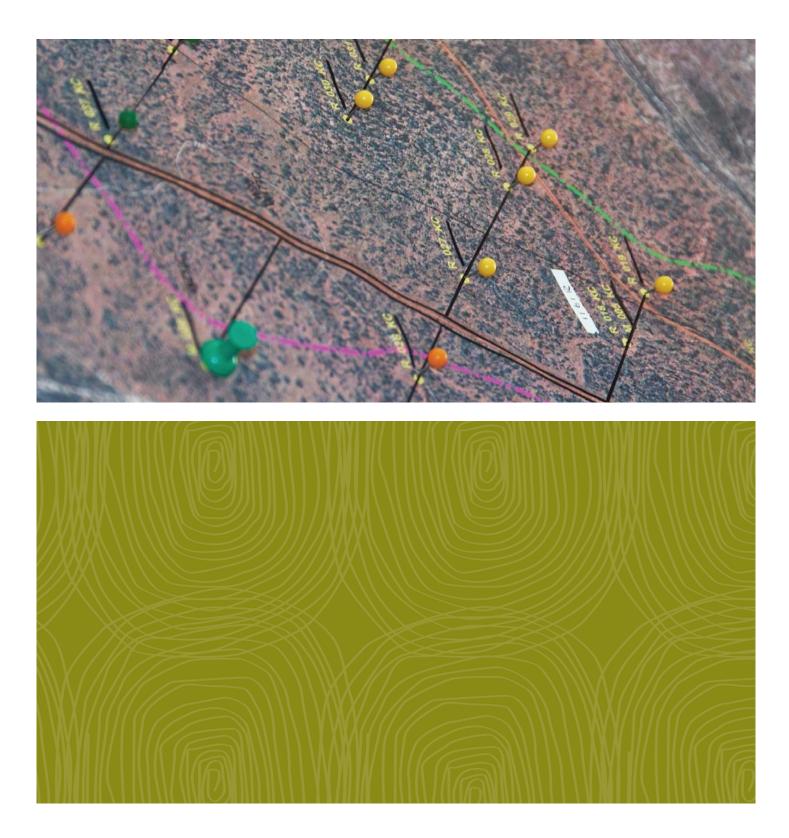


Alpha Coal Project Supplementary EIS • ADDENDUM

Out-of-Pit Tailings Storage Facility: Geotechnical Assessment





Final Report Alpha Coal Project Out-of-Pit Tailings Storage Facility (TSF): Geotechnical Investigation

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Abbreviations

Abbreviation	Description
BFS	Bankable Feasibility Study
DERM	Department of Environment and Resource Management of Queensland
DP	Douglas Partners
EIS	Environmental Impact Statement
HCPL	Hancock Coal Pty Ltd
LiDAR	Light Detection And Ranging
NATA	National Association of Testing Authorities
PVC	Polyvinyl Chloride
РВ	Parsons Brinkerhoff
SEIS	Supplementary Environmental Impact Statement
SPT	Standard Penetration Test
URS	URS Australia Pty Ltd



Executive Summary

As part of the Supplementary Environmental Impact Statement (SEIS), URS carried out a geotechnical investigation to assess the suitability of the Tailings Storage Facility (TSF) proposed in the Environmental Impact Statement (EIS) Bankable Feasibility Study (BFS) for the Alpha Coal Project. The objective of the investigation was to satisfy the Queensland Department of Environmental Management's (DERM) concerns regarding:

- Potential for tailings liquor to migrate through surface and/or near surface soils into Lagoon Creek
- Potential for tailings liquor to seep through the floor of the TSF and contaminate groundwater

The investigation comprised geologic mapping; drilling 14 exploratory boreholes to depths ranging from 10.0m to 20.0m, with in situ standard penetration tests (SPT) and falling head permeability tests in soil, and packer tests in rock; excavation of 52 test pits; and laboratory testing of soil and rock samples from the boreholes and test pits.

Based on the current investigation and review of data from previous investigations, the geologic model for the entire TSF footprint can generally be described as:

- 0.0m to 0.7m Topsoil/Alluvium (loose to medium dense, silty, fine to medium grained sand)
- 0.7m to 1.8m Residual Soil derived from weathering of Colinlea Sandstone (very dense silty/clayey sand and low plasticity sandy silt/clay mixes)
- Below 1.8m Low strength, completely weathered (CW) to highly weathered (HW) Colinlea Sandstone

In situ falling head permeability and packer tests in the floor of the TSF indicate a permeability ranging from 2.3 x 10^{-7} m/sec to 7.3 x 10^{-9} m/sec.

It is therefore concluded that, the TSF site as proposed in the BSF is suitable for the intended purpose. This conclusion is based on the following:

Surface Water Contamination: Surficial geologic mapping and subsurface investigations by borehole and test pit showed that it is unlikely that well-developed Lagoon Creek palaeochannels or deep cross drainage alluvial channels are present beneath the proposed TSF footprint. Slight horizontal migration of tailings liquor through surficial alluvial or low density residual soils can be expected during the life-of-mine, however, construction of an engineered cutoff trench that intercepts the soil/weathered rock interface should mitigate the risk of seepage into Lagoon Creek.

Groundwater Contamination: The low hydraulic conductivities measured during in situ falling head permeability tests and packer tests in the residual soils and weathered sandstone in the floor of the TSF footprint show that significant vertical migration of tailings liquor into the groundwater table is unlikely. Therefore, it is recommended that the low permeability blanket/liner proposed in the BFS report be substituted by moisture conditioning and proof rolling the soils in the floor of the TSF prior to tailings storage. It is recommended that a groundwater monitoring program comprising a series of piezometers be established to regularly assess the groundwater depth and quality around the perimeter of the proposed TSF.

Embankment Foundation: The soils and weathered rock in the area of the proposed TSF should provide a suitable strength, low permeability foundation to support the proposed TSF embankments.



Executive Summary

Construction Materials: The upper 1.0m to 3.0m of silty/clayey sand and silty/sandy clay that occurs over most of the TSF footprint should be suitable for use as borrow material for construction of the proposed TSF embankments. Crushing and processing of basalt from a potential quarry approximately 20km northeast of the site is expected to produce sand and gravel for filters and drains, and slope protection.

Construction Considerations: Excavation of the surface material to a depth of about 3.0m for TSF embankment construction can be effected with conventional earthmoving equipment such as scrapers, and hydraulic excavators. Compaction of the final exposed subgrade within the footprint of the TSF storage area would be expected to further mitigate downward migration of tailings liquor.

1.1 General

Hancock Coal Pty Ltd (HCPL) is developing the Alpha Coal Project (Project), a 30 Mtpa open-pit thermal coal mine with a life-of-mine planned for 30 years and the potential for future development of underground reserves. The project is located in the Galilee Basin, 50km northwest of the township of Alpha, 160km west of Emerald and 250km east of Longreach, in central Queensland, Australia. Figure 1-1 shows the project location.

The TSF Geotechnical Investigation characterises the surface and subsurface geology and geotechnical conditions at the site of the TSF, as proposed in the EIS BFS, prepared in 2011. The investigation was carried out by URS between July and October, 2011.

This report is organised with an Executive Summary; an Introduction which gives a brief background of the investigation, states the objectives, describes the site, and summarises previous investigations; Geotechnical Investigation details the scope of the investigation and methodology; Geological and Geotechnical Characterisation describes the findings of the investigation; and Conclusions and Recommendations emphasise the implications of the findings and outlines the path forward. A map showing the location of the exploratory boreholes and test pits, a surface geology map, a soil thickness isopach map, a series of geologic sections and a permeability contour map; information from previous investigations; borehole and test pit logs and photographs; results of in situ testing; and laboratory test results are included as appendices to the report.



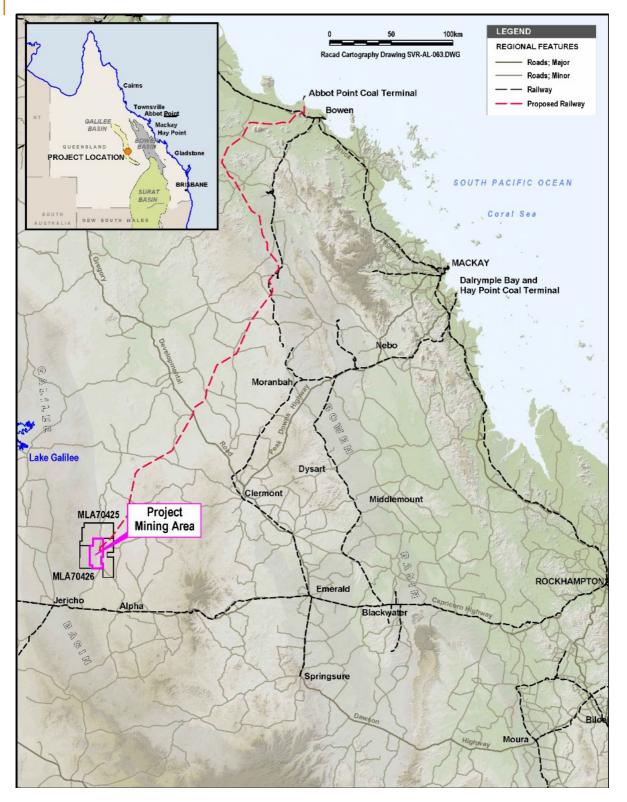


Figure 1-1 Project Location

1.2 Background

In November 2010, Parson Brinckerhoff (PB) prepared a report entitled "Alpha Coal Project Tailings Storage Facility - Location Options Report" which identified the location of the out-of-pit TSF included in the BFS and EIS. In April 2011, PB prepared a report entitled "Alpha Coal Tailings Storage Facility - Concept Design Report". During preparation of the SEIS, in order to satisfy the Queensland DERM that the proposed TSF site was suitable from a geotechnical perspective, an additional geotechnical investigation was requested to supplement previous findings.

1.3 Objective

The objective of the TSF geotechnical investigation was to determine if the assumptions regarding the geotechnical characteristics of the TSF included in the BFS and EIS render the site suitable for storing tailings safely, with minimal impact to the environment for the life-of-mine. Specific risks to be addressed are:

- Potential for tailings liquor to migrate through surface and/or near surface soils into Lagoon Creek
- · Potential for tailings liquor to seep through the floor of the TSF and contaminate groundwater

1.4 Site Description

The site proposed for the TSF in the EIS and BFS covers an area of around 2,600ha, spanning approximately 10.5km (north to south) by 3.2km (east to west) at its greatest extent.

The proposed TSF is bounded to the west by Lagoon Creek, which runs parallel to and around 2.0km east of the site, and by a northerly trending, low ridge that also runs parallel to the TSF and defines the eastern site limits.

The site generally slopes very gently (around 1°) and drains from the eastern ridge crest at approximate elevation 380mAMD towards Lagoon Creek in the west, at approximately 310mAMD. Representative topography at the site is depicted in Plates 1-1 and 1-2.









Plate 1-2 Greater vertical relief along the eastern TSF site boundary.

All creeks and drainage lines within the investigation area are ephemeral and predominantly poorly defined. They typically provide channels for westerly flowing runoff from the slightly elevated land to the east. Recognisable drainage lines typically fan out on encountering the more level land on the eastern flank of the Lagoon Creek flood plain. Runoff continues westward across the grassland either as sheet flow or in ill defined watercourses towards Lagoon Creek. Plates 1-3 and 1-4 show examples of drainage pathways observed across the site.



Plate 1-3 Typical poorly-defined east-west drainage channel.



Plate 1-4 Incised drainage channel, as observed along the eastern TSF site boundary.



Plate 1-5 Typical eastern site vegetation, comprising low-lying shrubbery and moderately-dense woodland.



Plate 1-6 Typical western site vegetation, comprising tall grassland with patchy woodland.

The site is generally covered with light to moderately-dense vegetation, ranging from tall grass, to medium sized shrubs, to eucalyptus (iron bark and short bark) woodland, as shown in Plates 1-5 and 1-6. Some very dense vegetation was also encountered along sections of the eastern site boundary.

1.5 **Previous Investigations**

1.5.1 Historical Geological Investigations through 2009

Coal exploration began in the Galilee Basin with drilling by the Queensland Department of Mines in the early 1970s. Later that decade, BHP Limited drilled 148 coal exploration holes, but determined the resource was uneconomical because of the thickness of Tertiary overburden. 82 of these boreholes were located in the northern part of the Project area. Subsequently Shell (Aust) Pty Ltd and Western Mining Company Ltd drilled an additional 50 exploration boreholes in the area.

In 2008 HPPL commissioned topographic mapping using LiDAR technology which resulted in aerial photographic coverage of the site as well as the development of a digital terrain model (DTM). Also in that year historical geological and geophysical coal related data was compiled into an electronic data base (Golder 2008). This allowed the development of a geologic model for the Project that was utilised for the EIS and BFS.



In 2008 HPPL initiated a drilling program of 153 holes totalling 15,729m to confirm and compliment the existing data. Subsequent to that in 2009 an additional 46 boreholes totalling 3,230m were drilled as part of a bridging study. Cross hole geophysics was carried out between 220 boreholes drilled in 2008 – 2009 for coal seam correlation. Laboratory analysis was also carried out on coal samples obtained from the 2008 – 2009 drilling programs.

To estimate the Project resource, geological data was compiled in Geological Database (GDB) in 2010.

1.5.2 2010 Geotechnical Investigation

Douglas Partners (DP) carried out a preliminary geotechnical investigation in 2010 and produced a report entitled *"Interim Report on Preliminary Geotechnical Investigation"*, 3 November 2010. The investigation was undertaken to provide information for ongoing feasibility studies for Project related infrastructure including the proposed area for the TSF contained in the EIS and BFS.

The investigation comprised drilling 15 boreholes, six hand augured bores and excavation of 58 test pits across the mine infrastructure area (MIA). Four of these boreholes, and 15 test pits were located in the area of the TSF. Holes were drilled by solid flight augers, washboring, and NMLC coring techniques to depths up to 27 m. Standard penetration tests (SPT) were conducted at 1.5 m intervals. Core was recovered in split inner tube, triple tube samplers. Standpipe piezometers were installed in each borehole upon completion. Falling head permeability tests were carried out in situ during the investigation. In addition, samples were collected from the drill holes and test pits, and subjected to laboratory testing. Boreholes and test pits were logged and photographed, and included in the report as well as the results of laboratory testing.

Borehole and test pit logs, results of falling head permeability tests, and laboratory test results from the DP 2010 investigation are include in Appendix B.

1.5.3 2011 Supplemental Geotechnical Investigation

A supplementary geotechnical investigation was carried out by DP between March and July 2011. The objective was to add to the level of information gained from the 2010 investigation, especially with regard to further delineating the extent of possible on-site borrow material sources, and assessing options to stabilise and improve the characteristics of subgrade and other borrow materials.

The investigation included the drilling of nine boreholes and the excavation of 32 test pits over the MIA, followed by laboratory testing. The investigation included six additional test pits excavated in the area of the TSF.

Test pit logs from this investigation in the area of the proposed TSF can also be found in Appendix B.

2.1 General

The fieldwork phase of the geotechnical investigation was undertaken during the period of 17 July to 12 August, 2011. It comprised a site walkover assessment (including surficial geologic mapping), 52 machine excavated test pits, together with 14 exploratory boreholes, including in-situ testing. There was a provision for geophysical investigations within the scope of work but this was deemed to be unnecessary. Samples obtained in the field were transported to a National Association of Testing Authorities (NATA) registered laboratory and tested.

The investigation was carried out under the supervision of a senior URS Engineering Geologist who, in conjunction with URS field staff, nominated sampling and testing depths, and logged the recovered subsurface conditions. The descriptions of the boreholes were logged in general accordance with the "Australian Guidelines for Soil and Rock Descriptions" (AS1726).

In advance of the investigation, the locations of the exploratory boreholes and test pits were pegged, cultural heritage clearances were obtained, and access was pioneered by Salva Resources. Final coordinates and elevations of the boreholes and test pits were measured using hand held GPS equipment, accurate to approximately +/- 5m.

Borehole and test pit locations relative to the footprint of the TSF are shown on URS Drawing No. 42626683-GE001, as presented in Appendix A.

2.2 Site Walkover Assessment/Geologic Mapping

Prior to commencing the subsurface investigation, a walkover assessment was undertaken to evaluate the site. This included documenting and photographing notable surface features, prominent vegetation types, drainage pathways, and the exposed surface soils/rock across the site as well as at each exploratory test location. This assessment has been compiled as a surficial geologic map (URS Drawing No. 42626683-GE002) of the area to be covered by the proposed TSF, as presented in Appendix A.

2.3 Boreholes

2.3.1 General

A total of 14 exploratory boreholes were drilled during the investigation. All boreholes reached their target depths, with nine drilled to a depth of approximately 10.0m and five to a depth of around 20.0m (located along the western edge of the site). A summary of the locations, depths, and ground surface elevations for each borehole is presented in Table 2-1. The borehole logs and corresponding core photographs are included in Appendix C.

Borehole	GPS Coordinates		Collar Elevation (mAHD)	Depth (m)	
Location	Northing	Easting		Deptil (III)	
BH-01	7429510	0451020	322	20.0	
BH-02	7429351	0452227	329	10.0	
BH-03	7429250	0453345	338	10.0	

Table 2-1 Exploratory Borehole Summary



Borehole	GPS Coordinates		Caller Elevation (mALID)		
Location	Northing	Easting	 Collar Elevation (mAHD) 	Depth (m)	
BH-04	7427970	0450695	321	20.0	
BH-05	7427936	0451853	329	10.0	
BH-06	7427953	0452859	338	12.0	
BH-07	7425884	0450748	322	20.2	
BH-08	7425936	0451854	331	10.0	
BH-09	7426169	0452755	338	10.0	
BH-10	7424122	0450696	323	20.0	
BH-11	7424103	0451745	330	10.0	
BH-12	7423924	0452644	339	10.0	
BH-13	7422312	0450717	328	20.0	
BH-14	7421310	0452120	340	10.0	

The exploratory boreholes were advanced from the ground surface using a 120mm solid flight auger and mud rotary techniques, with in situ testing by Standard Penetration Test (SPT). When refusal with these methods was reached or as subsurface conditions allowed, NQ3 wireline coring was then adopted and water pressure (packer) testing carried out where possible. The drilling was performed by *TerraTest*, using a Drillcat Explorer 200 track-mounted rig. Following completion of the exploratory drilling, piezometers were installed in select borehole locations.

Soil samples and core recovered from the boreholes was logged, stored in boxes and photographed accordingly. Selected samples were then sent to a NATA registered laboratory for testing.

Holes were also augered through a section of the soil horizon adjacent to each of the exploratory borehole locations, for the purpose of conducting in situ soil permeability tests.

2.3.2 Soil Permeability Tests

Fourteen (14) in situ, falling head tests were carried out in 120mm diameter auger holes, drilled into the surficial soils adjacent to each respective exploratory borehole. Falling head tests were performed between the depths of 1.5m and 3.2m to assess the in situ permeability.

Following drilling, the holes were filled with water to the ground surface level and left to "soak" overnight. The following morning, the standing water level within the holes was measured prior to refilling, with the subsequent drop in water level then recorded at specific time intervals over a 4 hour period. While care was taken during the soaking process, due to the loose, granular nature of the near surface soils, inevitably some soil was displaced to the bottom of the test holes as water was introduced, resulting in the boreholes typically caving an additional 0.3m from the final augured depth. At the end of testing, boreholes were backfilled with drill cuttings and levelled.

2.3.3 SPT

SPTs were conducted at nominal 1.0m to 1.5m intervals in each exploratory borehole to assess the in situ soils resistance to dynamic penetration (strength).

SPT comprises the measurement of the penetration resistance of the soil or rock to a 60kg hammer falling 760mm driving a 50mm diameter split sampler tube. The number of blows to drive an initial 150mm (for "seating" the apparatus into the testing stratum) is recorded, and similarly the number of blows required to drive the next two increments of 150mm is also recorded.

The number of blows required to drive the final 300mm following the seating is summed and recorded as the Raymond (or "N") number. In cases where the hammer is bouncing on the anvil, and where the resistance results in negligible penetration, or where the total number of blows per 150mm following "seating" reach 50, then "SPT refusal" is deemed to have occurred. While this is never intended to imply that rock has been encountered, based on the nature of the geology observed across the site and for the purpose of this report, the "SPT refusal" criteria has been adopted to establish the soil/rock interface.

2.3.4 Water Pressure (Packer) Testing

Water pressure (Packer) tests were conducted in seven of the 14 boreholes drilled within the footprint of the proposed TSF, to evaluate the in-situ hydraulic conductivity of the bedrock. These tests were performed in general accordance with the procedures for "Pressure Permeability Tests in Stable Rock", described in the Groundwater Manual (US Bureau of Reclamation, 1995). This data is needed in order to evaluate possible exfiltration rates of tailings liquor into the underlying bedrock and for liner design (if required). Packer tests were generally carried out within bedrock (cored section of the boreholes) over 3m intervals, and performed from the top down (as the boreholes were advanced), using a single packer arrangement.

Three-stage pressure tests were generally performed over each interval, conducted at 75%, and 100% of the baseline pressure, defined as 22.6kPa/m of depth from the ground surface to the centre of the test interval. The third stage was conducted at the same pressure as the first stage, following the test at 100% baseline pressure.

Packer tests were typically run for 5 minutes at each pressure step once the pressure stabilised. Water take, pressure data, borehole diameter, and testing intervals were used to calculate hydraulic conductivity values in both cm/sec (Zangar Pg. 48) and Lugeons (Houlsby) for each test. These water pressure tests allowed for interpretation of fracture changes during testing such as dilation, washout, and fracture filling.

Due to the limitations of testing at such shallow depths (i.e. very low pressures involved), the standard five-stage approach to testing each interval (conducted at 50%, 75%, and 100% of the baseline pressure) was not adopted during this investigation.

2.3.5 Monitoring Wells

Piezometers (monitoring wells) were installed in 11 of the 14 exploratory boreholes between the depths of 10.0m and 20.0m, to provide both groundwater level data and samples for groundwater testing. Piezometer installation was performed by *TerraTest* following borehole completion (drilling).

The monitoring wells were constructed using 50mm inside diameter polyvinyl chloride (PVC) pipe with 1mm factory slotted screens and an upright steel monument. Each flush jointed casing string had a threaded bottom cap. At the bottom of the piezometer, a 6.0m screen was installed. A sand pack consisting of clean wash sand was installed in the piezometer annulus at least 0.5m above the screened interval. A 0.5m thick bentonite seal was then installed above the sand pack filter. Above the



bentonite seal, cement grout was installed in the annular space to approximately 0.3m below the ground surface. Following grouting, an above-grade, upright locking monument was installed to 0.7m above ground level (approximate height of riser), and concreted in place. The piezometer locations were surveyed using hand held GPS equipment.

2.4 Test Pits

Under the supervision of URS field staff, a total of 52 of the planned 55 test pits were carried out, using a tracked Hitachi 200LC excavator. The purpose of the test pits was to observe and record the various lithologies, determine the stratigraphic profile across the footprint of the proposed TSF, and to collect bulk soil samples for laboratory testing and subsequent engineering analyses. A summary of the locations, depths, and ground surface elevations for each test pit is presented in Table 2-2.

Test Pit	GPS Coordinates		Ground	Depth of	Total Depth
Location	Northing	Easting	Elevation (mAHD)	Overburden (m)	(m)
TP-01	7430598	0452197	341	3.8	3.9
TP-02	7430596	0452947	353	4.0	4.4
TP-03	7429845	0450696	322	1.8	2.5
TP-04	7429846	0451447	326	1.7	1.8
TP-05	7429846	0452945	339	2.6	2.9
TP-06	7429844	0453695	346	2.8	3.7
TP-07	7429095	0450695	321	1.5	1.6
TP-08	7429096	0451448	329	0.6	1.5
TP-09	7429097	0452195	334	0.5	0.8
TP-10	7429095	0452949	335	0.9	3.5
TP-11	7429137	0453695	344	1.0	2.1
TP-12	7428345	0450697	321	2.0	2.8
TP-13	7428343	0451449	327	1.1	1.6
TP-14	7428346	0452196	338	1.0	1.2
TP-15	7428346	0452947	344	1.4	1.7
TP-16	7428345	0453697	347	2.1	2.9
TP-17	7427597	0450697	321	2.5	3.1
TP-18	7427596	0451448	331	0.5	1.2
TP-19	7427597	0452196	335	0.6	1.0
TP-20	7427597	0452949	343	1.0	1.1
TP-21	7427596	0453694	356	1.7	1.9
TP-22	7426846	0450695	318	1.1	1.35
TP-23	7426846	0451446	330	1.5	1.75
TP-24	7426849	0452947	352	1.5	4.7
TP-26	7426095	0452944	342	1.2	2.2
TP-27	7426098	0453694	352	5.0	5.0
TP-28/1	7425345	0451444	321	1.5	2.3

Table 2-2 Test Pit Summary

Test Pit	GPS Coordinates		Ground	Depth of	Total Depth
Location	Northing	Easting	Elevation (mAHD)	Overburden (m)	(m)
TP-28/2	7425349	0450697	328	0.6	3.5
TP-29	7425340	0452198	338	2.5	2.9
TP-30	7425346	0452946	350	1.8	2.3
TP-31	7425346	0453699	364	2.7	4.0
TP-32	7424596	0450697	322	1.5	3.8
TP-33	7424595	0452194	339	1.4	2.9
TP-34	7424595	0452949	350	1.2	2.2
TP-35	7424588	0453696	363	1.3	1.5
TP-37	7423846	0451450	329	2.7	2.9
TP-38	7423844	0452195	335	0.9	1.0
TP-39	7423845	0452946	342	1.2	2.4
TP-40	7423671	0453520	351	2.0	2.8
TP-41	7423096	0450699	323	1.8	2.8
TP-42	7423095	0451445	329	1.2	1.9
TP-43	7423094	0452195	337	0.8	1.0
TP-44	7423095	0452947	353	0.6	1.5
TP-45	7423100	0453459	361	1.7	1.7
TP-46	7422346	0452199	342	2.1	2.2
TP-47	7421599	0451446	335	2.1	2.3
TP-48	7421596	0452944	350	0.9	1.0
TP-50	7420845	0451445	336	1.2	1.4
TP-51	7420847	0452197	345	1.8	2.7
TP-52	7420848	0452948	349	1.6	2.4
TP-54	7420095	0452195	351	0.8	3.5
TP-55	7420095	0452944	362	1.0	1.2

A total of 102 soil samples were collected from the test pits during the investigation and transported to a NATA registered laboratory for testing. The exact depths where samples were collected were dependant on the soil/rock conditions encountered in each test location, which varied across the site. In general, samples were collected from near surface deposits and subsequently at successive major changes in lithology. Test pits were scheduled to be excavated to 5.0m or when "refusal" was attained. All excavations were terminated when either rock was encountered, or when subsurface conditions were too hard to penetrate with the machine-operated equipment. Test pits were excavated at approximate 750m centres.

A list of the samples collected is indicated on the test pit logs, which can be found in Appendix D, together with a selection of representative test pit photographs.

2.5 Laboratory Testing

A series of laboratory tests were carried out on select samples in order to determine pertinent physical and engineering properties of the soil and rock that underlie the site and that may be used during



construction of the TSF. The results of these tests have been used to confirm previous findings and to provide quantitative data over the TSF footprint that can be used during engineering analyses and/or design.

A summary of the test results is presented in Section 3, with complete test results included in Appendix F. All testing was performed by a NATA registered laboratory, in accordance with AS1289 *"Methods of testing soils for engineering purposes"*. The general purpose of each test is summarized below:

2.5.1 Atterberg Limits Tests

The Atterberg limits are the primary form of classification for cohesive soils, helping to distinguish between silt and clay (and the various forms they may take). Depending on the water content of the soil, it may appear in one of four states (solid, semi-solid, plastic or liquid). In each state the consistency and behavior of a soil is different and thus so are its engineering properties, in particular its strength and settlement characteristics.

The liquid limit (LL) and plastic limit (PL) define the water content boundaries between non-plastic, plastic and viscous fluid states. Moreover, the LL is the water content (%) where a soil changes from plastic to liquid behavior, with the PL being the water content at which soil transitions between semi-solid (brittle) and plastic behavior. The plasticity index (PI) defines the complete range of the plastic state, defined as *PI=LL-PL*. In addition to these classifications, the shrinkage limit (SL) is occasionally used. The SL is the water content that defines where the soil volume will no longer reduce even if the moisture content is further lowered.

A total of 57 Atterberg Limit tests were performed as part of this investigation.

2.5.2 Particle Size Distribution Tests

Particle Size Distribution (PSD) Tests (dry sieving method and hydrometer) were carried out on 70 soil samples recovered during the TSF geotechnical investigation. The basic objective of grain size analysis is to determine the composition and distribution of particle sizes within the soils sampled, typically expressed as a percentage and plotted as a grading curve. Particle size is one of the most important physical characteristics of soils, and many engineering, geotechnical and hydrological properties of soils are related to/determined from it.

2.5.3 Emerson Dispersion Tests

Soil dispersion potential is the likelihood that soils will release a "cloud" of fine particles when brought into contact with water, which may remain suspended for an indefinite period of time. Accordingly, the Emerson Dispersion Test (a simple semi-quantitative dispersion test) is used to classify this potential, recorded as the Emerson Class number (EC1 through EC8), which considers soil consistency, depth, and in one case the presence of calcium-rich minerals. Testing was carried out on eight representative samples (i.e. - soils with suitable aggregates. Sands and gravels with little fines are unsuitable for this test). It should be noted that weathered parent rock can also show dispersive tendencies.

2.5.4 Standard Compaction Tests

Standard Compaction tests were undertaken in order to determine the relationship between the moisture content and dry density of the soils. Understanding how the soils at the site will behave

when subjected to earthworks is crucial for a development of this size and nature, and furthermore, aids the contractor in the selection of appropriate machinery.

2.5.5 Effective Stress Triaxial Tests

The triaxial test is one of the most reliable methods available for determining shear strength parameters. Multi-stage, consolidated undrained (CU) triaxial testing is the most common of these and was undertaken on four remoulded soil samples collected during the investigation.

2.5.6 Constant Head Permeability Tests

The rate at which water flows through a soil media is an important aspect of soil mechanics, and is critical to evaluate when designing water-bearing structures. As part of this investigation, four constant head permeability tests were performed to give an indication of hydraulic conductivity and to compare with the in situ tests performed in the field.

2.5.7 Unconfined Compressive Strength Tests

Unconfined Compressive Strength (UCS) testing was undertaken on three select rock core samples (minimum Length:Diameter ratio of 2.5). The UCS test for rock is used to measure intact mechanical strength, whereby, a core sample is loaded axially between two platens of a compression testing machine. The stress value at failure is then defined as the uniaxial compressive strength of the specimen. It is important to note that due to the fractured and generally high weathered and low strength nature of the recovered core, not all test depths and locations could be sampled for UCS testing. For the purpose of this investigation, only the higher strength samples were selected.



3.1 Regional Geology

The Project is located at the eastern edge of the Galilee Basin which is a sequence of Late Carboniferous to Middle Triassic sedimentary rocks that overlie Late Devonian to Early Carboniferous sedimentary and volcanic rocks of the Drummond Basin. The rocks are exposed in a linear belt between the towns of Pentland in the north and Tambo to the south. Figure 3-1 shows the regional geology (BFS). A cross section through the sedimentary sequence is shown in Figure 3-2 (BFS).

The Galilee Basin rocks are similar in age to those of the Bowen Basin (i.e. Late Permian) and are exposed to the east of the Drummond Basin. The Bowen and Galilee basins are separated by a north-trending structural ridge between Anakie and Springsure that is referred to as the Springsure Shelf. Much of the western portion of the Galilee Basin occurs beneath Mesozoic sediments of the Eromanga Basin.

Late Permian, coal bearing strata of the Galilee Basin sub-crop along a linear, north trending belt in the central portion of the exposed section and dip 0.5° to 3° west. No major regional-scale fold and or fault structures are identified by regional mapping.

Quaternary sediments dominate the regional landscape, while Tertiary aged argillaceous sandstone, sandy mudstone and limestone and similarly aged basalt has been mapped within 20km of the Project site.

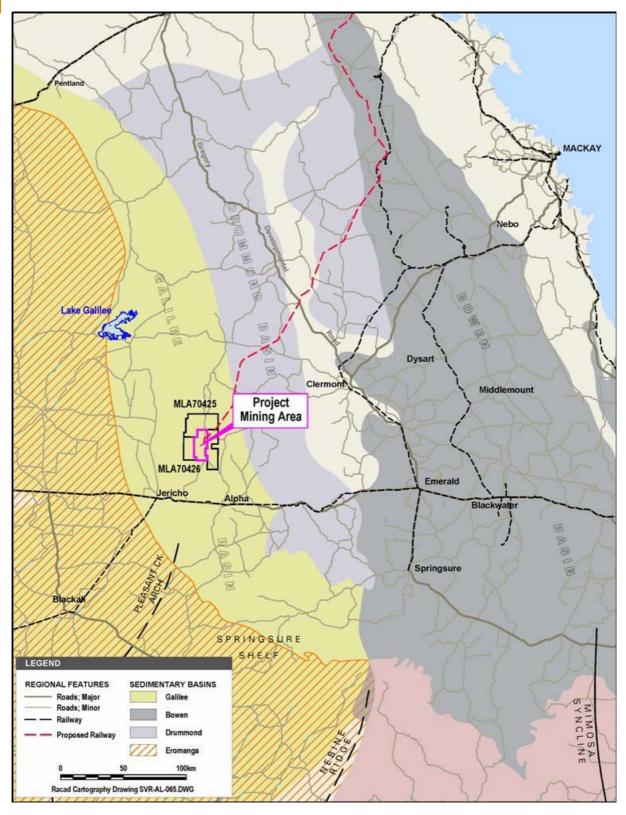


Figure 3-1 Regional Geologic Map (Figure 05-3 from BFS report)

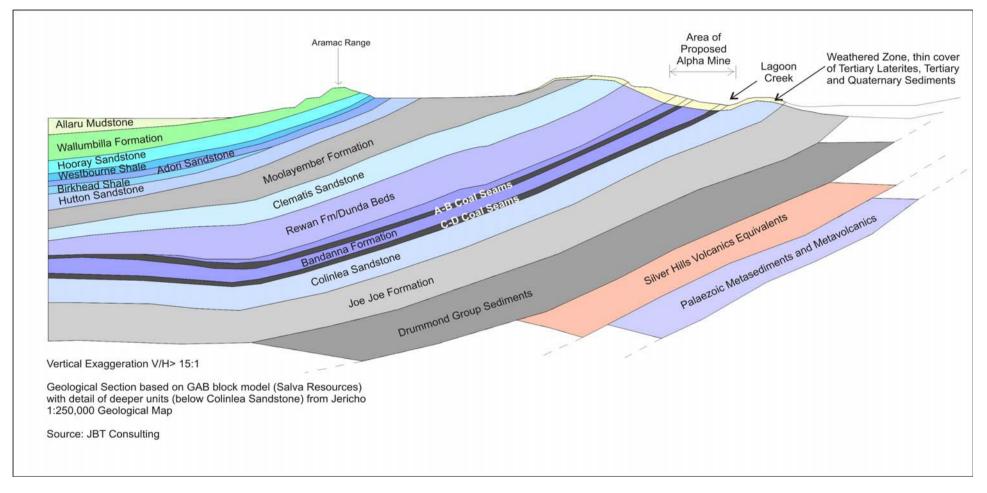


Figure 3-2 Regional Geology Cross Section (Figure 05-4 from BFS report)



3.2 Project Geology

In assessing the geology of the site, we have referred to the following geological maps and records:

 1972 First Edition, Sheet SF-55-14, Jericho, "Australia 1:250,000 Geological Series", Bureau of Mineral Resources, Geology and Geophysics, Canberra, ACT, Australia.

Geology in the Project area is characterised by westerly dipping Permian age sediments overlain by Tertiary and Quaternary sediments. The Tertiary and Quaternary (ie. Cainozoic era) sediments vary from 20m to 60m thick over the site.

The unconsolidated Quaternary deposits comprise recent alluvial sand, silt and fine gravel. These sediments are thickest in Lagoon Creek, thinning to the east and west. The remainder of the Cainozoic stratigraphy comprises Tertiary sandy clays and minor ironstone lenses. This overburden is thickest in the central and eastern portions of the mining area up to 56m with an average thickness of about 22m. Potentially expansive and dispersive Kaolinite, montomorillonite (AI smectite) and nontronite (Fe smectite) clay minerals were identified in these deposits. Testing indicated that soils derived from claystone and mudstone are dispersive or potentially dispersive, whereas soils from the siltstone and sandstone are only slightly dispersive. It is thought that the majority of the overburden from these deposits can be managed as non-acid forming (NAF). However approximately 11% of spoil comprising stoney coal and mudstone may have the potential for acid generation and required special management strategies to prevent acid generation.

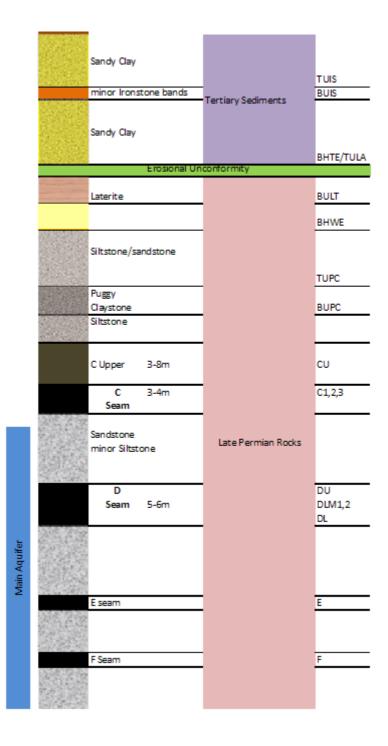
The Cainozoic sediments unconformably overlie the Bandanna Formation of Permian age. Drilling shows that the contact undulates. This has been interpreted as Tertiary sediments filling an ancient land surface that had been eroded into the Permian coal measures of the Bandanna Formation and underlying Colinlea Sandstone.

A geologic model was developed for the BFS based on 710 boreholes drilled to the west of Lagoon Creek but none in the area of the TSF. The model considered the base of the Tertiary age rocks to coincide with an extensive lateritic horizon of mottled (ie. re/white) clay paleosols which is present at the top of the Permian sediments. The Permian Bandanna Formation contains four economically viable coal seams. (A through D). Figure 3-3 depicts the Project stratigraphy.

No faulting has been identified in the Project area from the various investigations.

Minor, localised perched groundwater was recorded during exploration within the Cainozoic with confined aquifers in the coal measures. Static groundwater level in the mining area is at a depth of less than 10m.







3.3 Tailings Storage Facility Characterisation

Geological and Geotechnical Characterisation

This section of the report presents the geological and geotechnical conditions at the proposed TSF site, based on a review of previous investigations, together with the findings from the current investigation. An exploratory test location plan, geologic map of the site, borehole and test pit logs, core/test pit photographs, and laboratory results of the current investigation are presented in the appendices, as well as pertinent data from previous investigations referenced. This information should be read in conjunction with this Section.

Soil and Rock

Surficial geologic mapping, along with test pit and borehole subsurface investigations show the site to be typical of the published geology and consistent with previous investigations, being underlain by residual to weathered Colinlea Sandstone.

The sandstone bedrock is generally light grey to reddish brown, extremely low to medium strength, fine to medium grained, sometimes arkose, quartz-rich or oxidised, with thin inter-beds of siltstone and conglomerate. The rock mass is weathered to varying degrees, typically ranging from residual soil (over the majority of the site) to moderately weathered (MW) rock, where it is exposed as relatively resistant outcrops along the eastern ridge. Rock fabric is sometimes evident, ranging from crude, horizontal laminations to sub-horizontal (low angle), well defined thin bedding. The Colinlea Sandstone strikes approximately north-south and dips around 3° west.

Higher elevations on the east-west trending "rises" (perpendicular to the ridge) are generally oxidized reddish brown, whereas in the relatively lower elevation parallel "swales", the ground surface was observed to be light grey to cream in colour. The Colinlea Sandstone is in some locations covered to a depth of up to 1.8m by Quaternary alluvial deposits, comprising silty, fine to medium grained sand with occasional gravel, derived from erosion of the underlying sandstone and conglomerate bedrock. However, due to the composition of the parent rock and apparent minimal transportation of these materials, differentiation between the alluvial and residual soils was not readily apparent. Topsoil cover across the site was thin (< 500mm), where observed in test pits.

The residual soil typically comprised dry to moist, light greyish brown to reddish brown silty/clayey sand or sandy silt/clay mixes, with varying degrees of gravel, occasionally cemented and typically dense to very dense. Residual soil was typically encountered within the upper 2.0m, to a maximum depth of approximately 6.5m. A review of the soil cover across the TSF footprint has been undertaken to produce a soil thickness isopach map, as presented in Appendix A (URS Drawing No. 42626683-GE003).

Geologic Sections A-A' through H-H' (URS Drawing No's 42626683-GE004 to 42626683-GE07) present the subsurface conditions encountered across the site during the URS investigation and are included in Appendix A.

Soil Permeability Tests

In-situ falling head tests conducted during the investigation indicate that the soils at the site have low permeability, ranging from 2.3×10^{-7} m/s to 7.3×10^{-9} m/s. These results are consistent with the six falling head permeability tests performed by DP in the area of the TSF, which showed permeability's in the order of 1.5×10^{-7} m/s to 7.6×10^{-8} m/s. URS Drawing No. 42626683-GE08 presents a permeability contour map of the site (included in Appendix A), with complete URS test results presented in Appendix C and summarised in Table 3-1. Figures 3-4 and 3-5 present the falling head permeability results with respect to test depth and soil density (SPT N value).



Test Location	Depth of Test (m)	Soil Description	Permeability (m/sec)
BH01A	GL - 2.7	Silty/Clayey Sand	5.6 x 10 ⁻⁸
BH02A	GL - 3.0	Sandy Silt/Clayey Sand	7.3 x 10 ⁻⁹
BH03A	GL - 3.0	Sand/Silt	1.1 x 10 ⁻⁸
BH04A	GL - 2.9	Silty/Clayey Sand	1.3 x 10 ⁻⁷
BH05A	GL - 2.3	Sand/Clay	1.2 x 10 ⁻⁷
BH06A	GL - 3.0	Silt/Sand	2.3 x 10 ⁻⁷
BH07A	GL - 3.0	Sand/Clay	3.7 x 10 ⁻⁸
BH08A	GL - 1.5	Silt/Clay	1.2 x 10 ⁻⁸
BH09A	GL - 3.0	Silt/Clayey Sand	4.3 x 10 ⁻⁸
BH10A	GL - 2.7	Clay/Silty Sand	2.9 x 10 ⁻⁸
BH11A	GL - 1.5	Silty Sand	1.9 x 10 ⁻⁷
BH12A	GL - 1.8	Sandy Silt/Sandy Clay	1.4 x 10 ⁻⁷
BH13A	GL - 3.2	Sand/Clay	8.6 x 10 ⁻⁸
BH14A	GL - 3.2	Sand/Clayey Silt	1.4 x 10 ⁻⁷

Table 3-1 Falling Head Permeability Test Summary

GL – Ground Level

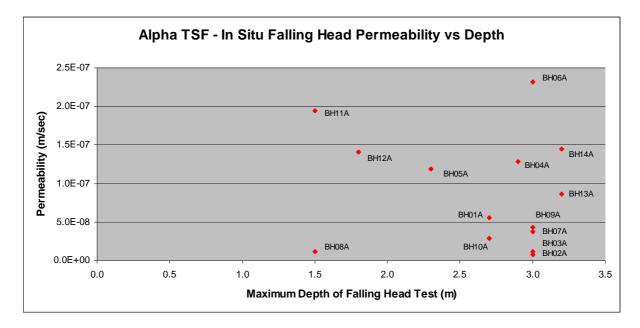


Figure 3-4 In situ Falling Head Permeability Correlation with Depth

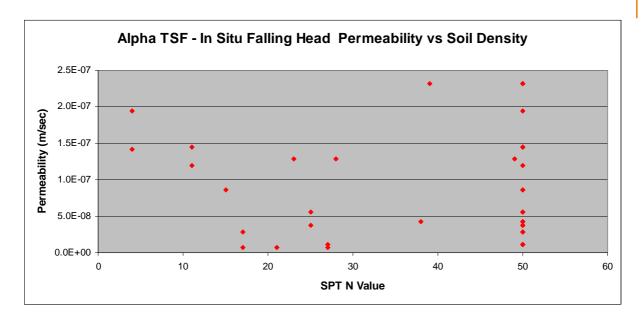


Figure 3-5 In situ Falling Head Permeability Correlation with Soil Density

SPT

SPTs were carried out in the exploratory boreholes, with "N" values ranging from 4 to 50+. The "N" values indicate that the subsurface conditions encountered across the site generally show high resistance to dynamic penetration, resulting in "SPT refusal" in all boreholes (with the exception of BH12), and commonly first recorded at depths of around 2.0m. The SPT results are indicated on the exploratory boreholes logs and have been summarised in Table 3-2.

Table 3-2 Standard Penetration Testing Summary

Borehole Location	Minimum "N" Value	Maximum "N" Value	Minimum "SPT Refusal" Depth (m)
BH-01	22	50+	3.0
BH-02	17	50+	6.0
BH-03	27	50+	2.0
BH-04	23	50+	4.5
BH-05	11	50+	2.0
BH-06	39	50+	2.0
BH-07	25	50+	2.0
BH-08	NR	50+	1.0
BH-09	35	50+	2.0
BH-10	17	50+	2.0
BH-11	4	50+	2.0
BH-12	4	4	NA
BH-13	15	50+	2.0
BH-14	11	50+	2.0



Water Pressure (Packer) Tests

Packer tests performed during the investigation indicate the Colinlea Sandstone bedrock has low hydraulic conductivity, with no "Lugeon take" recorded during the 12 test intervals, inferred to be a result of the lack of well developed discontinuities (degree of weathering) and possible swelling of the in situ soil/rock. Depths where packer tests were performed ranged from 4.0m to 20.2m. A summary of the water pressure testing is shown in Table 3-3, with full results presented in Appendix C, including the details for each pressure stage.

Borehole Location	Test Interval Depth (m)	Hydraulic Conductivity (Lugeons)
BH04	13.0 – 16.0	0
BH05	7.0 - 10.0	0
BH06	9.0 - 12.0	0
	9.2 – 12.2	0
BH07	12.2 – 15.2	0
	15.2 – 18.2	0
	18.2 – 20.2	0
BH08	4.0 - 7.0	0
BH11	4.0 - 7.0	0
БПП	7.0 - 10.0	0
BH12	4.0 - 7.0	0
DITIZ	7.0 - 10.0	0

Table 3-3 Water Pressure (Packer) Test Summary

Groundwater

With the exception of BH03, BH09 and BH13 (which were exclusively augered), groundwater levels within the exploratory boreholes were unable to be accurately measured at the time of drilling, due to the methodology involved (i.e. the addition of water). However, as previously detailed, piezometers were installed within 11 of the 14 boreholes following drilling, and subsequently monitored over the duration of the fieldwork phase to allow elevated levels to normalise and to assess the influence of heavy rainfall events on groundwater levels, if any. Groundwater was not encountered during the drilling of boreholes BH03, BH09 and BH13. Table 3-4 summarises the groundwater levels measured in the piezometers during the final day of fieldwork (12 August, 2011) and one month following (13 September, 2011).

