky; 2- cutans, Diffuse, V | de of structure, 10-20mm, Lenticular; Fine (1-2mm) macropores, Moist; -10%, medium gravelly, 6-20mm, 10-50% of ped faces or walls coated, Vavy change to - | | |
| 1C1 0.6 - 0.9 i | m Brown (10YR4/3-Moist); , 0 Smooth-ped fabric; Fine, ((Very firm consistence; Very subrounded, dispersed, Sha | I-0% ; Medium heavy 0 - 5) mm crack; Few / plastic; Normal plas ale, coarse fragment | clay; Mode (<1 per 10 ticity; Very s; Common | erate grad 0mm2) F sticky; 2- cutans, | de of structure, 10-20mm, Lenticular; Fine (1-2mm) macropores, Moist; -10%, medium gravelly, 6-20mm, 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 -</td>

Morphological Notes

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 Project Agency | Name: Code: V Name: | STYX SOUTH COAL PROJI J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 045 | AND LA Ol | ND CAPA pservatio | ABILITY n ID: 1 | , 1 | | | |
|--|--|--|---|--|--|--|--|--|---|---|
| Site Inf Desc. By Date Des Map Ref Northing Easting | ormation y: sc.: f.: g/Long.: /Lat.: | L I. Hollingsworth 12/05/12 GPS S.A. Off 7492044 AMG zone: 55 776476 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Corona, gravelly cl : 44 metres 756 Rapid Moderately well dra | | | ay loam; photos 144-148 rained | | | 48 |
| <u>Geolog</u> Exposu Geol. Re | I <u>V</u> reType: ef.: | Existing vertical exposure Pb | Conf. Sub. Substrate | Conf. Sub. is Parent. Mat.: Almost of Substrate Material: Existing deep. Fra | | | certain or certain vertical exposure, 1 m agmental. Bedded. Porous | | | |
| Mudstone | | | | | | 1, | 5 | , | , | , , |
| <u>Land Fo</u> Rel/Slop | <u>orm</u> be Class: | Undulating low hills 30-90m 3-10% | % Pattern Ty | pe: | Hills | | | | | |
| Morph. ⁻ Elem. Ty Slope: | Туре: уре: | Lower-slope Footslope 5 % | Relief: Slope Cate Aspect: | egory: | 31 metres Gently inc 200 degre | s clined ees | | | | |
| Surface | e Soil Co | ndition Hardsetting | | | | | | | | |
| Erosior Soil Cla | <u>n:</u> Active assificati | e, Moderate (sheet) Active, Moderat on I | te (gully) Microrelief: | Zero or microre | no lief | Vert.(m | ו) | Horiz.(n | n) | |
| Australia Mesotrop Clay-loar ASC Co No anal | an Soil Cl phic Subna my Modera onfidence: ytical data | assification: atric Brown Sodosol Medium Grave ately deep are available but confidence is fair | Ily Loamy | Mappir Princip Great \$ Land C | ng Unit: bal Profile Soil Group Class: | Form:): | Rd Dy2.4 Grey podz Land | 42 -brown olic soil Class : | C2 | |
| <u>Site</u> | | Limited clearing, for example se | elective loggin | ng | | | | | | |
| Vegeta | tion: | Tall Strata - Tree 6 01-12m M | id-dense *Sr | necies in | cludes - Fu | icalvotus | crebra | Acacia | rhodox | /lon |
| Surface Brofilo | e Coarse | 20-50%, medium g | ravelly, 6-20r | nm, roun | ided tabula | ir, Shale | orobit | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | inicacity | |
| 1A1 | 0 - 0.1 m | Dark grey (10YR4/1-Moist); mm crack; Many (>5 per 10 Moderately plastic; Normal platy, stratified, Shale, coar Wavy change to - | ; , 0-0% ; San 00mm2) Very plasticity; Mo se fragments | idy loam; fine (0.0 derately ; Field pł | Massive g 75-1mm) m sticky; 10-2 H 6 (Raupa | rade of s nacropore 20%, me ach); Con | structu es, Mo dium g nmon, | re; Earth ist; Very gravelly, fine (1-2 | y fabric; firm con 6-20mm, mm) roo | Fine, (0 - 5) sistence; , rounded ts; Diffuse, |
| 1A2e | 0.1 - 0.2 r | - 0.2 m Light grey (10YR7/2-Moist); , 0-0%; Sandy Ioam; 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 r | 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 r | n , 0-0% ; Sandy clay loam; V | Veak grade o | f structur | re, 10-20 m | ım, Suba | ngular | blocky; | Earthy fa | abric; 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: Project Code: Agency Name | STYX SOUTH COAL PRO J000019 Site ID: : Horizon Soil Survey (NT) | JECT SOIL AM 046 | ND LA Ot | ND CAP | ABILITY on ID: 1 | , | | | |
|--|---|---|---|---|---|---|---|--|--|
| Site Information | on | | | | | | | | |
| Desc. By: Date Desc.: Map Ref.: Northing/Long.: | I. Hollingsworth 12/05/12 GPS S.A. Off 7491080 AMG zone: 55 | Locality: Elevation: Rainfall: Runoff: | | Bar H, ph 45 metres 756 Rapid | notos 149- s | -151 | | | |
| Easting/Lat.: | 776704 Datum: GDA94 | Drainage: | | Moderate | ely well dra | ained | | | |
| <u>Geology</u> ExposureType: Geol. Ref.: | Existing vertical exposure Pb | Conf. Sub. is Parent. Mat.: Aim Substrate Material: Exi eep | | | | nost certain or certain sting vertical exposure, 0.5 m),Fragmental, Bedded, Porous, mudstone | | | |
| <u>Land Form</u> Rel/Slope Class | : Undulating low hills 30-90m 3-10 | 0% Pattern Type | e: | Hills | | | | | |
| Morph. Type: Elem. Type: Slope: | Lower-slope Footslope 10 % | Relief: Slope Categ Aspect: | gory: | 31 metre Moderate 200 degr | s ely incline ees | d | | | |
| Surface Soil C | ondition Hardsetting | | | - | | | | | |
| Erosion: Acti Acti | ve, Moderate (sheet) Active, Preserve, Moderate (gully) | nt (mass) Microrelief: 2 | Zero or | no lief | Vert.(m | 1) | Horiz.(m |) | |
| Son classifica | | 1 | | | | | | | |
| Mesotrophic Sub | natric Brown Sodosol Medium Grav | /ellv Loamv | Princip | al Profile | Form: | Dv2.4 | 12 | | |
| Clay-loamy Mode | erately deep | , , , , , , , , , , , , , , , , , , , | Great S | Soil Grou | p: | Grey | -brown | | |
| ASC Confidenc | e: | | | | | podz | olic soil | 00 | |
| No analytical da | ta are available but confidence is fa | air. | Land C | lass: | | Land | Class: | 62 | |
| Site Limited clearing, for example selective logging | | | | | | | | | |
| Vegetation: | Tall Strata - Tree, 6.01-12m | Mid_dense *Sne | acias ind | cludes - A | cacia rhor | dovulor | . | | |
| Surface Coars | e 90-100%. cobbly. | . 60-200mm. rou | unded ta | abular. Sha | ale | uonyioi | | | |
| Profile | | | | , | | | | | |
| 1A1 0 - 0.1 r | n Dark grey (10YR4/1-Mois mm crack; Common (1-5 plastic; Normal plasticity; stratified, Shale, coarse fr Wavy change to - | t); , 0-0% ; Sand per 0.01m2) Find Moderately stick agments; Field p | dy loam; e (1-2m ky; 50-90 pH 6 (Ra | Massive (m) macro 0%, coars aupach); (| grade of s pores, Mo e gravelly Common, | structur bist; Fir /, 20-60 mediu | re; Earthy rm consis)mm, sub m (2-5mi | / fabric; F stence; Mo prounded m) roots; | ine, (0 - 5) oderately platy, Diffuse, |
| 1A3j 0.1 - 0.2 | 2 m Light grey (10YR7/2-Mois mm crack; Common (1-5 plastic; Normal plasticity; dispersed, Shale, coarse Wavy change to - | t); , 0-0% ; Sand per 100mm2) Fii Moderately stick fragments; Field | dy loam; ne (1-2r ky; 20-5 l pH 6 (f | ; Massive mm) macr 0%, mediu Raupach); | grade of s opores, N um gravell Commor | structur loist; V ly, 6-20 n, medi | re; Earthy ′ery firm ()mm, sub um (2-5n | y fabric; F consisten bangular t nm) roots | ine, (0 - 5) ce; Very abular, ; Diffuse, |
| 1Bw 0.2 - 0.4 | H m Brown (10YR4/3-Moist); , crack; Common (1-5 per Normal plasticity; Very sti coarse fragments; Field p | 0-0% ; Sandy lo 100mm2) Fine (cky; 10-20%, me H 6.5 (Raupach) | oam; Ma (1-2mm) edium g); Comn | assive grad) macropo ravelly, 6-: non, medi | de of strue res, Moist 20mm, su um (2-5m | cture; E t; Firm Jbangu im) roo | Earthy fal consister lar tabula ts; Diffus | bric; Fine, nce; Very ar, dispers e, Wavy o | , (0 - 5) mm plastic; sed, Shale, change to - |
| 1C 0.4 - 0.6 | 6 m , 0-0% ; Sandy clay loam; | Massive grade | of struc | ture; Eartl: | hy fabric; | Fine, (| 0 - 5) mr | n crack; C | Common (1- |
| | 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 N | lotes | | | | | | | | |
| Check site, not s | ampled <u>Site Notes</u> rosev | wood and ironba | irk wood | lland, grav | elly clay | loam, | gravel pi | t | |



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 047 | AND LA OI | ND CAP | ABILITY on ID: | Y 1 | | | | |
|---|--|---|---|---|--|---|--|--|--|--|
| Site Information | <u>1</u> | | | | | | | | | |
| Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | I. Hollingsworth 12/05/12 GPS S.A. Off 7489821 AMG zone: 55 777397 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | 44 metres 756 Rapid Imperfectly draine | | ir, photos s tlv draine | s 152-154 | | | | |
| <u>Geology</u> ExposureType: Geol. Ref.: | Existing vertical exposure Pb | Conf. Sub. is Parent. Mat.: Almost d Substrate Material: Existing deep,Fr | | | | certain or certain g vertical exposure, 0.5 m ragmental, Bedded, Porous, , | | | | |
| Mudstone | | | | | | - | | | | |
| <u>Land Form</u> Rel/Slope Class: Morph. Type: Elem. Type: Slope: | Undulating rises 9-30m 3-10% Lower-slope 5 % | Rises 15 metre Gently in 300 degr | s clined ees | | | | | | | |
| Surface Soil Co | ndition Hardsetting | | | | | | | | | |
| Erosion: Active Soil Classificati | e, Moderate (sheet) Active, Modera <u>on</u> | ate (gully) Microrelief: | Zero or microre | no lief | Vert.(n | n) Horiz.(m) | | | | |
| Australian Soil Cl Mesotrophic Meso Clay-loamy Modera ASC Confidence No analytical data | assification: natric Brown Sodosol Medium Grav ately deep : are available but confidence is fair | velly Loamy r. | Mappir Princip Great S Land C | ng Unit: bal Profile Soil Grouj Class: | Form: p: | Tb Dy2.43 Grey-brown podzolic soil Land Class: C2 | | | | |
| Site | Site Complete clearing Pasture native or improved but never cultivated | | | | | | | | | |
| Vegetation: | oomploto oloannig. Faotaro, na | | iou, but i | | liou | | | | | |
| Surface Coarse | Tall Strata - Tree, 12.01-20m, 50-90%, coarse gr | Isolated plant avelly, 20-60 | s. *Spec mm, subi | ies include rounded, S | es - Euca Shale | lyptus crebra | | | | |
| <u>Profile</u> 1A1 0 - 0.1 m | Dark grey (10YR4/1-Moist) mm crack; Many (>5 per 10 plastic; Normal plasticity; M Shale, coarse fragments; F - | i; , 0-0% ; Sar 00mm2) Fine 1oderately stic Field pH 6 (Ra | ndy loam (1-2mm) cky; 50-9 nupach); l | ; Massive ; macropor 0%, coars Many, med | grade of es, Mois e gravell dium (2-5 | structure; Earthy fabric; Fine, (0 - 5) t; Firm consistence; Moderately y, 20-60mm, subrounded, stratified, 5mm) roots; Diffuse, Wavy change to | | | | |
| 1A2e 0.1 - 0.2 r | n Light grey (10YR7/2-Moist) mm crack; Common (1-5 p plastic; Normal plasticity; N Shale, coarse fragments; F to - |); , 0-0% ; Sar er 100mm2) f loderately stic field pH 6 (Ra | ndy loam Fine (1-2 cky; 20-5 upach); (| ; Massive mm) macr 0%, mediu Common, | grade of opores, N ım grave medium | structure; Earthy fabric; Fine, (0 - 5) Moist; Very firm consistence; Very Ily, 6-20mm, subrounded, dispersed, (2-5mm) roots; Clear, Wavy change | | | | |
| 1Bw 0.2 - 0.4 r | m Brown (10YR4/3-Moist); , 0 crack; Few (<1 per 100mm plastic; Normal plasticity; V coarse fragments; Common (Raupach); Common, medi | 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 r | n , 0-0% ; Sandy clay loam; M 100mm2) Very fine (0.075- Very sticky; 20-50%, stony, cutans, <10% of ped faces Wavy change to - | , 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 - | | | | | | | | |
| <u>Morphological I</u> 1A2e | Notes bleached_rusty_root_mottles | 3 | | | | | | | | |
| Observation No | tes | , | | | | | | | | |



Check site, not sampled

Project Name:STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:047Observation ID:1Agency Name:Horizon Soil Survey (NT)

Site Notes

cleared ironbark woodland, gravelly eroded clay loam



Appendix A



Project Name:STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:048Observation ID:1Agency 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 | рН | 1:5 EC | Ca. | Exchangeab | le Cations | CEC | | ESP | CI |
|-----------|------|--------|------|------------|------------|-----|---------------|-------|-------|
| cm | | dS/m | Ca | Mg | ĸ | Cm | Cmol (+)/kg % | | mg/kg |
| 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 | Organic | Total | Avail. | Total | Extr. | Trace Elements | | | | | |
|----------------------|---------|---------------|------------|--------------|------------|----------------|-----|-----------|----------|------|--|
| cm | C % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg/ | Zn kg | в | |
| 0 - 0.1 0.5 - 0.6 | 0.6D | 1160E 460E | <2J <2J | <200 <200 | 5* 9* | 1.68 | 101 | 59.9 | <1 | <0.2 | |



| Project Project Agency | t Name: t Code: y Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | JECT SOIL A 049 | AND LA O | ND CAP | ABILITY on ID: 1 | , I | | |
|---|---|--|---|--|---|---|--|--|--|
| Site Inf | formation | 1 | | | | | | | |
| Desc. B Date De Map Re Northin | y: sc.: f.: g/Long.: | I. Hollingsworth 12/05/12 GPS S.A. Off 7489923 AMG zone: 55 776415 Datum: CDA04 | Locality: Elevation: Rainfall: Runoff: | Locality: Elevation: Rainfall: Runoff: Drainago: | | Reference site; Strathmuir, p 34 metres 756 Moderately rapid | | | 60 |
| Geolog Exposu Geol. Re | 1 <u>V</u> reType: ef.: | Soil pit Kx | Conf. Sub. Substrate | is Pare Material | nt. Mat.: | No Data Fragme | ta ental, Bedded, Porous, , Alluvium | | |
| Land F Rel/Slop Morph. Elem. T Slope: | orm be Class: Type: ype: | Undulating rises 9-30m 3-10% Simple-slope 1 % | Pattern Ty Relief: Slope Cate Aspect: | pe: egory: | Rises 2 metres Very gen 180 degr | tly sloped | I | | |
| Surface | e Soil Co | ndition Surface crust | | | | | | | |
| Erosio Soil Cla | <u>n:</u> Active assificati | e, Minor (sheet) Active, Minor (gull <u>on</u> | y) Microrelief: | Zero or microre | r no elief | Vert.(m | ı) Horiz.(| m) | |
| Australi Vertic M loamy C ASC Co All nece | an Soil Cla esonatric E layey Mode onfidence: essary anal | assification: Brown Sodosol Medium Slightly gr erately deep : ytical data are available. | avelly Clay- | Mappi Princij Great Land (| ng Unit: pal Profile Soil Grouj Class: | Form: p: | Tb Dy2.43 Grey-brown podzolic so Land Class: | il C2 | |
| Site | | Limited clearing, for example s | selective loggi | ng | | | | | |
| Vegeta | tion: | | | | | | | | |
| Surface | e Coarse | Tall Strata - Tree, 12.01-20m, 10-20%, medium | Mid-dense. * gravelly, 6-20 | Species i mm, sub | includes - E rounded, C | Eucalyptu Conglome | s crebra, Euca rate | alyptus p | olatyphylla |
| Profile | | | | | | | | | |
| 1A1 | 0 - 0.1 m | Dark greyish brown (10YR mm, Subangular blocky; R (0.075-1mm) macropores, sticky; 2-10%, medium gra pH 6.5 (Raupach); Many, | 4/2-Moist); , 0 Rough-ped fab Moist; Firm co welly, 6-20mm fine (1-2mm) |)-0% ; Fi ric; Fine, onsisten n, subrou roots; Cl | ne sandy c , (0 - 5) mm ce; Modera inded, disp lear, Smoo | lay loam; n crack; N ately plast ersed, Cc th change | Moderate gra lany (>5 per 1 ic; Normal pla onglomerate, c e to - | de of str 00mm2) sticity; M coarse fra | ucture, 2-5 Very fine loderately agments; Field |
| 1B11 | 0.1 - 0.4 r | n Dark greyish brown (10YR Lenticular; Rough-ped fab macropores, Moist; Firm c gravelly, 6-20mm, subrour ped faces or walls coated (1-2mm) roots; Diffuse, W | 4/2-Moist); , 0 ric; Medium, (4 onsistence; Vo nded, disperse , distinct; Soil /avy change to |)-0% ; He 5 - 10) m ery plast d, Congl matrix is 0 - | eavy clay; l nm crack; N ic; Normal lomerate, c s Slightly ca | Moderate /any (>5 plasticity; coarse fra alcareous; | grade of struc per 100mm2) Moderately s gments; Comr ; Field pH 7.5 | cture, 2-{ Medium ticky; 2- non cuta (Raupac | 5 mm, (2-5mm) 10%, medium ans, 10-50% of ch); Many, fine |
| 1B12 | 0.4 - 0.6 r | n Dark greyish brown (10YR Subangular blocky; Earthy macropores, Moist; Very fi gravelly, 6-20mm, subrour faces or walls coated, disti (2-5mm) roots; Diffuse, Wa | 4/2-Moist); , 0 / fabric; Fine, (/rm consistenc nded, disperse inct; Soil matri avy change to | 0-0% ; He (0 - 5) mi e; Very ed, Cong ix is Sligl - | eavy clay; \ m crack; C plastic; Noi lomerate, c htly calcare | Weak gra ommon (′ rmal plast coarse fra cous; Field | de of structure 1-5 per 100mn icity; Very stic gments; Few d pH 8.5 (Rau | e, 5-10 m n2) Fine ky; 2-10 cutans, ∙ pach); F | nm, (1-2mm) %, medium <10% of ped ew, medium |
| 1C1 | 0.6 - 0.9 r | n Dark yellowish brown (10Y fabric; Fine, (0 - 5) mm cra consistence; Very plastic; dispersed, Conglomerate, Diffuse, Wavy change to - | /R4/6-Moist); , ack; Few (<1 p Normal plastic coarse fragme | , 0-0% ; ber 100m city; Very ents; Fie | Medium he 1m2) Fine (/ sticky; 2-1 ld pH 8.5 (| eavy clay; 1-2mm) n I0%, med Raupach) | Massive grad nacropores, M ium gravelly, (); Few, mediur | e of stru loist; Stro 6-20mm n (2-5mi | cture; Earthy ong , subrounded, m) roots; |
| 1R1 | 0.9 - 1.5 r | n Rock | | | | | | | |
| Morphe | ological | Notes | | | | | | | |
| 1A1 1B11 | | bleached surface thin layer of expansive clay | /; perhaps dep | osited o | ver the und | derlying co | onglomerate i | n this pro | ofile |



| Project Name: Project Code: Agency Name: | STYX SOUTH J000019 Horizon Soil S | COAL PROJ Site ID: Survey (NT) | ECT SOIL 049 | AND LAND CAPABILITY Observation ID: 1 |
|--|---|--------------------------------------|-----------------|--|
| 1C1 1R1 | massive weathered c | onglomerate | | |
| Observation Note | <u>es</u> as 145 146, tall mi | ved woodland | | |
| Site Notes | 25 140-140, tail 111 | | | |

tall mixed woodland, in alluvium over weathered colluvium at 0.9m

Laboratory Test Results:

| Depth | рН | 1:5 EC | 62 | Exchangeable | Cations | Na | CEC | ESP | CI |
|-----------|------|--------|------|--------------|---------|-----|-----------|-------|-------|
| cm | | dS/m | Ga | wg | n | Cm | ol (+)/kg | % | mg/kg |
| 0 - 0.1 | 7.1A | 215A | 5* | 10.5 | | 1.6 | 17.5* | 9.14 | 200* |
| 0.5 - 0.6 | 9.2A | 613A | 7.5* | 11.8 | 0.2 | 4.1 | 23.7* | 17.30 | 520* |

| Depth Organic | | Total | Total | Total | Total | Total | Total | Total | Total | Total | Total | Total | Total | Total | Total | Total | Total | Total | Total | Total | Total | Total | Total | Avail. | Total | Extr. | | ٦ | race Elem | nents | |
|----------------------|--------|---------------|------------|--------------|------------|-------|-------|-----------|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|--|---|-----------|-------|--|
| cm | C % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg/ | Zn kg | в | | | | | | | | | | | | | | | | | | | | | |
| 0 - 0.1 0.5 - 0.6 | 0.5D | 1160E 310E | <2J <2J | <200 <200 | 10* 31* | 2.01 | 81.2 | 35.7 | <1 | <0.2 | | | | | | | | | | | | | | | | | | | | | |



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | JECT SOIL A 050 | ND LA O | ND CAP | ABILITY on ID: 1 | , 1 | | | |
|--|--|--|---|---|--|---|--|---|--|
| Site Information | | | | | | | | | |
| Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | I. Hollingsworth 12/05/12 GPS S.A. Off 7490113 AMG zone: 55 777163 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Strathmu 41 metre 756 Rapid Moderate | ir, photos s ely well dr | 161-1 ained | 62 | | |
| <u>Geology</u> ExposureType: Geol. Ref.: | Existing vertical exposure Pb | Conf. Sub. Substrate I | . is Parent. Mat.: Probable Material: Existing vertical ex deep,Fragmental, | | | | al exposu ntal, Be | ure, 1 m edded, F | ^o orous, , |
| Mudstone | | | | | | | | | |
| Land Form Rel/Slope Class: Morph. Type: Elem. Type: Slope: Surface Soil Co Erosion: Active | Undulating rises 9-30m 3-10% Simple-slope 3 % <u>ndition</u> Hardsetting | Pattern Ty Relief: Slope Cate Aspect: | pe: egory: | Rises 15 metre Gently in 45 degre | s clined es | | | | |
| Erosion: Active Active | e, Moderate (sheet) Active, Modera e Present (stbank) | ate (gully) Microrelief: | Zero or | no | Vert (m | n) | Horiz (m | 1) | |
| Soil Classificati | <u>on</u> | | microre | lief | vor(n | '' | 110112.(11 | •) | |
| Australian Soil Cl Mesotrophic Subna | assification: atric Brown Sodosol Medium Grav | elly Clay-loam | Mappi i y | ng Unit: | | Tb Princ | ipal | Profile | Form: |
| Clayey Moderately ASC Confidence: No analytical data | / deep : are available but confidence is fai | ir. | Great | Soil Grou _l Class: | p: | Grey podz Land | -brown colic soil Class: | C2 | |
| <u>Site</u> Vegetation: | Limited clearing, for example s | selective loggir | ng | | | | | | |
| Surface Coarse | Tall Strata - Tree, 6.01-12m, S | Sparse. *Speci | es inclue | des - Euca rounded (| lyptus cre | ebra | | | |
| Brofile | | graveny, 0-201 | nin, sub | iounded, C | Jongiome | ale | | | |
| 1A1 0 - 0.1 m | Dark greyish brown (10YR - 5) mm crack; Many (>5 ⊧ Moderately plastic; Norma dispersed, Conglomerate, Clear, Smooth change to - | 84/2-Moist); , 0 per 100mm2) l l plasticity; Mo coarse fragme | -0% ; Fii Fine (1-2 derately ents; Fie | ne sandy c 2mm) macr sticky; 10- ld pH 6 (Ra | clay loam; copores, N -20%, me aupach); | Massi ⁄loist; \ dium g Comm | ive grade Very firm gravelly, 6 non, medi | of structur consistend 3-20mm, su um (2-5mr | re; Fine, (0 ce; ubrounded, n) roots; |
| 1B11 0.1 - 0.4 r | n Dark greyish brown (10YR mm crack; Many (>5 per 1 Normal plasticity; Modera Conglomerate, coarse frag change to - | 84/2-Moist); , 0 00mm2) Fine tely sticky; 10- gments; Field p | -0% ; ; N (1-2mm) 20%, me oH 6 (Ra | Aassive gra) macropor edium grav upach); Co | ade of str res, Moist velly, 6-20 ommon, f | ucture; ; Very)mm, s ine (1- | ; Earthy f firm cons subrounde 2mm) roo | abric; Fine sistence; V ed, dispers ots; Diffuse | , (0 - 5) ery plastic; ed, e, Wavy |
| 1B12 0.4 - 0.6 r | n Dark yellowish brown (10Y Fine, (0 - 5) mm crack; Co consistence; Very plastic; dispersed, Conglomerate, distinct; Field pH 8 (Raupa | (R4/6-Moist); , ommon (1-5 pe Normal plastic coarse fragme ach); Few, fine | 0-0% ; I r 100mn ity; Very ents; Coi (1-2mm | Light clay; n2) Very fir sticky; 10- mmon cuta) roots; Dif | Massive (ne (0.075 20%, me ans, 10-50 ffuse, Wa | grade (-1mm) dium g 0% of p vy cha | of structu macropo gravelly, 6 bed faces inge to - | rre; Earthy pres, Moist 3-20mm, su s or walls c | fabric; ; Very firm Jbrounded, oated, |
| 1C1 0.6 - 0.9 r | n , 0-0% ; ; Massive grade o Very fine (0.075-1mm) ma sticky; 20-50%, medium gr Field pH 8.5 (Raupach); Fo | , 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 r | n Rock | | | | | | | | |
| <u>Morphologic</u> al N | Notes | | | | | | | | |
| Observation No | tes | | | | | | | | |



Check site, not sampled Site Notes

tall ironbark woodland, in weathered (ferruginised) substrate, CHECK SITE



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND 051 | LAND CAF Observati | ABILIT on ID: | Y 1 | |
|--|--|---------------------------------------|-------------------------------|------------------|--|--|
| Site Information | 1 | | | | | |
| Desc. By: | I. Hollingsworth | Locality: | Oakdea | n, photos | 162-164 | |
| Date Desc.: | 12/05/12 | Elevation: | 37 metre | es | | |
| Map Ref.: | GPS S.A. Off | Rainfall: | 756 Slow | | | |
| Easting/Lat.: | 775994 Datum GDA94 | Drainage: | Poorly d | rained | | |
| Geology | | 2.4 | | annoa | | |
| ExposureType: | Auger boring | Conf. Sub. is Pa | rent. Mat.: | Almost | certain or certain | |
| Geol. Ref.: | Qpa | Substrate Mater | ial: | Auger | boring, 0.9 m deep,Fragmental, | |
| Bedded, | | | | _ | | |
| | | | | Porous | s, , Alluvium | |
| Land Form | | | | | | |
| Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern | Type: | Terraced land (alluvial) | |
| · · · · | , | | | , | () | |
| Morph. Type: | Flat | Relief: | 5 metres | 3 | | |
| Elem. Type: | Terrace plain | Slope Category | : Level | | | |
| Slope: | 0.5 % | Aspect: | 270 deg | rees | | |
| Surface Soil Co | ndition Cracking | | | | | |
| Erosion: No sc | alding (scald) Not apparent (sheet) | No rill | | | | |
| erosio | n (rill) No gully erosion (gully) | Microrelief: Melo | onhole gilgai | Vert.(I | m) 1 Horiz.(m) 20 | |
| Soli Classificati | on | | | | _ | |
| Australian Soil Cl | assification: | Мар | ping Unit: | | So | |
| Endohypersodic Ci | rusty Grey Vertosol Non-gravelly Fi | ine Medium Prin | cipal Profile | Form: | Ug5.25 | |
| fine Moderately de | ep | Gre | at Soil Grou | ip: | Grey clay | |
| ASC Confidence: | ara available but confidence is fair | l on | d Class | | Land Classy C1 | |
| no analylical dala | are available but confidence is fair | . Lan | a class: | | | |
| <u>Site</u> | Complete clearing. Pasture, na | tive or improved, b | ut never cult | ivated | | |
| Vegetation: | | | | | | |
| | Tall Strata - Tree, 6.01-12m, Is | olated plants. *Spe | cies include | s - Acacia | a harpophylla | |
| Surface Coarse | 0-2%, medium grav | velly, 6-20mm, sub | rounded, Co | nglomera | ate | |
| Profile_ | | | | | | |
| 1A11 0 - 0.1 m | Dark grey (10YR4/1-Moist) | ; , 0-0% ; Clay loar | n; Strong gra | de of stru | ucture, 2-5 mm, Subangular blocky; | |
| | Rough-ped fabric; Medium, | (5 - 10) mm crack | ; Many (>5 p | er 0.01m | 2) Medium (2-5mm) macropores, | |
| | Moist; Weak consistence; V | ery plastic; Norma | I plasticity; N | loderatel | y sticky; 0-2%, medium gravelly, 6- | |
| | 2011111, Subrounded, dispers 2mm) roots: Diffuse, Wavy | change to - | , coarse nag | ments, r | leid ph 6.5 (Raupach), Marty, line (1- | |
| | | onange to | | | | |
| 1A12 0.1 - 0.2 r | n Dark greyish brown (10YR4 | 1/2-Moist); , 0-0% ; | Clay loam; \$ | Strong gr | ade of structure, 10-20 mm, | |
| | Subangular blocky; Rough- | ped fabric; Mediun | n, (5 - 10) mr | n crack; (| Common (1-5 per 0.01m2) Medium | |
| | (2-5mm) macropores, Mois | c, Firm consistence | ; very plasti | c; Norma | r plasticity; Moderately Sticky; 0-2%, | |
| | (Raupach): Many, fine (1-2) | mm) roots: Diffuse | Wavy chan | de to - | coarse fragments, rield pri 0.5 | |
| | (************************************** | , | ,, , | <u> </u> | | |
| 1B11kss 0.2 - 0.3 r | n Greyish brown (10YR5/2-M | loist); , 0-0% ; Ligh | t medium cla | y; Moder | ate grade of structure, 5-10 mm, | |
| | (2 5mm) macropores Mois | ped fabric; Mediun | 1, (5 - 10) mr Verv plasti | n crack; (| Longer (1-5 per 0.01m2) Medium | |
| | medium gravelly, 6-20mm. | subrounded, dispe | rsed. Conald | omerate. | coarse fragments: Common cutans. | |
| | 10-50% of ped faces or wal | lls coated, distinct; | Soil matrix is | s Slightly | calcareous; Field pH 8.5 (Raupach); | |
| | Common, fine (1-2mm) roo | ts; Diffuse, Irregula | r change to | | , | |
| 1P12kaa 0.2 0.5 r | n Brown (10VP5/2 Moist): 0 | 0% · Modium boo | w clow Mod | orato ara | do of structure, 20,50 mm, Lontiquiar; | |
| 1D12K55 0.3 - 0.51 | Smooth-ped fabric: Mediur | -0%, Medium nea m (5 - 10) mm crac | k' Common | (1-5 ner | 0.01m2) Fine (1-2mm) macropores | |
| | Moist; Very firm consistenc | e; Very plastic; No | mal plasticit | y; Very st | ticky; 0-2%, medium gravelly, 6- | |
| | 20mm, subrounded, dispers | sed, Conglomerate | , coarse frag | ments; C | Common cutans, 10-50% of ped faces | |
| | or walls coated, distinct; So | il matrix is Slightly | calcareous; | Field pH | 8.5 (Raupach); Few, fine (1-2mm) | |
| | roots; Dimuse, Irregular cha | nge to - | | | | |
| 1D1ss 0.5 - 0.6 r | n Brown (10YR5/3-Moist): . 0 | -0% ; Medium hea | vy clay: Mod | erate gra | de of structure, 20-50 mm, Lenticular: | |
| | Smooth-ped fabric; Mediur | m, (5 - 10) mm crao | k; Common | (1-5 per | 100mm2) Fine (1-2mm) macropores, | |
| | Moist; Very firm consistence | e; Very plastic; No | mal plasticit | y; Modera | ately 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: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 052 C | ND CAPABILITY bservation ID: 1 | , I |
|---|---|---|---|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | l I. Hollingsworth 12/05/12 GPS S.A. Off 7491799 AMG zone: 55 775950 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Oakdean, photos 1 36 metres 756 Slow Poorly drained | 165,166,melonhole microrelief, |
| Geology ExposureType: Geol. Ref.: Bedded, | Auger boring Qpa | Conf. Sub. is Pare Substrate Materia | nt. Mat.: Almost o : Auger | certain or certain boring, 0.7 m deep,Fragmental, |
| <u>Land Form</u> Rel/Slope Class: | Gently undulating plains <9m 1-3 | 3% | Porous, Pattern Type: | , Alluvium Terraced land (alluvial) |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 270 degrees | |
| Surface Soil Condition Cracking | | | | |
| 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 Cl | assification: | Марр | ng Unit: | So |
| Endohypersodic Cr | usty Grey Vertosol Non-gravelly Fi | ine Medium Princ | oal Profile Form: | Ug5.25 |
| fine Moderately deep Great Soil Group: Grey clay | | | | |
| All necessary anal | ytical data are available. | Land | Class: | Land Class: C1 |
| Site | Complete clearing. Pasture, na | tive or improved, but | never cultivated | |
| Vegetation: | | | | |
| Tall Strata - Tree, 6.01-12m, Isolated clumps. *Species includes - Acacia harpophylla | | | | |
| Surrace Coarse 0-2%, medium gravelly, 6-20mm, subrounded, Conglomerate | | | | |
| 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 r | 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 r | n Brown (10YR5/3-Moist); , 0 Smooth-ped fabric; Medium Moist; Firm consistence; Ve subrounded, dispersed, Co (Raupach); Common, fine (|)-0% ; Medium heavy n, (5 - 10) mm crack; ery plastic; Normal pl nglomerate, coarse f (1-2mm) roots; Diffus | clay; Moderate grad Many (>5 per 100mr Isticity; Very sticky; 2 agments; Soil matrix a, Irregular change to | le of structure, 5-10mm, Lenticular; n2) Fine (1-2mm) macropores, 2-10%, medium gravelly, 6-20mm, x is Slightly calcareous; Field pH 8.5 o - |
| 1D1ss 0.5 - 0.6 r | n Yellowish brown (10YR5/4- Lenticular; Smooth-ped fab macropores, Moist; Firm co gravelly, 6-20mm, subroun | -Moist); , 0-0% ; Med rric; Fine, (0 - 5) mm onsistence; Very plas nded, dispersed, Con | um heavy clay; Mode rack; Common (1-5 ic; Normal plasticity; glomerate, coarse f | erate grade of structure, 5-10mm, per 100mm2) Fine (1-2mm) Moderately sticky; 2-10%, medium fragments; Field pH 8.5 (Raupach); |


| Few, | | fine (1-2 | mm) roots | s; Diffuse | , Irregula | ar char | nge to - | | | | | | |
|--|--|---|--|---|--|-------------------------------------|--|--|--|---|--|---|----------------|
| 1D2 0.6 - 1. | 5 m | Yellowish Lenticula macropo medium (Raupach | n brown (1 ir; Smooth res, Moist gravelly, 6 h); | 0YR5/4- i-ped fab ; Very fin 3-20mm, | Moist); , ric; Fine, m consis subroun | 0-0% (0 - 5 stence; ded, d | ; Medium) mm cra ; Slightly ispersed | n heavy c ick; Few (plastic; N , Conglor | clay; Mode (<1 per 10 Normal pla merate, co | rate gra 0mm2) sticity; S arse fra | de of stru Very fine Slightly sti gments; F | cture, 10-20 (0.075-1mm cky; 10-20% ⁻ ield pH 8.5 | mm, ı) , |
| Morphologica Observation M Detailed site, sau Site Notes cleared brigalow Laboratory Te | I <mark>I Notes</mark> Notes mples 14 v woodlan est Resu | 7-151 nd, improv Ilts: | red pastur | e, brown | clay | | | | | | | | |
| Depth | рН 1 | :5 EC | Exch | angeable | Cations | | CEC | ESP | c | | | | |
| cm | d | C IS/m | a N | lg | К | Na Cmo | ol (+)/kg | % | m | g/kg | | | |
| 0 - 0.1 8 | 3.1A | 32A 1 | 1.8* 9 | .7 | 0.4 | 0.6 | 22.4* | 2.68 | 2 | 0* | | | |
| 0.2 - 0.3 7 | ′.4A | 189A | | | | | | | 19 | 90* | | | |
| 0.5 - 0.6 5 | 5.2A | 910A 2 | 2.9* 9 | .6 | 0.2 | 3.7 | 16.4* | 22.56 | 16 | 80* | | | |
| 0.6 - 0.9 4 | I.8A 1 | 1300A | | | | | | | 25 | 80* | | | |
| 1.1 - 1.2 4 | I.8A 1 | 1390A 1 | .2* | 8 | 0.2 | 3.9 | 13.3* | 29.32 | 28 | 90* | | | |
| Depth | Organic C | Total N | Avail. P | Total K | Extr. S | | Cu | Fe | Trace Eler Mn | nents Zn | в | | |
| CIII | /0 | iiig/kg | j iliy/ky | iiig/kg | ilig/kg | | | | ng | ĸy | | | |
| 0 - 0.1 0.2 - 0.3 0.5 - 0.6 0.2 - 0.9 | 0.9D | 2500E 610E | 24J <2J | 300 320 | 9* 46* | | 2.15 | 203 | 215 | 3.16 | <0.2 | | |
| 1.1 - 1.2 | | 410E | <2J | 230 | 9* | Proj | ect Nan | ne: | STYX S | OUTH | COAL I | PROJECT | SOIL |
| AND LAND CA Project Code: Agency Name | PABILIT J00 e: Hor | 'Y 0019 izon Soi | Sit Survey | e ID: / (NT) | 053 | | Obs | servatio | n ID: 1 | | | | |
| Site Informati Desc. By: Date Desc.: Map Ref.: Northing/Long. Easting/Lat.: | on I. Hollin 12/05/ GPS S : 749173 775830 | ngsworth 12 3.A. Off 36 AMG z 6 Datum: | zone: 55 : GDA94 | | Locali Elevat Rainfa Runof Draina | ty: ion: ill: f: age: | 0 3 7 5 F | Dakdean, 30 metres 756 Slow Poorly dra | , photos 1 s ained | 67, 168 | | | |
| <u>Geology</u> ExposureType: Geol. Ref.: | Auger Qpa | boring | | | Conf. Subst | Sub. is rate M | s Parent aterial: | . Mat.: | No Data Fragmen | tal, Bed | ded, Porc | ous, , Alluviu | m |
| Land Form Rel/Slope Class | s: Gently | ı undulatiı | ng plains | <9m 1-3 | % | | I | Pattern T | уре: | Terraced | l land (all | uvial) | |
| Morph. Type: Elem. Type: Slope: | Flat Terrac 0.5 % | ce plain | | | Relief: Slope Aspec | Categ | l ory: l | 5 metres _evel 270 degre | ees | | | | |
| Surface Soil C | Conditio | <u>n</u> | Crackin | g | | | | | | | | | |

Horizon Soil Survey & Evaluation



| Soil Cla | assification | Microrelief: | Melonhole gilgai Vert.(| m) 1 Horiz.(m) | 20 |
|---|--|---|---|--|---|
| Australi Endohyp fine Mod ASC Co | an Soil Classific persodic Crusty G erately deep onfidence: | cation: Grey Vertosol Non-gravelly Fine Medium | Mapping Unit: Principal Profile Form: Great Soil Group: | So Ug5.25 Grey clay | |
| No anal | ytical data are av | vailable but confidence is fair. | Land Class: | Land Class: (| C1 |
| <u>Site</u> Vegeta | Co tion: | mplete clearing. Pasture, native or improv | ved, but never cultivated | | |
| | Ta | ll Strata - Tree, 6.01-12m, Isolated clump | s. *Species includes - Acad | cia harpophylla | |
| Surface | <u>e Coarse</u> | 2-10%, medium gravelly, 6-20m | nm, subrounded, Conglome | erate | |
| Profile 1A1 | 0 - 0.1 m | Greyish brown (10YR5/2-Moist); , 0-0% Subangular blocky; Rough-ped fabric; C 5mm) macropores, Moist; Firm consiste 10%, medium gravelly, 6-20mm, subrou (Raupach); Abundant, fine (1-2mm) root | ; Fine sandy clay loam; Str oarse, (10 - 20) mm crack; nce; Moderately plastic; No nded, dispersed, Conglomo s; Clear, Smooth change to | rong grade of struct Many (>5 per 0.01 ormal plasticity; Moo erate, coarse fragm o - | ure, 5-10 mm, m2) Medium (2- derately sticky; 2- ients; Field pH 7 |
| 1A2e | 0.1 - 0.2 m | Light grey (10YR7/1-Moist); , 0-0%; Fin Subangular blocky; Rough-ped fabric; C 2mm) macropores, Moist; Very firm com 2-10%, medium gravelly, 6-20mm, subr (Raupach); Many, fine (1-2mm) roots; C | e sandy clay loam; Strong ; oarse, (10 - 20) mm crack; sistence; Moderately plastic ounded, dispersed, Conglo lear, Smooth change to - | grade of structure, Common (1-5 per c; Normal plasticity; omerate, coarse fra | 10-20 mm, 100mm2) Fine (1- ; Moderately sticky; gments; Field pH 7 |
| 1B1 | 0.2 - 0.5 m | Brown (10YR5/3-Moist); , 0-0% ; Light c Rough-ped fabric; Medium, (5 - 10) mm macropores, Moist; Very firm consistenc gravelly, 6-20mm, subrounded, disperse Common, fine (1-2mm) roots; Diffuse, W | lay; Moderate grade of stru crack; Common (1-5 per 1 e; Very plastic; Normal pla ed, Conglomerate, coarse fi /avy change to - | icture, 5-10 mm, Su 00mm2) Very fine (sticity; Very sticky; ragments; Field pH | ıbangular blocky; 0.075-1mm) 2-10%, medium 8 (Raupach); |
| 1B2 | 0.5 - 0.8 m | Yellowish brown (10YR5/4-Moist); , 0-05 Lenticular; Smooth-ped fabric; Medium, 1mm) macropores, Moist; Very firm con- medium gravelly, 6-20mm, subrounded, (Raupach); Few, fine (1-2mm) roots; Dif | %; Medium heavy clay; Mo (5 - 10) mm crack; Commo sistence; Very plastic; Norn dispersed, Conglomerate, fuse, Wavy change to - | oderate grade of str on (1-5 per 100mm2 nal plasticity; Very s coarse fragments; | ucture, 5-10 mm, 2) Very fine (0.075- sticky; 2-10%, Field pH 9 |
| 1C | 0.8 - 1.5 m | Yellowish brown (10YR5/4-Moist); , 0-09 Fine, (0 - 5) mm crack; Moist; Very firm medium gravelly, 6-20mm, subrounded (Raupach); Diffuse, Wavy change to - | % ; Medium heavy clay; Ma consistence; Very plastic; I , dispersed, Conglomerate, | ssive grade of struc Normal plasticity; V , coarse fragments; | cture; Earthy fabric; ery sticky; 10-20%, Field pH 9 |
| Morpho 1A2e | ological Notes | bleached, rusty root mottles | | | |
| Observ | ation Notes | · · · | | | |
| | | | | | |

Check site, not sampled

Site Notes

melonhole microrelief, cleared brigalow woodland, improved pasture, brown clay



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND L 054 | AND CAPA Observation | BILITY 1 ID: 1 |
|--|---|--|--|---|
| Site Informatic Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | n I. Hollingsworth 12/05/12 GPS S.A. Off 7491633 AMG zone: 55 775693 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Oakdean, p 28 metres 756 Moderately Imperfectly | photos 169, 170, melonhole gilgai / rapid / drained |
| Geology ExposureType: Geol. Ref.: Bedded, | Soil pit Qpa | Conf. Sub. is Par Substrate Materi | ent. Mat.: // al: // | Almost certain or certain Auger boring, 1 m deep,Fragmental, |
| | | | I | Porous, , Alluvium |
| Land Form Rel/Slope Class | Gently undulating plains <9m 1-3 | 3% | Pattern Ty | pe: Terraced land (alluvial) |
| Morph. Type: Elem. Type: Slope: | Simple-slope Terrace plain 2 % | Relief: Slope Category: Aspect: | 5 metres Very gently 270 degree | y sloped es |
| Surface Soil C | ondition Cracking | | - | |
| Erosion: Activ Soil Classifica | e, Severe (sheet) Active, Severe (g <u>ion</u> | ully) Microrelief: Melor | nhole gilgai | Vert.(m) 1 Horiz.(m) 20 |
| Australian Soil C Endohypersodic C fine Moderately d | l assification: Crusty Grey Vertosol Non-gravelly F eep | ine Medium Princ Grea | oing Unit: Sipal Profile F t Soil Group: | So form: Ug5.25 Grey clay |
| No analytical dat | a are available but confidence is fair | r. Land | Class: | Land Class: C1 |
| Site | Complete clearing. Pasture, na | ative or improved, bu | t never cultiva | ated |
| Vegetation: | | • | | |
| Surface Coars | Tall Strata - Tree, 6.01-12m, Is | solated plants. *Spec | cies includes - | Acacia harpophylla |
| Profile | | | | ngionerate |
| 1A1 0 - 0.1 n | Greyish brown (10YR5/2-N Subangular blocky; Rough- 5mm) macropores, Moist; F 20%, medium gravelly, 6-2 (Raupach); Abundant, fine | Noist); , 0-0% ; Fine s -ped fabric; Medium Firm consistence; M 0mm, subrounded, (1-2mm) roots; Clea | sandy clay loa (5 - 10) mm c oderately plas dispersed, Cor r, Smooth cha | m; Strong grade of structure, 5-10 mm, crack; Many (>5 per 0.01m2) Medium (2- tic; Normal plasticity; Moderately sticky; 10- nglomerate, coarse fragments; Field pH 7.5 ange to - |
| 1A2e 0.1 - 0.2 | m Light grey (10YR7/1-Moist) Subangular blocky; Rough- 2mm) macropores, Moist; F 20%, medium gravelly, 6-2 (Raupach); Many, fine (1-2 |); , 0-0% ; Fine sand -ped fabric; Medium Firm consistence; M 0mm, subrounded, o mm) roots; Clear, S | y clay loam; N (5 - 10) mm o oderately plas dispersed, Cor mooth change | loderate grade of structure, 2-5 mm, crack; Common (1-5 per 0.01m2) Fine (1- tic; Normal plasticity; Moderately sticky; 10- nglomerate, coarse fragments; Field pH 7 to - |
| 1B21 0.2 - 0.5 | m Brown (10YR5/3-Moist); , 0 ped fabric; Medium, (5 - 10 Very firm consistence; Very subrounded, dispersed, Co roots; Diffuse, Wavy chang | 0-0% ; Light clay; Mc 0) mm crack; Commo y plastic; Normal pla onglomerate, coarse ge to - | derate grade on (1-5 per 100 sticity; Very st fragments; Fio | of structure, 5-10 mm, Lenticular; Smooth- 0mm2) Fine (1-2mm) macropores, Moist; ticky; 10-20%, medium gravelly, 6-20mm, eld pH 9 (Raupach); Common, fine (1-2mm) |
| 1B22 0.5 - 0.8 | m ; Medium heavy clay; Moist | t; Very plastic; Norm | al plasticity; V | /ery sticky; Diffuse, Wavy change to - |
| 1C 0.8 - 1.5 | m ; Medium heavy clay; Moist | t; Very plastic; Norm | al plasticity; V | ery sticky; Diffuse, Wavy change to - |
| Morphological | Notes | | | |
| 1A2e | bleached, rusty root mottles | 3 | | |
| Check site, not sa | <u>ptes</u> mpled | | | |
| Site Notes | • | | | |

terrace slope, cleared brigalow woodland, improved pasture, brown clay



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PR J000019 Site ID Horizon Soil Survey (NT | OJECT SOIL AND L : 055 (⁽) | AND CAPA | Ability n ID: 1 | | | |
|--|---|--|---|----------------------------------|------------------|-------------------|--|
| Site Informatio Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | <u>n</u> I. Hollingsworth 12/05/12 GPS S.A. Off 7491590 AMG zone: 55 775580 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Oakdean, 23 metres 756 Moderatel Imperfectl | photos 1 y rapid y drained | 71, 172 | | |
| Geology ExposureType: Geol. Ref.: | Soil pit Qa | Conf. Sub. is Par Substrate Materi | rent. Mat.: No Data ial: Fragmental, Bedded, Porous, , / | | | orous, , Alluvium | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m | 1-3% | Pattern T | ype: | Terraced land | (alluvial) | |
| Morph. Type: Elem. Type: Slope: | Simple-slope Terrace plain 3 % | Relief: Slope Category: Aspect: | 5 metres Gently inc 270 degre | lined es | | | |
| Surface Soil Co Erosion: Activ Soil Classificat | ondition_ e, Severe (sheet) Active, Severe <u>ion</u> | e (gully) Microrelief: | | | | | |
| Australian Soil Classification: Mapping Unit: So Episodic Crusty Brown Vertosol Gravelly Fine Medium fine Principal Profile Form: Ug5.25 Moderately deep Great Soil Group: Brown clay ASC Confidence: Here LOI Confidence: | | | | | | | |
| <u>Site</u> <u>Vegetation:</u> <u>Surface Coarse</u> | <u>.</u> | | | | | | |
| <u>Profile</u> 1A1 0 - 0.1 m | ; Fine sandy clay loam; change to - | Moist; Moderately plast | tic; Normal pl | asticity; N | loderately stick | ky; Diffuse, Wavy | |
| 1A2e 0.1 - 0.2 | m ; Fine sandy clay loam; change to - | Moist; Moderately plast | tic; Normal pl | asticity; N | loderately stick | ky; Clear, Smooth | |
| 1A1 0.2 - 0.5 | m ; Light clay; Moist; Very | plastic; Normal plastici | ty; Very sticky | ; Diffuse | , Wavy change | e to - | |
| 1B2 0.5 - 0.8 | m ; Medium heavy clay; M | loist; Very plastic; Norm | nal plasticity; \ | Very stick | y; Diffuse, Wa | vy change to - | |
| 1C 0.8 - 1.5 | m ; Medium heavy clay; M | loist; Very plastic; Norm | nal plasticity; | Very stick | y; Diffuse, Wa | vy change to - | |
| Morphological 1A2e Observation No Check site, not sa Site Notes | Notes bleached, rusty root mot <u>otes</u> mpled | tles | | | | | |
| terrace slope, clea | red brigalow woodland, improve | ed pasture, brown clay | | | | | |



- 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

| Depth | рН | 1:5 EC | Ca | Exchangeable | Cations | Na | CEC | ESP | CI |
|-----------|------|--------|------|--------------|---------|------|----------|-------|-------|
| cm | | μS/m | ou | ing | ĸ | Cmo | l (+)/kg | % | 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 | Organic | Total | Avail. | Total | Extr. | | 1 | race Elem | nents | |
|-------------------------------------|---------|------------|------------|------------|------------|----|------|-----------|----------|------|
| cm | C % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg/ | Zn kg | В |
| 0 - 0.1 0.2 - 0.3 | 0.7D | 1160E | <2J | <200 | 13* | <1 | 73.5 | 56.2 | <1 | <0.2 |
| 0.5 - 0.6 0.8 - 0.9 1.1 - 1.2 | | 270E | <2J | <200 | 20* | | | | | |







 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 -</td>

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

| Depth | рН | 1:5 EC | Ca | Exchangeable Ca | tions | CEC | ESP | CI |
|-----------|------|--------|----|-----------------|-------|-------------|-----|-------|
| cm | | dS/m | u | ing it | | Cmol (+)/kg | % | mg/kg |
| 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* |