Borehole	Date Installed	Piezometer	Groundwater Depth (m)			
Location	Date installed	Depth (m)	12/08/11	13/09/11		
BH01	21/07/2011	20.0	>20.0	>20.0		
BH02	22/07/2011	10.0	>10.0	>10.0		
BH03	23/07/2011	10.0	>10.0	>10.0		
BH04	10/08/2011	17.5	15.0	>20.0		
BH05	26/07/2011	10.0	7.0	>10.0		

Table 3-4Groundwater Summary

•		

Borehole	Date Installed	Piezometer	Groundwater Depth (m)			
Location	Date Installed	Depth (m)	12/08/11	13/09/11		
BH07	04/08/2011	20.0	19.2	>20.0		
BH09	25/07/2011	10.0	>10.0	>10.0		
BH10	09/08/2011	20.0	17.1	>20.0		
BH11	30/07/2011	10.0	>10.0	>10.0		
BH13	02/08/2011	20.0	14.0	>20.0		
BH14	31/07/2011	10.0	>10.0	>10.0		

The monitoring results indicate that groundwater levels across the site are at least 10.0m below the existing ground surface, and likely at a depth greater than 20.0m, as evidenced by the five "dry" 20.0m piezometers and measured levels in surrounding wells from previous investigations.

Groundwater was not encountered within the excavated test pits, with the exception of TP46 (2.1m) and TP34 (1.2m) where groundwater "ponding" was observed at the soil/rock interface, inferred to be a localised perched water table.

It is important to note, however, that groundwater levels and flows are transient, and are affected by such factors as soil and rock permeability, earth moving operations and preceding climatic conditions.

Laboratory Test Results

The laboratory test results indicate that the soils encountered in the upper 2.0m at the site are generally granular in nature, with typically in excess of 25% fines (silt and clay). Residual soils derived from partial to complete weathering of the underlying rock generally indicate a more cohesive nature, with fines in the order of 45 to 55%. The soils are predominantly of low plasticity, low permeability and non-dispersive in their behaviour. Laboratory tests performed on select rock core (refer Section 2.5.7) indicates the sandstone is of low to medium strength. Tables 3-5 to 3-7 summarize the test results.



Table 3-5 Laboratory Test Summary – Test Pits A (MC, Atterberg Limits, % Fines, Emerson Class, Standard Compaction)

Test Pit - Sample	Depth (m)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Fines (%)	Soil Particle Density (t/m ³)	Emerson Class	Maximum Dry Density (t/m ³)	Optimum Moisture Content (%)
TP01-03	3.0	9.3	31	18	13	5.0*	23				
TP01-04	3.4	9.8					38				
TP03-02	1.0	11.4	43	16	27	9.5+	55	2.63	2	1.80	14.5
TP04-01	0.3	8.8	21	11	10	3.0*	37	2.65	5	2.05	9.0
TP05-01	0.6	7.8	15	12	3	0.5	36	2.66			
TP05-02	1.7	12.2	29	13	16	6.0*	41	2.67	5		
TP05-03	2.8	10.1					19				
TP08-02	0.9	11.5					9				
TP09-02	0.7	10.3					61				
TP10-01	0.6	4.2					35				
TP10-03	2.0	11.7					10				
TP12-02	1.2	11.0	23	12	11	6.0+	53	2.67	1	1.94	10.5
TP13-01	0.4	3.8					29				
TP14-01	0.3	4.5					29				
TP15-01	0.6	7.7					50		5	1.91	11.5
TP19-02	0.9	7.2	27	18	9	2.5*	12				
TP23-01	0.5	6.7					29				
TP23-02	1.3	11.3	39	12	27	7.5+		2.60			
TP24-01	0.7	5.0	24	13	11	3.5*	28				

NO - not obtainable; + curling occurred; * crumbling occurred

Test Pit - Sample	Depth (m)	Moisture Content (%)	Liquid Limit (\$)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Fines (%)	Soil Particle Density (t/m ³)	Emerson Class	Maximum Dry Density (t/m ³)	Optimum Moisture Content (%)
TP24-02	2.5	11.7	29	14	15	7.0	43		5	1.86	14.0
TP26-02	0.9	10.0	31	11	20	5.5+	55	2.62			
TP28-02	1.2	11.6					41				
TP28/2-02	2.0	12.3	35	13	22	7.5+	42	2.62			
TP29-01	0.4	5.4	NO	NO	Non Plastic	NO	25		5	1.97	8.5
TP30-02	1.2	8.0					13				
TP33-02	1.3	9.4					7		2		
TP34-03	1.5	10.7					22				
TP37-01	0.4	3.1					40				
TP39-02	1.3	8.3					45				
TP41-02	2.2	17.0					41				
TP43-01	0.6	8.2					38				
TP46-02	1.7	16.9	22	15	7	3.0*	32	2.68			
TP47-02	1.6	12.4	25	10	15	4.5	45	2.65			
TP51-02	1.3	8.3	23	11	12	6.0	40	2.63			

NO - not obtainable; + curling occurred; * crumbling occurred

Table 3-6 Laboratory Test Summary – Test Pits B (Triaxial Testing)

Test Pit - Sample	Depth (m)	Effective Cohesion c' (kPa)	Effective Angle of Friction Ø (°)	Permeability (m/sec)
TP04-01	0.3	8.8	34.7	8 x 10 ⁻¹⁰
TP05-02	1.7	12.6	29.1	4 x 10 ⁻¹⁰
TP12-02	1.2	3.8	29.4	2 x 10 ⁻¹⁰
TP24-02	2.5	11.2	32.1	3 x 10 ⁻⁹

Table 3-7 Laboratory Test Summary – Exploratory Boreholes (MC, Atterberg Limits, % Fines, UCS)

Borehole - Sample	Depth (m)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Fines (%)	Soil Particle Density (t/m ³)	UCS (MPa)
BH01-01	1.0	5.7	18	10	8	2.0*	54		
BH01-04	6.4	23.8	90	20	70	12.5*+	60		
BH01-06	8.5	10.4	17	10	7	2.5*	42		
BH01-08	10.5	10.6	20	13	7	2.5*	52		
BH01-10	12.5	12.1					59	2.70	
BH01-11	13.5	11.9	18	12	6	4.0	54		
BH01-12	14.5	12.3	20	-	-	3.5			
BH01-13	15.5	12.0	19	13	6	3.0*	56		
BH02-02	2.0	8.1	20	12	8	1.0*	31		
BH02-04	4.0	11.5	21	-	-	1.5			
BH02-05	5.0	8.1	25	13	12	3.0+	23		
BH02-07	7.0	18.6	32	22	10	6.0	55		
BH03-05	5.0	9.0	20	11	9	3.0*	48		

Borehole - Sample	Depth (m)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Fines (%)	Soil Particle Density (t/m ³)	UCS (MPa)
BH03-06	6.0	6.6	45	-	-	7.5			
BH03-07	7.0	25.6	121	25	96	17.0*+	90		
BH04-01	1.0	10.2	31	13	18	8.0+	58		
BH04-02	2.0	7.9	19	12	7	3.0*	35		
BH04-05	6.0	14.6	30	20	10	5.5	59		
BH04-09	19.0	16.6	33	23	10	6.5	95		
BH04-Run 1									15.8
BH05-01	1.0	12.4	25	12	13	5.5	46		
BH06-03	3.0	9.0	24	13	11	4.0*	32		
BH06-04	4.0	14.8	25	14	11	4.0*			
BH06-05	5.0	11.1	24	17	7	3.0*	48		
BH07-01	1.0	5.3	22	10	12	5.5	49		
BH07-05	6.0	8.4	31	13	18	8.0	26		
BH07-Run 4									4.8
BH07-Run 4									5.2
BH08-01	1.0	10.4	26	13	13	5.5+	51		
BH09-04	4.0	4.3	23	15	8		46		
BH09-07	7.0	7.2	24	13	11	2.5*			
BH09-08	8.0	6.7	22	11	11	2.0*	37		
BH10-01	1.0	13.5	43	16	27	11.5+	63		
BH10-06	7.5	10.2	23	13	10	4.5	43		
BH10-08	10.5	21.2	46	17	29	7.0+	51		
BH10-10	13.5	13.7	31	14	17	8.0			
BH10-12	16.5	10.1					47	2.65	

3 Geological and Geotechnical Characterisation

Borehole - Sample	Depth (m)	Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)	Fines (%)	Soil Particle Density (t/m ³)	UCS (MPa)
BH10-14	19.5	14.6	22	12	10	3.5*	33		
BH11-01	1.0	10.2	0.2 20		15 5 1.5*		16		
BH12-01	1.0	12.6	32	13	19	7.0*	46		
BH13-01	1.0	10.0	40	12	28	11.0	51		
BH13-05	6.0	10.9	35	16	19	10.0	55		
BH13-14	19.5	14.8	31	17	14	6.0	56		
BH14-03	3.0	5.9	16	11	5	1.0*	35		
BH14-05	6.0	22.3	15	-	-	1.5			
BH14-07	9.0	16	12	4	1.5	7.9	34		



Conclusions and Recommendations

Based on the results of this investigation and a review of data previously collected, the TSF site is considered suitable for storing tailings as proposed in the EIS and BFS. This conclusion assumes that the TSF will be designed based on good engineering practice and constructed accordingly. Following are the conclusions and recommendations from the investigation.

4.1 Surface Water Contamination

It is considered highly unlikely that well-developed Lagoon Creek palaeochannels or extensive former drainage pathways are present beneath the proposed TSF footprint. Slight horizontal migration of tailings liquor through surficial alluvial or low density residual soils (if any) can be expected during the life-of-mine, however, the construction of an engineered cutoff trench that intercepts the soil/weathered rock interface (where liquor may accumulate over time) would mitigate the risk of contamination into Lagoon Creek to acceptable levels.

4.2 Groundwater Contamination

Due to the low groundwater level and low hydraulic conductivity measured during in situ falling head and packer testing, the residual soil and weathered sandstone in the floor of the TSF footprint appears to be sufficiently impermeable to limit significant vertical migration of tailings liquor into the groundwater table. Given the relatively low permeability of these materials, it is expected that the TSF can be designed to mitigate adverse impacts to the regional groundwater system. To the extent prudent engineering and best practice are adopted during design and construction, no adverse effect to groundwater quality is expected. Therefore, there is no need for an impermeable blanket/liner, as proposed in the BFS report. As such, it is recommended that the low permeability blanket/liner proposed in the BFS report be substituted by moisture conditioning and proof rolling the soils in the floor of the TSF prior to tailings storage.

At the time of construction, it is recommended that a groundwater monitoring program comprising a series of piezometers be established to regularly assess the groundwater depth and quality around the perimeter of the proposed TSF.

4.3 Embankment Foundation

The soils and weathered rock in the area of the proposed TSF should provide a suitable strength, low permeability foundation to support the proposed TSF embankments. Consolidation of foundation material is not anticipated.

4.4 Construction Materials

The upper 1.0m to 3.0m of silty/clayey sand and/or sandy silt/clay that occurs over most of the TSF footprint should be an excellent borrow material for construction of the proposed TSF embankments and haul roads, based on the low plasticity and generally non-dispersive characteristics of the soils.

The soils tested indicate that the addition of water may be required in order to achieve optimum compaction.

It may be possible to wash sand adjacent to Lagoon Creek and in other drainages in the surrounding area to produce sand for filters.



4 Conclusions and Recommendations

Crushing and processing of basalt from a potential quarry (Surbiton Quarry) located approximately 20km northeast of the site is expected to produce sand and gravel for filters and drains, as well as slope protection.

Should a clay liner be considered a requirement to lower the risk of vertical tailings liquor migration into the underlying soil, rock and groundwater, it is anticipated that the clayey materials required for construction would be sourced from the mine pre-strip area west of Lagoon Creek.

4.5 **Construction Considerations**

Excavation of the surface material to a depth of about 3.0m for TSF embankment construction can be effected with conventional earthmoving equipment such as scrapers, and hydraulic excavators. Particular care should be taken during periods of heavy or extensive precipitation, as the soils in this region are noted as becoming difficult to work and traffic in.

Compaction of the final exposed subgrade within the footprint of the TSF storage area is recommended and would be expected to further mitigate downward migration of tailings liquor.

References

- "Alpha coal Project Bankable Feasibility Study", Hancock Coal Pty Ltd, 2011.
- "Alpha Coal Project Tailings Storage Facility Location Options Report", Parsons Brinckerhoff, November 2010.
- *"Alpha Coal Project Tailings Storage Facility Concept Design Report"*, Parsons Brickerhoff, April 2011.
- Bankable Feasibility Study (BFS), Section 05 Geology, Hancock Coal, 2011.
- Houlsby, A.C., 1976. Routine Interpretation of the Lugeon Water-Test, Quarterly Journal of Engineering Geology, Vol. 9, pp. 303-313.
- *"Interim Report on Preliminary Geotechnical Investigation"*, Douglas Partners, 3 November 2010.
- Potential Surbiton South Quarry, Alpha to Clermont Rd. via Alpha Preliminary Investigation Report, 13 October 2008.
- Zangar, Carl N. 1953, *Theory And Problems Of Water Percolation*, United States Department of the Interior, Bureau Of Reclamation, Denver, Colorado, April 1953.

Limitations

6.1 Geotechnical & Hydro Geological Report

URS Australia Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of Hancock Coal and only those third parties who have been authorised in writing by URS to rely on the report. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the Proposal dated 17 June 2011.

The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

This report was prepared between 15 August 2011 and 14 October 2011 and is based on the conditions encountered and information reviewed at the time of preparation. URS disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

This report contains information obtained by inspection, sampling, testing or other means of investigation. This information is directly relevant only to the points in the ground where they were obtained at the time of the assessment. The borehole logs indicate the inferred ground conditions only at the specific locations tested. The precision with which conditions are indicated depends largely on the frequency and method of sampling, and the uniformity of conditions as constrained by the project budget limitations. The behaviour of groundwater and some aspects of contaminants in soil and groundwater are complex. Our conclusions are based upon the analytical data presented in this report and our experience. Future advances in regard to the understanding of chemicals and their behaviour, and changes in regulations affecting their management, could impact on our conclusions and recommendations regarding their potential presence on this site.

Where conditions encountered at the site are subsequently found to differ significantly from those anticipated in this report, URS must be notified of any such findings and be provided with an opportunity to review the recommendations of this report.

Whilst to the best of our knowledge information contained in this report is accurate at the date of issue, subsurface conditions, including groundwater levels can change in a limited time. Therefore this document and the information contained herein should only be regarded as valid at the time of the investigation unless otherwise explicitly stated in this report.

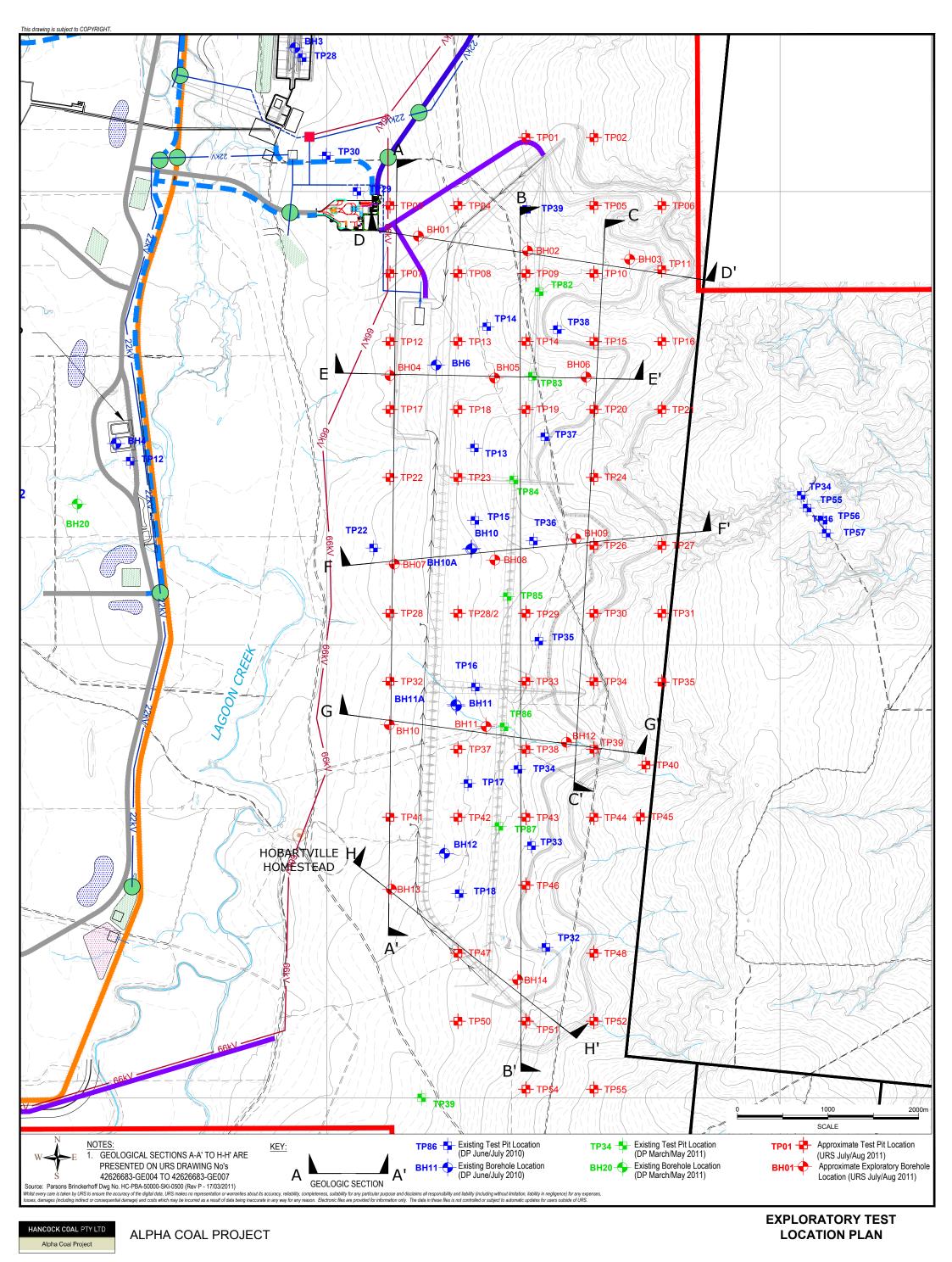


Appendix A Drawings

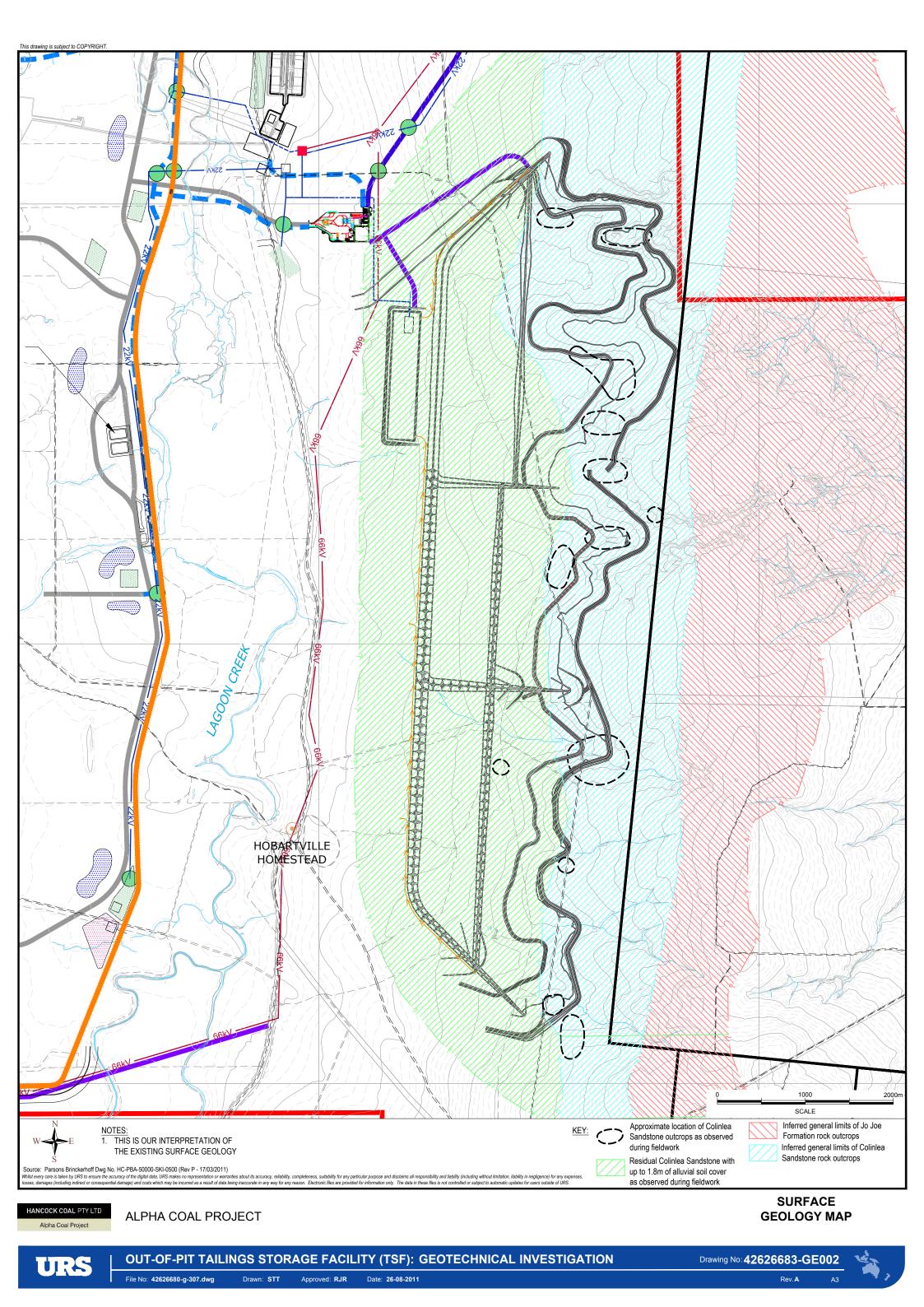


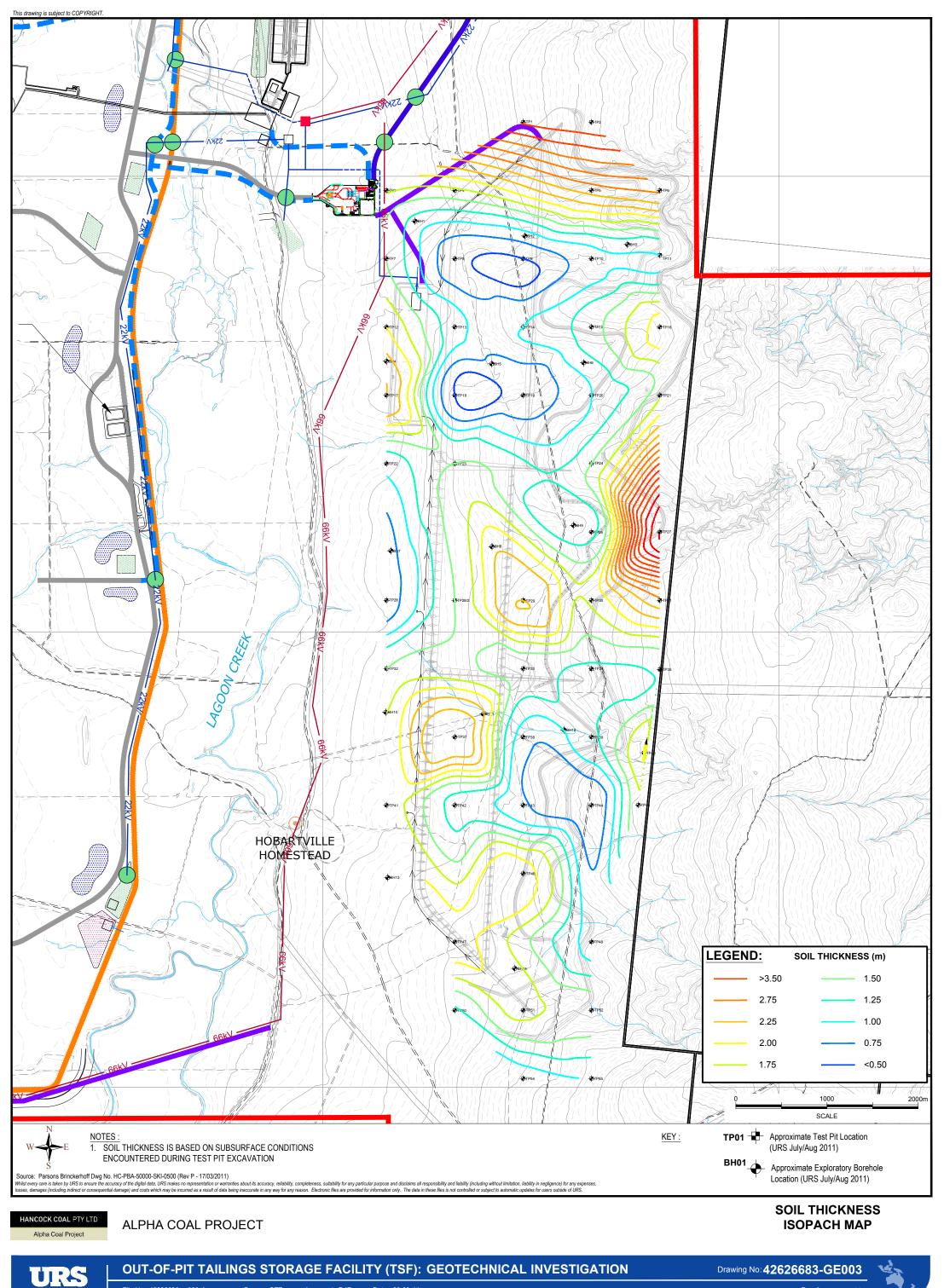
A

42626683/01/01



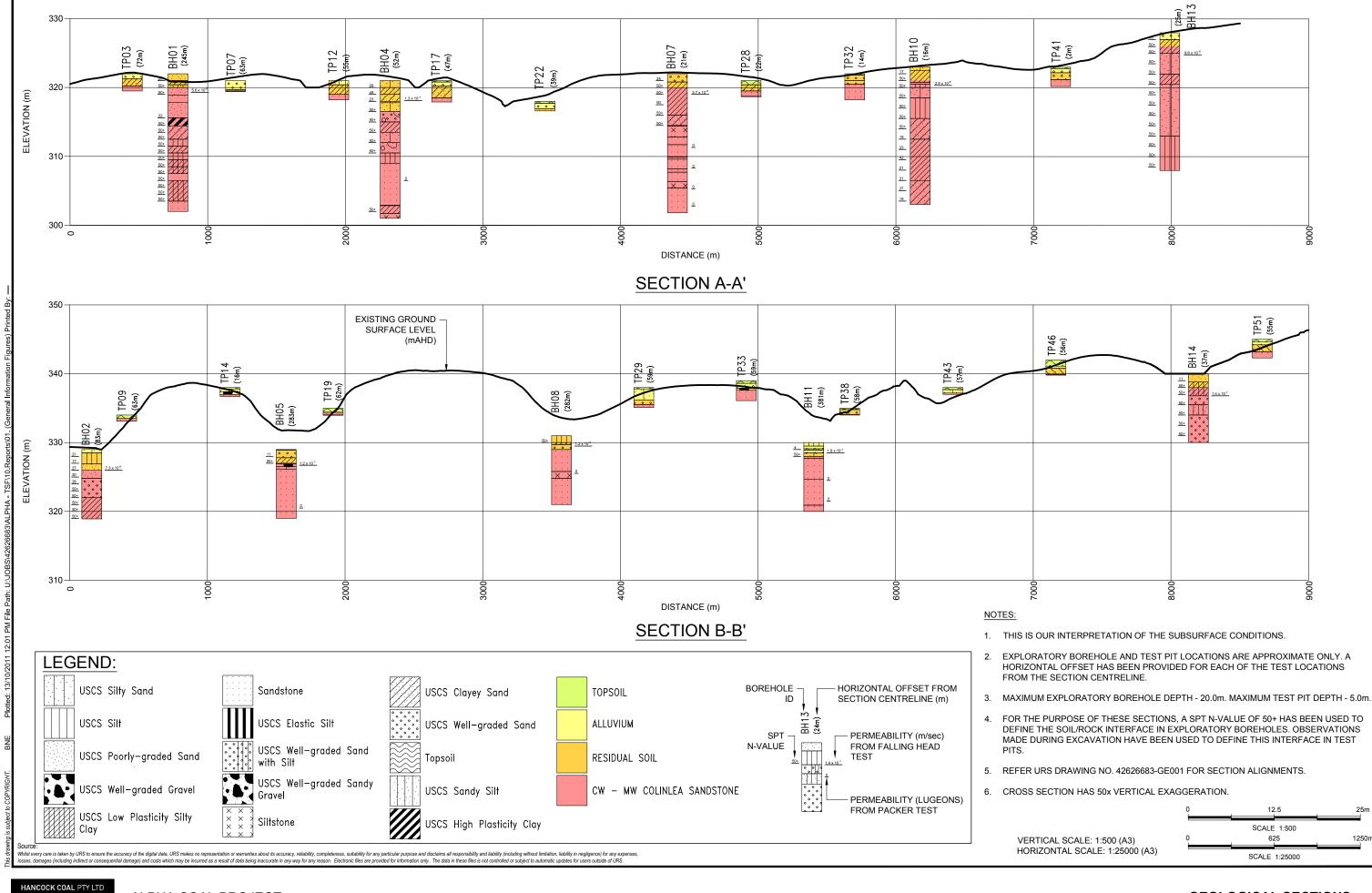






File No: 42626680-g-308.dwg Drawn: STT Approved: RJR Date: 23-09-11

Rev.A



Alpha Coal Project

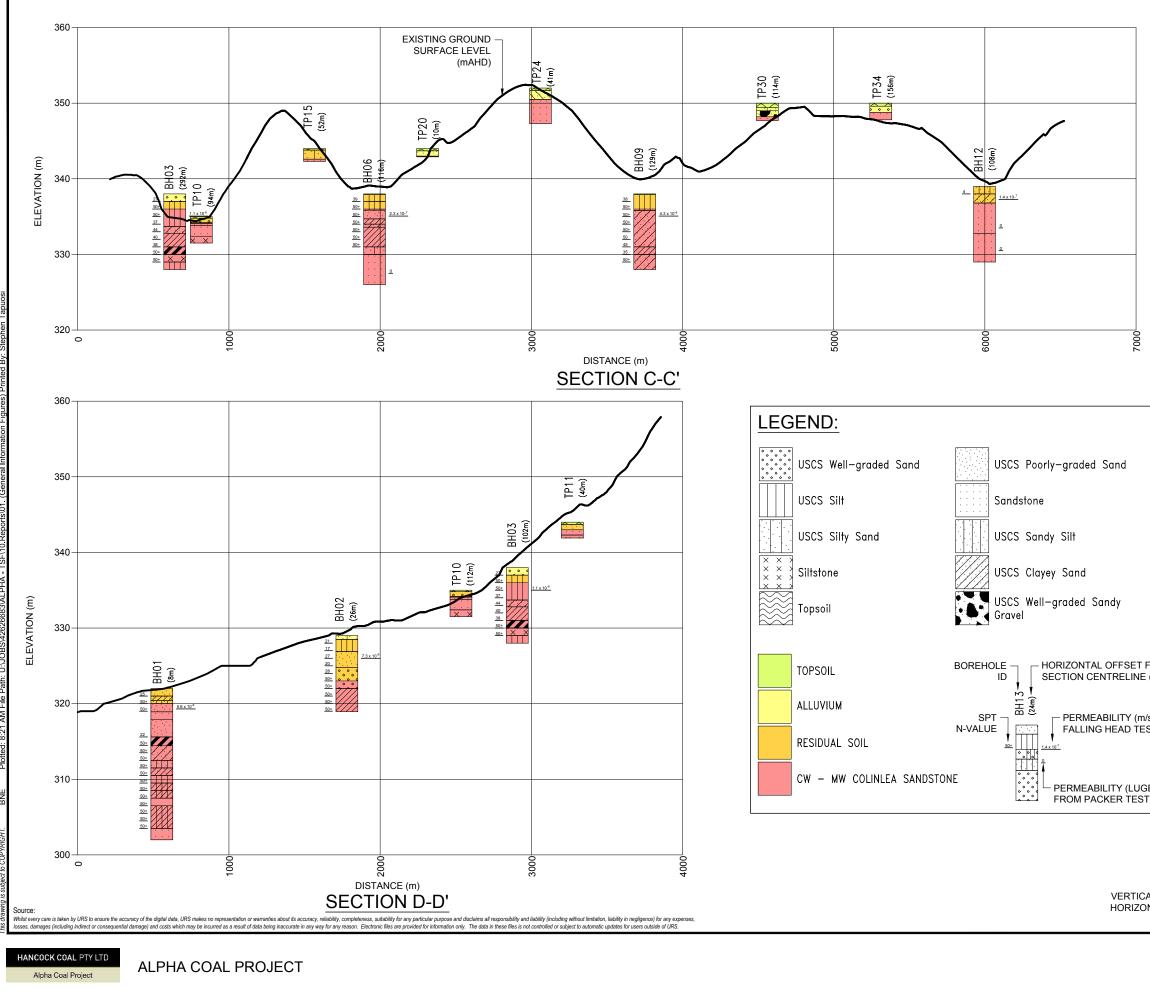
ALPHA COAL PROJECT

URS

0	12.5	25m
0	SCALE 1:500 625	1250m
	SCALE 1:25000	

GEOLOGICAL SECTIONS A-A' AND B-B'

Drawing No: **42626683-GE004**



OUT-OF-PIT TAILINGS STORAGE FACILITY (TSF) : GEOTECHNICAL INVESTIGATION

URS

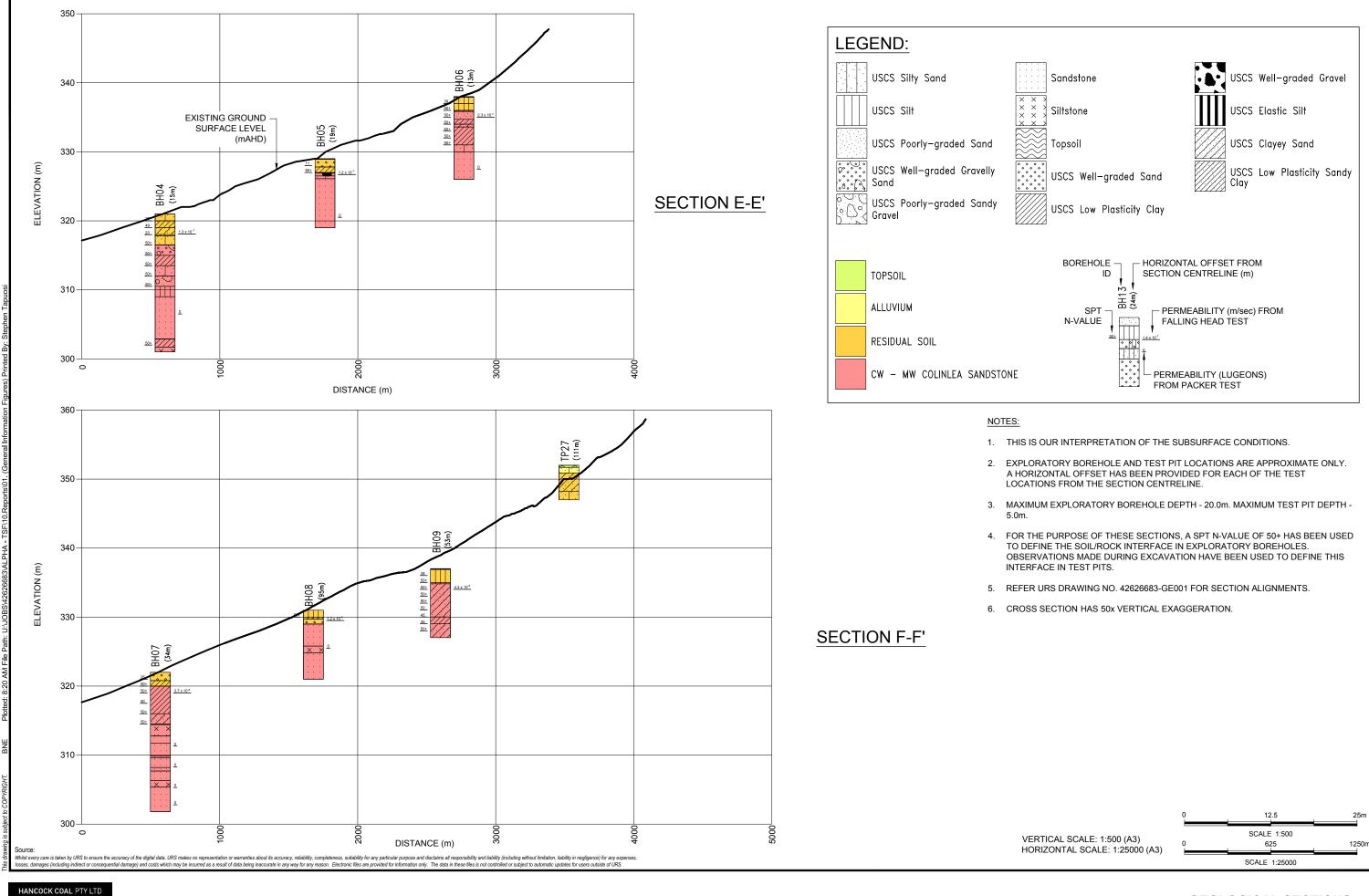
NOTES:

- 1. THIS IS OUR INTERPRETATION OF THE SUBSURFACE CONDITIONS.
- 2. EXPLORATORY BOREHOLE AND TEST PIT LOCATIONS ARE APPROXIMATE ONLY. A HORIZONTAL OFFSET HAS BEEN PROVIDED FOR EACH OF THE TEST LOCATIONS FROM THE SECTION CENTRELINE.
- 3. MAXIMUM EXPLORATORY BOREHOLE DEPTH 20.0m. MAXIMUM TEST PIT DEPTH - 5.0m.
- 4. FOR THE PURPOSE OF THESE SECTIONS, A SPT N-VALUE OF 50+ HAS BEEN USED TO DEFINE THE SOIL/ROCK INTERFACE IN EXPLORATORY BOREHOLES. OBSERVATIONS MADE DURING EXCAVATION HAVE BEEN USED TO DEFINE THIS INTERFACE IN TEST PITS.
- 5. REFER URS DRAWING NO. 42626683-GE001 FOR SECTION ALIGNMENTS.
- 6. CROSS SECTION HAS 50x VERTICAL EXAGGERATION.

USCS High P	lasticity Clay		
	lasticity Sandy		
USCS Low Pl Clay	asticity Silty		
USCS Low Pl	asticity Clay		
ROM (m)			
sec) FROM T			
EONS)			
	0	12.5	25m
AL SCALE: 1:500 (A3)	S	CALE 1:500 625	1250m
NTAL SCALE: 1:25000 (A3)			

C-C' AND D-D'

Drawing No: **42626683-GE005**



ALPHA COAL PROJECT Alpha Coal Project

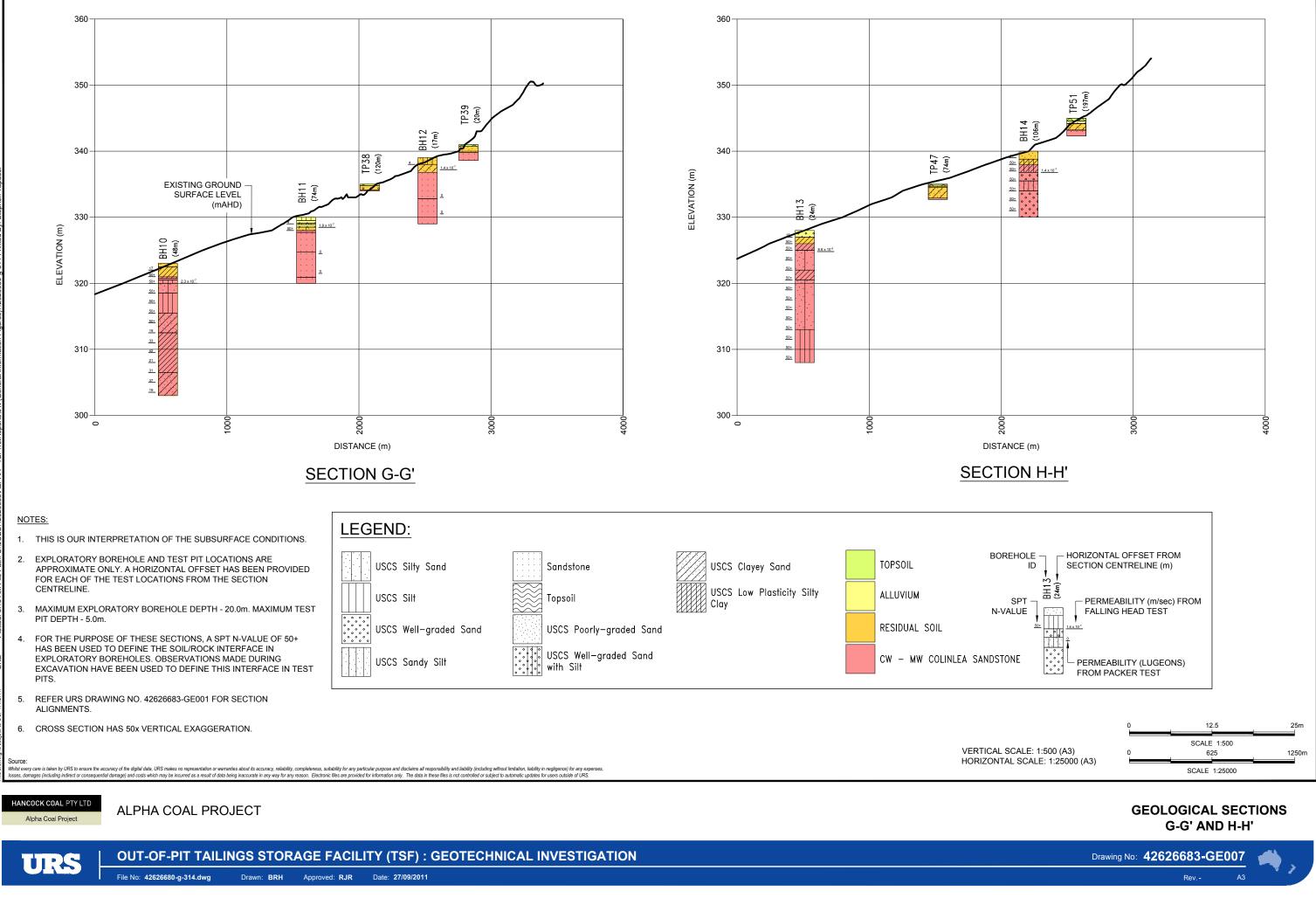
URS

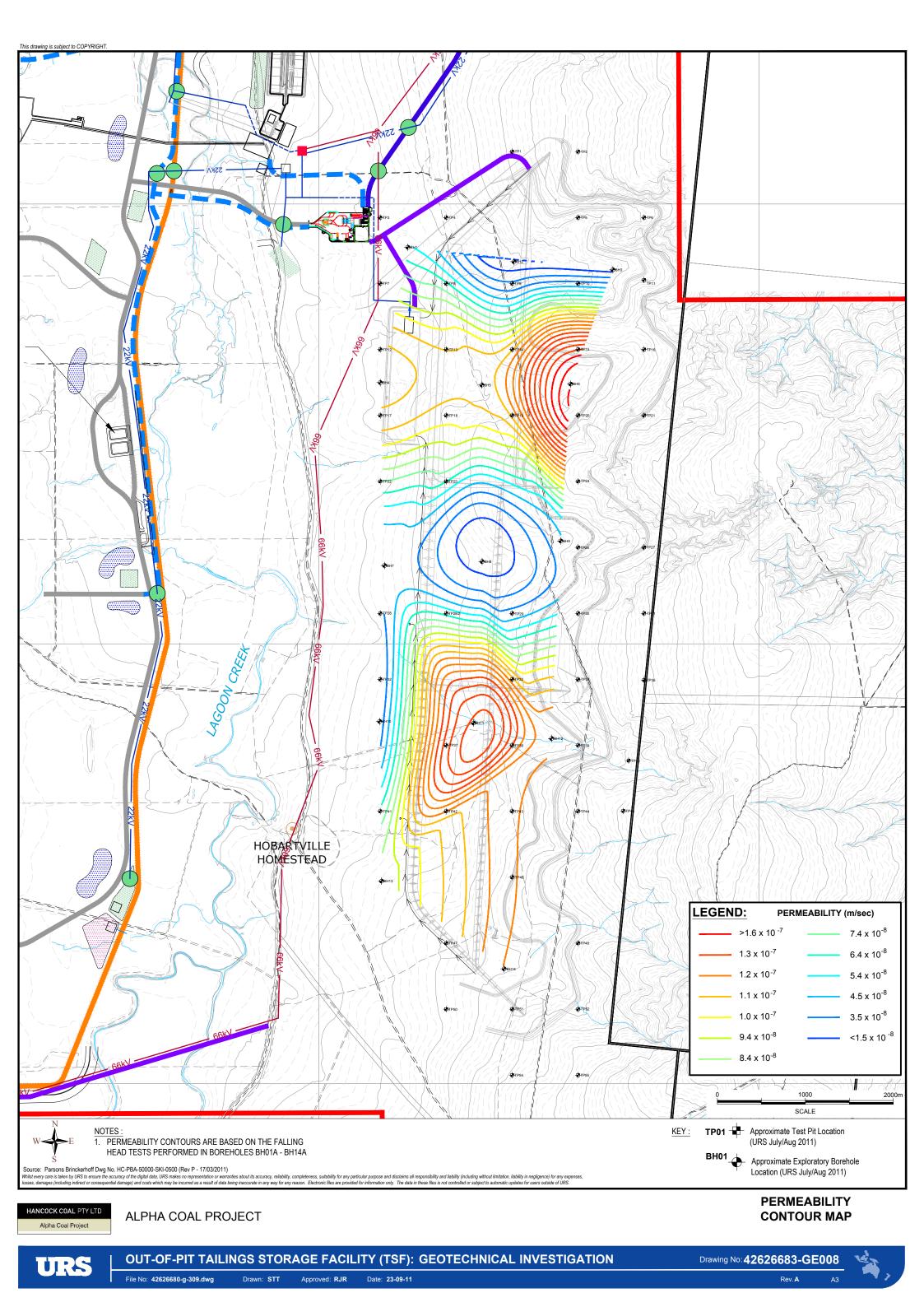
OUT-OF-PIT TAILINGS STORAGE FACILITY (TSF) : GEOTECHNICAL INVESTIGATION

	0	12.5	25m
CAL SCALE: 1:500 (A3) ONTAL SCALE: 1:25000 (A3)	0	SCALE 1:500 625	1250m
DITAL SCALL. 1.23000 (A3)			

GEOLOGICAL SECTIONS E-E' AND F-F'

Drawing No: **42626683-GE006**





Appendix B Information from Previous Investigations

URS

B

Appendix B

B.1 Borehole Logs

CLIENT: Hancock Prospecting Pty Ltd PROJECT: Alpha Coal Mine LOCATION: Alpha

SURFACE LEVEL: 325m AHD* BORE No: 6 EASTING: 451213 PROJECT No: 74359 **NORTHING:** 7428084 DATE: 05.06.2010 DIP/AZIMUTH: 90°/--SHEET 1 OF 1

	Description	ji ji	Sampling & In Situ Testing					Well	
Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction Details	
	SILTY SAND - medium dense, brown grey, fine grained silty sand, trace of clay, moist - becoming grey, dry	·]·[·]·		0.5				Seal to 0.4m (Standpipe extended 0.4m	
•1	- becoming grey mottled orange brown		s	0.95		4,6,7 N = 13		above ground level)	
-				1.5					
2			S	1.95		8,7,16 N = 23		-2	
2.7				-				Slotted pipe from 0.5m to 4.54m	
3.	SANDSTONE - extremely low strength, extremely weathered, light orange grey, fine grained sandstone		S	3.0 3.13		30/130mm		-3	
								- - - - - -	
4								-4	
4.54	- becoming low strength, slightly weathered, light grey Bore discontinued at 4.54m	!	_s_	4.5 4.54			-		: <u>=</u>
5		. ⁸		, and the second se	•			-5	
\$	· ·							-6	
,								-7	
3								-8	
•						· ·		-9	
		,							
	apower Scout DRILLER: Ground Test BORING: Auger to 4.54m		LO	GGE): LW	′D	CAS	i	