- 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 Na Project Co Agency Na | me: de: ime: | STYX SOU J000019 Horizon S | UTH Soil S | COAL PRO Site ID: Survey (NT) | JECT SC 058 | OIL AND | LAND Obse | CAPABI rvation | LITY 1 |
|---------------------------------------|--------------------|----------------------------------|---------------|-------------------------------------|----------------|---------------|--------------|-------------------|-----------|
| Laboratory | / Test I | Results: | | | | | | | |
| Depth | pН | 1:5 EC | ~ | Exchangeab | le Cations | CE | C | ESP | CI |
| cm | | dS/m | Са | Mg | ĸ | Na Cmol (+ |)/kg | % | mg/kg |
| 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 Project Agency | t Name: t Code: y Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | CT SOIL A | ND LA Ol | ND CAPA oservatio | ABILITY n ID: 1 | , I | |
|--|--|---|--|---|---|--|---|--|
| Site Inf Desc. B Date De Map Ref Northing Easting | formation y: sc.: f.: g/Long.: /Lat.: | I. HollingsworthLocality:14/05/12Elevation:GPS S.A. OffRainfall:7487938 AMG zone: 55Runoff:772814 Datum: GDA94Drainage: | | | Mamelon, 36 metres 756 Very slow Very poor | photos 2 | 200-201 d | |
| <u>Geolog</u> Exposu Geol. Re | <u>IV</u> reType: ef.: | Auger boring Qpa | Conf. Sub. i Substrate M | is Parer laterial: | nt. Mat.: | Almost o Existing deep,Fra | certain or certain vertical exposure, 1 m agmental, Bedded, Porous, Alluvium | |
| <u>Land F</u> Rel/Slop | orm be Class: | Gently undulating plains <9m 1-3% | 6 | | Pattern T | ype: | Terraced land (alluvial) | |
| Morph. Elem. Ty Slope: | Туре: уре: | Open depression (vale) Drainage depression 0.5 % | Relief: Slope Categ Aspect: | gory: | 5 metres Level 100 degre | es | | |
| Surface | e Soil Co | ndition Hardsetting | | | | | | |
| Erosio | n: Active | Present (sthank) | | | | | | |
| Soil Cla | assificati | on N | licrorelief: | Normal | qilqai | Vert.(m | n) 0.3 Horiz.(m) 10 | |
| Australi | an Soil Cl | assification: | | Mannir | a Unit | , | Pv | |
| Vertic St | ubnatric Br | own Sodosol Medium Slightly grave | ellv Clav- | Princip | al Profile | Form: | Dv2.43 | |
| loamy C | layey Mod | erately deep | 5 5 | Great S | Soil Group |): | Grey-brown | |
| ASC Co | onfidence | | | | | | podzolic soil | |
| No anal | ytical data | are available but confidence is fair. | | Land C | lass: | | Land Class: C2 | |
| Site | | Limited clearing, for example se | lective logain | a | | | | |
| Vegeta | tion: | 5, 1 | 55 | 0 | | | | |
| | | Tall Strata - Tree, 6.01-12m, Mi | d-dense. *Spe | ecies in | cludes - Ac | acia har | oophylla | |
| Surface | e Coarse | 2-10%, coarse grav | elly, 20-60mn | n, subro | unded, Co | nglomera | ate | |
| Profile | . | | | | | | | |
| 1A1 | 0 - 0.1 m | Greyish brown (10YR5/2-Mc Subangular blocky; Rough-p macropores, Moist; Firm cor medium gravelly, 6-20mm, r Many, fine (1-2mm) roots; D | bist); , 0-0% ; bed fabric; Fin hsistence; Mo ounded, dispe iffuse, Wavy (| Fine sa ne, (0 - 5 derately ersed, 0 change | ndy clay los 5) mm crac 7 plastic; No Conglomera to - | am; Mod k; Comm ormal pla ate, coars | erate grade of structure, 5-10 mm, on (1-5 per 0.01m2) Fine (1-2mm) isticity; Moderately sticky; 10-20%, se fragments; Field pH 6 (Raupach); | |
| 1A3 | 0.1 - 0.2 r | n Light grey (10YR7/1-Moist); blocky; Earthy fabric; Fine, (Firm consistence; Moderatel 20mm, rounded, dispersed, 2mm) roots; Diffuse, Wavy c | , 0-0% ; Fine 0 - 5) mm cra ly plastic; Nor Ferricrete, co change to - | sandy l lick; Few mal pla parse fra | oam; Weal v (<1 per 0. sticity; Moc gments; Fi | k grade c 01m2) F lerately s eld pH 7 | of structure, 5-10 mm, Subangular ine (1-2mm) macropores, Moist; sticky; 10-20%, medium gravelly, 6- .5 (Raupach); Common, fine (1- | |
| 1B21 | 0.2 - 0.4 r | O.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 r | n Yellowish brown (10YR5/4-M Lenticular; Smooth-ped fabri macropores, Moist; Very firn gravelly, 6-20mm, rounded, faces or walls coated, distinc | Moist); , 0-0% ic; Medium, (5 n consistence dispersed, Fe ct; Field pH 8 | ; Mediu 5 - 10) n ; Very p erricrete (Raupa | ım clay; Mo nm crack; F Iastic; Nori , coarse fra ch); Few, f | oderate g ⁼ ew (<1 mal plast agments; ine (1-2n | rade of structure, 10-20 mm, per 100mm2) Fine (1-2mm) icity; Very sticky; 2-10%, medium Common cutans, 10-50% of ped nm) roots; Diffuse, Wavy change to - | |
| 1C1 | 0.6 - 0.9 r | n Brown (10YR5/3-Moist); , 0- medium gravelly, 6-20mm, r roots; Diffuse, Wavy change | 0% ; Light cla ounded, dispe e to - | ay; Mois ersed, F | t; Very plas erricrete, c | stic; Norn coarse fra | nal plasticity; Very sticky; 2-10%, agments; Few, medium (2-5mm) | |



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: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA | AND CAP/)bservatio | ABILITY on ID: 1 | | | |
|---|--|---|---|--|--|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 14/05/12 GPS S.A. Off 7489151 AMG zone: 55 773553 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon 28 metres 756 Slow Poorly dra | , photos 202-203 s ained | | | |
| Geology ExposureType: Geol. Ref.: Alluvium | Existing vertical exposure Qpa | Conf. Sub. is Pare Substrate Materia | arent. Mat.: Almost certain or certain rial: Existing vertical exposure, 1 m deep,Fragmental, Bedded, Porou | | | | |
| <u>Land Form</u> Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern T | Type: Terraced land (alluvial) | | | |
| Morph. Type: Elem. Type: Slope: | Open depression (vale) Drainage depression 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 160 degre | ees | | | |
| Surface Soil Co | ndition Hardsetting | • | Ū | | | | |
| Erosion: Active | Moderate scalding (scald) Active | Severe | | | | | |
| (shee Horiz | t) Active, Severe (gully) Active, Pre .(m) | esent (stbank) Micro 10 | relief: | Crabhole gilgai Vert.(m) 0.2 | | | |
| | | | | Vert.(m) Horiz.(m) 10 | | | |
| Soil Classificati | <u>on</u> | | | | | | |
| Australian Soil Cl Vertic Subnatric Br Ioamy Clayey Mod ASC Confidence | assification: own Sodosol Medium Slightly grav erately deep : | Mapp relly Clay- Princ Great | ing Unit: ipal Profile : Soil Group | Form: Dy2.43 p: Grey-brown podzolic soil | | | |
| No analytical data | are available but confidence is fair | Land | Class: | Land Class: D | | | |
| <u>Site</u> | Complete clearing. Pasture, na | tive or improved, but | never cultiv | vated | | | |
| vegetation: | Tall Strata - Tree, 12.01-20m, | Isolated plants. *Spe | cies include | es - Acacia harpophylla | | | |
| Surface Coarse | 2-10%, medium gr | avelly, 6-20mm, subi | rounded, Co | onglomerate | | | |
| Profile | | | | | | | |
| 1A1 0 - 0.1 m | Greyish brown (10YR5/2-N Subangular blocky; Rough- macropores, Moist; Firm co medium gravelly, 6-20mm, (Raupach); Abundant, fine | loist); , 0-0% ; Fine s ped fabric; Fine, (0 - onsistence; Moderate subrounded, dispers (1-2mm) roots; Diffus | andy clay lo 5) mm crac ly plastic; N ed, Conglor se, Wavy ch | oam; Moderate grade of structure, 2-5 mm, ck; Many (>5 per 0.01m2) Fine (1-2mm) lormal plasticity; Moderately sticky; 2-10%, merate, coarse fragments; Field pH 7.5 nange to - | | | |
| 1A2e 0.1 - 0.2 r | m Light grey (10YR7/1-Moist) structure, 2-5 mm, Subang Fine (1-2mm) macropores, sticky; 2-10%, medium grav pH 8.5 (Raupach); Many, f | ; Mottles, 10YR54, 2 jular blocky; Earthy f Moist; Firm consiste velly, 6-20mm, subro fine (1-2mm) roots; C | -10% , 0-5m abric; Fine, nce; Modera unded, dispe clear, Wavy | nm, Distinct; Fine sandy loam; Weak grade of (0 - 5) mm crack; Common (1-5 per 0.01m2) ately plastic; Normal plasticity; Moderately ersed, Conglomerate, coarse fragments; Field change to - | | | |
| 1B21 0.2 - 0.4 r | m Yellowish brown (10YR5/4- Lenticular; Rough-ped fabr macropores, Moist; Very fir Calcareous, Medium (2 -6 I Few, fine (1-2mm) roots; D | Moist); , 0-0% ; Med ic; Medium, (5 - 10) r m consistence; Very mm), Nodules; Soil n iffuse, Wavy change | ium heavy c nm crack; C plastic; Nor natrix is Slig to - | clay; Moderate grade of structure, 10-20 mm, Common (1-5 per 100mm2) Fine (1-2mm) mal plasticity; Very sticky; Few (2 - 10 %), htly calcareous; Field pH 8.5 (Raupach); | | | |
| 1B22 0.4 - 0.6 r | Yellowish brown (10YR5/4- Lenticular; Smooth-ped fab macropores, Moist; Firm cc Calcareous, Medium (2 -6 - fine (1-2mm) roots; Diffuse | Moist); , 0-0% ; Med ric; Medium, (5 - 10) onsistence; Very plas mm), Nodules; Soil n , Wavy change to - | ium clay; Mo mm crack; tic; Normal natrix is Slig | oderate grade of structure, 2-5 mm, Few (<1 per 100mm2) Very fine (0.075-1mm) plasticity; Very sticky; Few (2 - 10 %), htly calcareous; Field pH 9 (Raupach); Few, | | | |



| 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

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 Project Agency | Name: Code: Name: | STYX SOUTH COAL PROJI J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AN 061 | ND LA Oł | ND CAPA Diservatio | ABILITY on ID: | r 1 |
|---|---|---|---|--|---|--|---|
| Site Info Desc. By Date Des Map Ref. Northing Easting/ | ormatior y: sc.: :: g/Long.: 'Lat.: | I I. Hollingsworth 14/05/12 GPS S.A. Off 7487565 AMG zone: 55 773241 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Mamelon 36 metres 756 Slow Poorly dra | , photos : s ained | 204-206, melonhole microrelief |
| Geolog Exposur Geol. Re | <u>V</u> reType: əf.: | Soil pit Qpa | Conf. Sub. is Parent. Mat.: Almost certain or certain Substrate Material: Soil pit, 1 m deep,Fragmental, | | | | |
| r orous, | | | | | | , Alluviu | ım |
| <u>Land Fo</u> Rel/Slop | orm oe Class: | Gently undulating plains <9m 1-3 | % | | Pattern T | уре: | Terraced land (alluvial) |
| Morph. 1 Elem. Ty Slope: | Гуре: /ре: | Flat Terrace plain 0.5 % | Relief: Slope Categ Aspect: | ory: | 5 metres Level 270 degre | ees | |
| Surface Erosion | <u>e Soil Co</u> | <u>ndition</u> Hardsetting | | | | | |
| Soil Cla | assificati | on | Microrelief: N | Melonh | ole gilgai | Vert.(n | n) 1 Horiz.(m) 20 |
| Australia Vertic Su loamy Cla ASC Co | an Soil Cl Ibnatric Br ayey Mod Infidence: | assification: own Sodosol Medium Slightly grave erately deep | elly Clay- F | Mappir Princip Great \$ | ng Unit: eal Profile Soil Group | Form:): | Pv Dy2.43 Grey-brown podzolic soil |
| Analytica | al data are | e incomplete but reasonable confide | ence. | Land C | lass: | | Land Class: C2 |
| <u>Site</u> <u>Vegetat</u> <u>Surface</u> | <u>tion:</u> e Coarse | Complete clearing. Pasture, nat Tall Strata - Tree, 6.01-12m, Iso No surface coarse | tive or improved olated plants. * fragments | d, but r Specie | never cultiv s includes | vated - Acacia | harpophylla |
| <u>Profile</u> 1A1 | 0 - 0.1 m | Dark grey (2.5Y4/1-Moist); Subangular blocky; Rough- macropores, Moist; Firm co 6.5 (Raupach); Many, fine (| , 0-0% ; Fine sa ped fabric; Fine nsistence; Mod 1-2mm) roots; I | andy cl e, (0 - 5 derately Diffuse | ay loam; M 5) mm crac 7 plastic; N 9, Wavy ch | loderate k; Comm ormal pla ange to - | grade of structure, 5-10 mm, non (1-5 per 0.01m2) Fine (1-2mm) asticity; Moderately sticky; Field pH |
| 1A2e | 0.1 - 0.2 r | n Grey (2.5Y6/1-Moist); Mottl of structure; Earthy fabric; Moist; Firm consistence; M (Raupach); Common, fine (| es, 7.5YR44, 1 Fine, (0 - 5) mn loderately plast 1-2mm) roots; (| 0-20% n crack tic; Nor Clear, ' | , 0-5mm, I ; Commor mal plastic Wavy char | Distinct; I n (1-5 per htty; Mode nge to - | Fine sandy clay loam; Massive grade r 0.01m2) Fine (1-2mm) macropores, erately sticky; Field pH 6.5 |
| 1B21 | 0.2 - 0.4 r | n Dark greyish brown (2.5Y4/ Lenticular; Smooth-ped fabi macropores, Moist; Very firi 10-50% of ped faces or wal Wavy change to - | 2-Moist); , 0-0% ric; Medium, (5 m consistence; Is coated, distir | % ; Meo i - 10) n ; Very p nct; Fie | dium heavy nm crack; l lastic; Nor ld pH 8 (R | y clay; M Few (<1 mal plas aupach); | oderate grade of structure, 5-10 mm, per 100mm2) Fine (1-2mm) ticity; Very sticky; Common cutans, ; Few, fine (1-2mm) roots; Clear, |
| 1B22 | 0.4 - 0.6 r | n Dark greyish brown (2.5Y4/ Lenticular; Smooth-ped fabi 1mm) macropores, Moist; V cutans, 10-50% of ped face (Raupach); Few, fine (1-2m) | 3-Moist); , 0-0% ric; Medium, (5 ⁄ery firm consis s or walls coate m) roots; Diffus | %; Meo 5 - 10) n stence; ed, dist se, Wa | dium heavy nm crack; Very plast tinct; Soil n vy change | y clay; M Commor ic; Norma natrix is \$ to - | oderate grade of structure, 5-10 mm, i (1-5 per 100mm2) Very fine (0.075- al plasticity; Very sticky; Common Slightly calcareous; Field pH 8 |
| 1C1 | 0.6 - 1 m | Dark greyish brown (2.5Y4/ mm, Lenticular; Smooth-per (0.075-1mm) macropores, M Common cutans, 10-50% o Medium (2 -6 mm), Concret | 3-Moist); , 0-0% d fabric; Mediuu Moist; Very firm f ped faces or v tions; Field pH | % ; Mea m, (5 - n consis walls co 6 (Rau | dium heavy 10) mm cr stence; Ver pated, disti pach); Diff | y clay; M ack; Con ry plastic inct; Con use, Way | oderate grade of structure, 10-20 nmon (1-5 per 100mm2) Very fine ; Normal plasticity; Very sticky; nmon (10 - 20 %), Manganiferous, vy change to - |
| 1C2 | 1 - 1.5 m | Dark greyish brown (2.5Y4/ fabric; Fine, (0 - 5) mm crac | 3-Moist); , 0-0% k; Common (1- | % ; Meo -5 per 1 | dium heavy 100mm2) \ | y clay; M ∕ery fine | assive grade of structure; Earthy (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 SOUT | H COAL PROJ | ECT SOI | L AND LAND CAPABILI | ΓY |
|---------------|--------------|-------------|---------|---------------------|----|
| Project Code: | J000019 | Site ID: | 061 | Observation | 1 |
| Agency Name: | Horizon Soil | Survey (NT) | | | |

| Depth | рН | 1:5 EC | 62 | Exchangeable Cations | S CEC | ESP | СІ |
|-----------|------|--------|----|----------------------|-------------|-----|-------|
| cm | | dS/m | Ca | Mig K | 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: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 062 O | AND CAPABILIT | Y 1 |
|---|--|--|---|---|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: Coology | 1 I. Hollingsworth 14/05/12 GPS S.A. Off 7487636 AMG zone: 55 772934 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, photos 32 metres 756 Very slow Very poorly drain | 207-209, melonhole microrelief |
| Geology ExposureType: Geol. Ref.: Porous, | Soil pit Qpa | Conf. Sub. is Pare Substrate Materia | nt. Mat.: Almos I: Soil p | t certain or certain it, 1 m deep,Fragmental, Bedded, |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | 3% | , Alluv Pattern Type: | um Terraced land (alluvial) |
| Morph. Type: Elem. Type: Slope: <u>Surface Soil Co</u> | Flat Swamp 0.5 % pndition Hardsetting | Relief: Slope Category: Aspect: | 5 metres Level 90 degrees | |
| Erosion: Activ | e, Minor scalding (scald) Active, Mii | nor (sheet) Microrelief: Melonh | nole gilgai Vert.(| m) 1 Horiz.(m) 20 |
| Soli Classificat Australian Soil C Vertic Subnatric B Ioamy Clayey Moc ASC Confidence Analytical data ar | ion lassification: rown Sodosol Medium Slightly grav lerately deep : e incomplete but reasonable confid | Mappi velly Clay- Princi Great | ng Unit: pal Profile Form: Soil Group: Class: | Pv Dy2.43 Grey-brown podzolic soil Land Class: C2 |
| <u>Site</u> Vegetation: | Complete clearing. Pasture, na | ative or improved, but | never cultivated | a arhorescens. Acacia harpophylla |
| Surface Coarse Profile | 10-20%, medium g | gravelly, 6-20mm, sub | prounded, Conglom | ierate |
| 1A1 0 - 0.1 m | Dark grey (10YR4/1-Moist) blocky; Rough-ped fabric; Few (<1 per 0.01m2) Fine plasticity; Moderately sticky coarse fragments; Field pH |); , 0-0% ; Fine sandy Fine, (0 - 5) mm crac (1-2mm) macropores y; 10-20%, medium gı ł 6 (Raupach); Many, | loam; Moderate gr k; Common (1-5 pe , Moist; Firm consis ravelly, 6-20mm, su fine (1-2mm) roots | ade of structure, 2-5 mm, Subangular er 0.01m2) Fine (1-2mm) macropores, stence; Moderately plastic; Normal ubrounded, dispersed, Conglomerate, ; Diffuse, Wavy change to - |
| 1A2e 0.1 - 0.3 | m Light grey (10YR7/1-Moist) grade of structure; Earthy f macropores, Moist; Firm co medium gravelly, 6-20mm, %), Ferromanganiferous, M 2mm) roots; Abrupt, Smool |); Mottles, 7.5YR44, 1 'abric; Fine, (0 - 5) mn onsistence; Moderatel subrounded, disperse <i>I</i> ledium (2 -6 mm), Co th change to - | 0-20% , 0-5mm, D n crack; Common (y plastic; Normal p ed, Conglomerate, ncretions; Field pH | istinct; Fine sandy loam; Massive 1-5 per 100mm2) Fine (1-2mm) lasticity; Moderately sticky; 2-10%, coarse fragments; Common (10 - 20 I 6.5 (Raupach); Common, fine (1- |
| 1B21 0.3 - 0.4 - | m Brown (10YR4/3-Moist); , 0 Rough-ped fabric; Fine, (0 Moist; Very firm consistenc 20mm, subrounded, disper or walls coated, distinct; Fi | 0-0% ; Medium heavy - 5) mm crack; Few (- ce; Very plastic; Norm rsed, Conglomerate, c ield pH 7.5 (Raupach) | clay; Moderate gra <1 per 100mm2) Vo al plasticity; Very s coarse fragments; (); Few, very fine (0 | ade of structure, 5-10 mm, Polyhedral; ery fine (0.075-1mm) macropores, ticky; 2-10%, medium gravelly, 6- Common cutans, 10-50% of ped faces -1mm) roots; Diffuse, Wavy change to |
| 1B22 0.4 - 0.6 | m Dark yellowish brown (10Y Lenticular; Smooth-ped fab macropores, Moist; Very fir gravelly, 6-20mm, subroun- ped faces or walls coated, | R4/4-Moist); , 0-0% ; pric; Fine, (0 - 5) mm o rm consistence; Very ded, dispersed, Cong distinct; Field pH 7.5 | Medium clay; Mod crack; Few (<1 per plastic; Normal pla lomerate, coarse fr (Raupach); Diffuse | erate grade of structure, 10-20 mm, 100mm2) Very fine (0.075-1mm) sticity; Very sticky; 2-10%, medium agments; Common cutans, 10-50% of e, Wavy change to - |



Project Name:STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:062Observation ID:1Agency 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 -</td>
- 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 CAPABILITYProject Code:J000019Site ID:062Observation1Agency Name:Horizon Soil Survey (NT)Laboratory Test Results:

| Depth | рН | 1:5 EC | 6.2 | Exchangeable Cat | ions | CEC | ESP | CI |
|-----------|------|--------|-----|------------------|------|-------------|-----|-------|
| cm | | dS/m | Ca | Mg K | | 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 Project Code Agency Name | : STYX SOUTH COAL PROJ J000019 Site ID: e: Horizon Soil Survey (NT) | IECT SOIL AND LA 063 O | ND CAPABILI | TY 1 | | | | | |
|--|--|--|--|--|--|--|--|--|--|
| Site Informati Desc. By: Date Desc.: Map Ref.: Northing/Long. Easting/Lat.: | on I. Hollingsworth 14/05/12 GPS S.A. Off : 7487726 AMG zone: 55 772594 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, photo 23 metres 756 Slow Poorly drained | os 210-212 | | | | | |
| <u>Geology</u> ExposureType: Geol. Ref.: | Existing vertical exposure Qpa | Conf. Sub. is Pare Substrate Material | nt. Mat.: Almo : Existi deep | st certain or certain ing vertical exposure, 1 m ,Fragmental, Bedded, Porous, , | | | | | |
| Alluvium | | | | | | | | | |
| Land Form Rel/Slope Class | s: Gently undulating plains <9m 1-3 | 3% | Pattern Type: | Terraced land (alluvial) | | | | | |
| Morph. Type: Elem. Type: Slope: | Open depression (vale) Drainage depression 2 % | Relief: Slope Category: Aspect: | 5 metres Level 100 degrees | | | | | | |
| Surface Soil (| Condition Hardsetting | | | | | | | | |
| Erosion: Act Soil Classific | ive, Severe (sheet) Active, Severe (g ation | gully) Microrelief: Melonh | ole gilgai Vert | .(m) Horiz.(m) | | | | | |
| Australian Soil Vertic Subnatric Ioamy Clayey M ASC Confiden | Classification: Brown Sodosol Medium Slightly grav oderately deep ce: ta are available but confidence is fai | Mappin velly Clay- Princip Great | ng Unit: bal Profile Form: Soil Group: Class: | Pv Dy2.43 Grey-brown podzolic soil Land Class: C2 | | | | | |
| Sito | Complete clearing Pasture na | ative or improved but | never cultivated | | | | | | |
| Vegetation: Surface Coar | Tall Strata - Tree, 6.01-12m, Is 5e 10-20%, medium g | solated plants. *Specie gravelly, 6-20mm, sub | es includes - Euca rounded, Conglo | alyptus crebra merate | | | | | |
| 1A1 0 - 0.1 | m Dark grey (10YR4/1-Moist) Subangular blocky; Rough macropores, Moist; Firm co medium gravelly, 6-20mm, (Raupach); Many, fine (1-2 |); , 0-0% ; Fine sandy I-ped fabric; Fine, (0 - onsistence; Moderatel , subrounded, disperse 2mm) roots; Diffuse, W | loam; Moderate g 5) mm crack; Mar y plastic; Normal ed, Conglomerate avy change to - | grade of structure, 5-10 mm, ny (>5 per 100mm2) Fine (1-2mm) plasticity; Moderately sticky; 10-20%, e, coarse fragments; Field pH 7 | | | | | |
| 1A2e 0.1 - 0. | 3 m Light grey (10YR7/1-Moist grade of structure; Earthy f macropores, Moist; Firm co medium gravelly, 6-20mm, %), Ferromanganiferous, M 2mm) roots; Abrupt, Smoo |); Mottles, 7.5YR44, 1/ fabric; Fine, (0 - 5) mm onsistence; Moderatel , subrounded, disperse Medium (2 -6 mm), Co th change to - | D-20% , 0-5mm, I o crack; Common y plastic; Normal ed, Conglomerate ncretions; Field p | Distinct; Fine sandy loam; Massive (1-5 per 100mm2) Fine (1-2mm) plasticity; Moderately sticky; 10-20%, e, coarse fragments; Common (10 - 20 H 7.5 (Raupach); Common, fine (1- | | | | | |
| 1B21 0.3 - 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 chance to - | | | | | | | | |
| 1B22 0.4 - 0. | 6 m Dark yellowish brown (10Y Lenticular; Smooth-ped fat macropores, Moist; Very fii gravelly, 6-20mm, subroun ped faces or walls coated, change to - | /R4/4-Moist); , 0-0% ; oric; Medium, (5 - 10) i rm consistence; Very ided, dispersed, Congl , distinct; Field pH 8 (F | Medium clay; Mo nm crack; Few (- olastic; Normal pl omerate, coarse Raupach); Few, w | derate grade of structure, 5-10 mm, (1 per 100mm2) Very fine (0.075-1mm) asticity; Very sticky; 10-20%, medium fragments; Common cutans, 10-50% of ery fine (0-1mm) roots; Diffuse, Wavy | | | | | |



Project Name:STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:063Observation ID:1Agency 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

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 Project Agency | t Name: t Code: y Name: | STYX SOUTH COAL PRO J000019 Site ID: Horizon Soil Survey (NT) | JECT SOIL A 064 | AND LA OI | ND CAP bservatio | ABILIT` on ID: | Y 1 | |
|--|---|---|--|--|--|--|---|--|
| Site Inf Desc. B Date De Map Re Northin Easting | formation y: ssc.: f.: g/Long.: /Lat.: | L I. Hollingsworth 14/05/12 GPS S.A. Off 7487733 AMG zone: 55 772436 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | : Mamelon, photos 313-214 n: 33 metres : 756 Slow e: Imperfectly drained | | | | |
| Geolog Exposu Geol. Re Porous | <u>IV</u> reType: ef.: | Soil pit Qpa | Conf. Sub. Substrate | is Pareı Material | nt. Mat.: : | Almost Soil pi | certain or certain it, 1 m deep,Fragmental, Bedded, | |
| , | | | | | | , Alluvi | um | |
| <u>Land F</u> Rel/Sloj | orm pe Class: | Gently undulating plains <9m 1 | -3% | | Pattern | Гуре: | Terraced land (alluvial) | |
| Morph. Elem. T Slope: | Туре: уре: | Flat Terrace plain 0.5 % | Relief: Slope Cate Aspect: | egory: | 5 metres Level 90 degre | es | | |
| Surfac | e Soil Co | ndition Hardsetting | • | | 0 | | | |
| Erosio Soil Cl | <u>n:</u> assificati | on | Microroliof | Crabbo | le gilgoi | Vort (r | m) 0.2 Horiz (m) 20 | |
| Australi | ian Soil Cl | assification: | when or ener. | Mannir | na Unit | vert.(i | Pv | |
| Vertic Soloamy C | ubnatric Br layey Mode onfidence: | own Sodosol Medium Slightly gra erately deep | avelly Clay- | Princip Great | oal Profile Soil Grou | Form: p: | Dy2.43 Grey-brown podzolic soil | |
| Analytic | cal data are | e incomplete but reasonable confi | idence. | Land C | Class: | | Land Class: C2 | |
| <u>Site</u> | | Limited clearing, for example | selective loggin | ng | | | | |
| <u>Vegeta</u> | tion: | Tall Strata - Tree, 6.01-12m. | Sparse, *Speci | ies incluc | des - Euca | lvptus cr | ebra | |
| Surface | e Coarse | 0-2%, medium gi | ravelly, 6-20mm | n, subrou | inded, Fer | ricrete | | |
| <u>Profile</u> | _ | | | | | | | |
| 1A1 | 0 - 0.1 m | Dark grey (2.5Y4/1-Moist blocky; Rough-ped fabric Moist; Firm consistence; I Many, fine (1-2mm) roots |); , 0-0% ; Fine ;; Fine, (0 - 5) n Moderately plas ; Diffuse, Wavy | sandy lo nm crack stic; Norr / change | oam; Mode x; Commor mal plastic to - | erate grad n (1-5 pe ity; Mode | de of structure, 5-10 mm, Subangular r 0.01m2) Fine (1-2mm) macropores, erately sticky; Field pH 6 (Raupach); | |
| 1A2e | 0.1 - 0.3 r | n Light grey (2.5Y7/1-Moist of structure; Earthy fabric Moist; Weak consistence Ferromanganiferous, Meo roots; Clear, Wavy chang |); Mottles, 10YI ; Fine, (0 - 5) m ; Moderately pla dium (2 -6 mm) le to - | R44, 2-1 nm crack astic; No , Concre | 0% , 0-5m ; Few (<1 rmal plasti tions; Field | m, Distin per 0.01 icity; Moo d pH 6 (F | nct; Fine sandy loam; Massive grade m2) Fine (1-2mm) macropores, derately sticky; Common (10 - 20 %), Raupach); Common, fine (1-2mm) | |
| 1B1 | 0.3 - 0.4 r | n Dark greyish brown (2.5Y Moderate grade of structu per 100mm2) Fine (1-2mi Very sticky; Common cut Ferromanganiferous, Meo roots; Diffuse, Wavy char | (4/2-Moist); Mot ure, 5-10 mm, F m) macropores ans, 10-50% of dium (2 -6 mm) nge to - | ttles, 7.5 Polyhedra , Moist; \ ped face , Concre | YR44, 10-: al; Rough- /ery firm c es or walls tions; Field | 20% , 0- ped fabri consisten coated, d pH 7.5 | 5mm, Distinct; Medium heavy clay; ic; Fine, (0 - 5) mm crack; Few (<1 ice; Very plastic; Normal plasticity; distinct; Few (2 - 10 %), (Raupach); Common, fine (1-2mm) | |
| 1B2 | 0.4 - 0.6 r | n Dark greyish brown (2.5Y Moderate grade of structu (1-5 per 100mm2) Very fi plasticity; Very sticky; Cc Slightly calcareous; Field | (4/2-Moist); Moi ure, 5-10mm, L ne (0.075-1mm ommon cutans, pH 8.5 (Raupa | ttles, 7.5 enticular) macrop 10-50% ich); Few | YR44, 10-; r; Smooth- oores, Mois of ped fac ı, fine (1-2) | 20% , 5- ped fabr st; Very f es or wa mm) roof | 15mm, Distinct; Medium clay; ic; Fine, (0 - 5) mm crack; Common firm consistence; Very plastic; Normal Ils coated, distinct; Soil matrix is ts; Diffuse, Wavy change to - | |
| 1C1 | 0.6 - 0.8 r | n Dark greyish brown (2.5Y Lenticular; Smooth-ped fa macropores, Moist; Very 10-50% of ped faces or w Few, fine (1-2mm) roots; | 4/2-Moist); , 0- abric; Fine, (0 - firm consistenc valls coated, dis Diffuse, Wavy o | 0% ; Meo 5) mm ci ce; Very stinct; So change t | dium clay; rack; Com plastic; Nc il matrix is o - | Moderat mon (1-5 ormal pla Slightly | te grade of structure, 5-10mm, 5 per 100mm2) Very fine (0.075-1mm) sticity; Very sticky; Common cutans, calcareous; Field pH 8.5 (Raupach); | |



 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)

| Depth | рН | 1:5 EC | 62 | Exchangeable Cations | CEC | ESP | CI |
|-----------|------|--------|----|----------------------|-------------|-----|-------|
| cm | | dS/m | Ca | Mg K | 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 Nar Project Coo Agency Na | me: de: me: | STYX SOUTH COAL PROJI J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 065 | ND LA Oł | ND CAP | ABILITY on ID: | r 1 | |
|---|--------------------------------------|--|--|--|---|--|--|--|
| Site Inform Desc. By: Date Desc.: Map Ref.: Northing/Lor Easting/Lat.: | ation I. 14 Gl ng.: 74 | Hollingsworth 4/05/12 PS S.A. Off 487816 AMG zone: 55 71794 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Bar H, ph 35 metres 756 Slow Imperfect | otos 215 s ly draine | 5-217 .d | |
| Geology ExposureTy Geol. Ref.: Porous, | pe: So Q | oil pit apa | Conf. Sub. Substrate I | Conf. Sub. is Parent. Mat.: Almost Substrate Material: Soil p | | | certain or certain t, 1 m deep,Fragmental, Bedded, | |
| | | | | | | , Alluviı | ım | |
| Land Form Rel/Slope Cl | ass : G | ently undulating plains <9m 1-3 | % | | Pattern 1 | Гуре: | Terraced land (alluvial) | |
| Morph. Type Elem. Type: Slope: | : Fl Te 0. | lat errace plain .5 % | Relief: Slope Cate Aspect: | gory: | 5 metres Level 300 degre | ees | | |
| Surface So | il Cond | dition Hardsetting | | | | | | |
| Soil Classif | fication | <u>ı</u> 1 | Microrelief: | Crabhol | e gilgai | Vert.(r | n) 0.2 Horiz.(m) 10 | |
| Australian Soil Classification:Mapping Unit:PvVertic Hypernatric Brown Sodosol Medium Slightly gravelly Clay- loamy Clayey Moderately deepPrincipal Profile Form: Great Soil Group:Dy2.43ASC Confidence:podzolic soilpodzolic soilAll necessary analytical data are available.Land Class:C2 | | | | | | | | |
| <u>Site</u> | _ | Limited clearing, for example se | elective loggir | ng | | | | |
| vegetation | <u> </u> | Tall Strata - Tree, 12.01-20m, S | Sparse. *Spec | cies inclu | ides - Euca | alyptus c | rebra | |
| Surface Co | arse | 0-2%, medium grav | velly, 6-20mm | ı, subrou | nded, Cor | nglomera | te | |
| Profile |) 1 m | Dark grey (10VR//1-Moist) | 0_0% · Fine | sandy l | am. Mod | erate ara | ide of structure 5-10 mm | |
| | | Subangular blocky; Rough- macropores, Moist; Firm co medium gravelly, 6-20mm, (Raupach); Many, fine (1-2r | ped fabric; Fin nsistence; Mo subrounded, mm) roots; Di | ne, (0 - 5 oderately disperse ffuse, W | i) mm crac i) plastic; N id, Conglor avy chang | k; Many ormal pl merate, o e to - | (>5 per 0.01m2) Fine (1-2mm) asticity; Moderately sticky; 0-2%, coarse fragments; Field pH 6.5 | |
| 1A2e 0.1 - | - 0.2 m | Light brownish grey (10YR6 Massive grade of structure; 2mm) macropores, Moist; F 10%, fine gravelly, 2-6mm, Ferromanganiferous, Mediu roots; Clear, Wavy change | 6/2-Moist); Mo Earthy fabric Firm consister subrounded, um (2 -6 mm), to - | ottles, 10 ; Fine, ((ice; Mod disperse Concrel | YR44, 2-1) - 5) mm c erately pla d, Congloi ions; Fielc | 0% , 0-5 crack; Co istic; Nor merate, o I pH 6.5 | mm, Distinct; Fine sandy loam; ommon (1-5 per 0.01m2) Fine (1- mal plasticity; Moderately sticky; 2- coarse fragments; Few (2 - 10 %), (Raupach); Many, fine (1-2mm) | |
| 1B1 0.2 · | - 0.3 m | Dark greyish brown (10YR4 Moderate grade of structure per 100mm2) Fine (1-2mm) Very sticky; Common cutan Ferromanganiferous, Mediu roots; Diffuse, Wavy change | l/2-Moist); Mc e, 5-10 mm, P) macropores, is, 10-50% of im (2 -6 mm), e to - | ottles, 7.5 olyhedra Moist; \ ped face Concrel | 6YR44, 10- al; Rough-r /ery firm co es or walls ions; Field | -20% , 0 bed fabri onsisten coated, I pH 6.6 | -5mm, Distinct; Medium heavy clay; c; Fine, (0 - 5) mm crack; Few (<1 ce; Very plastic; Normal plasticity; distinct; Common (10 - 20 %), (Raupach); Common, fine (1-2mm) | |
| 1B21 0.3 - | - 0.6 m | Brown (10YR4/3-Moist); , 0 Smooth-ped fabric; Fine, (0 Moist; Very firm consistence 20mm, subrounded, dispers or walls coated, distinct; Fie | -0% ; Medium - 5) mm crac e; Very plastic sed, Conglom eld pH 7.5 (Ra | n clay; M k; Few (c; Norma erate, co aupach); | oderate gr <1 per 100 I plasticity parse fragr Common, | rade of s 0mm2) V ; Very st ments; C fine (1-2 | tructure, 10-20 mm, Lenticular; ery fine (0.075-1mm) macropores, icky; 10-20%, medium gravelly, 6- ommon cutans, 10-50% of ped faces 2mm) roots; Diffuse, Wavy change to | |



Project Name:STYX SOUTH COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:065Observation ID:1Agency 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 Re | esults: | | | | | | | |
|------------|-----------|---------|------|--------------|---------|-----|-----------|-------|-------|
| Depth | рН | 1:5 EC | 6. | Exchangeable | Cations | Na | CEC | ESP | CI |
| cm | | dS/m | Ca | ca Mg | | Cm | ol (+)/kg | % | 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 | Organic | Total | Avail. | Total | Extr. | | Trace Elements | | | | | | |
|------------------------|---------|------------|------------|------------|------------|------|----------------|-----------|----------|------|--|--|--|
| cm | C % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg/ | Zn kg | В | | | |
| 0-0.1 | 0.5D | 750E | <2J | <200 | 6* | 1.67 | 145 | 182 | <1 | <0.2 | | | |
| 0.5 - 0.6 | | 390E | <2J | <200 | 25* | | | | | | | | |
| 0.0 - 0.9 1.1 - 1.2 | | 160E | <2J | <200 | 19* | | | | | | | | |



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJI J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 066 O | ND CAPAE | BILITY ID: 1 | , 1 |
|---|---|--|---|--|---|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 14/05/12 GPS S.A. Off 7488996 AMG zone: 55 770815 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, p 35 metres 756 Moderately Moderately | ohotos 2 7 rapid 7 well dr | 218-220 ained |
| Geology ExposureType: Geol. Ref.: Porous, | Soil pit Qpa | Conf. Sub. is Pare Substrate Material | nt. Mat.: A : S | Almost (Soil pit | certain or certain , 1 m deep,Fragmental, Bedded, |
| | | | , | Alluviu | m |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern Ty | pe: | Terraced land (alluvial) |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 100 degree | es | |
| Surface Soil Co | ndition Hardsetting | · | U | | |
| Erosion: | on | | nilmai | Mant (m | \sim 0.0 Heriz (m) 10 |
| <u>Soli Classificati</u> | <u>on</u> assification: | Mannie Mannie | giigai na Unit: | vert.(n | BI |
| Australian Son Cl Bleached-Vertic En Clay-loamy Claye ASC Confidence | utrophic Brown Chromosol Medium y Moderately deep | Non-gravelly Princip Great | oal Profile Fe Soil Group: | orm: | Dy3.83 Grey-brown podzolic soil |
| All necessary ana | iytical data are avallable. | Land | Jass: | | Land Class: A |
| <u>Site</u> Vegetation: | Complete clearing. Pasture, nat | tive or improved, culti | vated at som | ne stage Acacia | e harpophylla |
| Surface Coarse | No surface coarse | fragments | | | · · · · F · F · · J · · · |
| <u>Profile</u> | | | | | |
| 1A1 0-0.1 m | Dark greyish brown (10YR4 Subangular blocky; Rough- macropores, Moist; Firm co 6 (Raupach); Abundant, fine | I/1-Moist); , 0-0% ; Fin ped fabric; Fine, (0 nsistence; Moderatel e (1-2mm) roots; Diffu | ne sandy loai 5) mm crack; y plastic; Nor use, Wavy ch | im; Moc ; Comm rmal pla nange to | lerate grade of structure, 5-10mm, ion (1-5 per 0.01m2) Fine (1-2mm) asticity; Moderately sticky; Field pH o - |
| 1A2e 0.1 - 0.2 | n Light brownish grey (10YR6 Massive grade of structure; 2mm) macropores, Moist; F Few (2 - 10%), Ferromang; fine (1-2mm) roots; Clear, V | 6/2-Moist); Mottles, 10 Earthy fabric; Fine, (Firm consistence; Moo aniferous, Fine (0 - 2 Vavy change to - | 0YR44, 2-109 0 - 5) mm cra derately plast mm), Concre | % , 0-5r ack; Co tic; Norr etions; I | mm, Faint; Fine sandy loam; mmon (1-5 per 0.01m2) Fine (1- mal plasticity; Moderately sticky; Field pH 6.5 (Raupach); Common, |
| 1B21ss 0.2 - 0.3 | m Dark greyish brown (10YR4 mm, Polyhedral; Rough-per macropores, Moist; Strong 50% of ped faces or walls o Concretions; Cultivation par (1-2mm) roots; Diffuse, War | I/2-Moist); , 0-0% ; M d fabric; Fine, (0 - 5) r consistence; Very pla coated, distinct; Few (n, Uncemented, Cont vy change to - | edium heavy mm crack; Co Istic; Normal 2 - 10 %), Fe inuous, Mass | v clay; N ommon plastici erromar sive; Fie | Noderate grade of structure, 5-10 (1-5 per 100mm2) Fine (1-2mm) ty; Very sticky; Common cutans, 10- nganiferous, Medium (2 -6 mm), eld pH 7 (Raupach); Common, fine |
| 1B22ss 0.3 - 0.5 | Brown (10YR4/3-Moist); , 0 Smooth-ped fabric; Fine, (0 Moist; Strong consistence; faces or walls coated, distin (1-2mm) roots; Diffuse, Wat | -0% ; Medium clay; M - 5) mm crack; Comr Very plastic; Normal p nct; Soil matrix is Sligh vy change to - | loderate grac non (1-5 per plasticity; Ver ntly calcareou | de of st 100mn ry sticky us; Fiel | ructure, 5-10mm, Lenticular; n2) Fine (1-2mm) macropores, y; Common cutans, 10-50% of ped d pH 8.5 (Raupach); Common, fine |
| 1B3 0.5 - 0.8 | m Brown (10YR4/3-Moist); , 0 Smooth-ped fabric; Fine, (0 Moist; Strong consistence; faces or walls coated, distin 8 (Raupach); Common, fine | -0% ; Medium clay; M I - 5) mm crack; Comr Very plastic; Normal J Ict; Few (2 - 10%), C e (1-2mm) roots; Diffu | loderate grac mon (1-5 per blasticity; Ver alcareous, Fi use, Wavy ch | de of st 100mn ry sticky ine (0 - nange to | ructure, 5-10 mm, Lenticular; n2) Fine (1-2mm) macropores, y; Common cutans, 10-50% of ped 2 mm), Soft segregations; Field pH o - |



- 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

| Depth | рН | 1:5 EC | Ca | Exchangeable | Cations | Na | CEC | ESP | СІ |
|-----------|------|--------|-------|--------------|---------|------|-----------|------|-------|
| cm | | dS/m | Ua | mg | ĸ | Cmc | ol (+)/kg | % | 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 | Total Avail. N P mg/kg mg/kg | Avail. | Total K mg/kg m | Extr. S mg/kg | | Trace Elements | | | | | |
|-------------|---------|------------------------------------|------------|-----------------------|---------------------|------|----------------|-----------|-----------|------|--|--|
| | с % | | P mg/kg | | | Cu | Fe | Mn mga | Zn /kg | В | | |
| 0-0.1 | 0.8D | 1980E | 35J | 410 | 8* | 2.32 | 245 | 238 | 3.74 | <0.2 | | |
| 0.5 - 0.6 | | 420E | <2J | <200 | 10* | | | | | | | |
| 1.1 - 1.2 | | 310E | <2J | <200 | 7* | | | | | | | |







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

| Depth | рН | 1:5 EC | 6.2 | Exchangeable | Cations | Na | CEC | ESP | CI |
|-----------|------|--------|-------|--------------|---------|------|----------|------|-------|
| cm | | dS/m | Ca | Wg | n | Cmo | l (+)/kg | % | 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 | Organic | Total | Avail. | Total | Extr. | | Trace Elements | | | | | |
|------------------------|---------|------------|------------|--------------|------------|-----------|----------------|-------------|-----------|------|--|--|
| cm | C % | N mg/kg | P mg/kg | K mg/kg | S mg/kg | Cu | Fe | Mn mg | Zn /kg | в | | |
| 0-0.1 | 0.5D | 1840E | 31J 3.1 | 1050 <200 | 6* 4* | 3 2 39 | 203 | 159 86 8 | 3.23 | <0.2 | | |
| 0.5 - 0.6 0.8 - 0.9 | 0.00 | 480E | <2J | 460 | 2* | 2.00 | 02.0 | 00.0 | 1.77 | -0.2 | | |
| 1.1 - 1.2 | | 350E | <2J | <200 | 2* | | | | | | | |



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 068 O | ND CAPABILIT | Y 1 | | | | |
|---|---|---|--|---|--|--|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | L I. Hollingsworth 15/05/12 GPS S.A. Off 7485973 AMG zone: 55 774231 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, photo 2 41 metres 756 Slow Imperfectly draine | 224 ed | | | | |
| Geology ExposureType: Geol. Ref.: Bedded, | Auger boringConf. Sub. is Parent. Mat.:QpaSubstrate Material: | | nt. Mat.: Almost I: Auger | t certain or certain boring, 1 m deep,Fragmental, | | | | |
| | | | Porous | s, , Alluvium | | | | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern Type: | Terraced land (alluvial) | | | | |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 270 degrees | | | | | |
| Surface Soil Co | ndition Hardsetting | | - | | | | | |
| Erosion: Active | e, Minor scalding (scald) Active, Mir | nor (sheet) | | m 0.2 Horiz (m) 10 | | | | |
| Soil Classification | on | wicrorelier: Clabic | be gligai vert.(i | m) 0.2 Honz.(m) 10 | | | | |
| Australian Soil Classification: Mapping Unit: Pv Vertic Mesonatric Brown Sodosol Medium Non-gravelly Clay-loamy Principal Profile Form: Dy2.43 Clayey Moderately deep Great Soil Group: Grey-brown podzolic soil ASC Confidence: podzolic soil Land Class: C2 | | | | | | | | |
| <u>Site</u> | Complete clearing. Pasture, na | tive or improved, but | never cultivated | | | | | |
| Vegetation: | Tall Strata Trac 6.04.40m la | elated plants *Creati | ee includee Accei | | | | | |
| Surface Coarse | No surface coarse | fragments | es includes - Acacia | a narpophylia, Hakea arborescens | | | | |
| Profile | - | | | | | | | |
| 1A1 0 - 0.1 m | Dark grey (10YR4/1-Moist) Subangular blocky; Rough- macropores, Moist; Firm co 7 (Raupach); Many, fine (1- | ; , 0-0% ; Fine sandy ped fabric; Fine, (0 - onsistence; Moderatel -2mm) roots; Clear, S | loam; Moderate gra 5) mm crack; Comr y plastic; Normal pl mooth change to - | ade of structure, 5-10 mm, mon (1-5 per 0.01m2) Fine (1-2mm) lasticity; Moderately sticky; Field pH | | | | |
| 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 N | Notes | | | | | | | |
| 1A1 1A2e | ochric epipedon bleached, rusty root mottles | ; | | | | | | |
| 1B2n Observation No. | argillic, natric | | | | | | | |
| Flat on undulating p | plain, check site | | | | | | | |
| Site Notes | Site Notes | | | | | | | |
| mixed woodland - Eucalypt (ironbark), Hakea, native pasture | | | | | | | | |



Morphological Notes

1A2e bleached, rusty root mottles

Observation Notes

Flat on undulating plain, check site

Site Notes

cleared poplar box woodland, check site

Appendix A







| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 071 OI | ND CAPAE | BILITY ID: 1 | , 1 | | |
|---|---|---|---|----------------------------|---|--|--|
| Site InformationDesc. By:I. HollingsworthDate Desc.:15/05/12Map Ref.:GPS S.A. OffNorthing/Long.:7487304 AMG zone: 55Easting/Lat.:773536 Datum: GDA94 | | Locality: Elevation: Rainfall: Runoff: Drainage: | melon hole gilgai m 38 metres 756 No runoff Imperfectly drained | | nicrorelief, Mamelon, photo 227 d | | |
| Geology ExposureType: Geol. Ref.: Bedded, | <mark>≱ology</mark> posureType: Auger boring ю I. Ref.: Qpa ded, | | 1t. Mat.: Almost : Auger | | certain or certain boring, 1 m deep,Fragmental, | | |
| | | | P | Porous, | , Alluvium | | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | 3% | Pattern Ty | pe: | Terraced land (alluvial) | | |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 180 degree | s | | | |
| Erosion: | nultion Sunace crust | | | | | | |
| Soil Classificati | on | Microrelief: Melonh | ole gilgai | Vert.(m | n) 1 Horiz.(m) 20 | | |
| Australian Soil Cl. Vertic Mesonatric C Clayey Moderately ASC Confidence: | assification: Grey Sodosol Medium Non-gravell deep | Mapping Unit: y Clay-loamy Principal Profile Form: Great Soil Group: | | | Pv Dy2.43 Grey-brown podzolic soil | | |
| No analytical data | are available but confidence is fair | ir. Land Class: | | | Land Class: C2 | | |
| <u>Site</u> <u>Vegetation:</u> | Complete clearing. Pasture, na | ative or improved, but i | never cultivat | ted | | | |
| Surface Coarse | Tall Strata - Tree, 6.01-12m, Is 2-10%, medium gr | solated plants. *Specie ravelly, 6-20mm, subro | es includes - <i>i</i> ounded platy, | Acacia , Congl | harpophylla omerate | | |
| <u>Profile</u> 1A1 0 - 0.1 m | Black (2.5Y4/2-Moist); , 0-0 blocky; Rough-ped fabric; f Moist; Firm consistence; M Abundant, fine (1-2mm) roo | 0% ; Fine sandy loam; Fine, (0 - 5) mm crack loderately plastic; Norr ots; Clear, Smooth cha | Moderate gr ; Common (1 mal plasticity; ange to - | ade of -5 per ; Mode | structure, 2-5 mm, Subangular 0.01m2) Fine (1-2mm) macropores, rately sticky; Field pH 6 (Raupach); | | |
| 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 N | 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: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND L 072 | AND CAPA Observation | (BILIT) n ID: | Y 1 | | | | |
|--|---|--|--|---------------------------|---|--|--|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 15/05/12 GPS S.A. Off 7486744 AMG zone: 55 773005 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, 38 metres 756 Very slow Imperfectly | photo 2 y draine | 228 ed | | | | |
| Geology ExposureType: Geol. Ref.: Bedded, | Auger boring Qpa | Conf. Sub. is Par Substrate Materi | ent. Mat.: al: | Almost Auger Porous | certain or certain boring, 1 m deep,Fragmental, ;, , Alluvium | | | | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | 3% | Pattern T | ype: | Terraced land (alluvial) | | | | |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 270 degre | es | | | | | |
| Surface Soil Co Erosion: Partia | ndition Hardsetting I, Minor scalding (scald) Partial, M | inor (sheet) | | Vort (r | m) 0.1 Horiz (m) 10 | | | | |
| Soil Classification Mapping Unit: Pv Australian Soil Classification: Mapping Unit: Pv Vertic Hypernatric Brown Sodosol Medium Slightly gravelly Clay- Principal Profile Form: Dy2.43 Great Soil Group: Great Soil Group: Great Soil Group: Great Soil Group: | | | | | | | | | |
| ASC Confidence No analytical data | are available but confidence is fail | r. Land | Land Class: | | podzolic soil Land Class: C2 | | | | |
| <u>Site</u> Vegetation: | Complete clearing. Pasture, na | ative or improved, bu | t never cultiv | ated | | | | | |
| Surface Coarse | I all Strata - Tree, 6.01-12m, Is No surface coarse | e fragments | cies includes · | - Eucaly | yptus crebra | | | | |
| 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 | 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; | | | | | | | | |
| <u>Morphological I</u> 1A2e | <u>Notes</u> bleached. rusty root mottles | 5 | | | | | | | |

Observation Notes Flat on undulating plain, check site

Site Notes

cleared eucalypt woodland (ironbark, poplar box), tall native grass and sedge)



Site Notes

cleared mixed woodland, tall native grass, fine sandy loam over brown clay





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

Appendix A



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

Appendix A


| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 076 O | AND CAPAB | LITY D: 1 | | | | |
|---|---|--|---|---|--|--|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 15/05/12 GPS S.A. Off 7487704 AMG zone: 55 771384 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, ph 32 metres 756 No runoff Imperfectly d | oto 234 rained | | | | |
| Geology ExposureType: Geol. Ref.: Bedded, | Auger boring Qpa | Conf. Sub. is Pare Substrate Materia | ent. Mat.: Ali I: Au | nost certain or certain ger boring, 1 m deep,Fragmental, rous. Alluvium | | | | |
| <u>Land Form</u> Rel/Slope Class: | Gently undulating plains <9m 1-3 | 3% | Pattern Typ | e: Terraced land (alluvial) | | | | |
| Morph. Type: Elem. Type: Slope: | Flat Drainage depression 0 % | Relief: Slope Category: Aspect: | 5 metres Level 270 degrees | | | | | |
| Surface Soil Co Erosion: Stable | ndition Hardsetting e. Minor (sheet) | | | | | | | |
| Soil Classificati | on | Microrelief: Meloni | nole gilgai V | ert.(m) 1 Horiz.(m) 20 | | | | |
| Australian Soil Classification: Mapping Unit: Pv Vertic Hypernatric Brown Sodosol Medium Slightly gravelly Clay- Principal Profile Form: Dy2.43 Ioamy Clayey Moderately deep Great Soil Group: Grey-brown ASC Confidence: podzolic soil | | | | | | | | |
| No analytical data | are available but confidence is fail | r. Land | Class: | Land Class: C2 | | | | |
| Site Limited clearing, for example selective logging Vegetation: Description | | | | | | | | |
| Surface Coarse | No surface coarse | fragments | des - Eucalypt | as crebra, Eucaryptus platyphylia | | | | |
| <u>Profile</u> 1A1 0 - 0.1 m | Dark grey (10YR4/1-Moist) Subangular blocky; Rough macropores, Moist; Firm co 6.5 (Raupach); Abundant, |); , 0-0% ; Fine sandy -ped fabric; Fine, (0 - onsistence; Moderate fine (1-2mm) roots; C | loam; Moderat 5) mm crack; (ly plastic; Norn lear, Smooth c | e grade of structure, 5-10mm, Common (1-5 per 0.01m2) Fine (1-2mm) al plasticity; Moderately sticky; Field pH nange 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 I | Notes | | | | | | | |
| 1A2e Observation No | bleached, rusty root mottles | 3 | | | | | | |
| Flat on undulating | plain, check site | | | | | | | |
| Site Notes | | | | | | | | |

mixed woodland, with sedge ground cover in a drainage depression



Flat on undulating plain, melonhole gilgai, check site

Site Notes

cleared brigalow, cracking grey clay, melonhole microrelief 20 m, 0.5 m deep

Appendix A



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | CT SOIL AND LAI 078 Ob | ND CAPA | BILITY ID: 1 | | |
|---|---|---|--|--|--|---|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 16/05/12 GPS S.A. Off 7494412 AMG zone: 55 772893 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, p 28 metres 756 Very slow Imperfectly | ohoto 227 drained | | |
| <u>Geology</u> ExposureType: Geol. Ref.: | No Data Qa | Conf. Sub. is Paren Substrate Material: | t. Mat.: | No Data Fragmental, I | Bedded, Porou | ıs, , Alluvium |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3% | % | Pattern Ty | pe: Terra | aced land (allu | vial) |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level No Data | | | |
| Surface Soil Co | ndition Surface crust | | | | | |
| Erosion: Soil Classificati | on N | licrorelief: Melonho | ole gilgai | Vert.(m) | 1 Horiz.(m) | 20 |
| Australian Soil Classification: Mapping Unit: So Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium Principal Profile Form: Ug5.25 fine Moderately deep Moderately deep Great Soil Group: Grey clay ASC Confidence: Land Class: And Class: | | | | | | |
| Site Complete clearing Basture native or improved but never cultiveted | | | | | | |
| Vegetation: | Complete oleaning. Factore, hat | ite er impreted, sach | | | | |
| | Tall Strata - Tree, 6.01-12m, Isc | plated plants. *Species | s includes - | Acacia harp | ophylla | |
| Surface Coarse | No surface coarse f | fragments | | | | |
| <u>Profile</u> 1A11 0-0.1 m | Dark grey (10YR4/1-Moist); blocky; Rough-ped fabric; M Moist; Firm consistence; Mo Abundant, fine (1-2mm) rool | , 0-0% ; Clay loam; M ledium, (5 - 10) mm ci iderately plastic; Norm ts; Clear, Tongued ch | loderate gra rack; Many nal plasticity ange to - | de of structu (>5 per 0.01i ; Moderately | ure, 5-10 mm, 5 m2) Fine (1-2n / sticky; Field p | Subangular nm) macropores, H 7 (Raupach); |
| 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 I | Notes | | | | | |
| Observation No | tes | | | | | |
| Flat on undulating | plain, check site | | | | | |
| Site Notes | | | | | | |
| cleared brigalow, c | racking grey clay, | | | | | |



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: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | CT SOIL AND L 080 | AND CAPA | ABILITY n ID: 7 | , 1 | |
|--|---|--|--|--|--|------------------------|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 16/05/12 GPS S.A. Off 7496063 AMG zone: 55 772281 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon 15 metres 756 Moderate Moderate | , photo 2 s ly rapid ly well dr | 29 rained | |
| <u>Geology</u> ExposureType: Geol. Ref.: | No Data Qa | Conf. Sub. is Pa Substrate Materi | rent. Mat.: ial: | No Data Fragme | a ntal, Bedded, Pe | orous, , Alluvium |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3% | 6 | Pattern T | ype: | Terraced land (| alluvial) |
| Morph. Type: Elem. Type: Slope: <u>Surface Soil Co</u> <u>Erosion:</u> Soil Classificati | Open depression (vale) Valley flat 0.5 % <u>ndition</u> | Relief: Slope Category: Aspect: licrorelief: | 5 metres Level 300 degre | ees | | |
| Australian Soil Classification: Lutic Rudosol Non-gravelly Loamy Shallow ASC Confidence: No analytical data are available but confidence is fair. | | Map Princ Grea Lanc | ping Unit: cipal Profile at Soil Group d Class: | Form:): | Sx Um5.52 Alluvial soil Land Class: | A |
| <u>Site</u> <u>Vegetation:</u> <u>Surface Coarse</u> <u>Profile</u> 1A11 0 - 0.1 m | - Very dark grey (7.5YR3/1-M Diffuse, Smooth change to - | oist); ; Sandy loarr | n; Moist; Sligh | ntly plasti | c; Normal plasti | city; Slightly sticky; |
| 1A12 0.1 - 0.5 i | 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 | 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 - | | | | | ; Slightly sticky; |
| Morphological Observation No Check site, on value | <mark>Notes</mark> <u>tes</u> ey flat on undulating floodplain, not | sampled | | | | |

Styx River, deep sandy clay loam



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 081 | ND LAI Ot | ND CAPA servatio | ABILITY n ID: 1 | , I | | |
|---|--|--|-----------------------|---|----------------------------------|-------------------------------------|---|----------------------|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 16/05/12 GPS S.A. Off 7496073 AMG zone: 55 772476 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Mamelon, 22 metres 756 Slow Imperfect | , photo 23 | 30 d | | |
| Geology ExposureType: Geol. Ref.: Alluvium | Existing vertical exposure Qa | Conf. Sub. i Substrate N | is Paren Iaterial: | ıt. Mat.: | Almost o Existing deep,Fra | certain or vertical e agmenta | ⁻ certain exposure, I, Beddo | 0.5 m ed, Porous, |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | | Pattern T | уре: | Terraceo | d land (allu | uvial) |
| Morph. Type: Elem. Type: Slope: | Flat Terrace flat 0.5 % | Relief: Slope Categ Aspect: | gory: | 5 metres Level 45 degree | es | | | |
| Surface Soil Co | ndition Hardsetting | | | | | | | |
| Erosion: Active Soil Classificati | e, Severe (sheet) Active, Present (si on | tbank) Vicrorelief: | Zero or microrel | no ief | Vert.(m | ı) H | oriz.(m) | |
| Australian Soil Classification:Mapping Unit:SoBasic Grey-Orthic Tenosol Medium Non-gravelly Silty SiltyPrincipal Profile Form:Um5.52Moderately deepGreat Soil Group:Alluvial soil | | | | | | | | |
| No analytical data | are available but confidence is fair. | | Land C | lass: | | Land C | lass: A | |
| <u>Site</u> Vegetation: | Complete clearing. Pasture, nat | tive or improve | ed, but n | ever cultiv | ated | | | |
| Surface Coarse | Tall Strata - Tree, 6.01-12m, Iso 10-20%, medium g | olated plants. ravelly, 6-20m | *Specie nm, subr | s includes ounded, C | - Acacia onglome | harpoph rate | ylla | |
| Profile 1A11 0 - 0.1 m Dark grey (2.5Y4/1-Moist); ; Sandy Ioam; 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 I Observation No | <u>Notes</u> tes | | | | | | | |

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



cleared forest, improved pasture, river backswamps and terrace flats, grey cracking clay





cleared brigalow woodland, grey cracking clay





| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 084 | ND LAI Ot | ND CAPA oservation | BILITY n ID: 1 | , | |
|--|---|--|--------------------------------|--|------------------------------------|---|---|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | I. Hollingsworth 16/05/12 GPS S.A. Off 7493967 AMG zone: 55 767015 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Mamelon, 51 metres 756 Moderatel Imperfectiv | photo 24 y rapid y draineo | 43 1 | |
| <u>Geology</u> ExposureType: Geol. Ref.: | No Data Pb | Conf. Sub. Substrate M | is Parer /aterial: | it. Mat.: | No Data Fragme | ntal, Bedded, Po | orous, , Alluvium |
| Land Form Rel/Slope Class: | Undulating low hills 30-90m 3-109 | % Pattern Typ | be: | Hills | | | |
| Morph. Type: Elem. Type: Slope: | Upper-slope Footslope 3 % | Relief: Slope Cate Aspect: | gory: | 31 metres Gently inc 270 degre | lined es | | |
| Surface Soil Col Erosion: Soil Classification | ndition_ on | Microrelief: | | | | | |
| Australian Soil Classification: Mapping Unit: Tb Vertic Mesonatric Brown Sodosol Medium Gravelly Clay-loamy Principal Profile Form: Dy2.43 Clayey Moderately deep Great Soil Group: Grey-brown ASC Confidence: podzolic soil No apolitical data are qualitable but confidence is fair Lond Classi Careet | | | | | C2 | | |
| <u>Site</u> <u>Vegetation:</u> <u>Surface Coarse</u> | | | | | | | |
| 1A1 0 - 0.1 m | Dark greyish brown (10YR4 Fine, (0 - 5) mm crack; Cor consistence; Moderately pl | 4/2-Moist); ; Fi nmon (1-5 per astic; Normal | ne sand 100mm plasticity | y clay loam 2) Fine (1-2 ; Moderate | i; Massiv 2mm) ma ly sticky; | ve grade of struc acropores, Dry; ; Clear, Smooth | cture; Earthy fabric; Very firm 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 N 1A2e | lotes bleached, rusty root mottles | ; | | | | | |
| Observation No Eroded slope on lov Site Notes | tes w rise | | | | | | |

cleared ironbark woodland, gully erosion 1.5 m, gravelly brown clay



| Site Information Deec. By: I. Hollingsworth Locality: Mamelon, photo 244 Date Desc. By: I. Hollingsworth Locality: Mamelon, photo 244 Date Desc. 10/05/12 GPS S.A. Off Rainfall: 756 Map Ref.: GPS S.A. Off Rainfall: 756 Northing/Long: 7448957 AMG zone: 55 Runoff: Very slow Easting/Lat: 774027 Datum: GDA94 Drainage: Imperfectly drained Geology ExposureType: Auger boring Goode, Ref.: Auger boring, 1 m deep, Fragmental, Bedded, | | | | | | |
|---|--|--|--|--|--|--|
| Desc. By: Date Desc. Date Desc. Map Ref.: I. Hollingsworth (GPS S.A. Off Locality: Relivation: Mamelon, photo 244 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 ExposureType: Auger boring Conf. Sub. Is Parent. Mat: Almost certain or certain Bedded, Opa Substrate Material: Auger boring, 1 m deep,Fragmental, Bedded, Pattern Type: Terraced land (alluvial) Morph. Type: Flat Relief: 5 metres Slope: 0.5 % Aspect: 0 degrees Surface Soil Condition Hardsetting Mapping Unit: Pv (sheet) Active, More realing (scald) Active, Moderate Great Soil Group: Grey-brown Glayey Moderately deep Great Soil Group: Grey-brown Dodz Soil Group: Grey-brown Astralian Soil Classification: Very dark grey (2.SY3/1-Moist): 0.00000000000000000000000000000000000 | | | | | | |
| Geology ExposureType: Geol. Ref: Bedded, Auger boring Opa Conf. Sub. is Parent. Mat.: Substrate Material: Almost certain or certain Auger boring, 1 m deep,Fragmental, Auger boring, 1 m deep,Fragmental, Porous, , Alluvium Land Form Rel/Slope Class: Renty undulating plains <9m 1-3% Pattern Type: Sope: Terraced land (alluvial) Morph. Type: Flat Relief: Siope Category: 5 metres Elem. Type: Terrace plain Slope Category: Level Slope Category: 0 degrees Surface Soil Condition Hardsetting Erosion: Active, Moderate (gully) Microrelief: Crabhole gilgai Vert.(m) 0.1 Horiz.(m) 10 Soil Classification Mapping Unit: Pv Pv Vert.(m) 10 Soil Classification: Mapping Unit: Pv Vertic Hypermatric Grey Sodosol Medium Non-gravelly Clay-loamy Great Soil Group: Collocici Soil No analytical data are available but confidence is fair. Land Class: Land Class: C2 | | | | | | |
| Land Form Rel/Slope Class: Gently undulating plains <9m 1-3% | | | | | | |
| 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 Hardsetting Erosion: Active, Mion scalding (scald) Active, Moderate (sheet) Active, Moderate (gully) Microrelief: Crabhole gilgai Vert.(m) 0.1 Horiz.(m) 10 Soil Classification: Mapping Unit: Pv Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy Principal Profile Form: Dy2.43 Clayey Moderately deep Great Soil Group: Grey-brown ASC Confidence: podzolic soil 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, 12.01-20m, Isolated plants. *Species includes - Eucalytus crebra Surface Coarse 2-10%, medium gravelly, 6-20mm, rounded, Conglomerate Subangular blocky; Rough-ped fabric; Fine, (0 - 5) mm crack; Common (1-5 per 0.01m2) Fine (1-2mm) macropores, | | | | | | |
| Morph. Type: Flat Relief: 5 metres Elem. Type: Terrace plain Slope Category: Level Slope: 0.5 % Aspect: 0 degrees Surface Soil Condition Hardsetting Hardsetting Erosion: Active, Minor scalding (scald) Active, Moderate (sheet) Active, Moderate (gully) Microrelief: Crabole gilgai Vert.(m) 0.1 Horiz.(m) 10 Soil Classification: Mapping Unit: Pv Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy Principal Profile Form: Dy2.43 Clayey Moderately deep Great Soil Group: Grey-brown ASC Confidence: podzolic soil Dy2.43 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 2-10%, medium gravelly, 6-20mm, rounded, Conglomerate Frofile 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, Mo | | | | | | |
| Erosion: Active, Minor scalding (scald) Active, Moderate (sheet) Active, Moderate (gully) Microrelief: Crabhole gilgai Vert.(m) 0.1 Horiz.(m) 10 Soil Classification Mapping Unit: Pv Australian Soil Classification: Mapping Unit: Pv Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy Brincipal Profile Form: Dy2.43 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, 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 - | | | | | | |
| (sheet) Active, Moderate (gully) Microrelief: Crabhole gilgai Vert.(m) 0.1 Horiz.(m) 10 Soil Classification Australian Soil Classification: Mapping Unit: Pv Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy Mapping Unit: Pv Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy Principal Profile Form: Dy2.43 Clayey Moderately deep Great Soil Group: Grey-brown ASC Confidence: podzolic soil Land Class: C2 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 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 - | | | | | | |
| Soli Classification: Mapping Unit: Pv Australian Soil Classification: Principal Profile Form: Dy2.43 Clayey Moderately deep Great Soil Group: Grey-brown podzolic soil ASC Confidence: podzolic soil Land Class: Clayed Class: 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 - Eucalytus 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 - | | | | | | |
| Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy Principal Profile Form: Dy2.43 Clayey Moderately deep Great Soil Group: Grey-brown ASC Confidence: podzolic soil 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, 12.01-20m, Isolated plants. *Species includes - Eucalyptus crebra 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 - | | | | | | |
| 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 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 - | | | | | | |
| 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 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 - | | | | | | |
| 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 - | | | | | | |
| 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 - | | | | | | |
| 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 - | | | | | | |
| 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; Gradual, Wavy change to - | | | | | | |
| Morphological Notes | | | | | | |
| Observation Notes | | | | | | |

Flat on undulating plain, check site

Site Notes

cleared ironbark woodland, high plain, gravelly brown clay with native grass



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 086 OI | ND CAP/ bservatio | ABILITY on ID: | (1 | | |
|--|---|--|---|----------------------------------|---------------------------------------|----------------|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | I. Hollingsworth 15/05/12 GPS S.A. Off 7485975 AMG zone: 55 774247 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon 46 metres 756 Very slow Imperfect | , photo 2 s / ly draine | 225 Id | | |
| Geology ExposureType: Geol. Ref.: Bedded, | Auger boring Qpa | Conf. Sub. is Pare Substrate Material | nt. Mat.: : | Almost Auger | certain or certain boring, 1 m dee | ep,Fragmental, | |
| | | | | Porous | , , Alluvium | | |
| <u>Land Form</u> Rel/Slope Class: | Gently undulating plains <9m 1-3 | 3% | Pattern 1 | Гуре: | Terraced land (alluvia | al) | |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 270 degre | ees | | | |
| Surface Soil Co | ndition Hardsetting | | | | | | |
| Erosion: Active (sheet | e, Minor scalding (scald) Active, Mo t) | oderate Microrelief: Normal | ailaai | Vert.(r | n) 0.3 Horiz.(m) 5 | 5 | |
| Soil Classificati | <u>on</u> | | 5 5 | `` | , (, - | | |
| Australian Soil Cl | assification: | Марріі | ng Unit: | _ | Pv | | |
| Vertic Hypernatric (Clavey Moderately | Grey Sodosol Medium Non-gravell | ly Clay-loamy Princip Great | oal Profile Soil Grour | Form: | Dy2.43 Grev-brown | | |
| ASC Confidence: | doop | Ciout | | | podzolic soil | | |
| No analytical data | are available but confidence is fail | r. Land C | Class: | | Land Class: C2 | | |
| <u>Site</u> | Extensive clearing, for example | e poisoning, ringbarkir | ng | | | | |
| Vegetation: | Tell Strate Tree 12.01.00m | | indudee | Europh | tus such us | | |
| Surface Coarse | 0-2% medium gra | very sparse. "Species welly 6-20mm subrou | Includes - Inded Cor | domera | ite | | |
| Profile | 0/0,outum gra | | | giornora | | | |
| Prome 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; Many (>5 per 100mm2) 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 100mm2) 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; Field pH 7.5 (Raupach); Few, very fine (0-1mm) roots; | | | | | | | |
| Manabolania | lataa | | | | | | |
| INIOIPHOIOGICAL N 1A2e | bleached, rusty root mottles | 6 | | | | | |

Observation Notes Flat on undulating plain, check site

Site Notes

mixed woodland - Eucalypt (ironbark), Hakea, native pasture



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AI 087 | ND LAI Ot | ND CAPA oservation | ABILITY n ID: 1 | , 1 | |
|--|---|--|---|--|-----------------------|---|-------------------|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 16/05/12 GPS S.A. Off 7485747 AMG zone: 55 774342 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Mamelon, 42 metres 756 Very slow Imperfect | photo 24 y draineo | 45 d | |
| Geology ExposureType: Geol. Ref.: | No Data Qpa | Conf. Sub. is Substrate M | s Paren aterial: | it. Mat.: | No Data Fragme | n ntal, Bedded, Po | prous, , Alluvium |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3% | % | | Pattern T | уре: | Terraced land (| alluvial) |
| Morph. Type: Elem. Type: Slope: Surface Soil Co | Flat Terrace plain 0.5 % Addition | Relief: Slope Categ Aspect: | jory: | 5 metres Level 90 degree | s | | |
| Erosion: | nation | | | | | | |
| Soil Classificati | on N | licrorelief: | | | | | |
| Australian Soil Classification: Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy Clayey Moderately deep ASC Confidence: | | Clay-loamy | Mapping Unit: Principal Profile Form: Great Soil Group: | | Form: : | Pv Dy2.43 Grey-brown podzolic soil | |
| Site Vegetation: Surface Coarse Profile | | | | 1455. | | Lanu Class. | 02 |
| 1A1 0 - 0.1 m | 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 r | .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 I | Morphological Notes 1A2e bleached rusty root mottles | | | | | | |
| Observation No | <u>tes</u> plain, check site | | | | | | |
| Site Notes | - | | | | | | |

ironbark woodland on brown gravelly clay, native grassland,



| 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; |
| Morph | ological Notes | |
| 1A2e | | bleached, rusty root mottles |

Observation Notes Flat on floodplain, check site

Site Notes

Desc. By:

Map Ref.:

<u>Geology</u>

Bedded,

Slope:

Site

Erosion:

cleared ironbark woodland, native grassland





| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJI J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND L 089 (| AND CAP Observatio | ABILITY on ID: | r 1 | | |
|---|---|--|--|-------------------------------|--|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | <u>1</u> I. Hollingsworth 16/05/12 GPS S.A. Off 7484989 AMG zone: 55 773947 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon 44 metre 756 Slow Imperfec | i, photo 2 s tly draine | 247 ed | | |
| Geology ExposureType: Geol. Ref.: Bedded, | Auger boring Qa | Conf. Sub. is Par Substrate Materia | ent. Mat.: al: | Almost Auger | certain or certain boring, 1 m deep,Fragmental, | | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern ⁻ | Type: | Terraced land (alluvial) | | |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 120 degr | rees | | | |
| Surface Soil Co Erosion: | ndition Hardsetting | Minner lief. Ouch | -1 |) / | | | |
| Soil Classification: Mapping Unit: Pv Australian Soil Classification: Mapping Unit: Pv Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy Principal Profile Form: Dy2.43 Clayey Moderately deep Great Soil Group: Grey-brown ASC Confidence: podzolic soil No analytical data are available but confidence is fair 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 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 | | | | | | | |
| 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 I 1A2e | Notes bleached, rusty root mottles | | | | | | |
| Observation No Flat on floodplain, o | t <u>es</u> check site | | | | | | |
| <u>Site Notes</u> cleared ironbark w | oodland | | | | | | |



cleared ironbark woodland, native grassland

Appendix A



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 091 O | ND CAPABIL | LITY D: 1 | | |
|--|--|--|--|---|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 16/05/12 GPS S.A. Off 7484690 AMG zone: 55 776108 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, pho 45 metres 756 Moderately ra Imperfectly dra | to 249 pid ained | | |
| <u>Geology</u> ExposureType: Geol. Ref.: | Existing vertical exposure Qpa | Conf. Sub. is Pare Substrate Material | nt. Mat.: Alm I: Exis | ost certain or certain sting vertical exposure, 1 m p.Fragmental. Bedded. Porous. | | |
| Alluvium | | | | , agnonal, 20000, 10.000, , | | |
| <u>Land Form</u> Rel/Slope Class: | Gently undulating plains <9m 1-3 | 8% | Pattern Type | : Terraced land (alluvial) | | |
| Morph. Type: Elem. Type: Slope: | Open depression (vale) Drainage depression 2 % | Relief: Slope Category: Aspect: | 5 metres Gently incline 0 degrees | d | | |
| Surface Soil Co | ndition Hardsetting | | - | | | |
| Erosion: Active (shee Horiz | e, Severe scalding (scald) Active, M t) Active, Moderate (rill) Active, Se .(m) | <i>l</i> oderate vere (gully) Micror 10 | elief: Cr | abhole gilgai Vert.(m) 0.2 | | |
| Soil Classificati | ion | | | | | |
| Australian Soil Classification:Mapping Unit:PvVertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamyPrincipal Profile Form:Dy2.43Clayey Moderately deepGreat Soil Group:Grey-brownASC Confidence:podzolic soil | | | | | | |
| | | | nover cultivated | Lanu Class. 02 | | |
| Vegetation: | Toll Strate Tree 12.01.20m | lasted plants *Crea | | | | |
| Surface Coarse | 10-20%, medium g | gravelly, 6-20mm, sub | rounded, Congl | omerate | | |
| 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 0.01m2) 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 Grey (10YR6/1-Moist); Mottles, 10YR44, 2-10%, 0-5mm, Distinct; Medium heavy 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; 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 100mm2) 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; 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 1A2e | Notes bleached, rusty root mottles | 3 | | | | |

Observation Notes Flat on undulating plain, check site

Site Notes

cleared ironbark woodland, native pasture, severe active gully erosion



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND I 092 | AND CAP | ABILIT on ID: | Y 1 | | |
|--|---|--|--|---------------------------------|--|--|--|
| Site Information | | | | | | | |
| Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1. Hollingsworth 16/05/12 GPS S.A. Off 7483627 AMG zone: 55 776547 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelor 43 metre 756 Slow Imperfec | n, photo 2 es etly draine | 250 ed | | |
| <u>Geology</u> ExposureType: Geol. Ref.: Bedded, | Auger boring Qpa | Conf. Sub. is Pa Substrate Mater | rent. Mat.: al: | Almost Auger Porous | certain or certain boring, 1 m deep,Fragmental, s Alluvium | | |
| Land Form | | | | | ,, | | |
| Rel/Slope Class: | Gently undulating plains <9m 1-3 | 3% | Pattern | Туре: | Terraced land (alluvial) | | |
| Morph. Type: Elem. Type: Slope: Surface Soil Co | Flat Terrace plain 1 % ndition Hardsetting | Relief: Slope Category: Aspect: | 5 metres Gently in 90 degre | s nclined ees | | | |
| Erosion: Stable | e, Moderate (sheet) | | | | | | |
| Soil Classificati | on | Microrelief: Crab | hole gilgai | Vert.(ı | m) 0.1 Horiz.(m) 10 | | |
| Australian Soil Classification: Mapping Unit: Pv Vertic Hypernatric Grey Sodosol Medium Non-gravelly Clay-loamy Principal Profile Form: Dy2.43 Clayey Moderately deep Great Soil Group: Grey-brown ASC Confidence: podzolic soil No analytical data are available but confidence is fair. 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 | | | | | | | |
| Surrace coarse Intervention Profile Intervention 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 N | Notes | | | | | | |
| Deservation No | bleached, rusty root mottles | 5 | | | | | |
| Flat on undulating | plain, check site | | | | | | |

cleared ironbark woodland, native pasture, gravelly brown clay



cleared ironbark woodland, native grassland, basalt rock outcropping on crests of undulating plain, shallow over basalt

Appendix A



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 094 OI | ND CAPA bservatio | ABILITY n ID: | r 1 |
|---|--|--|---|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 16/05/12 GPS S.A. Off 7482398 AMG zone: 55 776658 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Normal gi 56 metres 756 Moderatel Moderatel | lgai, Bru s ly rapid ly well dr | ssels, photos 252 & 253 rained |
| <u>Geology</u> ExposureType: Geol. Ref.: Bedded, | Auger boring Tb | Conf. Sub. is Pare Substrate Material | nt. Mat.: : | Almost Auger | certain or certain boring, 1 m deep,Fragmental, |
| | | | | Porous, | , , Alluvium |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern T | уре: | Lava plain |
| Morph. Type: Elem. Type: Slope: | Crest Terrace plain 1 % | Relief: Slope Category: Aspect: | 5 metres Gently inc 90 degree | clined es | |
| Surface Soil Co | ndition Hardsetting | | | | |
| Erosion: Stable Soil Classificati | e, Moderate (sheet) on | Microrelief: Normal | ailaai | Vert.(n | n) 0.5 Horiz.(m) 10 |
| Australian Soil Cl Vertic Subnatric Br Moderately deep ASC Confidence: | assification: own Sodosol Thin Gravelly Clay-lo | Mappir amy Clayey Princip Great | ng Unit: Dal Profile Soil Group | Form: | Tb Dy2.43 Grey-brown podzolic soil |
| No analytical data | are available but confidence is fair | Land C | Class: | | Land Class: C2 |
| <u>Site</u> Vegetation: | Complete clearing. Pasture, na | tive or improved, but i | never cultiv | ated | |
| Surface Coarse tabular, Basalt | Tall Strata - Tree, 12.01-20m, I 2-10%, cobbly, 6 | lsolated plants. *Spec 0-200mm, subrounde | ed, Quartz; | s - Eucal ; 10-20% | lyptus crebra %, cobbly, 60-200mm, subrounded |
| <u>Profile</u> 1A1 0 - 0.1 m | Dark greyish brown (10YR4 mm, Subangular blocky; Ro (1-2mm) macropores, Mois 10-20%, coarse gravelly, 20 (Raupach); Many, fine (1-2) | 4/2-Moist); , 0-0% ; Fir ough-ped fabric; Medi t; Firm consistence; N 0-60mm, subrounded, mm) roots; Clear, Sm | ne sandy cl um, (5 - 10) loderately j , dispersed ooth chang | ay loam;) mm cra plastic; N , Quartz, e to - | ; Moderate grade of structure, 2-5 ack; Common (1-5 per 0.01m2) Fine Normal plasticity; Moderately sticky; , coarse fragments; Field pH 6 |
| 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 r | m Dark yellowish brown (10Y) Polyhedral; Moderate grade crack; Common (1-5 per 10 Normal plasticity; Very stic fragments; Common cutans ped faces or walls coated, fine (1-2mm) roots; Diffuse | R4/4-Moist); , 0-0% ; I e of structure, 10-20 n 00mm2) Fine (1-2mm) ky; 20-50%, cobbly, 6 s, 10-50% of ped face distinct; Soil matrix is , Irregular change to - | Medium cla nm, Lenticu macropore 0-200mm, s or walls c Slightly cale | iy; Mode ilar; Smo es, Moist subroun coated, d careous; | rate grade of structure, 5-10 mm, ooth-ped fabric; Fine, (0 - 5) mm t; Very firm consistence; Very plastic; ded, dispersed, Basalt, coarse listinct; Common cutans, 10-50% of ; Field pH 8 (Raupach); Common, |
| Morphological I 1A2e | Notes 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: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 095 | AND LA O | ND CAP | ABILIT on ID: | Y 1 |
|--|--|---|--|--|--|--|
| Site Information | ı | | | | | |
| Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1. Hollingsworth 16/05/12 GPS S.A. Off 7482036 AMG zone: 55 776520 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Mamelor 53 metre 756 Very slov Imperfec | n, photo 2 s w tly draine | 254 ed |
| Geology ExposureType: Geol. Ref.: Bedded, | Auger boring Qa | Conf. Sub. Substrate | is Pare Material | nt. Mat.: : | Almost Auger | t certain or certain boring, 1 m deep,Fragmental, |
| | | | | | Folous | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | 3% | | Pattern | Туре: | Terraced land (alluvial) |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Cate Aspect: | egory: | 5 metres Level 180 degr | rees | |
| Surface Soil Co | ndition Hardsetting | | | - | | |
| Erosion: Stable Soil Classificati | e, Moderate (sheet) on | Microrelief: | Crabho | le gilgai | Vert.(I | m) 0.3 Horiz.(m) 5 |
| Australian Soil Cl Vertic Subnatric Br Moderately deep ASC Confidence | assification: own Sodosol Thin Gravelly Clay-lo : | oamy Clayey | Mappi Princij Great | ng Unit: oal Profile Soil Grou | Form: p: | Pv Dy2.43 Grey-brown podzolic soil |
| No analytical data | are available but confidence is fair | r. | Land (| Class: | | Land Class: C2 |
| <u>Site</u> Vegetation: | Site Complete clearing. Pasture, native or improved, but never cultivated Vegetation: | | | | | |
| Surface Coarse | 2-10% coarse gra | velly 20-60m | m subr | ounded Co | onalome | rate |
| Profile 1A1 0 - 0.1 m | Dark greyish brown (10YR4 mm, Subangular blocky; Rd (1-2mm) macropores, Mois 2-10%, medium gravelly, 6 cutans, 10-50% of ped face coated, distinct; Field pH 7 | 4/2-Moist); , 0 ough-ped fabi st; Firm consis -20mm, subro es or walls co (Raupach); A | 0-0% ; Fin ric; Medi stence; N ounded, ated, dis Abundant | ne sandy c um, (5 - 10 loderately dispersed, tinct; Com t, fine (1-2) | clay loam)) mm cr plastic; l Conglor mon cuta mm) root | n; Moderate grade of structure, 5-10 ack; Common (1-5 per 0.01m2) Fine Normal plasticity; Moderately sticky; merate, coarse fragments; Common ans, 10-50% of ped faces or walls ts; Clear, Smooth change to - |
| 1A2e 0.1 - 0.2 r | Light brownish grey (10YR Massive grade of structure; 2mm) macropores, Moist; F 20%, medium gravelly, 6-2 %), Ferromanganiferous, F roots; Clear, Smooth chan | 6/2-Moist); Mo ; Earthy fabric Firm consister Omm, subrou Fine (0 - 2 mm ge to - | ottles, 10 c; Mediui nce; Moo nded, dis n), Concr |)YR44, 2-1 m, (5 - 10) derately pla spersed, C etions; Fie | 10% , 0-5 mm crac astic; No conglome dd pH 7.5 | 5mm, Distinct; Fine sandy clay loam; ck; Few (<1 per 0.01m2) Fine (1- rmal plasticity; Moderately sticky; 10- erate, coarse fragments; Few (2 - 10 5 (Raupach); Common, fine (1-2mm) |
| 1B2kss 0.2 - 0.5 r | n , 0-0% ; Medium clay; Mod 20 mm, Lenticular; Smooth 100mm2) Fine (1-2mm) ma sticky; 2-10%, medium grav matrix is Slightly calcareous change to - | erate grade o I-ped fabric; R acropores, Mo velly, 6-20mm s; Field pH 8 | f structur Rough-pe bist; Very n, subrou (Raupac | re, 2-5 mm ed fabric; F / firm cons Inded, disp h); Comm | n, Polyhe Fine, (0 - istence; persed, 0 on, fine (| edral; Moderate grade of structure, 10- 5) mm crack; Common (1-5 per Very plastic; Normal plasticity; Very Conglomerate, coarse fragments; Soil (1-2mm) roots; Diffuse, Irregular |
| Morphological I | Notes | | | | | |
| 1A2e | bleached, rusty root mottles | 3 | | | | |
| Observation No Flat on floodplain, o | <u>ttes</u> check site | | | | | |
| Site Notes | odland brown crocking day, srah | holo miororal | iof | | | |

ared ironbark woodland, brown cracking clay, crabhole microrelief



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | IECT SOIL A 096 | ND LA Oł | ND CAP | ABILIT` on ID: | Y 1 |
|---|--|--|--|---|--|---|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 16/05/12 GPS S.A. Off 7481181 AMG zone: 55 776224 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Mamelon 55 metres 756 Very slow Imperfect | , photo 2 s v tly draine | 255 9d |
| <u>Geology</u> ExposureType: Geol. Ref.: Bedded, | Auger boring Qa | Conf. Sub. Substrate I | is Parer Material: | nt. Mat.: | Almost Auger | certain or certain boring, 1 m deep,Fragmental, |
| | | | | | Porous | , , Alluvium |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | 3% | | Pattern 1 | Гуре: | Terraced land (alluvial) |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0 % | Relief: Slope Cate Aspect: | gory: | 5 metres Level 180 degre | ees | |
| Surface Soil Co | ndition Hardsetting | | | - | | |
| Erosion: Stable Soil Classificati | e, Moderate (sheet) on | Microrelief: | Crabhol | le ailaai | Vert.(r | m) 0.3 Horiz.(m) 5 |
| Australian Soil Classification: Mapping Unit: Pv Vertic Subnatric Brown Sodosol Thin Gravelly Clay-loamy Clayey Principal Profile Form: Dy2.43 Moderately deep Great Soil Group: Grey-brown ASC Confidence: podzolic soil Land Class: C2 | | | | | | |
| <u>Site</u> | Complete clearing. Pasture, na | ative or improv | ed, but r | never cultiv | vated | |
| Vegetation: | Tall Strata - Tree, 12.01-20m. | Isolated plants | s. *Speci | ies include | es - Euca | lvptus crebra |
| Surface Coarse | 10-20%, coarse gr | ravelly, 20-60r | nm, subr | rounded, C | Conglome | erate |
| <u>Profile</u> 1A1 0 - 0.1 m | 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 r | n , 0-0% ; Medium clay; Mod 20 mm, Lenticular; Smooth macropores, Moist; Very fii gravelly, 6-20mm, subroun ped faces or walls coated, (2 - 10%), Calcareous, Me (Raupach); Common, fine | lerate grade of h-ped fabric; F rm consistence ded, dispersed distinct; Com edium (2 -6 mr (1-2mm) roots | f structur ine, (0 - 5 e; Very p d, Congle mon cuta n), Nodu ; Diffuse | e, 2-5 mm 5) mm crao blastic; Nor omerate, c ans, 10-50 les; Soil m , Irregular | , Polyher ck; Few rmal plas coarse fra % of peo natrix is S change | dral; Moderate grade of structure, 10- (<1 per 100mm2) Fine (1-2mm) sticity; Very sticky; 2-10%, medium agments; Common cutans, 10-50% of d faces or walls coated, distinct; Few Slightly calcareous; Field pH 8.5 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: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 097 O | ND CAPAE | BILITY ID: 1 | | |
|--|--|---|--|--|---|--------------------------|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 16/05/12 GPS S.A. Off 7481056 AMG zone: 55 775394 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Brussels, ph 52 metres 756 Very slow Imperfectly | hoto 250 drained | 6 | |
| ExposureType: Geol. Ref.: Bedded, | Auger boring Qa | Conf. Sub. is Pare Substrate Material | nt.Mat.: A : A | Almost c Auger Porous | ertain or certain boring, 1 m deep,Fragm Alluvium | iental, |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern Typ | pe: | Terraced land (alluvial) | |
| Morph. Type: Elem. Type: Slope: <u>Surface Soil Co</u> | Flat Terrace plain 0.5 % ndition Surface crust | Relief: Slope Category: Aspect: | 5 metres Level 200 degree | s | | |
| Erosion: Stable Soil Classificati | e, Moderate (sheet) on | Microrelief: Crabho | le ailaai | Vert.(m |) 0.5 Horiz.(m) 5 | |
| Australian Soil Cl Vertic Subnatric Br Moderately deep ASC Confidence No analytical data | assification: own Sodosol Thin Gravelly Clay-lo : are available but confidence is fair | Mappin Mappin Princip Great | ng Unit: bal Profile Fo Soil Group: Class: | orm: | Pv Dy2.43 Grey-brown podzolic soil Land Class: C2 | |
| Site Vegetation: Surface Coarse Profile 1A1 0 - 0.1 m | 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 Dark grevish brown (10YB4/2-Moist): 0-0% : Eine sandy clay loam: Moderate grade of structure, 5-10 | | | | | |
| | Medium (2-5mm) macropoi Moderately sticky; 10-20%, fragments; Field pH 7 (Rau | res, Moist; Firm consis , coarse gravelly, 20-6 (pach); Abundant, fine | stence; Mode 0mm, subrou (1-2mm) roo | erately p unded, o ots; Clea | olastic; Normal plasticity; dispersed, Conglomerate, coar ar, Smooth change to - | rse |
| 1A3 0.1 - 0.2 i | n Dark greyish brown (10YR4 Subangular blocky; Rough- 2mm) macropores, Moist; F 20%, medium gravelly, 6-2i (Raupach); Many, fine (1-2 | 4/2-Moist); , 0-0% ; Lig ped fabric; Medium, (Firm consistence; Moc 0mm, subrounded, dis mm) roots; Clear, Sm | ght clay; Mod 5 - 10) mm ci lerately plasti spersed, Con ooth change | erate gi rack; Co ic; Norn glomera to - | rade of structure, 5-10mm, ommon (1-5 per 100mm2) Fine nal plasticity; Moderately sticky ate, coarse fragments; Field pl | e (1- /; 10- H 7.5 |
| 1B2kss 0.2 - 0.5 i | m Yellowish brown (10YR5/4- Lenticular; Smooth-ped fab macropores, Moist; Very fir gravelly, 20-60mm, subrour of ped faces or walls coated matrix is Slightly calcareous change to - | Moist); , 0-0% ; Mediu ric; Medium, (5 - 10) r m consistence; Very p nded, dispersed, Con d, distinct; Very few (0 s; Field pH 8 (Raupac | um clay; Mod nm crack; Ma blastic; Norma glomerate, cc 0 - 2 %), Calc h); Common, | lerate gi any (>5 al plasti barse fra areous, , fine (1 | rade of structure, 5-10 mm, per 100mm2) Fine (1-2mm) icity; Very sticky; 2-10%, coars agments; Common cutans, 10- , Medium (2 -6 mm), Nodules; -2mm) roots; Diffuse, Irregular | e -50% Soil |
| Morphological | Notes bloochod | | | | | |
| Observation No Flat on floodplain, | tes check site | | | | | |

cleared ironbark woodland; brown gravelly cracking clay, crabhole microrelief



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

Appendix A



Observation Notes

Flat on undulating plain, check site

Site Notes

cleared ironbark woodland, native pasture, brown cracking clay, crabhole microrelief

Appendix A



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJI J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 100 C | AND CAP Observatio | ABILIT on ID: | Y 1 | | | | | |
|---|--|--|--|--|------------------------------------|--|--------------------------------------|-------------|-----------|--------|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 16/05/12 GPS S.A. Off 7485897 AMG zone: 55 774839 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon 40 metres 756 Moderate Imperfect | , photos s ely rapid tly draine | 259 & ed | 260 | | | | |
| Geology ExposureType: Geol. Ref.: Alluvium | Auger boring Qpa | Conf. Sub. is Paro Substrate Materia | ent. Mat.: Il: | Almost Existing deep,F | certain g vertic ragmer | i or cer al expo ital, | tain osure, ^r Bedde | 1 m ;d, | Porou | ıs, , |
| | | | | | | | | | | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern 1 | Гуре: | Terra | ced lan | nd (allu | vial) | | |
| Morph. Type: Elem. Type: Slope: | Simple-slope Terrace plain 2 % | Relief: Slope Category: Aspect: | 5 metres Gently in 90 degre | clined es | | | | | | |
| Surface Soil Co | ndition Firm | N 1 1 | | | | | | | | |
| Erosion: Active (shee Horiz. | a, Moderate scalding (scald) Active, t) Active, Moderate (gully) Active, P (m) | Present Micro 10 | relief: | Crabh | ole gilg | jai | Vert.(| m) | 0.1 | |
| Soil Classificati Australian Soil Cl Vertic Hypernatric Clayey Moderately ASC Confidence: No analytical data | , on assification: Grey Sodosol Medium Gravelly Cla deep : are available but confidence is fair. | Mapp y-loamy Princ Great | ing Unit: ipal Profile Soil Group Class: | Form: p: | Pv Dy2. Grey podz Land | 43 /-brow colic so I Class | n oil a: C2 | 2 | | |
| <u>Site</u> | Complete clearing. Pasture, nat | tive or improved, but | never cultiv | vated | | | | | | |
| Vegetation: Surface Coarse Profile | Tall Strata - Tree, 12.01-20m, I 2-10%, medium gra | solated plants. *Spe avelly, 6-20mm, rour | cies include nded, Ferric | es - Euca rete Moist: M | lyptus (| crebra | stic: Nr | orma | l plasti | city: |
| 1A1 0-0.1111 | Moderately sticky; Clear, Sr | mooth change to - | Clay Ioani, | wost, w | louerau | siy pias | 5110, 140 | лпа | i piasu | oity, |
| 1A2e 0.1 - 0.2 r | m Greyish brown (10YR5/2-M Moist; Moderately plastic; N | oist); Mottles, 10YR Iormal plasticity; Mo | 44, 2-10%, derately stic | 0-5mm, ky; Clea | Distinc r, Smo | t; Fine oth cha | sandy ange to | clay) - | loam; | |
| 1B2kss 0.2 - 0.5 r | m Dark yellowish brown (10YF sticky; Soil matrix is Slightly | R4/4-Moist); , 0-0% ; y calcareous; Diffuse | Medium cla e, Irregular c | ay; Moist change te | ;; Very o - | plastic; | Norma | al pla | asticity; | ; Very |
| Morphological I | Notes bleached, rusty root mottles | | | | | | | | | |
| Observation No Flat on undulating | plain, check site | | | | | | | | | |
| Site Notes | , , | | | | | | | | | |
| cleared ironbark w | oodland, brown gravelly cracking cl | ay, crabhole microre | elief | | | | | | | |

Report Soil and Land Suitability Styx South Coal Project



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: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | IECT SOIL AND LA 102 OI | ND CAPABILI | TY 1 | | |
|---|--|---|--|--|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | <u>n</u> I. Hollingsworth 16/05/12 GPS S.A. Off 7487391 AMG zone: 55 774379 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, photo 31 metres 756 Very slow Imperfectly drai | os 262, 263 ned | | |
| <u>Geology</u> ExposureType: Geol. Ref.: Bedded, | Auger boring Qpa | Conf. Sub. is Parer Substrate Material | nt. Mat.: Proba | able r boring, 1 m deep,Fragmental, us Alluvium | | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | 3% | Pattern Type: | Terraced land (alluvial) | | |
| Morph. Type: Elem. Type: Slope: Surface Soil Co | Flat Drainage depression 0 % | Relief: Slope Category: Aspect: | 5 metres Level 90 degrees | | | |
| Erosion: | Cracking | | | | | |
| Soil Classificat | ion | Microrelief: Melonh | ole gilgai Vert | .(m) 1 Horiz.(m) 20 | | |
| Australian Soil C Vertic Hypernatric Clayey Moderately ASC Confidence | Australian Soil Classification: Mapping Unit: Pv Vertic Hypernatric Grey Sodosol Medium Gravelly Clay-loamy Principal Profile Form: Dy2.43 Clayey Moderately deep Great Soil Group: Grey-brown ASC Confidence: podzolic soil | | | | | |
| No analytical data | a are available but confidence is fai | r. Land C | lass: | Land Class: C2 | | |
| <u>Site</u> Vegetation: | Complete clearing. Pasture, na | ative or improved, but r | never cultivated | | | |
| <u></u> | Tall Strata - Tree, 6.01-12m, ls | solated plants. *Specie | s includes - Aca | cia harpophylla | | |
| Profile | <u>2-10%</u> , meaium gi | ravelly, 6-20mm, subro | unaea, Congiorr | ierate | | |
| 1A1 0 - 0.1 m | Grey (2.5Y5/1-Moist); , 0-0 blocky; Rough-ped fabric; macropores, Moist; Firm c 7 (Raupach); Many, fine (1 | % ; Fine sandy loam; l Medium, (5 - 10) mm c onsistence; Moderately -2mm) roots; Clear, Sr | Moderate grade rack; Common (/ plastic; Normal mooth change to | of structure, 5-10mm, Subangular 1-5 per 0.01m2) Fine (1-2mm) plasticity; Moderately sticky; Field pH - | | |
| 1A2e 0.1 - 0.2 | 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 | | | | | |
| Diservation No | pleached, rusty root mottles | 5 | | | | |
| Flat on undulating Site Notes | plain, check site | | | | | |
| cleared woodland. | brown cracking clay,melonhole m | icrorelief | | | | |



| Profile | |
|---------|---------|
| 1A1 | 0 - 0.1 |

Desc. By:

Map Ref.:

<u>Geology</u>

Geol. Ref .:

Bedded.