REMARKS:

*Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client

SAMPLING & IN SITU Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample (x mm dia.) Water sample (core drilling	p Pocket penetrometer (kPa)	CHECKED Initials: Date:	65	Douglas Partners Geotechnics · Environment · Groundwater
	Auger sample Disturbed sample Bulk sample Urbe sample (x mm dia.) Water sample	Disturbed sample PiD Photo ionisation detector Julk sample S Standard penetration test fube sample (x mm dia.) PL Point load strength 1s(50) MPa Water sample V Shear Vane (kPa)	Auger sample pp Pocket penetrometer (kPa)	Auger sample pp Pocket penetrometer (kPa) Initials: Diskurbed sample PID Photo ionisation detector Initials: Juk sample S Standard penetralion test Initials: Lube sample (x mm dia.) PL Point load strength Is(50) MPa Initials: Vater sample V Shear Vane (kPa) Initials: Initials:

CLIENT: Hancock Prospecting Pty Ltd PROJECT: Alpha Coal Mine LOCATION: Alpha

SURFACE LEVEL: 329m AHD* BORE No: 10 EASTING: 451613 NORTHING: 7426050 PROJECT No: 74359 DATE: 05.06.2010 DIP/AZIMUTH: 90°/--SHEET 1 OF 1

	_	Description	iči		Sarr		& In Situ Testing	5	Well	
ā	Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction Details	
	- 0. - 0.5	SILTY SAND - medium dense, brown, fine grained silty sand, dry to moist SANDY GRAVEL - medium dense, brown and red brown,	e e e Q°, č	A	0.3	<u></u>			- (Standpipe extended 0.5m above ground level) Seal to 0.4m	
	-1 1.0	sand, moist		S S	0.95 1.0 1.02 1.07		5,5,5 N = 10 30/50mm		-1 Slotted pipe from 0.5m to 2.52m	
	-2	- becoming orange					•		-2	
	2.5	- becoming medium strength and light grey Bore discontinued at 2.52m	<u></u>	_s_	-2.5- 2.52		20/20mm			
	3					-			-3	
	-4									
	- 		, ,>						-5	
							· ·		-6	
-	-7			-						
	-8								-8	
	-9			· · · · · · · · · · · · · · · · · · ·						
T W	RIG: Hydrapower Scout DRILLER: Ground Test LOGGED: LWD CASING: Nil TYPE OF BORING: Auger to 2.52m VATER OBSERVATIONS: No groundwater seepage observed VATER OBSERVATIONS: No groundwater seepage observed									
	EMARKS: *Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client SAMPLING & IN SITU TESTING LEGEND pp Auger sample pp Disturde sample PD Bulk sample Standard penetration test Tube sample (T) PL Value (R/P) PL Value (R/P) PL									

Douglas Partners Geotechnics · Environment · Groundwater S Standard penetration test PL Point load strength Is(50) MPa V Shear Vane (KPa) D Water seep Water level Date:

CLIENT:Hancock Prospecting Pty LtdPROJECT:Alpha Coal MineLOCATION:Alpha

SURFACE LEVEL: 329m AHD* BORE No: 10A EASTING: 451610 **NORTHING:** 7426044 SHEET 1 OF 1 DIP/AZIMUTH: 90°/--

PROJECT No: 74359 DATE: 06.06.2010

	_		Description	otion Sampling & In Situ Testing		well				
ᆋ		pth n)	of	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction
L	· ·		Strata	ļ	<u>ب</u>	ŏ.	Sal	Comments		Details
		0.2	SILTY SAND - medium dense, brown, fine grained slity sand, dry to moist	<u>ti</u> t						(Standpipe extended 0.7m above ground level)
		0.5	SANDY GRAVEL - stiff, yellow grey, light brown and red brown, fine to medium subrounded sandy gravel, fine	19.0°,						(Standpipe extended 0.7m above ground level)
	1 1	1.1	SANDY CLAY - stiff, yellow grey, light brown and red brown, medium plasticity sandy clay, fine to medium grained sand, trace of fine subrounded gravel, moist							-1 -1 Seat from 0.9m to 1.5m
	-		SANDSTONE - low strength, moderately weathered, red brown, fine to medium grained sandstone - becoming orange grey							
	-2									
	-	•						· ·		
-	-3									-3 Slotted pipe from 1.6m to 4.6m
	-4			· · · · · ·						-4
		4.4 4.6	SILTSTONE - very low to low strength, white and red	<u> </u>						
	-		brown silfstone							
	-5									-5
						۲ بلا :				
	-6									
										-6
	-		· · · ·					· · ·		
	-7									-7
	- ·	-								
	-							· · ·	•	
	-8									-8
	-									
	-9									~9
	- - -									
L Pi	ـــــــــــــــــــــــــــــــــــــ		apower Scout DRILLER: Ground Test		L	GGE	 אוניר	/D	•	
			BORING: Auger to 4.6m		20		J. LYV		UH3	
	atei Emai		SSERVATIONS: No groundwater seepage observed *Elevations interpolated from dxf file 2123204A-OVE	RALL_I	BFS_C	OPTIO	N_A3	a provided by client		
Ą	Aug	jer sa	SAMPLING & IN SITU TESTING LEGEND mple pp Pocket penetrometer (kPa) sample PID Photo ionisation detector		CHE	CKED				
D B U W	Bull Tub Wa	k sam	ple S Standard penetration test ple (x mm dia.) PL Point load strength Is(50) MPa mple V Shear Vane (kPa)		nitials: Date:			((/)) Doi	ıg	las Partners

CLIENT: Hancock Prospecting Pty Ltd PROJECT: Alpha Coal Mine LOCATION: Alpha

SURFACE LEVEL: 327m AHD* BORE No: 11 EASTING: 451438 **PROJECT No:** 74359 **NORTHING:** 7424327 DATE: 05.06.2010 DIP/AZIMUTH: 90°/--SHEET 1 OF 1

	Description 👱 Sampling & In Situ Testing					& In Situ Testing	Well		
RL	Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction Details
		SILTY SAND - medium dense, grey, fine grained silty sand, trace of clay, dry	· [•]•]•						(Standpipe extended 0.15m above ground level)
			 	s	0.5		4,5,5 N = 10		Seal to 0.6m
	- 0.9 -1 - 1.3	CLAYEY SAND - medium dense, grey mottled orange brown, fine grained clayey sand, some silt, dry to moist			0.95				
	-	SAND - medium dense, light brown and light grey, fine grained sand, trace of clay, moist		 S	1.5	-	8,10,12 N = 22		
	-2 -2 2.1		·····	····	1.95				-2 Slotted pipe from 1.0m to 3.04m
		CLAYEY SAND - medium dense, brown, fine grained clayey sand, trace of fine subrounded and subangular gravel, moist	1.1.1	A	2.2				
	- 2.6	SANDSTONE - low strength, slightly weathered, light grey, fine grained sandstone			_3.0_			-	
	⁻³ 3.04	Bore discontinued at 3.04m		S	3.04		30/40mm		
	- ` - -								
	-4								-4
	-								
	-								
	-5 -5		2				• •		-5
	-				۲ ۲				
	-6								-6
			, i						
	-7						• , *		-7
			•					•	
							. *		
	-8								-8
	-							•	
	• • •		•						
	-9								-9
	• •								
	-								
		apower Scout DRILLER: Ground Test		LO	GGEI)։ ԼW	/D	CAS	ING: Nil
w,	ATER O	BORING: Auger to 3.04m BSERVATIONS: No groundwater seepage observed			~~~~				
RE	MARKS	*Elevations interpolated from dxf file 2123204A-OVE	RALL_E			™_A3	_a provided by client	•	
A D B	Auger sa Disturbeo Bulk sam	mple pp Pocket penetrometer (kPa) I sample PID Photo ionisation detector de S Standard penetration test		CHE itials:	CKED			1 <i>6</i> 74	lac Dartnore
U, W C	Tube sar Water sa Core drill	nple (x mm dia.) PL Point load strength ls(50) MPa mple V Shear Vane (kPa)		ate:			NZ Geotech	nics	las Partners • Environment • Groundwater

CLIENT: Hancock Prospecting Pty Ltd PROJECT: Alpha Coal Mine LOCATION: Alpha

BORE No: 11A
PROJECT No: 74359
DATE: 05.06.2010
SHEET 1 OF 1

	Description	0	Sampling & In Situ Testing					Well
Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction Details
0.5	SILTY SAND - medium dense, grey, fine grained slity sand, trace of clay, dry - becoming moist	· [· [·] ·						(Standpipe extended 0.35m above ground level)
-1	CLAYEY SAND - medium dense, grey mottled orange brown, fine grained clayey sand, some silt, dry to moist							extended 0.35m above ground level)
1.4	SAND - medium dense, light brown and light grey, fine							
1.7	grained sand, trace of clay, moist	· · · · · · · · · · · · · · · · · · ·						
-2	clayey sand, trace of fine subrounded to subangular gravel, moist SANDSTONE - very low strength, moderately weathered, light grey and brown, fine grained sandstone							-2 Seal from 1.6m to 2.4m
-3	- becoming orange brown					·		-3
-4								-4 Slotted pipe from
-5	- becoming red brown					· · · · · · · · · · · · · · · · · · ·		-5
5.5	Bore discontinued at 5.5m							
-6								6
- 7						· · ·		-7
-8			•					-8
-9								-9
				•				
							· ·	

TYPE OF BORING: Auger to 5.5m

Core drilling

WATER OBSERVATIONS: No groundwater seepage observed

REMARKS: *Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client

SAMPLING & IN SITU TESTING LEGEND pp Pocket penetrometer (kPa) PID Photo ionisation detector S Standard penetration test nm dia.) PL Point load strength is(50) MPa V Shear Vane (kPa) D Water seep T Water tevel Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample ADBU. WC

CHECKED initials: Date:



Douglas Partners Geotechnics • Environment • Groundwater

CLIENT: Hancock Prospecting Pty Ltd **PROJECT:** Alpha Coal Mine LOCATION: Alpha

SURFACE LEVEL: 328m AHD* BORE No: 12 EASTING: 451311 PROJECT No: 74359 **NORTHING:** 7422690 DATE: 05.06.2010 DIP/AZIMUTH: 90°/--SHEET 1 OF 1

		Description	Description	L .	Well					
R	Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Construction Details	
	- 0,8	SILTY SAND - medium dense, brown grey, fine grained silty sand, dry - becoming loose, light brown, moist		s	0.5		3,4,5 N = 9		(Standpipe extended 0.5m above ground level) Seal to 0.4m	
	-1 -1	CLAYEY SAND - medium dense, grey and orange brown mottled clayey sand, fine grained sand, moist - becoming red brown, orange brown and grey mottled, dry to moist			0.95 1.5					
	-2			S	1.95		7,12,18 N = 30		-2 Slotted pipe from 0.5m to 4.02m	
	3 2.9	- becoming dense, red brown, fine to medium grained sand, trace of fine subangular gravel, dry SANDSTONE - very low strength, highly weathered, light grey, fine grained sandstone		S	3.0 3.1		30/95mm	•	-3	
	4 4.02	- becoming low strength, moderately weathered Bore discontinued at 4.02m		s	<u>4.0</u> 4.02					
									-5	
							· · ·			
	-6						· .			
	-7				· .	·			7	
	-8		-						-8	
	-9							2	-9	
	• • • •						·			
TY W/	RIG: Hydrapower Scout DRILLER: Ground Test LOGGED: LWD CASING: Nil ITYPE OF BORING: Auger to 4.02m MATER OBSERVATIONS: No groundwater seepage observed Kater of the sepage observed REMARKS: *Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client Filevations									
A D B U, W C	Bulk sar	d sample PID Photo ionisation detector nple S Standard penetration test mple (x mm dia.) PL Point load strength Is(50) MPa amble V Streat Vane (KPa)	$\cdot \vdash$	CHE nitials: Pate:	CKED			19 10:	las Partners s · Environment · Groundwater	

pp Pocket penetrometer (kPa) PID Photo ionisation detector S Standard penetration test PL Point load strength Is(50) MPa V Shear Vane (kPa) D Water seep ¥ Water leve **Call Douglas Partners** Geotechnics · Environment · Groundwater Initials: Date:

B.2 Test Pit Logs



CLIENT:Hancock Prospecting Pty LtdPROJECT:Alpha Coal MineLOCATION:Alpha

 SURFACE LEVEL:
 312m AHD*
 PIT No:
 12

 EASTING:
 447838
 PROJECT No:
 74359

 NORTHING:
 7427026
 DATE:
 03.07.10

 DIP/AZIMUTH:
 90°/- SHEET
 1 OF
 1

		Description	ţi,		Sampling & In Situ Testing			ب				
⊾	Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20			
	-	SANDY CLAY - very stiff to hard, brown, high plasticity sandy clay, fine grained sand, dry to moist										
	- 0.5 -	SILTY CLAY - very stiff to hard, light brown, high plasticity silty clay, trace fine sand, moist	<u></u> 	В	0.4 0.5							
	- 1											
	- -											
		- becoming hard		D	1.4 . 1.5							
	-2 2.15		1/2						-2			
		Pit discontinued at 2.15m (Refusal)										
			ý									
	-3			•					-3			
-	-											
-												
•	- 4					-			-4			
LLI RIC	G: Backl	noe JCB 3CX	-	LO	GGE	D: LW	/D					

REMARKS: *Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client Cone Penetrometer AS1289.6.3.2

	SAMPLING & IN SIT	J TE	STING LEGEND	CHECKED				
A I	Auger sample	DD	Pocket penetrometer (kPa)					
l D	Disturbed sample.	PiD	Photo ionisation detector	1	W.,			
B	Bulk sample	S	Standard penetration test	Initials:		1 1 1	Ranalaa	Dowloo o uo
ΙŪ.	Tube sample (x mm dia.)	ΡL.	Point load strength Is(50) MPa	1		1 0 A	Douglas	rarmers
l w 👘	Water sample	v	Shear Vane (kPa)	1	₿ ⊾`,	' 🖉		
C	Core drilling	⊳	Water seep 📱 Water leve	Date:			Geotechnics • Enviro	nment • Groundwater

CLIENT: Hancock Prospecting Pty Ltd PROJECT: Alpha Coal Mine LOCATION: Alpha

SAMP Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

ADBU VWC

SURFACE LEVE	L: 332m AHD*	PH NC
EASTING:	451781	PROJI
NORTHING:	7428508	DATE:
DIP/AZIMUTH:	90°/	SHEE

o: 14 ECT No: 74359 13.06.2010 **T** 1 OF 1

	Description	ici		San		& In Situ Testing	بر	Dynamic Penetrometer Test			
관 Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic F (blow 6 1	ws per mm)		
-	SILTY SAND - loose, orange-brown, fine grained silty sand, trace of clay, dry				<u> </u>						
- 0.3	SANDY GRAVEL - loose, grey sandy gravel, fine to medium subangular to subrounded gravel, fine grained sand, dry		В	0.4				-			
0,6	SANDY CLAY - very stiff to hard, grey mottled orange-brown and red-brown, high plasticity sandy clay, fine grained sand, dry to moist		В	0.6							
-1 - 1.1	SANDSTONE - extremely to very low strength, highly weathered, red-brown, light grey and orange-brown, fine to medium grained sandstone		B	1.2							
				1.4							
-2	- becoming very low strength, moderately weathered, grey with some orange-brown ironstaining						 	-2			
	Pit discontinued at 2.1m (Refusal)	>									
						\$		-			
-3						, , , , , , , , , , , , , , , , , , ,		-3			
- - -					-						
-4				La PLANA				-4			
			, and the second se								
		-									
	 where JCB 3CX where BSERVATIONS: No groundwater observed. S: *Elevations interpolated from dxf file 2123204A-OVE 	-RAI I		OGGE					meter AS1289.6.3. meter AS1289.6.3.		

SAMPLING & IN SITU TESTING LEGEND pp Pocket penetrometer (kPs) e PiD Photo ionisation detector S standard penetration test mm dia.) PL Point load strength Is(50) MPa V Shear Vane (kPa) b Water scop & Water Icvel Initials: U) **Douglas Partners** Geotechnics • Environment • Groundwater Date:

CHECKED

CLIENT: Hancock Prospecting Pty Ltd Alpha Coal Mine PROJECT: LOCATION: Alpha

SURFACE LEVI	EL: 334m AHD*	PIT No: 13
EASTING:	451641	PROJECT No: 743
NORTHING:	7427166	DATE: 13.06.2010
DIP/AZIMUTH:	90°/	SHEET 1 OF 1

74359

		Description	- <u>-</u>		San	Sampling & In Situ Testing		jr	Dynamic Penetrometer Test				
RL	Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dyr 5	(blow	s per mm)	20	
Γ		SILTY SAND - loose, grey, fine to medium grained silty sand, some rootlets, dry	· · ·										
		- becoming orange-brown, trace of clay, trace of rootlets, moist		в	0.2								
	-		· · · ·		0.5								
	-												
	- 0.8 - -1	GRAVELLY SAND - medium dense, light brown gravelly sand, fine to medium grained sand, fine to medium subrounded to subangular gravel, some clay, moist	0	B	0.8				-1				
	1.	I SANDY CLAY - stiff to very stiff, light brown and	22		1.1 1.2								
		orange-brown, medium plasticity sandy clay, fine to medium grained sand, trace of subrounded to subangular gravel, moist		B	1.4		*						
	1.6	SANDSTONE - extremely low strength, extremely weathered, light grey and orange-brown, fine to medium	· · · · ·		1.4								
		grained sandstone - from 1.4m: becoming very low strength, moderately weathered											
		Pit discontinued at 1.6m											
	-2	(Refusal)							-2				
	-												
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	-		2					¢					
	-								-				
	-3								-3				
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	· ·	· · · ·											
							<u> </u>		:		4		
		hoe JCB 3CX BSERVATIONS: No groundwater observed.	-	LO	GGEI	D: LW	/D		0++-05		-1 604000		
		*Elevations interpolated from dxf file 2123204A-OVEF	RALL	BES (OPTIC	N A3	a provided by client		Sand Pi Cone Pi	enetrom	eter AS1289 leter AS1289	9.6.3.3 96.3.2	

SAMPLING & IN SITU TESTING LEGEND pp Pocket penetrometer (kPa) PID Photo ionisation detector Standard penetration test nm dia.) PL Point load strength Is(50) MPa V Shear Vane (KPa) P Water seep ¥ Water level SAMF Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

A D B U W C

CHECKED	
Initials:	
Date:	

 $\langle D$ **Douglas Partners** Geotechnics · Environment · Groundwater

CLIENT: Hancock Prospecting Pty Ltd PROJECT: Alpha Coal Mine LOCATION: Alpha

SURFACE LEVI	EL: 332m A
EASTING:	451645
NORTHING:	7426360
DIP/AZIMUTH:	90°/

HD* PIT No: 15 **PROJECT No: 74359** DATE: 12.06.2010 SHEET 1 OF 1

Γ		Danth	Description	hic		·····		& In Situ Testing	5	Dynamic Penetrometer Test (blows per mm) 5 10 15 20				'est
ľ	뵈	Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water					
ľ	┢		SILTY SAND - medium dense, grey, fine grained silty sand, dry							-				
	ł		- becoming orange-brown, moist			0.2								
	ŀ				В	0.5								
	-					0.5					-			
	-		- some clay											
	-	1								-1		,		
	ŀ	1.2				1.2								
	ł		SANDY GRAVEL - loose, grey mottled red-brown slightly silty sandy gravel, fine to medium grained sand, subangular to rounded gravel, wet	e.Ö.	в									
l	ł			0.0		1.5						,		
		1.65 1.75	I SANDSTONE - extremely low strength extremely	, ,										
			sandstone - from 1.7m: becoming very low to low strength, moderately weathered					· ·						
		2	moderately weathered Pit discontinued at 1.75m							-2				
	ŀ		(Refusal)											
	ł			1				,						
	-			1						-				
	-													•
	-	3								-3				
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L	t													

RIG: Backhoe JCB 3CX

LOGGED: LWD

WATER OBSERVATIONS: Groundwater seepage observed at 1.6m.

□ Sand Penetrometer AS1289.6.3.3 **REMARKS:** *Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client 🛛 Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND pp Pocket penetrometer (kPa) e PiD Photo ionisation detector Standard penetration test standard penetration test Pt Point load strength Is(50) MPa V Shear Vane (RPa) V Water seep Valer (evel Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample ADBU. WC Core drilling

CHECKED	
Initials:	
Date:	





CLIENT:Hancock Prospecting Pty LtdPROJECT:Alpha Coal MineLOCATION:Alpha

SURFACE LEV	EL: 330m AHD'	PIT N
EASTING:	451651	PRO.
NORTHING:	7424528	DATE
DIP/AZIMUTH:	90°/	SHEE

PIT No: 16 PROJECT No: 74359 DATE: 12.06.2010 CHEET 1 OF 1

	Dep	oth	Description	Graphic Log			. –	In Situ Testing	Water	Dynamic Penetrometer Test (blows per mm)			
R	(m	ı)	of Strata	Grag	Type	Depth	Sample	Results & Comments	Wa	(b) 5	10 1		0
			SILTY SAND - loose, grey, fine grained silty sand, dry	iiii						-			
-			- becoming orange-brown, moist	· [•] •] • [•] •]	в	0.2							
						0.4							
		0.5	SANDY GRAVEL - dense, orange-brown sandy gravel, fine to medium subangular to rounded gravel, fine to	//	в	0.5							
		0.8	fine to medium subangular to rounded gravel, fine to medium grained sand, trace of clay, moist			0.7 0.8				-			
		0.0	CONGLOMERATE - very low to low strength, highly weathered, red-brown and grey conglomerate	١Ō	в					-1			
	-1			p p n									
				Dec		1.2 1.3							
			 becoming very low strength, moderately weathered, grey from 1.45m: becoming low strength, slightly weathered 	Õ	В	1.45			<u> </u>				
		1.5	Pit discontinued at 1.5m (Refusal)										
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	-2									-2			
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L	[OGGE						:	

WATER OBSERVATIONS: No groundwater observed.

□ Sand Penetrometer AS1289.6.3.3

REMARKS: *Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client
Cone Penetrometer AS1289.6.3.2

		•			
Γ		& IN SITU TESTING LEGEND	CHECKED		
	A Auger sample D Disturbed sample B Bulk sample	PID Photo ionisation detector S Standard penetration test	Initials:	MAN	Douglas Partners
	U. Tube sample (x mm dia.) W Water sample	PL Point load strength is(50) MPa V Shear Vane (kPa) ⊳ Water seep ₹ Water level	Date:	NZ	Geotechnics · Environment · Groundwater

CLIENT: Hancock Prospecting Pty Ltd PROJECT: Alpha Coal Mine LOCATION: Alpha

SURFACE LEVI	EL: 330m AHD [*]
EASTING:	451567
NORTHING:	7423459
DIP/AZIMUTH:	90°/

* PIT No: 17 **PROJECT No: 74359** DATE: 12.06.2010 SHEET 1 OF 1

Γ			Description	hic		San		& In Situ Testing	L	Sampling & In Situ Testing				stromotor Toot	
Ъ		epth _. (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dyr	(blov	ws per	mm)	Fest 20	
$\left \right $			SILTY SAND - loose, grey, fine grained silty sand, dry												
	[- becoming orange-brown, moist			0.2									
	-			• •]• • •]•		1									
	ŀ					0.6			-						
	-		 becoming medium dense with some clay and trace of fine to medium rounded to subrounded gravel 				ŀ								
	-					0.9									
	-1 -	1.1		1.1.1.1 1.1.1.1		1.1				-1		ż			
	ŀ		CLAYEY SAND - loose, grey mottled orange-brown, fine to medium grained clayey sand, moist to wet		в								•		
		1.4	CONGLOMERATE/SANDSTONE - very low strength,	67	В	1.4									
	ļ	1.5	with fine to medium gravel sized clasts and very low	┉╘┵╌╿┄┡╼┺╼╸		-1.5-		i		-			•		
			strength, highly weathered, grey, fine to medium grained sandstone												
			Pit discontinued at 1.5m (Refusal)												
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R	G.	Back	hoe JCB 3CX		10	GGEI): LW	/D							

WATER OBSERVATIONS: No groundwater observed.

□ Sand Penetrometer AS1289.6.3.3

REMARKS: *Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client 🛛 Cone Penetrometer AS1289.6.3.2

	SAMPLING & IN SIT	U TE	STING LEGEND	CHECKED		-
A	Auger sample	pp	Pocket penetrometer (kPa)			P
D	Disturbed sample	PID	Photo ionisation detector	1.30-1		
в	Bulk sample	S	Standard penetration test	Initials:		
U.	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa		- A V /	1
Ŵ	Water sample	V	Shear Vane (kPa)	1 1	₿ _`/	
C	Core drilling	Ď	Water seep 💈 Water level	Date:		£

Douglas Partners Geotechnics · Environment · Groundwater

CLIENT:Hancock Prospecting Pty LtdPROJECT:Alpha Coal MineLOCATION:Alpha

SURFACE LEVE	L: 332m AHD*	PIT No:
EASTING:	451470	PROJEC
Northing:	7422251	DATE:
dip/azimuth:	90°/	SHEET

PIT No: 18 PROJECT No: 74359 DATE: 12.06.2010 SHEET 1 OF 1

Donth	Description		Sampling & In Situ Testing			& In Situ Testing	5	Dynamic Penetrometer Test			
Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	(blows per mm) 5 10 15 20			
	SILTY SAND - medium dense, grey, fine grained silty			<u> </u>	S						
	sand, dry	: ·] · ·]									
-	- becoming orange-brown, moist, some clay	-i-i-i-									
				0.5							
-											
			В								
-				0.9							
-1 1.0	CLAYEY SAND - medium dense, grey, red-brown and			1.1				-1			
	orange-brown fine grained clayey sand, some fine to medium subangular gravel, moist to wet	1.1.	в								
-	· · ·	1.1									
.	- becoming orange-brown streaked grey and red-brown (no gravel)	1.1		1.4							
-		1.11									
		1.1.				-					
		1.1.1									
-2 2.0	SANDSTONE - extremely low to very low strength, highly weathered, grey and light orange-brown, fine to medium grained sandstone			2.0				-2			
	grained sandstone		В								
2.3	Pit discontinued at 2.3m	<u>.</u>		-2.3							
-	(Refusal)	7									
				4							
-											
· _						- -					
-3								-3			
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-4	· · · · · ·							-4			
r											
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G: Backh	noe JCB 3CX		LO	GGEI): LW	/D					
	SERVATIONS: No groundwater observed.					-	п	Sand Penetrometer AS1289.6			

REMARKS: *Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client Cone Penetrometer AS1289.6.3.2

		1		
SAMPLING & A Auger sample D bisturbed sample B sulk sample U, Tube sample (x mm dia.) W Water sample C Core drilling	& IN SITU TESTING LEGEND pp Pocket penetrometer (kPa) PID Photo ionisation delector Standard penetration test PL Point load strength is(50) MPa V Shear (kPa) ▷ Water (kPa) ▷ Water seep	CHECKED Initials: Date:	60	Douglas Partners Geotechnics • Environment • Groundwater

CLIENT: Hancock Prospecting Pty Ltd PROJECT: Alpha Coal Mine LOCATION: Alpha

SURFACE LEVE	L: 343m AHD*	PIT No:	-32	2	
EASTING:	452426	PROJE	СТ	No:	7
NORTHING:	7421657	DATE:	30	.06.1	10
dip/azimuth:	90°/	SHEET	1	OF	1

74359

		Description		-	Sam	pling	& In Situ Testing	Τ.				
RL	Depth (m)	of	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic (blo	Penetrometer Test ows per mm)		
		Strata		Ē	ă	Sar	Comments		5	10 15 20		
	- - - - -	SILTY SAND - loose, light grey, fine grained silty sand, moist				 -						
	- - 0,9 -1	CLAYEY SAND - medium dense, grey mottled yellow brown and orange brown, fine to medium grained clayey sand, trace fine sub-angular gravel, moist							-1			
	- 1.3 - 1.45 - 1.5	SANDY CLAY - very stiff, grey mottled yellow brown and orange brown, high plasticity sandy clay, fine sand, moist		· ·								
		mottled orange brown, fine grained sandstone Pit discontinued at 1.5m (Refusal)					· · ·					
	-2				•				-2			
	• • •		2		÷		.*					
	- - -3 -								-3			
	-				-							
	-4								-4			
				·								
	-											

RIG: Backhoe JCB 3CX

WATER OBSERVATIONS: No groundwater observed.

LOGGED: LWD

Sand Penetrometer AS1289.6.3.3

*Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client 🛛 Cone Penetrometer AS1289.6.3.2 REMARKS:

SAMPLING & IN SITU TESTING LEGEND pp Pocket penetrometer (kPa) PID Photo ionisation detector Standard penetration test mm dia.) PL Point load strength Is(50) MPa V Shear Vane (kPa) V Water seep ¥ Water level CHECKED Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling ADBU, WC **Geotechnics** · Environment · Groundwater Initials: Date:

CLIENT: Hancock Prospecting Pty Ltd PROJECT: Alpha Coal Mine LOCATION: Alpha

SURFACE LEVE	EL: 341m AHD*	PIT No: 33
EASTING:	452269	PROJECT No: 74359
Northing:	7422771	DATE: 30.06.10
dip/azimuth:	90°/	SHEET 1 OF 1

Sampling & In Situ Testing Description Graphic Log Water **Dynamic Penetrometer Test** of Type Depth Results & Comments (blows per mm) Sampl Strata 10 15 20 SILTY SAND - medium dense, light yellow grey, fine · | · | · | grained silty sand, dry • | • | • | · [· [·] 0.4 J.O.C. SANDY GRAVEL - medium dense, light yellow grey, fine 0.5 to medium sized sub-rounded sandy gravel, fine sand, ŗ, trace clay, dry CLAYEY SAND - medium dense, light yellow mottled orange brown, fine to medium grained clayey sand, trace fine sub-angular gravel, dry to moist 1.0 SANDY CLAY - stiff, grey mottled orange brown, high plasticity sandy clay, fine sand, moist 1.15 1.2 SANDSTONE - low strength, moderately weathered, grey mottled red brown, medium grained sandstone Pit discontinued at 1.2m (Refusal)

RIG: Backhoe JCB 3CX

LOGGED: LWD

WATER OBSERVATIONS: No groundwater observed.

*Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client 🛛 Cone Penetrometer AS1289.6.3.2 **REMARKS:**

 SAMPLING & IN SITU TESTING LEGEND

 pp
 Pocket penetrometer (kPa)

 PID
 Phote ioneation detector

 Standard penetration test
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Share Vane (kPa)

 P
 Water seep

 CHECKED SAIMI Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample ADBU WC Initials: Date: Core drilling



Douglas Partners Geotechnics · Environment · Groundwater **Douglas Partners**

Sand Penetrometer AS1289.6.3.3

-2

• 3

4

Depth 2

(m)

CLIENT: Hancock Prospecting Pty Ltd PROJECT: Alpha Coal Mine LOCATION: Alpha

SURFACE LEVE	EL: 337m AHD*	PIT No: 34
EASTING:	452125	PROJECT No: 74359
NORTHING:	7423615	DATE: 01.07.10
DIP/AZIMUTH:	90°/	SHEET 1 OF 1

Π		Description			Sampling & In Situ Testing			2	Dynamic Penetrometer Test			
Я	Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	(blo	Penetrometer Test ws per mm) 10 15 20		
		SANDY GRAVEL - loose, yellow brown and orange brown, fine to medium sized sub-angular to sub-rounded sandy gravel, fine sand, moist				<u>.</u>						
	-1 - 1.2 - 1.4	SANDY CLAY - very stiff, grey mottled orange brown and red brown, medium plasticity sandy clay, fine sand, moist SANDSTONE - very low strength, highly weathered, grey			1.4				-1			
	1.6	mottled orange brown, medium grained sandstone - becoming low strength and moderately weathered Pit discontinued at 1.6m	<u> </u>	В	-1.6-							
	-2 	(Refusal)	· * ·						-2			
	- 4								-4			
W	IG: Backhoe JCB 3CX LOGGED: LWD ATER OBSERVATIONS: No groundwater observed. Sand Penetrometer AS1289.6.3.3 EMARKS: *Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION A3 a provided by client Cone Penetrometer AS1289.6.3.2											

SAMPLING & IN SITU TESTING LEGEND pp Pocket penefrometer (kPa) e PID Photo ionisation detector S standard penetration test nm dia.) PL Point load strength is(50) MPa V Shear Vane (kPa) Water seep ¥ Water level CHECKED SAMF Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling ADBU.WC Initials: (Date:

Douglas Partners Geotechnics · Environment · Groundwater

CLIENT: Hancock Prospecting Pty Ltd PROJECT: Alpha Coal Mine LOCATION: Alpha

SURFACE LEVE	EL: 341m AHD*	PIT No:	35
EASTING:	452350	PROJEC	CT N
NORTHING:	7425034	DATE:	01.0
DIP/AZIMUTH:	90°/	SHEET	1 (

No: 74359 07.10 OF 1

		Description			Sampling & In Situ Testing								
RL	Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20				
╞		SILTY SAND - loose, brown, fine grained silty sand, moist	 · · ·			<u></u> 0			-				
		- becoming orange							-				
			· · ·				. *		-				
									-				
	- 1								-1				
		- trace clay							[1		
ļ			0.00										
	1.8	CONGLOMERATE - extremely low strength, extremely										-	
	-2	CONGLOMERATE - extremely low strength, extremely weathered, yellow brown mottled red brown conglomerate, fine to medium sub-rounded gravel sized clasts	FU boc						-2			-	
		^C - becoming very low strength and moderately weathered	ĒŎ		2.2								
	2.4	- becoming low strength	P°C	в	-2.4-								
		Pit discontinued at 2.4m (Refusal)	,»		2.4								
					ء م ب								
	-3			•	-			۰.	-3				
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	s. maala												

RIG: Backhoe JCB 3CX

LOGGED: LWD

WATER OBSERVATIONS: No groundwater observed.

Sand Penetrometer AS1289.6.3.3

REMARKS: *Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client 🛛 Cone Penetrometer AS1289.6.3.2

Γ		SITU TESTING LEGEND	CHECKED
- L/	A Augersample	pp Pocket penetrometer (kPa)	<u> </u>
_ I	D Disturbed sample	PID Photo ionisation detector	Institutes.
_ I	B Bulk sample	S Standard penetration test	Initials:
- 11	U. Tube sample (x mm dia.)	PL Point load strength Is(50) MPa	I
1	U, Tube sample (x mm dia.) W Water sample	V Shear Vane (kPa)	
- I.	C Core drilling	> Water seep	Date:



CLIENT: Hancock Prospecting Pty Ltd PROJECT: Alpha Coal Mine LOCATION: Alpha

EL: 336m AHD*	PIT No: 30
452294	PROJECT
7426142	DATE: 01.
90°/	SHEET 1
	7426142

No: 74359 .07.10 OF 1

Б "	Description	je –		Sam		& In Situ Testing	5	Dur	amin Da	notron	eter Test
Depth (m)	of Strata	Graphic Log	. Type	Depth	Sample	Results & Comments	Water	5 Jyn	amic Pe (blow: 10	s per mr 15	20
	SILTY SAND - toose, grey, fine grained silty sand, trace clay, dry							-			
- 0.4 - -	SANDY CLAY - very stiff, grey, high plasticity sandy clay, fine sand, dry to moist						*****				
- 0.8 - - 1	CLAYEY SAND - medium dense, grey mottled orange brown, fine grained clayey sand, dry to moist							-1		,	
	- becoming orange brown and grey, trace fine rounded gravel									/	
- 1.3 - -	SANDSTONE - extremely low strength, extremely weathered, orange brown and grey, fine to medium grained sandstone - becoming very low strength, moderately weathered, white, fine grained sandstone									-	
1.8	- becoming low strength Pit discontinued at 1,8m	<u> :</u>		, 			. <u>.</u> _				
-2	(Refusal)							-2			
		- 									,
		<i>2</i> *		1	•	· · · · · ·		-		-	
-3								-3	•		
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, ,						· · · · · · · · · · · · · · · · · · ·					
- 4								-4			•
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WATER OBSERVATIONS: No groundwater observed.

Sand Penetrometer AS1289.6.3.3

*Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client 🛛 Cone Penetrometer AS1289.6.3.2 **REMARKS:**

		SAMPLING & IN S			CHECKED			
		er sample		Pocket penetrometer (kPa)				
		irbed sample	PID	Photo ionisation detector	Initials:		1.1	
		sample	S	Standard penetration test	inducio.		/ / 1	Douglas Partners
-		sample (x mm dia.)	PL.	Point load strength Is(50) MPa		₿₹.	P A	www.iaj failicij
		ar sample	v	Shear Vane (kPa)	Date:		^ <u>A</u>	
	C Core	drilling	₽	Water seep 📱 Water level				Geotechnics • Environment • Groundwater

CLIENT:Hancock Prospecting Pty LtdPROJECT:Alpha Coal MineLOCATION:Alpha

SURFACE LEVE	L: 342m AHD*	PIT No: 37
EASTING:	452414	PROJECT No: 7
Northing:	7427287	DATE: 01,07.10
Dip/Azimuth:	90°/	SHEET 1 OF 1

74359

	Description	j		Sam		& In Situ Testing	-			
Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dyna 5	mic Penetro (blows per 10 1	meter Tes mm) 15 20
	SANDY GRAVEL - loose, yellow brown and red brown, fine to medium sized sub-rounded sandy gravel, fine sand, trace clay, dry									
0.4	CLAYEY SAND - medium dense, grey mottled red brown, fine grained clayey sand, dry to moist									
010	CONGLOMERATE - extremely low strength, extremely weathered, grey mottled red-brown and orange-brown conglomerate, fine to medium sized gravel clasts					· · ·				
0.9 1	SANDSTONE - extremely low strength, extremely weathered, grey mottled orange brown, fine to medium grained sandstone							-1	ł	
	- becoming very low strength	 						-	* - - * *	
1.4	Pit discontinued at 1.4m (Refusal)									
2								-2		
		7				· · .				
				,						
3								-3		
				·						
						· ·		-4		
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RIG: Backhoe JCB 3CX

WATER OBSERVATIONS: No groundwater observed.

LOGGED: LWD

Sand Penetrometer AS1289.6.3.3

REMARKS: *Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client 🛛 Cone Penetrometer AS1289.6.3.2

A	SAMPLING & IN SITI	J TESTING LEGEND	CHECKED		
D B U, W	Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample	PID Phote ionisation detector S Standard penetration test PL Point load strength Is(50) MPa	Initiais:	\mathcal{N}	Douglas Partners
c	Core drilling	V Shear Vane (kPa) Water seep Water level	Date:		Geotechnics • Environment • Groundwater

CLIENT: Hancock Prospecting Pty Ltd PROJECT: Alpha Coal Mine LOCATION: Alpha

SURFACE LEVE	L: 344m AHD*	PIT No:	38
EASTING:	452555	PROJE	CT N
NORTHING:	7428474	DATE:	01.0
dip/azimuth:	90°/	SHEET	1 (

lo: 74359 07.10 OF 1

ſ	Ť		Description	<u>i</u>		San	ເpling a	& In Situ Testing	۲.,	_				
æ)epth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20				
F		• •	SILTY SAND - loose, brown, fine grained silty sand, moist	1.1.1.		<u> </u>	0)	····· ··· ·						
										[.				
	-	0.3	SANDY GRAVEL - loose, red brown, fine to medium sized											
			sub-angular to sub-rounded sandy gravel, fine sand, trace clay, moist							[
	ŀ			iO.C										
	ŀ									÷.,				
	ľ	0.8	CONGLOMERATE - extremely low strength, extremely	67										-
	-1		weathered, red brown conglomerate, fine to medium gravel sized clasts	hor						-1		į		
	-	•		5						ŗ				
	t			bor						[-
	ļ			PUL		ļ				-				
	ł			boo		1.5				-				
	ł			PO	B					-				
	Ĺ	1.8	$\mathbb{R}_{\mathcal{N}}$ - becoming very low strength, moderately weathered	hor						<u> </u>				
	ŀ	1.81	SANDSTONE - low strength, slightly weathered, grey, fine							-				
	-2		to medium grained sandstone Pit discontinued at 1.81m							-2				
	l		(Refusal)							[
										-				
	ŀ			-						- .				
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	RIG: Backhoe JCB 3CX													
					LC	GGE	J: LV\	vu						
	WATER OBSERVATIONS: No groundwater observed. REMARKS: *Elevations interpolated from dxf file 2123204A-OVEI					Ортіс	N AG	a provided by client			Penetron Penetror			
ĸ	C IVI		Lievations interpulated from dxf life 2123204A-OVE		J 0_(/ N_/NJ		L	COURT	eneuor	netel /	1208	·.0.3.2
A			SAMPLING & IN SITU TESTING LEGEND pp Pocket penetrometer (kPa)	[CHE	CKED								
D B		Juger sa Disturbeo Bulk sam	f sample PID_Photo ionisation detector	1	nitials:					19	c D	9r	fp.	3 <i>YC</i>
	V . N	Tube sar Nater sa Core drill	nple (x mm dia.) PL Point load strength Is(50) MPa mple V Shear Vane (kPa)		Date:				a S mic	y∎⊄24∘ s•Fn	🧈 🕱	ब्द्राय । २०१२ व	s∎∎S round	₩ater Iwater
_						•		CDOCCOII	1114	- 611				

Geotechnics · Environment · Groundwater

CLIENT: Hancock Prospecting Pty Ltd PROJECT: Alpha Coal Mine LOCATION: Alpha, Central Queensland

SURFACE LEVEL: 340m AHD	* PIT No: ATP82
EASTING: 452354	PROJECT No: 74359.00
NORTHING: 7428893	DATE: 10/3/2011
DIP/AZIMUTH: 90°/	SHEET 1 OF 1

ſ		Description	nic		San		& In Situ Testing	-	Dynamia Danatramatar Taat				
č	고 Depth 또 (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water		Penetrometer Test ws per mm) 10 15 20			
ľ		SANDY GRAVEL - medium dense, grey sandy gravel with some silt, fine to medium grained sand, fine to medium grained subrounded gravel, dry			0.2				-				
	- -			в									
	-	- cemented			0.5								
	0.8 0.85	SANDSTONE - low strength, highly weathered, grey, fine / grained sandstone	<u>iQ:C</u>				· ·		-				
	-1	Pit discontinued at 0.85m (due to refusal)							-1				
				•									
	: - -		•						-				
	-2								-2				
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	-3								-3				
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	-4							-	-4				
											•		
F	RIG: JCB	3CX		LO	GGEI): TD	s s	URV	EY DATUM:	WGS84 Zone 55	Ж		

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: *Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client

□ Sand Penetrometer AS1289.6.3.3 Cone Penetrometer AS1289.6.3.2

 SAMPLING & IN SITU TESTING LEGEND

 G
 Gas sample

 P
 Piston sample

 U
 Fillon Sample

 V
 Fillon Sample (x mm dia.)

 W
 Water sample (x mm dia.)