Slope:

Site

Date Desc.:

| 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 -
- Dark greyish brown (2.5Y4/2-Moist); ; Medium clay; Moderate grade of structure, 10-20 mm, Polyhedral; 1B2kss 0.2 - 0.5 m 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

bleached, rusty root mottles 1A2e

Observation Notes

Flat on undulating plain, check site

Site Notes

cleared woodland, brown cracking clay, melonhole microrelief

Appendix A



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 104 O | ND CAPA bservatio | ABILITY n ID: | Y 1 | |
|---|---|---|--|--|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 16/05/12 GPS S.A. Off 7487730 AMG zone: 55 774039 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, 32 metres 756 Very slow Poorly dra | , photo 2 s , ained | 265 | |
| Geology ExposureType: Geol. Ref.: Bedded, | Auger boring Qpa | Conf. Sub. is Pare Substrate Material | nt. Mat.: l: | Almost Auger | certain or certain boring, 1 m deep,Fragmental, | |
| | | | | Porous | , , Alluvium | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern T | уре: | Terraced land (alluvial) | |
| Morph. Type: Elem. Type: Slope: | Closed Depression Drainage depression 0 % | Relief: Slope Category: Aspect: | 5 metres Level 200 degre | ees | | |
| Surface Soll Co | ndition Cracking | | | | | |
| Soil Classificati | on | Microrelief: Melonh | nole gilgai | Vert.(r | m) 1 Horiz.(m) 20 | |
| Australian Soil Cl Vertic Mesonatric C Clayey Moderately ASC Confidences | assification: Grey Sodosol Medium Non-gravelly deep : | Mappi / Clay-loamy Princij Great | ng Unit: pal Profile I Soil Group | Form:): | Pv Dy2.43 Grey-brown podzolic soil | |
| No analytical data | are available but confidence is fair | Land C | Class: | | Land Class: C2 | |
| <u>Site</u> | Complete clearing. Pasture, na | tive or improved, but | never cultiv | ated | | |
| <u>vegetation:</u> Surface Coarse | Tall Strata - Tree, 6.01-12m, ls 0-2% cobbly 60-2 | olated plants. *Specie | es includes Conglomera | - Acacia | a harpophylla | |
| Profile | | , castcatter, | e en giernere | | | |
| 1A1 0 - 0.1 m | Black (2.5Y2/2-Moist); , 0-0 Rough-ped fabric; Medium, Moist; Firm consistence; M 20-60mm, subrounded, dis (1-2mm) roots; Clear, Smoo |)% ; Clay loam; Mode (5 - 10) mm crack; C oderately plastic; Nor persed, Conglomerate oth change to - | rate grade c common (1- mal plasticit e, coarse fra | of structo 5 per 0.0 ty; Mode agments | ure, 2-5 mm, Subangular blocky; 01m2) Fine (1-2mm) macropores, erately sticky; 0-2%, coarse gravelly, s; Field pH 6.5 (Raupach); Many, fine | |
| 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 I | Notes | | | | | |
| Observation No | pleached, rusty root mottles | i | | | | |
| Drainage depression | on on undulating plain, check site | | | | | |

cleared woodland, brown cracking clay, melonhole microrelief



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 105 C | AND CAPA | BILITY 1 ID: 7 | r 1 |
|---|---|--|---|---|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | <u>n</u> I. Hollingsworth 16/05/12 GPS S.A. Off 7488038 AMG zone: 55 774282 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, 31 metres 756 Very slow Imperfectly | melonh / draine | nole microrelief, photo 266 d |
| Geology ExposureType: Geol. Ref.: Bedded, | Soil pit Qpa | Conf. Sub. is Pare Substrate Materia | ent. Mat.: / | Almost Auger Porous | certain or certain boring, 1 m deep,Fragmental, Alluvium |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | 3% | Pattern Ty | /pe: | Terraced land (alluvial) |
| Morph. Type: Elem. Type: Slope: | Open depression (vale) Drainage depression 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 270 degree | es | |
| Surface Soil Co | ondition Cracking | | | | |
| Erosion: Partia | al, Minor scalding (scald) Partial, Mi | inor (sheet) Microrelief: Melonl | hole gilgai | Vert.(n | n) 1 Horiz.(m) 20 |
| Soil Classificati | ion | | | | |
| Australian Soil Cl Vertic Mesonatric C Clayey Moderately ASC Confidence | lassification: Grey Sodosol Medium Non-gravelly / deep : | Mappi y Clay-loamy Princi Great | ing Unit: pal Profile F Soil Group: | orm: | Pv Dy2.43 Grey-brown podzolic soil |
| No analytical data | are available but confidence is fair | r. Land | Class: | | Land Class: C1 |
| <u>Site</u> Vegetation: | Complete clearing. Pasture, na | tive or improved, but | never cultiva | ated | |
| | Tall Strata - Tree, 6.01-12m, Is | olated plants. *Speci | es includes - | Acacia | harpophylla |
| <u>Surface Coarse</u> <u>Profile</u> | No surface coarse | fragments | | | |
| 1A1 0 - 0.1 m | Grey (2.5Y5/1-Moist); , 0-0 Rough-ped fabric; Coarse, Moist; Firm consistence; M Abundant, fine (1-2mm) roo | % ; Clay loam; Mode (10 - 20) mm crack; (oderately plastic; Nor ots; Clear, Smooth ch | rate grade of Common (1-5 rmal plasticity nange to - | f structu 5 per 0.0 y; Mode | re, 5-10 mm, Subangular blocky; 01m2) Fine (1-2mm) macropores, rately sticky; Field pH 7 (Raupach); |
| 1A2e 0.1 - 0.3 i | m Mottles, 10YR44, 2-10%, (Medium, (5 - 10) mm crack Very plastic; Normal plastic Concretions; Field pH 7 (R | D-5mm, Distinct; Clay ;; Few (<1 per 0.01m² city; Moderately sticky aupach); Many, fine (| loam; Massi 2) Fine (1-2m /; Few (2 - 10 1-2mm) roots | ive grad nm) mac) %), Fe s; Clear | le of structure; Earthy fabric; cropores, Moist; Firm consistence; rrromanganiferous, Fine (0 - 2 mm), ; Smooth change to - |
| 1B21 0.3 - 0.5 i | m Dark greyish brown (2.5Y4, Polyhedral; Moderate grad- crack; Common (1-5 per 10 Normal plasticity; Very stic cutans, 10-50% of ped face roots; Diffuse, Wavy chang | /3-Moist); , 0-0% ; Lig e of structure, 10-20)0mm2) Fine (1-2mm ky; Common cutans, es or walls coated, dis le to - | ght medium c mm, Lenticula) macropores 10-50% of p stinct; Field p | clay; Mo ar; Smo s, Moist bed face bH 8 (Ra | derate grade of structure, 5-10 mm, poth-ped fabric; Fine, (0 - 5) mm ;; Very firm consistence; Very plastic; s or walls coated, distinct; Common aupach); Common, very fine (0-1mm) |
| Morphological | Notes | | | | |
| 1A2e | bleached, rusty root mottles | 5 | | | |
| Observation No | otes | | | | |
| Drainage depressi | on on undulating plain, check site | | | | |
| Site Notes | | | | | |

cleared brigalow woodland, grey cracking clay, melonhole microrelief



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJI J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND L 106 (| AND CAP/ Observatio | ABILIT` on ID: | Y 1 |
|---|---|---|---|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | I. Hollingsworth 16/05/12 GPS S.A. Off 7486432 AMG zone: 55 774435 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon 37 metres 756 Very slow Imperfect | , photo 2 s / ily draine | 267 ed |
| Geology ExposureType: Geol. Ref.: Bedded, | Soil pit Qpa | Conf. Sub. is Par Substrate Materia | ent. Mat.: al: | Almost Auger | certain or certain boring, 1 m deep,Fragmental, |
| Land Form | | | | Porous | , , Alluvium |
| Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern 1 | Гуре: | Terraced land (alluvial) |
| Elem. Type: Slope: | Terrace plain 0.5 % | Slope Category: Aspect: | Level 300 degre | ees | |
| Surface Soil Co | ndition Hardsetting | • | Ŭ | | |
| Erosion: Partia (shee | I, Moderate scalding (scald) Partial t) | l, Moderate Microrelief: Crabh | ole gilgai | Vert.(r | m) 0.2 Horiz.(m) 10 |
| Australian Soil Cl Vertic Subnatric Gr Clayey Moderately ASC Confidence: No analytical data | <u>on</u> assification: ey Sodosol Medium Non-gravelly (deep are available but confidence is fair | Mapp Clay-loamy Princ Grea | ing Unit: ipal Profile t Soil Group Class: | Form: p: | Pv Dy2.42 Grey-brown podzolic soil Land Class: C2 |
| <u>Site</u> <u>Vegetation:</u> <u>Surface Coarse</u> | Complete clearing. Pasture, na Tall Strata - Tree, 12.01-20m, I 0-2%, coarse grave | tive or improved, bu Isolated plants. *Spe elly, 20-60mm, subro | never cultiv cies include ounded, Cor | vated es - Euca nglomera | llyptus crebra tte |
| 1A1 0 - 0.1 m | Very dark grey (7.5YR3/1-M Subangular blocky; Rough- macropores, Moist; Firm co coarse gravelly, 20-60mm, (Raupach); Many, fine (1-20 | Moist); , 0-0% ; Fine ped fabric; Fine, (0 - nnsistence; Moderate subrounded, dispers mm) roots; Clear, Sr | sandy clay le 5) mm crac ly plastic; N sed, Conglor nooth chang | oam; Mo ck; Comr lormal pl merate, o ge to - | oderate grade of structure, 2-5 mm, non (1-5 per 0.01m2) Fine (1-2mm) asticity; Moderately sticky; 0-2%, coarse fragments; Field pH 6.5 |
| 1A2e 0.1 - 0.2 r | n Strong brown (7.5YR4/6-Mu Massive grade of structure; macropores, Moist; Firm co cobbly, 60-200mm, subrour Ferromanganiferous, Fine (roots; Clear, Smooth chang | oist); Mottles, 10YR4 Earthy fabric; Fine, onsistence; Moderate nded, dispersed, Co (0 - 2 mm), Concretio ge to - | l4, 2-10% , ((0 - 5) mm c ly plastic; N nglomerate, pns; Field ph | 0-5mm, l crack; Ma lormal pl coarse t H 6.5 (Ra | Distinct; Fine sandy clay loam; any (>5 per 100mm2) Fine (1-2mm) asticity; Moderately sticky; 2-10%, fragments; Few (2 - 10 %), aupach); Common, fine (1-2mm) |
| 1B2kss 0.2 - 0.5 r | n , 0-0% ; Medium clay; Mode 10 mm, Lenticular; Smooth 1mm) macropores, Moist; V medium gravelly, 6-20mm, 10-50% of ped faces or wal distinct; Field pH 6.5 (Raup | erate grade of struct -ped fabric; Fine, (0 /ery firm consistence subrounded, dispers Ils coated, distinct; C pach); Few, fine (1-2) | ure, 5-10 mr - 5) mm crac e; Very plast ed, Conglor common cuta nm) roots; E | m, Polyh ck; Few tic; Norm merate, o ans, 10-4 Diffuse, I | edral; Moderate grade of structure, 5- (<1 per 100mm2) Very fine (0.075- nal plasticity; Very sticky; 0-2%, coarse fragments; Common cutans, 50% of ped faces or walls coated, rregular change to - |
| <u>Morphological I</u> 1A2e | Notes bleached, rusty root mottles | | | | |
| Observation No Check site, not sar | tes npled | | | | |
| Site Notes | | | | | |

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



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AN 107 | D LAND CAP Observatio | ABILITY on ID: 1 | | |
|---|--|---|--|---|--|---|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | <u>1</u> I. Hollingsworth 17/05/12 GPS S.A. Off 7493768 AMG zone: 55 767192 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Ogmore, 61 metre 756 Moderate Moderate | photo 268 s ely rapid ely well dra | 3 ained | |
| Geology ExposureType: Geol. Ref.: Alluvium | Soil pit Kx | Conf. Sub. is Substrate Ma | Parent. Mat.: iterial: | Almost c Existing deep,Fra | ertain or certain vertical exposu agmental, Be | n ire, 0.5 m idded, Porous, , |
| Land Form Rel/Slope Class: | Undulating low hills 30-90m 3-10% | 6 Pattern Type | : Hills | | | |
| Morph. Type: Elem. Type: Slope: | Simple-slope Bench 5 % | Relief: Slope Catego Aspect: | 31 metre ory: Gently in 270 degr | es Iclined rees | | |
| Surface Soil Co | ndition Self-mulching | | Ū | | | |
| Erosion: Active, Moderate (sheet) Active, Moderate (rill) Soil Classification Microrelief: Zero or no microrelief Vert.(m) Horiz.(m) | | | | | |) |
| Australian Soil Cl Haplic Self-Mulchin Shallow ASC Confidence | assification: ng Brown Vertosol Very gravelly Fin : ara available but confidence is fair | Ne Fine P G | lapping Unit: rincipal Profile Great Soil Grou | Form: p: | Ws Ug5.32 Brown earth | C2 |
| | are available but confidence is fail. | | | | Lanu Glass. | 02 |
| <u>Sile</u> Vegetation: | Limited cleaning, for example se | elective logging | | | | |
| vegetation. | Tall Strata - Tree, 6.01-12m, Mi | id-dense. *Spec | cies includes - A | cacia rhoc | loxylon, Eucaly | ptus melanophloia |
| Surface Coarse | 50-90%, coarse gra | avelly, 20-60mm | n, subangular ta | bular, Bas | alt | |
| Profile_ | | | | | | |
| 1A1 0-0.1 m | Brown (7.5YR4/2-Moist); , 0 Prismatic; Rough-ped fabric macropores, Moist; Firm co coarse gravelly, 20-60mm, s (Raupach); Many, fine (1-2n |)-0% ; Fine sand ; Medium, (5 - ´ nsistence; Mode subangular tabu nm) roots; Clea | dy clay loam; Mo 10) mm crack; C erately plastic; N ular, dispersed, Ir, Smooth chan | oderate gr Common (1 Normal pla Basalt, coa ge to - | ade of structure I-5 per 0.01m2) sticity; Moderat arse fragments; | e, 5-10 mm,) Medium (2-5mm) ely sticky; 90-100%, ; Field pH 6 |
| 1A3 0.1 - 0.3 i | m Brown (7.5YR4/3-Moist); , 0 blocky; Rough-ped fabric; C Moist; Firm consistence; Ve 60mm, subangular tabular, 2mm) roots; Sharp, Smooth | 0-0% ; Clay loan coarse, (10 - 20) ry plastic; Norm dispersed, Basa o change to - | n, sandy; Moder) mm crack; Fev nal plasticity; Mc alt, coarse fragn | rate grade v (<1 per 0 oderately s nents; Fiel | of structure, 2- 0.01m2) Fine (1 ticky; 90-100%) d pH 7.5 (Raup | 5 mm, Subangular -2mm) macropores, , coarse gravelly, 20- ach); Many, fine (1- |
| 1R 0.3 - m | Rock | | | | | |
| Morphological | Notes | | | | | |
| 1A3 | basalt | | | | | |
| Observation No | <u>otes</u> | | | | | |
| Basalt flow, gravel | quarry. Check site, not sampled | | | | | |
| SILE NOTES | | | | | | |

basalt terraced slope, gravel pit



Morphological Notes

Observation Notes

Check site, flat on edge of undulating terrace plain, not sampled

Site Notes





| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 109 O | ND CAPABILIT | Y 1 | | | |
|--|---|--|--|---|--|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 17/05/12 GPS S.A. Off 7490999 AMG zone: 55 771922 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Bar H, photos 27 35 metres 756 Slow Imperfectly draine | 1, melonhole microrelief ed | | | |
| Geology ExposureType: Geol. Ref.: Bedded, | Auger boring Qpa | Conf. Sub. is Pare Substrate Materia | nt. Mat.: Almost I: Auger Porous | t certain or certain boring, 1 m deep,Fragmental, s, , Alluvium | | | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern Type: | Terraced land (alluvial) | | | |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 100 degrees | | | | |
| Surface Soil Co | ndition Surface crust, C | racking | | | | | |
| Erosion: Partia | l, Minor scalding (scald) Partial, Mi | nor (sheet) | | | | | |
| Soil Classificati | ion | Microrelief: Melonh | iole gilgai Vert.(| m) 1 Horiz.(m) 20 | | | |
| Australian Soil Cl Endohypersodic E fine Moderately de ASC Confidence No analytical data | assification: pipedal Grey Vertosol Non-gravelly ep : are available but confidence is fair | Mappi Fine Medium Princi Great | ng Unit: pal Profile Form: Soil Group: Class: | BI Ug5.25 Grey clay Land Class: A | | | |
| <u>Site</u> Vegetation: | Complete clearing. Pasture, na | tive or improved, but | never cultivated | | | | |
| Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla | | | | | | | |
| Surrace coarse No surrace coarse tragments Profile In 1 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 r | 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 - | | | | | | |
| Mornhological I | Notes | | | | | | |

<u>Observation Notes</u> Check site, flat on edge of undulating terrace plain, not sampled

Site Notes



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 110 OI | ND CAP/ bservatio | ABILITY on ID: ′ | (1 | | | |
|--|--|---|---|----------------------------|---|-------------------------|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | L I. Hollingsworth 17/05/12 GPS S.A. Off 7490585 AMG zone: 55 772199 Datum: GDA94 | Locality: Bar H, photo Elevation: 35 metres Rainfall: 756 Runoff: Slow Drainage: Imperfectly of | | otos 272 s ly draine | 272 ained | | | |
| Geology ExposureType: Geol. Ref.: Bedded, | Auger boring Qpa | Conf. Sub. is Parei Substrate Material | nt. Mat.: : | Almost Auger Porous, | certain or certain boring, 1 m , Alluvium | n 1 deep,Fragmental, | | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern 1 | Гуре: | Terraced land (| (alluvial) | | |
| Morph. Type: Elem. Type: Slope: Surface Soil Co | Flat Terrace plain 0.5 % | Relief: Slope Category: Aspect: | 5 metres gory: Level 100 degrees | | | | | |
| Erosion: Stable | e, Minor scalding (scald) Stable, Min | nor (sheet) | | | | | | |
| Soil Classificati | on I | Microrelief: Melonh | ole gilgai | Vert.(m | n) 0.5 Horiz.(m |) 20 | | |
| Australian Soil Classification: Endohypersodic Epipedal Brown Vertosol Non-gravelly Fine Medium fine Moderately deep ASC Confidence: | | y Fine Mappir y Fine Princip Great S | Mapping Unit: Principal Profile Form: Great Soil Group: | | BI Ug5.25 Brown clay | A | | |
| No analytical data | Complete clearing Pasture nat | Land C | hass: | /ated | Land Class: | A | | |
| Vegetation: | n: Tall Strata - Tree, 6.01-12m, Isolated plants. *Species includes - Acacia harpophylla | | | | | | | |
| Surface Coarse Profile | No surface coarse | fragments | | | | | | |
| Prome 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 r | 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 r | 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



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 111 OI | ND CAPA bservatio | ABILITY n ID: | , 1 | | |
|---|---|--|--|----------------------------|--|---------------|------------------|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 17/05/12 GPS S.A. Off 7490041 AMG zone: 55 772456 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Locality: Bar H, photos 273 Elevation: 36 metres Rainfall: 756 Runoff: Slow Drainage: Imperfectly draine | | -274 d | | |
| Geology ExposureType: Geol. Ref.: Bedded, | Auger boring Qpa | Conf. Sub. is Pare Substrate Material | nt. Mat.: : | Almost Auger Porous, | certain or ce boring, 1 , Alluvium | rtain m | deep,Fragmental, |
| <u>Land Form</u> Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern T | уре: | Terraced la | nd (a | lluvial) |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 100 degre | es | | | |
| Surface Soil Co Erosion: Stable | <u>ndition</u> Surface crust e, Minor scalding (scald) Stable, Mi | nor (sheet) | | | | | |
| Soil Classificati | on | Microrelief: Melonh | ole gilgai | Vert.(n | n) 1 Horiz | <u>z.(</u> m) | 20 |
| Australian Soil Classification: Mapping Unit: Bl Endohypersodic Epipedal Grey Vertosol Non-gravelly Fine Medium Principal Profile Form: Ug5.25 fine Moderately deep Great Soil Group: Grey clay | | | | | | | |
| No analytical data | are available but confidence is fair | Land C | Class: | | Land Clas | s: / | Ą |
| <u>Site</u> <u>Vegetation:</u> | Complete clearing. Pasture, na | tive or improved, but i | never cultiv | ated | | | |
| Surface Coarse | Tall Strata - Tree, 6.01-12m, ls No surface coarse | olated plants. *Specie fragments | es includes | - Acacia | harpophylla | i | |
| <u>Profile</u> 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 r | 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 r | 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 I | Notes | | | | | | |

<u>Observation Notes</u> Check site, flat on edge of undulating terrace plain, not sampled Site Notes


| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 112 O | ND CAPAE | BILITY ID: 1 | |
|--|---|---|---|---|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 17/05/12 GPS S.A. Off 7489974 AMG zone: 55 772578 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Bar H, photo 25 metres 756 Rapid Imperfectly | os 275 drained | |
| <u>Geology</u> ExposureType: Geol. Ref.: Alluvium | Auger boring Qpa | Conf. Sub. is Pare Substrate Material | nt. Mat .: A : E d | Nmost certain or certain Existing vertical exposure, 1 m leep,Fragmental, Bedded, Porous, , | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3° | % | Pattern Typ | pe: Terraced land (alluvial) | |
| Morph. Type: Elem. Type: Slope: | Simple-slope Scarp 15 % | Relief: Slope Category: Aspect: | 15 metres Gently inclir 100 degree | ned s | |
| Surface Soil Co Erosion: Partia (shee | ndition Surface crust I, Moderate scalding (scald) Partial, t) Partial, Present (mass) Active, Se | Moderate evere (gully) Micror e microre | elief: | Zero or no Vert.(m) Horiz.(m) | |
| Soil Classificati Australian Soil Cl Endohypersodic E fine Moderately de ASC Confidence No analytical data | on assification: pipedal Grey Vertosol Non-gravelly ep : are available but confidence is fair. | Mappin Fine Medium Princip Great Land C | ng Unit: oal Profile Fo Soil Group: Class: | BI orm: Ug5.25 Brown clay Land Class: C1 | |
| <u>Site</u> Vegetation: | Complete clearing. Pasture, nat | ive or improved, but | never cultivat | | |
| Surface Coarse | No surface coarse t | 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 r | m Strong brown (7.5YR4/6-Mc Moderate grade of structure per 100mm2) Fine (1-2mm) sticky; Common cutans, 10- Medium (2 -6 mm), Nodules change to - | bist); , 0-0% ; Light cla , 10-20 mm, Lenticul macropores, Moist; I 50% of ped faces or ; Field pH 8.5 (Raup) | ay; Moderate ar; Smooth-p Firm consiste walls coated, ach); Commo | grade of structure, 5-10 mm, Polyhedral; ed fabric; Fine, (0 - 5) mm crack; Many (>5 ence; Very plastic; Normal plasticity; Very , distinct; Very few (0 - 2 %), Calcareous, on, fine (1-2mm) roots; Diffuse, Irregular | |
| 1B2kss 0.3 - 0.5 r | m , 0-0% ; Medium clay; Mode 20-50 mm, Lenticular; Smoo 2mm) macropores, Moist; V cutans, 10-50% of ped face mm), Nodules; Soil matrix is Diffuse, Irregular change to | erate grade of structu oth-ped fabric; Mediu ery firm consistence; s or walls coated, dis s Slightly calcareous; - | re, 5-10mm, m, (5 - 10)m Very plastic; tinct; Commc Field pH 8.5 | Polyhedral; Moderate grade of structure, m crack; Few (<1 per 100mm2) Fine (1- Normal plasticity; Very sticky; Common on (10 - 20 %), Calcareous, Medium (2 -6 (Raupach); Few, fine (1-2mm) roots; | |
| | | | | | |

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



floodplain below terrace plain, cleared mixed woodland, grey clay





| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | CT SOIL AND LA | AND CAPA Observation | NBILITY n ID: 1 | | |
|---|--|--|--|-----------------------------------|--|-----------------------|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 17/05/12 GPS S.A. Off 7489612 AMG zone: 55 772583 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Bar H, pho 19 metres 756 Moderatel Moderatel | otos 277 y rapid y well dra | ained | |
| ExposureType: Geol. Ref.: | Auger boring Qa | Conf. Sub. is Par Substrate Materia | ent. Mat.: al: | No Data Fragmer | ntal, Bedded, P | orous, , Alluvium |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-39 | 6 | Pattern T | уре: | Flood plain | |
| Morph. Type: Elem. Type: Slope: | Flat Flood-out 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 100 degre | es | | |
| Erosion: Active | e, Moderate (sheet) Active, Severe (| gully) | | | | |
| Active Soil Classificati | e, (stbank) N | licrorelief: | | | | |
| Australian Soil Cl Lutic Rudosol Non- ASC Confidence: No analytical data | assification: -gravelly Loamy Shallow : are available but confidence is fair. | Mapp Princ Great Land | ing Unit: ipal Profile I t Soil Group Class: | Form: : | Sx Um5.52 Alluvial soil Land Class : | C1 |
| <u>Site</u> Vegetation: Surface Coarse | | | | | | |
| <u>Profile</u> 1A11 0-0.1 m | Very dark grey (10YR3/1-Mo Diffuse, Smooth change to - | bist); ; Sandy loam; | Moist; Slight | ly plastic | ; Normal plastic | ity; Slightly sticky; |
| 1A12 0.1 - 0.5 r | n Very dark greyish brown (10 Slightly sticky; Diffuse, Smoo | YR3/2-Moist); ; Sar oth change to - | ndy loam; Mo | oist; Sligh | tly plastic; Norr | nal plasticity; |
| 1C1 0.5 - 0.8 r | m ; Sandy loam; Moist; Slightly | v plastic; Normal pla | sticity; Slight | tly sticky; | Diffuse, Smoo | th change to - |
| Morphological I | Notes | | | | | |
| Observation No. | taa | | | | | |

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: Project Code: Agency Name: | STYX SOUTH COAL PROJI J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 115 | ND LA Ol | ND CAP/ bservatio | ABILITY on ID: | (1 | |
|---|---|--|---|---|---|---|---|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 2 I. Hollingsworth 17/05/12 GPS S.A. Off 7489632 AMG zone: 55 772653 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Bar H, ph 14 metres 756 Moderate Moderate | otos 278 s ly rapid ly well dı | rained | |
| Geology ExposureType: Geol. Ref.: Alluvium | Auger boring Qa | Conf. Sub. i Substrate N | is Parei Iaterial | nt. Mat.: : | Almost Existing deep,Fr | certain or certa y vertical exposi ragmental, B | in ure, 0.25 m edded, Porous, |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | | Pattern T | Гуре: | Flood plain | |
| Morph. Type: Elem. Type: Slope: Surfaco Soil Co | Open depression (vale) Stream channel 0.5 % | Relief: Slope Cates Aspect: | gory: | 5 metres Level 90 degree | es | | |
| Erosion: Active | e, Moderate (gully) Active, Present (on | (stbank) Microrelief: | Contou | r trench | Vert.(n | n) Horiz.(n | n) |
| Australian Soil Cl Basic Fluvic Clasti | assification: c Rudosol Very gravelly Sandy Very | y shallow | Mappin Princip Great | ng Unit: bal Profile Soil Group | Form: | Sx Uc1.22 Alluvial soil | |
| ASC Confidence No analytical data | : are available but confidence is fair. | | Land C | Class: | | Land Class: | C1 |
| <u>Site</u> Vegetation: | No effective disturbance other t | han grazing b | y hoofe | d animals | | | |
| Surface Coarse | Tall Strata - Tree, 12.01-20m, M 90-100%, stony, 20 | /lid-dense. *S)0-600mm, su | pecies i brounde | ncludes - C ed, Shale | Casuarina | a cunninghamia | ina |
| <u>Profile</u> 1A11 0 - 0.1 m | Very dark grey (10YR3/1-M prominent) fabric; Many (>5 plastic; Normal plasticity; SI coarse fragments; Field pH | oist); , 0-0% ; 5 per 0.01m2) ightly sticky; 9 6 (Raupach); | Sandy Fine (1- 00-100% Diffuse | loam; Sing 2mm) mac 6, stony, 20 , Smooth c | le grain (cropores, 00-600mi hange to | grade of structu , Moist; Loose c m, subrounded,) - | re; Sandy (grains onsistence; Slightly stratified, Shale, |
| 1A12 0.1 - 0.5 i | m Very dark greyish brown (10 (grains prominent) fabric; M Slightly plastic; Normal plas Shale, coarse fragments; Fi | 0YR3/2-Moist) lany (>5 per 0 sticity; Slightly ield pH 6 (Rau |); , 0-0% .01m2) sticky; { ıpach); | 5 ; Sandy lo Fine (1-2m 50-90%, st Diffuse, Sn | oam; Sin nm) macr ony, 200 nooth ch | gle grain grade opores, Moist; -600mm, subro ange to - | of structure; Sandy Loose consistence; unded, dispersed, |
| 1R 0.5 - m | Rock | | | | | | |
| Morphological | Notes | | | | | | |
| Observation No Check site, floodpl | t tes ain below undulating terrace plain, | not sampled | | | | | |

Site Notes

floodplain below terrace plain, tall river gum woodland, silt loam



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | CT SOIL AND LA 116 O | ND CAPABILIT | Y 1 | |
|--|--|--|--|---|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 17/05/12 GPS S.A. Off 7489646 AMG zone: 55 772783 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Bar H, photos 279 19 metres 756 Moderately rapid Moderately well d |) rained | |
| Geology ExposureType: Geol. Ref.: | Auger boring Qa | Conf. Sub. is Pare Substrate Material | nt. Mat.: No Dat : Fragme | a ental, Bedded, Porous, , Alluvium | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-39 | ⁄₀ | Pattern Type: | Flood plain | |
| Morph. Type: Elem. Type: Slope: | Flat Flood-out 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 270 degrees | | |
| Erosion: Active | e, Moderate (sheet) Active, Moderate | e (gully) | | | |
| Soil Classificati | e, (stbank) N <u>on</u> | licrorelief: | | | |
| Australian Soil Cl. Lutic Rudosol Non- ASC Confidence: No analytical data | assification: -gravelly Loamy Shallow : are available but confidence is fair. | Mappin Princip Great Land (| ng Unit: oal Profile Form: Soil Group: Class: | Sx Um5.52 Alluvial soil Land Class: C1 | |
| <u>Site</u> <u>Vegetation:</u> Surface Coarse | Tall Strata - Tree, 20.01-35m, Is | solated plants. *Spec | ies includes - Euca | lyptus tereticornis | |
| 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 N Observation No Check site, floodpla | <u>Notes</u> <u>tes</u> ain below undulating terrace plain, ⊣ | not sampled | | | |

Site Notes

floodplain below terrace plain, tall river gum woodland, silt loam



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | CT SOIL AI 117 | ND LA Ot | ND CAPA oservatio | ABILITY n ID: 1 | | |
|--|--|--|--|--|------------------------------------|---|--------------------|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | l I. Hollingsworth 17/05/12 GPS S.A. Off 7489489 AMG zone: 55 772774 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Bar H, pho 30 metres 756 Moderatel Moderatel | otos 280- y rapid y well dra | 282 ained | |
| <u>Geology</u> ExposureType: Geol. Ref.: | Auger boring Qpa | Conf. Sub. i Substrate M | s Parer laterial: | nt. Mat.: | No Data Fragmer | ntal, Bedded, P | orous, , Alluvium |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-39 | 6 | | Pattern T | уре: | Terraced land | (alluvial) |
| Morph. Type: Elem. Type: Slope: Surface Soil Co | Upper-slope Scarp 2 % Addition | Relief: Slope Categ Aspect: | gory: | 15 metres Very gent 270 degre | i ly sloped ees | | |
| Erosion: Active | , Moderate (sheet) Active, Moderate on N | e (gully) licrorelief: | | | | | |
| Australian Soil Classification: Endohypersodic Crusty Brown Vertosol Non-gravelly Fine Medium fine Moderately deep ASC Confidence: | | | Mapping Unit: Principal Profile Form: Great Soil Group: Land Class: | | Form: : | So Ug5.25 Brown clay Land Class: | C1 |
| <u>Site</u> <u>Vegetation:</u> <u>Surface Coarse</u> <u>Profile</u> | | | | | | | |
| 1A1 0 - 0.1 m | Very dark grey (10YR3/1-Mo Moderately sticky; Clear, Sm | oist); ; Fine sa nooth change | ndy cla to - | y loam; Mo | ist; Mode | erately plastic; I | Vormal plasticity; |
| 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 r | n ; Medium clay; Moist; Very p Diffuse, Irregular change to | lastic; Norma - | I plastic | ity; Very st | icky; Soil | matrix is Sligh | tly calcareous; |
| Morphological N 1A2e Observation No | <u>lotes</u> bleached, rusty root mottles tes | | | | | | |
| Check site, above | scarp on undulating terrace plain, r | not sampled | | | | | |
| Site Notes | | | | | | | |

scarp at edge of terrace plain, cleared brigalow and bottle tree woodland, grey clay



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 118 C | AND CAPABILI Observation ID: | ГҮ 1 |
|---|--|---|---|---|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | <u>n</u> I. Hollingsworth 17/05/12 GPS S.A. Off 7489606 AMG zone: 55 772766 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Bar H, photos 2 27 metres 756 Moderately rapi Imperfectly drain | 83 d ned |
| Geology ExposureType: Geol. Ref.: Bedded, | Auger boring Qa | Conf. Sub. is Pare Substrate Materia | ent. Mat.: Almo I: Auge Porou | st certain or certain r boring, 1 m deep,Fragmental, ıs, , Alluvium |
| <u>Land Form</u> Rel/Slope Class: | Gently undulating plains <9m 1-3 | 3% | Pattern Type: | Terraced land (alluvial) |
| Morph. Type: Elem. Type: Slope: | Lower-slope Scarp 5 % | Relief: Slope Category: Aspect: | 15 metres Gently inclined 270 degrees | |
| Surface Soil Co | ndition Surface crust | <i>.</i> | | |
| Soil Classificati | e, Moderate (sheet) Stable, Severe ion | e (gully) Microrelief: Norma | l gilgai Vert | .(m) Horiz.(m) |
| Australian Soil Cl Endohypersodic C fine Shallow ASC Confidence | lassification: rusty Brown Vertosol Non-gravelly : | Fine Medium Princi Great | ing Unit: pal Profile Form: Soil Group: | So Ug5.22 Brown clay |
| Site | Complete clearing Pasture na | ative or improved but | never cultivated | |
| Vegetation: | Complete dealing. Lastare, na | | | |
| | Tall Strata - Tree, 12.01-20m, | Isolated plants. *Spe | cies includes - Eu | calyptus tereticornis |
| Surface Coarse | <u>)</u> | | | |
| 1A1 0 - 0.1 m | Very dark grey (10YR3/1-M Subangular blocky; Rough macropores, Moist; Firm cc 7 (Raupach); Many, fine (1 | Aoist); , 0-0% ; Fine s -ped fabric; Medium, onsistence; Moderate -2mm) roots; Clear, S | andy clay loam; M (5 - 10) mm crack ly plastic; Normal Smooth change to | oderate grade of structure, 5-10mm, ; Many (>5 per 0.01m2) Fine (1-2mm) plasticity; Moderately sticky; Field pH - |
| 1A3 0.1 - 0.2 | M Light grey (2.5Y7/1-Moist); grade of structure; Earthy f macropores, Moist; Firm co 7.5 (Raupach); Common, fi | Mottles, 10YR44, 2- abric; Medium, (5 - 1 onsistence; Moderate ine (1-2mm) roots; C | 10% , 5-15mm, Dis 0) mm crack; Few ly plastic; Normal ear, Smooth chan | stinct; Light medium clay; Massive (<1 per 0.01m2) Fine (1-2mm) plasticity; Moderately sticky; Field pH ge to - |
| 1B2kss 0.2 - 0.5 | m ; Medium clay; Moderate g mm, Polyhedral; Smooth-p 1mm) macropores, Moist; \ cutans, 10-50% of ped face coated, distinct; Few (2 - 11 calcareous; Field pH 8.5 (F | rade of structure, 10- ed fabric; Fine, (0 - 5 Very firm consistence es or walls coated, di 0 %), Calcareous, Me Raupach); Few, fine (| 20 mm, Lenticular) mm crack; Comn ; Very plastic; Nor stinct; Common cu edium (2 -6 mm), N 1-2mm) roots; Diff | ; Moderate grade of structure, 5-10 non (1-5 per 100mm2) Very fine (0.075- mal plasticity; Very sticky; Common ttans, 10-50% of ped faces or walls lodules; Soil matrix is Slightly use, Irregular change to - |
| Morphological | Notos | | | |
| 1A3 | bleached | | | |

1A3 bleach 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



Check site, below scarp on undulating terrace plain, not sampled

Site Notes

floodplain below terrace plain, cleared mixed woodland, gravelly brown clay, EXCLUSION SITE

Appendix A



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL A 120 | ND LA OI | ND CAPA bservatio | ABILITY n ID: ′ | , 1 | | |
|---|--|--|-------------------------|---|-------------------------------|---|-----------------------------|---------|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 17/05/12 GPS S.A. Off 7489902 AMG zone: 55 772479 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | Bar H, ph 30 metres 756 Slow Poorly dra | oto 285 S | | | |
| <u>Geology</u> ExposureType: Geol. Ref.: | Auger boring Qpa | Conf. Sub. i Substrate M | is Parei Iaterial | nt. Mat.: : | Almost Existing deep,Fr | certain or certa ı vertical expos agmental, E | ain sure, 1 m Bedded, | Porous, |
| | | | | | | | | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | | Pattern T | уре: | Terraced land | (alluvial) | |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Categ Aspect: | gory: | 5 metres Level 100 degre | es | | | |
| Surface Soil Co Erosion: Active Soil Classificati Australian Soil Cl | ndition Cracking e, Minor (sheet) Active, Minor (gully on f assification: |) Microrelief: | Melonh Mappir | ole gilgai 1 g Unit: | Vert.(n | n) 0.5 Horiz.(ı BI | m) 10 | |
| Endohypersodic C fine Moderately de ASC Confidence: | rusty Grey Vertosol Non-gravelly Fi ep : are available but confidence is fair | ne Medium | Princip Great | oal Profile Soil Group | Form:): | Ug5.25 Grey clay | C1 | |
| <u>Site</u> | Complete clearing. Pasture, nat | tive or improve | ed, but r | never cultiv | ated | Land Olass. | 01 | |
| Vegetation: | Tall Strata - Tree 6.01-12m Js | olated plants | *Snecie | s includes | - Acacia | harnonhylla | | |
| Surface Coarse | No surface coarse | fragments | opeone | | , 100.010 | | | |
| 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 I | Notes | | | | | | | |
| Observation No | edge of undulating terrace plain in | ot sampled | | | | | | |
| chook one, hat off | sage of unduluting torrate pidlin, in | s. sumpleu | | | | | | |

Site Notes

melonhole microrelief, cleared brigalow woodland, improved pasture, brown clay



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | CT SOIL AND LA 121 OI | ND CAPA | BILITY 1 ID: 1 | |
|--|--|---|---|---|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | l I. Hollingsworth 17/05/12 GPS S.A. Off 7488951 AMG zone: 55 772666 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, j 36 metres 756 Moderately Imperfectly | photo 286 y rapid y drained | |
| <u>Geology</u> ExposureType: Geol. Ref.: | Auger boring Qpa | Conf. Sub. is Parer Substrate Material | nt. Mat.: : | No Data Fragmental, Bedded, Porous, , Alluvium | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-39 | 6 | Pattern Ty | /pe: Terraced land (alluvial) | |
| Morph. Type: Elem. Type: Slope: | Simple-slope Stream channel 2 % | Relief: Slope Category: Aspect: | 5 metres Very gently 350 degree | y sloped es | |
| Surface Soil Co | ndition Cracking | | | | |
| Erosion: Active | , Moderate (sheet) Active, Severe (| gully) /icrorelief: Melonh | ole gilgai | Vert.(m) 1 Horiz.(m) 20 | |
| Australian Soil Cla Endohypersodic Cr fine Moderately dea ASC Confidence: No analytical data | assification: usty Brown Vertosol Non-gravelly F ep are available but confidence is fair. | ine Medium Princip Great S | ng Unit: bal Profile F Soil Group: Class: | So Form: Ug5.25 : Brown clay Land Class: C1 | |
| <u>Site</u> Vegetation: | T-11 04-44 T-1-2 0.04 40-1-1-2 | | | A sector beam surfacilly | |
| | Tall Strata - Tree, 6.01-12m, Isc | plated plants. "Specie | es includes - | - Acacia narpophylia | |
| Surface Coarse | No surface coarse f | ragments | | | |
| Profile | | | | | |
| 1A1 0 - 0.1 m | Very dark grey (10YR3/1-Mo Subangular blocky; Rough-p (2-5mm) macropores, Moist Field pH 7 (Raupach); Abun | bist); , 0-0% ; Fine sa bed fabric; Medium, (i ; Firm consistence; M dant, fine (1-2mm) ro | ndy clay loa 5 - 10) mm o loderately pl oots; Clear, S | am; Moderate grade of structure, 5-10 mm, crack; Common (1-5 per 0.01m2) Medium lastic; Normal plasticity; Moderately sticky; Smooth change to - | |
| 1A3 0.1 - 0.2 r | 1.3 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 N | lotes bleached | | | | |
| Upservation No | tes | | | | |
| Check site, slope o Site Notes | n drainage line on undulating terra | ce plain, not sample | d | | |

cleared brigalow woodland, melonhole microrelief, brown cracking clay



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 122 O | ND CAPABI | LITY D: 1 |
|--|---|---|---|---|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | I. Hollingsworth 17/05/12 GPS S.A. Off 7488866 AMG zone: 55 772696 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, pho 37 metres 756 Slow Poorly draine | oto 287 d |
| <u>Geology</u> ExposureType: Geol. Ref.: Bedded, | Auger boring Qpa | Conf. Sub. is Pare Substrate Materia | nt. Mat.: Aln I: Au | nost certain or certain ger boring, 1 m deep,Fragmental, |
| | | | Pol | rous, , Alluvium |
| <u>Land Form</u> Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern Type | : Terraced land (alluvial) |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 0 degrees | |
| Surface Soil Co | ndition Surface crust | | | |
| Erosion: Active Soil Classificati | e, Moderate (sheet) Active, Moderat on | te (gully) Microrelief: Melont | nole gilgai Ve | ert (m) 1 Horiz (m) 10 |
| Australian Soil CI Vertic Subnatric Gr Clayey Moderately ASC Confidence: No analytical data | assification: rey Sodosol Medium Non-gravelly C deep are available but confidence is fair. | Mappi Clay-loamy Princi Great | ng Unit: pal Profile For Soil Group: Class: | Pv m: Dy2.43 Grey-brown podzolic soil Land Class: C1 |
| <u>Site</u> | Complete clearing. Pasture, nat | tive or improved, but | never cultivated | b |
| Vegetation: | Tall Strata Tree 6.01.12m la | olated plants *Specie | as includes Ar | |
| Surface Coarse | 2-10%, medium gra | avelly, 6-20mm, subr | ounded, Conglo | omerate |
| <u>Profile</u> 1A1 0 - 0.1 m | Very dark grey (10YR3/1-M Subangular blocky; Rough- macropores, Moist; Firm co medium gravelly, 6-20mm, s (Raupach); Abundant, fine (| oist); , 0-0% ; Fine sa ped fabric; Medium, i nsistence; Moderatel subrounded, disperso (1-2mm) roots; Clear, | andy clay loam; (5 - 10) mm cra y plastic; Norm ed, Conglomera , Smooth chang | Moderate grade of structure, 2-5 mm, ck; Many (>5 per 0.01m2) Fine (1-2mm) al plasticity; Moderately sticky; 2-10%, ate, coarse fragments; Field pH 7 je to - |
| 1A2e 0.1 - 0.2 r | n Light grey (2.5Y7/1-Moist); I grade of structure; Earthy fa macropores, Moist; Firm co medium gravelly, 6-20mm, s Ferromanganiferous, Fine (Clear, Smooth change to - | Mottles, 10YR44, 2-1 abric; Medium, (5 - 10 nsistence; Moderatel subrounded, disperse 0 - 2 mm), Concretio | 0% , 0-5mm, D)) mm crack; Fe y plastic; Norm ed, Conglomera ns; Field pH 7.5 | Distinct; Fine sandy clay loam; Massive ew (<1 per 0.01m2) Fine (1-2mm) al plasticity; Moderately sticky; 0-2%, ate, coarse fragments; Few (2 - 10 %), 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 microrelief, brown cracking clay



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 123 O | ND CAP/ bservatio | ABILITY on ID: | r 1 |
|---|--|---|--|---|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 17/05/12 GPS S.A. Off 7489674 AMG zone: 55 773668 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon 32 metres 756 Slow Poorly dra | , photo 2 s ained | 88 |
| <u>Geology</u> ExposureType: Geol. Ref.: | Auger boring Qpa | Conf. Sub. is Pare Substrate Material | nt. Mat.: : | Almost Auger b Porous, | certain or certain oring, 1 m deep, Bedded, Alluvium |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern 1 | Гуре: | Terraced land (alluvial) |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 150 degre | ees | |
| Surface Soil Co | ndition Hardsetting | | | | |
| Erosion: Stable (sheet Soil Classificati | e, Moderate scalding (scald) Stable, t) <u>on</u> | , Moderate Microrelief: Crabho | le gilgai | Vert.(n | n) 0.3 Horiz.(m) 10 |
| Australian Soil Claver Subnatric Groups Clayey Moderately ASC Confidence: No analytical data | assification: ey Sodosol Medium Non-gravelly C deep are available but confidence is fair. | Mappin Clay-loamy Princip Great | ng Unit: bal Profile Soil Group Class: | Form: o: | Pv Dy2.43 Grey-brown podzolic soil Land Class: C1 |
| <u>Site</u> | Complete clearing. Pasture, nat | tive or improved, but | never cultiv | /ated | |
| Vegetation: | | | | | |
| | Tall Strata - Tree, 6.01-12m, Iso | olated plants. *Specie | es includes | - Acacia | harpophylla |
| Surface Coarse Profile | 0-2%, medium grav | /elly, 6-20mm, subrou | unded platy | /, Conglo | merate |
| 1A11 0-0.1 m | Very dark grey (10YR3/1-M blocky; Rough-ped fabric; M Moderately moist; Firm cons gravelly, 6-20mm, subround Abundant, fine (1-2mm) roo | oist); , 0-0% ; Clay lo Medium, (5 - 10) mm o sistence; Moderately ded, dispersed, Cong ts; Diffuse, Wavy cha | am; Moder crack; Man plastic; No lomerate, o ange to - | ate grade y (>5 per rmal plas coarse fra | e of structure, 5-10 mm, Subangular 0.01m2) Fine (1-2mm) macropores, sticity; Slightly sticky; 2-10%, medium agments; Field pH 8 (Raupach); |
| 1A12 0.1 - 0.3 r | n Light grey (2.5Y7/1-Moist); 1 structure; Earthy fabric; Med Moderately moist; Firm cons gravelly, 6-20mm, subround Ferromanganiferous, Fine (roots; Diffuse, Wavy change | Mottles, 10YR44, 2-1 dium, (5 - 10) mm cra sistence; Moderately ded, dispersed, Cong 0 - 2 mm), Concretion e to - | 0% , 0-5mi ick; Few (< plastic; No lomerate, o ns; Field ph | m, Distino 1 per 0.0 rmal plas coarse fra 1 8.5 (Ra | ct; Clay loam; Massive grade of 11m2) Fine (1-2mm) macropores, sticity; Slightly sticky; 2-10%, medium agments; Few (2 - 10%), upach); Common, fine (1-2mm) |
| 1B2kss 0.3 - 0.5 r | n ; Light clay; Moderate grade Lenticular; Smooth-ped fabr Moist; Very firm consistence 6-20mm, subrounded, dispe faces or walls coated, distin is Slightly calcareous; Field | e of structure, 5-10 mi ric; Fine, (0 - 5) mm c e; Very plastic; Norma ersed, Conglomerate, ct; Common cutans, pH 9 (Raupach); Fev | m, Polyheo rack; Few al plasticity coarse fra 10-50% of v, fine (1-2) | Iral; Mod (<1 per 1 ; Modera gments; ped face mm) root | erate grade of structure, 10-20 mm, 00mm2) Fine (1-2mm) macropores, tely sticky; 0-2%, medium gravelly, Common cutans, 10-50% of ped s or walls coated, distinct; Soil matrix s; Diffuse, Irregular change to - |

Morphological Notes

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: Project Code: Agency Name: | STYX SOUTH COAL PROJI J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 124 O | ND CAPA bservatio | ABILITY n ID: | Y 1 | |
|---|--|--|---|--|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 17/05/12 GPS S.A. Off 7489856 AMG zone: 55 773904 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, 35 metres 756 Slow Poorly dra | , photo 2 S ained | 289 | |
| Geology ExposureType: Geol. Ref.: Bedded, | Auger boring Qpa | Conf. Sub. is Pare Substrate Material | nt. Mat.: : | Almost Auger | certain or certain boring, 1 m | deep,Fragmental, |
| | | | | Porous | ,, Alluvium | |
| <u>Land Form</u> Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern T | ype: | Terraced land (al | lluvial) |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 150 degre | ees | | |
| <u>Surface Soil Co</u> | ndition Hardsetting | | | | | |
| Erosion: Stable | e, Minor scalding (scald) Stable, Mi | nor (sheet) | مام منامما | \/aut/u | | 20 |
| Soil Classificati | on | wicroreller: weionn | iole gligal | vert.(r | n) i Honz.(m) | 20 |
| Australian Soil Cl | assification: | Mappi | ng Unit: | | Pv | |
| Vertic Subnatric Gr | ey Sodosol Very thick Non-gravelly | Clay-loamy Princip | oal Profile | Form: | Dy2.43 | |
| Clayey Moderately | deep | Great | Soil Group |) : | Grey-brown | |
| No analytical data | are available but confidence is fair | Land (| Class: | | Land Class: (| C1 |
| <u>Site</u> | Complete clearing. Pasture, na | tive or improved, but | never cultiv | rated | | |
| Vegetation: | Tall Strata - Tree 6 01-12m Is | olated plants *Specie | es includes | - Acacia | a harpophylla | |
| Surface Coarse | 2-10%, medium gra | avelly, 6-20mm, subro | ounded, Co | nglomer | rate | |
| 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 r | n Light grey (2.5Y7/1-Moist); structure; Earthy fabric; Me Moderately moist; Firm con gravelly, 6-20mm, subround Ferromanganiferous, Fine (Clear, Wavy change to - | Mottles, 10R44, 2-10 dium, (5 - 10) mm cra sistence; Moderately ded, dispersed, Cong 0 - 2 mm), Concretion | % , 0-5mm, ick; Many (> plastic; Nor lomerate, c ns; Field pH | , Distinct >5 per 1 rmal plas oarse fra 1 8 (Rau | t; Clay loam; Mass 00mm2) Fine (1-2 sticity; Slightly stic agments; Few (2 - Ipach); Common, f | ive grade of mm) macropores, ky; 0-2%, medium 10 %), ine (1-2mm) roots; |
| 1B2kss 0.3 - 0.5 r | n ; Light clay; Moderate grade Polyhedral; Smooth-ped fat Moist; Very firm consistenc of ped faces or walls coate Few (2 - 10 %), Calcareous (Raupach); Few, fine (1-2n | e of structure, 10-20 r pric; Fine, (0 - 5) mm xe; Very plastic; Norm d, distinct; Common (, Medium (2 -6 mm), nm) roots; Diffuse, Irr | nm, Lenticu crack; Few al plasticity cutans, 10-{ Nodules; S egular chan | ular; Moo (<1 per ; Modera 50% of p toil matri nge to - | derate grade of stri 100mm2) Fine (1- ately sticky; Comm bed faces or walls ix is Slightly calcard | ucture, 5-10 mm, .2mm) macropores, ion cutans, 10-50% coated, distinct; eous; Field pH 8.5 |
| Morphological | Notes | | | | | |

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



1A11 1A2e rusty root mottles 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

Appendix A



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND L 126 (| AND CAPA Observatio | ABILITY n ID: 1 | | |
|--|--|--|--|---|--|---|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | I. Hollingsworth 17/05/12 GPS S.A. Off 7490015 AMG zone: 55 774292 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, 28 metres 756 Moderatel Moderatel | photo 2 y rapid y well dra | 91 ained | |
| <u>Geology</u> ExposureType: Geol. Ref.: | Auger boring Qa | Conf. Sub. is Par Substrate Materia | ent. Mat.: al: | Almost certain or certain Existing vertical exposure, 0.5 m deep,Fragmental, Bedded, Porous, Alluvium | | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3% | % | Pattern T | уре: | Flood plain | |
| Morph. Type: Elem. Type: Slope: | Simple-slope Channel bench 5 % | Relief: Slope Category: Aspect: | 15 metres Gently inc 100 degre | s clined ees | | |
| Surface Soil Co | ndition Soft | | | | | |
| Erosion: Active Soil Classificati | e, Moderate (gully) Active, Present (: on N | stbank) /icrorelief: Zero o micro | or no relief | Vert.(m | ı) Horiz.(n | n) |
| Australian Soil Cl. Stratic Rudosol No ASC Confidence: No analytical data | assification: n-gravelly Loamy Shallow are available but confidence is fair. | Mapp Princ Grea Land | ing Unit: ipal Profile t Soil Group Class: | Form:): | Sx Um5.52 Alluvial soil Land Class: | D |
| Site | No effective disturbance other the | nan grazing by hool | ed animals | | | |
| Vegetation: | | 0 0 7 | | | | |
| <u>Surface Coarse</u> Profile | Tall Strata - Tree, 12.01-20m, M No surface coarse f | lid-dense. *Species ragments | includes - E | ucalyptu | s tereticornis | |
| 1A11 0 - 0.1 m 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 r | 12 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 - | | | | | | crack; Common (1-5 ormal plasticity; e, coarse fragments; |
| | | | | | | |

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



Site Notes

below scarp on flood plain, cleared mixed woodland, grey clay

Appendix A



Appendix A



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 129 O | ND CAP | ABILITY on ID: 1 |
|--|--|------------------------------|------------------------------|---|
| Site Information | | | | |
| Deeg By | L Hollingoworth | Locality | Mamalar | nhata 201 |
| Desc. By: | | Locality: | Mamelor | 1, photo 294 |
| Date Desc.: | 17/05/12 | Elevation: | 39 metre | S |
| Map Ref.: | GPS S.A. Off | Rainfall: | 756 | |
| Northing/Long.: | 7489340 AMG zone: 55 | Runoff: | Slow | |
| Easting/Lat.: | 774363 Datum: GDA94 | Drainage: | Poorly dr | ained |
| Geoloav | | | | |
| ExposureType: | Auger boring | Conf Sub is Pare | nt Mat | Almost certain or certain |
| Gool Rof | Ona | Substrate Material | I. | Existing vertical exposure 1 m |
| | apu | Cubblinte materia | | deen Fragmental Bedded Porous |
| Alluvium | | | | deep, raginental, bedded, rolods, , |
| Alluvium | | | | |
| | | | | |
| Land Came | | | | |
| Land Form | | | | |
| Rel/Slope Class: | Gently undulating plains <9m 1-3 | 3% | Pattern | Type: Terraced land (alluvial) |
| | | | | |
| Morph, Type: | Flat | Relief: | 5 metres | |
| Flem Type | Terrace plain | Slope Category | Verv den | itly sloped |
| Slone: | 1 % | Asnect: | | |
| | 1 /0 | Азреси. | 30 degre | |
| Surface Soil Co | ndition Hardsetting | | | |
| Erosion: Partia | I. Moderate scalding (scald) Active | . Moderate | | |
| (shee | t) Active Moderate (gully) | Microrelief: Melonk | icalia alag | Vert (m) 0.5 Horiz (m) 20 |
| | | Microrener. Meloni | iole gligal | ven.(iii) 0.5 Honz.(iii) 20 |
| Soli Classificati | on | | | |
| Australian Soil Cl | assification: | Маррі | na Unit: | Pv |
| Vertic Mesonatric | Brown Sodosol Medium Non grave | lly Clay Joamy Princi | nal Profilo | Form: Dv2 33 |
| | , | | | Oraci harring |
| Clayey Moderately | / deep | Great | Soll Grou | p: Grey-brown |
| ASC Confidence: | | | | podzolic soil |
| No analytical data | are available but confidence is fair | r. Land | Class: | Land Class: C1 |
| | | | | |
| <u>Site</u> | Complete clearing. Pasture, na | tive or improved, but | never culti | vated |
| Vegetation. | | | | |
| regetation | Tall Strata - Tree 6.01-12m Is | clated plants *Specie | es includes | a - Acacia harnonhylla |
| | | | | |
| Surface Coarse | No surface coarse | fragments | | |
| Profile | | | | |
| <u>101</u> 0 0.1 m | Very dark grov (10VP2/1 M | Aciat): 0.0% · Fina a | | anny Madarata grada of atructura. E 10 mm |
| IAI 0-0.111 | Very dark grey (101R3/1-W | ioist), , 0-0% , Fille Sa | | |
| | Subangular blocky; Rough | -ped labric; Fine, (0 - | 5) mm crae | ck; Few (<1 per 0.0 mz) Fine (1-2mm) |
| | macropores, Moist; Very fir | m consistence; Mode | erately plas | tic; Normal plasticity; Moderately sticky; Field |
| | pH 6.5 (Raupach); Abunda | nt, fine (1-2mm) roots | s; Clear, Sr | nooth change to - |
| | | | | |
| 1A1 0-0.1 m | Very dark grey (10YR3/1-N | loist); , 0-0% ; Fine sa | andy clay l | oam; Moderate grade of structure, 5-10 mm, |
| | Subangular blocky; Rough- | -ped fabric; Fine, (0 - | 5) mm crae | ck; Few (<1 per 0.01m2) Fine (1-2mm) |
| | macropores, Moist; Firm co | onsistence; Moderatel | y plastic; N | Normal plasticity; Moderately sticky; Field pH |
| | 6.5 (Raupach); Abundant, 1 | fine (1-2mm) roots; Cl | lear, Smoo | th change to - |
| | | | , | Ũ |
| 1A1 0-0.1 m | Very dark grey (10YR3/1-M | loist); , 0-0% ; Fine sa | andy clay l | oam; Moderate grade of structure, 5-10 mm, |
| | Subangular blocky: Rough | -ped fabric: Fine. (0 - | 5) mm cra | ck: Few (<1 per 0.01m2) Fine (1-2mm) |
| | macropores Moist Firm co | nsistence. Moderatel | v plastic: N | Jormal plasticity. Moderately sticky. Field pH |
| | 6.5 (Raupach): Abundant 1 | fine (1-2mm) roots: Cl | lear Smoo | th change to - |
| | | | | |
| 1A2e 01-02 | m Light grev (2.5Y7/1-Moist). | Mottles 10YR44 2-1 | 0% 0-5m | m Distinct: Fine sandy clay loam: Massive |
| 17 120 0.1 0.21 | arade of structure: Earthy f | abric: Eine (0, 5) mn | n crack: M | $(>5 \text{ per } 100 \text{ mm}^2)$ Very fine (0.075 1 mm) |
| | macronorea Maiati Madar | abile, 1 inc, (0 - 0) fill | locticity: N | Any (*5 per 100mm2) very mic (0.075-mm) |
| | macropores, moist, modera | allery plastic, Normal p | | Inderately sticky, common cutaris, 10-50% of |
| | ped faces or walls coated, | uisunct; rew cutans, | < 10% of pe | eu laces of walls coated, distinct; Few (2 - 10 |
| | %), Ferromanganiferous, F | ine (0 - 2 mm), Concr | etions; Fie | Id pH 7.5 (Raupach); Common, fine (1-2mm) |
| | roots; Clear, Smooth chan | ge to - | | |
| | | | | |
| 1B2kss 0.2 - 0.5 r | m Dark yellowish brown (10Y | R4/4-Moist); ; Mediun | n clay; Moo | derate grade of structure, 5-10 mm, |
| | Polyhedral; Moderate grad | e of structure, 10-20 r | nm, Lentic | ular; Smooth-ped fabric; Fine, (0 - 5) mm |
| | crack: Common (1-5 per 1) | 00mm2) Verv fine (0 0 |)75-1mm) i | macropores. Moist: Very plastic: Normal |
| | plasticity: Verv sticky: Soil | matrix is Slightly calca | areous: Fie | ld pH 8.5 (Raupach): Few fine (1-2mm) |
| | rooto: Diffuso Irregular aba | igned 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



Observation Notes

Check site, above scarp on undulating terrace plain, not sampled

Site Notes

cleared brigalow woodland, melonhole microrelief, brown cracking clay

Appendix A



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND 1 131 | LAND CAP Observatio | ABILITY on ID: | r 1 | |
|--|---|--|---|--------------------------------|-----------------------|------------------------|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: Geology | <u>1</u> I. Hollingsworth 17/05/12 GPS S.A. Off 7489327 AMG zone: 55 774684 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon 34 metre: 756 Slow Moderate | l, photo 2 s ely well di | 296 rained | |
| ExposureType: Geol. Ref.: | Auger boring Qa | Conf. Sub. is Pa Substrate Mater | arent. Mat.: rial: | No Data Fragme | a ental, Bedded, P | orous, , Alluvium |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern 1 | Гуре: | Flood plain | |
| Morph. Type: Elem. Type: Slope: Surface Soil Co | Flat Flood-out 0.5 % | Relief: Slope Category Aspect: | 5 metres : Level 90 degre | es | | |
| Erosion: Active Soil Classificat | e, (stbank) ion N | licrorelief: | | | | |
| Australian Soil C Basic Fluvic Clasti ASC Confidence No analytical data | lassification: c Rudosol Non-gravelly Clayey Sha : are available but confidence is fair. | Mapping Unit: Sx llow Principal Profile Form: Um5.5 Great Soil Group: Grey clay Land Class: Land Class: A | | | A | |
| <u>Site</u> <u>Vegetation:</u> <u>Surface Coarse</u> Profile | <u>-</u> | | | | | |
| 1A11 0 - 0.1 m | Very dark grey (7.5YR3/1-M Diffuse, Smooth change to - | loist); ; Sandy loar | n; Moist; Sligl | htly plasti | ic; Normal plasti | city; Slightly sticky; |
| 1A12 0.1 - 0.5 | m Strong brown (7.5YR4/6-Mc Diffuse, Smooth change to - | bist); ; Sandy loam | ; Moist; Slight | tly plastic | ; Normal plastic | ity; Slightly sticky; |
| 1C1 0.5 - 0.8 | m Strong brown (7.5YR4/6-Mo Diffuse, Smooth change to - | oist); ; Sandy loam | ; Moist; Slight | tly plastic | ; Normal plastic | ity; Slightly sticky; |
| Morphological | Notes | | | | | |
| Observation No | o <u>tes</u> | • • • • • • • • • | | | | |

Check site, on valley flat on undulating floodplain, not sampled

Site Notes

cleared mixed woodland,brown fine sandy clay loam



| Project Name: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 132 OI | ND CAPABILIT bservation ID: | Y 1 | | | |
|---|---|--|--|---|--|--|--|
| Site information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 17/05/12 GPS S.A. Off 7487948 AMG zone: 55 773577 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, photo 2 41 metres 756 Slow Poorly drained | 297 | | | |
| Geology ExposureType: Geol. Ref.: Bedded, | Auger boring Qpa | Conf. Sub. is Pare Substrate Material | n t. Mat.: Almost : Auger Porous | certain or certain boring, 1 m deep,Fragmental, s, , Alluvium | | | |
| <u>Land Form</u> Rel/Slope Class: | Gently undulating plains <9m 1-3 | % | Pattern Type: | Terraced land (alluvial) | | | |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 90 degrees | | | | |
| Surface Soil Co | ndition Hardsetting | | | | | | |
| Erosion: Stable | e, Minor scalding (scald) Stable, Mir | nor (sheet) | | | | | |
| Soil Classificati | on | Microrelief: Melonh | ole gilgai Vert.(r | m) Horiz.(m) | | | |
| Australian Soil Cl | assification: | Mannii | na Unit: | Pv | | | |
| Vertic Mesonatric E Clayey Moderately ASC Confidence: No analytical data | Brown Sodosol Medium Non-gravell / deep : are available but confidence is fair. | ly Clay-loamy Princip Great | oal Profile Form: Soil Group: Class: | Dy2.33 Grey-brown podzolic soil Land Class: C1 | | | |
| Site | Complete clearing. Pasture, nat | tive or improved, but i | never cultivated | | | | |
| Vegetation: | | | | | | | |
| 0 | Tall Strata - Tree, 6.01-12m, Iso | olated plants. *Specie | es includes - Acacia | a harpophylla | | | |
| Surface Coarse | 0-2%, coarse grave | elly, 20-60mm, subrou | inded, Conglomera | ate | | | |
| Profile 1A11 0 - 0.1 m | 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 r | n Light grey (2.5Y7/1-Moist); l structure; Earthy fabric; Mec Moist; Firm consistence; Sli 60mm, subrounded, dispers Ferromanganiferous, Fine (Clear, Smooth change to - | Mottles, 10YR44, 2-1 dium, (5 - 10) mm cra ghtly plastic; Normal sed, Conglomerate, co 0 - 2 mm), Concretior | 0% , 0-5mm, Distin ck; Many (>5 per 1 plasticity; Slightly s parse fragments; C ns; Field pH 8 (Rau | nct; Sandy loam; Massive grade of 00mm2) Fine (1-2mm) macropores, sticky; 2-10%, coarse gravelly, 20- common (10 - 20%), upach); Common, fine (1-2mm) roots; | | | |
| 1B2kss 0.5 - 0.8 r | n Dark yellowish brown (10YF Moderate grade of structure per 100mm2) Fine (1-2mm) Slightly sticky; 0-2%, cobbly Common cutans, 10-50% of walls coated, distinct; Few (calcareous; Field pH 8.5 (Re | R4/4-Moist); ; Sandy I e, 10-20 mm, Lenticuli macropores, Moist; Y y, 60-200mm, subrou f ped faces or walls c 2 - 10 %), Calcareou: aupach); FewDiffuse, | oam; Moderate gra ar; Smooth-ped fab /ery firm consisten nded, dispersed, C oated, distinct; Cor s, Medium (2 -6 mr Smooth change to | ade of structure, 5-10 mm, Polyhedral; oric; Fine, (0 - 5) mm crack; Few (<1 ice; Slightly plastic; Normal plasticity; Conglomerate, coarse fragments; nmon cutans, 10-50% of ped faces or m), Nodules; Soil matrix is Slightly O - | | | |

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: Project Code: Agency Name: | STYX SOUTH COAL PROJ J000019 Site ID: Horizon Soil Survey (NT) | ECT SOIL AND LA 133 O | ND CAPABILIT | Y 1 | | |
|---|---|--|--|---|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 1 I. Hollingsworth 17/05/12 GPS S.A. Off 7486717 AMG zone: 55 773596 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon, photo 40 metres 756 Slow Poorly drained | 298 | | |
| Geology ExposureType: Geol. Ref.: Bedded, | Auger boring Qpa | Conf. Sub. is Pare Substrate Materia | nt. Mat.: Almos I: Auger | t certain or certain boring, 1 m deep,Fragmental, | | |
| Land Form | | | Porous | s, , Alluvium | | |
| Rel/Slope Class: | Gently undulating plains <9m 1-3 | 1% | Pattern Type: | Terraced land (alluvial) | | |
| Morph. Type: Elem. Type: Slope: Surface Soil Co | Flat Terrace plain 0.5 % Hardsetting | Relief: Slope Category: Aspect: | 5 metres Level 120 degrees | | | |
| Erosion: Partia | I, Moderate scalding (scald) Partia | l, Moderate | | | | |
| (shee) Soil Classificati | t) on | Microrelief: Crabho | ole gilgai Vert.(| (m) 0.2 Horiz.(m) 10 | | |
| Australian Soil CI Vertic Mesonatric E Clayey Moderately ASC Confidence: No analytical data | assification: Brown Sodosol Medium Non-grave / deep : are available but confidence is fair | Mappi Ily Clay-loamy Princi Great | ng Unit: pal Profile Form: Soil Group: Class: | Pv Dy2.33 Grey-brown podzolic soil Land Class: C2 | | |
| <u>Site</u> | Complete clearing. Pasture, na | tive or improved, but | never cultivated | | | |
| Surface Coarse | Tall Strata - Tree, 6.01-12m, Is 2-10%, medium gr | olated plants. *Specie avelly, 6-20mm, subre | es includes - Eucal ounded platy, Cong | lyptus crebra, Melaleuca viridiflora glomerate | | |
| 1A1 0 - 0.1 m | Very dark grey (10YR3/1-M Subangular blocky; Rough- macropores, Moist; Firm co medium gravelly, 6-20mm, (Raupach); Abundant, fine | loist); , 0-0% ; Fine sa ped fabric; Fine, (0 - onsistence; Moderatel subrounded, disperso (1-2mm) roots; Clear, | andy clay loam; Mo 5) mm crack; Few y plastic; Normal p ed, Conglomerate, , Smooth change to | oderate grade of structure, 2-5 mm, (<1 per 0.01m2) Fine (1-2mm) vlasticity; Moderately sticky; 2-10%, coarse fragments; Field pH 7 o - | | |
| 1A2e 0.1 - 0.2 m Light grey (2.5Y7/1-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; 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 r | n Dark yellowish brown (10Y Polyhedral; Moderate grad crack; Few (<1 per 100mm Normal plasticity; Very sticl coarse fragments; Commo 50% of ped faces or walls o Soil matrix is Slightly calcar | R4/4-Moist); ; Mediun e of structure, 10-20 r 2) Fine (1-2mm) mac xy; 0-2%, medium gra n cutans, 10-50% of p coated, distinct; Very reous; Field pH 8.5 (F | n clay; Moderate g nm, Lenticular; Sm ropores, Moist; Ve ivelly, 6-20mm, sul bed faces or walls o few (0 - 2 %), Calc Raupach); FewDiffu | rade of structure, 5-10 mm, nooth-ped fabric; Fine, (0 - 5) mm ry firm consistence; Very plastic; brounded, dispersed, Conglomerate, coated, distinct; Common cutans, 10- areous, Medium (2 -6 mm), Nodules; use, 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: Project Code: Agency Name: | STYX SOUTH COAL PROJE J000019 Site ID: Horizon Soil Survey (NT) | CT SOIL AND L 134 C | AND CAP Observatio | ABILITY on ID: 1 | | | |
|---|--|---|---|---|--|--|--|
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | l I. Hollingsworth 17/05/12 GPS S.A. Off 7486717 AMG zone: 55 773596 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | Mamelon 40 metres 756 Slow Poorly dr | , photo 29 s ained | 99 | | |
| <u>Geology</u> ExposureType: Geol. Ref.: | Auger boring Qpa | Conf. Sub. is Pare Substrate Materia | ent. Mat.: al: | No Data Fragmei | ntal, Bedded, Porous, , Alluvium | | |
| Land Form Rel/Slope Class: | Gently undulating plains <9m 1-39 | % | Pattern 1 | Гуре: | Terraced land (alluvial) | | |
| Morph. Type: Elem. Type: Slope: | Flat Terrace plain 0.5 % | Relief: Slope Category: Aspect: | 5 metres Level 100 degr | ees | | | |
| Erosion: | ndition Hardsetting | | | | | | |
| Soil Classification Australian Soil Claver Vertic Mesonatric E Clayey Moderately ASC Confidence: No analytical data | on N assification: Brown Sodosol Medium Non-gravelly r deep are available but confidence is fair. | Microrelief: Crabh Mapp y Clay-loamy Princ Great Land | ole gilgai ing Unit: ipal Profile t Soil Grouj Class: | Vert.(m Form: p: | a) 0.2 Horiz.(m) 10 Pv Dy2.33 Grey-brown podzolic soil Land Class: C2 | | |
| <u>Vegetation:</u> Surface Coarse <u>Profile</u> 1A1 0 - 0.1 m | 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 (Paunach): Many, fine (1-2mm) roots; Clear, Smooth change to - | | | | | | |
| 1A2e 0.1 - 0.2 n | n Light grey (10YR7/1-Moist); grade of structure; Earthy fa macropores, Moist; Firm cor medium gravelly, 6-20mm, s Ferromanganiferous, Fine (0 Clear, Smooth change to - | Mottles, 7.5YR44, abric; Fine, (0 - 5) m nsistence; Moderate subrounded, dispers 0 - 2 mm), Concretio | 10-20% , 0-3 nm crack; M ely plastic; N sed, Conglo ons; Field pł | 5mm, Disi any (>5 p lormal pla merate, ca H 7 (Raup | tinct; Fine sandy clay loam; Massive er 100mm2) Fine (1-2mm) Isticity; Moderately sticky; 10-20%, oarse fragments; Few (2 - 10%), oach); Common, fine (1-2mm) roots; | | |
| 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; 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 N | lotes bleached, rusty root mottles | | | | | | |
| Observation No | tes | | | | | | |
| Check site, flat on u | undulating terrace plain, not sample | ed | | | | | |
| Site Notes | U I I I | | | | | | |
| cleared ironbark wo | oodland, brown cracking clay, crabh | ole microrelief, high | nly pulverule | ent surface | e | | |

| Projec Projec Agenc | ct Name: ct Code: cy Name: | CENTRAL QUEENSLAND J000019 Site ID: Horizon Soil Survey (NT) | COAL PROJEC SS01 | CT SO Ob | OIL AND oservatio | LAND n ID: | CAPABILITY 1 |
|--------------------------------------|--|---|--|--|--|--|---|
| | | ······ | | | | | |
| <u>Site Ir</u> Desc. I | htormation By: | 1 | Locality: | | MAP UNI ⁻ footslope CLASSIFI | Γ 1 ΟN on rise, ED | Ws LAND SYSTEM, Detailed site, CDM SMITH SITE, MISS |
| Date D Map R Northin Eastin | esc.: ef.: ng/Long.: g/Lat.: | 06/05/17 GPS 7483395 AMG zone: 55 772837 Datum: GDA94 | Elevation: Rainfall: Runoff: Drainage: | | 49 metres 756 Slow Moderatel | y well d | rained |
| <u>Geolo</u> Expos Geol. F | 9 <u>97</u> ureType: Ref.: | Auger boring QrKx | Conf. Sub. is I Substrate Mat | Parer | nt. Mat.: | Almost Auger b | certain or certain boring, 2 m deep,Porous, , Colluvium |
| land | Form | | | | | 0 | |
| Rel/Sic | ope Class: | Undulating low hills 30-90m 3- 10% | Pattern Type: | | Low hills | | |
| Morph Elem. Slope: | . Туре: Туре: | Lower-slope Footslope 2.7 % | Relief: Slope Catego Aspect: | ry: | 30 metres Gently inclined No Data | | |
| Surfa | ce Soil Co | ndition (dry): Soft | | | | | |
| <u>Erosic</u> | on: Stable | e, Stable, | | | | | |
| <u>Soil C</u> | lassificati | on | | | | | |
| Austra Ferric-S | lian Soil Cl Sodic Dystro Loamv Dee | assification: ophic Brown Kandosol Thick Very o | Ma gravelly Pr | appin rincip | ng Unit: al Profile | Form: | 1 N/A |
| ASC C | confidence | r : lytical data are available. | Gr | reat S | Soil Group | : | N/A |
| Site D | isturbanc | e: Complete clearing. Pasture, n | ative or improved, | , but r | never cultiv | rated | |
| Veget | ation: | | · | | | | |
| | | Tall Strata - Tree, 3.01-6m, Is | olated plants. *Sp | ecies | includes - | Eucaly | ptus crebra, Melaleuca species |
| Surfa | ce Coarse | Fragments: 10-20%, coarse g | ravelly, 20-60mm | , subr | ounded, Ir | onstone |) |
| Profile | e Morphol | ogy | | | | | |
| 1A11 | 0 - 0.1 m | Dark brown (10YR3/3-Moi structure; Sandy (grains p Moist; Loose consistence; subrounded, dispersed, Fe 2mm) roots; Clear, Smoot | st); (10YR3/4-Mo rominent) fabric; N Non-plastic; Non- erricrete, coarse fr h change to - | oist); , Vany -stick ragme | 0-0% ; Loa (>5 per 0.0 y; 20-50%, ents; Field | amy fine)1m2) F mediur pH 5.3 (| e sand; Single grain grade of 'ine (1-2mm) macropores, n gravelly, 6-20mm, (pH meter); Many, fine (1- |
| 1A12 | 0.1 - 0.2 | m Dark yellowish brown (10) Sandy (grains prominent) weak consistence; Non-pla dispersed, Ferricrete, coar Gradual, Smooth change | /R3/4-Moist); , 0-0 fabric; Many (>5 p astic; Non-sticky; ; rse fragments; Fie to - | 0% ; 8 per 10 20-50 eld pH | Sandy loam 00mm2) Fir 0%, mediur I 5.4 (pH m | n; Single ne (1-2n n grave neter); N | e grain grade of structure; nm) macropores, Moist; Very Ily, 6-20mm, subrounded, lany, fine (1-2mm) roots; |
| 1A3 | 0.2 - 0.3 | m Dark yellowish brown (10) fabric; Common (1-5 per 1 plastic; Non-sticky; 20-509 coarse fragments; Field pl change to - | /R4/4-Moist); , 0-0 l00mm2) Fine (1-2 %, medium gravell H 5.5 (pH meter); | 0% ; 8 2mm) Iy, 6-2 Comi | Sandy loam macropor 20mm, sub mon, fine (| n; Weak es, Mois roundeo 1-2mm) | grade of structure; Earthy st; Weak consistence; Non- d, dispersed, Ferricrete, roots; Gradual, Smooth |
| 1B3 | 0.3 - 0.6 | m Dark yellowish brown (10) fabric; Common (1-5 per 1 plastic; Non-sticky; 20-509 coarse fragments; Very fe meter); Few, fine (1-2mm) | /R4/6-Moist); , 0-0 l00mm2) Fine (1-2 %, medium gravell w (0 - 2 %), Ferru) roots; Gradual, S | 0% ; 8 2mm) ly, 6-2 ginou Smoot | Sandy loam macropor 20mm, sub s, Fine (0 - th change t | n; Weak es, Mois roundeo - 2 mm) to - | grade of structure; Earthy st; Firm consistence; Non- d, dispersed, Ferricrete, , Nodules; Field pH 5.5 (pH |
| 1C1 | 0.6 - 0.9 | m Yellowish brown (10YR5/6 fabric; Common (1-5 per 1 plastic; Non-sticky; 50-909 coarse fragments; Commo (pH meter); Few, fine (1-2 | 6-Moist); , 0-0% ; 5 100mm2) Fine (1-2 %, coarse gravelly on (10 - 20 %), Fe mm) roots; Gradu | Sandy 2mm) /, 20-6 errugir ial, Sr | y loam (Hea macropor 60mm, sub nous, Medi nooth char | avy); W es, Mois rounded um (2 -6 nge to - | eak grade of structure; Earthy st; Firm consistence; Non- d, dispersed, Ferricrete, 6 mm), Nodules; Field pH 5.6 |
| 1C2 | 0.9 - 1.2 | m Yellowish brown (10YR5/6 Common (1-5 per 100mm Non-sticky; 50-90%, coars fragments; Very few (0 - 2 meter); Gradual, Smooth 6 | 6-Moist); , 0-0% ; 5 2) Fine (1-2mm) n se gravelly, 20-60r %), Ferruginous, change to - | Sandy nacro mm, s Medi | / loam; We pores, Moi subrounded um (2 -6 m | eak grad ist; Firm d, disper im), Fra | le of structure; Earthy fabric; a consistence; Non-plastic; rsed, Ferricrete, coarse agments; Field pH 5.6 (pH |
| <u>Morph</u> | nological | Notes | - | | | | |

Observation Notes

| Project Name: | CENTRAL QUE | ENSLAND | COAL PRO | JECT SOIL AND LAND CA | PABILITY |
|---------------|----------------|------------|----------|-----------------------|----------|
| Project Code: | J000019 | Site ID: | SS01 | Observation ID: 1 | |
| Agency Name: | Horizon Soil S | urvey (NT) | | | |

Site Notes

SOIL MAP UNIT 1, Woodstock land system, cleared, gravelly yellow earth, Kandosol

| Project Name: | CENTRAL QUE | EENSLAND | COAL PROJ | ECT SOIL AND LAND | CAPABILITY |
|---------------|----------------|------------|-----------|-------------------|------------|
| Project Code: | J000019 | Site ID: | SS01 | Observation ID: | 1 |
| Agency Name: | Horizon Soil S | urvey (NT) | | | |

Laboratory Test Results:

| Depth | рН | 1:5 EC | Exc | hangeable | Cations | E | xchangeable | CEC | | ECEC | | ESP |
|--------------|-------|---------|----------|-------------|-------------|------------|--------------|-----------|---------|------------|----------|--------|
| | | | Ca | Mg | к | Na | Acidity | | | | | |
| m | | dS/m | | | | Cmol (+) | /kg | | | | | % |
| 0 - 0 1 | 5 30 | 0 024 | 0.8* | 0.5 | 04 | <0 1 | 0.64 | 2 3* | | 2 3F | ť | Error |
| 01.02 | 5.00 | 0.027 | 0.0 | 0.5 | 0.4 | <0.1 | 0.64 | 2.0 | | 2.01 2E | - | Error |
| 0.1-0.2 | 5.50 | 0.0174 | 0.7 | 0.0 | 0.2 | <0.1 | 0.04 | 2 1 0* | | 21 1 2E | | Error |
| 0.2 - 0.5 | 5.50 | 0.0077 | <0.5 | 0.4 | 0.2 | <0.1 | 0.54 | 1.2 | | 1.21 | | Error |
| 0.0 - 0.0 | 5.60 | 0.0077 | <0.1 | 0.5 | 0.2 | <0.1 | 0.3A | 1.1 | | 1.11 | 7 | -21101 |
| 1.1 - 1.2 | 5.6A | 0.034A | <0.1* | 1.3 | <0.1 | 0.4 | 0.4A 0.3A | 2* | | 2F | : | 20.00 |
| Depth | CaCO3 | Organic | Avail. | Total | Total | Total | Bulk | F | article | Size / | Analysis | i |
| • | | c | Р | Р | N | к | Density | GV | cs | FS | Silt | Clay |
| m | % | % | mg/kg | % | % | % | Mg/m3 | | | % | | |
| | | | | | | | | | | | | |
| 0 - 0.1 | | 2F | <5E | | 730 | A | | 50 | 19F | 12 | 8 | 11 |
| 0.1 - 0.2 | | | | | | | | 53 | 21F | 10 | 5 | 11 |
| 0.2 - 0.3 | | | | | | | | 54 | 19F | 10 | 9 | 8 |
| 0.5 - 0.6 | | | | | | | | 60 | 16F | 10 | 3 | 11 |
| 0.8 - 0.9 | | | | | | | | 59 | 14F | 10 | 3 | 14 |
| 1.1 - 1.2 | | | | | | | | 52 | 17F | 9 | 4 | 18 |
| Depth | COLE | | Grav | vimetric/Ve | olumetric \ | Nater Cont | ents | | K sa | at | K unsa | it |
| | | Sat. | 0.05 Bar | 0.1 Bar | 0.5 Bar | 1 Bar | 5 Bar 15 | Bar | | | | |
| m | | | | g | /g - m3/m | 3 | | | mm | /h | mm/h | l |
| 0 0 <i>(</i> | | | | | | | | | | | | |
| 0-0.1 | | | | | | | | | | | | |
| 0.1 - 0.2 | | | | | | | | | | | | |
| 0.2 - 0.3 | | | | | | | | | | | | |
| 0.5 - 0.6 | | | | | | | | | | | | |
| 0.8 - 0.9 | | | | | | | | | | | | |

1.1 - 1.2

Project Name:CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:SS01Observation ID:1Agency 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 (Ca2+,Mg2+,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 Code: | J000019 | Site ID: SS02 | Ok | servation I | D: 1 | 1 |
|----------------------|---|---|---|--|---|---|
| Agency Name: | Horizon Soli Sur | vey (NT) | | | | |
| Site Information | <u>n</u> | | | | | |
| Desc. By: | 00/00/10 | Localit | y: | Pv, Detailed | site | |
| Date Desc.: | 06/06/19 | Elevati | on: | 50 metres | | |
| Northing/Long : | 7485595 AMG zone 4 | 5 Runoff | | 700 Vervislow | | |
| Easting/Lat.: | 773943 Datum: GDA | 94 Draina | ue. | Imperfectly d | Iraine | d |
| Geology | | Diama | 90. | imponootiy a | irairio | - |
| ExposureType: | Auger boring | Conf. S | Sub. is Parer | nt. Mat.: Ali | most | certain or certain |
| Geol. Ref.: | Qpa | Substra | ate Material: | AL | uger b | oring, 2 m deep,Porous, , Alluvium |
| l and Form | | | | | 0 | |
| Rel/Slope Class | l evel plain <9m <1% | Pattern | Type: | Terrace (allu | ivial) | |
| Morph. Type: | No Data | Relief: | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | 3 metres | | |
| Elem. Type: | Terrace plain | Slope 0 | Category: | Level | | |
| Slope: | 0.3 % | Aspect | : | No Data | | |
| Surface Soil C | ondition (dry): Hard | Isetting | | | | |
| Erosion: Stab | le, Stable, Minor (sheet |) Stable, Minor (rill) | | | | |
| Soil Classifica | tion | | | | | |
| Australian Soil (| lassification. | | Mannir | a Unit: | | 5 |
| Vertic Mesonatric | Brown Sodosol Thick S | lightly gravelly | Princip | al Profile Fo | rm: | S N/A |
| Loamy Clayey De | ер | | | | | |
| ASC Confidence | 9: alutiaal data ara ayailabl | | Great S | Soil Group: | | N/A |
| All necessary an | | e. Desture notive en inc | | | I | |
| Sile Disturban | ce: Complete clearing. | Pasture, native or im | provea, but i | | ea | A vistida en acia a |
| vegetation: | | ock grass, 0.26-0.5m, | wild-dense. | Species inclu | ides - | Ansida species |
| | Tall Strata - Tree, | 5.01-12m, Isolated clu | umps. *Spec | ies includes - | Euca | lyptus populnea, Grevillea striata, Aca |
| Surface Coars | e Fragments: 10-20% | 6, medium gravelly, 6 | -20mm, subi | rounded, Ferr | icrete | |
| Profile Morpho | ology | | | | | |
| 1A1 0 - 0.1 n | n Brownish yellov fabric; Many (> Non-plastic; No coarse fragmer | w (10YR6/6-Moist); , (5 per 100mm2) Very on-sticky; 10-20%, me nts; Field pH 6.2 (pH r | 0-0% ; Fine s fine (0.075-1 edium gravell meter); Many | andy loam; M mm) macropo y, 6-20mm, si v, fine (1-2mm | lassiv ores, l ubang n) root | e grade of structure; Earthy Moist; Very firm consistence; gular, dispersed, Ferricrete, is; Clear, Smooth change to - |
| 1A2e 0.1 - 0.3 | m Yellowish brow Massive grade Moist; Firm cor dispersed, Ferr linings; Field pl | n (10YR5/4-Moist); M of structure; Earthy fa sistence; Non-plastic icrete, coarse fragme H 6 (pH meter); Comr | lottles, 10YR abric; Many (;; Non-sticky; ents; Few (2 - non, fine (1-2 | 56, 2-10% , 0 >5 per 100mr 2-10%, medi 10%), Ferru 2mm) roots; A | -5mm m2) Fi ium gi iginou \brupt | n, Distinct; Sandy loam; ine (1-2mm) macropores, ravelly, 6-20mm, subrounded, s, Fine (0 - 2 mm), Root , Smooth change to - |
| 1B2n 0.3 - 0.5 | m Yellowish brow Angular blocky Moist; Strong c medium gravel >50% of ped fa Concretions; Fi | n (10YR5/6-Moist); , (; Rough-ped fabric; F onsistence; Moderate ly, 6-20mm, subrounc ces or walls coated, o eld pH 6.1 (pH meter | D-0% ; Mediu ew (<1 per 1 ely plastic; No led, disperse distinct; Few); Few, fine (| im clay; Stron 00mm2) Very ormal plasticit d, Ferricrete, (2 - 10 %), Fe 1-2mm) roots | ng grad fine (cy; Mo coars errugin ; Clea | de of structure, 10-20mm, (0.075-1mm) macropores, derately sticky; 0-2%, se fragments; Many cutans, nous, Fine (0 - 2mm), ar, Smooth change to - |
| 1B3n 0.5 - 0.8 | m Dark yellowish 20 mm, Angula macropores, M 0-2%, medium cutans, 10-50% change to - | brown (10YR4/6-Mois ir blocky; Rough-ped oist; Strong consister gravelly, 6-20mm, su o of ped faces or walls | st); , 0-0% ; L fabric; Few (nce; Moderat brounded, di s coated, dis | ight medium <1 per 100mn ely plastic; No spersed, Ferr tinct; Field pH | clay; n2) Ve ormal icrete I 7.6 (| Strong grade of structure, 10- ery fine (0.075-1mm) plasticity; Moderately sticky; , coarse fragments; Common pH meter); Gradual, Smooth |
| 1C1 0.8 - 0.9 | m Dark yellowish 100 mm, Prism Moist; Strong c gravelly, 6-20m ped faces or wa | brown (10YR4/6-Mois atic; Earthy fabric; Fe onsistence; Slightly p ım, subrounded, dispe alls coated, faint; Fiele | st); , 0-0% ; (ew (<1 per 1(lastic; Norma ersed, Ferric d pH 8 (pH n | Clay loam, sar 00mm2) Very al plasticity; N rete, coarse fi neter); Gradua | ndy; V fine ((lodera ragme al, Sm | Veak grade of structure, 50- 0.075-1mm) macropores, ately sticky; 0-2%, medium ents; Few cutans, <10% of nooth change to - |
| 1C2 0.9 - 1.2 | m, 0-0%; Clay lo (<1 per 100mm Normal plastici Ferricrete, coai (pH meter); Gra | am, sandy; Weak gra (2) Very fine (0.075-1) ty; Moderately sticky; rse fragments; Few cu adual, Smooth change | ade of structu mm) macrop 0-2%, mediu utans, <10% e to - | ire, 50-100 m ores, Moist; S im gravelly, 6 of ped faces o | m, Pr Strong -20mi or wal | ismatic; Earthy fabric; Few consistence; Slightly plastic; m, subrounded, dispersed, lls coated, faint; Field pH 8 |
| <u>Morphological</u> | Notes | | | | | |
| 1A2e 1B2n | BLEACHED A2 DRAINAGE LIN SKINS | IITATION IN TOP OF | B HORIZON | N, PORESE B | BLOC | KED WITH CLAY |

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY

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)

1B3nBOTTOM OF ROOT ZONE AT ABOUT 0.5M1C1PARENT MATERIAL,, CHLORIDE AND SODICITY BULGE BELOW ROOT ZONE1C2PARENT 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 QUE | ENSLAND | COAL PRO | JECT SOIL AND LAND | CAPABILITY |
|---------------|-----------------|------------|----------|--------------------|------------|
| Project Code: | J000019 | Site ID: | SS02 | Observation ID: | 1 |
| Agency Name: | Horizon Soil Su | ırvey (NT) | | | |

Laboratory Test Results:

| Depth | рН | 1:5 EC | Exc | hangeable | e Cations | | Exchangeable | CEC | | ECEC | | ESP |
|-----------|---------|---------|----------|-------------|-------------|----------|--------------|------|----------|--------|----------|------|
| | | | Ca | Mg | к | Na | Acidity | | | | | |
| m | | dS/m | | | | Cmol (| +)/kg | | | | | % |
| 0 - 0.1 | 6.2A | 0.01A | 2.4* | 1.9 | 0.2 | 0.2 | | 4.7* | | 4.7F | 2 | 4.26 |
| 0.1 - 0.2 | 6A | 0.038A | 4.1* | 5.7 | 0.2 | 1.1 | | 11.4 | * | 11.4F | ç | 9.65 |
| 0.2 - 0.3 | 6.1A | 0.192A | 5.1* | 7.9 | 0.3 | 2 | | 15.5 | * | 15.5F | 1 | 2.90 |
| 0.5 - 0.6 | 0.0076/ | 0.581A | 2.1* | 4 | <0.2 | 1.3 | | 7.4* | | 7.4F | 1 | 7.57 |
| 0.8 - 0.9 | 8A | 0.554A | 2.1* | 3.6 | <0.2 | 1.5 | | 7.2* | | 7.2F | 2 | 0.83 |
| 1.1 - 1.2 | 8A | 0.517A | 1.8* | 3.1 | <0.2 | | | | | | | |
| Depth | CaCO3 | Organic | Avail. | Total | Total | Tota | al Bulk | F | Particle | Size / | Analvsis | |
| | | C | P | P | N | ĸ | Density | GV | CS | FS | Silt | Clay |
| m | % | % | mg/kg | % | % | % | Mg/m3 | | | % | | |
| | | | | | | | | | | | | |
| 0 - 0.1 | | 1.3F | <5E | | 550 | A | | 14 | 2F | 24 | 42 | 18 |
| 0.1 - 0.2 | | | | | | | | 4 | <1F | 13 | 60 | 22 |
| 0.2 - 0.3 | | | | | | | | 1 | 1F | 15 | 32 | 51 |
| 0.5 - 0.6 | | | | | | | | 1 | <1F | 23 | 33 | 42 |
| 0.8 - 0.9 | | | | | | | | 1 | 4F | 29 | 31 | 35 |
| 1.1 - 1.2 | | | | | | | | 1 | 4F | 30 | 29 | 36 |
| Depth | COLE | | Grav | vimetric/Ve | olumetric V | Vater Co | ntents | | Ks | at | K unsa | t |
| | | Sat. | 0.05 Bar | 0.1 Bar | 0.5 Bar | 1 Bar | 5 Bar 1 | Bar | | | | |
| m | | | | g | /g - m3/m3 | 3 | | | mm | /h | mm/h | |
| | | | | | | | | | | | | |
| 0 - 0.1 | | | | | | | | | | | | |
| 0.1 - 0.2 | | | | | | | | | | | | |
| 0.2 - 0.3 | | | | | | | | | | | | |
| 0.5 - 0.6 | | | | | | | | | | | | |
| 0.8 - 0.9 | | | | | | | | | | | | |
| 1.1 - 1.2 | | | | | | | | | | | | |

 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 (Ca2+,Mg2+,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 |

| Projec Projec Agenc | t Name: t Code: y Name: | CENTRAL QUEENSL J000019 Site Horizon Soil Survey | AND COAL PROJEC 9 ID: SS03 (NT) | T SOIL AND Observatio | D LANE |) CAPABILITY 1 |
|---------------------------|-------------------------------|---|---|---------------------------------|-----------------------|--|
| Site In | formatio | n | | | | |
| Desc. E | Bv: | - | Locality: | MAP UN | IT 5. P\ | /. Detailed site |
| Date De | -). | 06/06/19 | Elevation: | 39 metre | s | |
| Map Re | of.: | 1:25000 | Rainfall: | 756 | - | |
| Northin | all ona . | 7487330 AMG zone: 55 | Runoff [.] | Slow | | |
| Easting | g/Lat.: | 771804 Datum: GDA94 | Drainage: | Imperfec | tlv drair | ned |
| Geolo | av | | U U | · | , | |
| Exposi | ureType: | Auger boring | Conf. Sub. is P | arent. Mat.: | Almos | st certain or certain |
| Geol. R | lef.: | Qpa | Substrate Mate | erial: | Auger | r boring, 1.2 m deep,Porous, , All |
| Land F | Form | | | | • | |
| Rel/Slo | pe Class: | No Data | Pattern Type: | No Data | | |
| Morph. | Type: | No Data | Relief: | No Data | | |
| Elem. 1 | vpe: | Terrace plain | Slope Categor | v. Level | | |
| Slope: | 1 | 1.2 % | Aspect: | No Data | | |
| Surfac | e Soil Co | ndition (dry): Hardsetti | na | | | |
| <u>Currac</u> | | | | | | |
| Erosio | o <u>n:</u> Stabl (shee | e, Minor or present (wind); F t) Partial, Minor (rill) | Partial, Minor | | | |
| Soil C | assificat | ion | | | | |
| Austral | ian Soil C | assification: | Ма | nning Unit [.] | | 5 |
| Vertic N | lesonatric | Brown Sodosol Medium Mo | derately gravelly Pri | ncipal Profile | Form: | N/A |
| Clay-loa | amy Clayey | / Deep | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | | | |
| ASC C | onfidence | : | Gre | eat Soil Grou | p: | N/A |
| All nec | essary ana | lytical data are available. | | | | |
| Site Di | sturbanc | e: Complete clearing. Pas | ture, native or improved, | but never cult | vated | |
| Vegeta | ation: | Low Strata - Tussock g | rass, 0.26-0.5m, Sparse. | *Species incl | udes - A | Aristida species |
| | | Tall Strata - Tree 6.01 | 12m Isolated clumps *9 | Species includ | 28 - Eu | calvatus populaea. Eucalvatus cr |
| Surfac | e Coarse | Fragments: 20-50% m | edium gravelly 6-20mm | subrounded | = Eur | te |
| Drefile | Marahal | | ouluin glarony, o zollin, | | | |
| Profile | | logy | | | | |
| 1A1 | 0 - 0.2 m | Brownish yellow (10 |)YR6/6-Moist); , 0-0% ; F mm.crack: Modium. (5 _ 1 | Ine sandy loar | n; Mass | sive grade of structure; Earthy |
| | | 2mm) macropores | Moist: Verv firm consiste | nce: Non-plas | tic [.] Nor | n-sticky: 20-50% medium |
| | | gravelly, 6-20mm, s | ubrounded, dispersed, F | erricrete, coar | se fragr | ments; Field pH 6.3 (pH meter); |
| | | Many, fine (1-2mm) | roots; Clear, Smooth ch | ange to - | Ũ | |
| 1A2e | 02-03 | m Yellowish brown (10 |)YR5/4-Moist) [,] Mottles 2 | -10% 0-5mm | Distin | ct [.] Fine sandy loam [.] Massive |
| | 0.2 0.0 | grade of structure; I | Earthy fabric; Common (1 | I-5 per 100mm | n2) Fine | e (1-2mm) macropores, Moist; |
| | | Firm consistence; S | lightly plastic, Slightly sti | cky; 20-50%,⊺ | nédium | gravelly, 6-20mm, |
| | | subrounded, disper | sed, Ferricrete, coarse fra | agments; Com | imon (1 | 0 - 20 %), Ferruginous-organic, |
| | | Fine (0 - 2 mm), Ro Smooth change to - | ot linings; Field pH 6.5 (p | oH meter); Cor | nmon, 1 | fine (1-2mm) roots; Abrupt, |
| | | | | | - | |
| 1B2n | 0.3 - 0.5 | m Yellowish brown (10 |)YR5/6-Moist); Mottles, 2 | -10% , 0-5mm | , Distin | ct; Medium clay; Strong grade |
| | | (0.075-1mm) macro | nn, Angular blocky, Rou | gn-ped labric, sistence: Mod | rew (< erately | nlastic: Normal plasticity: Very |
| | | sticky: 10-20%, me | dium gravelly, 6-20mm, s | ubrounded. di | spersed | d. Ferricrete. coarse fragments: |
| | | Many cutans, >50% | of ped faces or walls co | ated, distinct; | Commo | on (10 - 20 %), Ferruginous, |
| | | Medium (2 -6 mm), | Concretions; Field pH 7 | (pH meter); Fe | ew, fine | (1-2mm) roots; Clear, Smooth |
| | | change to - | | | | |
| 1B3n | 0.5 - 0.6 | m Dark yellowish brow | /n (10YR4/6-Moist); , 0-0 | % ; Clay loam | sandy | ; Strong grade of structure, 10- |
| | | 20 mm, Angular blo | cky; Rough-ped fabric; F | ew (<1 per 10 | 0mm2) | Very fine (0.075-1mm) |
| | | macropores, Moist; | Strong consistence; Moc | terately plastic | ; Norm | al plasticity; Moderately sticky; |
| | | 10-20%, meaium gi | avelly, o-zumm, subroun | iuea, aisperse | u, rerrie tinct: F | ew (2 - 10 %) Ferrugingue |
| | | Medium (2 -6 mm), | Concretions; Field pH 8.3 | 3 (pH meter): | Gradua | I, Smooth change to - |
| 101 | 06 00 | m Dork vellowich brow | (10)/D4/6 Mainth 0.0 | % · Clov loom | 0000 | Modoroto grado of otmoture |
| 101 | 0.6 - 0.9 | m Dark yellowish brow | n (101K4/6-Moist); , 0-0 c: Rough-ped fabric: Fow | % ; ∪lay loam / (<1 per 100p | , sandy; hm2) \// | ; woderate grade of structure, |
| | | macropores. Moist | Strong consistence: Mod | erately plastic | ; Norm | al plasticity; Moderatelv stickv |
| | | 10-20%, medium gr | avelly, 6-20mm, subroun | ided, disperse | d, Ferri | crete, coarse fragments; Few |
| | | cutans, <10% of pe | d faces or walls coated, o | distinct; Very f | ew (0 - | 2 %), Ferruginous, Medium (2 - |
| | | | | | - 0) ** | |

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) State ID: StateID: State ID: State

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 QUE | ENSLAND | COAL PROJ | IECT SOIL AND LAND | CAPABILITY |
|---------------|-----------------|------------|-----------|--------------------|------------|
| Project Code: | J000019 | Site ID: | SS03 | Observation ID: | 1 |
| Agency Name: | Horizon Soil Su | ırvey (NT) | | | |

Laboratory Test Results:

0.8 - 0.9 1.1 - 1.2

| Depth | рН | 1:5 EC | Exc | hangeable | Cations | E | xchangeable | CEC | | ECEC | | ESP |
|-----------|-------|----------------|----------|------------|-------------|-------------|-------------|------------------------|-----|------|-------|-------|
| | | | Ca | Mg | к | Na | Acidity | | | | | |
| m | | dS/m | | | | Cmol (+) | /kg | | | | | % |
| 0.04 | C 2 A | 0.0074 | 4.0* | 0.5 | -0.1 | 0.0 | | 4.0* | | 4 05 | | 0.05 |
| 0-0.1 | 6.3A | 0.0077 | 1.0 | 2.5 | <0.1 | 0.3 | | 4.8 | | 4.85 | | 0.25 |
| 0.1 - 0.2 | 6.5A | 0.013 <i>F</i> | 1.3* | 2.5 | <0.1 | 0.3 | | 4.6* | | 4.6 | | 6.52 |
| 0.2 - 0.3 | 7A | 0.051A | 1.8* | 2.6 | <0.1 | 1.4 | | 7.9* | | 7.9F | | 17.72 |
| 0.5 - 0.6 | 8.3A | 0.215A | 0.8* | 3.3 | <0.2 | 1.7 | | 5.8* | | 5.8F | 2 | 29.31 |
| 0.8 - 0.9 | 9.1A | 0.492A | 0.7* | 3.2 | <0.2 | 2.1 | | 6* | | 6F | 3 | 35.00 |
| 1.1 - 1.2 | 9.1A | 0.412A | 0.8* | 3.5 | <0.2 | 2.6 | | 6.9* | | 6.9F | 3 | 37.68 |
| Depth | CaCO3 | Organic | Avail. | Total | Total | Total | Bulk | Particle Size Analysis | | | | |
| | | C | Р | P | N | K | Density | GV | CS | FS | Silt | Clav |
| m | % | % | mg/kg | % | % | % | Mg/m3 | | | % | | |
| | | | | | | | | | | | | |
| 0 - 0.1 | | 1.1F | <5E | | 440 | A | | 30 | 12F | 20 | 15 | 23 |
| 0.1 - 0.2 | | | | | | | | 27 | 11F | 19 | 17 | 26 |
| 0.2 - 0.3 | | | | | | | | 21 | 8F | 12 | 14 | 45 |
| 0.5 - 0.6 | | | | | | | | 17 | 8F | 20 | 14 | 38 |
| 0.8 - 0.9 | | | | | | | | 18 | 11F | 23 | 14 | 34 |
| 1.1 - 1.2 | | | | | | | | 17 | 11F | 24 | 16 | 32 |
| Depth | COLE | | Grav | /imetric/V | olumetric V | Vater Conte | ents | | Ksa | at | Kunsa | ıt |
| | | Sat. | 0.05 Bar | 0.1 Bar | 0.5 Bar | 1 Bar | 5 Bar 15 | Bar | | | | |
| m | | | | g | /g - m3/m3 | 3 | | | mm | 'h | mm/h | |
| | | | | | | | | | | | | |
| 0 - 0.1 | | | | | | | | | | | | |
| 0.1 - 0.2 | | | | | | | | | | | | |
| 0.2 - 0.3 | | | | | | | | | | | | |
| 0.5 - 0.6 | | | | | | | | | | | | |

Project Name:CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:SS03Observation ID:1Agency 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 (Ca2+,Mg2+,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 |
| Projec | t Name: | CENTRAL QUE | ENSLAND C | OAL PROJEC | T SC | OIL AND | LAND CAPABILITY | |
|---------------------|-------------------------------------|--|--|---|---|---|---|---------|
| Projec Agenc | t Code: y Name: | J000019 Horizon Soil Su | Site ID: rvey (NT) | SS04 | Ob | oservatio | on ID: 1 | |
| Site In | formatior | 1 | | | | | | |
| Desc B | lv [.] | - | | Locality: | | MAP UNI | T 1 ON Th LAND SYSTEM. Detailed | site |
| Date De | | 05/05/17 | | Elevation: | | 50 metres | s | 0.10 |
| Man Re | f · | 1.25000 | | Rainfall: | | 756 | - | |
| Northin | all ona : | 7489007 AMG zone | 55 | Runoff: | | Slow | | |
| Easting | /Lat.: | 777863 Datum: GDA | 494 | Drainage: | | Poorly dr | ained | |
| Caslar | | | | Brainage. | | r oony an | | |
| Geolog | <u>17</u> | | | | | | | |
| Exposu | ire i ype: | Auger boring | | Conf. Sub. is P | aren | it. Mat.: | Almost certain or certain | |
| Geol. R | ef.: | Pb | | Substrate Mate | rial: | | Auger boring, 0.5 m deep, Porous, S | shale |
| Land F | orm | | | | | | | |
| Rel/Slo | pe Class: | Level plain <9m <1% | , 0 | Pattern Type: | | Terrace (| alluvial) | |
| Morph. | Туре: | Flat | | Relief: | | 9 metres | | |
| Elem. T | уре: | Terrace plain | | Slope Category | / : | Level | | |
| Slope: | | 1.1 % | | Aspect: | | No Data | | |
| Surfac | e Soil Co | ndition (drv): Ha | rdsettina | | | | | |
| <u>Erosio</u> | <u>n:</u> Stable (shee (rill) | e, No scalding (scald) t) No wave erosion (w | No sheet ero: /ave) Stable, N | sion ⁄linor | | | | |
| <u>Soil Cl</u> | assificati | <u>on</u> | | | | | | |
| Austral | ian Soil Cl | assification: | | Ма | ppin | ig Unit: | 1 | |
| Bleache gravelly | d-Sodic Dy Clay-loam | vstrophic Brown Kand y Clayey Shallow | osol Thin Moc | lerately Pri | ncip | al Profile | Form: N/A | |
| ASC C All nec | onfidence: essary anal | ytical data are availal | ble. | Gre | at S | Soil Group | p: N/A | |
| Site Di | sturbanc | e: Complete clearing | . Pasture, nat | ive or improved, l | but r | never culti | vated | |
| Vegeta | tion [.] | Low Strata - Tuss | ock grass, 0.2 | 26-0.5m. Sparse. | *Sp | ecies inclu | udes - Aristida species | |
| rogote | | Tell Otrete Tree | 0.04 Cm last | | | | Fuerburtue enclus | |
| | - | Tall Strata - Tree, | 3.01-6m, Isol | ated plants. "Spe | cies | includes | - Eucalyplus crebra | |
| <u>Surfac</u> | e Coarse | Fragments: 20-50 | 1%, medium g | ravelly, 6-20mm, | roun | ided platy, | , Shale | |
| Profile | Morphol | ogy | | | | | | |
| 1A1 | 0 - 0.1 m | Light brownish | n grey (10YR6 Ibangular bloc | /2-Moist); , 0-0% kv [.] Rough-ped fa | ; Fir | ne sandy c · Many (>5 | clay loam; Moderate grade of structur 5 per 100mm2) Fine (1-2mm) | e, |
| | | macropores, I 50%, medium (pH meter); M | Dry; Very firm gravelly, 6-20 any, fine (1-2r | consistence; Slig mm, subrounded mm) roots; Gradu | htly I, dis al, S | plastic; No persed, S Smooth ch | ormal plasticity; Moderately sticky; 20 hale, coarse fragments; Field pH 7 ange to - |)_ |
| 1B1 | 0.1 - 0.2 r | n Light brownisł | n grey (10YR6 | /2-Moist); , 0-0% | ; Liq | ht mediur | n clay; Weak grade of structure, 10-2 | 20 |
| | | mm, Subangu macropores, I 20-50%, medi 10%), Ferrug 2mm) roots; C | ilar blocky; Ro Dry; Very firm Jum gravelly, 6 inous, Mediun Gradual, Smoo | ugh-ped fabric; C consistence; Moc 20mm, subround n (2 -6 mm), Cond oth change to - | comr derat ded, cretio | mon (1-5 p tely plastic dispersec ons; Field | per 100mm2) Very fine (0.075-1mm) c; Normal plasticity; Moderately sticky d, Shale, coarse fragments; Few (2 - pH 7.6 (pH meter); Common, fine (1- | '; - |
| 1B3n | 0.2 - 0.3 r | n Brown (10YR Few (<1 per 1 Normal plastic Shale, coarse 8.2 (pH meter | 5/3-Moist); , 0- 00mm2) Fine city; Slightly st fragments; Fe); Few, fine (1 | 0% ; Fine sandy (1-2mm) macrop icky; 20-50%, me ew (2 - 10 %), Fe -2mm) roots; Gra | clay ores diun rrugi dual | loam; Ma s, Dry; Stro n gravelly, nous, Meo l, Smooth | ssive grade of structure; Earthy fabric ong consistence; Slightly plastic; , 6-20mm, subrounded, dispersed, dium (2 -6 mm), Concretions; Field pl change to - | c; H |
| 1C1n | 0.3 - 0.5 r | n Yellowish brov grade of struc Strong consis dispersed, Sh Concretions; I | wn (10YR5/4-I ture; Earthy fa tence; Non-pla ale, coarse fra Field pH 9.5 (p | Moist); Mottles, 10 abric; Few (<1 per astic; Non-sticky; agments; Few (2 - oH meter); Gradua | 0-20 ⁻ 100 20-5 - 10 al, S | % , 0-5mn 0mm2) Ve 50%, medi %), Ferrug mooth cha | n, Distinct; Fine sandy loam; Massive ry fine (0.075-1mm) macropores, Dry ium gravelly, 6-20mm, subrounded, ginous, Medium (2 -6 mm), ange to - |) (; |
| Morph | ological I | Notes | | | | | | |
| 1A1 | | STRUCTURAL | A HORIZON | | | | | |
| 1B1 | | GRADATIONA | L B HORIZOI | N | | | | |
| 1B3n | | TRANSITION | AL B HORIZO | N | | | | |