 W
 Water sample

 V
 PL(D) Point load axial test is(50) (MPa)

 V
 PL(D) Point load diametral test is(50) (MPa)

 W
 Water sample

 V
 Water sample

 V
 Vater sample

 V
 Vater sample

 V
 Standard ponetration test

 Mple
 V

 Standard ponetration test
 A B B C D F Auger sample Bulk sample Block sample Core drilling Disturbed sample Environmental sample



CLIENT:Hancock Prospecting Pty LtdPROJECT:Alpha Coal MineLOCATION:Alpha, Central Queensland

SURFACE LEVEL: 333m AHD	PII NO: A P83
EASTING: 452281	PROJECT No: 74359.00
NORTHING: 7427956	DATE: 10/3/2011
DIP/AZIMUTH: 90°/	SHEET 1 OF 1

	Description	ic i		San		& In Situ Testing	L.	Dynamic Penetrometer Test					
균 Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynam (blows per	meter Lest mm) 15 20			
	SANDY SILT - stiff, grey, low plasticity, fine grained sandy silt, trace of fine gravel, dry - hard		B	0.2 0.3	S	pp >600							
				0.4		pp >600 pp >600	:						
	- grey with red-brown mottling			0.8		рр >600							
- -1	- red-brown			1.0				-1	,				
- 1.2			В	1.2				-	<i>*</i>				
•	silty sand, dry	· [•] •] •]											
			D	1.6									
-		•]• •											
-2		• • • • • •						-2					
				2,4									
la marte de la constante		·[·]· /[·]·		2,4									
							•						
-3 _ - 3.1 _ 3.12	SANDSTONE - low strength, highly weathered, grey, fine	! ! ! : : : /						-3					
- -	grained sandstone Pit discontinued at 3.12m (due to refusal)												
.								-					
- 4								-4					
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	· · · · · · · · · · · · · · · · · · ·							-					

RIG: JCB 3CX

LOGGED: TDL

SURVEY DATUM: WGS84 Zone 55K

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: *Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client

Sand Penetrometer AS1289.6.3.3

Cone Penetrometer AS1289.6.3.2

	SAMPLING & IN SITU TESTING LEGEND												
		MINI LINKS											
Α	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)								
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)								
BLK	Block sample	U,	Tube sample (x mm dia.	.) PL(D)) Point load diametral test Is(50) (MPa)								
С	Core drilling	Ŵ	Water sample	í pp`	Pocket penetrometer (kPa)								
D	Disturbed sample		Water seep	S	Standard penetration test								
ε	Environmental samp	le 📱	Water level	. V.	Shear vane (kPa)								

Douglas Partners Geotechnics | Environment | Groundwater

CLIENT: Hancock Prospecting Pty Ltd PROJECT: Alpha Coal Mine LOCATION: Alpha, Central Queensland

SURFACE LEVEL: 340m AHD* PIT No: ATP84 EASTING: 452075 PROJECT No: 74359.00 **NORTHING:** 7426816 DATE: 10/3/2011 DIP/AZIMUTH: 90°/--SHEET 1 OF 1

		· · ·											
	Depth	Description	고 고				& In Situ Testing	5	יח	namic Pr	enetror	neter T	'est
R	(m)	of	Graphic Log	Type	Depth	Sample	Results & Comments	Water	5,	namic Pe (blow	/s per r	nm)	001
		Strata	0	F	ð	Sai	Comments			5 10	1	52	0
	-	SILTY SAND - medium dense, brown, fine to medium grained silty sand, dry	1.1.1		-				-				
	-	gramed any sand, dry	-i-i-i		0.2		pp = 150-200		-				
	-		<u> </u>	в					-				
÷	-				0.4 0.5		pp = 200-250		-				
	[· · · · · ·			0.5		pp = 200-250		_				
	-						· ·		-				
	-	- becoming moist			0.8		pp = 150-200		-			:	
					10								
			 • - -		1.0		pp = 200-250		-1		1		
	r	· · ·	: : : · · ·		1.2		pp = 200-250		-			•	
				l					·				
		 yellow-brown with some fine to medium grained subrounded gravel, trace clay 	1.1.1		1.4		pp = 200-250		-				
		subrounded gravel, trace clay	[·i·i·i	В	1.6								
	-		<u>. 1. 1. 1</u>		1.0				-				·
	-			1				ŀ	. .				
	-	· · · ·	· ·					-	-		-		
	-2	- grey with orange-brown mottling, wet]					-2				
	-												
	-												
	-		l i i i				•		-				
	2.6	· · · · · · · · · · · · · · · · · · ·	<u> </u>		,								
	- 2.7	SANDSTONE - low strength, highly weathered, grey, fine grained sandstone						_					
	-	Pit discontinued at 2.7m							-				
	-3	(due to refusal)							-3				
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RIG: JCB 3CX

LOGGED: TDL

SURVEY DATUM: WGS84 Zone 55K

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: *Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client

Sand Penetrometer AS1289.6.3.3 Cone Penetrometer AS1289.6.3.2

 SAMPLING & IN SITU TESTING LEGEND

 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 P
 Piston sample
 PID
 Photo ionisation detector (ppm)

 U
 Tube sample (x mm dia.)
 PL(D) Point load axial test is(50) (MPa)

 W
 Water sample
 PL(D) Point load diametral test is(50) (MPa)

 P
 Water seep
 Standard penetration test

 mplo
 Twater level
 V
 A Auger sample B Bulk sample BLK Block sample C Core drilling D Disturbed sam E Environmental



CLIENT:Hancock Prospecting Pty LtdPROJECT:Alpha Coal MineLOCATION:Alpha, Central Queensland

SURFACE LEVEL: 334m AHD*	PIT No: ATP85
EASTING: 452000	PROJECT No: 74359.00
NORTHING: 7425524	DATE: 10/3/2011
DIP/AZIMUTH: 90°/	SHEET 1 OF 1

		Description	Description Sampling & In Situ Testing								
쩐	Depth (m)	of	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic (b	e Penetro ows per	meter Test mm)
\vdash		Strata SILTY SAND - medium dense, brown, fine to medium		-		Sa	Constients		5	10	15 20
		grained silty sand, moist	• • • • • • •		0.1 0.2		pp = 100-125		-		
	-		$\cdot \cdot \cdot \cdot \cdot$ $\cdot \cdot \cdot \cdot \cdot \cdot$	В	V.E.		pp - 100-120				
		- some fine to coarse grained subrounded gravel	•[•]•]		0.4		pp = 150-200				· · ·
	0.	6 SANDY GRAVEL - dense, brown, fine to coarse sized	i ارابا م		0.6		pp = 150-200				
		subrounded sandy gravel, fine to coarse grained sand, some clay, moist	ە ى	Ď	0.7 0.8		pp >600				
	- 0.		\sim	В	0.9		FF				
	-1	mottling, low plasticity, fine to coarse grained clayey sand with some fine to coarse grained subrounded gravel, wet			1.0		-		-1	1	
	-										
	- · 1./	4									
		SANDY CLAY - very stiff, grey with red-brown mottling, fine to coarse grained sandy clay, moist	/./.	_							
	· 1.		<u></u>	D 	1.6 1.7			•			
	1.7	grained sandstone			-1.75-	•					
	-2	Pit discontinued at 1.75m (due to refusal)							-2		
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RIG: JCB 3CX

LOGGED: TDL

SURVEY DATUM: WGS84 Zone 55K

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: *Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client

Sand Penetrometer AS1289.6.3.3Cone Penetrometer AS1289.6.3.2

 SAMPLING & IN SITU TESTING LEGEND

 A
 Auger sample
 G
 Gas sample
 PID
 Photo ionisation detector (ppm)

 B
 Bulk sample
 P
 Piston sample
 PIL(A) Point load dataletast Is(50) (MPa)

 BLK Block sample
 U
 Tube sample (x mm dia.)
 PIL(D) Point load dataletast Is(50) (MPa)

 C
 Core drilling
 W
 Water sample
 p
 Pocket penetrometer (kPa)

 D
 Disturbed sample
 W
 Water seep
 S
 Standard penetration test

 E
 Environmental sample
 Water level
 V
 Shear vane (kPa)



CLIENT: Hancock Prospecting Pty Ltd PROJECT: Alpha Coal Mine LOCATION: Alpha, Central Queensland

SURFACE L	EVEL: 333m AHD [•]	* PIT No: ATP86
EASTING:	451965	PROJECT No: 74359.00
NORTHING:	7424085	DATE: 9/3/2011
DIP/AZIMUTI	-1: 90°/	SHEET 1 OF 1

Π			Description	. <u>0</u>		San	npling a	& In Situ Testing	Ι.					
Ъ	Dep (m	oth)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dyr	namic P (blov			Fest 20
			SILTY SAND - medium dense, grey, fine grained silly sand, dry	• • •	в	0.1		pp = 500-600						
				· · ·		0.3 0.4		pp >600				-		
	- -	0.6	CLAYEY SAND - medium dense, orange-brown, low plasticity, fine to medium grained clayey sand with some		в	0.6		pp >600						
	-		plasticity, fine to medium grained clayey sand with some silt, moist			0.8		pp >600				-		
	-1					1,0		pp >600		-1		ŝ	, , , , , , , , , , , , , , , , , , ,	
	•													
			- some coarse grained subrounded gravel											,
	-2				D	2.0				-2		-		
						-								-
-		2,5 2.6	SANDSTONE - low strength, highly weathered, grey, fine				•	•			-			
			Pit discontinued at 2.6m (due to refusal)						•					
	-3		• •							-3				
														-
-								25						
		:						-						
	-4			-						-4				
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RIG: JCB 3CX

LOGGED: TDL

SURVEY DATUM: WGS84 Zone 55K

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: *Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client

Sand Penetrometer AS1289.6.3.3 Cone Penètrometer AS1289.6.3.2

		SA	MPLING	& IN SITU TESTING	LEGE	ND
- 1	Α	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
f		Bulk sample	Р	Piston sample		Point load axial test Is(50) (MPa)
	BLK	Block sample	U,	Tube sample (x mm dia.)	PL(D)	Point load diametral test (s(50) (MPa)
- [Core drilling		Water sample	ppi	Pocket penetrometer (kPa)
		Disturbed sample		Water seep	S	Standard penetration test
	E	Environmental sample		Water level	V	Shear vane (kPa)



CLIENT:Hancock Prospecting Pty LtdPROJECT:Alpha Coal MineLOCATION:Alpha, Central Queensland

SURFACE LEVEL: 335m AHD* PIT No: ATP87 EASTING: 451908 PROJECT No: 74359.00 NORTHING: 7422986 DATE: 9/3/2011 DIP/AZIMUTH: 90°/- SHEET 1 OF 1

		Description	. <u></u>		San		& In Situ Testing	L	Dynamic	Denetro		
ዲ	Depth (m)	of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	bynamic (bl	ows per	mm)	20
		GRAVEL - dense, red-brown, fine to coarse sized subrounded gravel, some fine to coarse grained sand and silt, moist		В	0.1 0.2 0.3		pp >600		-			
	- - - -	- cemented - no longer cemented, becoming wet			0.5		pp >600					
	- 0,8 - 0,9	1 SANDSTONE - low strength highly weathered grey time			0.8	×.		. 				
	-1	Pit discontinued at 0.9m (due to refusal)	ı						-1	ż		
	- - -										•	•
	-2						•		-2			
	-					•.						
	-		.*		4 3.					* * * * * * * * * * * * * * * * * * * *		
	- - 3 -								-3	****		
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Ц							l	1		<u>:</u>	<u> </u>	<u> </u>

RIG: JCB 3CX

LOGGED: TDL

SURVEY DATUM: WGS84 Zone 55K

WATER OBSERVATIONS: No free groundwater observed.

REMARKS: *Elevations interpolated from dxf file 2123204A-OVERALL_BFS_OPTION_A3_a provided by client

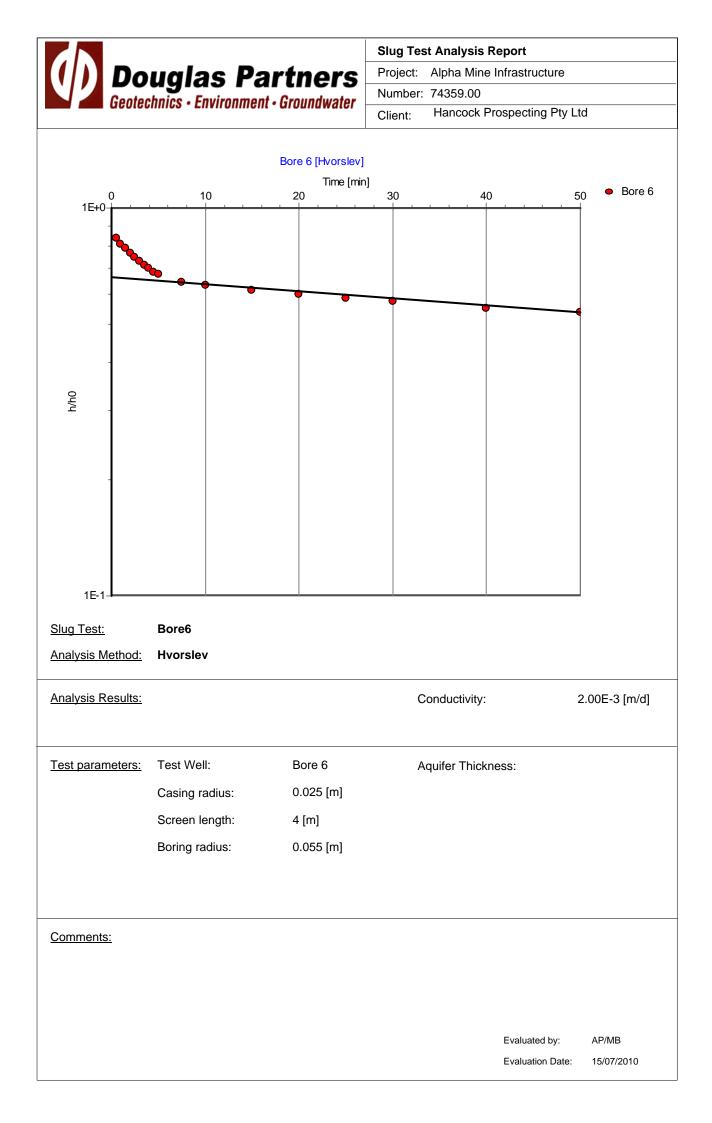
Sand Penetrometer AS1289.6.3.3

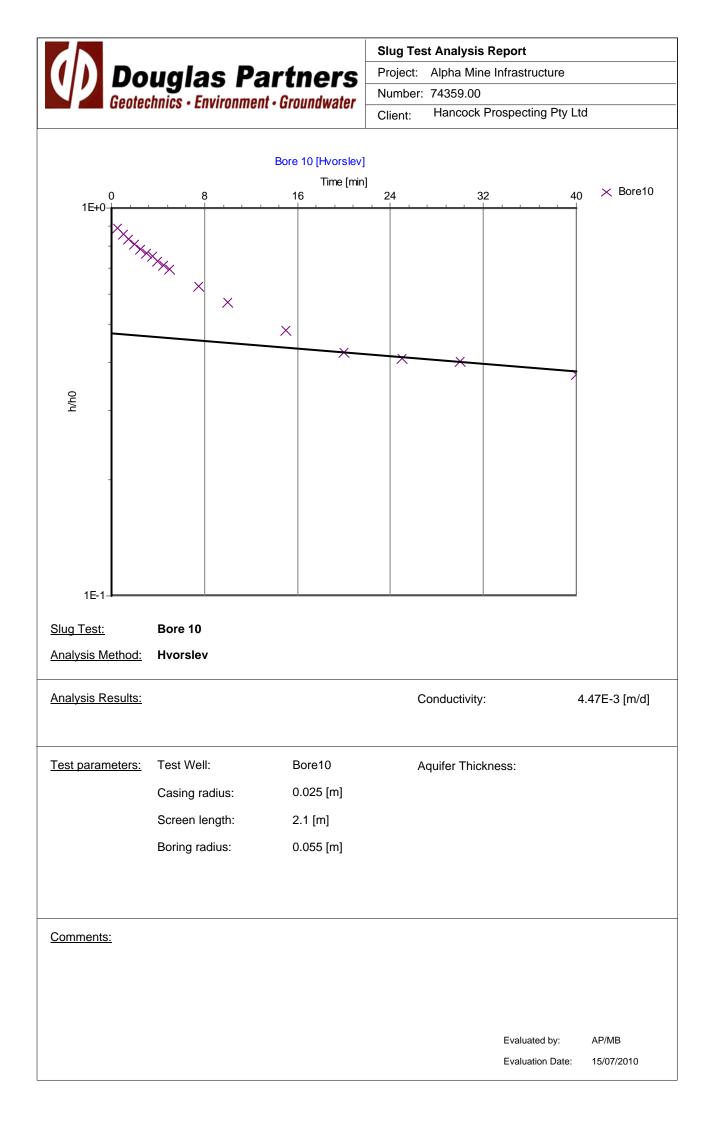
Cone Penetrometer AS1289.6.3.2

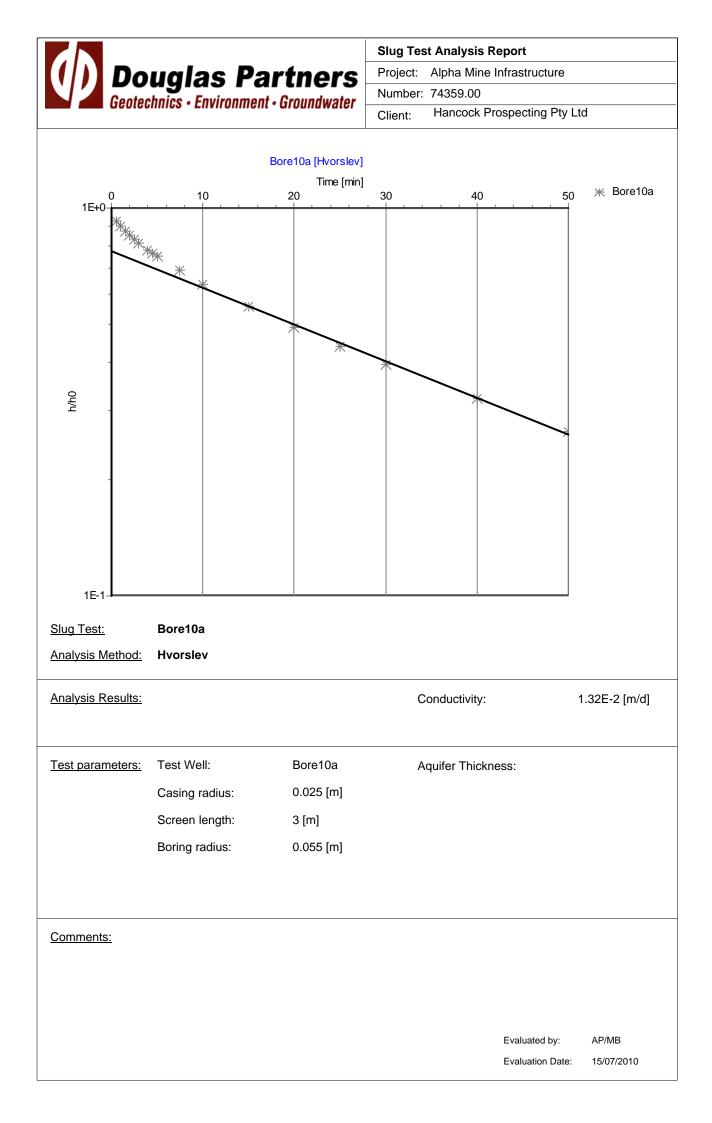
	SAMPLING & IN SITU TESTING LEGEND											
A	Auger sample	Ģ	Gas sample		Photo ionisation detector (ppm)							
8	Bulk sample	Р	Piston sample	PL(A) Point load axial test Is(50) (MPa)							
BLF	C Block sample	υ,	Tube sample (x mm dia.)	PL(C) Point load diametral test is(50) (MPa)							
C	Core drilling	Ŵ	Water sample	pp`	Pocket penetrometer (kPa)							
D	Disturbed sample	⊳	Water seep	S	Standard penetration test							
ε	Environmental sample	Ā	Water level	v	Shear vane (kPa)							

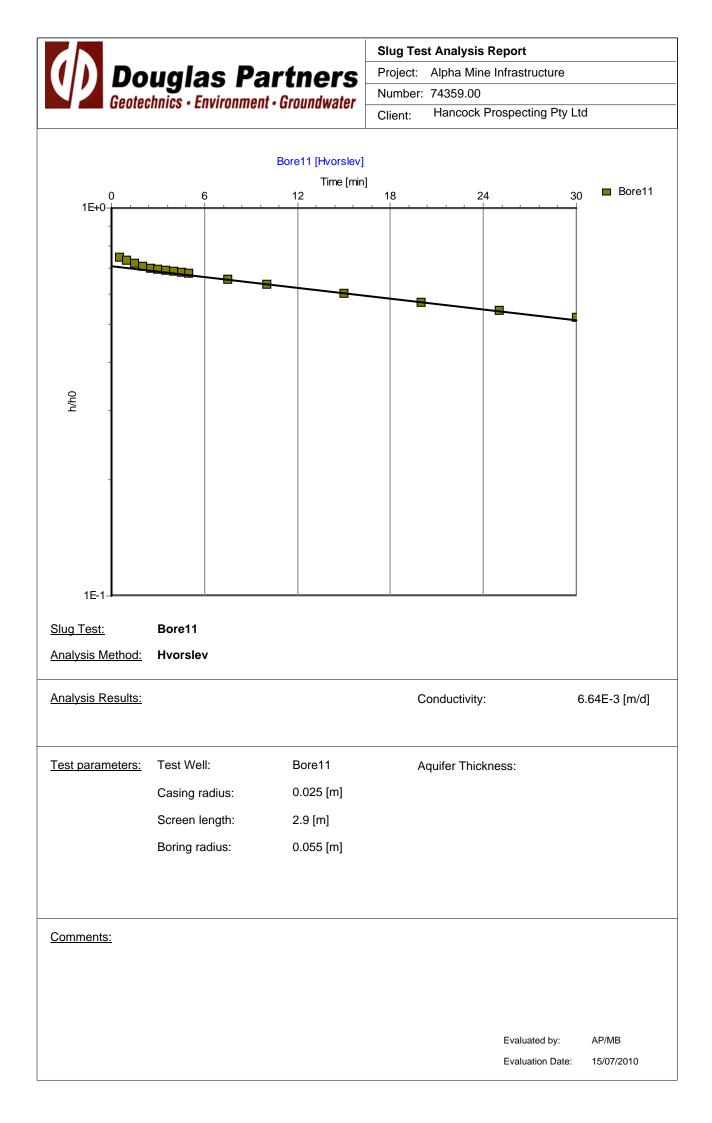
Douglas Partners Geotechnics | Environment | Groundwater Appendix B

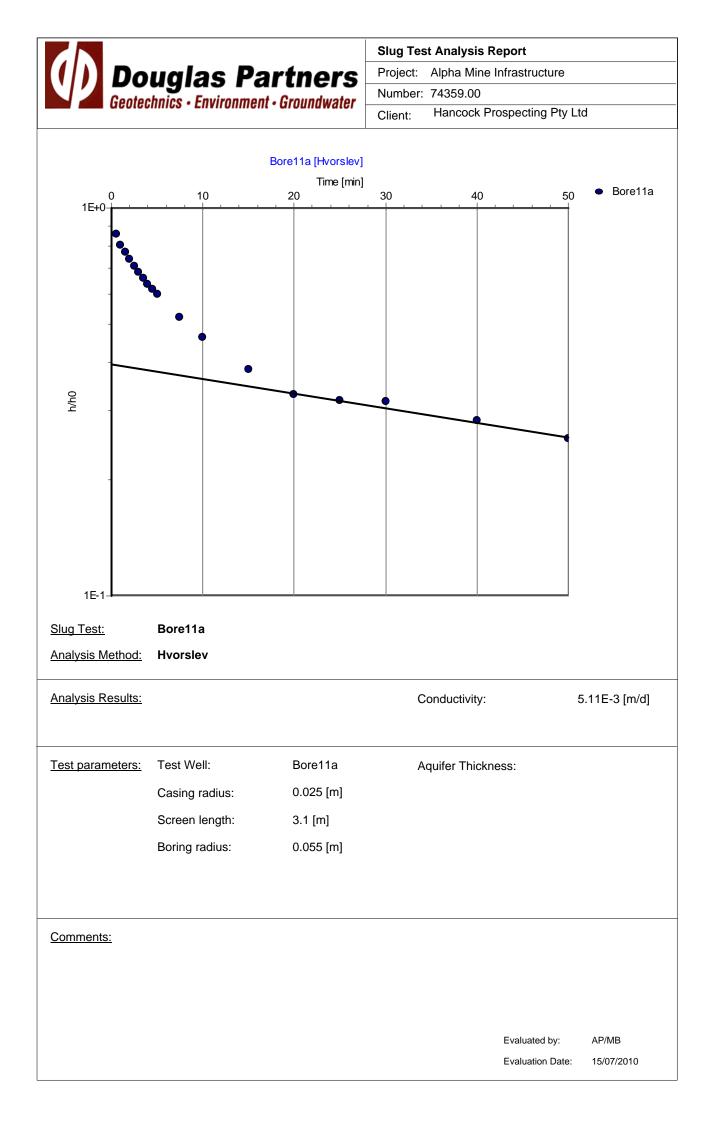
B.3 Falling Head Permeability Test Results

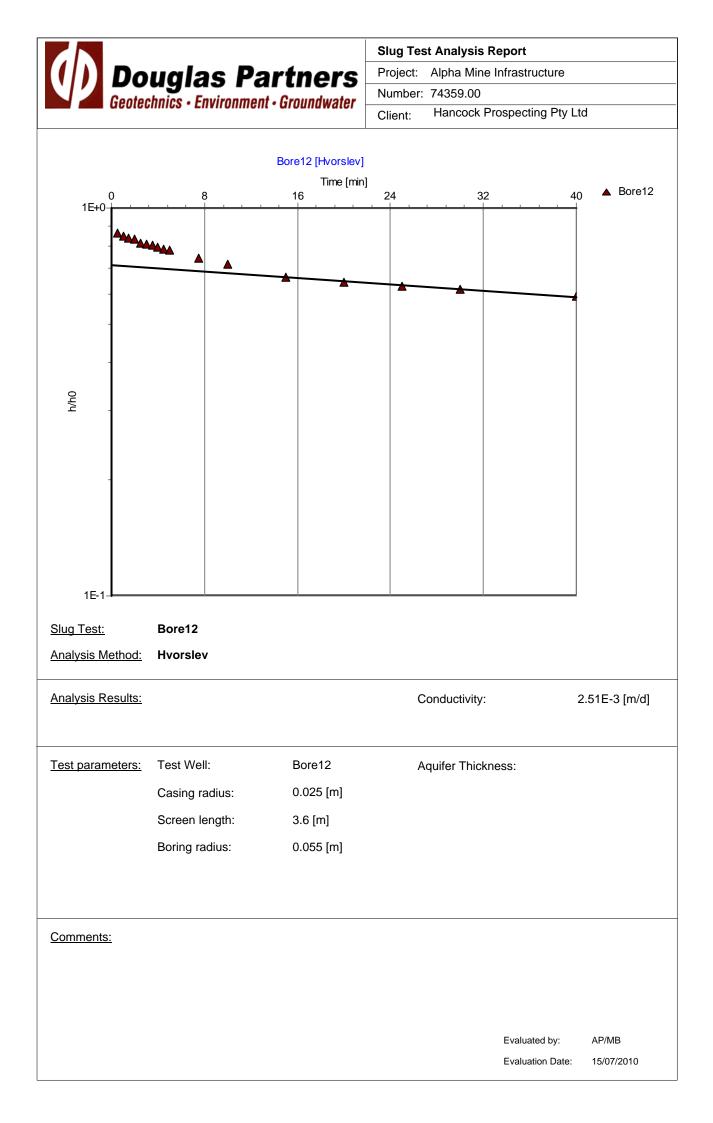












B.4 Laboratory Test Results





Douglas Partners Pty Ltd ABN 75 053 980 117 439 Montague Road West End QLD 4101 Australia

439 Montague Road West End QLD 4101 Phone (07) 3237 8900 Fax: (07) 3237 8999 brisbane@douglaspartners.com.au

RESULTS OF MOISTURE CONTENT, PLASTICITY AND LINEAR SHRINKAGE TESTS

Client :	Hancock	Prospecting Pty Ltd	Project N Report N		74359 BO10-517				
Project :	Alpha Coa	al Project	Report D		15/07/2010				
Location :	Alpha Date Samplec Page:		•		2-17/06/2010 26/06-01/07/2 1 of 1				
TEST LOCATION	DEPTH (m)	DESCRIPTION	Code	W _F %	W _L %	W _P %	PI %	*LS %	
Bore 1	3.00-3.45m	Sandy silty clay	2, 5	16.4	48	23	25	15.5	
Bore 4	0.50-0.95m	Silty clay	2, 5	15.7	48	15	33	12.5	
Bore 4	3.00-3.45m	Sandy clay	2, 5	12.1	43	20	23	14.5	
Bore 5	0.50-0.95m	Silty clay	2, 5	14.4	31	15	16	11	
Bore 5	3.00-3.45m	Clayey silt	2, 5	15.3	30	20	10	8	
Pit 1	1.4-1.8m	ELS Sandstone	2, 5	5.6	19	11	8	3	
Pit 4	1.8-2.1m	EL-VLS Sandstone	2, 5	7.4	22	12	10	5	
Pit 7	0.6-0.9m	Sandy clay	2, 5	8.6	21	9	12	6	
Pit 8	0.4-0.8m	Sandy clay	2, 5	10.2	34	13	21	9	
Pit 13	1.2 - 1.4m	ELS Sandstone	2, 5	9.6	25	11	14	5	
Pit 18	2.0-2.3m	EL-VLS Sandstone	2, 5	8.8	23	11	12	5.5	
Pit 24	1.7-1.9m	ELS Sandstone	2, 5	9.4	27	11	16	4.5	
Pit 26 0.1-0.3m		Clayey sand with some gravel	2, 5	8.3	47	18	29	11.5	
Legend:		1	Code	1	I	L	I	<u></u>	

THERE RTY

200H

- Field Moisture Content WF
- ₿ WL Liquid limit
- Wp Plastic limit
- Pl Plasticity index
- LS Linear shrinkage from liquid limit condition.

Remarks

DOUGUAS PI Test Methods:

Moisture Content:	AS 1289.2.1.1 - 2005
Liquid Limit:	AS 1289.3.1.2 - 1995
Plastic Limit:	AS 1289.3.3.1 - 1995
Plasticity Index:	AS 1289.3.2.1 - 1995
🕺 Linear Shrinkage:	AS 1289.3.4.1 - 1995
^{ਤੂ} Sampling Method(s):	AS 1289.1.1 - 2001, AS 1289.1.2.1 - 1998
55	



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Approved Signatory

TF/CG

SG

Tested

Checked

S. Gue $\phi \sim \phi$

Sue-Ellen Gibbons Senior Soil Technician

Sample history for plasticity tests

Oven (105°C) dried

Low temperature (<50°C) oven dried

Method of preparation for plasticity tests

*Specify if sample crumbled CR or curled CU

Air dried

Unknown

Dry sieved Wet sieved

Natural

1

2

3

4

5



Douglas Partners Pty Ltd ABN 75 053 980 117 www.douglaspartners.com.au 439 Montague Road West End QLD 4101 Phone (07) 3237 8900 Fax (07) 3237 8999

RESULTS OF MOISTURE CONTENT, PLASTICITY AND LINEAR SHRINKAGE TESTS

Client :		Prospecting Pty Ltd	Project N Report N	o. :		74359 BO11-736					
Project :	Proposed	Alpha Mine Infrastructure	Report D			18/6/2011					
Location :	Via Alpha,	Central Qld	Date San Date of T Page:	-		5-16/3/2011 16/6/2011 1 of 1					
TEST LOCATION	DEPTH (m)	DESCRIPTION	Code	W _F %	₩ _L %	W _Р %	PI %	*LS %			
ABH 20	8.90-15.35m	Silty Clay with trace of Sand	2, 5	27.0	68	27	41	16			
ABH 16	8.74-13.00m	MS Sandstone	2, 5	6.1	14	13	1	1.5			
ATP 82	0.20-0.50m	Slightly Sandy Gravel with some Silt	2, 5	3.3	15	9	6	1.5			
ATP 83	0.20-0.30m	Sand and Silt with trace of Gravel	2, 5	4.9	15	8	7	1.5			
ATP 84	1.40-1.60m	Silty Sand with some Gravel	2, 5	11.0	18	10	8	2			
ATP 85	0.70-0.75m	Slightly Clayey Sandy Gravel	2, 5	5.7	23	17	6	1			
ATP 86	0.60-0.80m	Clayey Sand with some Silt	2, 5	8.8	21	8	13	4.5			
ATP 87	0.10-0.30m	Gravel with some Sand and Silt	2, 5	2.3	16	15	1	0.5			
Legend: W _F Field M	loisture Content		Code Sample histo	ny for pla	asticity	teste					
			1 Air dri	1.5	stiony	10010					

- WP Plastic limit
- PI Plasticity index
- LS Linear shrinkage from liquid limit condition.
- DOD **Test Methods:**

AS

REV.6 DATE OF

FORN

4 1000 11100101	
Moisture Content:	AS 1289.2.1.1 - 2005
Liquid Limit:	AS 1289.3.1.2 - 1995
Plastic Limit:	AS 1289.3.3.1 - 1995
Plasticity Index:	AS 1289.3.2.1 - 1995
Einear Shrinkage:	AS 1289.3.4.1 - 1995
Sampling Method(s):	AS 1289.1.1 - 2001, AS 1289.1.2.1 - 1998
<u></u>	

Remarks DITED FOR TECHNICAL

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NATA Accredited Laboratory Number 828

- 2 Low temperature (<50°C) oven dried
- 3 Oven (105°C) dried
- 4 Unknown

Method of preparation for plasticity tests

- 5 Dry sieved
- 6 Wet sieved
- 7 Natural

*Specify if sample crumbled CR or curled CU

Approved Signatory

Tested SM Checked S..J.





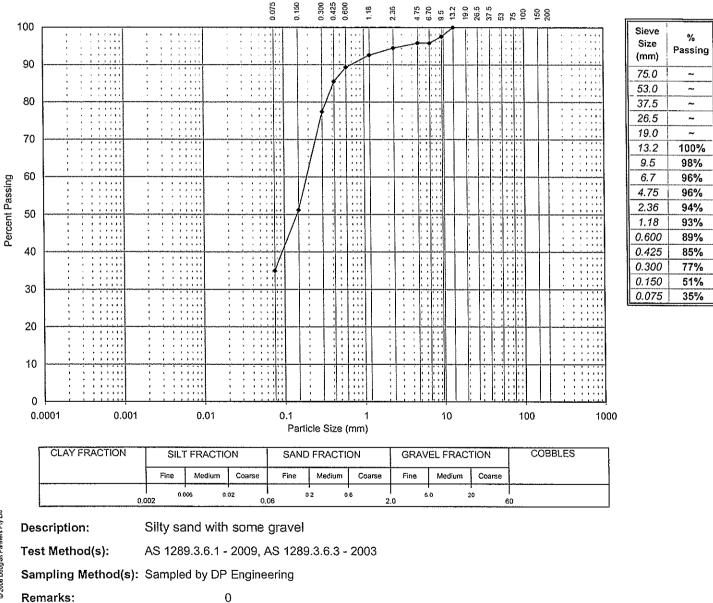
Douglas Partners Pty Ltd ABN 75 053 980 117 439 Montague Road West End QLD 4101 AUSTRALIA

439 Montague Road West End QLD 4101 Phone 07 3237 8900 Fax: 07 3237 8999 brisbanelab@douglaspartners.com.au

RESULTS OF PARTICLE SIZE DISTRIBUTION

Client :	Hanncoc	k Prospecting Pty Ltd	Project No. :	74359
			Report No. :	BO10-497
Project :	Alpha Co	oal Project	Report Date :	29-Jun-10
			Date Sampled:	2-17/06/2010
Location :	Alpha		Date of Test:	28-Jun-10
Road No:	-	Sample / Pit No: Bore 6	Depth / Layer:	0.50-0.95m
Chainage:	-	Section / Lot No: -	Test Request No:	-
			Page:	1 of 1

AUSTRALIAN STANDARD SIEVE APERTURES



Remarks:



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Approved Signatory:



Sue-Ellen Gibbons Senior Soil Technician

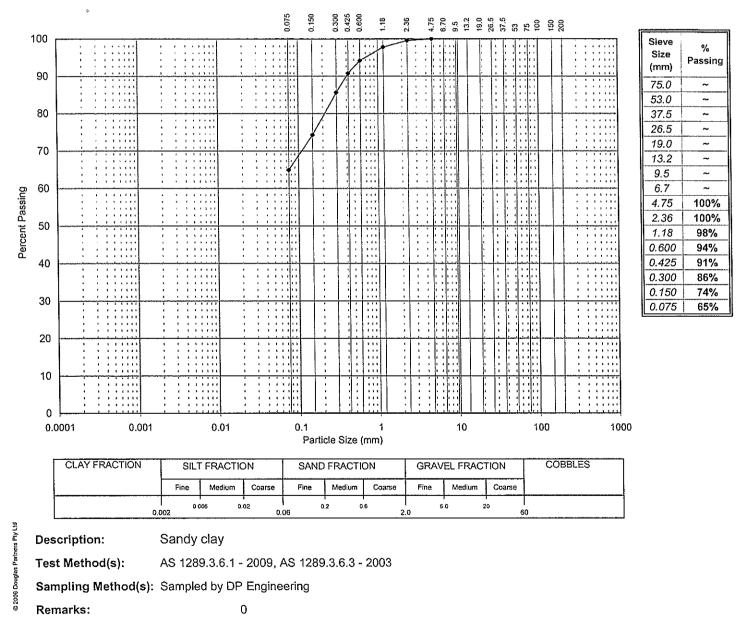


Douglas Partners Pty Ltd ABN 75 053 980 117 439 Montague Road West End QLD 4101 AUSTRALIA 439 Montague Road West End QLD 4101 Phone 07 3237 8900 Fax: 07 3237 8999 brisbanelab@douglasparlners.com.au

RESULTS OF PARTICLE SIZE DISTRIBUTION

Client :	Hanncoc	<pre>< Prospecting Pty Ltd</pre>	Project No. :	74359
			Report No. :	BO10-499
Project :	Alpha Co	al Project	Report Date :	08-Jul-10
			Date Sampled:	2-17/06/2010
Location :	Alpha		Date of Test:	06-Jul-10
Road No:	-	Sample / Pit No: Bore 12	Depth / Layer:	1.50-1.95m
Chainage:	-	Section / Lot No: -	Test Request No	: -
			Page:	1 of 1

AUSTRALIAN STANDARD SIEVE APERTURES





² prm R004A Rev41Jul 2008

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nulore

Sue-Ellen Gibbons

Senior Soil Technician



Appendix C Exploratory Boreholes

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С

Appendix C

C.1 Exploratory Borehole Logs

TIDS Alletralia Dtv/1 td	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility	sheet 1 of 4 BH01		
Date(s) Drilled: 19/07/11 to 21/07/11	Logged By: RJR/CJH	Checked By: RJR		
Drilling Method: Solid Flight Auger/Rotary Wash & NQ3	Drill Bit Size/Type: Bit Bit	Total Depth Drilled (m): 20.0		
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:322.0 m		
Groundwater Depth: Not Encountered	Location: 7429510 mN 451020 mE	Inclination from .90 deg Horizontal/Bearing:		
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:		

\int	í.			RO	CK	CO	RE					S	OIL	SAN	IPL	ES	
	Kelative Level (m)	Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	n-situ Testing	Lithology	MATERIAL DESCRIPTION	Type		N Value	Recovery (m)	Water Content (%)	REMARKS
—: :	322	0	R	ā	R	Q	<u>~</u>	Q	ц		SAND (SP); fine grained, light greyish brown with some light orange stain, with some silt, dry, loose to medium dense, friable (Residual)	Ē	z		<u></u>	20	Start Augering at 09:22 (19/07/11)
	321	- 1									Sandy CLAY (CL); low plasticity, light greyish brown, sand is fine grained, dry, stiff to very stiff, friable, MC:5.7%, LL:18%, PL:10%, PI:8%, LS:2.0*%, 54% Fines	X	10 1 12 13	25	0.5		
his drawing is subject to COPYRIGHT. It remains the property of URS Australia Pty Ltd	320	- - - 2 -									Sandy SILT (ML); light greyish brown, sand is fine to medium grained, with a trace of clay, dry, stiff to very stiff, friable SAND (SP); fine grained, light brown to light greyish brown with some light orange stain, with some silt and a trace of clay, dry, very dense, friable,	\times	2 30 f 120n		0.1		
T. It remains the propert	319										becomes silty						
st to COPYRIGHT	519	3 - -	1	1	36		36				becomes light greyish brown, with a trace of silt, Alightly cemented in places SANDSTONE; low strength, highly weathered, light greyish brown with light orange stain, fine grained, slightly fractured	\times	3 50 f 80m		0.1		HW Casing installed to 3.0m. Start NQ3 Coring at 10:57
drawing is subjec	318		2	1	80		80										Polymer added to water
GEOTECH.GDT 13/10/11 T			3	1	100		87				From 4.0m to 4.13m - highly fractured (recovered as -(ine to coarse grained angular gravel of sandstone) / SAND (SP); fine grained, light grey to light brown, with a trace of silt (Residual)						
SF_MB_RJI.GPJ	317	5— - - -	4	1	0		0										NO RECOVERY from 5.0m to 6.4m
IOLE ALPHA TS	316	-	5	1	0		0										
BUKEr	-										3 1726 - 1993 .: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC:	Em	erson	Class	: Lab	oratory	/ Permeability

	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility	ock Coal BH01			
Date(s) Drilled: 19/07/11 to 21/07/11	Logged By: RJR/CJH	Checked By: RJR			
Drilling Method: Solid Flight Auger/Rotary Wash & NQ3	Drill Bit Size/Type: 120mm Auger/90 mm Blade Bit	Total Depth Drilled (m): 20.0			
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:322.0 m			
Groundwater Depth: Not Encountered	Location: 7429510 mN 451020 mE	Inclination from Horizontal/Bearing: ⁹⁰ deg			
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:			

Ê		RO	CK								SC	DIL S	AM	PL	S	
 9 9 Depth (m) 	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
316 6 315 7	6	1	0		0				CLAY (CH); high plasticity, light brown to light grey, with some silt and some fine grained sand, moist, very stiff, MC:23.8%, LL:90%, PL:20%, PI:70%, LS:12.5*+%, 60% Fines		4	7 8 14	22	0.5		Start Rotary Wash Drilling at 6.4m
									becomes with some fine grained sand Clayey SAND (SC); fine grained, light grey, with a trace of to some silt, dry to moist, very dense, slightly to moderately cemented, rare silt lenses	. X	5	27 50 for 50mm	50+	0.2		
-314 8-									MC:10.4%, LL:17%, PL:10%, PI:7%, LS:2.5*%, 42% Fines	X	6	36 50 for 120mm	50+	0.3		
									Sandy SILT (ML); light orange brown, sand is fine grained, moist, hard	X	7	42 50 for 50mm	50+	0.2		
									Sandy CLAY (CL); low plasticity, light grey and light orange, sand is fine grained, with a trace of to some silt, moist, very stiff to hard, MC:10.6%, LL:20%, PL:13%, PI:7%, LS:2.5*%, 52% Fines		8	32 50 for 130mm	50+	0.3		Start of days drilling (20/07/11)
									SILT (ML); light grey mottled light orange and dark red, with some fine to medium grained sand, moist, very stiff, occassional pockets of light orange fine to coarse grained sand and layer cemented silty fine grained sand (Residual to EW Sandstone) 5 1726 - 1993 .: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC		9	30 50 for 110mm	50+	0.3		

TIDE Alletralia Dtv/ 1 td	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility	ock Coal BH01
Date(s) Drilled: 19/07/11 to 21/07/11	Logged By: RJR/CJH	Checked By: RJR
Drilling Method: Solid Flight Auger/Rotary Wash & NQ3	Drill Bit Size/Type: 120mm Auger/90 mm Blade Bit	Total Depth Drilled (m): 20.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:322.0 m
Groundwater Depth: Not Encountered	Location: 7429510 mN 451020 mE	Inclination from Horizontal/Bearing: 90 deg
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

Ē		RO	СК	CO	RE						SC	DIL S	AM	PLE	S	
1012 Relative Level (m) 71 Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
									Silty CLAY/Clayey SILT (CL-ML); low to medium plasticity, mottled light orange, red and light grey, with a trace of to some fine to coarse grained sand, moist, very stiff, MC: 12.1%, 59% Fines		10	23 50 50 for 100mm	50+	0.4		
									Silty CLAY/Clayey SILT (CL-ML); low plasticity, light grey mottled with some light orange, with some fine to coarse grained sand, moist, very stiff to hard, MC:11.9%, LL:18%, PL:12%, PI:6%, LS:4%, 54% Fines		11	34 50 for 120mm	50+	0.3		Start of days drilling (21/07/11). Overnight water level at 5.15m
									Sandy CLAY (CH); medium to high plasticity, light grey mottled with some red iron stain, sand is fine to coarse grained, moist, hard, with a few cemented layers (EW Sandstone), MC:12.3%, LL:20%, LS:3.5%		12	50 for 130mm	50+	0.1		
									Silty CLAY/Clayey SILT (CL-ML); low plasticity, light grey with trace light orange, with some fine to medium grained sand, moist, stiff to hard, MC:12%, LL:19%, PL:13%, PI:6%, LS:3.0*%, 56% Fines		13	27 49 50 for 60mm	50+	0.4		
									becomes red and light grey with rare yellow, hard		14	50 for 130mm	50+	0.1		
									becomes red mottled light grey, with a trace of fine to medium grained sand, moist, hard 6 1726 - 1993 L: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC			50 for 130mm	50+	0.1 Labo	pratory	r Permeability

	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility	ock Coal BH01
Date(s) Drilled: 19/07/11 to 21/07/11	Logged By: RJR/CJH	Checked By: RJR
Drilling Method: Solid Flight Auger/Rotary Wash & NQ3	Drill Bit Size/Type: 120mm Auger/90 mm Blade Bit	Total Depth Drilled (m): 20.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:322.0 m
Groundwater Depth: Not Encountered	Location: 7429510 mN 451020 mE	Inclination from Horizontal/Bearing:
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

	-			RC	CK	со	RE						SC	DIL S	AM	PLI	ES	
Belative Level (m)		Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
—3	04 1 03 1		7	1	85		74				SANDSTONE; very low strength, highly to extremely weathered, red with a trace of light grey, no visible bedding, fine to medium grained, fractured (Colinlea Sandstone) 55mm layer of light grey clay becomes light grey with some red, occasional laminations of light grey clay (5-20mm thick)	X	16	40 for 30mm	50+	0.0		Start NQ3 Coring at 11:40
BOREHOLE ALPHATSF_MB_RJT.GPJ GEOTECH.GDT 13/10/11 This drawing is subject to COPYRIGHT. It remains the property of URS Australia Pty Ltd. C E C C	02 2	20	0				04				END OF BOREHOLE at 20.0m (Target Depth)							Rlg chatter and rods bouncing at 19.8m Piezometer installed to 20.0m at conclusion of drilling
wing is subject to COPYRIGHT. It rem E	012	- - - - - - - - -																
PJ GEOTECH.GDT 13/10/11 This dra	:00 2 :99 2																	
BOREHOLE ALPHA ISF_MB_KJI.G	98										3 1726 - 1993 L: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC	En	ners	son Cla	ass ki	Labo	pratory	[/] Permeability

TIDE Alletralia Dtv/ 1 td	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility	Sheet 1 of 2 BH02
Date(s) Drilled: 22/07/11 to 22/07/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/Rotary Wash	Drill Bit Size/Type: Bit Bit	Total Depth Drilled (m): 10.1
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level: 329.0 m
Groundwater Depth: Not Encountered	Location: 7429351 mN 452227 mE	Inclination from Horizontal/Bearing: 90 deg
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

Ē							SC	DIL S	SAM	PLE	ES	S					
evel (m				(9	Loss		/min)	Б.					SP		(1		DEMADIZO
Relative Level (m)		Run No.	Box No.	Recovery (%)	Drilling Fluid	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
—329 0	- - - -									Silty SAND (SM); fine to medium grained, brown to light brown, dry, friable, trace rootlets (Alluvium)							Start Augering at 09:20 (22/07/11)
	-									SILT (ML); light yellowish brown, with a trace of clay and some fine grained sand, dry, stiff, slightly cemented (Residual)	-						
-328 1	 - - -									becomes mottled orange, sandy (fine grained)	X	1	9 11 10	21	0.5		
	-									becomes orange brown, some fine grained sand, dry to moist							
-327 2	2									MC:8.1%, LL:20%, PL:12%, PI:8%, LS:1.0*%, 31% Trines			7				
	-									SAND (SP); fine grained, light grey mottled light orange, with a trace of to some clay, moist, medium dense	Ň	2	7 10	17	0.5		
										becomes light orange brown, clayey							
-326 3	3									becomes fine to medium grained, light grey, with a trace of clay, moist, slightly cemented	\mathbb{V}		17				
	-									becomes light grey to orange brown, mottled, with a trace of to some clay	Ň	3	15 12	27	0.5		
	-																Driller notes possible perched groundwate
020 4	-								· · · · · · · · ·	becomes with some red iron staining, with a trace of fine to coarse sub angular to subrounded gravel (incl. rouartz and sandstone), MC:11.5%, LL:21%, LS:1.5%	Ŋ	4	19 9	20	0.5		at 3.8m
										SAND (SW); fine to medium grained, light grey, moist to wet, medium dense, clean becomes clayey			11				HW Casing installed to 4.5m. Start Rotary Wash Drilling
—324 5	- - - -									becomes medium to coarse grained, light grey speckled white, with some clay and with a trace of fine to coarse grained subrounded gravel of sandstone, slightly cemented, MC:8.1%, LL:25%, PL:13%, PI:12%, LS:3.0+%, 23% Fines	X	5	12 13 15	28	0.5		÷
										- 2.1070, F1.1270, 20.0.0770, 2070 Filles			IJ				
-323										3 1726 - 1993 L: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC							

	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility	ock Coal BH02
Date(s) Drilled: 22/07/11 to 22/07/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/Rotary Wash	Drill Bit Size/Type: 120mm Auger/70 mm Blade Bit	Total Depth Drilled (m): 10.1
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:329.0 m
Groundwater Depth: Not Encountered	Location: 7429351 mN 452227 mE	Inclination from Horizontal/Bearing: ⁹⁰ deg
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

Ê			ROCK CORE					SC	DIL S	AM	PLE	S					
252 Relative Level (m)	Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
										becomes light grey to white with rare reddish brown mottles, with a trace of fine grained subrounded gravel, very dense, homogenous		6	50 for 140mm	50+	0.1		
-322										CLAY (CL); low plasticity, light grey with some light orange stain, with some fine grained sand and a trace of silt, very stiff to hard, a few sandy pockets (medium to coarse grained), MC:18.6%, LL:32%, PL:22%, PI:10%, LS:6%, 55% Fines		7	42 50 for 70mm	50+	0.2		
-321	8 - - - - - -									with rare grey to reddish brown pockets, with some silt, very thinly laminated, very slightly cemented, a few light grey silt nodules		8	50 for 100mm	50+	0.1		
-320	9 - - - - - -									becomes with a trace of silt, homogenous, moderately cemented becomes with some fine grained sand	X	9	50 for 60mm	50+	0.1		
	0 - - - - - -									END OF BOREHOLE at 10.07m (Target Depth)		10	50 for 70mm	50+	0.1		Piezometer installed to 10.0m at conclusion of drilling
-318 1	- - - - - - - - -																
-317										3 1726 - 1993 .: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC.	: Er	ner	son Cla	iss k:	Labo	oratory	/ Permeability