Observation Notes MAP UNIT 1 ON Tb LAND SYSTEM, Detailed site, 0.5M TO ROCK

C OVER ROCK

Site Notes

1C1n

CLEARED EUCALYPT WOODLAND; ROCK AT 0.5 M

| Project Name: | CENTRAL QUE | ENSLAND | COAL PRO | JECT SOIL AND LAND | CAPABILITY |
|---------------|----------------|------------|----------|--------------------|------------|
| Project Code: | J000019 | Site ID: | SS04 | Observation ID: | 1 |
| Agency Name: | Horizon Soil S | urvey (NT) | | | |

| Depth | рН | 1:5 EC | Exc | hangeable | Cations | E | xchangeable | CEC | | ECEC | | ESP |
|------------|-------|---------|----------|-------------|-------------|------------|-------------|-------|---------|--------|----------|-------|
| | | | Ca | Mg | к | Na | Acidity | | | | | |
| m | | dS/m | | | | Cmol (+) | /kg | | | | | % |
| 0 - 0 1 | 7A | 0 45A | 2 8* | 74 | 03 | 18 | | 12 5' | | 12 5F | 1 | 4 40 |
| 0.1 - 0.2 | 7.6A | 0.071A | 1.1* | 3.7 | <0.2 | 1 | | 5.7* | | 5.7F | 1 | 7.54 |
| 02-03 | 8 2 A | 0 16A | 0.9* | 3 | <0.2 | 0.9 | | 4 8* | | 4 8F | 1 | 8 75 |
| 0.45 - 0.5 | 9.5A | 0.339A | 1.2* | 3.1 | <0.2 | 1.1 | | 5.4* | | 5.4F | 2 | 20.37 |
| Depth | CaCO3 | Organic | Avail. | Total | Total | Total | Bulk | Р | article | Size A | Analysis | |
| | | С | Р | Р | N | к | Density | GV | cs | FS | Silt | Clay |
| m | % | % | mg/kg | % | % | % | Mg/m3 | | | % | | |
| 0 - 0.1 | | 1.6F | <5E | | 1000 |)A | | 29 | 10F | 12 | 14 | 35 |
| 0.1 - 0.2 | | | | | | | | 22 | 13F | 12 | 13 | 40 |
| 0.2 - 0.3 | | | | | | | | 30 | 11F | 14 | 13 | 32 |
| 0.45 - 0.5 | | | | | | | | 37 | 18F | 13 | 13 | 19 |
| Depth | COLE | | Grav | /imetric/Vo | olumetric W | /ater Cont | ents | | Ksa | at | K unsa | t |
| | | Sat. | 0.05 Bar | 0.1 Bar | 0.5 Bar | 1 Bar | 5 Bar 15 | Bar | | | | |
| m | | | | g | /g - m3/m3 | | | | mm | /h | mm/h | |

0.45 - 0.5

Project Name:CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:SS04Observation ID:1Agency Name:Horizon Soil Survey (NT)

| 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 (Ca2+,Mg2+,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 |
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| 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 |

| Agend | cy Name: | Horizon Soil Survey (N | D. 5505 IT) | Observatio | , טו ווס | 1 |
|---------------------------|---------------------------------|--|---|---|---|--|
| <u>Site In</u> Desc. I | n <mark>formatior</mark> By: | <u>1</u> | Locality: | MAP UN | IT 2, SC | L TRIGGER MAPPING LAND |
| Date D | esc.: | 06/06/19 | Elevation: | 29 metre | s | ASS A, SX, Detailed Site |
| Map R | ef.: | 1:25000 | Rainfall: | 756 | | |
| Northi | ng/Long.: | 7489109 AMG zone: 55 | Runoff: | Very slow | v | |
| Easting | g/Lat.: | 774667 Datum: GDA94 | Drainage: | Imperfec | tly draine | ed |
| <u>Geolo</u> | <u>gy</u> | A | Operf Operation | | A | a sector in a sector in |
| Exposi Geol. F | ure i ype: Ref.: | Auger boring Qa | Substrate Mate | arent. Mat.: arial: | Almost | certain or certain |
| Land | Form | | | | , | |
| Rel/Slo | ope Class: | No Data | Pattern Type: | No Data | | |
| Morph | . Type: | Flat | Relief: | No Data | | |
| Elem. | Туре: | Terrace plain | Slope Categor | y: Very gen | tly slope | d |
| Slope: | | 1.8 % | Aspect: | No Data | | |
| Surfac | ce Soil Co | ondition (dry): Firm | | | | |
| Erosic | on: Stable | e, Moderate (sheet) Stable, M | linor (rill) | | | |
| <u>Soil C</u> | lassificati | ion | | | | |
| Austra | lian Soil Cl | assification: | Ма | pping Unit: | | 2 |
| Basic F | luvic Clasti | c Rudosol Gravelly Clay-loam | y Shallow Pri | ncipal Profile | Form: | N/A |
| ASC C | onfidence | : | Gr | eat Soil Grou | o: | N/A |
| All nec | essary ana | lytical data are available. | | | | |
| <u>Site D</u> | isturbanc | e: Complete clearing. Pastu | re, native or improved, | but never culti | vated | |
| Vegeta | ation: | Low Strata - Tussock gra | ss, 0.51-1m, Closed or | dense. *Spec | ies inclu | des - Chloris gayana |
| | | Tall Strata - Tree 12 01-2 | 20m Isolated plants *S | Species include | es - Fuc | alvotus camaldulensis |
| Profile 1A11 | e Morphol 0 - 0.1 m | ogy Light brownish grey (1 mm, Subangular bloc | I0YR6/2-Moist); , 0-0% ky; Rough-ped fabric; F | ; Sandy clay I Fine, (0 - 5) mr | oam; Str n crack; | rong grade of structure, 5-10 Many (>5 per 100mm2) Fine |
| | | (1-2mm) macropores, 10-20%, medium grav (pH meter); Abundant | , Moist; Firm consistend velly, 6-20mm, roundec ;, fine (1-2mm) roots; C | ce; Slightly pla I, dispersed, S lear, Smooth o | stic; Nor hale, coa change te | mal plasticity; Slightly sticky; arse fragments; Field pH 6.8 o - |
| 1A12 | 0.1 - 0.2 | m Light brownish grey (1 mm, Subangular block Fine (1-2mm) macrop sticky; 10-20%, coars pH 6.7 (pH meter); Ab | I0YR6/2-Moist); , 0-0% ky; Rough-ped fabric; N oores, Moist; Firm cons e gravelly, 20-60mm, r oundant, fine (1-2mm) r | ; Sandy clay I Medium, (5 - 10 istence; Slight ounded, dispe roots; Clear, S | oam; Str 0) mm cr ly plastic rsed, Sh mooth cl | rong grade of structure, 10-20 rack; Many (>5 per 100mm2) ;; Normal plasticity; Slightly ale, coarse fragments; Field nange to - |
| 2A11 | 0.2 - 0.3 | m Brown (10YR5/3-Mois structure, 10-20 mm, (>5 per 100mm2) Fine plasticity; Slightly sticl fragments; Common (meter); Abundant, fine | st); Mottles, 10-20%, 0 Subangular blocky; Ro e (1-2mm) macropores ky; 10-20%, cobbly, 60 (10 - 20%), Ferruginou e (1-2mm) roots; Clear, | -5mm, Distinct ugh-ped fabric , Moist; Firm c -200mm, roun ls, Fine (0 - 2 r , Smooth chan | t; Sandy ; Mediur onsisten ded, disp nm), Ro ge to - | clay loam; Strong grade of n, (5 - 10) mm crack; Many ice; Slightly plastic; Normal bersed, Shale, coarse ot linings; Field pH 6.6 (pH |
| 2B12 | 0.3 - 0.6 | m Dark yellowish brown 10-20 mm, Subangula macropores, Moist; Fi cobbly, 60-200mm, ro Ferruginous, Fine (0 - Clear, Smooth change | (10YR3/4-Moist); , 0-0 ar blocky; Rough-ped fa irm consistence; Slight ounded, dispersed, Sha · 2 mm), Root linings; F e to - | % ; Sandy clay abric; Many (> ly plastic; Norr ile, coarse frac ïield pH 6.6 (pl | / loam; N 5 per 100 nal plast jments; 0 H meter) | Moderate grade of structure, Omm2) Fine (1-2mm) icity; Slightly sticky; 20-50%, Common (10 - 20%), ; Many, fine (1-2mm) roots; |
| 1C1 | 0.6 - 0.9 | m Dark yellowish brown mm, Subangular block Firm consistence; Slig rounded, dispersed, S roots; Clear, Smooth | (10YR3/4-Moist); , 0-0 ky; Earthy fabric; Few (ghtly plastic; Normal pla Shale, coarse fragments change to - | % ; Sandy clay <1 per 100mn asticity; Slightl s; Field pH 6.7 | / loam; V n2) Fine y sticky; (pH me | Veak grade of structure, 20-50 (1-2mm) macropores, Moist; 10-20%, cobbly, 60-200mm, ter); Common, fine (1-2mm) |
| 1C2 | 0.9 - 1.2 | m Dark yellowish brown Earthy fabric; Few (<1 plastic; Non-sticky; 10 Field pH 6.7 (pH mete | (10YR3/4-Moist); , 0-0 I per 100mm2) Fine (1- 0-20%, cobbly, 60-200r er); Few, fine (1-2mm) i | % ; Sandy clay 2mm) macrop nm, rounded, o roots; Gradual | / loam; N ores, Mo disperse , Smooth | Massive grade of structure; bist; Firm consistence; Non- d, Shale, coarse fragments; n change to - |
| <u>Morph</u> | nological | <u>Notes</u> | | | | |
| 1A11 | | AGGRADED | | | | |
| | | | | | | |

Project Name:CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:SS05Observation ID:1Agency Name:Horizon Soil Survey (NT)

2A11BURIED A HORIZON2B12ALLUVIUM1C1ALLUVIUM

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 QU | JEENSLAND | COAL PRC | JECT SOIL AND LAND | CAPABILITY |
|---------------|--------------|-------------|----------|--------------------|------------|
| Project Code: | J000019 | Site ID: | SS05 | Observation ID: | 1 |
| Agency Name: | Horizon Soil | Survey (NT) | | | |

| Depth | pН | 1:5 EC | Exc | changeable | e Cations | E | xchangeable | CEC | | ECEC | | ESP |
|-----------|-------|---------|----------|-------------|-------------|-------------|-------------|------|---------|--------|----------|-------|
| | | | Ca | Mg | к | Na | Acidity | | | | | |
| m | | dS/m | | | | Cmol (+) | /kg | | | | | % |
| 0 - 0.1 | 6.8A | 0.016A | 1.6* | 2.5 | <0.1 | 0.3 | | 4.8* | | 4.8F | | 6.25 |
| 0.1 - 0.2 | 6.7A | 0.012A | 5.8* | 2 | 0.9 | <0.1 | | 8.7* | | 8.7F | # | Error |
| 0.2 - 0.3 | 6.6A | 0.09A | 5.1* | 1.8 | 0.6 | <0.1 | | 7.6* | | 7.6F | # | Error |
| 0.5 - 0.6 | 6.6A | 0.06A | 6.2* | 2.3 | 0.4 | <0.1 | | 9* | | 9F | # | Error |
| 0.8 - 0.9 | 6.7A | 0.06A | 5* | 2.6 | 0.2 | <0.1 | | 7.9* | | 7.9F | # | Error |
| 1.1 - 1.2 | 6.7A | 0.05A | 3.7* | 2.4 | 0.2 | 0.1 | | 6.4* | | 6.4F | | 1.56 |
| Depth | CaCO3 | Organic | Avail. | Total | Total | Total | Bulk | P | article | Size A | Analysis | |
| | | С | Р | Р | Ν | к | Density | GV | cs | FS | Silt | Clay |
| m | % | % | mg/kg | % | % | % | Mg/m3 | | | % | | |
| | | | | | | | | | | | | |
| 0 - 0.1 | | 2.4F | 28E | | 990 | A | | 14 | 28F | 22 | 16 | 20 |
| 0.1 - 0.2 | | | | | | | | 16 | 30F | 18 | 13 | 23 |
| 0.2 - 0.3 | | | | | | | | 15 | 30F | 24 | 11 | 20 |
| 0.5 - 0.6 | | | | | | | | 10 | 30F | 23 | 15 | 22 |
| 0.8 - 0.9 | | | | | | | | 14 | 33F | 23 | 10 | 20 |
| 1.1 - 1.2 | | | | | | | | 13 | 30F | 20 | 11 | 2′ |
| Depth | COLE | | Gra | vimetric/Vo | olumetric \ | Nater Conte | ents | | K sa | at | K unsa | ıt |
| | | Sat. | 0.05 Bar | 0.1 Bar | 0.5 Bar | 1 Bar | 5 Bar 15 | Bar | | | | |
| m | | | | g | /g - m3/m | 3 | | | mm | 'h | mm/h | |
| 0 0 1 | | | | | | | | | | | | |
| 0-0.1 | | | | | | | | | | | | |
| 0.1-0.2 | | | | | | | | | | | | |
| 0.2 - 0.3 | | | | | | | | | | | | |
| 0.0 - 0.0 | | | | | | | | | | | | |

1.1 - 1.2

Project Name:CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:SS05Observation ID:1Agency Name:Horizon Soil Survey (NT)

| 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 (Ca2+,Mg2+,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 Code: Agency Name: | J000019 Site ID: Horizon Soil Survev (NT) | SS06 C | bservation | ID: 1 | |
|-------------------------------|--|--|---|---|-----------|
| | | | | | |
| Site Informatio | <u>n</u> | Locality | | 5 LAND SYSTEM So. Detailed sit | |
| Desc. By: | 05/05/17 | Elovation: | 30 motros | 5, LAND 5151 EM 50, Detailed Si | |
| Date Desc.: | 1-25000 | Elevation: Bainfall: | 30 menes | | |
| Northing/Long | 7488000 AMG zono: 55 | Rainiaii. Bunoff: | 700 Voru olow | | |
| Easting/Long. | 7486909 AMG 2011e. 55 | Ruiloit. | very slow | drainad | |
| | 112119 Daluin. GDA94 | Drainage. | Impenecuy | uraineu | |
| <u>Geology</u> | | Conf Sub in Por | nt Mati / | Imost cortain or cortain | |
| Exposure Type: | | Com. Sub. Is Pare | | | A 1 |
| Geol. Ref.: | Qpa | Substrate Materia | II: <i>F</i> | Auger boring, 0.5 m deep,Porous, , | AI |
| 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 C | ondition (dry): Cracking | | | | |
| Erosion: Activ | e, Minor scalding (scald) | | | | |
| Soil Classificat | tion | | | | |
| Australian Soil C | lassification: | Mann | ina Unit [.] | 5 | |
| Vertic Hypernatric | Grey Sodosol Medium Sliahtly ar | ravelly Clav- Princi | inal Profile F | orm: N/A | |
| loamy Clayey Mo | derately deep | | | | |
| ASC Confidence | *: | Great | Soil Group: | N/A | |
| All necessary and | alytical data are available. | | | | |
| Site Disturban | <u>:e:</u> Complete clearing. Pasture, ı | native or improved, but | t never cultiva | ted | |
| Vegetation: | Low Strata - Tussock grass, | 0.51-1m, Closed or de | nse. *Species | s includes - Chloris gayana | |
| | Tall Strata Trad 2.01 fm / | coloted alumna *Cnoo | ioo iooludoo | Acacia harpanhulla | |
| | | solated clumps. Spec | les includes - | | |
| Surface Coars | Fragments: 2-10%, medium | gravelly, 6-20mm, rour | nded, Ferricre | te | |
| Profile Morpho | logy | | | | |
| 1A1 0 - 0.2 n | Pale brown (10YR6/3-Mo Subangular blocky; Roug per 100mm2) Very fine (0 Normal plasticity; Slightly Ferricrete, coarse fragme Field pH 7.5 (pH meter); | hist); , 0-0% ; Fine sand h-ped fabric; Fine, (0 - 0.075-1mm) macropore v sticky; 2-10%, mediur ents; Very few (0 - 2 % Many, fine (1-2mm) ro | dy clay loam; 5) mm crack es, Moist; Firm n gravelly, 6-2), Ferruginous ots; Gradual, | Strong grade of structure, 5-10 mn ; Fine, (0 - 5) mm crack; Many (>5 n consistence; Slightly plastic; 20mm, subrounded, dispersed, s, Medium (2 -6 mm), Concretions; Smooth change to - | ١, |
| 1A2 0.2 - 0.3 | m Yellowish brown (10YR5/ Weak grade of structure, 100mm2) Fine (1-2mm) r Slightly sticky; 2-10%, me fragments; Common (10 meter); Common, fine (1- | 4-Moist); Mottles, 10-2 10-20 mm, Subangula macropores, Moist; Firi edium gravelly, 6-20mi - 20 %), Ferruginous, I -2mm) roots; Abrupt, S | 20% , 0-5mm, ar blocky; Rou m consistence m, subrounde Fine (0 - 2 mn amooth chang | Distinct; Fine sandy clay loam; gh-ped fabric; Common (1-5 per e; Slightly plastic; Normal plasticity d, dispersed, Ferricrete, coarse n), Root linings; Field pH 7.9 (pH e to - | ; |
| 1B21n 0.3 - 0.6 | m Brown (10YR4/3-Moist); , Prismatic; Smooth-ped fa Very firm consistence; M gravelly, 6-20mm, subrou 50% of ped faces or walls Concretions; Field pH 9 (| , 0-0% ; Light medium abric; Few (<1 per 100r oderately plastic; Norm unded, dispersed, Ferri s coated, distinct; Few pH meter); Few, fine (| clay; Strong g mm2) Very fin hal plasticity; l crete, coarse (2 - 10 %), Fe 1-2mm) roots | grade of structure, 20-50 mm, le (0.075-1mm) macropores, Moist Moderately sticky; 2-10%, medium fragments; Common cutans, 10- erruginous, Medium (2 -6 mm), ; Clear, Smooth change to - | - |
| 1B22n 0.6 - 0.8 | m Brown (10YR4/3-Moist); , Lenticular; Smooth-ped fa Very firm consistence; M gravelly, 6-20mm, subrou 50% of ped faces or wall: | , 0-0% ; Light medium abric; Few (<1 per 100 oderately plastic; Norm unded, dispersed, Ferri s coated, distinct; Field | clay; Strong g mm2) Very fir nal plasticity; l crete, coarse l pH 9.3 (pH r | grade of structure, 50-100 mm, ne (0.075-1mm) macropores, Mois Moderately sticky; 10-20%, mediur fragments; Common cutans, 10- neter); Clear, Smooth change to - | t; n |
| 2B21 0.8 - 0.9 | m Brown (10YR4/3-Moist); , Smooth-ped fabric; Few (consistence; Moderately 20mm, subrounded, disp faces or walls coated, dis | , 0-0% ; Medium clay; (<1 per 100mm2) Very plastic; Normal plastici ersed, Ferricrete, coar stinct; Field pH 9.1 (pH | Strong grade fine (0.075-1 ity; Moderatel se fragments; meter); Grad | of structure, 50-100 mm, Polyhedr mm) macropores, Moist; Strong y sticky; 2-10%, medium gravelly, Common cutans, 10-50% of ped ual, Smooth change to - | al; 6- |
| 1B22 0.9 - 1.2 | m Brown (10YR4/3-Moist); , fine (0.075-1mm) macrop plasticity; Moderately stic Ferricrete, coarse fragme Field pH 9.2 (pH meter); | , 0-0% ; Medium clay; pores, Moist; Very firm ky; 2-10%, medium gr ents; Common cutans, Gradual, Smooth chan | Smooth-ped f consistence; avelly, 6-20m 10-50% of pe ge to - | abric; Few (<1 per 100mm2) Very Moderately plastic; Normal m, subrounded, dispersed, d faces or walls coated, distinct; | |
| Morphological | <u>Notes</u> | | | | |
| 1A1 | STRUCTURED A | | | | |

| Project Name: | CENTRAL QUEE | NSLAND (| COAL PROJECT | SOIL AND LAND | CAPABILITY |
|---------------|------------------|----------|--------------|-----------------|------------|
| Project Code: | J000019 | Site ID: | SS06 | Observation ID: | 1 |
| Agency Name: | Horizon Soil Sur | vey (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 QU | EENSLAND | COAL PRO | JECT SOIL AND LAND C | APABILITY |
|---------------|----------------|-------------|----------|----------------------|-----------|
| Project Code: | J000019 | Site ID: | SS06 | Observation ID: 1 | |
| Agency Name: | Horizon Soil S | Survey (NT) | | | |

| Depth | рН | 1:5 EC | Exc | hangeable | Cations | | Exchangeable | CEC | | ECEC | l | ESP |
|-----------|-------|---------|----------|-------------|-------------|-----------|--------------|-------|---------|--------|---------|------|
| | | | Ca | Mg | к | Na | Acidity | | | | | |
| m | | dS/m | | | | Cmol (- | ⊦)/kg | | | | | % |
| 0 - 0.1 | 7.5A | 0.026A | 29* | 2 | <0.2 | 0.2 | | 5.3* | | 5.3F | 3 | 3.77 |
| 0.1 - 0.2 | 7.9A | 0.064A | 2.9* | 2 | <0.2 | 0.2 | | 5.3* | | 5.3F | 3 | 3.77 |
| 0.2 - 0.3 | 9A | 0.189A | 4.9* | 3.9 | <0.2 | 0.9 | | 9.9* | | 9.9F | ç | 9.09 |
| 0.5 - 0.6 | 9.3A | 0.396A | 5.5* | 6.8 | <0.2 | 4.3 | | 16.7' | | 16.7F | 2 | 5.75 |
| 0.8 - 0.9 | 9.1A | 1.16A | 2.8* | 4.3 | <0.2 | 3.4 | | 10.6* | | 10.6F | 3 | 2.08 |
| 1.1 - 1.2 | 9.2A | 1.19A | 3.5* | 5.4 | <0.2 | 4 | | 12.8' | | 12.8F | 3 | 1.25 |
| Depth | CaCO3 | Organic | Avail. | Total | Total | Tota | l Bulk | Р | article | Size A | nalvsis | |
| | | C | Р | Р | N | ĸ | Density | GV | CS | FS | Silt | Clay |
| m | % | % | mg/kg | % | % | % | Mg/m3 | | | % | | - |
| | | | | | | | | | | | | |
| 0 - 0.1 | | 2.3F | 47E | | 159 |)A | | | | | | |
| 0.1 - 0.2 | | | | | | | | 6 | 4F | 222 | 30 | 38 |
| 0.2 - 0.3 | | | | | | | | 6 | 3F | 18 | 26 | 40 |
| 0.5 - 0.6 | | | | | | | | 13 | 3F | 18 | 26 | 40 |
| 0.8 - 0.9 | | | | | | | | 7 | 4F | 15 | 26 | 48 |
| 1.1 - 1.2 | | | | | | | | 9 | 3F | 13 | 26 | 49 |
| Depth | COLE | | Grav | /imetric/Vo | olumetric V | Vater Cor | itents | | Ks | at | K unsa | t |
| • | | Sat. | 0.05 Bar | 0.1 Bar | 0.5 Bar | 1 Bar | 5 Bar 15 | Bar | | | | |
| m | | | | g | /g - m3/m3 | 3 | | | mm | ı/h | mm/h | |
| | | | | | | | | | | | | |
| 0 - 0.1 | | | | | | | | | | | | |
| 0.1 - 0.2 | | | | | | | | | | | | |
| 0.2 - 0.3 | | | | | | | | | | | | |
| 0.5 - 0.6 | | | | | | | | | | | | |
| 0.8 - 0.9 | | | | | | | | | | | | |
| 1.1 - 1.2 | | | | | | | | | | | | |

Project Name:CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:SS06Observation ID:1Agency Name:Horizon Soil Survey (NT)

| 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 (Ca2+,Mg2+,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 |

| Projec | t Name: | CENTRAL QUEENSLAN | D COAL PROJ | ECT S | OIL AND | LAND | CAPABILITY | |
|-------------------------|-----------------------|--|--|---|---|--|---|-------------------------------------|
| Projec | t Code: | J000019 Site ID | : SS07 | 0 | bservatio | on ID: | 1 | |
| Agenc | y Name: | Horizon Soil Survey (NT |) | | | | | |
| <u>Site In</u> | formatio | <u>1</u> | | | | | | |
| Desc. E | By: | | Locality: | | MAP UN | T 1 ON | TI LAND SYSTEM, De | tailed site |
| Date De | esc.: | 06/06/19 | Elevation: | | 50 metre | s | | |
| Map Re | əf.: | 1:25000 | Rainfall: | | 756 | | | |
| Northin | ng/Long.: | 7486115 AMG zone: 55 | Runoff: | | Moderate | ely rapid | | |
| Easting | g/Lat.: | 770623 Datum: GDA94 | Drainage: | | Well drai | ned | | |
| <u>Geolog</u> Exposi | <u>gy</u> JreTvpe: | Auger boring | Conf. Sub. | is Pare | nt. Mat.: | Almost | certain or certain | |
| Geol. R | lef.: | Kx | Substrate N | /lateria | l: | Outcro | p, 3 m deep,Porous, , S | Sandstone |
| Land F | Form | | | | | | | |
| Rel/Slo | pe Class: | Undulating low hills 30-90m 3- 10% | Pattern Typ | be: | No Data | | | |
| Morph. | Туре: | Lower-slope | Relief: | | 30 metre | s | | |
| Elem. 1 | Гуре: | Hillslope | Slope Cate | gory: | Gently in | clined | | |
| Slope: | | 2 % | Aspect: | | No Data | | | |
| <u>Surfac</u> | e Soil Co | ndition (dry): Soft | | | | | | |
| <u>Erosio</u> | on: Active (shee | e, Moderate (wind); Active, Mod t) | erate | | | | | |
| Soil C | lassificati | <u>ion</u> | | | | | | |
| Austral | ian Soil Cl | assification: | | Маррі | ng Unit: | | 1 | |
| Ferric D |)ystrophic F | Red Kandosol Medium Moderate | ely gravelly | Princi | pal Profile | Form: | N/A | |
| | amy Clayey | Deep | | Graat | Soil Grow | | NI/A | |
| All nec | essary ana | : Ivtical data are available | | Great | | J. | N/A | |
| Sito Di | isturbanc | a: Extensive clearing for evan | nole poisoning riv | nabarki | na | | | |
| | | Low Strete Tuesock gross | | | ny Naina inalud | aa Tha | mada quatralia Ariatid | |
| vegeta | ation: | LOW SITALA - TUSSOCK GLASS | s, 0.51-111, Spars | e. ope | | es - me | aneua australis, Anstiua | a species |
| | | Tall Strata - Tree, 3.01-6m, | Sparse. *Specie | s includ | les - Eucal | yptus pla | atyphylla, Eucalyptus in | termedia |
| <u>Surfac</u> | e Coarse | Fragments: 20-50%, mediu | m gravelly, 6-20n | nm, sub | bangular ta | bular, Fe | erricrete | |
| Profile | Morphol | <u>oqy</u> | | | | | | |
| 1A11 | 0 - 0.1 m | Light brownish grey (10 10mm, Subangular blo Very fine (0.075-1mm) coarse gravelly, 20-60m (pH meter); Many, fine (| YR6/2-Moist); , 0- cky; Rough-ped f macropores, Dry; im, subrounded, ((1-2mm) roots; Gi | -0% ; C abric; F Firm co disperso radual, | lay loam, s line, (0 - 5) onsistence ed, Ferricre Smooth ch | andy; M mm cra ; Non-pla ete, coar ange to | oderate grade of struct ck; Many (>5 per 100m astic; Non-sticky; 20-50 se fragments; Field pH - | ure, 5- m2) %, 6.3 |
| 1A12 | 0.1 - 0.2 | m Light brownish grey (10 10 mm, Subangular blo macropores Dry: Firm | YR6/2-Moist); , 0- cky; Rough-ped f | -0% ; S abric; N -plastic | andy clay l lany (>5 pe · Non-stick | oam; Mo er 100mr v: 20-50 | oderate grade of structu m2) Fine (1-2mm) % coarse gravelly 20- | ıre, 5- 60mm |
| | | subrounded, dispersed, 2mm) roots; Gradual, S | Ferricrete, coars mooth change to | e fragm - | ents; Field | pH 7.2 | (pH meter); Many, fine | (1- |
| 1A3 | 0.2 - 0.3 | m Brownish yellow (10YR mm, Subangular blocky Moderately moist; Firm subrounded, dispersed, 2mm) roots; Gradual, S | 5/6-Moist); , 0-0% ; Rough-ped fabr consistence; Nor Ferricrete, coars mooth change to | ; Sand ic; Man n-plastic e fragm - | ly clay loan y (>5 per 1 ; Non-stick ients; Field | n; Moder 00mm2) xy; 20-50 pH 7.3 | rate grade of structure,) Fine (1-2mm) macrop %, cobbly, 60-200mm, (pH meter); Common, 1 | 20-50 ores, fine (1- |
| 1B1 | 0.3 - 0.6 | m Greyish brown (10YR5/ Subangular blocky; Ear moist; Firm consistence subrounded, dispersed, 2mm) roots; Gradual, S | 2-Moist); , 0-0% ; thy fabric; Many (e; Non-plastic; No Ferricrete, coars mooth change to | Sandy >5 per n-sticky e fragm - | clay loam; 100mm2) f /; 20-50%, nents; Field | Weak g Fine (1-2 coarse g pH 7.4 | rade of structure, 20-50 mm) macropores, Mod gravelly, 20-60mm, (pH meter); Common, 1 | 0 mm, lerately fine (1- |
| 1B21 | 0.6 - 0.9 | m Greyish brown (10YR5/ fabric; Many (>5 per 10) Non-plastic; Non-sticky; coarse fragments; Com (pH meter); Few, fine (1 | 2-Moist); , 0-0% ; 0mm2) Fine (1-2r ; 20-50%, coarse mon cutans, 10-5 -2mm) roots; Gra | Clay lo nm) ma gravelly 50% of µ adual, S | am, sandy acropores, y, 20-60mn ped faces o mooth cha | ; Massiv Moderat n, subrou or walls o nge to - | e grade of structure; Ea ely moist; Strong consi unded, dispersed, Ferri coated, distinct; Field p | arthy stence; crete, H 8.4 |
| 1B22 | 0.9 - 1.2 | m , 0-0% ; Clay loam, san fabric; Many (>5 per 10 consistence; Non-plasti dispersed, Ferricrete, co distinct; Field pH 8.5 (pl | dy; Massive grad 0mm2) Fine (1-2r c; Non-sticky; 20- parse fragments; H meter); Gradua | e of stru nm) ma ·50%, c Commo I, Smoo | ucture, 10- acropores, oarse grav on cutans, oth change | 20 mm, 3 Moderati elly, 20-6 10-50% to - | Subangular blocky; Ear ely moist; Very firm 60mm, subrounded, of ped faces or walls co | thy oated, |
| Mornh | ological | Notes | | | | | | |
| 1A11 | S. C givan | ORGANIC MATTER AC | CUMULATION | | | | | |
| 1A12 | | LOWER TEXTURE CLA | SS | | | | | |

| Project Name: | CENTRAL QUE | EENSLAND | COAL PRO | JECT SOIL AND LAND | CAPABILITY |
|---------------|----------------|------------|----------|--------------------|------------|
| Project Code: | J000019 | Site ID: | SS07 | Observation ID: | 1 |
| Agency Name: | Horizon Soil S | urvey (NT) | | | |

0.8 - 0.9 1.1 - 1.2

| Depth | рН | 1:5 EC | Exc | hangeable | e Cations | E | xchangeable | CEC | | ECEC | | ESP |
|-----------|-------|------------------|----------|-------------|-------------|------------|-------------|------|----------|--------------|----------|--------|
| | | | Ca | Mg | к | Na | Acidity | | | | | |
| m | | dS/m | | | | Cmol (+) | /kg | | | | | % |
| 0 - 0 1 | 5 6A | 0.0074 | 0.6* | 18 | 0 1 | <0.1 | 0 2A | 2 7* | | 2 7F | ŧ | Frror |
| 01-02 | 5 7 4 | 0.0094 | 0.6* | 2.1 | <0.1 | <0.1 | 0.24 | 2.0* | | 2.9F | , ± | tError |
| 02-03 | 5.64 | 0.000 | 0.5* | 2.5 | <0.1 | <0.1 | 0.24 | 3.2* | | 3.2F | , + | Error |
| 0.2 - 0.0 | 5.64 | 0.000/ | <0.0 | 2.5 | <0.1 | <0.1 | 0.24 | 2.0* | | 2.0F | + | |
| 0.0-0.0 | 5.64 | 0.0037 | <0.1 | 2.7 | <0.1 | <0.1 | <0.1A | 2.5 | | 2.51 2.6E | + | |
| 1.1 - 1.2 | 6.6A | 0.000/ 0.007/ | <0.1* | 2.4 | <0.1 | <0.1 | -0.1A | 2.6* | | 2.6F | <i>‡</i> | Error |
| Depth | CaCO3 | Organic | Avail. | Total | Total | Total | Bulk | P | Particle | Size A | Analysis | 5 |
| | | C | P | P | N | K | Density | GV | CS | FS | Silt | Clav |
| m | % | % | mg/kg | % | % | % | Mg/m3 | | | % | | |
| | | | | | | | | | | | | |
| 0 - 0.1 | | 0.8F | <5E | | | | | 36 | 14F | 10 | 5 | 35 |
| 0.1 - 0.2 | | | | | | | | 32 | 12F | 9 | 5 | 42 |
| 0.2 - 0.3 | | | | | | | | 27 | 13F | 7 | 3 | 50 |
| 0.5 - 0.6 | | | | | | | | 29 | 12F | 12 | 4 | 44 |
| 0.8 - 0.9 | | | | | | | | 32 | 14F | 13 | 4 | 37 |
| 1.1 - 1.2 | | | | | | | | 32 | 14F | 10 | 6 | 38 |
| Depth | COLE | | Grav | /imetric/Vo | olumetric V | Vater Cont | ents | | K sa | at | K unsa | at |
| | | Sat. | 0.05 Bar | 0.1 Bar | 0.5 Bar | 1 Bar | 5 Bar 15 | Bar | | | | |
| m | | | | g | /g - m3/m | 3 | | | mm | /h | mm/h | 1 |
| | | | | | | | | | | | | |
| 0 - 0.1 | | | | | | | | | | | | |
| 0.1 - 0.2 | | | | | | | | | | | | |
| 0.2 - 0.3 | | | | | | | | | | | | |
| 0.5 - 0.6 | | | | | | | | | | | | |

Project Name:CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:SS07Observation ID:1Agency Name:Horizon Soil Survey (NT)

| 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 (Ca2+,Mg2+,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 Agency | t Code: y Name: | J00 Hor | 0019 izon Soil Sur | Site ID: vey (NT) | SS08 | Ob | oservatio | n ID: 1 | 1 |
|--|--|--------------------------------------|---|---|--|--|---|---|---|
| Site Inf Desc. B Date De Map Re Northin Easting | ormatior y: sc.: f.: g/Long.: /Lat.: | 06/06/ 1:2500 74861: 772020 | 19)0 35 AMG zone: { 0 Datum: GDA | 55 94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | MAP UNI ^T 42 metres 756 Slow Imperfectl | T 5 ON F | Pv LAND SYSTEM, Detailed site |
| <u>Geolog</u> Exposu Geol. Re | I <u>V</u> reType: ef.: | Auger Qpa | boring | | Conf. Sub. Substrate M | is Parer /aterial: | nt. Mat.: | Almost Auger b | certain or certain oring, 1 m deep,Porous, , Alluvium |
| Land F Rel/Slop Morph. Elem. T Slope: | orm pe Class: Type: ype: | Level Flat Terrac 1.4 % | plain <9m <1% ce plain | | Pattern Typ Relief: Slope Cate Aspect: | be: gory: | Terrace (a 9 metres Level No Data | alluvial) | |
| <u>Surfac</u> | e Soil Co | nditio | n (dry): Haro | dsetting | | | | | |
| Erosio | <u>n:</u> | | | | | | | | |
| Soil Cla | assificati | <u>on</u> | | | | | | | |
| Australi Vertic M gravelly | an Soil Cl ottled-Mes Clay-loam | assific onatric y Claye | ation: Grey Sodosol I ey Deep | Medium Mode | erately | Mappin Princip | ig Unit: al Profile | Form: | 5 N/A |
| ASC Co | onfidence: | | | | | Great S | oil Group | : | N/A |
| All nece | essary ana | lytical d | lata are availab | le. | | | | | |
| Site Dis | sturbanc | e: Cor | nplete clearing. | Pasture, nati | ive or improv | ed, but r | never cultiv | vated | |
| Vegeta | tion: | _ | | | | | | | |
| Surface | e Coarse | Fragr | nents: 20-509 | %, medium gr | avelly, 6-20n | nm, subr | rounded, F | erricrete | |
| 1A1 | <u>Morpnoi</u> 0 - 0.1 m | <u>oqv</u> | Light brownish Weak grade of Common (1-5 Slightly plastic; dispersed, Fen linings; , , , ; Fi to - | grey (10YR6, structure, 5- per 100mm2) Normal plast ricrete, coarse eld pH 6.3 (pl | /2-Moist); Mo 10 mm, Suba Very fine (0. ticity; Slightly e fragments; H meter); Co | ottles, 10 angular b 075-1mr v sticky; 2 Few (2 - mmon, v | -20% , 0-5 locky; Rou n) macrop 20-50%, fir · 10 %), Fe very fine (0 | mm, Dis ligh-ped f ores, Mo ne gravel rruginou -1mm) ro | tinct; Fine sandy clay loam; fabric; Fine, (0 - 5) mm crack; oist; Very firm consistence; Ily, 2-6mm, subrounded, s, Fine (0 - 2 mm), Root oots; Abrupt, Smooth change |
| 1B21n | 0.2 - 0.5 r | n | Brown (10YR5 structure, 5-10 Very fine (0.07 plasticity; Mode coarse fragmen 20 %), Ferrugin 1mm) roots; Cl | /3-Moist); Moi mm, Polyheo 5-1mm) macr erately sticky; nts; Common nous, Medium lear, Smooth | ttles, 10-20% dral; Rough-p ropores, Mois 10-20%, fine cutans, 10-5 n (2 -6 mm), 0 change to - | o , 5-15m bed fabric st; Strong e gravelly 50% of p Concretio | am, Distinc c; Fine, (0- g consister y, 2-6mm, ed faces o ons; Field | t; Mediun - 5) mm nce; Mod subroun r walls co pH 7.2 (p | m clay; Strong grade of crack; Few (<1 per 100mm2) lerately plastic; Normal ded, dispersed, Ferricrete, oated, distinct; Common (10 - oH meter); Few, very fine (0- |
| 1B22n | 0.5 - 0.6 r | n | Yellowish brow 50 mm, Polyhe Medium, (5 - 1 Moderately stic fragments; Cor Ferruginous, M roots; Clear, Si | m (10YR5/4-M edral; Moderai 0) mm crack; cky; 10-20%, 1 mmon cutans ledium (2 -6 r mooth change | Moist); (/-Moi te grade of st Moist; Stron fine gravelly, , 10-50% of p nm), Concret e to - | ist); , 0-0 tructure, g consis 2-6mm, ped face tions; Fie | 9% ; Mediu 20-50 mm tence; Moo subrounde s or walls o eld pH 7.3 | m clay; \$, Lenticu derately p ed, dispe coated, c (pH mete | Strong grade of structure, 20- ular; Smooth-ped fabric; plastic; Normal plasticity; ersed, Ferricrete, coarse distinct; Few (2 - 10 %), er); Few, medium (2-5mm) |
| 2B3n | 0.6 - 0.8 r | n | Yellowish brow Lenticular; Smo plastic; Normal Ferricrete, coa Field pH 7.4 (p | n (10YR5/4-N ooth-ped fabr l plasticity; Sli rse fragments H meter); Fev | Moist); , 0-0% ic; Medium, (ightly sticky; s; Common c w, fine (1-2m | o ; Light ((5 - 10) n 20-50%, eutans, 10 m) roots | clay; Mode nm crack; fine grave 0-50% of p ; Clear, Sn | rate grac Moist; Si Ily, 2-6m oed faces nooth ch | de of structure, 20-50mm, trong consistence; Slightly im, subrounded, dispersed, s or walls coated, distinct; ange to - |
| 2C1 | 0.8 - 0.9 r | n | Yellowish brow Lenticular; Smo Normal plastici Ferricrete, coa Field pH 8.4 (p | n (10YR5/4-N ooth-ped fabr ity; Slightly sti rse fragments H meter); Cle | Moist); , 0-0% ic; Fine, (0 - icky; 20-50% s; Common c ear, Smooth c | o ; Light o 5) mm c , fine gra utans, 10 change to | clay; Mode rack; Mois avelly, 2-6n 0-50% of p o - | rate grac t; Strong nm, subr oed faces | de of structure, 10-20mm, consistence; Slightly plastic; rounded, dispersed, s or walls coated, distinct; |
| 2C2 | 0.9 - 1.2 r | n | Yellowish brow Polyhedral; Ro plastic; Normal dispersed, Ferr | n (10YR5/4-N ugh-ped fabri l plasticity; Mo ricrete, coarse | Moist); , 0-0% c; Fine, (0 - { oderately stic e fragments; | 5 ; Light o 5) mm cr ky; 10-2 Field pH | clay; Mode rack; Moist 0%, fine gi 8.5 (pH m | rate grac ; Strong ravelly, 2 neter); Gi | de of structure, 10-20mm, consistence; Moderately 2-6mm, subrounded, radual, Smooth change to - |
| | | | | | | | | | |

Project Name: CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITY

- Morphological Notes
- 1A1
- FINE SANDY LOAM A HORIZON OVER VERTIC CLAY SUBSOIL

| Project Name: | CENTRAL QUE | ENSLAND | COAL PROJEC | T SOIL AND LAND | CAPABILITY |
|---------------|-----------------|-----------|-------------|-----------------|------------|
| Project Code: | J000019 | Site ID: | SS08 | Observation ID: | 1 |
| Agency Name: | Horizon Soil Su | rvey (NT) | | | |

| Depth | рН | 1:5 EC | Exc | hangeable | e Cations | E | xchangeable | CEC | | ECEC | | ESP |
|-----------|-------|---------|----------|-------------|-------------|-------------|-------------|------|---------|--------|----------|-------|
| | | | Ca | Mg | к | Na | Acidity | | | | | |
| m | | dS/m | | | | Cmol (+) | /kg | | | | | % |
| 0 - 0 1 | 6 3A | 0 015A | 5* | 39 | 0 1 | 03 | | 9 3* | | 9 3F | : | 3 23 |
| 01-02 | 7 2A | 0 016A | 4 3* | 5 | 0.1 | 0.7 | | 10.2 | * | 10 2F | | 6.86 |
| 02-03 | 7.34 | 0.0264 | 4 4* | 6.2 | 0.1 | 1 | | 11.7 | * | 11 7F | | 8 55 |
| 0.5 - 0.6 | 7.0/(| 0.020, | 0.4* | 1.5 | <0.1 | 0.6 | | 2.5* | | 2 5F | 2 | 24 00 |
| 0.8 - 0.9 | 8 4 A | 0.5924 | 0.7* | 3.7 | <0.2 | 1.8 | | 6.2* | | 6.2F | 2 | 9.03 |
| 1.1 - 1.2 | 8.6A | 0.636A | 1* | 4.9 | <0.2 | 2.5 | | 8.5* | | 8.5F | 2 | 9.41 |
| Depth | CaCO3 | Organic | Avail. | Total | Total | Total | Bulk | Р | article | Size A | Analvsis | |
| • | | C | P | Р | N | к | Density | GV | CS | FS | Silt | Clay |
| m | % | % | mg/kg | % | % | % | Mg/m3 | | | % | | - |
| | | | | | | | | | | | | |
| 0 - 0.1 | | 1.9F | <5E | | 910 | A | | 33 | 11F | 18 | 17 | 21 |
| 0.1 - 0.2 | | | | | | | | 19 | 8F | 12 | 14 | 47 |
| 0.2 - 0.3 | | | | | | | | 20 | 7F | 14 | 110 | 49 |
| 0.5 - 0.6 | | | | | | | | 25 | 10F | 15 | 15 | 35 |
| 0.8 - 0.9 | | | | | | | | 25 | 10F | 12 | 15 | 38 |
| 1.1 - 1.2 | | | | | | | | 15 | 11F | 20 | 16 | 38 |
| Depth | COLE | | Grav | /imetric/Vo | olumetric V | Vater Conte | ents | | K sa | at | K unsa | t |
| | | Sat. | 0.05 Bar | 0.1 Bar | 0.5 Bar | 1 Bar | 5 Bar 15 | Bar | | | | |
| m | | | | g | /g - m3/m3 | 3 | | | mm | /h | mm/h | |
| 0 - 0 1 | | | | | | | | | | | | |
| 0.1 - 0 2 | | | | | | | | | | | | |
| 0.2 - 0.3 | | | | | | | | | | | | |
| 0.5 - 0.6 | | | | | | | | | | | | |
| 0.8 - 0.9 | | | | | | | | | | | | |

1.1 - 1.2

Project Name:CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:SS08Observation ID:1Agency Name:Horizon Soil Survey (NT)

| 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 (Ca2+,Mg2+,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 Project Agency | Name: Code: Name: | CENTRAL QUEENSLAND J000019 Site ID: Horizon Soil Survey (NT) |) COAL PROJ SS09 | ECT S Oł | OIL AND oservatio | LAND (n ID: 1 | CAPABILITY I | |
|---|--|---|--|--|--|--|---|--|
| Site Inf Desc. By Date De Map Ref Northing Easting/ | ormation y: sc.: f.: g/Long.: /Lat.: | 06/06/19 1:25000 7486642 AMG zone: 55 775377 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | MAP UNI ⁻ 31 metres 756 Slow Imperfectl | Γ 5 ON L | AND SYSTEM | 1 Pv, Detailed site |
| <u>Geolog</u> Exposu Geol. Re | <u>V</u> reType: əf.: | Auger boring Qpa | Conf. Sub. Substrate M | is Pareı /aterial: | nt. Mat.: | Almost o Auger b | certain or certa oring, 1 m dee | iin p,Porous, , Alluvium |
| Land For Rel/Slop Morph. Elem. Ty Slope: Surface | orm pe Class: Type: ype: <u>e Soil Co</u> | Level plain <9m <1% Flat Terrace plain 0.6 % <u>ndition (dry):</u> Hardsetting | Pattern Typ Relief: Slope Cate Aspect: | be: gory: | Terrace (a 9 metres Level No Data | alluvial) | | |
| Erosior | 1: Active Moder Moder | , Moderate scalding (scald) Activ ate (sheet) Active, Moderate (rill ate (gully) | ve, I) Active, | | | | | |
| Soil Cla Australia Vertic Hy Clay-loan ASC Co All nece | assification an Soil Cla pernatric I my Clayey onfidence: assary anal | <u>on</u> assification: Brown Sodosol Medium Moderat Deep ytical data are available. | tely gravelly | Mappir Princip Great S | ng Unit: bal Profile Soil Group | Form: | 5 N/A N/A | |
| Site Dis | sturbanco | e: Complete clearing. Pasture, | native or improv | ed, but i | never cultiv | ated | | |
| Vegeta | <u>tion:</u> | Low Strata - Tussock grass, | 0.26-0.5m, Spa | rse. *Sp | ecies inclu | des - Ari | stida species | |
| | _ | Tall Strata - Tree, 3.01-6m, I | solated plants. * | Species | includes - | Eucalyp | otus populnea | |
| Surface | e Coarse | Fragments: 10-20%, medium | n gravelly, 6-20n | nm, sub | rounded, Ir | onstone | | |
| Profile 1A1 | <u>Morphol</u> 0 - 0.1 m | DQV Mottles, 2-10%, 0-5mm, Subangular blocky; Roug (0.075-1mm) macropores sticky; 10-20%, fine grav (2 - 10%), Ferruginous, I 2mm) roots; Abrupt, Smo | Distinct; Fine sa gh-ped fabric; Fin s, Dry; Very firm elly, 2-6mm, sub Fine (0 - 2 mm), poth change to - | andy cla ne, (0 - { consist prounde Root lir | y loam; Mc 5) mm crac ence; Sligh d, disperse iings; Field | oderate g k; Many tly plasti d, Ironsto pH 6.4 (| rade of structu (>5 per 0.01m c; Normal plas one, coarse fra pH meter); Co | rre, 5-10 mm, 2) Very fine ticity; Slightly agments; Few mmon, fine (1- |
| 1B21n | 0.2 - 0.5 r | n Light brownish grey (10Y grade of structure, 10-20 100mm2) Very fine (0.07 Normal plasticity; Modera Ironstone, coarse fragme (10 - 20 %), Ferruginous, 2mm) roots; Clear, Smoo | R6/2-Moist); Mo mm, Polyhedra 5-1mm) macrop ately sticky; 2-10 ents; Many cutar , Fine (0 - 2 mm oth change to - | ottles, 2- l; Rough ores, Di 0%, med ns, >50%), Concr | 10% , 0-5m n-ped fabric ry; Strong c ium gravel 6 of ped fac etions; Fiel | nm, Distii ;; Fine, ((consisten ly, 6-20m ces or wa d pH 7.3 | nct; Medium cl 0 - 5) mm crac nce; Moderately nm, subrounde alls coated, dis 5 (pH meter); F | ay; Moderate k; Few (<1 per y plastic; d, dispersed, tinct; Common ew, fine (1- |
| 1B22n | 0.5 - 0.6 r | n Brown (10YR5/3-Moist); Lenticular; Smooth-ped f macropores, Dry; Strong 10%, medium gravelly, 6 cutans, 10-50% of ped fa mm), Concretions; Field | , 0-0% ; Medium abric; Fine, (0 - consistence; Mo -20mm, subrour aces or walls coa pH 8 (pH meter) | n clay; N 5) mm c oderatel nded, dis ated, dis ; Clear, | loderate gra rack; Comi y plastic; N spersed, Iro tinct; Few (Smooth ch | ade of st mon (1-5 ormal pla onstone, 2 - 10 % ange to | ructure, 10-20 5 per 100mm2) asticity; Moder coarse fragme), Ferruginous - | mm, Fine (1-2mm) ately sticky; 2- ents; Common , Fine (0 - 2 |
| 2B3n | 0.6 - 0.8 r | n Yellowish brown (10YR5/ Lenticular; Smooth-ped f Moderately moist; Very s sticky; 2-10%, medium g Common cutans, 10-50% Smooth change to - | /4-Moist); , 0-0% abric; Few (<1 p trong consistenc ravelly, 6-20mm 6 of ped faces on | o ; Light er 100m ce; Mode , subrou r walls c | clay; Mode nm2) Very f erately plas inded, disp oated, disti | rate grac fine (0.07 stic; Norn ersed, In nct; Field | de of structure, 75-1mm) macra nal plasticity; N onstone, coars d pH 8.9 (pH n | 20-50 mm, opores, /loderately se fragments; neter); Clear, |
| 2C1 | 0.8 - 0.9 r | n Yellowish brown (10YR5/ Polyhedral; Rough-ped fa Moderately moist; Very s sticky; Common cutans, | /4-Moist); , 0-0% abric; Few (<1 p trong consistend 10-50% of ped f | ; Light er 100m ce; Mode aces or | clay; Mode m2) Very f erately plas walls coate | rate grac ine (0.07 stic; Norn ed, distin | de of structure, 5-1mm) macro nal plasticity; N ct; Clear, Smo | 20-50 mm, opores, /loderately oth change to - |
| 2C2 | 0.9 - 1.2 r | n Yellowish brown (10YR5/ Polyhedral; Rough-ped fa Moderately moist; Moder change to - | 0YR5/4-Moist); , 0-0% ; Light clay; Moderate grade of structure, 20-50 mm, ped fabric; Few (<1 per 100mm2) Very fine (0.075-1mm) macropores, Noderately plastic; Normal plasticity; Moderately sticky; Gradual, Smooth | | | | | |

Morphological Notes

Project Name:CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:SS09Observation ID:1Agency Name:Horizon Soil Survey (NT)

Laboratory Test Results:

| Depth | рН | 1:5 EC | Exc | hangeable | e Cations | E | xchangeable | CEC | | ECEC | | ESP |
|-----------|-------|---------|----------|------------|-------------|-------------|-------------|------|---------|--------|----------|-------|
| | | | Ca | Mg | к | Na | Acidity | | | | | |
| m | | dS/m | | | | Cmol (+) | /kg | | | | | % |
| 0 - 0 1 | 644 | 0 0484 | | | | | | | | | | |
| 01-02 | 7.34 | 0.3654 | 0.7* | 34 | <0.2 | 13 | | 5.3* | | 5.3F | | 24 53 |
| 0.1 0.2 | 84 | 0.5884 | 0.8* | 4.6 | <0.2 | 2 | | 7.5* | | 7.5F | - | 26.67 |
| 0.5 - 0.6 | 8.9A | 0.75A | 0.8* | 3.8 | <0.2 | 2.1 | | 6.7* | | 6.7F | | 31.34 |
| | | | | | | | | | | | | |
| Depth | CaCO3 | Organic | Avail. | Total | Total | Total | Bulk | P | article | Size A | Analysis | |
| | | С | Р | Р | Ν | к | Density | GV | cs | FS | Silt | Clay |
| m | % | % | mg/kg | % | % | % | Mg/m3 | | | % | | |
| 0 - 0 1 | | 1 4F | <5F | | 470 | A | | 14 | 16F | 33 | 11 | 26 |
| 0.1 - 0.2 | | | 02 | | | | | 7 | 11F | 23 | 12 | 47 |
| 0.2 - 0.3 | | | | | | | | 11 | 10F | 21 | 13 | 45 |
| 0.5 - 0.6 | | | | | | | | 9 | 18F | 20 | 12 | 41 |
| Depth | COLE | | Grav | /imetric/V | olumetric V | Vater Conto | ents | | Ks | at | K unsa | nt |
| • | | Sat. | 0.05 Bar | 0.1 Bar | 0.5 Bar | 1 Bar | 5 Bar 15 | Bar | | | | |
| m | | | | g | /g - m3/m3 | 3 | | | mm | /h | mm/h | |
| | | | | | | | | | | | | |
| 0 - 0.1 | | | | | | | | | | | | |
| 0.1 - 0.2 | | | | | | | | | | | | |
| 0.2 - 0.3 | | | | | | | | | | | | |
| 05-06 | | | | | | | | | | | | |

Project Name:CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:SS09Observation ID:1Agency Name:Horizon Soil Survey (NT)

| 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 (Ca2+,Mg2+,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: Project Code: | CENTRAL QUEENSLAND C J000019 Site ID: Horizon Soil Survey (NT) | OAL PROJ SS10 | ECT SO Ob | DIL AND servatio | LAND (n ID: 1 | CAPABILITY I |
|---|---|---|---|---|--|--|
| Agency Name. | Holizon Son Survey (NT) | | | | | |
| Site Information Desc. By: Date Desc.: Map Ref.: Northing/Long.: Easting/Lat.: | 06/06/19 1:25000 7486953 AMG zone: 55 776267 Datum: GDA94 | Locality: Elevation: Rainfall: Runoff: Drainage: | | MAP UNIT 35 metres 756 Slow Imperfectly | ⁻ 5 ON L y drained | AND SYSTEM Pv, Detailed site |
| <u>Geology</u> ExposureType: Geol. Ref.: | Auger boring Qpa | Conf. Sub. Substrate M | is Parer /aterial: | it. Mat.: | Almost o Auger b | certain or certain oring, 1 m deep,Porous, , Alluvium |
| l and Form | | | | | Ū | |
| Rel/Slope Class: Morph. Type: Elem. Type: Slope: | Level plain <9m <1% Flat Terrace plain 0.5 % | Pattern Typ Relief: Slope Categ Aspect: | e: gory: | Terrace (a 9 metres Level No Data | lluvial) | |
| Surface Soil Co | ndition (dry): Hardsetting | | | | | |
| Erosion: Stable scaldi Mode | e, Minor or present (wind); Partial, M ng (scald) Partial, Moderate (sheet) rate (rill) Partial, Moderate (gully) | /linor) Partial, | | | | |
| Soil Classificati | <u>on</u> | | | | | |
| Australian Soil Cl Vertic Hypernatric Clay-loamy Clayey | assification: Brown Sodosol Medium Moderately Deep | gravelly | Mappin Princip | g Unit: al Profile I | Form: | 5 N/A |
| ASC Confidence: All necessary anal | , ytical data are available. | | Great S | oil Group | | N/A |
| Site Disturbanc | e: Complete clearing. Pasture, nat | ive or improv | ed, but r | never cultiv | ated | |
| Vegetation: | Low Strata - Tussock grass, 0.2 | 26-0.5m, Mid- | dense. ' | Species in | cludes - | Aristida species |
| | Tall Strata - Tree, 3.01-6m, Isol | ated plants. * | Species | includes - | Eucalyp | tus crebra, Eucalyptus populnea |
| Surface Coarse | Fragments: 20-50%, medium gi | ravelly, 6-20m | nm, subr | ounded, Iro | onstone | |
| Profile Morphol | oav | | | | | |
| 1A1 0 - 0.1 m | , 0-0% ; Fine sandy clay loa ped fabric; Fine, (0 - 5) mm Very firm consistence; Sligh gravelly, 6-20mm, subround Common, fine (1-2mm) root | m; Moderate crack; Comm atly plastic; No led, dispersed s; Gradual, S | grade o non (1-5 ormal pla d, Ironsto mooth o | f structure, per 0.01m2 asticity; Slig one, coarse hange to - | 5-10 mr 2) Fine (htly stic fragme | n, Subangular blocky; Rough- 1-2mm) macropores, Moist; ky; 10-20%, medium nts; Field pH 6.6 (pH meter); |
| 1A2e 0.1 - 0.2 r | n Mottles, 10-20%, 0-5mm, E Subangular blocky; Rough- 2mm) macropores, Moist; V 10-20%, medium gravelly, 6 Common (10 - 20%), Ferru Common, fine (1-2mm) root | Distinct; Fine s bed fabric; Fir 'ery firm cons 3-20mm, subr ginous, Fine 's; Gradual, S | sandy cla ne, (0 - 5 istence; ounded, (0 - 2 mi smooth c | ay loam; W 5) mm crack Slightly pla dispersed, n), Root lin hange to - | eak grack; Many astic; No Ironstor ings; Fie | de of structure, 5-10 mm, (>5 per 100mm2) Fine (1- rmal plasticity; Slightly sticky; ne, coarse fragments; eld pH 7.4 (pH meter); |
| 1B2n 0.2 - 0.3 r | n Mottles, 10-20%, 0-5mm, C Polyhedral; Rough-ped fabr 1mm) macropores, Moist; S sticky; 10-20%, medium gra Many cutans, >50% of ped Medium (2 -6 mm), Concret Smooth change to - | Distinct; Mediu ic; Fine, (0 - 5 trong consist welly, 6-20mr faces or walls ions; Field pH | um clay; 5) mm cr ence; M n, subro coated, 17.7 (pF | Strong gra rack; Few (oderately p unded, dis distinct; C i meter); Fe | de of str <1 per 1 lastic; N bersed, l ommon ew, fine | ucture, 10-20 mm, 00mm2) Very fine (0.075- lormal plasticity; Moderately Ironstone, coarse fragments; (10 - 20 %), Ferruginous, (1-2mm) roots; Gradual, |
| 2B3n 0.3 - 0.6 r | n , 0-0% ; Medium clay; Stron (<1 per 100mm2) Very fine plastic; Normal plasticity; M dispersed, Ironstone, coarse distinct; Very few (0 - 2%), meter); Gradual, Smooth ch | g grade of str (0.075-1mm) oderately stic e fragments; l Ferruginous, lange to - | ructure, macrop ky; 10-2 Many cu Medium | 10-20 mm, ores, Moist 0%, mediu tans, >50% (2 -6 mm) | Lenticul ; Strong m grave o of ped , Concre | lar; Smooth-ped fabric; Few consistence; Moderately Ily, 6-20mm, subrounded, faces or walls coated, tions; Field pH 8.7 (pH |
| 2C1 0.6 - 0.9 r | n , 0-0% ; Light medium clay; Moist; Strong consistence; I medium gravelly, 6-20mm, s <10% of ped faces or walls to - | Weak grade Moderately pl subrounded, o coated, distin | of struct astic; No disperse lct; Field | ure, 20-50 ormal plasti d, Ironston pH 9.4 (pł | mm, Po city; Mo e, coars I meter) | lyhedral; Rough-ped fabric; derately sticky; 0-2%, e fragments; Few cutans, ; Gradual, Smooth change |
| Morphological | lotes | | | | | |
| 2B3n | BURIED B HORIZON | | | | | |

Observation Notes

MAP UNIT 5 ON LAND SYSTEM Pv, Detailed site

| Project Name: | CENTRAL QUEE | ENSLAND | | T SOIL AND LAND | CAPABILITY |
|---------------|-----------------|-----------|------|-----------------|------------|
| Project Code: | J000019 | Site ID: | SS10 | Observation ID: | 1 |
| Agency Name: | Horizon Soil Su | rvey (NT) | | | |

| Depth | рН | 1:5 EC | Ex | changeable | e Cations | | Exchangeable | CEC | E | ECEC | | ESP |
|-----------|-------|---------|--------|------------|-----------|---------|--------------|------|---------|--------|----------|-------|
| | | | Ca | Mg | к | Na | Acidity | | | | | |
| m | | dS/m | | | | Cmol (- | +)/kg | | | | | % |
| 0 - 0.1 | 6.6A | 0.049A | | | | | | | | | | |
| 0.1 - 0.2 | 7.4A | 0.22A | 0.3* | 1 | <0.2 | 0.6 | | 2* | | 2F | 3 | 80.00 |
| 0.2 - 0.3 | 7.7A | 0.31A | 0.9* | 3.1 | <0.2 | 1.8 | | 5.8* | : | 5.8F | 3 | 31.03 |
| 0.5 - 0.6 | 8.7A | 0.68A | 0.6* | 3.1 | <0.3 | 2.3 | | 6.1* | | 6.1F | 3 | 87.70 |
| 0.8 - 0.9 | 9.4A | 0.792A | 1.5* | 3.8 | <0.2 | 2.6 | | 7.9* | | 7.9F | 3 | 82.91 |
| Depth | CaCO3 | Organic | Avail. | Total | Total | Tota | l Bulk | Pa | article | Size A | Analysis | |
| | | С | Р | Р | Ν | к | Density | GV | cs | FS | Silt | Clay |
| m | % | % | mg/kg | % | % | % | Mg/m3 | | | % | | |
| 0 - 0.1 | | | <5E | | 450 | A | | | | | | |
| 0.1 - 0.2 | | | | | | | | | | | | |
| 0.2 - 0.3 | | | | | | | | | | | | |
| 0.5 - 0.6 | | | | | | | | | | | | |
| 0.8-0.9 | | | | | | | | | | | | |

| Depth | COLE | | Grav | /imetric/V | olumetric V | Vater Cont | ents | | K sat | K unsat |
|-----------|------|------|----------|------------|-------------|------------|-------|--------|-------|---------|
| | | Sat. | 0.05 Bar | 0.1 Bar | 0.5 Bar | 1 Bar | 5 Bar | 15 Bar | - | |
| m | | | | g | /g - m3/m3 | 3 | | | mm/h | mm/h |
| | | | | | | | | | | |
| 0 - 0.1 | | | | | | | | | | |
| 0.1 - 0.2 | | | | | | | | | | |
| 0.2 - 0.3 | | | | | | | | | | |
| 0.5 - 0.6 | | | | | | | | | | |
| 0.8 - 0.9 | | | | | | | | | | |

Project Name:CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:SS10Observation ID:1Agency Name:Horizon Soil Survey (NT)

| 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 (Ca2+,Mg2+,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 PROJ | ECT S | OIL AND | LAND | CAPABILITY |
|--------------------------------------|---|---|--|---|---|---|
| Project Code: Agency Name: | J000019 Site ID: Horizon Soil Survey (NT) | SS11 | Ob | oservatio | n ID: | 1 |
| Site Informatio | n | | | | | |
| Desc By: | - | Locality: | | | 5 ON I | ANDSYSTEM Pv Detailed site |
| Desc. Dy. | 06/06/19 | Elevation: | | 20 metres | 0 0111 | |
| Man Def | 1:25000 | Dainfall: | | 25 metres | | |
| Northing/Long | 7486642 AMC Topo: EE | Railliall. | | 700 Class | | |
| Northing/Long.: | 7486643 AMG zone: 55 | Runoff: | | SIOW | | |
| Easting/Lat.: | 775681 Datum: GDA94 | Drainage: | | Imperfecti | y draine | d |
| <u>Geology</u> | | | | | | |
| ExposureType: | Auger boring | Conf. Sub. | is Parer | nt. Mat.: | Almost | certain or certain |
| Geol. Ref.: | Qa | Substrate M | laterial: | | Auger b | ooring, 1 m deep,Porous, , Alluvium |
| Land Form | | | | | | |
| | | D-44 | | - (| | |
| Rel/Slope Class: | Level plain <9m <1% | Pattern Typ | e: | l errace (a | illuvial) | |
| Morph. Type: | Flat | Relief: | | 9 metres | | |
| Elem. Type: | Terrace plain | Slope Cate | gory: | Level | | |
| Slope: | 0.7 % | Aspect: | | No Data | | |
| Surface Soil Co | ondition (dry): Hardsetting | | | | | |
| Erosion: Activ scald Mode | e, Minor or present (wind); Active, ing (scald) Partial, Moderate (shee erate (rill) Partial, Minor (gully) | Moderate et) Partial, | | | | |
| Soil Classificat | ion | | | | | |
| Australian Soil C | lassification | | Mannin | a Unit: | | 5 |
| Vertic Mesonatric Clay-loamy Deep | Brown Sodosol Medium Non-grav | elly Loamy | Princip | al Profile l | Form: | s N/A |
| ASC Confidence | : | | Great S | Soil Group | : | N/A |
| All necessary and | | | | | | |
| Site Disturband | :e: Complete clearing. Pasture, n | ative or improv | ed, but r | never cultiv | ated | |
| Vegetation: | Low Strata - Tussock grass, (| 0.26-0.5m, Spa | rse. *Sp | ecies inclu | des - Ari | istida species |
| | Tall Strata - Tree, 3.01-6m, Is | olated plants. * | Species | includes - | Eucalv | otus crebra |
| Surface Coore | | o fragmonte | | | , | |
| Surface Coarse | Fragments. No surface coarse | e nagments | | | | |
| Profile Morpho | logy | | | | | |
| 1A11 0 - 0.1 m | Light brownish grey (10YF 10mm, Subangular block macropores, Dry; Very firr fine (1-2mm) roots; Clear, | R6/2-Moist); , 0- y; Rough-ped fa m consistence; Smooth chang | 0% ; Fir abric; Ma Non-pla je to - | ne sandy lo any (>5 per stic; Non-s | am; Mo ⁻ 100mn ticky; Fi | derate grade of structure, 5- n2) Fine (1-2mm) eld pH 6.1 (pH meter); Many, |
| 1A12 0.1 - 0.2 | m Light brownish grey (10YF 10 mm, Subangular block macropores, Dry; Very firr fine (1-2mm) roots; Clear, | R6/2-Moist); , 0- y; Rough-ped fa n consistence; Smooth chang | 0% ; Fir abric; Co Non-pla je to - | ne sandy lo ommon (1-{ stic; Non-s | am; Mo 5 per 0.0 ticky; Fi | derate grade of structure, 5- 01m2) Fine (1-2mm) eld pH 6.3 (pH meter); Many, |
| 1A2e 0.2 - 0.3 | m Light grey (10YR7/2-Moist grade of structure; Earthy Very firm consistence; Slig of ped faces or walls coate linings; Field pH 6.6 (pH n | t); Mottles, 2-10 fabric; Commo ghtly plastic; No ed, distinct; Co neter); Commo |)% , 0-5i n (1-5 p ormal pla mmon (′ n, mediu | mm, Disting er 100mm2 asticity; Slig 10 - 20 %), ım (2-5mm | ct; Fine 2) Fine (ghtly stic Ferrugii) roots; 2 | sandy clay loam; Massive 1-2mm) macropores, Dry; cky; Common cutans, 10-50% nous, Fine (0 - 2 mm), Root Abrupt, Smooth change to - |
| 1B2n 0.3 - 0.6 | m Dark yellowish brown (10) Moderate grade of structu Very fine (0.075-1mm) ma Normal plasticity; Moderal distinct; Common (10 - 20 meter); Few, medium (2-5 | YR4/6-Moist); M Ire, 10-20 mm, acropores, Mod tely sticky; Corr 0 %), Ferruginou 5mm) roots; Cle | lottles, 2 Polyhed erately r nmon cu us, Medi ar, Smo | 2-10% , 0-5 ral; Rough- noist; Stror tans, 10-50 um (2 -6 m oth change | mm, Dis ped fab ng consi 0% of pe m), Cor e to - | stinct; Clay loam, fine sandy; ric; Few (<1 per 100mm2) stence; Slightly plastic; ed faces or walls coated, ncretions; Field pH 8 (pH |
| 2B2 0.6 - 0.9 | m Dark yellowish brown (10) 10-20 mm, Prismatic; Rou macropores, Moderately r Moderately sticky; Commo (pH meter); Gradual, Smo | YR4/6-Moist); , ugh-ped fabric; noist; Strong co on cutans, 10-5 ooth change to - | 0-0% ; F Few (<1 onsisten 0% of p | Fine sandy per 100mr ce; Modera ed faces or | clay loa n2) Ver tely plas walls c | m; Weak grade of structure, y fine (0.075-1mm) stic; Normal plasticity; oated, distinct; Field pH 8.6 |
| <u>Morphological</u> | Notes_ | | | | | |
| 1A11 | ORGANIC ACCUMULATIO | ON, ERODED | | | | |
| 1A12 | ORGANIC ACCUMULATIO | NC | | | | |
| 1A2e | TOP OF B HORIZON | | | | | |
| 1B2n | BURIED HORIZON | | | | | |
| Observation No | ntes | | | | | |

MAP UNIT 5 ON LANDSYSTEM Pv, Detailed site

Site Notes

| Project Name: | CENTRAL QUEE | INSLAND C | COAL PROJECT | SOIL AND LAND | CAPABILITY |
|---------------|------------------|-----------|--------------|-----------------|------------|
| Project Code: | J000019 | Site ID: | SS11 | Observation ID: | 1 |
| Agency Name: | Horizon Soil Sur | vey (NT) | | | |

| Depth | рН | 1:5 EC | E | xchangeat | le Cations | 5 | Exchangeable | CEC | ECEC | ESP |
|-----------|------|--------|------|-----------|------------|------|--------------|------|------|--------|
| | | | Ca | Mg | к | Na | Acidity | | | |
| m | | dS/m | | | | Cmo | (+)/kg | | | % |
| 0 - 0.1 | 6.1A | 0.005A | 1.4* | 1.5 | 0.2 | <0.1 | | 3.3* | 3.3F | #Error |
| 0.1 - 0.2 | 6.3A | 0.008A | 1.1* | 1.6 | <0.1 | 0.2 | | 3* | 3F | 6.67 |
| 0.2 - 0.3 | 6.6A | 0.042A | 0.8* | 1.7 | <0.1 | 0.6 | | 3.3* | 3.3F | 18.18 |
| 0.5 - 0.6 | 8A | 0.521A | | | | | | | | |
| 0.8 - 0.9 | 8.6A | 0.873A | | | | | | | | |

| Depth | CaCO3 | Organic | Avail. | Total | Total | Total | Bulk | P | Particle | Size A | nalysis | |
|-----------|-------|---------|--------|-------|-------|-------|---------|----|----------|--------|---------|------|
| | | С | Р | Р | Ν | к | Density | GV | CS | FS | Silt | Clay |
| m | % | % | mg/kg | % | % | % | Mg/m3 | | | % | | |
| | | | | | | | | | | | | |
| 0 - 0.1 | | 0.9F | 5E | | 560A | | | <1 | 6F | 61 | 17 | 16 |
| 0.1 - 0.2 | | | | | | | | <1 | 9F | 57 | 18 | 16 |
| 0.2 - 0.3 | | | | | | | | <1 | 3F | 59 | 18 | 20 |
| 0.5 - 0.6 | | | | | | | | 1 | 2F | 43 | 21 | 33 |
| 0.8 - 0.9 | | | | | | | | <1 | 4F | 48 | 19 | 29 |

| Depth | COLE | | Grav | | K sat | K unsat | | | | |
|-----------|------|------|----------|---------|------------|---------|-------|--------|------|------|
| | | Sat. | 0.05 Bar | 0.1 Bar | 0.5 Bar | 1 Bar | 5 Bar | 15 Bar | - | |
| m | | | | g | /g - m3/m3 | i | | | mm/h | mm/h |
| | | | | | | | | | | |
| 0 - 0.1 | | | | | | | | | | |
| 0.1 - 0.2 | | | | | | | | | | |
| 0.2 - 0.3 | | | | | | | | | | |
| 0.5 - 0.6 | | | | | | | | | | |
| 0.8 - 0.9 | | | | | | | | | | |
| 0.0 0.0 | | | | | | | | | | |

Project Name:CENTRAL QUEENSLAND COAL PROJECT SOIL AND LAND CAPABILITYProject Code:J000019Site ID:SS11Observation ID:1Agency Name:Horizon Soil Survey (NT)

| 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 (Ca2+,Mg2+,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
































































































Appendix C

Laboratory Reporting





Environmental Division

INTERPRETIVE QUALITY CONTROL REPORT

| Work Order | EB1213707 | Page | : 1 of 35 |
|---|--|--|---|
| Client Contact Address | HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION DR IAN HOLLINGSWORTH 38 WITHERDEN STREET NAKARA NT 0810 | Laboratory Contact Address | Environmental Division Brisbane Customer Services 32 Shand Street Stafford QLD Australia 4053 |
| E-mail Telephone Facsimile | ian.hollingsworth@horizonesse.com : : | E-mail Telephone Facsimile | Erisbane.Enviro.Services@alsglobal.com +61 7 3243 7222 +61 7 3243 7218 |
| Project Site | : J000019 : | QC Level | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |
| C-O-C number Sampler Order number | : : Ian Hollingsworth : | Date Samples Received Issue Date | : 22-MAY-2012 : 12-JUN-2012 |
| Quote number | : ED/016/12 | No. of samples received No. of samples analysed | : 198 : 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 Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Address 32 Shand Street Stafford QLD Australia 4053 PHONE +61-7-3243 7222 Facsimile +61-7-3243 7218 Environmental Division Brisbane ABN 84 009 936 029 Part of the ALS Group A Campbell Brothers Limited Company



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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 ; 🗸 = Withir | n holding time. |
|---|--|-------------|----------------|------------------------|-------------|-------------------------|---------------------|-----------------|
| Method | | Sample Date | Ex | traction / Preparation | | | Analysis | |
| Container / Client Sample ID(s) | | | 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 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 1100-1200, SITE 008 DEPTH 200-300, SITE 008 DEPTH 800-900, SITE 014 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 100-1200, SITE 014 DEPTH 100-1200, SITE 017 DEPTH 200-300, SITE 018 DEPTH 0-100, SITE 018 DEPTH 0-100, SITE 018 DEPTH 100-1200, SITE 018 DEPTH 100-1200, SITE 019 DEPTH 200-300, SITE 019 DEPTH 200-300, SITE 020 DEPTH 200-300, SITE 020 DEPTH 800-900, SITE 021 DEPTH 0-100, SITE 021 DEPTH 500-600, SITE 021 DEPTH 100-1200 | SITE 011 DEPTH 200-300, SITE 011 DEPTH 800-900, SITE 014 DEPTH 200-300, SITE 014 DEPTH 800-900, SITE 017 DEPTH 600-600, SITE 017 DEPTH 500-600, SITE 017 DEPTH 1100-1200, SITE 018 DEPTH 200-300, SITE 019 DEPTH 0-100, SITE 019 DEPTH 0-100, SITE 019 DEPTH 1100-1200, SITE 019 DEPTH 1100-1200, SITE 020 DEPTH 1100-1200, SITE 020 DEPTH 1100-1200, SITE 021 DEPTH 200-300, SITE 021 DEPTH 800-900, | 09-MAY-2012 | 01-JUN-2012 | 16-MAY-2012 | * | 04-JUN-2012 | 01-JUN-2012 | × |
| Snap Lock Bag (EA002) | | | | | | | | |

| Page | : 3 of 35 |
|------------|---|
| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Matrix: SOIL | | | | | Evaluation | : × = Holding time | breach ; ✓ = Within | n holding time |
|---------------------------------|---------------------------|-------------|--------------------------|--------------------|------------|--------------------|---------------------|----------------|
| Method | | Sample Date | Extraction / Preparation | | | Analysis | | |
| Container / Client Sample ID(s) | | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation |
| EA002 : pH (Soils) - Continued | | | | | | | | |
| SITE 022 DEPTH 0-100, | SITE 022 DEPTH 200-300, | 10-MAY-2012 | 01-JUN-2012 | 17-MAY-2012 | * | 04-JUN-2012 | 02-JUN-2012 | * |
| SITE 022 DEPTH 500-600, | SITE 022 DEPTH 800-900, | | | | | | | |
| SITE 022 DEPTH 1100-1200, | 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, | | | | | | | |
| 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, | 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 | | | | | | | |
| Snap Lock Bag (EA002) | | | | | | | | |
| SITE 026 DEPTH 0-100, | SITE 026 DEPTH 200-300, | 10-MAY-2012 | 01-JUN-2012 | 17-MAY-2012 | <u>*</u> | 05-JUN-2012 | 01-JUN-2012 | * |
| SITE 026 DEPTH 500-600, | SITE 026 DEPTH 800-900, | | | | | | | |
| SITE 026 DEPTH 1100-1200, | 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, | | | | | | | |
| 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, | 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 | | | | | | | |
| Snap Lock Bag (EA002) | | | | | | | | |
| SITE 031 DEPTH 0-100, | SITE 031 DEPTH 200-300, | 11-MAY-2012 | 01-JUN-2012 | 18-MAY-2012 | <u>*</u> | 05-JUN-2012 | 01-JUN-2012 | x |
| SITE 031 DEPTH 500-600, | SITE 031 DEPTH 800-900, | | | | | | | |
| SITE 031 DEPTH 1100-1200, | 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, | | | | | | | |
| 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, | 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, | | | | | | | |
| 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, | 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, | | | | | | | |
| 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, | 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 | | | | | | | |
| Snap Lock Bag (EA002) | | | | 10 1411 00 10 | | | 00.000 | |
| SITE 041 DEPTH 0-100, | SITE 041 DEPTH 500-600, | 12-MAY-2012 | 01-JUN-2012 | 19-MAY-2012 | <u>*</u> | 05-JUN-2012 | 02-JUN-2012 | * |
| SITE 042 DEPTH 0-100, | SITE 042 DEPTH 500-600, | | | | | | | |
| SITE 040 DEPTH 0-100, | SITE 040 DEPTH 500-600 | | | | | | | |
| SITE 049 DEPTH 0-100, | SITE 049 DEPTH 500-600 | | | | | | | |
| Snap Lock Bag (EA002) | | | | | | 1 | | |

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| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Matrix: SOIL | | | | | Evaluation: | × = Holding time | breach ; ✓ = Within | holding time. |
|---|---|-------------|--------------------------|--------------------|-------------|------------------|---------------------|---------------|
| Method | | Sample Date | Extraction / Preparation | | | Analysis | | |
| Container / Client Sample ID(s) | | | 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 800-90, | 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 | x | 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 400-900, 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 0-100, 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 | × |

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| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Matrix: SOIL | | | | | Evaluation | : × = Holding time | breach ; ✓ = Within | n holding time |
|---|---|-------------|----------------|------------------------|------------|--------------------|---------------------|----------------|
| Method | | Sample Date | Ex | traction / Preparation | | | Analysis | |
| Container / Client Sample ID(s) | | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation |
| EA010: Conductivity | | | | | | | | |
| Snap Lock Bag (EA010) 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 008 DEPTH 0-100, SITE 008 DEPTH 1100-1200, SITE 008 DEPTH 1100-1200, SITE 008 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 500-600, SITE 007 DEPTH 1100-1200, SITE 008 DEPTH 200-300, SITE 008 DEPTH 800-900, SITE 014 DEPTH 0-100, | 08-MAY-2012 | 01-JUN-2012 | 15-MAY-2012 | ¥ | 04-JUN-2012 | 29-JUN-2012 | ~ |
| Snap Lock Bag (EA010) 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 1100-1200, SITE 018 DEPTH 0-100, SITE 019 DEPTH 800-900, SITE 019 DEPTH 200-300, SITE 020 DEPTH 200-300, SITE 020 DEPTH 800-900, SITE 021 DEPTH 0-100, SITE 021 DEPTH 0-100, SITE 021 DEPTH 100-1200 | 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 019 DEPTH 0-100, SITE 019 DEPTH 500-600, SITE 019 DEPTH 1100-1200, SITE 020 DEPTH 500-600, SITE 020 DEPTH 500-600, SITE 020 DEPTH 100-1200, SITE 021 DEPTH 800-900, SITE 021 DEPTH 800-900, | 09-MAY-2012 | 01-JUN-2012 | 16-MAY-2012 | ¥ | 04-JUN-2012 | 29-JUN-2012 | ~ |
| Snap Lock Bag (EA010) 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 0-100, SITE 024 DEPTH 1100-1200, 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 0-100, SITE 025 DEPTH 1100-1200 | 10-MAY-2012 | 01-JUN-2012 | 17-MAY-2012 | × | 04-JUN-2012 | 29-JUN-2012 | ~ |
| Shap Lock Bag (EA010) | | l l | 1 | 1 | | 1 | | 1 |

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| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Matrix: SOIL | | | | | Evaluation | : × = Holding time | breach ; ✓ = Withir | n holding time. |
|---------------------------------|---------------------------|-------------|----------------|------------------------|------------|---|---------------------|-----------------|
| Method | | Sample Date | E | traction / Preparation | | | Analysis | |
| Container / Client Sample ID(s) | | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation |
| EA010: Conductivity - Continued | | | | | | | | |
| SITE 026 DEPTH 0-100, | SITE 026 DEPTH 200-300, | 10-MAY-2012 | 01-JUN-2012 | 17-MAY-2012 | <u>*</u> | 05-JUN-2012 | 29-JUN-2012 | 1 |
| SITE 026 DEPTH 500-600, | SITE 026 DEPTH 800-900, | | | | | | | |
| SITE 026 DEPTH 1100-1200, | 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, | | | | | | | |
| 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, | 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 | | | | | | | |
| Snap Lock Bag (EA010) | | | | | | | | |
| SITE 031 DEPTH 0-100, | SITE 031 DEPTH 200-300, | 11-MAY-2012 | 01-JUN-2012 | 18-MAY-2012 | <u>*</u> | 05-JUN-2012 | 29-JUN-2012 | ✓ |
| SITE 031 DEPTH 500-600, | SITE 031 DEPTH 800-900, | | | | | | | |
| SITE 031 DEPTH 1100-1200, | 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, | | | | | | | |
| 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, | 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. | | | | | | | |
| 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. | 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. | | | | | | | |
| 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 | 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 | | | | | | | |
| Snap Lock Bag (EA010) | | | | | | | | |
| SITE 041 DEPTH 0-100. | SITE 041 DEPTH 500-600. | 12-MAY-2012 | 01-JUN-2012 | 19-MAY-2012 | . | 05-JUN-2012 | 29-JUN-2012 | 1 |
| SITE 042 DEPTH 0-100. | SITE 042 DEPTH 500-600. | | | | _ | | | • |
| SITE 048 DEPTH 0-100. | SITE 048 DEPTH 500-600. | | | | | | | |
| SITE 049 DEPTH 0-100. | SITE 049 DEPTH 500-600 | | | | | | | |
| Snap Lock Bag (EA010) | | | | | | | | |
| SITE 065 DEPTH 500-600, | SITE 065 DEPTH 800-900, | 14-MAY-2012 | 01-JUN-2012 | 21-MAY-2012 | ¥2 | 04-JUN-2012 | 29-JUN-2012 | 1 |
| SITE 065 DEPTH 1100-1200, | SITE 066 DEPTH 0-100, | | | | | | | • |
| SITE 066 DEPTH 200-300. | 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. | | | | | | | |
| SITE 067 DEPTH 500-600 | SITE 067 DEPTH 800-90 | | | | | | | |
| SITE 067 DEPTH 1100-1200 | | | | | | | | |
| Snap Lock Bag (FA010) | | | | | | | | |
| | | 1 | 1 | 1 | 1 | A second sec second second sec | 1 | 1 |

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| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Matrix: SOIL | | | | | Evaluation | × = Holding time | breach ; ✓ = Within | n holding time |
|--------------------------------------|---------------------------|-------------|----------------|------------------------|------------|------------------|---------------------|-----------------------|
| Method | | | E | traction / Preparation | | Analysis | | |
| Container / Client Sample ID(s) | | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation |
| EA010: Conductivity - Continued | | | | | | | | |
| SITE 056 DEPTH 0-100, | SITE 056 DEPTH 200-300, | 14-MAY-2012 | 01-JUN-2012 | 21-MAY-2012 | <u>*</u> | 05-JUN-2012 | 29-JUN-2012 | ✓ |
| 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, | 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 | | | | | | | |
| Snap Lock Bag (EA010) | | | | | | | | |
| SITE 058 DEPTH 500-600, | SITE 058 DEPTH 800-900, | 14-MAY-2012 | 05-JUN-2012 | 21-MAY-2012 | <u>*</u> | 05-JUN-2012 | 03-JUL-2012 | ✓ |
| SITE 058 DEPTH 1100-1200, | SITE 061 DEPTH 0-100, | | | | | | | - |
| SITE 061 DEPTH 200-300, | 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, | | | | | | | |
| 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, | 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 | | | | | | | |
| Soil Glass Jar - Unpreserved (EA010) | | | | | | | | |
| SITE 52 DEPTH 0-100, | SITE 52 DEPTH 200-300, | 12-MAY-2012 | 01-JUN-2012 | 19-MAY-2012 | <u>.</u> | 04-JUN-2012 | 29-JUN-2012 | ✓ |
| SITE 52 DEPTH 500-600, | SITE 52 DEPTH 800-900, | | | | | | | |
| SITE 52 DEPTH 1100-1200 | | | | | | | | |

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| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Matrix: SOIL | | | | Evaluation: × = Holding time breach ; < = Within holding | | | | |
|--------------|-------------------------------------|----------------------------------|--|--|---|--|--|--|
| Sample Date | Ex | traction / Preparation | | Analysis | | | | |
| | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation | | |
| | | | | | | | | |
| 08-MAY-2012 | | | | 24-MAY-2012 | 22-MAY-2012 | × | | |
| | | | | | | | | |
| 09-MAY-2012 | | | | 24-MAY-2012 | 23-MAY-2012 | × | | |
| | Sample Date 08-MAY-2012 09-MAY-2012 | Sample Date Ex Date extracted | Sample Date Extraction / Preparation Date extracted Due for extraction 08-MAY-2012 09-MAY-2012 09-MAY-2012 | Evaluation: Sample Date Extraction / Preparation Evaluation Date extracted Due for extraction Evaluation 08-MAY-2012 09-MAY-2012 09-MAY-2012 | Sample Date Extraction / Preparation Image: constraint of the stract of the strac | Evaluation: * = Holding time breach ; ✓ = Within Sample Date Extraction / Preparation Analysis Date extracted Due for extraction Evaluation Date analysed Due for analysis 08-MAY-2012 24-MAY-2012 22-MAY-2012 09-MAY-2012 24-MAY-2012 23-MAY-2012 | | |

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|------------|---|
| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Matrix: SOIL | | Evaluation: × = Holding time bre | | | | | n holding time | |
|-------------------------------------|---------------------------|----------------------------------|--------------------------|--------------------|------------|---------------|------------------|-----------------------|
| Method | | Sample Date | Extraction / Preparation | | | Analysis | | |
| Container / Client Sample ID(s) | | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation |
| EA055: Moisture Content - Continued | | | | | | | | |
| SITE 022 DEPTH 0-100, | SITE 022 DEPTH 200-300, | 10-MAY-2012 | | | | 24-MAY-2012 | 24-MAY-2012 | ✓ |
| SITE 022 DEPTH 500-600, | SITE 022 DEPTH 800-900, | | | | | | | |
| SITE 022 DEPTH 1100-1200, | 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, | | | | | | | |
| 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, | 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, | | | | | | | |
| 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, | 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, | | | | | | | |
| 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, | 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 | | | | | | | |
| Snap Lock Bag (EA055-103) | | | | | | | | |
| SITE 031 DEPTH 0-100, | SITE 031 DEPTH 200-300, | 11-MAY-2012 | | | | 24-MAY-2012 | 25-MAY-2012 | 1 |
| SITE 031 DEPTH 500-600, | SITE 031 DEPTH 800-900, | | | | | | | |
| SITE 031 DEPTH 1100-1200, | 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, | | | | | | | |
| 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, | 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, | | | | | | | |
| 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, | 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, | | | | | | | |
| 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, | 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 | | | | | | | |
| Snap Lock Bag (EA055-103) | | | | | | | | |
| SITE 041 DEPTH 0-100, | SITE 041 DEPTH 500-600, | 12-MAY-2012 | | | | 24-MAY-2012 | 26-MAY-2012 | ✓ |
| SITE 042 DEPTH 0-100, | SITE 042 DEPTH 500-600, | | | | | | | |
| SITE 048 DEPTH 0-100, | SITE 048 DEPTH 500-600, | | | | | | | |
| SITE 049 DEPTH 0-100, | SITE 049 DEPTH 500-600 | | | | | | | |
| Snap Lock Bag (EA055-103) | | | | | | | | |

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| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Matrix: SOIL | | | | | Evaluation | × = Holding time | breach ; 🗸 = Withii | h holding time. | |
|--|---------------------------|-------------|--------------------------|--------------------|------------|-------------------------|---------------------|-----------------|--|
| Method | | Sample Date | Extraction / Preparation | | | Analysis | | | |
| Container / Client Sample ID(s) | | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation | |
| EA055: Moisture Content - Continued | | | | | | | | | |
| SITE 056 DEPTH 0-100, | SITE 056 DEPTH 200-300, | 14-MAY-2012 | | | | 24-MAY-2012 | 28-MAY-2012 | ✓ | |
| SITE 056 DEPTH 500-600, | SITE 056 DEPTH 800-900, | | | | | | | | |
| SITE 056 DEPTH 1100-1200, | | | | | | | | | |
| SITE 057 DEPTH 200-300, | 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, | | | | | | | | |
| 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, | 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, | | | | | | | | |
| 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, | 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, | | | | | | | | |
| 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, | 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, | | | | | | | | |
| SITE 067 DEPTH 500-600. | SITE 067 DEPTH 800-90. | | | | | | | | |
| SITE 067 DEPTH 1100-1200 | | | | | | | | | |
| Soil Glass Jar - Unpreserved (FA055-103) | | | | | | | | | |
| SITE 52 DEPTH 0-100, | SITE 52 DEPTH 200-300, | 12-MAY-2012 | | | | 29-MAY-2012 | 26-MAY-2012 | . | |
| SITE 52 DEPTH 500-600. | SITE 52 DEPTH 800-900. | | | | | | | · · | |
| SITE 52 DEPTH 1100-1200 | | | | | | | | | |

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| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Matrix: SOIL Evaluation: * = | | | | | × = Holding time breach ; \checkmark = Within holding time | | | |
|--|---|-------------|--------------------------|--------------------|---|---------------|------------------|------------|
| Method | | Sample Date | Extraction / Preparation | | | Analysis | | |
| Container / Client Sample ID(s) | | | 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, | 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 | ~ |
| SiSTE 020 DEPTH 0-100 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 | 1 | 04-JUN-2012 | 05-NOV-2012 | ~ |
| Soil Glass Jar - Unpreserved (ED008) SITE 022 DEPTH 0-100, SITE 022 DEPTH 1100-1200, SITE 022 DEPTH 1100-1200, SITE 026 DEPTH 500-600, SITE 027 DEPTH 0-100, 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 | J | 04-JUN-2012 | 06-NOV-2012 | 1 |
| SiTE 029 DEFTIT 1100-1200 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 | 1 | 04-JUN-2012 | 07-NOV-2012 | 1 |
| 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 | 1 | 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 100-1200, SITE 067 DEPTH 0-100, SITE 067 DEPTH 0-100, | 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 | 1 | 04-JUN-2012 | 10-NOV-2012 | 1 |

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| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Matrix: SOIL | | | | | Evaluation: | × = Holding time | breach ; ✓ = Withir | n holding time. |
|---|---|-------------|----------------|------------------------|-------------|------------------|---------------------|-----------------|
| Method | | Sample Date | Ex | traction / Preparation | | | Analysis | |
| Container / Client Sample ID(s) | | | 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 | 1 | 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 | 5 | 05-JUN-2012 | 05-NOV-2012 | 1 |
| Soil Glass Jar - Unpreserved (ED021) SITE 022 DEPTH 0-100, SITE 022 DEPTH 1100-1200, SITE 022 DEPTH 1100-1200, SITE 026 DEPTH 500-600, SITE 027 DEPTH 0-100, SITE 028 DEPTH 0-100, SITE 029 DEPTH 0-100, SITE 029 DEPTH 0-100, | 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 | J | 05-JUN-2012 | 06-NOV-2012 | 1 |
| SiTE 029 DEPTH 1100-1200 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 | 1 | 05-JUN-2012 | 07-NOV-2012 | 4 |
| 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 | 1 | 05-JUN-2012 | 10-NOV-2012 | ✓ |

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| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Matrix: SOIL | | | | | Evaluation | : × = Holding time | breach ; 🗸 = Withii | n holding time. | |
|---|---|-------------|----------------|------------------------|------------|--------------------|---------------------|-----------------|--|
| Method | | Sample Date | Ex | traction / Preparation | | Analysis | | | |
| Container / Client Sample ID(s) | | | 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 008 DEPTH 0-100, SITE 008 DEPTH 1100-1200, | 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 | 5 | 07-JUN-2012 | 04-NOV-2012 | ~ | |
| 51SITE 020 DEPTH 0-100 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 022 DEPTH 500-600, SITE 027 DEPTH 0-100, SITE 028 DEPTH 0-00, 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 | J | 07-JUN-2012 | 06-NOV-2012 | 1 | |
| 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 | 1 | 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 | 5 | 05-JUN-2012 | 08-NOV-2012 | 1 | |
| 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 | 5 | 05-JUN-2012 | 10-NOV-2012 | ~ | |

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| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Matrix: SOIL | | | | Evaluation: \star = Holding time breach ; \checkmark = Within holding time. | | | | | | |
|---|---|-------------|--|---|------------|---------------|------------------|------------|--|--|
| Method | | Sample Date | Extraction / Preparation | | | Analysis | | | | |
| Container / Client Sample ID(s) | | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation | | |
| ED045G: Chloride Discrete analyser | | | | | | | | | | |
| Snap Lock Bag (ED045G) | | | | | | | | | | |
| SITE 001 DEPTH 0-100, | SITE 001 DEPTH 200-300, | 08-MAY-2012 | 01-JUN-2012 | 15-MAY-2012 | <u>*</u> | 04-JUN-2012 | 29-JUN-2012 | ✓ | | |
| SITE 001 DEPTH 500-600, | SITE 001 DEPTH 800-900, | | | | | | | | | |
| SITE 001 DEPTH 1100-1200, | SITE 002 DEPTH 200-300, | | | | | | | | | |
| SITE 002 DEPTH 800-900, | SITE 002 DEPTH 1100-1200, | | | | | | | | | |
| 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, | SITE 007 DEPTH 200-300, | | | | | | | | | |
| SITE 007 DEPTH 500-600, | SITE 007 DEPTH 800-900, | | | | | | | | | |
| SITE 007 DEPTH 1100-1200, | SITE 008 DEPTH 0-100, | | | | | | | | | |
| SITE 008 DEPTH 200-300, | SITE 008 DEPTH 500-600, | | | | | | | | | |
| SITE 008 DEPTH 800-900, | SITE 014 DEPTH 0-100, | | | | | | | | | |
| 51SITE 020 DEPTH 0-100 | | | | | | | | | | |
| Snap Lock Bag (ED045G) | | | | | | | | | | |
| SITE 011 DEPTH 0-100, | SITE 011 DEPTH 200-300, | 09-MAY-2012 | 01-JUN-2012 | 16-MAY-2012 | * | 04-JUN-2012 | 29-JUN-2012 | 1 | | |
| SITE 011 DEPTH 500-600, | SITE 011 DEPTH 800-900, | | | | | | | | | |
| SITE 011 DEPTH 1100-1200, | SITE 014 DEPTH 200-300, | | | | | | | | | |
| SITE 014 DEPTH 500-600, | SITE 014 DEPTH 800-900, | | | | | | | | | |
| SITE 014 DEPTH 1100-1200. | 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. | | | | | | | | | |
| 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 | 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 | | | | | | | | | |
| SITE 020 DEPTH 200-300 | SITE 020 DEPTH 500-600 | | | | | | | | | |
| SITE 020 DEPTH 800-900 | SITE 020 DEPTH 1100-1200 | | | | | | | | | |
| 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 | | | | | | | | | | |
| Shan Lock Bag (ED045G) | | | | | | | | | | |
| SITE 022 DEPTH 0-100 | SITE 022 DEPTH 200-300 | 10-MAY-2012 | 01-11IN-2012 | 17-MAY-2012 | | 04-111N-2012 | 29-JUN-2012 | 1 | | |
| SITE 022 DEPTH 500-600 | SITE 022 DEPTH 800-900 | 10-11-2012 | 01-0011-2012 | 17 10711 2012 | * | 04-0011-2012 | 20 0011 2012 | v | | |
| SITE 022 DEPTH 1100-1200 | 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 | | | | | | | | | |
| 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 | SITE 025 DEPTH 0-100 | | | | | | | | | |
| SITE 025 DEPTH 200 300 | SITE 025 DEPTH 500 600 | | | | | | | | | |
| SITE 025 DEPTH 200-300, SITE 025 DEPTH 200 000 | SITE 025 DEPTH 300-000, SITE 025 DEPTH 1100 1200 | | | | | | | | | |
| STL 023 DEFTH 000-900, | SHE 023 DEFTH 1100-1200 | | | | | | | | | |
| рпар LOCK Bag (ED045G) | | | I Contraction of the second seco | 1 | | 1 | | 1 | | |

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| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Matrix: SOIL | | | Evaluation: \star = Holding time breach ; \star = Within holding time. | | | | | | |
|--|---------------------------|--------------|--|--------------------|------------|---------------|------------------|------------|--|
| Method | | Sample Date | Extraction / Preparation | | | Analysis | | | |
| Container / Client Sample ID(s) | | | 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 200-300, | 10-MAY-2012 | 01-JUN-2012 | 17-MAY-2012 | <u>*</u> | 05-JUN-2012 | 29-JUN-2012 | ✓ | |
| SITE 026 DEPTH 500-600, | SITE 026 DEPTH 800-900, | | | | | | | | |
| SITE 026 DEPTH 1100-1200, | 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, | | | | | | | | |
| 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, | 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 | | | | | | | | |
| Snap Lock Bag (ED045G) | | | | | | | | | |
| SITE 031 DEPTH 0-100, | SITE 031 DEPTH 200-300, | 11-MAY-2012 | 01-JUN-2012 | 18-MAY-2012 | <u>*</u> | 05-JUN-2012 | 29-JUN-2012 | 1 | |
| SITE 031 DEPTH 500-600, | SITE 031 DEPTH 800-900, | | | | | | | | |
| SITE 031 DEPTH 1100-1200. | 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. | | | | | | | | |
| 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 | 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 | | | | | | | | |
| 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 | 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 | | | | | | | | |
| SITE 038 DEPTH 0 100 | SITE 038 DEDTH 200 300 | | | | | | | | |
| SITE 038 DEPTH 500 600 | SITE 038 DEPTH 200 000 | | | | | | | | |
| SITE 030 DEPTH 1100 1200 | SITE 040 DEPTH 0 100 | | | | | | | | |
| SITE 030 DEPTH 1100-1200, | SITE 040 DEPTH 500 600 | | | | | | | | |
| SITE 040 DEPTH 200-300, | SITE 040 DEPTH 300-000, | | | | | | | | |
| SITE 040 DEFTH 800-900, | SITE 040 DEPTH 1100-1200 | | | | | | | | |
| SITE 041 DEPTH 0 100 | | 12 MAY 2012 | 01 111N 2012 | 10 MAY 2012 | | 05 UIN 2012 | 20 11 10 2012 | 1 | |
| SITE 042 DEPTH 0 100, | SITE 041 DEPTH 500-600, | 12-WA 1-2012 | 01-3010-2012 | 19-IMA1-2012 | × | 05-3011-2012 | 29-3011-2012 | ✓ | |
| SITE 042 DEPTH 0-100, | SITE 042 DEPTH 500-600, | | | | | | | | |
| SITE 040 DEPTH 0-100, | SITE 040 DEPTH 500-600, | | | | | | | | |
| SITE 049 DEFTH 0-100, | SITE 049 DEPTH 500-000 | | | | | | | | |
| | | 14 MAX 2012 | 04 1110 2042 | 21 MAX 2012 | | 04 1111 2042 | 20 11 10 2012 | , | |
| SITE 005 DEPTH 300-000, | SITE 005 DEPTH 0 100 | 14-WA 1-2012 | 01-3010-2012 | 21-IVIA1-2012 | × | 04-JUN-2012 | 29-3011-2012 | ✓ | |
| SITE 005 DEPTH 1100-1200, | | | | | | | | | |
| SITE 000 DEPTH 200-300, | SITE 000 DEPTH 300-000, | | | | | | | | |
| | SITE 000 DEPTH 1100-1200, | | | | | | | | |
| SITE 007 DEPTH 0-100, | SITE 007 DEPTH 200-300, | | | | | | | | |
| SITE 007 DEPTH 500-500, | 511E 067 DEPTH 800-90, | | | | | | | | |
| SITE 067 DEPTH 1100-1200 | | | | | | | | | |
| Snap Lock Bag (ED045G) | | | | | | 1 | | | |
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|------------|---|
| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |

SITE 067 DEPTH 200-300



| Matrix: SOIL Evaluatio | | | | | | on: \mathbf{x} = Holding time breach ; \mathbf{v} = Within holding time. | | | | |
|---|--|---|---|---|------------|--|---|-------------|--|--|
| Method | | Sample Date | Ex | traction / Preparation | | Analysis | | | | |
| Container / Client Sample ID(s) | | | 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 0-100, SITE 062 DEPTH 0-100, SITE 062 DEPTH 1100-1200, SITE 062 DEPTH 1100-1200, SITE 062 DEPTH 1100-1200, SITE 064 DEPTH 200-300, SITE 064 DEPTH 800-900, SITE 065 DEPTH 0-100, Soli Glass Jar - Unpreserved (ED045G) SITE 007 DEPTH 0-100, Site 007 DEPTH 0-100, Site 52 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 0-100, SITE 064 DEPTH 1100-1200, SITE 065 DEPTH 200-300 SITE 002 DEPTH 500-600, SITE 002 DEPTH 1100-1200 SITE 52 DEPTH 200-300, | 14-MAY-2012 08-MAY-2012 12-MAY-2012 | 05-JUN-2012 01-JUN-2012 01-JUN-2012 | 21-MAY-2012 15-MAY-2012 19-MAY-2012 | × × | 05-JUN-2012 04-JUN-2012 04-JUN-2012 | 03-JUL-2012 29-JUN-2012 29-JUN-2012 | ✓ ✓ ✓ | | |
| SITE 52 DEPTH 500-600, SITE 52 DEPTH 1100-1200 | SITE 52 DEPTH 800-900, | | | | | | | | | |
| 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 | 1 | 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 | 1 | 05-JUN-2012 | 05-NOV-2012 | 1 | | |
| 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 | 1 | 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 | 1 | 05-JUN-2012 | 08-NOV-2012 | ✓ | | |
| Soil Glass Jar - Unpreserved (ED091) SITE 056 DEPTH 0-100, SITE 066 DEPTH 0-100, | 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 | ~ | | |

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|------------|---|
| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |

SITE 042 DEPTH 0-100.