	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Hand	cock Coal BH03
Date(s) Drilled: 23/07/11 to 23/07/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger	Drill Bit Size/Type: 120mm Auger	Total Depth Drilled (m): 10.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:338.0 m
Groundwater Depth: Not Encountered	Location: 7429250 mN 453345 mE	Inclination from .90 deg Horizontal/Bearing:
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

Ê			RO	СК	со	RE							SC	DIL S	AM	PLE	ES	
B Relative Level (m)	Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing		Limology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
-338	U										SAND (SW); fine to medium grained, light greyish brown, with some silt, dry, friable, trace rootlets (Alluvium)							Start Augering at 10:23 (23/07/11)
	-										becomes fine to coarse grained							
—337	1— - -								<u> </u>		SILT (ML); low plasticity, light greyish brown, with some fine grained sand, dry, very stiff, friable (Residual)		1	9 10 17	27	0.5		
-336											becomes low to medium plasticity, mottled light orange brown, with a trace of fine grained sand and a trace of clay, slightly cemented							
-330	-										becomes light brown to light orange brown, with some sand to sandy (fine to medium grained), a few iron stained pockets	X	2	27 43 30 for	50+	0.4		
											becomes with a trace of fine grained sand, light grey, slightly to moderately cemented			100mm				
-335	3 - -										becomes sandy (fine grained), no clay, moist, no cementation	X	3	11 21	50+	0.5		
	-										becomes with some orange brown mottles, sand is fine to coarse grained becomes with a trace of fine to medium grained subangular to subrounded gravel of quartz and sandstone			30				
	4										becomes brown to light greyish brown, speckled black, slightly cemented	V	4	13 11	37	0.5		
-333	-										100mm silt lense with a trace of fine grained sand and a trace of clay / Clayey SAND (SC); fine grained, light orange brown with rare light grey mottles, moist, medium dense to dense becomes with a trace of fine to medium grained subangular to subrounded gravel of quartz and sandstone			26				
-333	5— - -										becomes fine to coarse grained, MC:9%, LL:20%, PL:11%, PI:9%, LS:3.0*%, 48% Fines CLAY (CL); low plasticity, light orange brown to light grey with occasional orange mottles, with a trace of	-	5	17 17 27	44	0.5		
	-										to some fine grained sand and silt, dry to moist, very stiff, a few fine grained sandy pockets			27				
-332											: 1726 - 1993 .: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC	: Er	ner	son Cla	ass k:	Labo	oratory	Permeability

TIDS Alletralia Dtv/1 td	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility	sheet 2 of 2 BH03
Date(s) Drilled: 23/07/11 to 23/07/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger	Drill Bit Size/Type: 120mm Auger	Total Depth Drilled (m): 10.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:338.0 m
Groundwater Depth: Not Encountered	Location: 7429250 mN 453345 mE	Inclination from 90 deg Horizontal/Bearing:
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

Ē			RO	СК	со	RE						S	DIL S	AM	PLE	S	
Relative Level (m)	Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm dG	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
-332	- 6 - - - - -									becomes some fine to medium grained sand, MC:6.6%, LL:45%, LS:7.5% becomes light grey with light orange stain, with a trace of fine grained sand 30mm thick reddish brown iron hard pan	X	6	11 19 21	40	0.5		
—331	7									Silty CLAY (CH); high plasticity, light brown speckled white and yellow, with a trace of fine grained sand, moist, stiff to very stiff, MC:25.6%, LL:121%, PL:25%, PI:96%, LS:17.0*+%, 90% Fines becomes light grey, crudely very thinly laminated in places, occasional reddish brown iron hard pans		7	11 17 21	38	0.5		
329 328 327 326	- 8 - - - - - -									SILTSTONE; extremely low strength, residual to completely weathered, tan and light grey, very thinly laminated to laminated (SILT: tan to light grey, with some clay, dry, friable, slightly to moderately cemented)		8	46 50 for 90mm	50+	0.2		
—329	9 - - - - - - -								Ŷ.Ŷ.	SILT (ML); tan to light grey, with some clay, dry, hard, friable, slightly to moderately cemented (Residual Siltstone)		9	23 50 for 120mm	50+	0.3		
—328	- 10 									END OF BOREHOLE at 10.0m (Target Depth)	_						Piezometer installed to10.0m at conclusion of drilling
—327	- - - - - - - -																
-326										S 1726 - 1993 L: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC	: Er	ner	son Cla	ass k:	Labo	oratory	Permeability

	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility	ock Coal BH04
Date(s) Drilled: 09/08/11 to 10/08/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/Rotary Wash & NQ3	Drill Bit Size/Type: 120mm Auger/90 mm Blade Bit	Total Depth Drilled (m): 20.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:321.0 m
Groundwater Depth: Not Encountered	Location: 7427970 mN 450695 mE	Inclination from Horizontal/Bearing: 90 deg
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

Ê		RO	CK	со	RE						SC	DIL S	AM	PLE	ES	
 155 Relative Level (m) 0 Depth (m) 	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm d	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
-321 0									Silty SAND (SM); fine grained, light grey, dry, friable, a few rootlets (Residual)							Start Augering at 14:48 (09/08/11)
									becomes with some silt, moist, rare slightly cemented silt nodules							
-320 1 - - - - - - -									Sandy CLAY (CL); low plasticity, light greyish brown to light brown with rare light orange stain, with a trace of silt, moist, very stiff, MC:10.2%, LL:31%, PL:13%, PI:18%, LS:8.0+%, 58% Fines		1	12 12 16	28	0.5		
-319 2 - - - - - - - -									Clayey SAND (SC); fine grained, light grey with rare light orange stain, moist, friable, dense, homogenous, MC:7.9%, LL:19%, PL:12%, PI:7%, LS:3.0*%, 35% Fines		2	17 24 25	49	0.5		
-318 3 - - - - - - - - - - - - -									SILT (ML); with a trace of clay and some fine grained sand, light grey and light orange, moist, very stiff Silty SAND (SM); fine grained, light grey with rare light orange stain, moist, medium dense		3	8 10 13	23	0.5		HW casing installed t 3.2m. Begin Rotary Wash Drilling at 16:0
-317 4 - - - - - -									Gravelly SAND (SW); fine to medium grained, light grey, gravel is medium to coarse grained and		4	50 for	50+	0.1		
-316 5 - - - - - - - - - - - - - - - - -									grey, grave is medium to coarse grained and angular to subangular of sandstone, moist, very dense, slightly to moderately cemented (Residual to CW Sandstone)			80mm				

	ject No.: 42626683 ject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Hanco	ock Coal BH04
Date(s) Drilled: 09/08/11 to 10/08/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/Rotary Wash & NQ3	Drill Bit Size/Type: 120mm Auger/90 mm Blade Bit	Total Depth Drilled (m): 20.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level: 321.0 m
Groundwater Depth: Not Encountered	Location: 7427970 mN 450695 mE	Inclination from Horizontal/Bearing: 90 deg
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

<u> </u>			RO	CK	со	RE					Ś	SC	DIL S	AM	PLE	S	
	Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
—315 —314										CLAY (CL); low plasticity, light grey, with some fine grained sand and with a trace of silt, moist, very stiff, slightly cemented (Residual), MC:14.6%, LL:30%, PL:20%, PI:10%, LS:5.5%, 59% Fines		5	27 44 50 for 130mm	50+	0.4		
	- 									Silty SAND (SM); fine to medium grained, light grey, moist, very dense, homogenous	×	6	50 for 80mm	50+	0.1		Alternating hard and soft bands observed during drilling
	- 									Sandy GRAVEL (GW); gravel is fine to medium grained and angular of sandstone, sand is fine to coarse grained, light pinkish grey, with some silt, very dense, slightly cemented (Residual to CW Sandstone)	X	7	50 for 50mm	50+	0.1		Alternating hard and soft bands observed during drilling
-										SILT (ML); low plasticity, light grey, with a trace of to some clay and with a trace of fine grained sand, moist, very stiff to hard, homogenous		8	50 for 140mm	50+	0.1		Alternating hard and soft bands observed during drilling
										: 1726 - 1993 .: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC:	Em	ners	son Cla	iss k:	Labo	pratory	Permeability

TIDS Alletralia Dtv/1 td	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility	Sheet 3 of 4 BH04
Date(s) Drilled: 09/08/11 to 10/08/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/Rotary Wash & NQ3	Drill Bit Size/Type: 120mm Auger/90 mm Blade Bit	Total Depth Drilled (m): 20.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:321.0 m
Groundwater Depth: Not Encountered	Location: 7427970 mN 450695 mE	Inclination from Horizontal/Bearing: 90 deg
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

			RO	CK	CO	RE						SC	DIL S	SAM	PLI	ES	
605 Relative Level (m)	Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
- 309		1	1	100		100				SANDSTONE; medium strength, moderately to slightly weathered, light grey, light pinkish red and light yellow, laminated at 0° to 20°, well developed, fine to medium grained, slightly fractured, rare soft silt or sand lenses up to 25mm thick (Colinlea Sandstone) UCS: 15.8MPa							Start NQ3 Coring at 12.0m
—308	13									becomes laminated to very thinly bedded							Packer Testing from 13.0m to 16.0m
—307	- - 14 - -	2	1	100		100				becomes low to medium strength, moderately weathered							
—307 —306 —305	- - - - - - 15									becomes light grey and light pink							
	-	3	1	100		100				from 15.45m to 16.70m: becomes fine to coarse grained							
—305	- - - - - -									becomes light grey, light orange and light pinkish red, quartz-rich							Core has abundant mechanically induced fractures
—304	- - - 17 - - -	4	1/2	100		0				becomes medium to coarse grained, low strength, moderately to highly weathered, slightly pitted in places becomes laminated light grey and light pink at 0° to 30°							
	-																Piezometer installed to 17.5m at conclusion of drilling
-303										5 1726 - 1993 L: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC:	: En	ners	son Cla	ass k:	Labo	oratory	Permeability

TIDS Alletralia Dtv/1 td	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Hanco	Sheet 4 of 4 BH04
Date(s) Drilled: 09/08/11 to 10/08/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/Rotary Wash & NQ3	Drill Bit Size/Type: 120mm Auger/90 mm Blade Bit	Total Depth Drilled (m): 20.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:321.0 m
Groundwater Depth: Not Encountered	Location: 7427970 mN 450695 mE	Inclination from Horizontal/Bearing: 90 deg
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

Ê		RO	CK	СО	RE					SC	DIL S	AM	PL	ES		
81 Cepth (m) B Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm d	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
-303 18 	5	2	17		0				becomes with a few coarse grained subangular to subrounded gravel of quartz, sandstone and daystone/chert (conglomeratic) CLAYSTONE/CHERT; high strength, moderately to slightly weathered, white, cryptocrystaline to argillaceous CLAY (CL); low plasticity, grey to light grey, with some silt, moist, very stiff, homogenous (Residual Siltstone)							
-302 19 - -									MC:16.6%, LL:33%, PL:23%, PI:10%, LS:6.5%, 95% Fines	M	9	25 50 for	50+	0.3		
- - - - - -	6	2	100		0			X × × × × × × × × × × × × × × × × × × ×	SILTSTONE; extremely low strength, residual to completely weathered, grey to light grey (SILT; low plasticity, grey to light grey, with a trace of to some clay, moist, very stiff, homogenous)			120mm				
-301 20								×××	END OF BOREHOLE at 20.0m (Target Depth)							
-																
-300 21 — - -																
-																
- - -299 22																
-																
-																
- - -298 23																
-																
									3 1726 - 1993 .: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC:							

	ject No.: 42626683 ject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Hanc	cock Coal BH05
Date(s) Drilled: 26/07/11 to 26/07/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/NQ3	Drill Bit Size/Type: 120mm Auger	Total Depth Drilled (m): 10.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:329.0 m
Groundwater Depth: Not Encountered	Location: 7427936 mN 451853 mE	Inclination from .90 deg Horizontal/Bearing:
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

Ē							S	OILS	SAM	PL	ES					
Relative Level (m)	Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	Q D (%)	l Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Blows Per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
-329	0_	Ru	Bo	Re	Dri	Ř	Drill	ln-s		Silty SAND (SM); fine to medium grained, brown to	⊢ Z	Blo	N N N	Re	ŠΟ	
	- - - - -									Sity SAND (SW); fine to medium grained, blown to Jight brown, dry, friable, some rootlets (TOPSOIL) // SAND (SW); fine to medium grained, light brown, with some silt and with a trace of fine grained subangular gravel, dry to moist, loose to medium dense, friable (Residual)						Start Augering at 08:59 (26/07/11)
-328	1								,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	MC:12.4%, LL:25%, PL:12%, PI:13%, LS:5.5%, 46% Fines CLAY (CL); low plasticity, light grey to light brown	\mathbb{N}_{1}	2	11	0.5		
	-									mottled orange brown, with some fine grained sand, rare rootlets becomes with a trace of fine grained sand	M	6		0.0		
	-															
-327	2									becomes with a trace of fine grained angular gravel and fine to coarse grained sand / GRAVEL (GW); fine to medium grained and angular to subangular of sandstone, reddish brown, with a trace of silt and some fine to coarse grained sand,		2 15 50 for 20mm	50+	0.2		
	-									dry, very dense Silty SAND (SM); fine to coarse grained, reddish brown, with a trace of fine to medium grained subangular gravel of sandstone, dry						From 2.4m - becom difficult to auger
-326	3	1	1	100		0				becomes gravelly SANDSTONE; extremely low to very low strength, residual to highly weathered, light grey to reddish brown, fine grained, slightly oxidised (Colinlea Sandstone)						HW Casing installe to 2.8m. Start NQ Coring at 2.8m. Polymer added to
	-									becomes lów strength						water
	-	2	1	100		100				becomes highly weathered						
-325	4									becomes reddish brown, iron rich, oxidised, silty						
	-															
-324	5															
	-	3	1	98		75										
	-									becomes completely to highly weathered, extremely low to very low strength						
-323		NOTE	S : C	lassifi	catior	l 1: Soil	 class	sificati	l:::::: on via AS	1726 - 1993						

	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Hanc	sock Coal BH05
Date(s) Drilled: 26/07/11 to 26/07/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/NQ3	Drill Bit Size/Type: 120mm Auger	Total Depth Drilled (m): 10.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:329.0 m
Groundwater Depth: Not Encountered	Location: 7427936 mN 451853 mE	Inclination from -90 deg Horizontal/Bearing:
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

Ê		ROCK CORE										SC	DIL S	AM			
	Deptn (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
-322										becomes completely weathered, with rare light grey beds							Packer Test from 7.0 - 10.0m
-321	- - - 8- - - - - - - - - - - - - -	4	1/2	93		0				becomes fine to coarse grained							
		5	2	75		0				becomes very low strength, highly weathered							
										END OF BOREHOLE at 10.0m (Target Depth)							Piezometer installed to 10.0m at conclusion of drilling
-317										5 1726 - 1993 L: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC:	: Er	ners	son Cla	iss k:	Labo	oratory	Permeability

TIDE Alletralia Dtv/1 td	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility	ock Coal BH06						
Date(s) Drilled: 24/07/11 to 24/07/11	Logged By: RJR	Checked By: RJR						
Drilling Method: Solid Flight Auger/NQ3	Drill Bit Size/Type: 120mm Auger	Total Depth Drilled (m): 12.0						
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:338.0 m						
Groundwater Depth: Not Encountered	Location: 7427953 mN 452859 mE	Inclination from . 90 deg Horizontal/Bearing:						
Borehole Backfill: Drill Cuttings	Sampler Type: SPT	Hammer Data:						

								Ş	SC	DIL S	SAM			
885 Relative Level (m) 0 Depth (m)	Run No. Box No. Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
							SILT (ML); brown, with a trace of clay and a trace of Tine to medium grained sand, dry, friable, rootlets (TOPSOIL) SILT (ML); light brown to light yellowish brown, with a trace of clay and a trace of fine to medium grained sand, dry, friable (Residual)							Start Augering at 10:17 (24/07/11)
-337 1- 							SILT (ML); low to medium plasticity, light greyish brown and reddish brown, with some clay and a trace of fine grained sand, dry, very stiff, slightly cemented becomes light reddish brown, with a few medium grained sand-sized silt nodules	X	1	14 20 19	39	0.5		
-336 2							becomes with a trace of clay and some fine to medium grained sand SAND (SP); fine grained, light grey and light reddish brown, with some clay, dry, very dense becomes slightly to moderately cemented becomes fine to medium grained sand, clayey, with a	X	2	24 31 37	50+	0.5		
-336 2-							trace of fine to medium grained subangular gravel of predominantly quartz becomes light reddish brown, with some clay, MC:9%, LL:24%, PL:13%, PI:11%, LS:4.0°%, 32% Fines CLAY (CL); light reddish brown with rare light grey lenses, with some fine to medium grained sand and with a trace of fine subangular gravel, dry, very stiff		3	11 21 31	50+	0.5		
•							Clayey SAND (SC); fine to medium grained, light grey with some light orange brown pockets, with a trace of fine grained angular gravel, dry, very dense, moderately cemented in places, MC:14.8%, LL:25%, PL:14%, PI:11%, LS:4.0*% CLAY (CL); low plasticity, light grey, with a trace of fine grained sand and silt, dry, very stiff, slightly cemented, homogenous		4	29 28 34	50+	0.5		
-333 5-							becomes with rare light orange brown pockets and with some silt, MC:11.1%, LL:24%, PL:17%, PI:7%, LS:3.0*%, 48% Fines becomes sandy (fine grained)		5	19 47 50 for 100mm	50+	0.4		
-332 -	Notes: Classi Abbreviation						5 1726 - 1993 .: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC:	Em	ners	son Cla	ass k:	Labo	oratory	Permeability

TIDE Alletralia Dtv/1 td	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility	ock Coal BH06
Date(s) Drilled: 24/07/11 to 24/07/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/NQ3	Drill Bit Size/Type: 120mm Auger	Total Depth Drilled (m): 12.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:338.0 m
Groundwater Depth: Not Encountered	Location: 7427953 mN 452859 mE	Inclination from Horizontal/Bearing: 90 deg
Borehole Backfill: Drill Cuttings	Sampler Type: SPT	Hammer Data:

												;	SC	DIL S	AM	PLI	ES	
Relative Level (m)	Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Litholoav	6	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
-332											becomes moderately cemented		6	50 for 130mm	50+	0.0		
-331											of fine grained angular gravel, dry, very dense		7	50 for 70mm	50+	0.0		From 7.0m to 7.3m and 7.7m to 8.0m: difficult to auger
		1	1	96		96				+	SANDSTONE; low to very low strength, highly weathered, light orange brown to light grey, thinly laminated in places, fine grained (Colinlea Sandstone)							HW Casing installed to 8.0m. Start NQ3 Coring at 14:54. Polymer added
—329	9									•••••••••••••••••••••••••••••••••••••••	From 8.90m to 9.05m: becomes completely weathered, extremely low strength no discernable bedding							Packer Test from 9.0 - 12.0m
-328	- - - 10	2	1	100		100				•••••••••••••••••••••••••••••••••••••••	becomes low strength, highly to moderately							
-327	- - - - - - - - - - - - - - - -	3	1	86		86					weathered, light grevish white to light orange brown, slightly fractured							
-326											From 11.60m to 11.85m: inferred core loss 3 1726 - 1993 L: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC:	En	ner	son Cla	ass k:	Labo	pratory	/ Permeability

	ject No.: 42626683 ject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Facility	Sheet 3 of 3 BH06
Date(s) Drilled: 24/07/11 to 24/07/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/NQ3	Drill Bit Size/Type: 120mm Auger	Total Depth Drilled (m): 12.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:338.0 m
Groundwater Depth: Not Encountered	Location: 7427953 mN 452859 mE	Inclination from Horizontal/Bearing: 90 deg
Borehole Backfill: Drill Cuttings	Sampler Type: SPT	Hammer Data:

ſ	ر													;	SC	DIL S	AM	PLE	ES	
	52 Relative Level (m)	Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS		
	-320	- 12 o									END OF BOREHOLE at 12.0m (Target Depth)									
		-																		
		-	-																	
		-																		
┢	-325	513—	-																	
		-	-																	
29		-																		
alla rty		-	-																	
12 AUST	-324	14-																		
		-																		
e prope		-	-																	
mains tr		-																		
nis grawing is subject to כטריז אוסרו ו. וו remains the property of טרא Australia רגע. 	-323	15—	-																	
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is subje		-	-																	
arawing	-322	- - 16																		
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13/10/		-																		
כח. קטן		-																		
ц сн С н С		-																		
L19.1	-321	17—																		
BUREHULE ALFHA ISF_MB_KJI.GFJ GEUTECH.GUT 13/10/11 1		-																		
		-																		
E ALPI		-																		
	-320										§ 1726 - 1993 .: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC:	· Fr			ise k.	lahr	rator	Permeability		
Ľ			יססא	_ V 1/4		. . F r	. 1 00	NGC P	LIGUO		L. EIGON EITHE I E. I ROUG EITHE FI. FROUDEN HUER EU.	. ∟1				Labu	/ a.01)	a criticability		

TIDS Alletralia Dtv/1 td	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility	ock Coal BH07
Date(s) Drilled: 02/08/11 to 03/08/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/Rotary Wash & NQ3	Drill Bit Size/Type: 120mm Auger/90 mm Blade Bit	Total Depth Drilled (m): 20.2
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:322.0 m
Groundwater Depth: Not Encountered	Location: 7425884 mN 450748 mE	Inclination from Horizontal/Bearing: ⁹⁰ deg
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

Ê		RC	OCK	СО	RE					SOIL SAMPLES				S		
 Relative Level (m) Depth (m) 	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm d	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
-322 0-	-								SAND (SW); fine grained, light greyish brown, with some silt, dry, friable, a few rootlets (Residual)							Start Augering at 12:38 (02/08/11)
									becomes fine to medium grained, light brown, slightly cemented in places							
-321 1-	_								MC:5.3%, LL:22%, PL:10%, PI:12%, LS:5.5%, 49% Fines			9				
									CLAY (CL); low plasticity, light greyish brown with light orange stain, with a trace of fine grained sand and silt, dry, friable, stiff	ľ	1	12 13	25	0.5		
	-								becomes some silt							
-320 2-	-								becomes light grey to light brown, some fine grained sand, trace silt, hard		2	50 for 145mm	50+	0.2		
-319 3-									becomes with a few light orange and orange brown mottles, rare sandy pockets, very stiff to hard		3	20 34 38	50+	0.5		HW casing installed t 3.0. Start Rotary Was Drilling at 3.0m. Polymer added
-318 4-																
-317 5-									becomes light grey with rare light orange stain, sandy (fine grained), moist	X	4	37 50 for 150mm	50	0.3		
	-															
-316 -									∟ § 1726 - 1993 L: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC	· Fr	ner	son Cla	les k		rator	Permechility

	ject No.: 42626683 ject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Hanco	Sheet 2 of 4 BH07
Date(s) Drilled: 02/08/11 to 03/08/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/Rotary Wash & NQ3	Drill Bit Size/Type: 120mm Auger/90 mm Blade Bit	Total Depth Drilled (m): 20.2
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:322.0 m
Groundwater Depth: Not Encountered	Location: 7425884 mN 450748 mE	Inclination from Horizontal/Bearing: 90 deg
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

Ê		RO	CK	CO	RE						SC	DIL S	AM	PLE	ES	
9 916 (m) Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
316 6 									Clayey SAND (SC); fine to medium grained, light grey to light orange brown, moist, very dense, MC:8.4%, LL:31%, PL:13%, PI:18%, LS:8%, 26% Fines becomes fine to coarse grained, with some clay		5	21 25 28	50+	0.5		
314 8 	1	1	96		95		****		SILT; low plasticity, light grey, with some clay, very stiff, moist, homogenous SILTSTONE; medium strength, slightly weathered, light grey to light greyish brown, very thinly laminated to very thinly bedded, slightly fractured, rare cherty veins (Colinlea Sandstone) At: 8.05m: 50mm inferred zone of core loss becomes low to medium strength, moderately weathered		6	50 for 140mm	50+	0.1		Start NQ3 Coring at 7.8m
313 9							× × × ·		SANDSTONE; low to medium strength, moderately weathered, light grey with rare light orange stain, laminated to very thinly bedded, fine grained,							Packer Test from 9.2m to 12.2m
- - - - - - - - - - - - - - - - - - -	2	1	98		98				SANDSTONE; medium strength, moderately weathered, light greyish brown with some light orange iron stain, fine to coarse grained, unbroken becomes medium strength, fine to medium grained							
							ification v		becomes light orange grey to light pinkish grey, some to heavy stain : 1726 - 1993 .: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC:							

	iect No.: 42626683 iect Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Hanco	Sheet 3 of 4 BH07
Date(s) Drilled: 02/08/11 to 03/08/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/Rotary Wash & NQ3	Drill Bit Size/Type: 120mm Auger/90 mm Blade Bit	Total Depth Drilled (m): 20.2
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:322.0 m
Groundwater Depth: Not Encountered	Location: 7425884 mN 450748 mE	Inclination from Horizontal/Bearing:
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

Ê		RO	CK	CO	RE					\$	SO	IL S	AM	PL	ES	
CLC Relative Level (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARK
-309 13 	3	1/2	100		100				SANDSTONE; medium to high strength, slightly weathered, medium red to reddish grey, fine to medium grained, unbroken SANDSTONE; medium strength, slightly to moderately weathered, light grey, fine grained, quartz-rich becomes crudely laminated light orange and light grey At 12.0m: 130 mm coarse grained band							Start of days drilli (03/08/11). Pack Test from 12.2m 15.2m
									becomes interlaminated light grey and light orange pink becomes medium to coarse grained SANDSTONE; low to medium strength, moderately							
- -308 14 - - - - - - - - - - - - - - - - -	4	2	99		99				SANDSTONE; medium strength, slight orange and light pinkish grey laminations at 15° to 30°, fine to coarse grained, quartz rich, UCS: 4.8MPa SANDSTONE; medium strength, slighty to moderately weathered, light grey with a few light orange to light pink laminations at 30°, crudely very thinly bedded, fine to medium grained UCS: 5.22MPa							
-307 15	5	2	97		97			x x x x x x x x x x x x x x x x x x x	From 15.4m to 15.6m: becomes fine to coarse grained, laminated to very thinly bedded SILTSTONE; very low to low strength, highly to completely weathered, light grey to grey, crudely very thinly to thinly bedded with some "soft" beds From 16.1m: becomes interbedded with fine grained							Packer Test fro 15.2m to 18.2r
- - - - - - 305 17 - - - - - - - - - - - - - - - - - - -								× × × × × × × × × × × × × × × × × × ×	SANDSTONE; low to medium strength, moderately weathered, light grey, laminated to very thinly bedded, very fine to fine grained, some very thin low strength beds of siltstone							
- - - - - - - 304 -	6	2	100		98											

	ject No.: 42626683 ject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Hanc	ock Coal BH07
Date(s) Drilled: 02/08/11 to 03/08/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/Rotary Wash & NQ3	Drill Bit Size/Type: 120mm Auger/90 mm Blade Bit	Total Depth Drilled (m): 20.2
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:322.0 m
Groundwater Depth: Not Encountered	Location: 7425884 mN 450748 mE	Inclination from Horizontal/Bearing:
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

			RC	CK	CO	RE						SC	DIL S	SAM	PLI	ES	
Relative Level (m)	– Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
	4 10	-								From 18.0m to 18.4m: becomes very low to low strength, highly weathered At 18.1m: 30mm fractured zone becomes fine to medium grained							Packer Test from 18.2m to 20.2m
-30		7	2/3	72		70				From 19.45 to 20.0m: likely zone of core loss							Piezometer installed to
	121-	-								END OF BOREHOLE at 20.2m (Target Depth)	-						20.0m at conclusion of drilling
	022-																
-29 -29	923—																
-29										S 1726 - 1993 L: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC	: En	mer	son Cla	ass k:	Labo	pratory	/ Permeability

	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Hanc	sheet 1 of 2 BH08
Date(s) Drilled: 27/07/11 to 28/07/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/NQ3	Drill Bit Size/Type: 120mm Auger	Total Depth Drilled (m): 10.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:331.0 m
Groundwater Depth: Not Encountered	Location: 7425936 mN 451854 mE	Inclination from .90 deg Horizontal/Bearing:
Borehole Backfill: Drill Cuttings	Sampler Type: SPT	Hammer Data:

			ROCK CORE									SC	DIL S	AM	ES		
Relative Level (m)	Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
—331	0									SILT (ML); light brown with some light orange stain, low to medium plasticity, with some clay and a trace of fine grained sand, dry to moist (Residual)							Start Augering (27/07/11)
	-									becomes light orange brown, with a trace of clay and some fine to medium grained sand, moist							
—330	- 1 -									Silty CLAY (CL); low plasticity, light orange brown with a few grey mottles, moist, stiff, MC:10.4%, LL:26%, PL:13%, PI:13%, LS:5.5+%, 51% Fines		1	6 6	50+	0.4		
	-									SAND (SW): fine to coarse grained, reddish brown, with a trace of silt and some fine to medium grained angular to subangular gravel of sandstone, very dense becomes with a trace of fine grained gravel, some silt			50 for 130mm				
—329 —328 —327	2									SANDSTONE; low to very low strength, highly weathered, dark reddish brown with rare grey pockets, fine to medium grained, iron rich, oxidised							HW Casing installed
	-	1	1	100		100				(Coliniea Sandstone) becomes slightly pitted (washed out sand pockets) From 2.6m to 3.0m: becomes fine to coarse grained							to 2.0m. Start NQ3 Coring at 2.1m
—328	- - 3									(fine grained matrix with coarse grained sand-sized clasts)							
	-																Core badly disturbed when removing from barrel.
-327										becomes extremely low strength, residual to							
521	• - -									completely weathered (SAND: fine to coarse grained with some silt and a trace of to some fine to medium grained angular to subangular gravel of sandstone, slightly cemented)							Packer Test from 4.0 - 7.0m
		2	1	73		0											
—326	5								× × × ×	SILTSTONE; very low to extremely low strength, residual to completely weathered, light reddish							
—326 —325	-								× × × × × × × × × × × × × × × × × × ×	brown, fine to medium grained sandy beds, weakly cemented, iron rich, oxidised							
—325									× × × × × × on via As	5 1726 - 1993 .: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC	: Em	ners	son Cla	iss k	Labo	oratory	Permeability

TIDS Alletralia Dtv/1 td	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility	ock Coal BH08
Date(s) Drilled: 27/07/11 to 28/07/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/NQ3	Drill Bit Size/Type: 120mm Auger	Total Depth Drilled (m): 10.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:331.0 m
Groundwater Depth: Not Encountered	Location: 7425936 mN 451854 mE	Inclination from Horizontal/Bearing:
Borehole Backfill: Drill Cuttings	Sampler Type: SPT	Hammer Data:

ſ	Ē			RC	CK	CO	RE					;	SC	DIL S	AM	PL	S	
	52 Relative Level (m)	Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
	-324		3	1	100		0			× × × × × × × × ×	SANDSTONE; extremely low to very low strength, residual to completely weathered, light reddish brown, fine to medium grained, with a few silty beds up to 200mm, iron rich, oxidised							
Australia Pty Ltd.		-	4	1	0		0											Start of days drilling (28/07/11)
operty of URS ⊭	-323	8 - - -	5	1	90		0				becomes reddish brown, fine to coarse grained (SAND; fine to coarse grained, reddish brown, with some silt and fine to medium grained angular to subangular gravel)							
his drawing is subject to COPYRIGHT. It remains the property of URS Australia Pty Ltd	-322	 - - 9	6	1/2	93		0				becomes with a few coarse grained subrounded gravel (conglomeritic) From 9.1m to 9.2m: becomes very low strength,							
awing is subject to COPY		-	7	2	100		0				highly weathered							
IT.GPJ GEOTECH.GDT 13/10/11 This dra	-321 -320	-									END OF BOREHOLE at 10.0m (Target Depth)							
BOREHOLE ALPHA TSF_MB_RJT.GPJ GEOTECH.GDT 13/10/11 T	-319										3 1726 - 1993 .: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC:	En	ners	son Cla	ass k:	Labo	pratory	Permeability

	ject No.: 42626683 ject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Hanc	ock Coal BH09
Date(s) Drilled: 25/07/11 to 25/07/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger	Drill Bit Size/Type: 120mm Auger	Total Depth Drilled (m): 10.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:338.0 m
Groundwater Depth: Not Encountered	Location: 7426169 mN 452755 mE	Inclination from Horizontal/Bearing:
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

Ē		RO	CK	CO	RE					;	sc	DIL S	AM	PLE	S	
	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
-336 0-	-								SILT (ML); brown, with a trace of fine grained sand, dry, friable, rootlets (TOPSOIL) SILT (ML); low plasticity, light greyish brown, with some clay, dry, a few very stiff silt nodules (Residual)							Start Augering at 13:15 (25/07/11)
-337 1-	-								becomes light brown with rare light grey to grey mottles, with a trace of fine grained sand	X	1	11 17 21	38	0.5		
	-								becomes with a trace of clay							
—336 2— —335 3—									with rare black inclusions Clayey SAND (SC); fine grained, light greyish brown, dry, very dense, friable		2	30 34 37	50+	0.5		
-335 3-									becomes with trace light orange stain, slightly cemented in places becomes with a trace of fine grained subangular gravel	X	3	25 34 32	50+	0.5		
334 4									becomes light greyish brown to light grey with light orange to orange pockets, no gravel, MC:4.3%, LL:23%, PL:15%, PI:8%, 46% Fines	X	4	29 36 50 for 110mm	50+	0.5		
-333 5-											5	16 31 47	50+	0.4		
-332 -									l 5 1726 - 1993 L: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC:	En	ner	son Cla	ass k:	Labo	oratory	Permeability

TIDS Alletralia Dtv/1 td	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility	ock Coal BH09
Date(s) Drilled: 25/07/11 to 25/07/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger	Drill Bit Size/Type: 120mm Auger	Total Depth Drilled (m): 10.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:338.0 m
Groundwater Depth: Not Encountered	Location: 7426169 mN 452755 mE	Inclination from Horizontal/Bearing: 90 deg
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

(r										;	SC	DIL S	AM	PLE	ES	
Relative Level (m) Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
-332 6 - - - - - - - - - - - - - - - - -									becomes fine to medium grained, light grey with no stain, with some silt, homogenous	X	6	15 23 27	50	0.5		
-331 7 - - - - - - - - - - - - - -									CLAY (CL); low plasticity, light grey with orange brown pockets, occasionally speckled white, with some fine grained sand and trace silt, dry, very stiff, slightly cemented, MC:7.2%, LL:24%, PL:13%, PI:11%, LS:2.5*%		7	17 19 26	45	0.5		
-330 8 - - - - - - - - - - - -									SAND (SC): fine grained, light grey with orange brown pockets and some light orange lenses, with some clay to clayey, dry, dense, MC:6.7%, LL:22%, PL:11%, PI:11%, LS:2.0*%, 37% Fines		8	21 17 18	35	0.5		
-329 9 - - - - - - - - - - - - - - -										X	9	21 26 30	50+	0.5		
-328 10 - - - - - - - - - - - - -									END OF BOREHOLE at 10.0m (Target Depth)	-						Piezometer installed to10.0m at conclusior of drilling
- -327 11 - - - - - - - - - - -																
									3 1726 - 1993 L: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC	: En	ners	son Cla	iss k	Labo	oratory	Permeability

TIDS Alletralia Dtv/1 td	ject No.: 42626683 ject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Facility	Sheet 1 of 4 BH10
Date(s) Drilled: 04/08/11 to 09/08/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/Rotary Wash	Drill Bit Size/Type: 120mm Auger/90 mm Blade Bit	Total Depth Drilled (m): 20.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:323.0 m
Groundwater Depth: Not Encountered	Location: 7424122 mN 450696 mE	Inclination from Horizontal/Bearing: 90 deg
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

			ROCK CORE											SC	DIL S	SAM	PL	ES	
B Relative Level (m)	D Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS		
—323	- U i									Silty SAND (SM); fine to medium grained, light greyish brown, dry, friable, some rootlets (Residual)							Start Augering at 13:23 (04/08/11)		
	-									CLAY (CI); moderately plastic, light brown to light orange brown with rare light grey mottles, with a trace of fine grained sand and silt, dry, stiff, friable	-								
—322	- 1 ! - -									becomes moist, stiff to very stiff, MC:13.5%, LL:43%, PL:16%, PI:27%, LS:11.5+%, 63% Fines	X	1	6 7 10	17	0.5				
ralia Mty Lta.	-									becomes with a trace of to some silt			10						
150 - 321	2	•								becomes light greyish brown		2	5 39	50+	0.4				
mains the propert	-									brown, with some silt and some fine to medium grained angular gravel of siltstone, dry, friable, very dense SiLT (ML); light brown, with a trace of to some fine to medium grained sand and a trace of fine grained angular to subangular gravel, dry, very stiff, friable	-		50 for 50mm						
al II - 320	- 3- -									Silty SAND (SM); fine grained, light brown, with a trace of clay, dry, very dense, friable		3	50 for 70mm	50+	0.1		HW casing installed to 3.0m. Start Rotary Wash Drilling at 3.0m.		
13/10/11 international is subject to COPYRIGHI. It remains the property of UKS Australia Pty Ltd 	- - - - - - - - - - - - - - -																		
BUREHOLE ALPHA ISP_MB_KUI.GPJ GEOLECH.GDI 13/10/11 	- - - - - - - - -									SILT (ML); low to medium plasticity, mottled light grey and light brown, with a trace of clay and fine to medium grained sand, moist, very stiff, a few sandy (fine to medium grained) pockets		4	44 50	50+	0.3				
E ALPHA I SF_WB_KJ	-																		
-317 -317										5 1726 - 1993 L: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC	: En	ner	son Cla	ass k:	Labo	oratory	Permeability		

	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Hanco	Sheet 2 of 4 BH10
Date(s) Drilled: 04/08/11 to 09/08/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/Rotary Wash	Drill Bit Size/Type: 120mm Auger/90 mm Blade Bit	Total Depth Drilled (m): 20.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:323.0 m
Groundwater Depth: Not Encountered	Location: 7424122 mN 450696 mE	Inclination from Horizontal/Bearing: 90 deg
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

Ē		RO	CK	CO	RE							DIL S	SAM	ES) j	
 212 Relative Level (m) 9 Depth (m) 	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
-317 6 - - - - - - - - - - - - - - - - -									becomes with a trace of fine grained sand, trace to some clay, slightly to moderately cemented	X	5	29 36 48	50+	0.5		
-316 7									Clayey SAND (SC); fine grained, light brown to light orange brown, with a trace of fine grained angular gravel, moist, very dense, MC:10.2%, LL:23%, PL:13%, PI:10%, LS:4.5%, 43% Fines		6	30 31 33	50+	0.5		Start of days drilling 07:58 (09/08/11)
									becomes fine to medium grained, light greyish brown with light orange brown and reddish brown mottles, with some fine to medium grained angular to subangular gravel	X	7	21 31 47	50+	0.4		
-313 10 									CLAY (CI); medium plasticity, light grey, with some fine to medium grained sand, a trace of silt and a trace of fine to medium grained angular gravel, stiff to very stiff, MC:21.2%, LL:46%, PL:17%, PI:29%, LS:7.0+%, 51% Fines becomes low to medium plasticity, light grey to light orange brown, with a trace of fine grained sand and a trace of to some silt, no gravel		8	6 9 10	19	0.5		
									3 1726 - 1993 .: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC:	: En	ners	son Cla	ass k	Labo	pratory	/ Permeability

TIDS Alletralia Dtv/1 td	ject No.: 42626683 ject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Hanco	Sheet 3 of 4 BH10
Date(s) Drilled: 04/08/11 to 09/08/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/Rotary Wash	Drill Bit Size/Type: 120mm Auger/90 mm Blade Bit	Total Depth Drilled (m): 20.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:323.0 m
Groundwater Depth: Not Encountered	Location: 7424122 mN 450696 mE	Inclination from Horizontal/Bearing: 90 deg
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

Ê		RO	CK	СО	RE						SC	DIL S	SAM	PLE	ES	
evel (m			(Loss		(min)	jg				-	SP		-		
	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
-31112 - - - - - - - -									becomes light grey with some light orange staining, with a trace of silt and some fine to medium grained sand, rare silt nodules		9	11 16 17	33	0.5		
-310 13 - - - - - - - - - - 309 14 - - - - - - - - - - - - - - - - - - -									becomes reddish brown to light grey with some yellow mottles, some silt, MC:13.7%, LL:31%, PL:14%, PI:17%, LS:8%	X	10	13 17 25	42	0.5		
- - - -308 15 - - - - - - - - - - - - - - - - - - -									becomes with a trace of to some silt	X	11	10 10 11	21	0.4		
-307 16 									Clayey SAND (SC); fine grained, mottled light grey, reddish brown and light yellow, with a trace of silt, moist, dense, slightly cemented in rare lenses, MC: 10.1%, 47% Fines		12	12 15 16	31	0.4		
-305 —	NOTE	S : C	lassifi	catior	n: Soi	 class	sificat	ion via AS	5 1726 - 1993							

	Niect Reference: Alpha Coal Project -	^{ient:} Hancock Coal	Sheet 4 of 4 BH10
Date(s) Drilled: 04/08/11 to 09/08/11	Logged By: RJR	Checked By: RJR	
Drilling Method: Solid Flight Auger/Rotary Wash	Drill Bit Size/Type: 120mm Auger/90 mm Blade Bit	Total Depth Drilled (m): 20.0	
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:323.0	m
Groundwater Depth: Not Encountered	Location: 7424122 mN 450696 mE	Inclination from Horizontal/Bearing:	10 deg
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:	

	RO	CK	CO	RE					SOIL SAMPLES						
Relative Level (m) Depth (m)	Run No. Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm S	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
-305 18								becomes fine to coarse grained, with a trace of fine grained subangular gravel, moist to wet, medium dense, MC:14.6%, LL:22%, PL:12%, PI:10%, LS:3.5*%, 33% Fines END OF BOREHOLE at 20.0m (Target Depth)		13	14 18 19 7 9 10	37	0.5		Piezometer installed to 20.0m at conclusion of drilling
-302 21															
303 20															
-299								5 1726 - 1993 .: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC:	Er	mer	son Cla	ass k:	Labo	oratory	[,] Permeability

TIDS Alletralia Dtv/1 td	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility	ock Coal BH11
Date(s) Drilled: 29/07/11 to 30/07/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/NQ3	Drill Bit Size/Type: 120mm Auger	Total Depth Drilled (m): 10.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:330.0 m
Groundwater Depth: Not Encountered	Location: 7424103 mN 451745 mE	Inclination from -90 deg Horizontal/Bearing:
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

			RC	CK	CO	RE						SOIL SAMPLES					
Denth (m)		Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
-330 (- - -									SILT (ML); low plasticity, brown to light greyish brown, with a trace of clay and a trace of fine grained sand, dry, friable, rootlets (Alluvium)							Start Augering at 14:35 (29/07/11)
										SAND (SW); fine to medium grained, light brown, with some silt and a trace of clay, dry, friable, trace rootlets							
-329 1	- - - - -									Sandy SILT (ML); light brown to tan with light orange stain, sand is fine to medium grained, with a trace of fine grained subangular gravel, moist, firm // MC:10.2%, LL:20%, PL:15%, PI:5%, LS:1.5*%, 16%/ Fines SAND (SW); fine to medium grained, light brown to tan with light orange stain, with some clay and some	X	1	2 1 3	4	0.5		
-328 2	- - - 2									Tine to medium grained subangular to subrounded / gravel, moist, loose / Silty SAND (SM); fine to medium grained, light brown, moist to wet, medium dense (Residual)							
		1	1	100		100				SANDSTONE; extremely low strength, residual to completely weathered, light grey, fine grained (SAND: fine to medium grained, light grey, with some -sit and medium grained gravel, dry, moderately cemented) (Colinlea Sandstone) // becomes very low to low strength, highly to // noderately weathered, crudely laminated, silty // SANDSTONE; low strength, moderately weathered, reddish brown mottled/speckled white and yellow, fine to coarse grained (fine grained matrix with medium to coarse grained sand and fine grained subangular gravel-sized clasts), iron rich, oxidised	X	2	50 for 70mm	50+	0.4		HW Casing installed to 2.2m. Start NQ3 Coring at 15:44
-327 3	3 - - - - - - -									becomes medium strength, fine grained with rare medium to coarse grained sand-sized clasts							
-326 4	- 4 - - - -	2	1	100		95											Packer Test from 4.0 7.0m
-325 (- - - 5 -									becomes interbedded light grey and reddish brown, rare quartz veins becomes low strength, moderately to highly weathered							
		3	1	100		100				SANDSTONE; low strength, moderately weathered, light brown to light grey, fine grained with rare medium to coarse grained sand-sized clasts, slightly oxidised, silty							Start of days drilling (30/07/11)
-324										5 1726 - 1993 .: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC:	Em	ners	son Cla	ass k:	Labo	oratory	Permeability

	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Han	cock Coal BH11
Date(s) Drilled: 29/07/11 to 30/07/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/NQ3	Drill Bit Size/Type: 120mm Auger	Total Depth Drilled (m): 10.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:330.0 m
Groundwater Depth: Not Encountered	Location: 7424103 mN 451745 mE	Inclination from 90 deg Horizontal/Bearing:
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

(F		RO	CK	CO	RE	-					SC	DIL S	AM	PLI	ES	
 P5C Relative Level (m) Depth (m) 	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
-323 7-	4	1	75		75				becomes moderately to bighly weathered light gray							
-322 8-	- 5	1/2	100		98				becomes moderately to highly weathered, light grey to reddish brown, slightly pitted (washing out of sand-sized clasts), iron rich							Packer Test from 7.0 10.0m
-321 9-	-								from 8.2m to 8.5m: becomes moderately to highly clastic from 8.3m: becomes highly weathered, low to medium strength, fine grained matrix with some medium to coarse grained sand and fine grained gravel sized clasts	-						
- - - - 320 10	6	2	56		0				SANDSTONE: very low strength, highly to completely weathered, fine to coarse grained, moderately cemented, slightly pitted (washing out of coarse grained sand-sized clasts), iron rich, oxidised							
-31911-																Piezometer installe to10.0m at conclusio of drilling
-318									5 1726 - 1993 .: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC	En	ners	son Cla	ass k:	Labo	prator	/ Permeability

	ject No.: 42626683 ject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Hanc	cock Coal BH12
Date(s) Drilled: 28/07/11 to 29/07/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/NQ3	Drill Bit Size/Type: 120mm Auger	Total Depth Drilled (m): 10.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:339.0 m
Groundwater Depth: Not Encountered	Location: 7423924 mN 452644 mE	Inclination from Horizontal/Bearing:
Borehole Backfill: Drill Cuttings	Sampler Type: SPT	Hammer Data:

(L		RO	CK	CO	RE					SOIL SAMPLES						
B Relative Level (m) Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
-339 0 									Sandy SILT (ML); low plasticity, brown, sand is fine grained, with a trace of clay, dry, friable, some rootlets (Residual)							Start Augering at 0.0r
-338 1— - - - - - -337 2—									Clayey SAND (SC); fine grained, light brown to light orange brown with orange brown pockets, with a trace of silt, moist, firm to stiff, MC:12.6%, LL:32%, PL:13%, PI:19%, LS:7.0*%, 46% Fines becomes light brown, some fine grained sand		1	2 2 2	4	0.5		HW Casing installed
- - - - -336 3-	1	1	100		100				SANDSTONE; low to very low strength, highly weathered, reddish brown with a few light grey and yellow mottles, fine grained, iron rich, oxidised (Colinlea Sandstone)	-						to 2.0m. Štart NQ3 Coring at 12:50. Polymer added
- - - -335 4- - - - - - - - - - - - - - - - - - -	2	1	97		0				becomes interbedded sandstone and siltstone becomes very low strength, highly to completely weathered							Packer Test from 4.0 7.0m
-334 5	-															