SITE 049 DEPTH 0-100

SITE 065 DEPTH 0-100,

SITE 067 DEPTH 0-100.

Soil Glass Jar - Unpreserved (ED092) SITE 041 DEPTH 0-100,

Soil Glass Jar - Unpreserved (ED092) SITE 52 DEPTH 0-100

Soil Glass Jar - Unpreserved (ED092) SITE 056 DEPTH 0-100,

SITE 048 DEPTH 0-100,

SITE 066 DEPTH 0-100.

SITE 067 DEPTH 200-300



✓

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Matrix: SOIL Evaluation: \mathbf{x} = Holding time breach ; \mathbf{v} = Within holding time. Method Sample Date Extraction / Preparation Analvsis Container / Client Sample ID(s) 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 002 DEPTH 0-100. 08-MAY-2012 01-JUN-2012 04-NOV-2012 04-JUN-2012 04-NOV-2012 1 \checkmark SITE 004 DEPTH 0-100, SITE 007 DEPTH 0-100, SITE 008 DEPTH 0-100, SITE 014 DEPTH 0-100, 51SITE 020 DEPTH 0-100 Soil Glass Jar - Unpreserved (ED092) SITE 011 DEPTH 0-100 09-MAY-2012 05-NOV-2012 04-JUN-2012 05-NOV-2012 01-JUN-2012 1 Soil Glass Jar - Unpreserved (ED092) SITE 022 DEPTH 0-100, SITE 026 DEPTH 0-100, 10-MAY-2012 01-JUN-2012 06-NOV-2012 1 04-JUN-2012 06-NOV-2012 \checkmark SITE 027 DEPTH 0-100, SITE 028 DEPTH 0-100, SITE 029 DEPTH 0-100 Soil Glass Jar - Unpreserved (ED092) SITE 031 DEPTH 0-100, SITE 035 DEPTH 0-100, 11-MAY-2012 07-NOV-2012 04-JUN-2012 07-NOV-2012 01-JUN-2012 1 \checkmark SITE 036 DEPTH 0-100

12-MAY-2012

12-MAY-2012

14-MAY-2012

01-JUN-2012

04-JUN-2012

01-JUN-2012

08-NOV-2012

08-NOV-2012

10-NOV-2012

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04-JUN-2012

04-JUN-2012

04-JUN-2012

08-NOV-2012

08-NOV-2012

10-NOV-2012

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|------------|---|
| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Matrix: SOIL | | | | | Evaluation | × = Holding time | breach ; 🗸 = Withii | n holding time. |
|--|---|-------------|------------------------|--------------------|------------|-------------------------|---------------------|-----------------|
| Method | Sample Date | Ex | traction / Preparation | | Analysis | | | |
| Container / Client Sample ID(s) | | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation |
| EK061G: Total Kjeldahl Nitrogen By Discrete An | alyser | | | | | | | |
| 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 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 | 5 | 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 | 1 | 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 | 1 | 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 | 1 | 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 | 1 | 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 | 1 | 02-JUN-2012 | 08-NOV-2012 | ~ |

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|------------|---|
| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Matrix: SOIL | | | | | Evaluation | × = Holding time | breach ; 🗸 = Within | n holding time. |
|---|---|-------------|------------------------|--------------------|------------|-------------------------|---------------------|-----------------|
| Method | Sample Date | Ex | traction / Preparation | | Analysis | | | |
| Container / Client Sample ID(s) | | | Date extracted | Due for extraction | Evaluation | Date analysed | Due for analysis | Evaluation |
| EK080: Bicarbonate Extractable Phosphorus (Colv | vell) | | | | | | | |
| Soil Glass Jar - Unpreserved (EK080) SITE 001 DEPTH 0-100, SITE 001 DEPTH 1100-1200. | SITE 001 DEPTH 500-600, SITE 002 DEPTH 0-100. | 08-MAY-2012 | | | | 01-JUN-2012 | 04-NOV-2012 | ~ |
| 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 002 DEPTH 1100-1200, SITE 007 DEPTH 0-100, SITE 007 DEPTH 1100-1200, SITE 008 DEPTH 500-600, SITE 014 DEPTH 0-100, | | | | | | | |
| 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) | | 40 MAX 0040 | | | | 04 1111 0040 | 00 NOV 2012 | |
| 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 300-800, SITE 042 DEPTH 500-600, SITE 048 DEPTH 500-600, SITE 049 DEPTH 500-600, SITE 52 DEPTH 500-600, | 12-MAT-2012 | | | | 01-JUN-2012 | 06-110 V-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 | ~ |

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|------------|---|
| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |

SITE 042 DEPTH 0-100,

SITE 049 DEPTH 0-100

SITE 065 DEPTH 0-100,

SITE 067 DEPTH 0-100.

SITE 036 DEPTH 0-100 Soil Glass Jar - Unpreserved (EP004) SITE 52 DEPTH 0-100

SITE 048 DEPTH 0-100,

SITE 066 DEPTH 0-100.

SITE 067 DEPTH 200-300

Soil Glass Jar - Unpreserved (EP004) SITE 041 DEPTH 0-100,

Soil Glass Jar - Unpreserved (EP004) SITE 056 DEPTH 0-100,



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Matrix: SOIL Evaluation: \mathbf{x} = Holding time breach ; \mathbf{v} = Within holding time. Method Sample Date Extraction / Preparation Analvsis Container / Client Sample ID(s) 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 002 DEPTH 0-100. 08-MAY-2012 31-MAY-2012 15-MAY-2012 04-JUN-2012 28-JUN-2012 * \checkmark SITE 004 DEPTH 0-100, SITE 007 DEPTH 0-100, SITE 008 DEPTH 0-100, SITE 014 DEPTH 0-100, 51SITE 020 DEPTH 0-100 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 50 Soil Glass Jar - Unpreserved (EP004) SITE 022 DEPTH 0-100, SITE 026 DEPTH 0-100, 10-MAY-2012 31-MAY-2012 17-MAY-2012 x 04-JUN-2012 28-JUN-2012 \checkmark SITE 027 DEPTH 0-100, SITE 028 DEPTH 0-100, SITE 029 DEPTH 0-100 Soil Glass Jar - Unpreserved (EP004) SITE 031 DEPTH 0-100, SITE 035 DEPTH 0-100, 11-MAY-2012 31-MAY-2012 18-MAY-2012 28-JUN-2012 04-JUN-2012 x \checkmark

12-MAY-2012

12-MAY-2012

14-MAY-2012

01-JUN-2012

31-MAY-2012

31-MAY-2012

19-MAY-2012

19-MAY-2012

21-MAY-2012

06-JUN-2012

04-JUN-2012

04-JUN-2012

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29-JUN-2012

28-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 | n: 🗴 = Quality Cor | ntrol frequency r | to twithin specification ; \checkmark = Quality Control frequency within specification. |
|---|-----------|----|---------|------------|--------------------|-------------------|---|
| Quality Control Sample Type | | Сс | ount | | Rate (%) | | Quality Control Specification |
| Analytical Methods | Method | QC | Regular | Actual | Expected | Evaluation | |
| Laboratory Duplicates (DUP) | | | | | | | |
| Bicarbonate Extractable K (Colwell) | ED021 | 8 | 67 | 11.9 | 10.0 | 1 | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |
| Bicarbonate Extractable P (Colwell) | EK080 | 9 | 67 | 13.4 | 10.0 | 1 | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |
| Calcium Chloride Extractable Boron | ED091 | 4 | 26 | 15.4 | 10.0 | 1 | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |
| Calcium Phosphate Extractable Sulfur as S | ED044 | 8 | 67 | 11.9 | 10.0 | 1 | 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 | 1 | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |
| Bicarbonate Extractable P (Colwell) | EK080 | 5 | 67 | 7.5 | 5.0 | 1 | NEPM 1999 Schedule B(3) and ALS QCS3 requirement |
| Calcium Chloride Extractable Boron | ED091 | 3 | 26 | 11.5 | 5.0 | 1 | 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 | 1 | 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 NaHCO3 at a 1:100 soil:solution ratio and determined by ICP. |
| Calcium Phosphate Extractable Sulfur as S | ED044 | SOIL | fhe 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. SO4 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 librated thiocynate forms highly-coloured ferric thiocynate 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 CaCl2 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 NaHCO3 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 NH4Cl 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 NaHCO3 at a 1:100 soil:solution ratio and determined by ICP. |
| Calcium Phosphate Extraction for Sulphate as SO4 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. SO4 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 CaCl2 Extraction for Boron | ED091PR | SOIL | Rayment & Higginson (1992) method 12C2. Soil is extracted with hot 0.01M CaCl2 solution at a 1:2 ratio. Extracts can be run on ICP. |

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| Preparation Methods | Method | Matrix | Method Descriptions |
|---------------------------------------|-------------|--------|--|
| DTPA Extraction for Cu, Zn, Mn, Fe (2 | ED092PR | SOIL | Rayment & Higginson (1992) Method 12A1 2 hour end over end tumbler extraction with 0.005M DTPA at a ratio of |
| TKN/TP Digestion | EK061/EK067 | SOIL | APHA 21st ed., 4500 Nora- D: APHA 21st ed., 4500 P - H. Macro Kieldahl digestion. |
| 1:5 solid / water leach for soluble | 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 |
| analytes | | | 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 | | Standard recovery not determined, |
| | | | | | Determined | | result less than LOR |
| EP004: Organic Matter | 2759469-002 | | Total Organic Carbon | | Not | | Standard recovery not determined, |
| | | | | | Determined | | result less than LOR |
| EP004: Organic Matter | 2751201-002 | | Total Organic Carbon | | Not | | Standard recovery not determined, |
| | | | | | 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.

| Method | | E | Extraction / Preparation | | | Analysis | | |
|---------------------------------|---------------------------|----------------|--------------------------|---------|---------------|------------------|---------|--|
| Container / Client Sample ID(s) | | Date extracted | Due for extraction | Days | Date analysed | Due for analysis | Days | |
| | | | | overdue | | | overdue | |
| EA002 : pH (Soils) | | | | | | | | |
| Snap Lock Bag | | | | | | | | |
| SITE 001 DEPTH 0-100, | SITE 001 DEPTH 200-300, | 01-JUN-2012 | 15-MAY-2012 | 17 | 04-JUN-2012 | 01-JUN-2012 | 3 | |
| SITE 001 DEPTH 500-600, | SITE 001 DEPTH 800-900, | | | | | | | |
| SITE 001 DEPTH 1100-1200, | 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, | | | | | | | |
| 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, | 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, | | | | | | | |
| 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, | SITE 014 DEPTH 0-100, | | | | | | | |
| 51SITE 020 DEPTH 0-100 | | | | | | | | |

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| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Method | | Ex | traction / Preparation | | | Analysis | |
|---|---------------------------|----------------|------------------------|-----------------|---------------|------------------|-----------------|
| Container / Client Sample ID(s) | | 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 200-300, | 01-JUN-2012 | 16-MAY-2012 | 16 | 04-JUN-2012 | 01-JUN-2012 | 3 |
| SITE 011 DEPTH 500-600, | SITE 011 DEPTH 800-900, | | | | | | |
| SITE 011 DEPTH 1100-1200, | SITE 014 DEPTH 200-300, | | | | | | |
| SITE 014 DEPTH 500-600, | SITE 014 DEPTH 800-900, | | | | | | |
| SITE 014 DEPTH 1100-1200, | 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, | | | | | | |
| 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, | 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, | | | | | | |
| SITE 020 DEPTH 200-300, | SITE 020 DEPTH 500-600, | | | | | | |
| SITE 020 DEPTH 800-900, | SITE 020 DEPTH 1100-1200, | | | | | | |
| 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 | | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 022 DEPTH 0-100, | SITE 022 DEPTH 200-300, | 01-JUN-2012 | 17-MAY-2012 | 15 | 04-JUN-2012 | 02-JUN-2012 | 2 |
| SITE 022 DEPTH 500-600, | SITE 022 DEPTH 800-900, | | | | | | |
| SITE 022 DEPTH 1100-1200, | 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, | | | | | | |
| 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, | 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 | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 026 DEPTH 0-100, | SITE 026 DEPTH 200-300, | 01-JUN-2012 | 17-MAY-2012 | 15 | 05-JUN-2012 | 01-JUN-2012 | 4 |
| SITE 026 DEPTH 500-600, | SITE 026 DEPTH 800-900, | | | | | | |
| SITE 026 DEPTH 1100-1200, | 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, | | | | | | |
| 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, | 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 | | | | | | |

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| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Method | | Ex | traction / Preparation | | | Analysis | |
|---|---------------------------|----------------|------------------------|---------|----------------|------------------|---------|
| Container / Client Sample ID(s) | | Date extracted | Due for extraction | Days | Date analysed | Due for analysis | Days |
| | | | | overdue | | | overdue |
| EA002 : pH (Soils) - Analysis Holding Time Compliance | | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 031 DEPTH 0-100, | SITE 031 DEPTH 200-300, | 01-JUN-2012 | 18-MAY-2012 | 14 | 05-JUN-2012 | 01-JUN-2012 | 4 |
| SITE 031 DEPTH 500-600, | SITE 031 DEPTH 800-900, | | | | | | |
| SITE 031 DEPTH 1100-1200, | 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, | | | | | | |
| 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, | 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, | | | | | | |
| 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. | 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 | | | | | | |
| 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 | 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 | | | | | | |
| Snan Lock Bag | | | | | | | |
| SITE 041 DEPTH 0-100 | SITE 041 DEPTH 500-600 | 01- II IN-2012 | 19-MAY-2012 | 13 | 05- II IN-2012 | 02- II INI-2012 | 3 |
| SITE 042 DEPTH 0-100 | SITE 042 DEPTH 500-600 | 01 001 2012 | 10 10/2012 | 10 | 00 0011 2012 | 02 0011 2012 | Ŭ |
| SITE 048 DEPTH 0-100 | SITE 048 DEPTH 500-600 | | | | | | |
| SITE 049 DEPTH 0-100 | SITE 049 DEPTH 500-600 | | | | | | |
| Snan Lock Bag | | | | | | | |
| SITE 065 DEPTH 500-600. | SITE 065 DEPTH 800-900. | 01-,IUN-2012 | 21-MAY-2012 | 11 | 04IUN-2012 | 02-,IUN-2012 | 2 |
| SITE 065 DEPTH 1100-1200. | SITE 066 DEPTH 0-100. | 01 0011 2012 | 21 10012 | | 01 0011 2012 | 02 0011 2012 | - |
| SITE 066 DEPTH 200-300. | 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 | | | | | | |
| SITE 067 DEPTH 500-600 | SITE 067 DEPTH 800-90 | | | | | | |
| SITE 067 DEPTH 1100-1200 | | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 056 DEPTH 0-100. | SITE 056 DEPTH 200-300. | 01-JUN-2012 | 21-MAY-2012 | 11 | 05-JUN-2012 | 02-JUN-2012 | 3 |
| SITE 056 DEPTH 500-600. | SITE 056 DEPTH 800-900. | 2. 00. 2012 | | •• | 2000.12012 | | - |
| SITE 056 DEPTH 1100-1200. | SITE 057 DEPTH 0-100. | | | | | | |
| SITE 057 DEPTH 200-300 | 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 | | | | | | |

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| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Method | | Extraction / Preparation | | | Analysis | | |
|--|---------------------------|--------------------------|--------------------|-----------------|---------------|------------------|-----------------|
| Container / Client Sample ID(s) | | Date extracted | Due for extraction | Days overdue | Date analysed | Due for analysis | Days overdue |
| EA002 : pH (Soils) - Analysis Holding Time Complia | nce | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 058 DEPTH 500-600, | SITE 058 DEPTH 800-900, | 05-JUN-2012 | 21-MAY-2012 | 15 | | | |
| SITE 058 DEPTH 1100-1200, | SITE 061 DEPTH 0-100, | | | | | | |
| SITE 061 DEPTH 200-300, | 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, | | | | | | |
| 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, | 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 | | | | | | |
| Soil Glass Jar - Unpreserved | | | | | | | |
| SITE 52 DEPTH 0-100, | SITE 52 DEPTH 200-300, | 01-JUN-2012 | 19-MAY-2012 | 13 | 04-JUN-2012 | 02-JUN-2012 | 2 |
| SITE 52 DEPTH 500-600, | SITE 52 DEPTH 800-900, | | | | | | |
| SITE 52 DEPTH 1100-1200 | | | | | | | |
| EA010: Conductivity | | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 001 DEPTH 0-100, | SITE 001 DEPTH 200-300, | 01-JUN-2012 | 15-MAY-2012 | 17 | | | |
| SITE 001 DEPTH 500-600, | SITE 001 DEPTH 800-900, | | | | | | |
| SITE 001 DEPTH 1100-1200, | 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, | | | | | | |
| 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, | 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, | | | | | | |
| 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, | SITE 014 DEPTH 0-100, | | | | | | |
| 51SITE 020 DEPTH 0-100 | | | | | | | |

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|------------|---|
| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Method | | Extraction / Preparation | | Analysis | | | |
|--|---------------------------|--------------------------|--------------------|----------|---------------|------------------|---------|
| Container / Client Sample ID(s) | | Date extracted | Due for extraction | Days | Date analysed | Due for analysis | Days |
| FA010: Conductivity - Analysis Holding Time Complian | CP | | | overdue | | | overdue |
| Snan Lock Bag | | | | | | | |
| SITE 011 DEPTH 0-100, | SITE 011 DEPTH 200-300. | 01-JUN-2012 | 16-MAY-2012 | 16 | | | |
| SITE 011 DEPTH 500-600, | SITE 011 DEPTH 800-900, | 0100112012 | | 10 | | | |
| SITE 011 DEPTH 1100-1200, | SITE 014 DEPTH 200-300, | | | | | | |
| SITE 014 DEPTH 500-600, | SITE 014 DEPTH 800-900, | | | | | | |
| SITE 014 DEPTH 1100-1200, | 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, | | | | | | |
| 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, | 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, | | | | | | |
| SITE 020 DEPTH 200-300, | SITE 020 DEPTH 500-600, | | | | | | |
| SITE 020 DEPTH 800-900, | SITE 020 DEPTH 1100-1200, | | | | | | |
| 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 | | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 022 DEPTH 0-100, | SITE 022 DEPTH 200-300, | 01-JUN-2012 | 17-MAY-2012 | 15 | | | |
| SITE 022 DEPTH 500-600, | SITE 022 DEPTH 800-900, | | | | | | |
| SITE 022 DEPTH 1100-1200, | 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, | | | | | | |
| 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, | 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 | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 026 DEPTH 0-100, | SITE 026 DEPTH 200-300, | 01-JUN-2012 | 17-MAY-2012 | 15 | | | |
| SITE 026 DEPTH 500-600, | SITE 026 DEPTH 800-900, | | | | | | |
| SITE 026 DEPTH 1100-1200, | 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, | | | | | | |
| 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, | 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 | | | | | | |

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|------------|---|
| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Method | | Ex | traction / Preparation | | | Analysis | |
|--|---------------------------|----------------|------------------------|-----------------|---------------|------------------|-----------------|
| Container / Client Sample ID(s) | | Date extracted | Due for extraction | Days overdue | Date analysed | Due for analysis | Days overdue |
| EA010: Conductivity - Analysis Holding Time Complian | ce | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 031 DEPTH 0-100, | SITE 031 DEPTH 200-300, | 01-JUN-2012 | 18-MAY-2012 | 14 | | | |
| SITE 031 DEPTH 500-600, | SITE 031 DEPTH 800-900, | | | | | | |
| SITE 031 DEPTH 1100-1200, | 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, | | | | | | |
| 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, | 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, | | | | | | |
| 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, | 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, | | | | | | |
| 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, | 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 | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 041 DEPTH 0-100, | SITE 041 DEPTH 500-600, | 01-JUN-2012 | 19-MAY-2012 | 13 | | | |
| SITE 042 DEPTH 0-100, | SITE 042 DEPTH 500-600, | | | | | | |
| SITE 048 DEPTH 0-100, | SITE 048 DEPTH 500-600, | | | | | | |
| SITE 049 DEPTH 0-100, | SITE 049 DEPTH 500-600 | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 065 DEPTH 500-600, | SITE 065 DEPTH 800-900, | 01-JUN-2012 | 21-MAY-2012 | 11 | | | |
| SITE 065 DEPTH 1100-1200, | SITE 066 DEPTH 0-100, | | | | | | |
| SITE 066 DEPTH 200-300, | 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, | | | | | | |
| SITE 067 DEPTH 500-600, | SITE 067 DEPTH 800-90, | | | | | | |
| SITE 067 DEPTH 1100-1200 | | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 056 DEPTH 0-100, | SITE 056 DEPTH 200-300, | 01-JUN-2012 | 21-MAY-2012 | 11 | | | |
| 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, | 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 | | | | | | |

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|------------|---|
| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Method | Ex | traction / Preparation | | Analysis | | | |
|--|---------------------------|------------------------|-----------------|---------------|------------------|-----------------|---|
| Container / Client Sample ID(s) | Date extracted | Due for extraction | Days overdue | Date analysed | Due for analysis | Days overdue | |
| EA010: Conductivity - Analysis Holding Time Co | ompliance | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 058 DEPTH 500-600, | SITE 058 DEPTH 800-900, | 05-JUN-2012 | 21-MAY-2012 | 15 | | | |
| SITE 058 DEPTH 1100-1200, | SITE 061 DEPTH 0-100, | | | | | | |
| SITE 061 DEPTH 200-300, | 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, | | | | | | |
| 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, | 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 | | | | | | |
| Soil Glass Jar - Unpreserved | | | | | | | |
| SITE 52 DEPTH 0-100, | SITE 52 DEPTH 200-300, | 01-JUN-2012 | 19-MAY-2012 | 13 | | | |
| SITE 52 DEPTH 500-600, | SITE 52 DEPTH 800-900, | | | | | | |
| SITE 52 DEPTH 1100-1200 | | | | | | | |
| EA055: Moisture Content | | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 001 DEPTH 0-100, | SITE 001 DEPTH 200-300, | | | | 24-MAY-2012 | 22-MAY-2012 | 2 |
| SITE 001 DEPTH 500-600, | SITE 001 DEPTH 800-900, | | | | | | |
| SITE 001 DEPTH 1100-1200, | 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, | | | | | | |
| 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, | 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, | | | | | | |
| 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, | SITE 014 DEPTH 0-100, | | | | | | |
| 51SITE 020 DEPTH 0-100 | | | | | | | |

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| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Method | | Extraction / Preparation | | | Analysis | | |
|---|---------------------------|--------------------------|--------------------|-----------------|---------------|------------------|-----------------|
| Container / Client Sample ID(s) | | Date extracted | Due for extraction | Days overdue | Date analysed | Due for analysis | Days overdue |
| EA055: Moisture Content - Analysis Holding Time Compl | iance | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 011 DEPTH 0-100, | SITE 011 DEPTH 200-300, | | | | 24-MAY-2012 | 23-MAY-2012 | 1 |
| SITE 011 DEPTH 500-600, | SITE 011 DEPTH 800-900, | | | | | | |
| SITE 011 DEPTH 1100-1200, | SITE 014 DEPTH 200-300, | | | | | | |
| SITE 014 DEPTH 500-600, | SITE 014 DEPTH 800-900, | | | | | | |
| SITE 014 DEPTH 1100-1200, | 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, | | | | | | |
| 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, | 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, | | | | | | |
| SITE 020 DEPTH 200-300, | SITE 020 DEPTH 500-600, | | | | | | |
| SITE 020 DEPTH 800-900, | SITE 020 DEPTH 1100-1200, | | | | | | |
| 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 | | | | | | | |
| Soil Glass Jar - Unpreserved | | | | | | | |
| SITE 52 DEPTH 0-100, | SITE 52 DEPTH 200-300, | | | | 29-MAY-2012 | 26-MAY-2012 | 3 |
| SITE 52 DEPTH 500-600, | SITE 52 DEPTH 800-900, | | | | | | |
| SITE 52 DEPTH 1100-1200 | | | | | | | |
| ED045G: Chloride Discrete analyser | | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 001 DEPTH 0-100, | SITE 001 DEPTH 200-300, | 01-JUN-2012 | 15-MAY-2012 | 17 | | | |
| SITE 001 DEPTH 500-600, | SITE 001 DEPTH 800-900, | | | | | | |
| SITE 001 DEPTH 1100-1200, | SITE 002 DEPTH 200-300, | | | | | | |
| SITE 002 DEPTH 800-900, | SITE 002 DEPTH 1100-1200, | | | | | | |
| 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, | SITE 007 DEPTH 200-300, | | | | | | |
| SITE 007 DEPTH 500-600, | SITE 007 DEPTH 800-900, | | | | | | |
| SITE 007 DEPTH 1100-1200, | SITE 008 DEPTH 0-100, | | | | | | |
| SITE 008 DEPTH 200-300, | SITE 008 DEPTH 500-600, | | | | | | |
| SITE 008 DEPTH 800-900, | SITE 014 DEPTH 0-100, | | | | | | |
| 51SITE 020 DEPTH 0-100 | | | | | | | |

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|------------|---|
| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Method | Ex | traction / Preparation | | Analysis | | | |
|---|---------------------------|------------------------|-------------|---------------|------------------|------|---------|
| Container / Client Sample ID(s) | Date extracted | Due for extraction | Days | Date analysed | Due for analysis | Days | |
| | | | | overdue | | | overdue |
| ED045G: Chloride Discrete analyser - Analysis Hol | ding Time Compliance | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 011 DEPTH 0-100, | SITE 011 DEPTH 200-300, | 01-JUN-2012 | 16-MAY-2012 | 16 | | | |
| SITE 011 DEPTH 500-600, | SITE 011 DEPTH 800-900, | | | | | | |
| SITE 011 DEPTH 1100-1200, | SITE 014 DEPTH 200-300, | | | | | | |
| SITE 014 DEPTH 500-600, | SITE 014 DEPTH 800-900, | | | | | | |
| SITE 014 DEPTH 1100-1200, | 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, | | | | | | |
| 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, | 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, | | | | | | |
| SITE 020 DEPTH 200-300, | SITE 020 DEPTH 500-600, | | | | | | |
| SITE 020 DEPTH 800-900, | SITE 020 DEPTH 1100-1200, | | | | | | |
| 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 | | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 022 DEPTH 0-100, | SITE 022 DEPTH 200-300, | 01-JUN-2012 | 17-MAY-2012 | 15 | | | |
| SITE 022 DEPTH 500-600, | SITE 022 DEPTH 800-900, | | | | | | |
| SITE 022 DEPTH 1100-1200, | 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, | | | | | | |
| 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, | 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 | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 026 DEPTH 0-100, | SITE 026 DEPTH 200-300, | 01-JUN-2012 | 17-MAY-2012 | 15 | | | |
| SITE 026 DEPTH 500-600, | SITE 026 DEPTH 800-900, | | | | | | |
| SITE 026 DEPTH 1100-1200, | 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, | | | | | | |
| 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, | 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 | | | | | | |

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| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Method | | Extraction / Preparation | | | | | |
|---|---------------------------|--------------------------|-------------|---------------|------------------|------|---------|
| Container / Client Sample ID(s) | Date extracted | Due for extraction | Days | Date analysed | Due for analysis | Days | |
| | | | | overdue | | | overdue |
| ED045G: Chloride Discrete analyser - Analysis Holding T | ime Compliance | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 031 DEPTH 0-100, | SITE 031 DEPTH 200-300, | 01-JUN-2012 | 18-MAY-2012 | 14 | | | |
| SITE 031 DEPTH 500-600, | SITE 031 DEPTH 800-900, | | | | | | |
| SITE 031 DEPTH 1100-1200, | 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, | | | | | | |
| 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, | 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, | | | | | | |
| 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, | 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, | | | | | | |
| 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, | 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 | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 041 DEPTH 0-100, | SITE 041 DEPTH 500-600, | 01-JUN-2012 | 19-MAY-2012 | 13 | | | |
| SITE 042 DEPTH 0-100, | SITE 042 DEPTH 500-600, | | | | | | |
| SITE 048 DEPTH 0-100, | SITE 048 DEPTH 500-600, | | | | | | |
| SITE 049 DEPTH 0-100, | SITE 049 DEPTH 500-600 | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 065 DEPTH 500-600, | SITE 065 DEPTH 800-900, | 01-JUN-2012 | 21-MAY-2012 | 11 | | | |
| SITE 065 DEPTH 1100-1200, | SITE 066 DEPTH 0-100, | | | | | | |
| SITE 066 DEPTH 200-300, | 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, | | | | | | |
| SITE 067 DEPTH 500-600, | SITE 067 DEPTH 800-90, | | | | | | |
| SITE 067 DEPTH 1100-1200 | | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 056 DEPTH 0-100, | SITE 056 DEPTH 200-300, | 01-JUN-2012 | 21-MAY-2012 | 11 | | | |
| 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, | 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 | | | | | | |

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| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



| Method | Extraction / Preparation | | | Analysis | | | |
|---|---------------------------|----------------|--------------------|----------|---------------|------------------|---------|
| Container / Client Sample ID(s) | | Date extracted | Due for extraction | Days | Date analysed | Due for analysis | Days |
| | | | | overdue | | | overdue |
| ED045G: Chloride Discrete analyser - Analysis Holding T | ïme Compliance | | | | | | |
| Snap Lock Bag | | | | | | | |
| SITE 058 DEPTH 500-600. | SITE 058 DEPTH 800-900. | 05-JUN-2012 | 21-MAY-2012 | 15 | | | |
| SITE 058 DEPTH 1100-1200. | SITE 061 DEPTH 0-100. | 00 0011 2012 | | | | | |
| SITE 061 DEPTH 200-300. | 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, | | | | | | |
| 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, | 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 | | | | | | |
| Soil Glass Jar - Unpreserved | | | | | | | |
| SITE 002 DEPTH 0-100, | SITE 002 DEPTH 500-600, | 01-JUN-2012 | 15-MAY-2012 | 17 | | | |
| SITE 007 DEPTH 0-100, | SITE 008 DEPTH 1100-1200 | | | | | | |
| Soil Glass Jar - Unpreserved | | | | | | | |
| SITE 52 DEPTH 0-100, | SITE 52 DEPTH 200-300, | 01-JUN-2012 | 19-MAY-2012 | 13 | | | |
| SITE 52 DEPTH 500-600, | SITE 52 DEPTH 800-900, | | | | | | |
| SITE 52 DEPTH 1100-1200 | | | | | | | |
| EP004: Organic Matter | | | | | | | |
| Soil Glass Jar - Unpreserved | | | | | | | |
| SITE 001 DEPTH 0-100 | SITE 002 DEPTH 0-100 | 31-MAV-2012 | 15-MAV-2012 | 16 | | | |
| SITE 004 DEPTH 0-100 | SITE 007 DEPTH 0-100 | 01 10/01 2012 | 10 10/12012 | 10 | | | |
| SITE 008 DEPTH 0-100. | SITE 014 DEPTH 0-100. | | | | | | |
| 51SITE 020 DEPTH 0-100 | | | | | | | |
| Soil Glass Jar - Unpreserved | | | | | | | |
| SITE 011 DEPTH 0-100 | | 31-MAY-2012 | 16-MAY-2012 | 15 | | | |
| Soil Glass Jar - Unpreserved | | 0110012012 | 10 10/11/2012 | 10 | | | |
| SITE 022 DEPTH 0-100 | | 21 MAY 2012 | 17 MAX 2012 | 44 | | | |
| SITE 022 DEPTH 0-100 | SITE 028 DEPTH 0-100 | 31-IVIA1-2012 | 17-100-01-2012 | 14 | | | |
| SITE 029 DEPTH 0-100 | | | | | | | |
| Soil Glass Jar - Unpreserved | | | | | | | |
| SITE 031 DEPTH 0-100 | SITE 035 DEPTH 0-100 | 31-MAV-2012 | 18-MAV-2012 | 12 | | | |
| SITE 036 DEPTH 0-100 | | 51-WAT-2012 | 10-10171-2012 | 15 | | | |
| Soil Glass Jar - Unpreserved | | | | | | | |
| SITE 52 DEPTH 0-100 | | 01-JUN-2012 | 19-MAY-2012 | 13 | | | |
| Soil Glass Jar - Unpreserved | | 5. 55. 12012 | | | | | |
| SITE 041 DEPTH 0-100 | SITE 042 DEPTH 0-100 | 31-MAY-2012 | 19-MAY-2012 | 12 | | | |
| SITE 048 DEPTH 0-100 | SITE 049 DEPTH 0-100 | 01-10/21-2012 | 10-10/2012 | 14 | | | |
| Soil Glass Jar - Unpreserved | | | | | | | |
| SITE 056 DEPTH 0-100. | SITE 065 DEPTH 0-100. | 31-MAY-2012 | 21-MAY-2012 | 10 | | | |
| SITE 066 DEPTH 0-100, | SITE 067 DEPTH 0-100, | | 2. 100 11 2012 | | | | |
| SITE 067 DEPTH 200-300 | | | | | | | |

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 Work Order
 : EB1213707

 Client
 : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION

 Project
 : J000019



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 | Address | : 32 Shand Street Stafford QLD Australia 4053 | | | | | | | |
| | NAKARA NT 0810 | | | | | | | | | |
| 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 | : | | | | | | | | | |
| | | No. of samples received | : 198 | | | | | | | |
| Quote number | : ED/016/12 | 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

Signatories NATA Accredited Laboratory 825 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. Accredited for compliance with NATA ISO/IEC 17025. Signatories Position Accreditation Category Jonathon Angell Inorganic Coordinator **Brisbane Inorganics** Matt Frost Senior Organic Chemist **Brisbane Inorganics** WORLD RECOGNISED Stephen Hislop Senior Inorganic Chemist **Brisbane Inorganics** ACCREDITATION

> Address 32 Shand Street Stafford QLD Australia 4053 PHONE +61-7-3243 7222 Facsimile +61-7-3243 7218 Environmental Division Brisbane ABN 84 009 936 029 Part of the ALS Group A Campbell Brothers Limited Company





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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.

Page : 3 of 44 Work Order : EB1213707 Client : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION Project : J000019



| Sub-Matrix: SOIL | Client sample ID | | | 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 |
|---|------------------|------------|----------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Cli | ent sampli | ng date / time | 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 |
| Compound | CAS Number | LOR | Unit | 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 Potassiur | m (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 Bor | on | | | | | | | |
| 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 Discre | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 1740 | | 280 | | 160 |
| EK080: Bicarbonate Extractable Phosphore | rus (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 | | | | |

Page : 4 of 44 Work Order : EB1213707 Client : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION Project : J000019



| Sub-Matrix: SOIL | Client sample ID | | | 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 |
|--|------------------|-------------|----------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Cl | ient sampli | ng date / time | 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 |
| Compound | CAS Number | LOR | Unit | 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 Potassiu | m (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 Bor | ron | | | | | | | |
| 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 Discr | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 1080 | | 490 | | 310 |
| EK080: Bicarbonate Extractable Phospho | rus (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 | | | | |

Page : 5 of 44 Work Order : EB1213707 Client : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION Project : J000019



| Sub-Matrix: SOIL | Client sample ID | | | 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 |
|--|------------------|-------------|-----------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Cl | ient sampli | ing date / time | 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 |
| Compound | CAS Number | LOR | Unit | 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 Potassiur | m (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 Bor | on | | | | | | | |
| 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 Discr | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 2050 | | | | |
| EK080: Bicarbonate Extractable Phosphore | rus (Colwell) | | | | | | | |
| Bicarbonate Ext. P (Colwell) | | 2 | mg/kg | 52 | | | | |
| EP004: Organic Matter | | | | | | | | |
| Organic Matter | | 0.5 | % | 1.2 | | | | |

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| Sub-Matrix: SOIL | | Cli | ent sample ID | 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 |
|---|---------------|-------------|----------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Cli | ient sampli | ng date / time | 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 |
| Compound | CAS Number | LOR | Unit | 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 Potassiur | n (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 Bor | on | | | | | | | |
| 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 Discre | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 1960 | | 480 | | 470 |
| EK080: Bicarbonate Extractable Phosphor | rus (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 | | | | |

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| Sub-Matrix: SOIL | | Clie | ent sample ID | SITE 008 DEPTH 0-100 | SITE 008 DEPTH | SITE 008 DEPTH | SITE 008 DEPTH | SITE 008 DEPTH |
|---|--------------|------------|----------------|----------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | | 200-300 | 500-600 | 800-900 | 1100-1200 |
| | Cli | ent sampli | ng date / time | 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 |
| Compound | CAS Number | LOR | Unit | 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 Potassiun | n (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 Bor | on | | | | | | | |
| 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 Discre | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 1860 | | 540 | | 270 |
| EK080: Bicarbonate Extractable Phosphor | us (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 | | | | |

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| Sub-Matrix: SOIL | | Cli | ent sample ID | SITE 011 DEPTH 0-100 | SITE 011 DEPTH | SITE 011 DEPTH | SITE 011 DEPTH | SITE 011 DEPTH |
|--|---------------|-------------|----------------|----------------------|----------------|-------------------|----------------|-------------------|
| | | iont compli | na data / tima | 00 MAX 2012 15:00 | 200-300 | 500-600 | 800-900 | 1100-1200 |
| | | | | 09-MAT-2012 15.00 | EB1212707 027 | 09-MAT-2012 15.00 | EB1212707 020 | 09-MAT-2012 15.00 |
| Compound | CAS Number | LOR | Unit | EB1213707-026 | EB1213707-027 | EB1213/0/-028 | EB1213/07-029 | 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 Potassiur | m (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 Bor | on | | | | | | | |
| 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 Discr | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 1670 | | 420 | | 380 |
| EK080: Bicarbonate Extractable Phospho | rus (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 | | | | |

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| Sub-Matrix: SOIL | | Cli | ent sample ID | SITE 014 DEPTH 0-100 | SITE 014 DEPTH | SITE 014 DEPTH | SITE 014 DEPTH | SITE 014 DEPTH |
|---|----------------------|-------------|-----------------|----------------------|-------------------|-------------------|-------------------|-------------------|
| | | | and the filters | 00 1411/ 0040 45 00 | 200-300 | 500-600 | 800-900 | 1100-1200 |
| | Cli | ient sampli | ng date / time | 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 | EB1213707-031 | 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 Potassiun | n (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 Bord | on | | | | | | | |
| 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 Discre | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 860 | | 200 | | 120 |
| EK080: Bicarbonate Extractable Phosphor | us (Col <u>well)</u> | | | | | | | |
| 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 | | | | |

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| Sub-Matrix: SOIL | | Cli | ent sample ID | 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 |
|------------------------------------|------------|-------------|-----------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Ci | lient sampl | ing date / time | 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 |

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| Sub-Matrix: SOIL | | Cli | ent sample ID | 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 |
|------------------------------------|------------|--------------|-----------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Ci | lient sampli | ing date / time | 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 |

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| Sub-Matrix: SOIL | | Cli | ent sample ID | 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 |
|------------------------------------|------------|-------------|-----------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Cl | ient sampli | ing date / time | 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 |

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| Sub-Matrix: SOIL | | Clie | ent sample ID | 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 |
|---|---------------|-------------|----------------|---------------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Cli | ient sampli | ng date / time | 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 Potassiur | n (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 Bor | on | | | | | | | |
| 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 Discre | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 2190 | | 450 | | 290 |
| EK080: Bicarbonate Extractable Phosphore | rus (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 | | | | |

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| Sub-Matrix: SOIL | | Cli | ent sample ID | 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 |
|------------------------------------|------------|-------------|----------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Cl | ient sampli | ng date / time | 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 |

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| Sub-Matrix: SOIL | | Clie | ent sample ID | 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 |
|---|---------------|-------------|----------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Cl | ient sampli | ng date / time | 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 | EB1213707-061 | 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 Potassiur | m (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 Bor | on | | | | | | | |
| 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 Discre | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 1100 | | 600 | | 380 |
| EK080: Bicarbonate Extractable Phosphore | rus (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 | | | | |

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| Sub-Matrix: SOIL | Client sample ID | | | 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 |
|------------------------------------|------------------|--------------|----------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Ci | lient sampli | ng date / time | 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 |
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| Sub-Matrix: SOIL | | Cli | ent sample ID | 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 |
|------------------------------------|-----------------------------|-----|---------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Client sampling date / time | | | 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 |

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| Sub-Matrix: SOIL | | Cli | ent sample ID | 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 |
|------------------------------------|------------|--------------|-----------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Ci | lient sampli | ing date / time | 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 |

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| Sub-Matrix: SOIL | | Clie | ent sample ID | 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 |
|--|---------------|-------------|----------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Cl | ient sampli | ng date / time | 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 Bor | on | | | | | | | |
| 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 Discr | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 1020 | | 440 | | 270 |
| EK080: Bicarbonate Extractable Phospho | rus (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 | | | | |

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| Sub-Matrix: SOIL | | Clie | ent sample ID | SITE 027 DEPTH 0-100 | SITE 027 DEPTH | SITE 027 DEPTH | SITE 027 DEPTH | SITE 027 DEPTH |
|--|---------------|------------|----------------|----------------------|-------------------|-------------------|-------------------|-------------------|
| | Cli | ent sampli | ng date / time | 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 | EB1213707-086 | 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 Potassiur | m (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 Bor | on | | | | | | | |
| 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 Discr | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 1060 | | | | |
| EK080: Bicarbonate Extractable Phospho | rus (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 | | | | |

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| Sub-Matrix: SOIL | | Clie | ent sample ID | SITE 028 DEPTH 0-100 | SITE 028 DEPTH 200-300 | SITE 028 DEPTH | SITE 028 DEPTH | SITE 028 DEPTH |
|--|---------------|------------|----------------|----------------------|---------------------------|-------------------|-------------------|-------------------|
| | Cli | ent sampli | ng date / time | 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 | EB1213707-091 | 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 Bor | on | | | | | | | |
| 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 Discre | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 1350 | | 580 | | 380 |
| EK080: Bicarbonate Extractable Phosphor | rus (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 | | | | |

Page : 22 of 44 Work Order : EB1213707 Client : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION Project : J000019



| Sub-Matrix: SOIL | | Clie | ent sample ID | 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 |
|---|---------------|-------------|----------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Cl | ient sampli | ng date / time | 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 | EB1213707-096 | 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 Potassiur | m (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 Bor | on | | | | | | | |
| 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 Discre | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 980 | | 620 | | 340 |
| EK080: Bicarbonate Extractable Phosphore | rus (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 | | | | |

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| Sub-Matrix: SOIL | | Cli | ent sample ID | SITE 031 DEPTH 0-100 | SITE 031 DEPTH | SITE 031 DEPTH | SITE 031 DEPTH | SITE 031 DEPTH |
|--|-----------------------|-------------|----------------|----------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | | 200-300 | 500-600 | 800-900 | 1100-1200 |
| | Cl | ient sampli | ng date / time | 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 Bor | on | | | | | | | |
| 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 Discre | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 1680 | | 50 | | 470 |
| EK080: Bicarbonate Extractable Phosphore | rus (Colwel <u>l)</u> | | | | | | | |
| 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 | | | | |

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| Sub-Matrix: SOIL | Client sample ID | | 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 | |
|------------------------------------|------------------|--------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|-------------------|
| | Ci | lient sampli | ng date / time | 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 |

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| Sub-Matrix: SOIL | | Cli | ent sample ID | 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 |
|------------------------------------|-----------------------------|-----|---------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Client sampling date / time | | | 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 |

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| Sub-Matrix: SOIL | | Cli | ent sample ID | 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 |
|------------------------------------|------------|-------------|-----------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Cl | ient sampli | ing date / time | 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 |

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| Sub-Matrix: SOIL | | Clie | ent sample ID | 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 |
|---|---------------|-------------|----------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Cl | ient sampli | ng date / time | 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 Potassiur | m (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 Bor | on | | | | | | | |
| 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 Discre | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 530 | | 240 | | 90 |
| EK080: Bicarbonate Extractable Phosphore | rus (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 | | | | |

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| Sub-Matrix: SOIL | | Clie | ent sample ID | 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 |
|---|---------------|-------------|----------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Cl | ient sampli | ng date / time | 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 | EB1213707-126 | 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 Potassiur | m (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 Bor | on | | | | | | | |
| 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 Discre | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 730 | | 390 | | 220 |
| EK080: Bicarbonate Extractable Phospho | rus (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 | | | | |

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| Sub-Matrix: SOIL | | Cli | ent sample ID | 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 |
|------------------------------------|------------|-------------|----------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|
| | Cl | ient sampli | ng date / time | 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 |

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| Sub-Matrix: SOIL | Client sample ID | | 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 | |
|------------------------------------|------------------|-------------|----------------------|---------------------------|---------------------------|---------------------------|-----------------------------|-------------------|
| | Ci | ient sampli | ing date / time | 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 |

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| Sub-Matrix: SOIL | | Cli | ent sample ID | 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 |
|---|--------------|-------------|----------------|----------------------|---------------------------|----------------------|---------------------------|----------------------|
| | CI | ient sampli | ng date / time | 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 | n (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 Bor | on | | | | | | | |
| 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 Discre | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 1690 | 450 | 2930 | 370 | 1160 |
| EK080: Bicarbonate Extractable Phosphor | us (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 |

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| Sub-Matrix: SOIL | | Clie | ent sample ID | 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 |
|---|---------------|-------------|----------------|---------------------------|----------------------|---------------------------|----------------------|---------------------------|
| | Cli | ient sampli | ng date / time | 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 |
| Compound | CAS Number | LOR | Unit | EB1213707-146 | EB1213707-147 | EB1213707-148 | EB1213707-149 | EB1213707-150 |
| 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 | n (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 Bor | on | | | | | | | |
| 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 Discre | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 460 | 1160 | 310 | 1160 | |
| EK080: Bicarbonate Extractable Phosphor | rus (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 | |

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| Sub-Matrix: SOIL | Client sample ID | | | 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 |
|--|------------------|-------------|----------------|---------------------------|---------------------------|-----------------------------|----------------------|---------------------------|
| | Cl | ient sampli | ng date / time | 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 | EB1213707-151 | EB1213707-152 | EB1213707-153 | EB1213707-154 | EB1213707-155 |
| 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 Potassi | um (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 Dis | crete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 270 | | | | |
| EK080: Bicarbonate Extractable Phosph | orus (Colwell) | | | | | | | |
| Bicarbonate Ext. P (Colwell) | | 2 | mg/kg | <2 | | | | |

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| Sub-Matrix: SOIL | Client sample ID | | | 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 |
|------------------------------------|------------------|-------------|----------------|---------------------------|---------------------------|-----------------------------|----------------------|---------------------------|
| | Cli | ient sampli | ng date / time | 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 | EB1213707-156 | EB1213707-157 | EB1213707-158 | EB1213707-159 | EB1213707-160 |
| 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 |

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| Sub-Matrix: SOIL | Client sample ID | | | 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 |
|------------------------------------|------------------|--------------|-----------------|---------------------------|---------------------------|-----------------------------|----------------------|---------------------------|
| | Ci | lient sampli | ing date / time | 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 | EB1213707-161 | EB1213707-162 | EB1213707-163 | EB1213707-164 | EB1213707-165 |
| 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 |

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| Sub-Matrix: SOIL | Client sample ID | | | 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 |
|------------------------------------|------------------|-------------|----------------|---------------------------|---------------------------|-----------------------------|----------------------|---------------------------|
| | Cli | ient sampli | ng date / time | 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 | EB1213707-166 | EB1213707-167 | EB1213707-168 | EB1213707-169 | EB1213707-170 |
| 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 |

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| 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 |

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| Sub-Matrix: SOIL | | Cli | ent sample ID | 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 |
|--|---------------|-------------|-----------------|---------------------------|---------------------------|-----------------------------|----------------------|---------------------------|
| | Cl | ient sampli | ing date / time | 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 | EB1213707-176 | 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 | m (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 Bor | on | | | | | | | |
| 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 Discr | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | | | | 750 | |
| EK080: Bicarbonate Extractable Phospho | rus (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 | |

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| Sub-Matrix: SOIL | | Cli | ent sample ID | SITE 065 DEPTH | SITE 065 DEPTH | SITE 065 DEPTH | SITE 066 DEPTH 0-100 | SITE 066 DEPTH |
|--|---------------|------------|----------------|-------------------|-------------------|-------------------|----------------------|-------------------|
| | Cli | ent sampli | ng date / time | 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 | EB1213707-181 | 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 Bor | on | | | | | | | |
| 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 Discre | ete Analyser | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 390 | | 160 | 1980 | |
| EK080: Bicarbonate Extractable Phosphor | rus (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 | |

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| Sub-Matrix: SOIL | | Clie | ent sample ID | 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 | |
|--|---------------|-------------|----------------|---------------------------|---------------------------|-----------------------------|----------------------|---------------------------|--|
| | Cl | ient sampli | ng date / time | 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 | EB1213707-186 | 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 Bor | ron | | | | | | | | |
| 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 Discr | ete Analyser | | | | | | | | |
| Total Kjeldahl Nitrogen as N | | 20 | mg/kg | 420 | | 310 | 1840 | 1290 | |
| EK080: Bicarbonate Extractable Phospho | rus (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 | |

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| Sub-Matrix: SOIL | | Clie | ent sample ID | SITE 067 DEPTH | SITE 067 DEPTH | SITE 067 DEPTH | SITE 52 DEPTH 0-100 | SITE 52 DEPTH |
|--|-------------|-------------|----------------|-------------------|-------------------|-------------------|---------------------|-------------------|
| | | | | 500-600 | 800-90 | 1100-1200 | | 200-300 |
| | Cli | ient sampli | ng date / time | 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 |
| Compound | CAS Number | LOR | Unit | 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 Potassiu | m (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 Bor | on | | | | | | | |
| 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 | |

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| Sub-Matrix: SOIL | Client sample ID | | | SITE 52 DEPTH | SITE 52 DEPTH | SITE 52 DEPTH | | |
|--|------------------|-------------|----------------|-------------------|-------------------|-------------------|--|--|
| | Cli | ient sampli | ng date / time | 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 |

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|------------|---|
| Work Order | : EB1213707 |
| Client | : HORIZON ENVIRONMENTAL, SOIL SURVEY & EVALUATION |
| Project | : J000019 |



Sub-Matrix: SOIL Analytical Results Method: Compound Client sample ID - Client sampling date / time 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 SITE 036 DEPTH 500-600 - 11-MAY-2012 15:00 ED044: Sulfur as S 47 SITE 036 DEPTH 1100-1200 - 11-MAY-2012 15:00 ED044: Sulfur as S 18 SITE 041 DEPTH 0-100 - 12-MAY-2012 15:00 ED044: Sulfur as S 5 SITE 041 DEPTH 500-600 - 12-MAY-2012 15:00 ED044: Sulfur as S 21 ED044: Sulfur as S SITE 042 DEPTH 0-100 - 12-MAY-2012 15:00 8 SITE 042 DEPTH 500-600 - 12-MAY-2012 15:00 ED044: Sulfur as S 9 ED044: Sulfur as S SITE 048 DEPTH 0-100 - 12-MAY-2012 15:00 5 SITE 048 DEPTH 500-600 - 12-MAY-2012 15:00 ED044: Sulfur as S 9 SITE 049 DEPTH 0-100 - 12-MAY-2012 15:00 ED044: Sulfur as S 10 SITE 049 DEPTH 500-600 - 12-MAY-2012 15:00 ED044: Sulfur as S 31 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 ED044: Sulfur as S 20 ED044: Sulfur as S SITE 065 DEPTH 0-100 - 14-MAY-2012 15:00 6 SITE 065 DEPTH 500-600 - 14-MAY-2012 15:00 ED044: Sulfur as S 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 SITE 066 DEPTH 1100-1200 - 14-MAY-2012 15:00 ED044: Sulfur as S 7 SITE 067 DEPTH 0-100 - 14-MAY-2012 15:00 ED044: Sulfur as S 6 SITE 067 DEPTH 200-300 - 14-MAY-2012 15:00 ED044: Sulfur as S 4 SITE 067 DEPTH 500-600 - 14-MAY-2012 15:00 ED044: Sulfur as S 2 SITE 067 DEPTH 1100-1200 - 14-MAY-2012 15:00 ED044: Sulfur as S 2 SITE 52 DEPTH 0-100 - 12-MAY-2012 15:00 ED044: Sulfur as S 9 SITE 52 DEPTH 500-600 - 12-MAY-2012 15:00 ED044: Sulfur as S 46 SITE 52 DEPTH 1100-1200 - 12-MAY-2012 15:00 ED044: Sulfur as S 9