TIDS Alletralia Dtv/1 td	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility	ock Coal BH12
Date(s) Drilled: 28/07/11 to 29/07/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/NQ3	Drill Bit Size/Type: 120mm Auger	Total Depth Drilled (m): 10.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:339.0 m
Groundwater Depth: Not Encountered	Location: 7423924 mN 452644 mE	Inclination from Horizontal/Bearing:
Borehole Backfill: Drill Cuttings	Sampler Type: SPT	Hammer Data:

				RO	CK	CO	RE						SC	DIL S	AM	PL	ES	
Relative Level (m)	9 Denth (m)		Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
	2 7		3	1	100		0				SANDSTONE: very low to extremely low strength, completely weathered, reddish brown with some light brown to tan lenses and pockets, fine grained, silty, iron rich, oxidised							
	1 8		4	1/2	76		0				from 7.8m to 8.5m: recovered as 200mm of Sandy Gravel with some silt (very weak zone)							Packer Test from 7.0 - 10.0m
	09	- - - - - -									from 8.9m to 9.2m: very weak zone (recovered as 200mm of Sandy GRAVEL with some silt)							
alons si bilime o siluti i 1 /01 /c 	9 10	- - - - - -	5	2	100		0				END OF BOREHOLE at 10.0m (Target Depth)							
	8 1 1																	
	7	- - - -	IOTE \BBR	:S: C Revia	lassifi TION	cation S : PF	n: Soi P: Poc	I class cket Po	sificati enetro	ion via AS ometer LI	5 1726 - 1993 L: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC:	Er	mers	son Cla	ass k:	Labo	pratory	/ Permeability

TIDS Alletralia Dtv/1 td	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Hanco	Sheet 1 of 4 BH13
Date(s) Drilled: 01/08/11 to 01/08/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/Rotary Wash	Drill Bit Size/Type: 120mm Auger/90 mm Blade Bit	Total Depth Drilled (m): 20.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:328.0 m
Groundwater Depth: Not Encountered	Location: 7422312 mN 450717 mE	Inclination from Horizontal/Bearing: 90 deg
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

Ê		ROC	ĸ	CO	RE						SC	DIL S	SAM	PLI	ES	
 856 Relative Level (m) 0 Depth (m) 	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Tvpe	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
									SAND (SW); fine to medium grained, brown, with some silt, dry, loose, friable, rootlets (Alluvium) becomes light brown, with a trace of silt							Start Augering at 08:31 (31/08/11)
-327 1 - - - - - - - - - - - - - -									CLAY (CI); medium plasticity, light brown with rare light grey and light orange stain, with a trace of silt and a trace of fine grained sand, dry to moist, stiff to very stiff (Residual), MC:10%, LL:40%, PL:12%, PI:28%, LS:11%, 51% Fines becomes with a trace of to some silt		1	6 7 8	15	0.5		
326 2 									becomes light grey to light greyish brown, with a trace of to some fine grained sand and a trace of silt, very stiff	X	2	10 23 31	50+	0.5		
- - - - - - - - - - - - - - - - - - -									Silty SAND (SM); fine grained, light greyish brown mottled orange and light orange brown, dry, very dense, friable, slightly cemented		3	24 38 33	50+	0.5		HW Casing installed to 3.0m. Start Rotary Wash Drilling at 3.0m
324 4									becomes find to medium grained sand, with some silt and with a trace of fine to medium grained subangular gravel	X	4	40 38 50 for 90mm	50+	0.4		
									3 1726 - 1993 : Liquid Limit PL: Plastic Limit PI: Plasticity Index EC): Er	mer	son Cla	ass k:	Labo	pratory	/ Permeability

TIDS Alletralia Dtv/1 td	ject No.: 42626683 ject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Hanco	Sheet 2 of 4 BH13
Date(s) Drilled: 01/08/11 to 01/08/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/Rotary Wash	Drill Bit Size/Type: 120mm Auger/90 mm Blade Bit	Total Depth Drilled (m): 20.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level: 328.0 m
Groundwater Depth: Not Encountered	Location: 7422312 mN 450717 mE	Inclination from -90 deg Horizontal/Bearing:
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

Ē			RO	CK	CO	RE				SOI	IL S/	AM	PLE	S	
	 Depth (m) 	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology		Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
—322 —321	-									CLAY (CL); low plasticity, light grey to light greyish brown with some light orange mottles, with a trace of silt and some fine to medium grained sand, dry, very	40	50+	0.3		
—320	- - - - - 8 - - - - - - - - -										50 for D0mm	50+	0.1		
—319	- - - 9 - - - - -									becomes fine to medium grained, light brown to light grey with rare light orange stain, no gravel	50 for 50mm	50+	0.1		
—3181	-									becomes fine grained, light grey	50 for 10mm	50+	0.1		
—317 1 —316										5 1726 - 1993 L: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC: Emersor	on Clas	ss k:	Labo	pratory	^r Permeability

TIDE Alletralia Dtv/1 td	ject No.: 42626683 ject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Facility	Sheet 3 of 4 BH13
Date(s) Drilled: 01/08/11 to 01/08/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/Rotary Wash	Drill Bit Size/Type: 120mm Auger/90 mm Blade Bit	Total Depth Drilled (m): 20.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:328.0 m
Groundwater Depth: Not Encountered	Location: 7422312 mN 450717 mE	Inclination from Horizontal/Bearing: 90 deg
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

<u></u>			RO	CK	CO	RE					S	OII	S	AM	PLE	ES	
Relative Level (m)	Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Blows	ber 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
—31	6 12 — 									becomes light grey to light greyish brown becomes fine to coarse grained, with some silt and some fine to medium grained angular gravel	×	9 50 120 0 50	for	50+	0.1		
This drawing is subject to COPYRIGHT. It remains the property of URS Australia Pty Ltd. 	315-									SILT (ML); low plasticity, light grey with light orange stain, with a trace of clay and a trace of fine to medium grained sand, dry to moist, very stiff, rare limonitic nodules and iron stain (SANDSTONE/SILTSTONE; extremely low strength, residual, light grey)		1 50	12 for imm	50+	0.3		
JEOLECH.GUL 13/10/11	216-									becomes grey to light grey, slightly cemented		2 50	28 for imm	50+	0.3		
	0 —									5 1726 - 1993 L: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC:	: Em	ersor	Cla	ss k:	Labo	pratory	Permeability

TIDS Alletralia Dtv/1 td	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Hanco	Sheet 4 of 4 BH13
Date(s) Drilled: 01/08/11 to 01/08/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger/Rotary Wash	Drill Bit Size/Type: 120mm Auger/90 mm Blade Bit	Total Depth Drilled (m): 20.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:328.0 m
Groundwater Depth: Not Encountered	Location: 7422312 mN 450717 mE	Inclination from Horizontal/Bearing: 90 deg
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

2		RO	СК	СО	RE					SOIL SAMPLE					ES	
Relative Level (m) Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
-310 18									becomes mottled light grey, reddish brown and light orange, with a trace of to some clay	M	13	27	50+	0.4		
									becomes clayey with rare sandy pockets, MC:14.8%, LL:31%, PL:17%, PI:14%, LS:6%, 56% Fines becomes light grey, homogenous	X	14	35 34 50 for 135mm	50+	0.4		
-308 20									END OF BOREHOLE at 20.0m (Target Depth)	-						Piezometer installed 20.0m at conclusion drilling
-307 21																
- - - - - - - - - - - - - - - - - - -																
- - - - - - - - - - - - - - - - - - -																
									6 1726 - 1993 L: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC	: En	ner	son Cla	ass k:	Labo	pratory	/ Permeability

TIDS Alletralia Dtv/1 td	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility	ock Coal BH14
Date(s) Drilled: 31/07/11 to 31/07/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger	Drill Bit Size/Type: 120mm Auger	Total Depth Drilled (m): 10.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level:340.0 m
Groundwater Depth: Not Encountered	Location: 7421310 mN 452120 mE	Inclination from Horizontal/Bearing:
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

Ē		RO	СК	со	RE						SC	DIL S	AM	PL	ES	
Relative Level (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
340 0 - - -									SAND (SP); fine grained, light brown to light brownish grey, with some silt, dry, loose, friable, rootlets (Residual)							Start Augering at 09:13 (31/07/11)
									becomes fine to medium grained sand							
339 1									becomes moist, medium dense Clayey SILT (ML); low plasticity, light grey with light	-	1	3 5	11	0.3		
- - - -									orange stain, with a trace of clay and some fine grained sand, moist, very stiff, rare sandy pockets becomes with rare light orange stain, no sandy pockets, homogenous		N	6				
338 2 - - -										X	2	19 31	50+	0.5		
- - -											N	34				
									MC:5.9%, LL:16%, PL:11%, PI:5%, LS:1.0*%, 35% Fines SAND (SW); fine to medium grained, light grey to	-	3	16 27	50+	0.5		
- - - -									SAND (SW); fine to medium grained, light grey to light orange brown, with some silt to silty and with a trace of fine to medium grained subangular gravel, moist, very dense, friable		N	29				
336 4 																
- - - -									Sandy SILT (ML): light greyish brown, sand is fine grained, with a trace of fine grained angular to subrounded gravel, dry, very stiff to hard, friable		4	50 for 80mm	50+	0.1		
335 5 - - - -																
- - - -																
									 3 1726 - 1993 L: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC	 : Er	ner	son Cla	ass k:	Labo	oratory	Permeability

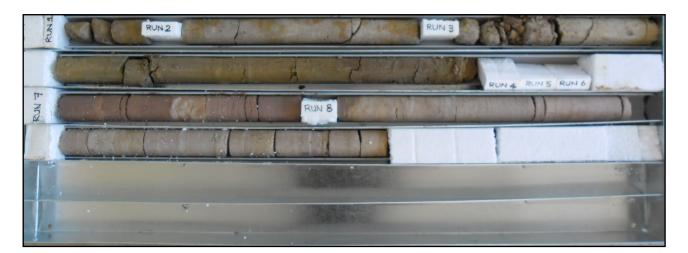
TIDS Alletralia Dtv/1 td	oject No.: 42626683 oject Reference: Alpha Coal Project - Out-of-Pit Tailings Storage Facility Hanc	cock Coal BH14
Date(s) Drilled: 31/07/11 to 31/07/11	Logged By: RJR	Checked By: RJR
Drilling Method: Solid Flight Auger	Drill Bit Size/Type: 120mm Auger	Total Depth Drilled (m): 10.0
Drilling Rig Type: Drillcat Explorer 200	Drilling Contractor: TerraTest	Relative Level: 340.0 m
Groundwater Depth: Not Encountered	Location: 7421310 mN 452120 mE	Inclination from -90 deg Horizontal/Bearing:
Borehole Backfill: Piezometer	Sampler Type: SPT	Hammer Data:

Ê		RO	СК	со	RE						SC	DIL S	AM	PLE	S	
Relative Level (m) Depth (m)	Run No.	Box No.	Recovery (%)	Drilling Fluid Loss	R Q D (%)	Drill Rate (m/min)	In-situ Testing	Lithology	MATERIAL DESCRIPTION	Type	Number	Blows per 150mm G	N Value Blows/300mm	Recovery (m)	Water Content (%)	REMARKS
—334 6—	-								SAND (SW); fine to coarse grained, light greyish brown with rare light orange stain, with some fine to medium grained angular gravel and some silt, dry, very dense, slightly cemented, MC:22.3%, LL:15%, LS:1.5%	N/	5	41 50 for 80mm	50+	0.2		
-333 7-									becomes fine grained, no gravel	×	(6	50 for 100mm	50+	0.1		
									becomes fine to coarse grained, with a trace of fine grained angular gravel, MC:7.9%, LL:16%, PL:12%, PI:4%, LS:1.5%, 34% Fines	X	7	40 50 for 110mm	50+	0.3		
330 10 								<u>`</u> ••••••	END OF BOREHOLE at 10.0m (Target Depth							Piezometer installed to 10.0m at conclusion of drilling
-329 11 -									5 1726 - 1993 .: Liquid Limit PL: Plastic Limit PI: Plasticity Index EC:	: Er	mer	son Cla	iss k:	Labo	pratory	r Permeability

C.2 Core Photographs







	Run	Depth (m)	Recovery (%)	RQD (%)
	Run 1	3.08 - 3.50	36	36
	Run 2	3.50 - 4.00	80	80
BH01	Run 3	4.00 - 5.00	100	87
(Box 1)	Run 4	5.00 - 5.50	0 (NR)	0
	Run 5	5.50 - 6.20	0 (NR)	0
	Run 6	6.20 - 6.40	0 (NR)	0
	Run 7	18.53 – 19.0	85	74
	Run 8	19.0 – 20.0	100	84

NR - No Recovery

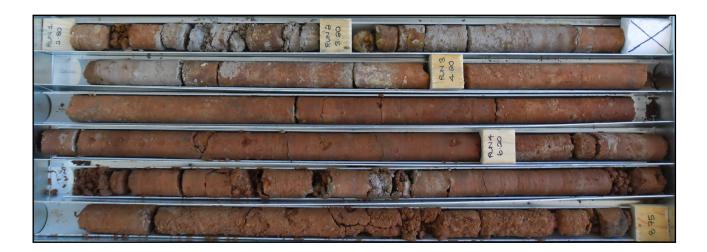


	Run	Depth (m)	Recovery (%)	RQD (%)
BH 04	Run 1	12.00 – 13.10	100	100
(Box 1)	Run 2	13.10 – 15.20	100	100
(BUX I)	Run 3	15.20 - 16.00	100	100
	Run 4	16.00 – 18.10	100	0





	Run	Depth (m)	Recovery (%)	RQD (%)
BH04	Run 4	12.00 – 13.10	100	100
(Box 2)	Run 5	18.10 – 19.30	100	100
	Run 6	19.30 – 20.00	100	100



	Run	Depth (m)	Recovery (%)	RQD (%)
BH05	Run 1	2.80 - 3.20	100	0
(Box 1)	Run 2	3.20 - 4.20	100	100
	Run 3	4.20 - 6.20	98	75
	Run 4	6.20 - 9.20	93	0





BH05 (Box 2)	Run	Depth (m)	Recovery (%)	RQD (%)
	Run 4	6.20 - 9.20	93	0
(B0X 2)	Run 5	9.20 - 10.00	75	0



	Run	Depth (m)	Recovery (%)	RQD (%)
BH06	Run 1	8.00 - 9.20	96	96
(Box 1)	Run 2	9.20 - 10.20	100	100
	Run 3	10.20 - 12.00	86	86





	Run	Depth (m)	Recovery (%)	RQD (%)
BH07	Run 1	7.80 - 9.20	96	95
(Box 1)	Run 2	9.20 - 12.20	98	98
	Run 3	12.20 – 13.80	100	100



	Run	Depth (m)	Recovery (%)	RQD (%)
	Run 3	12.20 – 13.80	100	100
BH07	Run 4	13.80 – 15.20	99	99
(Box 2)	Run 5	15.20 – 16.70	97	97
	Run 6	16.70 – 18.20	100	98
	Run 7	18.20 - 20.00	72	70



8		CORE LOSS	88 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	(
1.	•		· · · ·	
	·	Contraction of the local division of the loc	ż	• 1
	•	-	1	
	<u>.</u>	I ELER MARINE		15

BH07	Run	Depth (m)	Recovery (%)	RQD (%)
(Box 3)	Run 7	18.20 – 20.00	72	70



	Run	Depth (m)	Recovery (%)	RQD (%)
	Run 1	2.10 - 3.20	100	100
вило	Run 2	3.20 - 6.20	73	0
BH08	Run 3	6.20 - 7.00	100	0
(Box 1)	Run 4	7.00 - 8.00	0 (NR)	0
	Run 5	8.00 - 8.50	90	0
	Run 6	8.50 - 9.20	93	0



the second		1-150	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	t d	00
No. 9	20		A Burner and		0. 10.
					-
T	and the second s		7		-
7					
3					

BH08	Run	Depth (m)	Recovery (%)	RQD (%)
	Run 6	8.50 - 9.20	72	70
(Box 2)	Run 7	9.20 - 10.00	100	0



	Run	Depth (m)	Recovery (%)	RQD (%)
	Run 1	2.20 - 3.20	100	100
BH11	Run 2	3.20 - 5.20	100	95
(Box 1)	Run 3	5.20 - 6.20	100	100
	Run 4	6.20 - 7.00	75	75
	Run 5	7.00 - 9.20	100	98





BH11	Run	Depth (m)	Recovery (%)	RQD (%)
(Box 2)	Run 5	7.00 - 9.20	100	98
(B0X 2)	Run 6	9.20 - 10.00	56	0



	Run	Depth (m)	Recovery (%)	RQD (%)
BH12	Run 1	2.20 - 3.20	100	100
	Run 2	3.20 - 6.20	97	0
(Box 1)	Run 3	6.20 - 7.00	100	0
	Run 4	7.00 - 9.20	76	0





BH12	Run	Depth (m)	Recovery (%)	RQD (%)
(Box 2)	Run 4	7.00 - 9.20	76	0
	Run 5	9.20 - 10.00	100	0

Appendix D Test Pits



D

42626683/01/01

Appendix D

D.1 Test Pit Logs

IRS Aust	raša Pty. Ltd.			Phon	a: (07\ 31	243 2111	Project	No			Project	Reference			
Fax: (07) 3243 2199 Excavator Contractor Hills Mass Contracting Excavator Type: Logged By: CD Hitachi Checked By: 200 LC Date Started:						Project No.: 426266833 Relative Level: 341 mAHD Coordinates: 7430598 mN 452197 mE Permit No:				Project Reference: Alpha Coal Project - Out-Of-Pit Tailings Storag Facility Client: Hancock Coal					
															-14 LEVEL (m RL) -14
.941-	Sandy SILT moist, organ Sandy SILT grained, mo	ML); low p	OIL) Masticity,	reddish	brown,										
340	with some r Sandy GRA subangular, coarse grain	VEL (GW); well graded	fine to c	oarse g	n yellow	nd subro bands,	bunded I sand is t	o — — fine to						BS @ 1.0m TP01-01	
339														BS @ 2.0m TP01-02	
338	Clayey SAN brown, with gravel, mois MC:9.3%, L MC:9.8%, 3	a trace of to st, medium o L:31%, PL:	o some f dense to	ine to m dense	edium g	grained s	ubangu	and lar		3				BS @ 3.0m TP01-03 BS @ 3.4m	
	becomes fir becomes de	ie to mediu inse IE: low to vi	erv.low.s	trenath	comple	telv wea	thered	ight						TP01-04	
337 336	Qrey motilec	l orange, fir	ne graine	d (Colin	lea San	dslone)				4					
					TEST	PIT S	ECTIC)N						TEST PIT TERMIN	NATED AT;
		-												Target Depth Refusal Flooding Caving/collapse	
·														SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sample	BS TS e DS

URS Aust	ralia Pty. Ltd.				3243 211 3243 219		ct No.:				Reference:		t - Out-Of-Pit Tai	lings Storag
Excavato	or Contractor H	lls Mass Cont		ax. (07)	5245 2 15	-	426	26683			a Obai i	TOJECI	Facility	iniga otorag
Excavato Hitachi 200 LC	и Туре:	Logged By: Checked By Date Started Date Finishe	i: 21-7-				dinates: 1	353 mAHD 7430596 m 152947 mE		Client:		Har	icock Coa	
REDUCED. LEVEL (m RL)	DES	CRIPTION	OF STR	ATA				GRAPHIC LOG	DEPTH (m)	SHEAR VANE STRENGTH (KP3)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENT
-353-	Silty SAND (rootlets (TOF	SM); fine to me SOIL)	dium grair	ied, red	dish brov	vn, mols	st,		0-					
250	SAND (SW); moist, loose	fine to mediun Residual)	n grained,	reddish	brown, w	ith a tra	ace of silt,						BS @ 0.6m TP02-01	
-352	Silty SAND (Scoarse graine	SM); fine grain d subrounded	ed, reddist gravel, dr	brown, /, loose	with sor	ne med	um to						BS @ 1.1m TP02-02	
-351); medium to c		and rea	dich bro				2					
-350	•	SM); fine to me arse grained s	-						3				BS @ 3.0m TP02-02	Bucket Rippir
·349	SANDSTON	velly (fine to co ; extremely loo ne to medium	v strenath.	comole	telv wea	thered.	reddish —		4				BS @ 4.4m TP02-04	Bucket Rippir
	END OF TES	T PIT at 4.4m	(Refusal)						Ē				TP02-04	
348									5					
		·		TES	r PIT S	ECTI	ON		•				TEST PIT TERMI	NATED AT:
													Target Depth Refusal Flooding Caving/collapse	
												 	SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sample	BS TS e DS

	alia Pty. Ltd. r Contractor	Hills	Mass (Contr		Fax		243 211 243 219		Project		16266	83			Project I Alpha	Reference a Coal	: Projeci	t - Out-Of-Pit Tai Facility	lings Storaç
Excavator Hitachi 200 LC	г Туре:		Logged Checke Date St Date Fir	d By: arted:	R 20	D JR 6-7-11 6-7-11			¢			74298		N		Client:		Har	icock Coa	I
LEVEL (m RL)	D	ESCF	RIPTIC	DN C)F ST	TRA'	ГА						GRAPHIC LOG	DEPTH (m)		SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENT
-322-	SAND (S trace of s becomes Sandy Cl sand is fi gravel, m MC:11.49 OMC:14.	pate b DAY (C ne to n oist, st %, LL:4	st, very rown, d i); medi redium iff to ve :3%, PL	ium p grain grain :16%	lasticil ed, wil	lets (A ty, bro th a tr sidual)	win mo ace of	n) Ittled ya fine to	ellow	r and re dium gr	ed, rained	_			_ر 1				BS @ 0.3m TP03-01 BS @ 1.0m TP03-02	·
-320	becomes becomes SANDST grey moti (Coliniea	dry ONE; V	very low	to los	w strei	ngth, l	highly	to com	plete	aly wea	thered,				2				BS @ 1.5m TP03-03	
-319	END OF	TESTI	PIT at 2	2.5m (Refus	al)									8					
-318															4					
-317															5					
						1	rest	PIT	SE	стю	N								TEST PIT TERMI	NATED AT:
																		,	Target Depth Refusal Flooding Caving/collapse	
																			SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sample	BS TS e DS

FA: Peak Friction Angle C: Cohesion

URS Aus		Å u				<u> </u>	Phone	: (07) 3	243 21		oject N	lo.:				Project F				inge Stores
Excavat	or Contr	actor i	Hills I	Mass	Cont	ractin		= (07) \$	243 21	99		42	626683			Alpha	i Coal r	rojeci	t - Out-Of-Pit Tail Facility	ings storag
Excavat Hitachi 200 LC	or Type:		C C	.ogged Checke Date S Date Fi	ed By: tarted	F : 2	2D XJR 6-7-11 6-7-11			C	elative oordina ermit N	ites:	326 mAH 7429846 451447 r	mΝ		Client:		Har	icock Coa	I
REDUCED LEVEL (m RL)		DES	SCR	IPTIC	ON C	DF S	TRA	TA		<u>, , , , , , , , , , , , , , , , , , , </u>			GRAPHIC LOG		DEPTH (m)	SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENT
-326		SAND k, low p 8.8%, L C:9%, 3 /ey SAN ige, low	lastic L:219 7% F ID (S	ity, m %, PL: ines, C); fin	oist, k :11%, <u>K=8 x</u> e to n	PI:10 10-10 1ediun	rootlet %, LS 0m/s, 0 n grain	s (TOI :3.0*% 2'=8.8 ied, w	PSOIL) 5, EC:5 kPa, pl	, MDI hi'=34	D:2.05t .7°	/m3,			-0				BS @ 0.3m TP4-01	
-325		omes gr IDSTON					-								-1				BS @ 1.1m TP4-02	·
-324	\grey \San	mottled dstone) OOF TE	d yelk	wan	d red,	fine to	o medi	um gr	ained (Colini	ea		/		-2					
-323															-3					
322		·													-4					• •
-321															-5					
							-	rest	PIT	SEC		1							<u>TEST PIT TERMI</u>	NATED AT:
																			Target Depth Refusal Flooding Caving/collapse	
																			SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sample	BS TS e DS

ak Friction Angle Q,

URS Aust	ralia Pty. Ltd.					243 2111 243 2199	Projec							Reference a Coal I		t - Out-Of-Pit Tail	ings Storag
≘xcavato	r Contractor H	IIIs Mass Cont	ractin	g				4	2626	683						Facility	
Excavato Hitachi 200 LC	и Туре:	Logged By: Checked By: Date Started Date Finishe	R : 2	D KJR 1-7-11 1-7-11				və Leve linates: t No:	742	mAHD 9846 m 945 mf	N		Client:	******	Har	icock Coa	
KEDUCED	DES	CRIPTION	DF S	TRA	ΤΑ					GRAPHIC LOG			SHEAR VANE STRENGTH (kPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENT
-340-		SM); fine to me potlets (TOPSC		grained	d, dark	c grey to l	olack, n	noist,		*		0—					
-339	loose to med MC:7.8%, LL	SM); fine to me ium dense (Re :15%, PL:12%,	sidual) PI:3%	5, LS:0).5%, (36% Fine	s					1				BS @ 0.6m TP05-01	
559	plasticity, mo	D (SC); fine to n ist, loose to me grained, unifo	dium d rm, ma	dense ottled I	ight gr	rey and re	ed							1		BC @ 4.7m	
-338	K=4 x 10-10	.L:29%, PL:13% n/s, C'=12.6kPa ttled grey, red a	a, phi'=	=29.1°		%, EC.9,	41% [nes,				2		2		BS @ 1.7m TP05-02	
	SANDSTON yellow, fine to MC:12.1%, 1	E; medium strei medium grain 9% Fines	ngth, n ed (Co	nodera Ninlea	ately w Sands	eathered stone)	l, grey i	nottled	_ /							BS @ 2.8m TP05-03	Bucket Rippin
-337	END OF TES	ST PIT at 2.9m	(Refus	al)								3			-		
·336												4					
-335												5					
				•	rest	PIT S	ECTIO	ON								TEST PIT TERMIN	NATED AT:
																Target Depth Refusal Flooding Caving/collapse	
									•							SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sample	BS TS e DS

FA: Peak Friction Angle C: Cohesion

URS Austr	_			.	<u> </u>		Fax		243 21 243 21		roject l		2626	683			Project Alph	Refe a C	rence: oal F	rojec	t - Out-Of-Pit Facility	Tailir	ngs Storage
Excavator Excavator Hitachi 200 LC			Li C D	ogged hecke ate Si		C R 20				С	telative coordination	ates:	7429		N		Client:			Har	ncock Co	oal	
C REDUCED	-	DES	CRI	PTI	ON C)F ST	[RA]	A						GRAPHIC LOG			SHEAR VANE STRENGTH (KPa)	POCKET	PENETROMETER (KG/CM [*])	DCPT (Blows/100mm)	SAMPLING AND OTHE TESTING	R	COMMENTS
-346-	(TÓł Silty dens	PSOIL) SAND (e (Alluv	AND (SM); fine grained, greyish brown, d (Alluvium) LAY (CL-ML); medium plasticity, grey mo ome fine grained sand, moist, firm to very AND (SM); fine to medium grained sand, ed, yellow, moist, dense							ose to	medi	-				1					BS @ 0.5m TP08-01		
-345	Silty	SAND (SAND (SM); fine to medium grained sand ed, yellow, moist, dense STONE; extremely low strength, complet													I			2.5		BS @ 1.3m TP06-02		
-344			CLAY (CL-ML); medium plasticity, grey mo ome fine grained sand, moist, firm to very SAND (SM); fine to medium grained sand, ed, yellow, moist, dense													2			4.5		BS @ 2.0m TP06-03	ł	
-343		fine to medium grained (Coliniea Sandsto								ather	ed, ye	lowisł) 			3					BS @ 3.7m TP06-04_	1	
-342 -341	END	NDSTONE; extremely low strength, completely y, fine to medium grained (Coliniea Sandstond D OF TEST PIT at 3.7m (Refusal)														4					1208-04		
							٦ .	EST	PIT	SEC	СТІОІ	N						•	_		<u>TEST PIT TE</u>		
		,																		· .	Target Depth Refusal Flooding Caving/colla		
														- - -							SAMPLE TYF Bulk Sample Tube Sample Disturbed Sa)	BS TS DS

JRS Austr						Fax		243 2111 243 2199	Proje		262668	83		Project Alph	Referenc Ia Coal	e: Projec	t - Out-Of-Pit Tai Facility	lings Stora
Excavator Excavator Hitachi 200 LC		ictor F	Logg Chec Date	s Cont ed By: ked By: Started Finishe	C F	- 3D 3JR 6-7-11				ve Level: linates: t No;		95 mN	l 	Client:		Hai	ncock Coa	
LEVEL (m RL) 15 LEVEL (m RL) 26-			CRIPT									GRAPHIC LOG	DEPTH (m)	SHEAR VANE STRENGTH (kPa)	POCKET PENETROMETER	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENT
-320	becc	a trace mes ye	of silt, dr	y to mo	ist, ve	ry loo:	≽e to ko	l graded, lose, roo ained, w tv. moist	lets (A	ed, Iuvium)					2.5 to 3	5	BS @ 0.35m TP7-01 BS @ 1.5m	
-319	\ to de \ SAN \weat \bedd	nse (Re DSTON hered, g led (Col	esidual) E: low to	mediu led red	m stre and y	ngth, i ellow,	noder	ately to s medium	iohtly]	<u></u>	2				BS @ 1.5m TP7-02	
318													3					
-317 -316													4 4 5					
							rcer				•						TEST PIT TERMI	NATED AT:
						-		PIT S							· ·		Target Depth Refusal Flooding Caving/collapse	
																	<u>SAMPLE TYPE:</u> Bulk Sample Tube Sample Disturbed Sampl	BS TS e DS

^{+:} Curling occurred EC: Emerson Clas FA: Peak Friction Angle C: Cohesion IVI): IVii

		stralia I									JG	ГРО8	
	ralia Pty. Ltd. 	lls Mass Contra	Fax:	(07) 3243 2111 (07) 3243 2199	Project		626683		Project I Alpha	Reference: A Coal F	roject	- Out-Of-Pit Tail Facility	ings Storag
Excavato Hitachi 200 L.C	r Туре:	Logged By: Checked By; Date Started: Date Finished:	CD RJR 26-7-11 26-7-11			ates:	329 mAHD 7429096 ml 451448 mE	4	Client:		Han	cock Coa	
CEVEL (m RL)	DESC	CRIPTION OF	- STRAT	A .			GRAPHIC LOG	DEPTH (m)	SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM [*])	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENT
-329- -328	rootlets (Alluv becomes grai subangular) Sandy GRAV to subrounder MC: 11.5%, 9 SANDSTONE	velly (fine to medi EL (GW); mediur d, brown, with sor	ium grained m to coarse me silt, dry, strength, hi	and subround grained, well dense ghly weathere	ded to graded, a	angular						BS @ 0.4m TP08-01 BS @ 0.9m TP08-02	
327	END OF TES	T PIT at 1.5m (R	efusal)					2	-				
326				·				3					
325								4					
324								5					
			TI	EST PIT S	ECTIO	N ¹						TEST PIT TERMIN	NATED AT:
												Target Depth Refusal Flooding Caving/collapse	
											· ·	SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sample	BS TS DS

JRS AL	ustrali	ia Pty.	Ltd.								243 21		roject	No.:					Project	Reference				4
Excave	ator C	Contra	ctor	Hills	Mas	is C	Contr	acting		: (07) 3	243 21	99		42	2626	683			Alph: 	a Coal	Projec	t - Out-Of-Pit Tail Facility	lings S	torag
Excava Hitach 200 LC	ı₽	Гуре;		-		kec Sta	i By: arted:		JR 2-7-11			с		ates:	7429	mAHD 9097 m 195 mB	N		Client:		Har	ncock Coa]	
C REDUCED)F S								GRAPHIC LOG			SHEAR VANE STRENGTH (^{kPa)}	POCKET PENETROMETER	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COM	MENTS
•334	+	becc SAN weat (Coli	DST DST hereo	light t	very	i, no low wn, ì	to ior	dry w stre	ngth, i	highly	k brov to mod o med	derate						0				BS @ 0.2m TP09-01 BS @ 0.7m TP09-02		
-333	3	END	10.3 OF 1	TEST	PIT a	at 0.	.9m (Refus	al)									1		-				i
-332														•				2						
-330										•								4						
										rest	PIT	SEC	стю	N						I		TEST PIT TERMI	NATED	AT:
		,								- 												Target Depth Refusal Flooding Caving/collapse		
																			•			<u>SAMPLE TYPE:</u> Bulk Sample Tube Sample Disturbed Sampl		BS TS DS

FA: Peak Friction Angle C: Cohesion

	ralia Pty. Ltd. r Contractor Hill	s Mass Contra	Fax	: (07) 3243 211 : (07) 3243 219		ct No.: 42	262668	3		Project Alph	Reference: a Coal F	Projec	t - Out-Of-Pit Tai Facility	lings Storag
Excavato Hitachi 200 LC		Logged By: Checked By: Date Started: Date Finished	CD RJR 26-7-1			dinates;	335 mA 742909! 452949	5 mN		Client:		Har	icock Coa	1
C REDUCED		RIPTION O					GRAPHIC LOG		DEPTH (m)	SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
-334	SAND (SW); fil loose, rootlets SAND (SW); fil loose, roots, fri becomes silty, SAND (SW); fil yellow, moist, r SANDSTONE; brown mottled Sandstone) SANDSTONE; yellow, fine to r	TOPSOIL) ne to medium g able (Residual MC: 4.2%, 35% ne to medium g nedium dense extremely low red and yellow, low strength, r	grained, lig % Fines grained, da strength, c , fine to me	ht grey, with a rk brown moti ompletely wea dium grained	Itrace of Ited red a athered, (Colinie	f silt, dry, and dark a			- 1				BS @ 0.6m TP10-01 BS @ 1.0m TP10-02	Bucket Rippin
-333	becomes medi MC: 11.7%, 10 SILTSTONE; n thinly bedded	% Fines		veathered, gro	ay mottle	d red,			-2 -				BS @ 2.0m TP10-03	
-331 -330	END OF TEST	PIT at 3.5m (F	Refusar)				××××××		-4 -5				BS @ 3.2m TP10-04	
					SECTI						· · · · · · · · · · · · · · · · · · ·		TEST PIT TERMI Target Depth Refusal Flooding Caving/collapse SAMPLE TYPE:	
													Bulk Sample Tube Sample Disturbed Sampl	BS TS e DS

	aša Pty. Ltd. r Contractor Hill	s Mass Contra	Phone: (07) 32 Fax: (07) 32		Project N		26683		Project Alph	Reference: a Coal F	Project	- Out-Of-Pit Tai Facility	lings Storag
Excavator Hitachi 200 LC		Logged By: Checked By: Date Started: Date Finished	CD RJR 22-7-11		Relative Coordina Permit N	tes: 7 4	44 mAHD 429137 m 53695 mE	N	Client:		Han	icock Coa	
REDUCED	DESC	RIPTION O	F STRATA				GRAPHIC LOG	DEPTH (m)	SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM ¹)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
-344-	(TOPSOIL) SAND (SP): fir	e to medium o	rained, light brown rained, poorly grad w rootlets (Residu:	ded, ligh							-	BS @ 0.2m TP11-01	
-343			strength, complete grained (Coliniea s oderately weather		nered, gre ne)	<u>y</u> — — ·						BS @ 1.2m TP11-02	
-342	SILTSTONE; r	nedium strengt	h, moderately wea	ithered,	grey, sand	iy — —	× × × × × × × × × × × ×					BS @ 2.0m TP11-03	
-341								3					
-340 -339	•							4					
	-		TEST		ECTION			F				TEST PIT TERMI	NATED AT:
												Target Depth Refusal Flooding Caving/collapse	
		·										SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sample	BS TS e DS

FA: Peak Friction Angle C: Cohesion

JRS Austr	ralia Pty. Ltd.						• •	3243 211 3243 219		roject		26266	202				Reference a Coal		t - Out-Of-Pit Ta	ilings Storage
Excavator	r Contractor	Hills	s Mass	Contr	acting]					42	26265	583						Facility	
Excavator Hitachi 200 LC	r Type:		Logged Checko Date S Date F	ed By: tarted:	20	D JR 3-7-11 3-7-11			С		ates:	: 321 r 7428 4506		N		Client:		Hai	ncock Coa	I
LEVEL (m RL)	D	ESC	RIPTI	ONC	DF ST	ſRA	ſA						GRAPHIC LOG			SHEAR VANE STRENGTH (kPa)	POCKET PENETROMETER	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
-321-	Silty SAI plasticity	, drý, l	oose to	mediu	ım der	nse (A	lluviur	n)			ticity.	-							BS @ 0.3m TP12-01	
-320	Sandy C sand is f MC:11% OMC:10														1				BS @ 1.2m TP12-02	
-319	SANDST weather Sandsto	ed, gre	very los y mottle	v to lo ed bro	w strei vn, fin	ngth, i e to n	esidu aediun	al to col n graine	mplei xd (C	lely olinlea	 l				2				BS @ 2.5m TP12-03	
318	END OF	TEST	PIT at	2.8m (Refus	al)		-							3					
-317															4					• •
·316												,			5					
I						•	ESI	PIT (SEC	TIO	N								TEST PIT TERM	INATED AT:
														-					Target Depth Refusal Flooding Caving/collapse	
		-																	<u>SAMPLE TYPE;</u> Bulk Sample Tube Sample Disturbed Samp	BS TS le DS

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URS Austr	ralia Pty. Ltd.		F	2hone: (07)	3243 2111 3243 2199	Project N	lo.:			Proj	ect R	eference:	roleof	- Out-Of-Pit Tai	linne Qf	orea
Excavato	r Contractor H	lls Mass Cor	ntracting		5245 2188		426	26683			μια	ooar r	rojeci	Facility	ninga Ot	Jiag
Excavato Hitachi 200 LC	г Туре:	Logged By Checked B Date Starte Date Finish	y: RJ ed: 26				tes: 7 4	27 mAHC 428343 n 51449 ml	۱N	Clier	nt:		Han	cock Coa]	
LEVEL (m RL)	DES	CRIPTION	OF ST	RATA				GRAPHIC LOG	DEPTH (m)	SHEAR VANE	STRENGTH (KPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMM	ENTS
-327-	SAND (SW); dry, kosse, ro SAND (SW); some silt to s MC: 3.4%, 29 SANDSTONI weathered, ro Sandstone) SANDSTONI pale red and END OF TES	ots (TOPSOII fine to mediu lity, dry, medi % Fines ; extremely k d mottled yel ; medium str speckled blac	m graine um dense ow to low low brow ength, m k, fine to	d, well gra e (Alluviun strength, n, fine to r oderately v medium c	ded, light n) residual to nedium gr weathered	complete ained (Col	h h iniea							BS @ 0.4m TP13-01		
-325			n (rveruse	'n					2				·			
-324									3							
-323									4						•	
-322				•					5							
				TES	T PIT S	ECTION								TEST PIT TERM	NATED A	<u>.T:</u>
														Target Depth Refusal Flooding Caving/collapse		
														SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sampl	e	BS TS DS

FA: Peak Friction Angle C: Cohesion

	alia Pty. Ltd. 	s Mass Contra	Fax	: (07) 3243 2111 : (07) 3243 2199	Project N		26683				eference: Coal P	roject	- Out-Of-Pit Tail Facility	lings Storage
Excavator Hitachi 200 LC	т Туре:	Logged By: Checked By: Date Started: Date Finished:	CD RJR 26-7-11 26-7-11			ates: 7 4	38 mAHE 428346 n 52196 ml	'nN		Client:		Han	cock Coa]
REDUCED LEVEL (m RL)	DESC	RIPTION OF	STRA	ΓΑ	<u></u>		GRAPHIC LOG	DEPTH (m)		SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM [*])	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
-338-	loose, rootlets Silty SAND (S rounded, redd M.C: 4.5%, 29	W); fine to medi sh brown, dry, k	um graine oose (Alluv	d, well graded, s /ium)	subround	ed to)				BS @ 0.3m TP14-01	<u>, , , , , , , , , , , , , , , , , , , </u>
-337	dry, medium d SANDSTONE yellow red bro	own, sand is fin ense very low streng wn, fine to mediu o medium streng	th, comple	tely weathered	grey mo	ttled							BS @ 0.8m TP14-02	
-336 -335		PT at 1.3m (R												
-334					·				ţ					
-333		·	·						5	•	-			
				EST PIT S	ECTION	1							TEST PIT TERMI	NATED AT:
												· · · · · · · · · · · · · · · · · · ·	Target Depth Refusal Flooding Caving/collapse	
													SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sampl	BS TS e DS

	raša Pty. Ltd. r Contractor Hi	lls Mass Contrac	Phone: (07) 324 Fax: (07) 324 ting		Project i		626683			Project F Alpha	teference: Coal F	roject	- Out-Of-Pit Tail Facility	ings Storage
Excavato Ilitachi 00 LC		Logged By: Checked By: Date Started: Date Finished:	CD RJR 22-7-11			ates:	344 mAHD 7428346 m 452947 mE	N		Client:		Han	cock Coa	
C: REDUCED		CRIPTION OF			, 1		GRAPHIC LOG	DEPTH (m)		SHEAR VANE STRENGTH (kPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
-344-	rootlets (TOP Silty SAND (S moist, mediur MC:7.7%, EC	SOIL) SM); fine to mediu n dense to dense ::5, MDD:1.91t/m3	ained, light brown, m grained, yellow , friable (Residual) a, OMC:11.5%, 50 addish brown, mois	to light % Fine	brown, c					-			BS @ 0.6m TP15-01	
		; very low strengt medium grained (T PIT at 1.7m (Ta	h, completely wea Coliniea Sandston Irget Depth)	thered ie)	, pale yel	low to							BS @ 1.6m TP15-02	
-342														
341								3						
340								4						·
339								5	;					
	<u>,</u>		TEST	PIT S	ECTIO	N		•					TEST PIT TERMI	NATED AT:
													Target Depth Refusal Flooding Caving/collapse	
													SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sampl	BS TS e DS

U	RS Au	stralia	l Pty	/ Ltd				TE	ST P	PIT L(DG .	TP16	Sheet 1 of 1
	ella Pty. Ltd.	ills Mass Con		hone: (07) 3243 211 Fax: (07) 3243 219			26683		Project Alph	Reference: a Coal F	Project	- Out-Of-Pit Ta Facility	ilings Storage
Excavator Excavator Hitachi 200 LC		Logged By: Checked By Date Starte Date Finish	CD r: RJI d: 22-		Relative L Coordinat Permit No	es: 7 4	47 mAHD 428345 ml 53697 mE	N	Client:		Han	cock Coa	I .
REDUCED LEVEL (m RL)	DES	CRIPTION	OF STI	RATA			GRAPHIC LOG	DEPTH (m)	SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
-347-	(Topsoil) Sand (SW)	; fine to mediur	m grained	I, dark brown, moi	st, loose (Alh	uvial)							Easily excavated from GL to 1.5m
-345	plasticity, v	ery moist, loose	to mediu	light brown, with im dense (Residua dense to very der	11)	N						BS @ 1.5m TP16-01	Low to moderate resistance from 1.5m to 2.1m
	mottled yell Sandstone) becomes ve silty	w, red and bro	wn, fine ti , highly w	th, completely wear o medium grained eathered, fine to r	(Colinlea					:		BS @ 2.8m TP16-02	Difficult to excava from 2.7m to 2.9r
-344		51 FTI @ 2.01	T (TGIUSA	. .			· .						
-343 -342													•
				TEST PIT :								TEST PIT TERM Target Depth Refusal Flooding Caving/collapse	
										-		SAMPLE TYPE; Bulk Sample Tube Sample Disturbed Samp	BS TS le DS

of HRS Australia Phy I td ţ ŝ 4 į Ne example TUCIONDC of working of polymer TESTPIT ALPHACOAL.GPJ GEOTECH.GDT 13/10/11 This

	RS Aus			(07) 3243 2111	Project No.:				Reference:		FP17	
	or Contractor Hill	s Mass Contra	Fax:	(07) 3243 2199		2626683		Alpha	a Coal F	roject	- Out-Of-Pit Tail Facility	lings Stora
Excavato Hitachi 200 LC	эг Туре:	Logged By: Checked By: Date Started: Date Finished:	CD RJR 26-7-11 26-7-11	•	Relative Leve Coordinates: Permit No:	: 321 mAHD 7427597 m 450697 mE	N	Client:		Han	cock Coa	l
LEVEL (m RL)	DESC	RIPTION O	F STRAT	Ä		GRAPHIC LOG	,DEPTH (m)	SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM [†])	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENT
-321-	of silt, moist, ro SAND (SVV); fi low plasticity, r	pollets (TOPSC ne to medium o noist, loose (Al	011.) grained, ligh luvium)	t brown, with		-					BS @ 0.5m TP17-01	
-320	Clayey SAND yellow and red	SC); fine to me with some silt,	edium grain , moist, mec	ed, weil grade lium dense (F	d, grey mottled tesidual)							
-319												
-318	SANDSTONE; grey motiled ye becomes medi	slow, fine to ma	edium grain	ed, silty (Colir	ilea Sandstone)							
-317 -316	END OF TEST	<u> </u>	· ·									
			Т	EST PIT S	ECTION						TEST PIT TERMI	NATED AT:
						· · · · · · · · · · · · · · · · · · ·					Target Depth Refusal Flooding Caving/collapse	
											SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sampl	BS TS e DS

FA: Peak Friction Angle C: Cohesion

JR\$ Aust	ralia Ply, Ltd.							3243 21 3243 21		roject i		2626	683			Project Alph	Reference a Coal	e: Proje	ct - Out-Of-Pit Tai Facility	ilings Si	torag
Excavalo Excavalo Hitachi 200 LC	r Contractor	Hills	Mass Logged Checke Date St Date Fi	l By: ed By: tarted	(F	9 CD RJR 26-7-1 26-7-1			C	elative oordin ermit N	Level ates:	: 331 742	mAHE 7596 n 448 ml	ηN		Client:		Ha	ncock Coa	l	<u>.</u>
REDUCED LEVEL (m RL)	D	ESCI	RIPTIC	ON (OF S	TRA	TA		.				GRAPHIC LOG			SHEAR VANE STRENGTH (kPa)	POCKET PENETROMETER	(KG/CM)) DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	сом	/ENT:
-331- -330	SAND (S (TOPSO Sandy G subround dense (A SANDST brown m GRAVEL dense) (f SANDST \moderate	IL) RAVEI led to luviun ONE; ottled y ; fine t Coline	(GP); subangi n) medium veliow a o medium a Sands	fine t ular, t nd re um gr stone)	o med prown ngth, i d, fine alned,)	ium g with residu to ma brow	rained a trace al to co edium n mott	gravel of silt, pomplete grained ed yell	, pool mois ely we d (Sai low ar	ily grad athere adhered ad red, to	lium sd, very	(((((0,0)))))))))))))))))))))))))))))))			0				BS @ 0.3m TP18-01		
-329	grained END OF	•		• •		•						 			2						
-328															3						
-327								·							4						
326									-4						5						
							TEST	PIT	SEC	TIO	N .								TEST PIT TERM	NATED	<u> 4T:</u>
			:											-					Target Depth Refusal Flooding Caving/collapse		
				_															<u>SAMPLE TYPE:</u> Bulk Sample Tube Sample Disturbed Samp	le	BS TS DS

FA: Peak Friction Angle C: Cohesion

	rə Au:	stralia I	Pty Ltd							IT L(JG	IP19	
	alia Pty. Ltd. Contractor Hi	Ils Mass Contra	Phone: (07) 3 Fax: (07) 3 cting		Project No.:	2626683			Project F Alpha	Reference: Coal P	roject	- Out-Of-Pit Tai Facility	lings Stora
ixcavator Iltachi 00 LC	Туре:	Logged By: Checked By: Date Started: Date Finished:	CD RJR 26-7-11 26-7-11		Relative Level Coordinates: Permit No:		nN		Client:		Han	cock Coa	
REDUCED LEVEL (m RL)	DESC	CRIPTION OF	STRATA			GRAPHIC LOG	DEPTH (m)		SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/cm ¹)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMEN
.335-	dry, loose, ro	ine to medium gr otlets (TOPSOIL) ; very low to low eathered, grey to	strength comple	telv wea	thered to	-		,			,	BS @ 0.4m TP19-01	
334-	Sandstone) becomes mee l weathered, M	dium to high stree IC:7.2%, LL:27% T PIT at 1.0m (R	ngth, moderately PL:18%, PI:9%	weather	ed to slightly	/						BS @ 0.9m TP19-02	
333					· · ·			2					
332								3					
331								1					
330								5					
			TEST	PIT S	ECTION				.			TEST PIT TERMI	NATED AT:
												Target Depth Refusal Flooding Caving/collapse	
												SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Samp	B Ti le D

FA: Peak Friction Angle C: Cohesion

U	RS Aus	stralia I	Pty L	td				TE	ST P	IT LO	DG '	TP20	Sheet 1 of 1
	aša Pty. Ltd. r Contractor Hil	is Mass Contrac	Fax:	(07) 3243 2111 (07) 3243 2199	Project N		26683		Project Alph	Reference: a Coal F	rojec	t - Out-Of-Pit Tail Facility	ings Storage
Excavator Hitachi 200 LC	r Туре;	Logged By: Checked By: Date Started: Date Finished:	CD RJR 22-7-11 22-7-11		Relative L Coordinat	les: 74	44 mAHD 427597 m 52949 mE	N	Client:		Har	icock Coal	
LEVEL (m RL)		RIPTION OF					GRAPHIC LOG	DEPTH (m)	SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
-344-		ine to coarse gra a trace of slit, dr ne grained, dark a (Alluvium)				iry,						BS @ 0.4m TP20-01	
-343	\grained (Colin	; medium streng lea Sandstone)		tely weathered	, grey, fine	/	·····		<u> </u>	<u> </u>			Bucket Ripping
	END OF TES	ſ PIT at 1.1m (R	efusal)										
-342								– 2					
-341		•							-				
-340		•				·		4					
-339								5. 5. 					
			т	EST PIT S	ECTION							TEST PIT TERMI	NATED AT:
												Target Depth Refusal Flooding Caving/collapse	
					· ·							<u>SAMPLE TYPE;</u> Bulk Sample Tube Sample Disturbed Sample	BS TS DS

FA: Peak Friction Angle C: Cohesion

U	RS	Au	stra	lia	Pt	y L	_td	•					T	ES				TP21	
JRS Austr			lls Mass	Contr		Fax		243 2111 243 2199	Projec		2626	683				Reference a Coal I		t - Out-Of-Pit Tai Facility	lings Storage
Excavato Hitachi 200 LC	г Туре;			•	22	D JR 2-7-11 2-7-11				ve Leve inates: t No:	7427	mAHD '596 m 94 mE	N	•	Client:	<u>.</u>	Har	ncock Coa]
LEVEL (m RL)		DES	CRIPTI	ON C	DF ST	[RA]	TA					GRAPHIC LOG	DEPTH (m)		SHEAR VANE STRENGTH (KP2)	POCKET PENETROMETER	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
-356- -355	(TO) Sand mois	PSOIL) By SILT (It, stiff (F	ML); dari ML); low tesidual) low and r	plastic	ity, red	ddish I				ined,				1				BS @ 0.6m TP21-01	
-354	SILT	STONE; ev. fine	tiled red High stro arained s	ength, and (C	moder olinlea	ately Sanc	weathe	red, red	mottled	i yellow	×××	···· ···· ···· ···· ···· ···· ·····		2				BS @ 1.6m TP21-02 BS @ 1.8m TP21-03	Bucket Rippin
-353					·									3					
-352 -351			·											1		-			
						٦	rest	PIT S	ЕСТІС	DN								TEST PIT TERMI	NATED AT:
							-											Target Depth Refusal Flooding Caving/collapse	
																		SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sampl	BS TS e DS

	ralia Pty. Ltd. r Contractor H	ills Mass Contr	F	one: (07) 324 Fax: (07) 324		Project		626683			Project F Alpha	teference: Coal F	roject	- Out-Of-Pit Tai Facility	lings Stora
Excavato litachi 200 LC	r Туре:	Logged By: Checked By: Date Started: Date Finished	CD RJR 26-7- 1: 26-7-	-11		Relativ Coordi Permit	nates:	318 mAHC 7426846 n 450695 ml	N		Client:		Han	cock Coa	1
C: REDUCED 8 LEVEL (m RL) 81		CRIPTION C						GRAPHIC LOG	DEPTH (m)		SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMEN
-317	SAND (SW); trace of silt, of becomes del SANDSTON grey, fine to becomes me	fine to medium medium dense fine to medium dry, medium den nse to very dens E; low strength, medium grained dium strength, r ST PIT at 1.4m (grained, se to der e highly to (Colinlea noderatel	well gradeo ise (Alluviu comletely w	I, brow m) veather e)	n to gre	y, with a							BS @ 0.9m TP22-01	
-316									2						
315									3						
·314 ·313										5					
				TEST	PIT S	ECTIC	DN			H		ł		TEST PIT TERMI	NATED AT:
														Target Depth Refusal Flooding Caving/collapse	
														SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Samp	B T Ie D

	raša Ply. Lld.			Fa	e: (07) 3243 c (07) 3243		Project		2626	683				teference: Coal P	roject	- Out-Of-Pit Tail Facility	ings Storaç
Excavator Excavator Hitachî 200 LC	r Contractor Hil	s Mass C Logged I Checked Date Sta Date Fin	By: By: rted:	CD RJR 23-1-1			Relative Coordir Permit	e Level nates:	330		Ν		Client:		Han	cock Coa	1
REDUCED LEVEL (m RL)	DESC	RIPTIO	N OF S	STRA	ТА					GRAPHIC LOG			SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/cm/)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENT
-330-	SAND (SW); f	ne to med	lium grai	ned, br	own, with	a trac	e of silt,	dry,	Ŕ	ž	<u></u> _`	ō	0, 0)	ште			
	loose (TOPSC SAND (SW); f trace of silt, dr becomes silty;	ne to meo y, loose to	mediun	i dense	ell graded, (Alluvium))	orown, w	ith a								BS @ 0.5m TP23-01	
-329	Clayey SAND brown amd ye (Residual) MC:11.3%, LL SANDSTONE yellowish brow	kow, medii :39%, PL: very kow: n. fine to r	um plast 12%, Pl: strength, nedium	city, m 27%, L comple grained	oist, medii S:7.5+%, etely weat (Colinlea	um de 45% F hered, Sands	ines ines grey mo stone)	ense ottled				1				BS @ 1.3m TP23-02	
-328	becomes low t END OF TES	PIT at 1.	8m (Refi	isal)	etery to h	igniy v	eamere	<u>a</u>	::		E	2					
-327					·							3					
·326 ·325												4				· .	
I		•			TEST P	IT SI	ECTIO	N			.1					TEST PIT TERMIN	NATED AT:
																Target Depth Refusal Flooding Caving/collapse	
																SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sample	BS TS DS

F/

URS Austr							Phone	· ·	243 2111	Projec	zt No.:					Project F			t - Out-Of-Pit Tai	lings Store
Excavato	r Contra	ctor	Hills	Mass	Cont	ractin		- (/ -			4	2626	683			Tupic	oouri	10,00	Facility	inigo otore
Excavato Hitachi 200 LC	r Туре:			Logge Check Date S Date F	ed By: Started	F 2	D SJR 3-7-11 3-7-11				linates:	742	mAHD 6849 m 947 mE			Client:		Har	ncock Coa	l
REDUCED LEVEL (m RL)		DE	SCF	RIPTI	ON	DF S	TRA	TA					GRAPHIC LOG	DEPTH (m)		SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM [*])	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMEN
-352-		ey SA PSOIL		SC); da	ark bro	wn to	reddis	sh brov	vn, moist	, koose,	rootlet		Ž	<u>⊢</u> ō	+					
-351	roun (Allur MC:t	ded to vium) 5.0%,	LL24	ounde	d, red	to ligh	it brov	m, đry,	ined, wel , loose, n 28% Fir	ootlets	d, — —								BS @ 0.8m TP24-01	
-350	brow	DSTC n, fine Istone	e to m	edium	iely łow o grain	v stren ed, wil	igth, ro h son	esidual ne clay	l, yellow t and grav	o reddi vel (Coli	sh inlea			2						·
-349	MC:1 OMC	i1.7% ∷14%	, LL:2 , 43%	99%, P Fines	L:14% s, K=3	5, PE11 x 10-9	5%, L3 9m/s, 0	S:7%,∶ C'=11.2	EC:5, MI 2kPa, phi	0D:1.86 '=32.1°	i/m3,				8.4				BS @ 2.5m TP24-02	
-348	beco	mes c	comple	etely w	veathe	red								4 4 4 						
·347	END	OF T	EST I	PIT at	4.7m	(Targe	t Dep			-				5				· · ·		
							-	FEST	PIT S	ЕСТІС	лс								TEST PIT TERMI	NATED AT:
																			Target Depth Refusal Flooding Caving/collapse	
											-								<u>SAMPLE TYPE:</u> Buik Sample Tube Sample Disturbed Sample	B\$ T\$ 9 D\$

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FA: Peak Friction Angle C: Cohesion

JRS Ausl	traša Pt	y. Ltd.		·		1			43 2111	Proje	ct No.:				Project F	Reference:		0.4.07.57.5.		
Excavato	or Cont	ractor	lills N	lass (Contra	acting		(07) 32	43 2199		42	626683			Alpha	Coal P	roject	- Out-Of-Pit Tai Facility	lings S	torage
Excavalo Hitachi 100 LC	ог Туре	:	CI Di	ogged neckeo ate Sta ate Fir	d By: arted:	CI R. 23	IR -7-11			Coor		342 mAHE 7426095 n 452944 m)	Ν		Client:		Han	cock Coa		
CEVEL (m RL)						FST						GRAPHIC LOG		DEPTH (m)	SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	СОМ	MENTS
·342- ·341	der Cla gre bec 55	ND (SW prounded ise, root yey SAN y mottle comes p. % Fines TSTON	lets (T ID (SC d oran ale gre	OPSC ;; fine ge and y, MC	biL) to m d yelk ::10%	edium w, lov , LL:31	grain plast	ed, we icity, n _:11%,	ll gradec noist, de , PI:20%	l, roun nse (F , LS:5	ded, dark Residual) .5+%,			1	-			BS @ 0.4m TP26-01 BS @ 0.9m TP26-02		
340	we	comes m	grey n edium	stren	d yello gth	sv, fine	e grair	ied (Ci	oliniea S	andsto	,, one)			2	-				Bucke	t Rippin
339														ß	•					
·338 ·337														4					L L	
							T	EST	PIT S									<u>TEST PIT TERMI</u> Target Depth Refusal Flooding Caving/collapse		AT:
																		SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Samp	le	BS TS DS

Peak Friction Angle C: Cohesion FA: F

	aša Pty. Ltd. Contractor Hill	n Mann Control	Phone: (07) 3243 2111 Fax: (07) 3243 2195)	626683		Project F Alpha	teference: Coal P	roject	- Out-Of-Pit Tail Facility	ings Storag
Excavator Excavator Hitachi 100 LC		Logged By: Checked By: Date Started: Date Finished:	CD RJR 23-7-11		352 mAHD 7426098 ml 453694 mE	1	Client:		Han	cock Coa	
EVEL (m RL)	DESC	RIPTION OF	STRATA		GRAPHIC LOG	DEPTH (m)	SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENT
-352- -351	(TOPSOIL) Silty SAND (S plasticity, mole Clayey SAND a trace of fine	(SC): fine oraine	d, well graded, grey mo ded to rounded gravel,	dark grey, low							
·350	becomes mot	led yellow and re	d			2					
-349 -348	Silty SAND: fir dense (Residu	e grained, light l ial)	prown to yellowish grey,	moist, very						BS @ 2.9m TP27-01	
-347-	END OF TES	f PIT at 5.0m (Ta	arget Depth)								
						_				-	
			TEST PIT S							TEST PIT TERMI Target Depth Refusal Flooding Caving/collapse	
										SAMPLE TYPE; Bulk Sample Tube Sample Disturbed Sampl	BS TS e DS

	ralia Pty. Ltd. r Contractor Hill	s Mass Contra	Fax	(07) 3243 2111 (07) 3243 2199	Project		26683		Project F Alpha	Reference: a Coal P	roject	- Out-Of-Pit Tail Facility	ings Storage
xcavalo litachi 00 LC	г Туре;	Logged By: Checked By: Date Started: Date Finished:	CD RJR 25-7-11 25-7-11		Relative Coordin Permit I	ates: 7	21 mAHD 7425349 ml 150697 mE		Client:		Han	cock Coal	
REDUCED LEVEL (m RL)	DESC	RIPTION OF	STRAT	Ā			GRAPHIC LOG	DEPTH (m)	SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
·321-	SAND (SW); fi dry, loose (TO becomes light		rained, dar	k brown, with a	a trace of	f sitt,						BS @ 0.3m TP28-01	
-320	Clayey Gravell mottled yellowi dense (Residu	y SAND (SC); fi sh brown, grave al)	ne to medi el is subrou	um grained, wa nded, moist, d	ell graded ense to v	d, grey very							
•	MC:11.6%, 41 SANDSTONE; yellowish brow	low strength, o	ompletely v m grained	eathered, grey (Colinlea Sand	/ mottled stone)							BS @ 1.2m TP28-02	
31 <u>9</u>	becomes low t			to moderately	weathere	:d		2					
318	END OF TEST	PIT at 2.3m (R	(erusai)					3					
317								4					
316													
			Т	EST PIT S	ECTIO	N						TEST PIT TERMI	NATED AT:
												Target Depth Refusal Flooding Caving/collapse	
			· ·									SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sample	BS TS e DS

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	ralia Pty. Ltd.		Phone: (07) 324 Fax: (07) 324		Project		626683			Project f Alpha	Reference: a Coal F	Project	- Out-Of-Pit Taili Facility	ings Storage
Excavato Excavato Hitachi 200 LC	r Contractor Hill	s Mass Contrac Logged By: Checked By: Date Started: Date Finished:	CD RJR 25-7-11		Relative Coordin Permit I	nates:	328 mAH 7425345 451444 n	mN	-	Client:		Han	cock Coal	
REDUCED LEVEL (m RL)	DESC	RIPTION OF	STRATA				GRAPHIC LOG	-	DEPTH (m)	SHEAR VANE STRENGTH (KP2)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
-328- -327	Moist, very koo SAND (SW); fi trace of silt, mo SANDSTONE; weathered, gro (Colintea Sand	se (TOPSOIL) ne to medium gr bist, loose (Alluvi very low to low s y mottled yellow	strength, residual t and red, fine to m	, light t	prown, w				-0				BS @ 0.4m TP28/2-01	
-326	MC:12.3%, LL:	:35%, PL:1 3% , F	1:22%, LS:7.5+%,	42% F	ines				-2				BS @ 2.0m TP28/2-02	
-325	becomes medi greyish brown	um to high stren	gth, highly to mode	erately	weather	ed,			-3					
-324 -323	END OF TEST	PIT at 3.5m (Re	sfusal)			-			-4					
			TEST P	IT SE	ΞΟΤΙΟ	N			_				TEST PIT TERMIN	IATED AT:
													Target Depth Refusal Flooding Caving/collapse	
													<u>SAMPLE TYPE:</u> Bulk Sample Tube Sample Disturbed Sample	BS TS DS

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RS Austr			-tills I	Mass	Conti		Fax		243 2111 243 2199		ject No		326683	3			Reference a Coal		t - Out-Of-Pit Tail Facility	ings Sto	orag
xcavato litachi 00 LC	r Type:		C D	ate Si	ed By: tarted:	R	- D SJR 5-7-11 5-7-11			Cod		es: 7 4	338 mAl 7425340 152198	mN		Client:		Har	icock Coa		
CC REDUCED 80 LEVEL (m RL) 92		DES	SCRI	IPTIC	ON C	DF S	TRA	ГА				ş	GRAPHIC LOG		DEPTH (m)	SHEAR VANE STRENGTH (kPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMME	ENT
330-	a trac Silty : reddi (Alluy	e of si SAND: sh bro ium)	lt, dry fîne t wn, lo	io coa w plas	e, roo rse gr sticity,	tiets (rained , mois	tops towe	OIL) iraded, t, loosi	ed, redd subrou to med 3.5%, 25	nded lium	, dark dense	with 							BS @ 0.4m TP29-01		
336	(Resi SANI grey	dual) D <u>STO</u> N	₩E; ve	ery lov	v to lo	wstre	ngth,	omple	id, light medium tely to h	ighly	weath				-2				BS @ 2.0m TP29-02		
335 334		nes m OF TE						veathe	red, grey	1	•				-3						
333															-5	-					
							٦	EST	PIT S	EC1	TION								TEST PIT TERMI	NATED A	<u>T:</u>
																			Target Depth Refusal Flooding Caving/collapse		
				•															SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sample		BS TS DS

2 TUCIOVICO TUCIOVICO ź ADMONA TH TESTPIT AI PHACOAL GP/LGEOTECH GDT

JRS Austr	alia Pty.	Ltd.							243 211		roject N	ło.:					Referen		-	- Out-Of-Pit Tai	lines 6	torar
Excavator	r Contra	actor	Hills	Mass	Cont	ractin	·	. (07) 3	243 2 18	~~~		42	626683	3		Aibi		41 F T	ojeci	Facility	៣ឫទ ១	ហេងឫ
Excavator Hitachi 200 L.C	г Тура:	*	ļ	Logge Check Date S Date F	ed By: itarted	R : 2	D JR 3-7-11 3-7-11			C ·		ites:	350 mAl 7425346 452946 i	mN		Client:	1	ŀ	-lan	cock Coa	I	
LEVEL (m RL)		DE	SCF	NPTI	ON	DF S	TRA	ГА					GRAPHIC LOG		DEPTH (m)	SHEAR VANE STRENGTH (KPa)	POCKET	(KG/CM [*])	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COM	MENT
-350-	Silty mois	SANI st, Ioo	D (SM se, roo); fine otlets (to me TOPS	dium g :OIL)	raineo	l, well	graded	l, ligh	t brown	1,			-0-					BS @ 0.3m TP30-01		
-349	low j	olastic	ity, m	oist, lo	ose (/	Vluvivr	n)		graded			own,			1			-				
010	suba mois	ingula st. me	AVEL ar, yelk dium o 3% Fi	owish l dense	; fine : prown	to mec , sand	iium g is fine	rained grain	, subro ed, with	unde n son	dito 1e clay	,	•							BS @ 1.2m TP30-02		
348	weat (Coli	herec nlea \$	l, gréy Sandsi	mottle tone)	d yel	ow ark	f red,	mediu	to con m to co	bàrse	graine	- — —			-2							
				<u>m stre</u> PIT at∶				veathe	red, fin	ne gra	ined .								•			
347						•									-3							
346															- -4							
															- - - -							
345							·								-5							
							7	FEST	PIT	SEC		1								TEST PIT TERMI	NATED	<u>AT:</u>
					\		· · · · · · · · · · · · · · · · · · ·				:									Target Depth Refusal Flooding Caving/collapse		
				-																<u>SAMPLE TYPE:</u> Bulk Sample Tube Sample Disturbed Sample		BS TS DS

URS Ausl	ralia Pty. Ltd.			: (07) 3243 211 : (07) 3243 219		26266	02			Reference: a Coal F	Project	- Out-Of-Pit Tail	ings Storage
Excavato Excavato Hitachi 200 LC	r Contractor Hil r Туре:	Is Mass Contra Logged By: Checked By: Date Started: Date Finished:	CD RJR 25-7-11		Relative Level Coordinates: Permit No:	322 m	nAHD 596 mN		Client:		Han	Facility	ł
REDUCED LEVEL (m RL)	DESC	RIPTION OF	- STRA	ГА			GRAPHIC LOG	DEPTH (m)	SHEAR VANE STRENGTH (kPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
-322-	Loose, rootlets SAND (SW); f loose, roots (F SAND (SW); f	(TOPSOIL) ine to medium g	rained, we	II graded, yelk	t brown, dry, very owish brown, dry v mottled yellow	\mathbb{N}		0 - - - - - - - - - - - - - - - -				BS @ 0.3m TP32-01	
-320	 and brown, fin 	; extremely low s e to medium gra ense) (Colinlea S	ined (SAN	ID: fine to me	nottled yellow Jium grained,								
-319		low to low stren			ed weathered, grey			3					
-318 -317	END OF TEST	F PT at 3.8m (R	efusai)					-4				· · · ·	
				FEST PIT S	ECTION							TEST PIT TERMI	NATED AT:
												Target Depth Refusal Flooding Caving/collapse	
			· ·									SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sample	BS TS e DS

FA: Peak Friction Angle C: Cohesion

	ralia Pty. Ltd.		Phone: (07) 33 Fax: (07) 33		Project		26683		Project F Alpha	Reference: Coal P	roject	- Out-Of-Pit Tail Facility	ings Storage
Excavator Excavator Hitachi 200 LC	r Contractor Hill r Type:	s Mass Contrac Logged By: Checked By: Date Started: Date Finished:	CD RJR 23-7-11	,		uates: 7 4	64 mAHD 425346 m 53699 mE	N	Client:		Han	cock Coa	
REDUCED LEVEL (m RL)	DESC	RIPTION OF	STRATA				GRAPHIC LOG	DEPTH (m)	SHEAR VANE STRENGTH (kPa)	POCKET PENETROMETER (KG/CM [*])	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
-364- -363	loose, rootlets	M); fine to mediu (TOPSOIL) M); fine to mediu noist, loose (Allu	m grained, well									BS @ 0.4m TP31-01	
-362	Silty SAND (Si some fine to n moist, loose (f	N); fine to mediu ledium grained a Residual)	m grained, well s nd rounded to s	graded, ubround	brown, w ed grave	ith I, dry to		2					
-361	SANDSTONE brown, fine to grained, reddi (Colintea Sand	extremely low si medium grained sh brown, with sc istone)	irength, residual (Gravelly SAND me silt, moist, d	, red mo ; fine to ense to	tiled yelk medium very den	se)		3				BS @ 3.2m TP31-02	
360	END OF TEST	⁻ PIT at 4.7m (Ta	irget Depth)					4					
359			•					5 		:			
-			TEST	PIT S	ECTIO	N		_	_			TEST PIT TERMI	NATED AT:
												Target Depth Refusal Flooding Caving/collapse	
												SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sampl	' BS TS e DS

	ralia Pty. Ltd, r Contractor F	illis Mas	s Contr		Fax		43 2111 43 2199		ect No.:	2626	683		Project Alph	Reference a Coal	∞: Proje	ect -	Out-Of-Pit Tail Facility	ings Stora
Excavator Hitachi 200 LC		Logge Check Date	ed By: ked By: Started: Finished	C R 2(Cool	tive Leve dinates; nit No:	7424			Client:		На	nc	ock Coal	
C REDUCED	DES	CRIPT		F ST	[RA]	ΓA					GRAPHIC LOG	ОПЕРТН (M)	SHEAR VANE STRENGTH (kPa)	POCKET PENETROMETER	(KG/CM) DCPT	(Blows/100mm)	SAMPLING AND OTHER TESTING	COMMEN
-349-	SAND (SW) trace of silt,	moist, ve	ry loose	e, rool	lets (T	OPSO	IL)					0						
	SAND (SW) brown, with	; fine to n a trace of	silt, mo	graine vist, lo	ed, we ose, re	ll grade ootlets	ed, light (Alluviu	yellow m)	ish								BS @ 0.4m TP33-01	
-348	Sandy GRA is fine to me to dense (Re 1 MC:9.4%, E SANDSTOM mottled grey	dium grai esidual) C:2 <u>, 7%</u> I IE; extren	ined, br ines hely low	own, v stren	with so gth, re	ome silt sidual,	, moist, yellowi:	mediu sh bro	ım dens	d e		1					BS @ 1.2m TP33-02	
-347	becomes ve light yellow	ry low to l	ow stre	ngth, i	compl	etely w	eathere	d, gre	y mottled	1		2						
346	becomes me END OF TE					<u>y to con</u>	npletely	weath	nered			3						<u>.</u>
-345 -344												4						
					1	EST	PIT S	ЕСТ	ION	1			.					NATED AT:
																F	arget Depth lefusal looding caving/collapse	
																E	AMPLE TYPE: Bulk Sample Tube Sample Disturbed Sample	B Ti Đ D

U	RS Aus	stralia F	Yty Ltd			TES	ST P	IT LO	DG -	TP34	Sheet 1 of 1
	alia Pty. Ltd. Contractor Hill	s Mass Contrac	Phone: (07) 3243 2111 Fax: (07) 3243 2199	-	626683		Project F Alpha	Reference: a Coal F	Project	- Out-Of-Pit Tai Facility	lings Storage
Excavator Hitachi 200 LC	Туре:	Logged By: Checked By: Date Started: Date Finished:	CD RJR 25-7-11 25-7-11		350 mAHD 7424595 ml 452949 mE	1	Client:		Han	cock Coa	I
C REDUCED C LEVEL (m RL)		RIPTION OF			GRAPHIC LOG	DEPTH (m)	SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
-349	SAND (SW); fi Grey, with som becomes mois	rootlets (TOPSC ne to medium gra e silt, moist (Aliun t to wet extremely low st	ained, well graded, reddi rium) rength, residual, grey m	sh brown and			1			BS @ 0.5m TP34-01 BS @ 1m TP34-02	Groundwater
-348	MC:10.7%, 22 becomes low t	% Fines	silty (Coliniea Sandston th, highly to moderately Collapsing)	-		2				BS @ 1.5m TP34-03	ponding at soil/rock interface
-347						3	:	· · ·			
-346				·		4					
-345						5			-		
			TEST PIT S	ECTION						TEST PIT TERM	NATED AT:
· · · · · · · · · · · · · · · · · · ·						-				Target Depth Refusal Flooding Caving/collapse	
										SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Samp	BS TS le DS
NOTES: ABBRE	VIATIONS: M	ation via AS172 IC: Moisture C : Curling occur A: Peak Frictio	26-1993 ontent LL: Liquid Lin red EC: Emerson Cl n Angle C: Cohesior	hit PL:Plastic L ass MDD: Max	imit PI: Pla kimum Dry	asticity I Density	ndex LS / OMC: (: Linear S Optimum	Shrinka Moistu	ge *: Crumbling o re Content k: Labo	ccurred pratory Permeabil

	alia Pty. Ltd.	ilis Mass (Contra	Fax		243 2111 243 2199	Proje	ct No.: 42	626683		Proj Al	ect F pha	Reference: I Coal P	roject	- Out-Of-Pit Tail Facility	ings Storag
Excavator Hitachi 200 LC		Logged Checked Date Sta Date Fin	By: I By: arted:	CD RJR 25-7-1 ² 25-7-1				linates;	363 mAHD 7424588 m 453696 mB	N	Clie	nt:		Han	cock Coa	
C REDUCED C LEVEL (m RL)		CRIPTIC							GRAPHIC LOG	DEPTH (m)	SHEAR VANE	STRENGTH (kPa)	POCKET PENETROMETER (KG/CM [*])	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENT
-303-	Silty SAND (a trace of fir (TOPSOIL) Gravelly SAI gravel is fine (Alluvial)	e to mediur ND (SW); fir	n grain	ed gravel	, dry, k ned, w	ose, roc	otlets	ided,	/						BS @ 0.3m TP35-01	
-362	Silty SAND (plasticity, mo SILTSTONE stained red a	bist, mediun	n dense	e to dense	e (Resi	dual)									BS @ 1.1m TP35-02	
-361 -360	END OF TE	51 PIT a(1.	та (ка	2033)						2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2						
-358										5						
					TEST	PIT S	ECTI	ON							TEST PIT TERMI	NATED AT:
															Target Depth Refusal Flooding Caving/collapse	
				· · · · · · · · · · · · · · · · · · ·							-				SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sampl	BS TS 9 DS

E C TESTPIT A) PHACOAL GP.1 GEOTEC:

URS Austr			Hills	Mass	Confi		Fax		243 2111 243 2199		oject		6266	83				Reference a Coal		t - Out-Of-Pit Tai Facility	lings St	orag
Excavato Hitachi 200 LC	_			oggeo Checke Date Si	l By: d By: larted:	C R 2	D JR 5-7-11 5-7-11			Co				46 m1	4		Client:		Har	ncock Coa	I	
REDUCED LEVEL (m RL)		DES	SCR	IPTI	ON C)F S	TRA	ГА		<u> </u>				GRAPHIC LOG	DEPTH (m)		SHEAR VANE STRENGTH (kPa)	POCKET PENETROMETER	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	сомм	ENT
-329-	dry, Silty plast MC:	Very loc SAND icity, di 3.1%, 4	ose, r (SM) ry, loc 0% F	ootlets fine (ise to ines	s (TOI graine mediu	-SOIL d, poc im dei) priy gra hse (A	aded, 1 Iluviun	rown, wi ight brow n) prown, wi	vn an	ıd gre	ey, low								BS @ 0.4m TP37-01		
-328	beco	mes de	ense				·									1				BS @ 1.2m TP37-02		
-327	- SAÑ weat	DSTOM	√E; ve	ery for mottle	v to m	edium	stren	gth, co	mpletely	to h	ighly um a					2						
-326 -325	∖(Coli	niea Sa OF TE	andsto	one)						-												
324																5						
							 1	EST	PIT S	ECI	rioi	N							<u> </u>	TEST PIT TERMI	NATED A	. <u></u>
	-	-													-					Target Depth Refusal Flooding Caving/collapse		
																				SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sampl	e	BS TS DS

			stral	ia I	Pty	Ltd									TP38		
URS Austr			Ils Mass	Contra	Fa	e: (07) 3243 211 x: (07) 3243 219		Project No.: 42	626683		Proj Alj	ect R pha	eference: Coal P	rojec	t - Out-Of-Pit Tai Facility	lings St	orage
Excavato Hitachi 200 LC			Logged Checke Date St Date Fi	By: d By: arted:	CD RJR 24-7-1		C	Relative Level: Coordinates: Permit No:	335 mAHD 7423844 m 452195 mB	N	Clie	nt:		Har	ncock Coa	I	
C REDUCED			CRIPTIC						GRAPHIC LOG	DEPTH (m)	SHEAR VANE	STRENGTH (kPa)	POCKET PENETROMETER (KG/CM [*])	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMM	IENTS
	SAN SAN	e silt, mo ID (SW); e of to so	list, loose, fine to me me silt, m	rootleis dium g oist, loc	s (TOPS) rained, w ose to me	rell graded, ligt dium dense (F	nt bri Resid	own, with a dual)							BS @ 0.4m TP38-01		
334-	\grey \San⊮	mottled dstone)	2: medium red and ye ST PIT at 1	ellow, fil	ne to me	n, highly to slig dium grained (ntiy Colir	weathered. nlea	/								
·333											r -						
332										3							
331										4							
330																	
						TEST PIT	SE	CTION							TEST PIT TERMI	NATED	<u>AT:</u>
															Target Depth Refusal Flooding Caving/collapse		
															SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sampl	le	BS TS DS

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> ak Friction Angle C: Con

U U	RS Aus	tralia	a Pt	y L	.td				TI	=0	ST P	IT L(DG '	TP39	
URS Austra	alia Pty. Ltd.				(07) 3243 2111 (07) 3243 2199	Project N		326683			Project F Alpha	Reference: Coal F	roject	- Out-Of-Pit Tai Facility	ilings Storage
Excavator Excavator Hitachi 200 LC	Contractor Hill Type:	s Mass Co Logged By Checked B Date Starte Date Finist	: C By: R ed: 24	9 D JR 5-7-11 5-7-11		Relative I Coordina Permit No	_evel: 3 tes: 7	341 mAHE 7423845 n 152946 ml	N		Client:		Han	cock Coa	I
REDUCED LEVEL (m RL)	DESC	RIPTION	OF S	TRAI	A			GRAPHIC LOG	DEPTH (m)		SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
341- 340	SAND (SP); fii dry, very kose SAND (SP); fii silt, dry, kose	, rootlets (T	OPSOIL) aded,	dark grey, with rounded, grey, al))				BS @ 0.5m TP39-01	Next to Creek Bed ~ offset 10m
339	SANDSTONE completely we (Colinlea Sanc MC:8.3%, 45% becomes very mottled yellow	athered, gre Istone) & Fines Iow to low s	ey mottle	d yello	w, fine to medi	um graine				2				BS @ 1.3m TP39-02	
	becomes med grey		-		erately to slight	y weather	ed,	· · · · · · · ·							Strong Resisitance
338	END OF TEST									}					
337 336										5					
I				٦	EST PIT S	ECTION						1		TEST PIT TERM	INATED AT:
														Target Depth Refusal Flooding Caving/collapse	
	Soil classific:			1000										SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Samp	BS TS Ne DS

Shoot 1 of 1

JRS Aust	tralia Pl	y, Ltđ.							243 2111 243 2199		roject i		626683			Project F Alpha	Reference: a Coal F	Project	t - Out-Of-Pit Tai Facility	lings S	torage
Excavato Excavato Hitachi 200 L.C			HIII	Mass Logge Check Date S Date F	d By: ed By: itarted	C R 23				C		Level: ates:	351 mAH 7423671 i 453520 m	nΝ		Client:	- -	Har	icock Coa	ŀ	
-15 LEVEL (m RL) -19				RIPTI									GRAPHIC LOG			SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM [†])	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	сом	MENTS
-350 -349	be-	me silt comes	, dry, grey	nottled	yellov ely kov	al) vish bro	own, c	Jense	to very c	lens	se ed, gr				1				BS @ 0.3m TP40-01		
-348	be	comes	medi	um stre PIT at	•			ered, I	thinly lan	nina	ited				3						
-347 -346															4						
		TEST PI							FC									TEST PIT TERM	NATED	AT:	
										· L= \				-					Target Depth Refusal Flooding Caving/collapse		
									· ·										SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Samp	le	BS TS DS

FA: Peak Friction Angle C: Cohesion

URS Austr	ralia Pty, Ltd.					243 2111 243 2199		oject l					Project F Alpha	Reference: a Coal F	Project	- Out-Of-Pit Tail	ings Storage
Excavato	r Contractor Hil	Is Mass Cont	racting	3					42	6266	583					Facility	
Excavalo Hitachi 200 L.C	r Туре:	Logged By: Checked By: Date Started Date Finishe	2	JR 5-7-11			Co		Level: ates: lo:	7423			Client:		Han	cock Coal	
REDUCED LEVEL (m RL)	DESC	RIPTION	OF ST	[RA]	Ā						GRAPHIC LOG		SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
-323-	SAND (SW); f some silt, moi SAND (SW); f trace of silt, m	st, loose, root ine to mediun oist, loose to	ets (TC n graine mediur	DPSO ed, we n dens	I grad i grad se (All	ed, light Ivial)	t bro	wn, w	ilh a		**)—+				BS @ 0.5m TP41-01	
-322	SAND (SW); f or red, with sc	nedium grained (Coliniea Sandstone)					/ mo sidua	ttled y I)	rellow			1					
-321	medium grain MC:17.0%, 41	SANDSTONE; extremely low to very low strength, r completely weathered, grey with rare yellow and red medium grained (Coliniea Sandstone) MC:17.0%, 41% Fines becomes medium to high strength, highly to modera grey END OF TEST PIT at 2.8m (Refusal)										2				BS @ 2.2m TP41-02	
-320	grey	prey					• •				<u>.</u>	3	4000 -				
-319												4					
-318												5					
		TEST PIT							N	•		 				TEST PIT TERMIN	NATED AT:
																Target Depth Refusal Flooding Caving/collapse	
											-	 				<u>SAMPLE TYPE:</u> Bulk Sample Tube Sample Disturbed Sample	BS TS e DS

U	RS Aus	stralia I	Pty Ltd			TE:	ST P	IT L(CG.	TP42	Sheet 1 of 1
	alia Pty. Ltd. Contractor Hil	Is Mass Contrac	Phone: (07) 3243 2111 Fax: (07) 3243 2199		626683		Project F Alpha	Reference: a Coal F	Project	- Out-Of-Pit Tai Facility	lings Storage
Excavator Hitachi 200 LC	Туре;	Logged By: Checked By: Date Started: Date Finished:	CD RJR 25-7-11 25-7-11	1	329 mAHD 7423095 mi 451445 mE	N	Client:		Han	cock Coa	
LEVEL (m RL)	DESC	RIPTION OF	- STRATA		GRAPHIC LOG	DEPTH (m)	SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
-329-	Some silt, dry, SAND (SW); f with some silt,	loose to very loc ine to medium g low plasticity, dr	rained, well graded, dark ose, rootlets (TOPSOIL) rained, well graded, pale y, loose (Alluvium) rained, well graded, grey ery dense (Residual)	brownish grey,						BS @ 0.3m .TP42-01	
-328	SANDSTONE completely we medium grain	; extremely low to athered, greyish ed (Colintea San	o very low strength, residual brown mottled yellow ar dstone) gth, completely to mode								
-327	END OF TES	ΓΡΙΤ at 1.9m (Re	efusal)			2 					
-326				•		3			•		
-325						4			-		
-324						- - - -	i			· ·	-
			TEST PIT S	SECTION						TEST PIT TERMI	NATED AT:
										Target Depth Refusal Flooding Caving/collapse	
										SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sample	· BS TS e DS

FA: Peak Friction Angle C: Cohesion

IRS Aust	ralia Pty. Ltd.					3243 211 3243 2199	1	oject No.						Reference: a Coal F		t - Out-Of-Pit Tail	lings Stora
xcavato	r Contractor H	ilis Mass Co	ntracti	ng					426	526683						Facility	
ixcavato Iltachi 00 LC	г Туре:	Logged By Checked B Date Starte Date Finisi	y: ed:	CD RJR 24-7-1 ⁻ 24-7-1		·	Co		s: 7	338 mAHD 7423094 m 152195 mB	N		Client:		Har	ncock Coa	
REDUCED LEVEL (m RL)	DES	CRIPTION	OF S	STRA	TA					GRAPHIC LOG			SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMĘN
338-	SAND (GW) trace of silt, o	fine to mediu Iry, loose, roo	ım grai itlets (1	ned, w OPSO	ell grad IL)	led, pak	e brov	vn, with	a			0—					
	Silty SAND (mottled yelko sandstone, c MC:8.2%, 38 SANDSTON	w and red, wi ry, dense (Re % Fines	h a fev sidual)	v cobb!	e-sizeo	l fragme	nts o	f	<u>n</u> —							BS @ 0.6m TP43-01	Bucket Rip
337-	weathered, r. (Sandstone) END OF TES	eddish brown	fine to	o mediu	ım grai	ined (Co	linlea			<u> </u>	E	1—					
				·													
336												2					-
000								·				-					
									÷								r
225												°					
335												3					
004												A					
334												4	- - - -			-	
												~					
333												5					
					TEST	PIT S	SEC.						[<u> </u>	TEST PIT TERMI	NATED AT:
																Target Depth	
																Refusal Flooding	
																Caving/collapse	
																<u>SAMPLE TYPE:</u> Bulk Sample	В
				1												Tube Sample Disturbed Sampl	e D

FA: Peak Friction Angle C: Cohesion

	RS Aus	stralia											TP44	
	ralia Pty. Ltd. r Contractor Hi	lls Mass Coni	F	one: (07) 3243 211 Fax: (07) 3243 219			326683				Reference: a Coal F		- Out-Of-Pit Tail Facility	ings Storag
Excavator Hitachi 200 LC	r Туре:	Logged By: Checked By Date Started Date Finishe	l: 24-7 -	-11	Relative Coordin Permit I	nates:	353 mAHC 7423095 n 452947 ml	N		Client:		Han	icock Coal	- -
REDUCED LEVEL (m RL)	DESC	CRIPTION	OF STR	ΑΤΑ			GRAPHIC LOG	DEPTH (m)		SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM)	DCPT (Btows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
-353- -352	with a trace o Sandy GRAV angular, dark dense to den SANDSTONE motiled red a becomes low becomes ven	f silt, dry, loose EL (GP); fine (brown, sand is se ; very low to k nd grey, fine g strength, com y low to low str	e, a few ro grained, w s fine to m w strengti rained pletely wea ength, higi		unded to ry, mediur	——— m			1				BS @ 0.5m TP44-01	Bucket Rippin
351	END OF TES	T PIT at 1.5m	(Refusal)						2					
-350									3					
349 348									5			•.		
			1 [TEST PIT	SECTIO	N		T		<u> </u>			TEST PIT TERMIN	
													Refusal Flooding Caving/collapse	
			· · · · · · · · · · · · · · · · · · ·										SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sample	BS TS DS

Cheet 4 of 1

U	RS Ai	ustra	lia	Pty	Ĺ	td					Т	'ES	ST P	IT LO	DG	TP45	
URS Austr	alia Pty. Ltd.	·				07) 3243 211 07) 3243 219		ject No		26683			Project F Alpha	Reference: a Coal F	Project	- Out-Of-Pit Tail Facility	ings Storage
	Contractor																
Excavator Hitachi 200 LC	Туре:			CD RJF 24-7 : 24-7	र 7-11		Cox		es: 7 4	61 mAH 423100 i 53459 m	nN		Client:		Han	icock Coa	
C S TEVEL (m RL) LEVEL (m RL)		SCRIPTI							- -	GRAPHIC LOG	•		SHEAR VANE STRENGTH (kPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
-301-	dry, loose	(TOPSOIL)	ie to me	edium a	rained	well graded d, well grade y, dense (Re	ed, gre	ey molt	,			0				BS @ 0.3m TP45-01	
-360	becomes v	very dense							·			1				BS @ 1.1m TP45-02	
		EST PIT at	1.7m (f	Refusal	- San	dstone)				<u> /////</u>	7_					-	
-359											E	2					
-358								·				3					
-357 -356									,			4					
											-						
ł	<u> </u>		[]		TE	EST PIT \$	SECI	rion T		<u> </u>	T	1	1 1			TEST PIT TERMII	
																Refusal Flooding Caving/collapse	
																<u>SAMPLE TYPE:</u> Bulk Sample Tube Sample Disturbed Sampl	BS TS DS

Cheet 1 of 4

1000 ALPHACOAL GP.1 FIGTOR

ıy

	aša Pty. Ltd.				Fax:		243 2111 243 2199	Proje	ct No.: 4	26266	883		Project Alph	Reference: a Coal F	roject	- Out-Of-Pit Tai Facility	lings Storag
ixcavator ixcavator itachi 00 LC	Contractor 1	Logg Cheo Date	ed By: ked By: Started: Finishee	CI R. 24	D JR I-7-11				ive Leve Jinates; it No;	74223			Client:		Han	icock Coa	1
EVEL (m RL)	DES	CRIP)F ST	RAT	Ā		₩			GRAPHIC LOG	DEPTH (m)	SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENT
·342– ·341	SAND (SW a trace of si SAND (SW, brown, with (Alluvium) Clayey SAN brown, low	t, dry, lo ; fine to a trace c D (SC); ;	medium f to son	graine graine ne silt, nedium	d, wel moist,	DIL) gradi loose	ed, red t to medi	o reddi um der	sh se							BS @ 0.3m TP46-01	· · ·
-340	MC:16.9%, SANDSTON (weathered, (Colintea Sa END OF TE	E: medi grey mol	um to hi tied yelk	gh stre ow and	ngth, i I red, f	moder	rately to	slightly	 	_ #		2				B\$ @ 1.7m TP46-02	Groundwate ponding at soil/ interface
·339												3					
338							·					4					
337												5					
					Т	EST	PIT S	ECTI	ON							TEST PIT TERMI	NATED AT:
																Target Depth Refusal Flooding Caving/collapse	
						·										SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sample	BS TS le DS

ALCONTO 14

FA: Peak Friction Angle C: Cohesion

U	RS Au	stralia I	Pty Ltd			TE:	ST P	IT LO	DG ⁻	ГР47	
	ralia Pty. Ltd. r Contractor H	ilis Mass Contrac	Phone: (07) 3243 2111 Fax: (07) 3243 2199	Project No.: 42	626683			Reference: a Coal F		- Out-Of-Pit Tail Facility	ings Storage
Excavator Hitachi 200 LC		Logged By: Checked By: Date Started: Date Finished:	CD RJR 24-7-11		335 mAHD 7421599 mł 451446 mE	1	Client:		Han	cock Coal	
LEVEL (m RL)	DES	CRIPTION OF	STRATA		GRAPHIC LOG	DEPTH (m)	SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
-335	dry, loose, ro SAND (SP); of silt, dry, m Clavey SANI	otlets (TOPSOIL) fine to fine grained edium dense (Res (SC); fine to med wn mottled grey a	d. poorly oraded, light bro	wn, with a trace						BS @ 0.3m TP47-01	
-333	becomes gre MC:12.4%, L		PI:15%, LS:4.5%, 45% Fi	nes						BS @ 1.6m TP47-02	
	weathered, g	rey mottled yellow	strength, highly to moder / and red, fine to medium efusal)	ately grained	. <u>(//////</u> 				-		
-332						3					
-331						4		2			
-330		·				—5 — —					
			TEST PIT S	ECTION						TEST PIT TERMIN	NATED AT:
										Target Depth Refusal Flooding Caving/collapse	
										SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sample	BS TS e DS

	ralia Pty. Ltd. r Contractor Hill	s Mass Contrac	Phone: (07) 3243 2111 Fax: (07) 3243 2199	1	626683		Project F Alpha	Reference: a Coal P	roject	- Out-Of-Pit Taili Facility	ings Storage
Excavato Hitachi 200 L.C	г Туре:	Logged By: Checked By: Date Started: Date Finished:	CD RJR 24-7-11 24-7-11	Relative Level: Coordinates: Permit No:			Client:	l	Han	cock Coal	
C REDUCED		RIPTION OF			GRAPHIC LOG	DEPTH (m)	SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
	dry, loose (TO Sandy GRAVE	PSOIL) L (GW); fine to i	ained, well graded, dark subrounded gravel, with medium grained, well gr hoose to medium dense	aded, light						BS @ 0.4m TP48-01	
-349-	\weathered, gro	low to medium : ayish red, fine to PIT at 1.0m (Re	<u>strength, highly to mode</u> medium grain <u>(Coliniea</u> efusal)	rately Sandstone)		1 					Bucket Rippin
-348						2 2					
347						3					
346						4					
·345						5					
			TEST PIT S	ECTION						TEST PIT TERMIN	ATED AT:
										Target Depth Refusal Flooding Caving/collapse	
								· ·		SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sample	BS TS DS

4 \$ S A E 10MON TESTPIT ALPHACOAL GP.1 GEOTECH GDT

URS Austr	raīia Pty, Ltd.			(07) 3243 2111 (07) 3243 2199							Project Alph	Reference: a Coal F	Project	- Out-Of-Pit Tail	ings Storage
	r Contractor Hill	I					2626							Facility	
Excavato Hitachî 200 LC	г туре:	Logged By: Checked By: Date Started: Date Finished:	CD RJR 24-7-11 24-7-11		Relativ Coordin Permit	nates:	7420		N		Client:	• ·	Han	cock Coa	
LEVEL (m RL)	DESC	RIPTION OF	STRAT	Α				GRAPHIC LOG			SHEAR VANE STRENGTH (kPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS
-336-	trace of silt, m SAND (SW); f brown, with a t	ne to medium gr pist, loose, rootle ne to medium gr race of silt, mois mottled yellow a	ets <u>(TOPS</u> ained, wel t, loose (R	OIL) I graded, light tesidual)	yellowish	, — —		<u>~~</u>		J				BS @ 0.4m TP50-01	
-335	SANDSTONE weathered, gro	very low to med	ium streng and red, f	in, completel	/ to mode grained	erately				1		-		BS @ 0.9m TP50-02	
-334	(Coliniea Sanc	PIT at 1.4m (Re	efusal)							2					
333										3					÷
332										4					
331	•									5	·				
			т	EST PIT S	ECTIO	N	k							TEST PIT TERMIN	NATED AT:
														Target Depth Refusal Flooding Caving/collapse	
										·· ·				<u>SAMPLE TYPE:</u> Bulk Sample Tube Sample Disturbed Sample	BS TS Ə DS

FA: Peak Friction Angle C: Cohesion

	ralia Pty. Lt		. Mare	Con	fractin	Fa		3243 2 3243 2		Project		626683	ł			Reference a Coal I		- Out-Of-Pit Tai Facility	llings Stora
Excavato Excavator Hitachi 200 LC			Logge Check Date S	d By: ed By Started	(: F	- CD RJR 14-7-1	-		. (ates:	345 mAł 7420847 452197 i	mΝ		Client:		Han	cock Coa	1
REDUCED LEVEL (m RL)		DESC	RIPTI	ON	OF S	TRA	ТА		-			GRAPHIC LOG		DEPTH (m)	SHEAR VANE STRENGTH (kPa)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMEN
-345	of silt, of SAND some s	(SW); fi ilt, dry, l	e, rootl ne to n loose (/	ets (T iediun Alluviu	OPSC	ed, w	ell grad	ded, li	ght bro	own, w	iin			-0				BS @ 0.3m TP51-01	
-344	SAND and rec (Residu becom Fines	191)												1				BS @ 1.3m TP51-02	
-343	SANDS comple red (Co	lintea S	andsto	ne)										2					
-342	END O	F TEST	PIT at	2.7m	(Refu	;al)								3					Bucket Rippi
·341												V		4					
340				·										5					
						-	TEST	r pit	SEC		N	-						TEST PIT TERMI	NATED AT:
																		Target Depth Refusal Flooding Caving/collapse	
																		SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sample	BS TS e DS

,

	ralia Pty. Ltd. r Contractor Hill	s Mass Contrac	Phone: (07) 3243 2111 Fax: (07) 3243 2199		626683		Project Reference: Alpha Coal Project - Out-Of-Pit Tailings Storag Facility						
Excavato litachi 200 LC		Logged By: Checked By: Date Started: Date Finished:	Relative Level: Coordinates: Permit No:		4	Client: Hancock Coal							
မှ LEVEL (။ RL) တို LEVEL (။ RL)	DESC	RIPTION OF	STRATA		GRAPHIC LOG	DEPTH (m)	SHEAR VANE STRENGTH (kPa)	POCKET PENETROMETER (KS/cM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENTS		
349	dry, loose, root	lets (TOPSOIL)	n grained, poorly grade n grained, poorly grade dense (Residual)							BS @ 0.3m TP52-01 BS @ 1.0m TP52-02			
347	SANDSTONE; completely wea grained (Colin)	thered, arey moi	very low strength, resid tled yellowish brown, fir	ual to		2			:	BS @ 2.2m TP52-03	Bucket Rippin Bucket Rippin		
346	END OF TEST	PIT at 2.4m (Re	fusal)			3							
345 344						4							
			TEST PIT S	ECTION						TEST PIT TERMI	NATED AT:		
										Target Depth Refusal Flooding Caving/collapse			
										<u>SAMPLE TYPE:</u> Bulk Sample Tube Sample Disturbed Sample	BS TS DS		

	RS Aus	Project No.: Project Reference:											
		is Mass Contrac	Phone: (07) 3243 2111 Fax: (07) 3243 2199	Project No.: 42	626683			oject - Out-Of-Pit Tailings Storage Facility					
Excavato Hitachi 200 LC	Hitachi Checked By: I		CD RJR 24-7-11 24-7-11	Relative Level: Coordinates: Permit No:		1	Client: Hancock Coal						
LEVEL (m RL)		RIPTION OF			GRAPHIC LOG	DEPTH (m)	SHEAR VANE STRENGTH (KP3)	POCKET PENETROMETER (KG/CM)	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMENT		
-350	With a trace of Gravelly SANI gravel is fine t medium dense SANDSTONE completely we	silt, dry, loose, ro O (SW); fine to mo o medium grainec e (Alluvium)	ained, well graded, brow otlets (TOPSOIL) edium grained, well grad i and subrounded to sub very low strength, resid ottled yellow and red, fin	ed, light brown, angular, dry, Jal to		 1				BS @ 0.2m TP54-01 BS @ 0.6m TP54-02 BS @ 1m	Bucket Rippin		
	becomes low s	strength, highly to	o completely weathered dium strength, moderate ed fusal)	ly weathered,		- - - - - -				BS @ 1m TP54-03			
-349 -348						2							
-347			,			4							
-346			•			5	· ·	•					
			TEST PIT SE	ECTION	<u> </u>		1	1		TEST PIT TERMII	NATED AT:		
										Target Depth Refusal Flooding Caving/collapse			
										SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sampl	BS TS DS		

+: Curling occurred EC: Emerson Class MDD: Maximum Dry Density OMC: Optimum Moisture Content k: Laboratory Permeability FA: Peak Friction Angle C: Cohesion

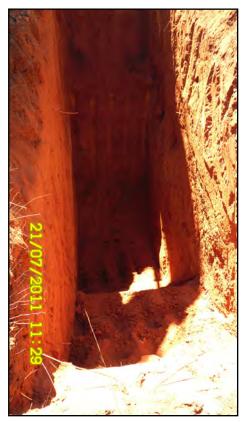
URS Australia Pty. Ltd. Phone: (07) 3243 2111 Fax: (07) 3243 2199														ect - Out-Of-Pit Tailings Storac					
Excavator Contractor Hills Mass Contracting						42626683						Alpha Coal Project - Out-Of-Pit Tailings Storag Facility							
Hitachi Checked By: RJR Call 200 LC Date Started: 24-7-11					Coord	Relative Level: 362 mAHD Coordinates: 7420095 mN 452944 mE Permit No:						Client: Hancock Coal							
C- REDUCED	DESCRIPTION OF STRATA											GRAPHIC LOG			SHEAR VANE STRENGTH (KPa)	POCKET PENETROMETER	DCPT (Blows/100mm)	SAMPLING AND OTHER TESTING	COMMEN
-361	Silty S dry, de	TOOLIELS AND (SM ense (Alli	(TOPSC A); fine t uvium) medium	DIL) to me	dium (graine	rd, well	graded, i graded, g o highly w ed (Colinie	reyish	brown,	20-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1			0— 1				BS @ 0.5m TP55-01	High resistar
360		OF TEST												2		-			
359						·								3	,				
358														•					
507														,					
		<u></u>				-	TEST	PIT SE		N								TEST PIT TERMIN	IATED AT:
																		Target Depth Refusal Flooding Caving/collapse	
														· · ·				SAMPLE TYPE: Bulk Sample Tube Sample Disturbed Sample	BS TS DS

FA: Peak Friction Angle C: Cohesion

D.2 Test Pit Photographs







Test Pit 02



Test Pit 07



Test Pit 05



Test Pit 10



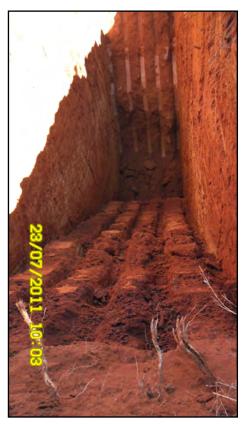








Test Pit 16



Test Pit 24









Test Pit 28/2



Test Pit 34











Test Pit 46



Test Pit 50







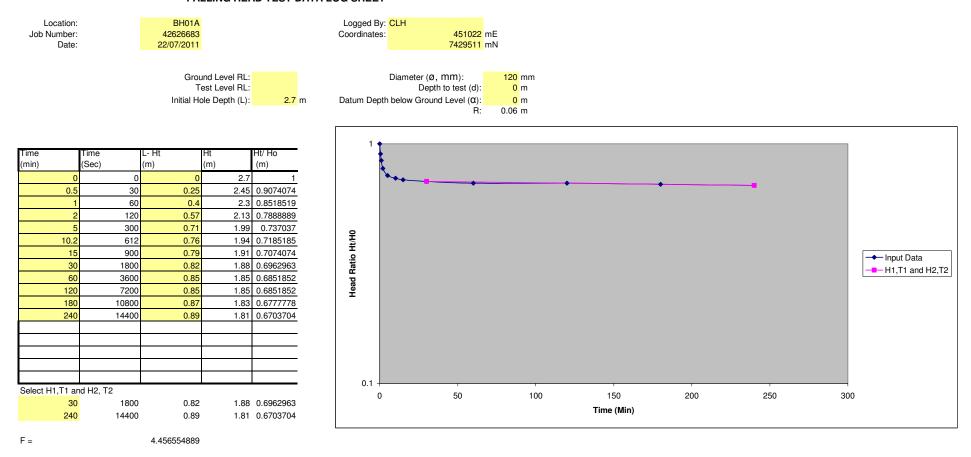
Appendix E In Situ Test Results

Ε

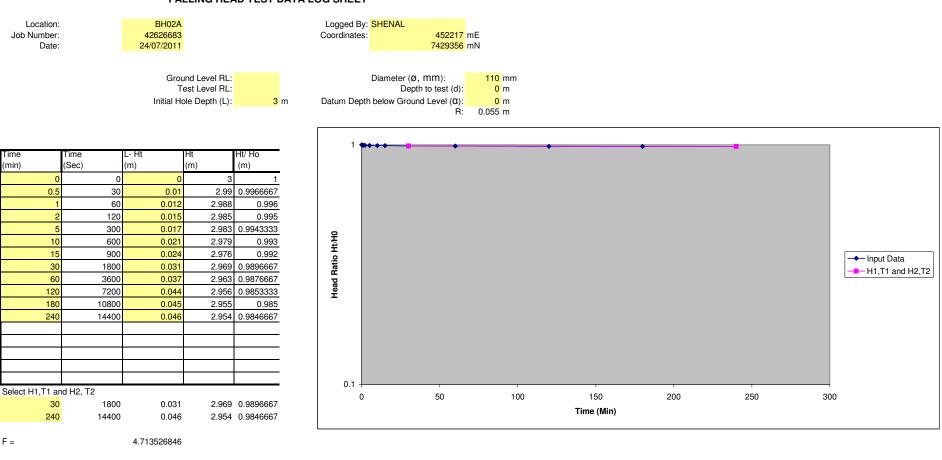


Appendix E

E.1 Falling Head Permeability Tests



K= 5.57139E-08

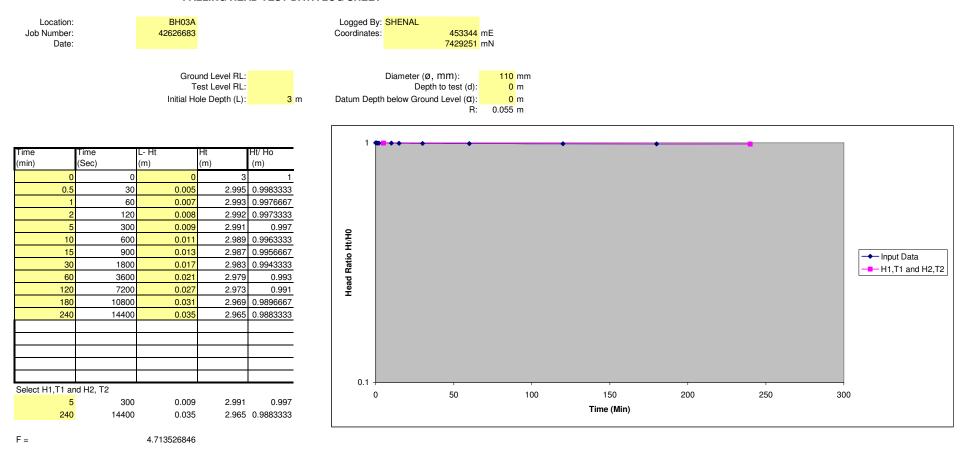


K= 7.29427E-09

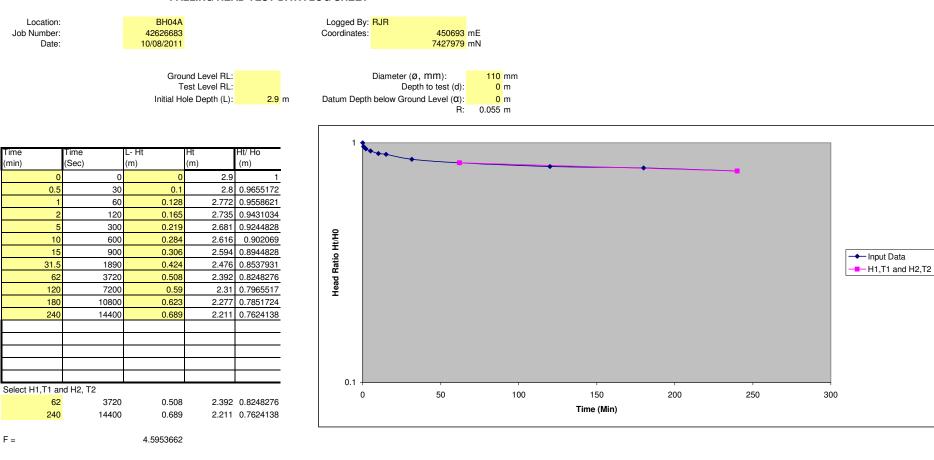
Time

(min)

F =

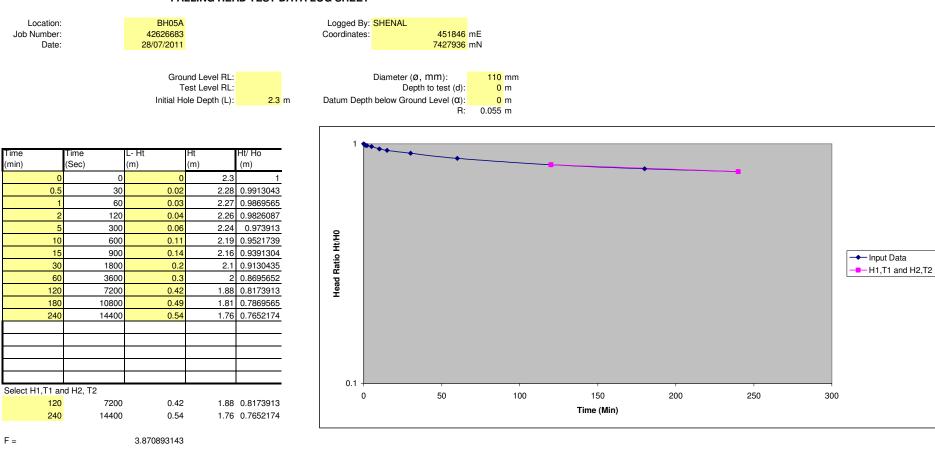


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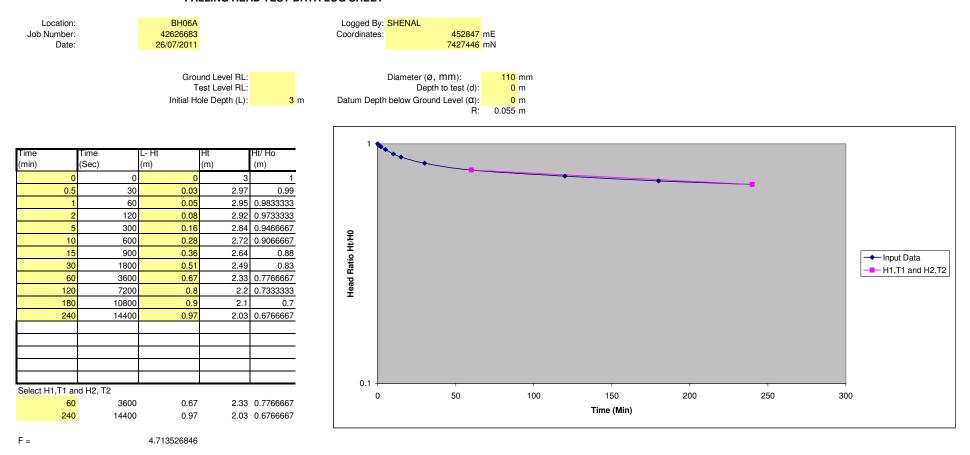


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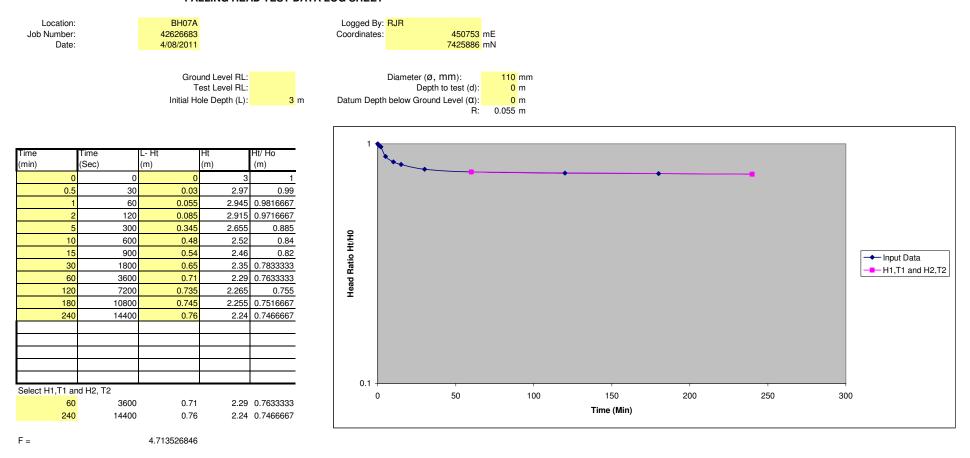
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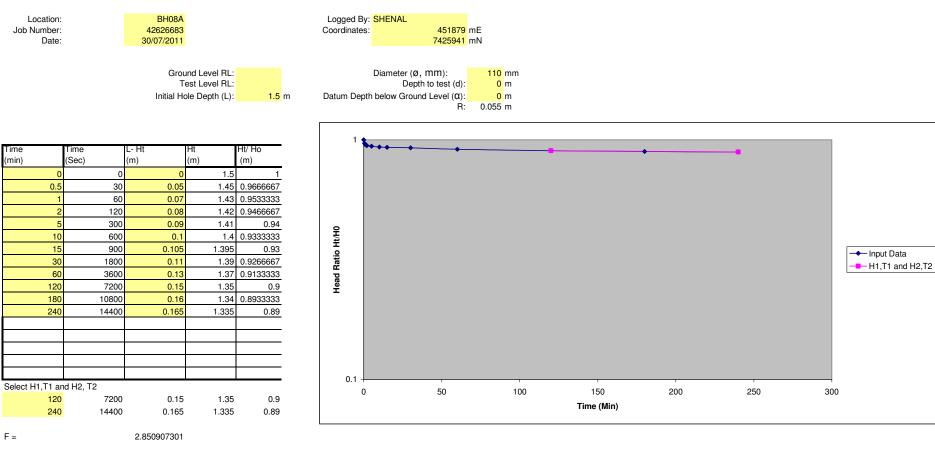
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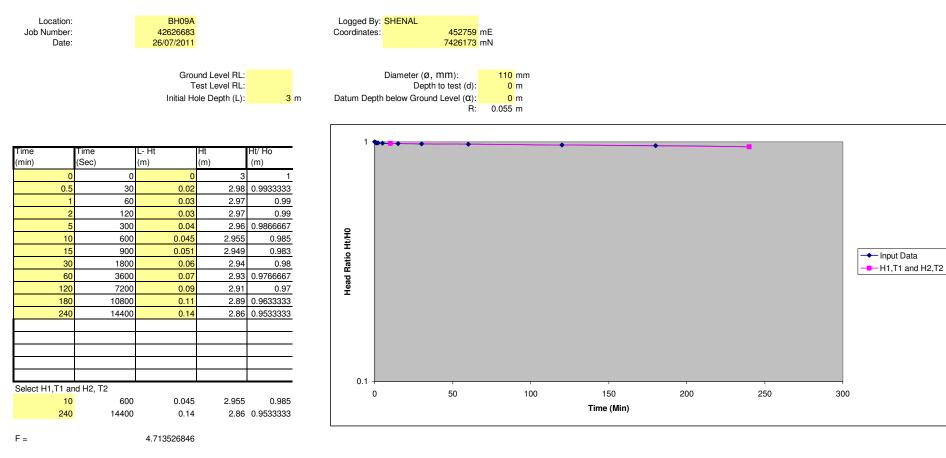
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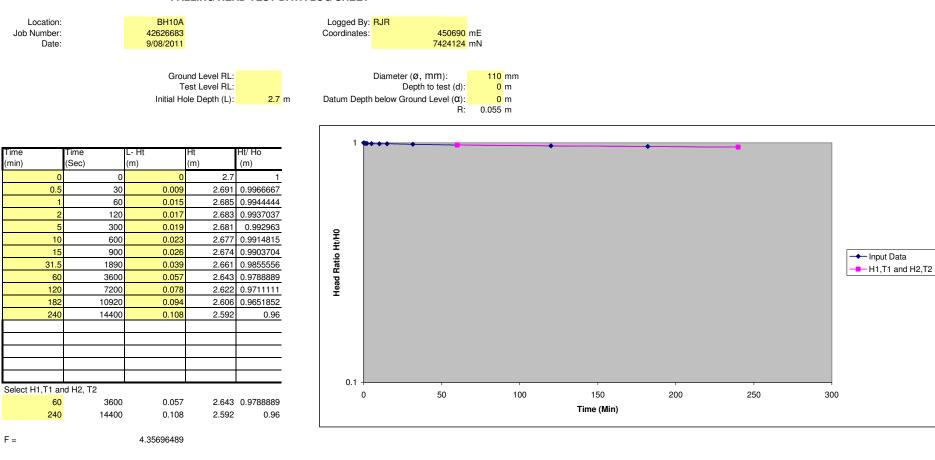
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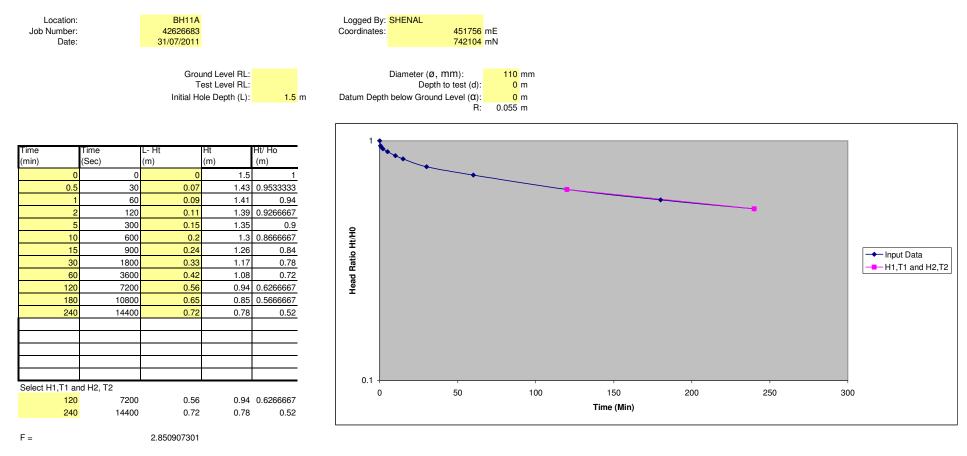
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K= 4.2967E-08

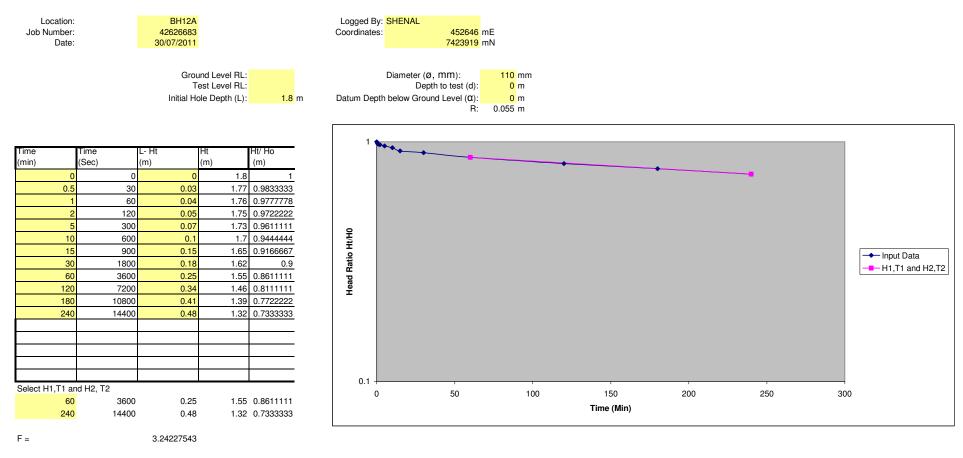


K= 2.86875E-08



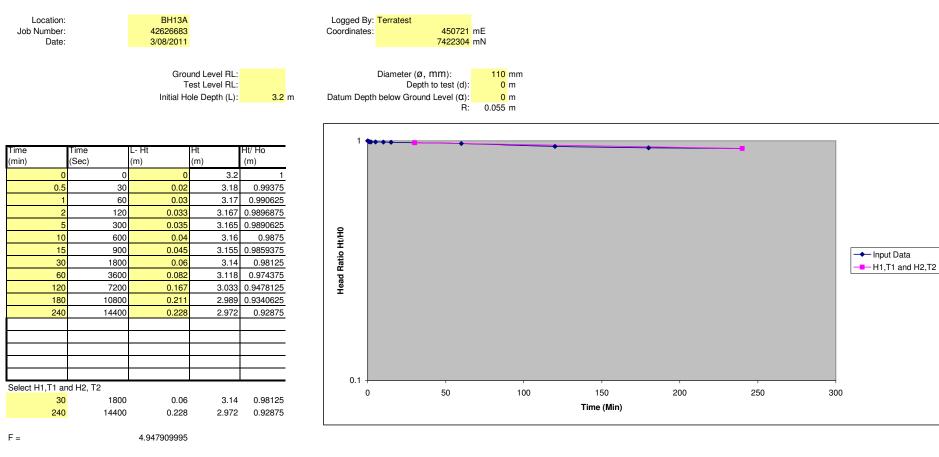
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URS FALLING HEAD TEST DATA LOG SHEET



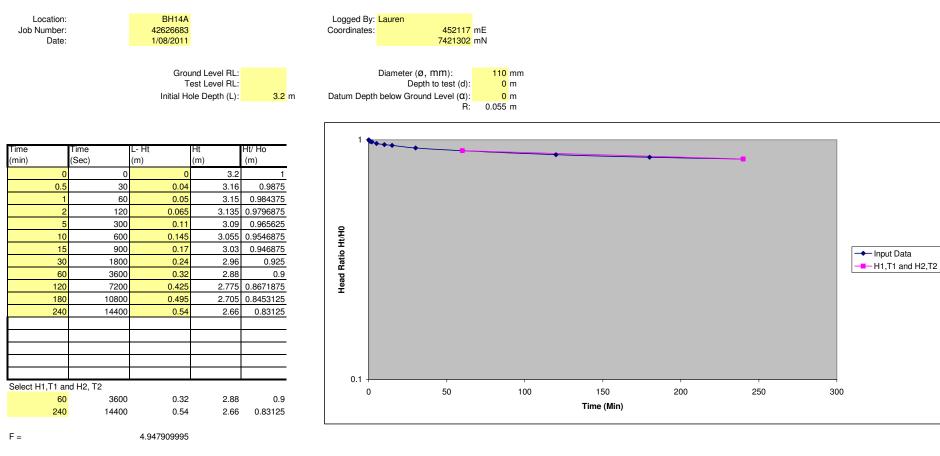
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URS FALLING HEAD TEST DATA LOG SHEET



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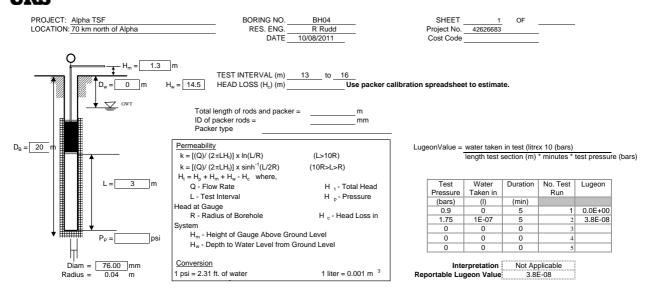
URS FALLING HEAD TEST DATA LOG SHEET



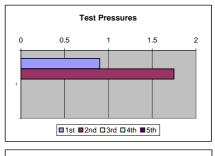
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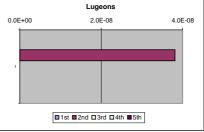
E.2 Packer Tests

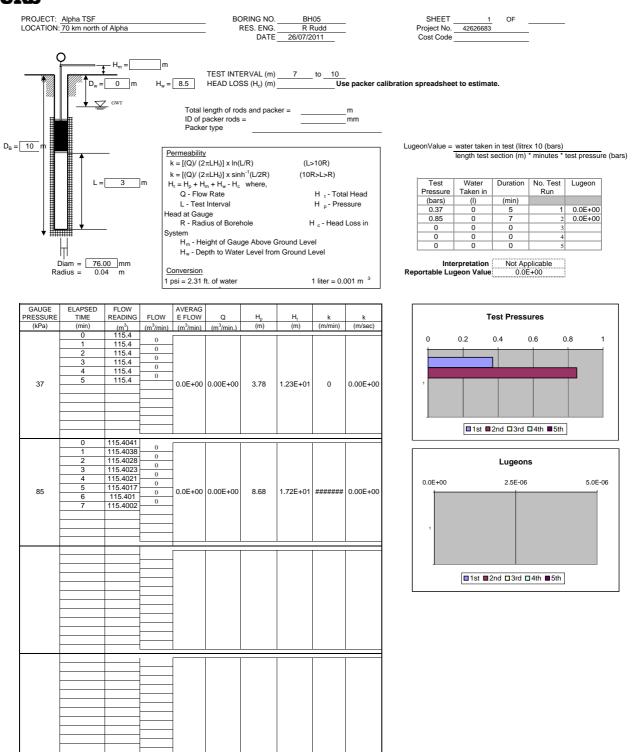


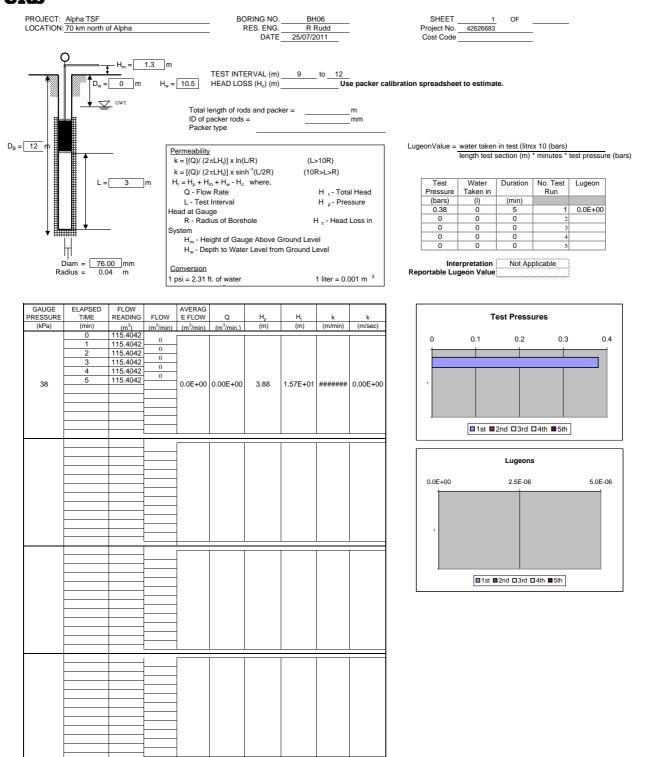


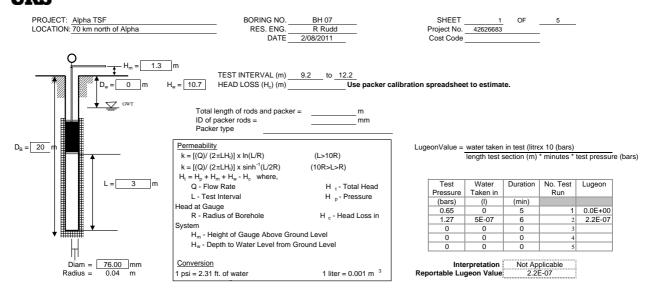
GAUGE	ELAPSED	FLOW		AVERAG			1		
PRESSURE	TIME	READING	FLOW	E FLOW	Q	Hp	H	k	k
(kPa)	(min)	(m ³)	(m ³ /min)	(m ³ /min)		(m)	(m)	(m/min)	(m/sec)
	0	115.2583	0						
	1	115.2583	0	-					
	2	115.2583	0						
	3	115.2583	0						
	4	115.2583	0	-					
90	5	115.2583	0	0.0E+00	0.00E+00	9.20	2.50E+01	0	0.00E+00
00				0.02.00	0.002100	0.20	2.002.01	Ŭ	0.002100
				1					
				1					
	0	115.2606							
	1	115.2606	0.0001						
	2	115.2607	0	1					
	3	115.2607	0	1					
	4	115.2607	0						
	5	115.2607	0					=	
175	-			2.0E-05	2.00E-05	17.88	3.37E+01	1.38E-07	2.29E-09
				-					
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				1					
				1					
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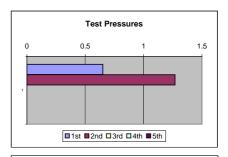


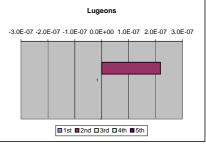


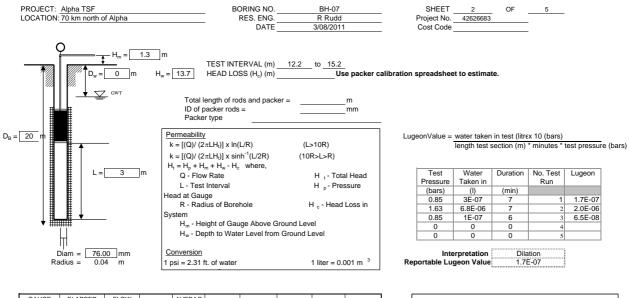




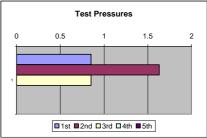
	GAUGE	ELAPSED	FLOW	51.011	AVERAG					
0 115,205 0 1 115,205 0 3 115,205 0 4 115,205 0 5 115,205 0 0 115,205 0 4 115,205 0 0 115,205 0 115,205 0 0.0E+00 0.0E+00 0.0E+00 6.64 1.86E+01 115,2066 0.0001 0.0001 0.0001 2 115,2066 0.0001 0.0001 1 115,2066 0.0001 0.0001 1 115,2066 0.0001 0.0001 3 115,2066 0.0001 0.0001 4 115,2068 0.0001 0.0001 5 115,2069 0.0001 0.0001 115,2069 0.001 0.0001 0.0001 0 0 0.0001 0.0001 0 0 0.0001 0.0001 0 0 0.0001 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>k (m/sec)</td>										k (m/sec)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	(Kra)				(m /min)	(m [*] /min.)	(11)	(11)	((((((((((((((((((((((((((((((((((((((((11/300)
2 115.205 0 3 115.205 0 65 5 115.205 0 0.0E+00 0.00E+00 1 0.0E+00 0.0E+00 1 115.2066 0.0001 1 115.2066 0.0001 1 115.2066 0.0001 1 115.2066 0.0001 1 115.2066 0.0001 1 0.0001 0.0001 1 0.0001 0.0001 1 0.0001 0.0001 0 0.0001 0.0001 0 0.0001 0.0001 0 0.0001 0.0001 0 0.0001 0.0001 0 0.0001 0.0001 0 0.0001 0.0001 0 0.0001	F									
3 115.205 0 4 115.205 0 5 115.205 0 0 115.206 0 1 115.2065 0 0.001 0.001 2 115.2066 0.0001 0.0001 1 115.2066 0.0001 0.0001 4 115.2066 0.0001 0.0001 115.2066 0.0001 0.0001 0.0001 115.2069 0 0 115.2069 0 0.0001 115.2069 0 0 0.0001 115.2069 0 0 0.0001 12.98 2.50E+01 12.98 2.50E+01 12.98 2.50E+01	F									
4 115.205 0 0.0E+00 0.0E+00 6.64 1.86E+01 ####### 0.00E 65 115.206 0 0.001 0.00E+00 6.64 1.86E+01 ####### 0.00E 1 115.2066 0.0001	F									
65 5 115.205 0 0.0E+00 0.00E+00 6.64 1.86E+01 ####### 0.00E 0 115.2064 0.0001 0	ŀ									
0 115.2064 0.002+00 0.002+00 0.002+00 0.002+01 <td></td> <td></td> <td></td> <td>0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>				0						
1 115.2065 0.0001 2 115.2066 0.0001 3 115.2066 0.0001 4 115.2069 0.0001 5 115.2069 0 6 115.2069 0	65				0.0E+00	0.00E+00	6.64	1.86E+01	#######	0.00E+00
1 115.2065 0.0001 2 115.2066 0.0001 3 115.2067 0.0001 4 115.2069 0.0001 6 115.2069 0 6 115.2069 0	F									
1 115.2065 0.0001 2 115.2066 0.0001 3 115.2067 0.0001 4 115.2069 0 6 115.2069 0 0 0 0 115.2069 0 0 0 115.2069 0 0 0										
1 115.2065 0.0001 2 115.2066 0.0001 3 115.2067 0.0001 4 115.2069 0 6 115.2069 0 0 0 0 115.2069 0 0 0 115.2069 0 0 0	Ī									
1 115.2065 0.0001 2 115.2066 0.0001 3 115.2067 0.0001 4 115.2069 0 6 115.2069 0 0 0 0 115.2069 0 0 0 115.2069 0 0 0					-					
1 115.2065 0.0001 2 115.2066 0.0001 3 115.2067 0.0001 4 115.2069 0 6 115.2069 0 0 0 0 115.2069 0 0 0 115.2069 0 0 0										
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2 115.2065 0.0001 <td>L</td> <td></td> <td></td> <td></td> <td>1</td> <td> </td> <td></td> <td> </td> <td></td> <td></td>	L				1					
111 0.0001 4 115.2069 5 115.2069 6 115.2069 6 115.2069 0 0 0 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>										
127 4 115.2008 5 115.2069 6 115.2069 6 115.2069 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -										
127 3 115.2069 0 8.3E-05 8.33E-05 12.98 2.50E+01 7.73E-07 1.291					1					
	127				8.3E-05	8.33E-05	12.98	2.50E+01	7.73E-07	1.29E-08
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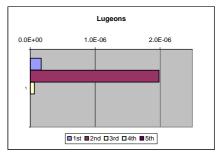


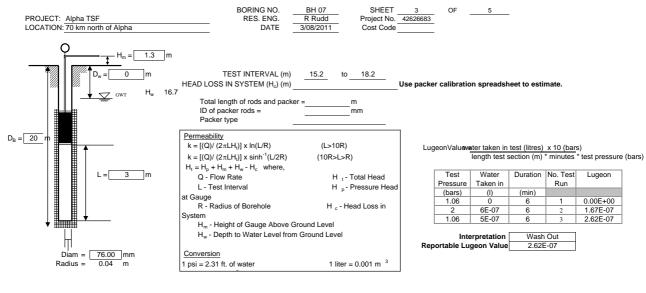




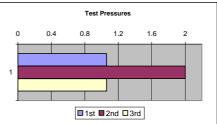
GAUGE PRESSURE	ELAPSED TIME	FLOW READING	FLOW	AVERAG E FLOW	Q	H	H,	k	k
(kPa)	(min)	(m ³)	(m ³ /min)	(m ³ /min)	(m ³ /min.)	(m)	(m)	(m/min)	(m/sec)
. ,	0	115.2169			(111 /11111.)	. ,	.,	, ,	. ,
	1	115.217	0.0001	-					
	2	115.217	0						
	3	115.2171	0.0001						
	4	115.2171	0						
85	5	115.2172	0.0001	4 25 05	4.29E-05	8.68	2.37E+01	4 105 07	6 00E 00
65	6	115.2172	0	4.3E-03	4.295-03	0.00	2.37 E+01	4.196-07	0.99E-09
	7	115.2172	0						
	0	115.2191	0.0012						
	1	115.2203	0.0012						
	2	115.2214	0.0009						
	3	115.2223	0.001						
	4	115.2233	0.001						
163	5	115.2243	0.0009	9.7E-04	9.71E-04	16.65	3.17E+01	7.11E-06	1.19E-07
	6	115.2252	0.0007						
	7	115.2259							
				1					
	0	115 0057							
	0	115.2257 115.2257	0						
			0	1					
	2	115.2257	0	1					
	4	115.2258	0.0001						
	5	115.2258	0						
85	6	115.2258	0	1.7E-05	1.67E-05	8.68	2.37E+01	1.63E-07	2.72E-09
	0	113.2230							
				1					
			1	-	1	1	1	1	
				4					
		1		4					
		1		4					
		1		"DIV//C	#DIV//C	0.00	4.505.04	"DIV/C	"DIV/C
		1		#DIV/0!	#DIV/0!	0.00	1.50E+01	#DIV/0!	#DIV/0!
				-					
				4					
				4					
				4					
							1		

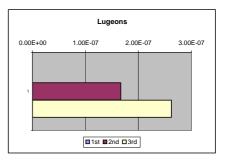


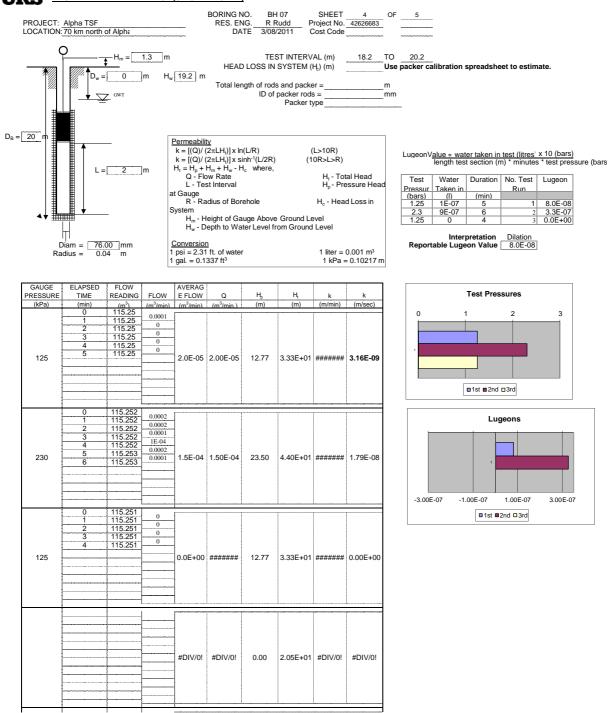




PRESSURE	ELAPSED TIME	FLOW READING	FLOW	AVERAG E FLOW	Q	Н _р	Н,	k	k
(kPa)	(min)	(m ³)	(m ³ /min)	(m ³ /min)	(m ³ /min.)	(m)	(m)	(m/min)	(m/sec)
	0	115.2275	0				1		
	1	115.2275	0						
	2	115.2275	0						
	3	115.2275							
	4	115.2275	0						
	5	115.2275	0						
106	6	115.2275	0	0.0E+00	0.00E+00	10.83	2.88E+01	########	0.00E+0
	-								
	0	115.229							
			0.0001						
	1	115.2291	0.0001	1			1		
	2	115.2292	0.0001	1					
	3	115.2293	0.0001						
	4	115.2294	0.0001						
200	5	115.2295		1.0E-04	1.00E-04	20.43	3.84E+01	6 025 07	1.01E-0
200	6	115.2296	0.0001	1.0E-04	1.00E-04	20.43	3.04E+01	0.03E-07	1.01E-0
	0	115.2285							
	1	115.2286	0.0001						
			0.0002						
	2	115.2288	0.0001						
	3	115.2289	0						
	4	115.2289	0.0001						
106	5	115.229		7.1E-05	7.14E-05	10.83	2.88E+01	5 74E 07	9.57E-0
100	6	115.229	0	7.TE=05	7.14E-05	10.05	2.000+01	5.74E-07	9.57
İ		115.229	0						
				#DIV/0!	#DIV/0!	0.00	1.80E+01	#DIV/0!	#DIV/0
				#DIV/0!	#DIV/0!	0.00	1.80E+01	#DIV/0!	#DIV/0
				#DIV/0!	#DIV/0!	0.00	1.80E+01	#DIV/0!	#DIV/0
				#DIV/0!	#DIV/0!	0.00	1.80E+01	#DIV/0!	#DIV/0
				#DIV/0!	#DIV/0!	0.00	1.80E+01	#DIV/0!	#DIV/0
				#DIV/0!	#DIV/0!	0.00	1.80E+01	#DIV/0!	#DIV/0
				#DIV/0!	#DIV/0!	0.00	1.80E+01	#DIV/0!	#DIV/0
				#DIV/0!	#DIV/0!	0.00	1.80E+01	#DIV/0!	#DIV/0
				#DIV/0!	#DIV/0!	0.00	1.80E+01	#DIV/0!	#DIV/0
				#DIV/0!	#DIV/0!	0.00	1.80E+01	#DIV/0!	#DIV/0
				#DIV/0!	#DIV/0!	0.00	1.80E+01	#DIV/0!	#DIV/0
				#DIV/0!	#DIV/0!	0.00	1.80E+01	#DIV/0!	#DIV/0
				#DIV/0!	#DIV/0!	0.00	1.80E+01	#DIV/0!	#DIV/0
				#DIV/0!	#DIV/0!	0.00	1.80E+01		
									#DIV/0





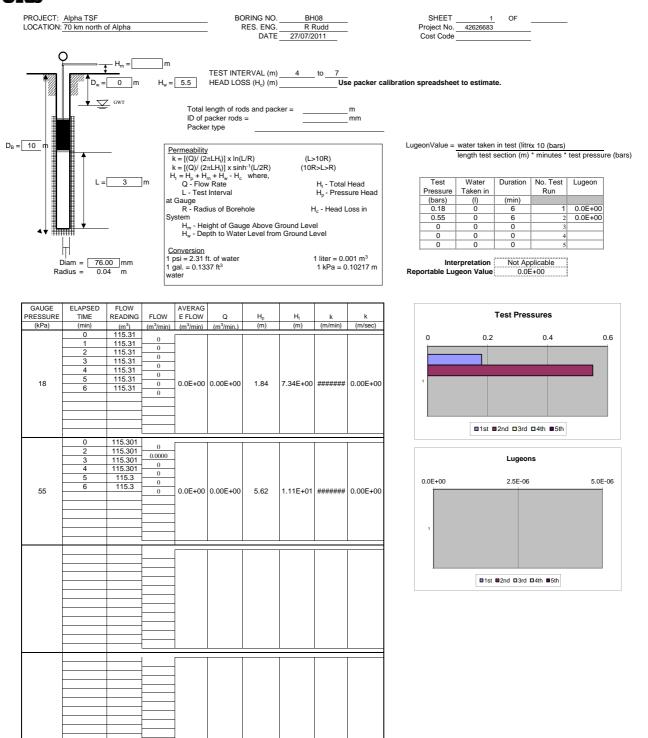


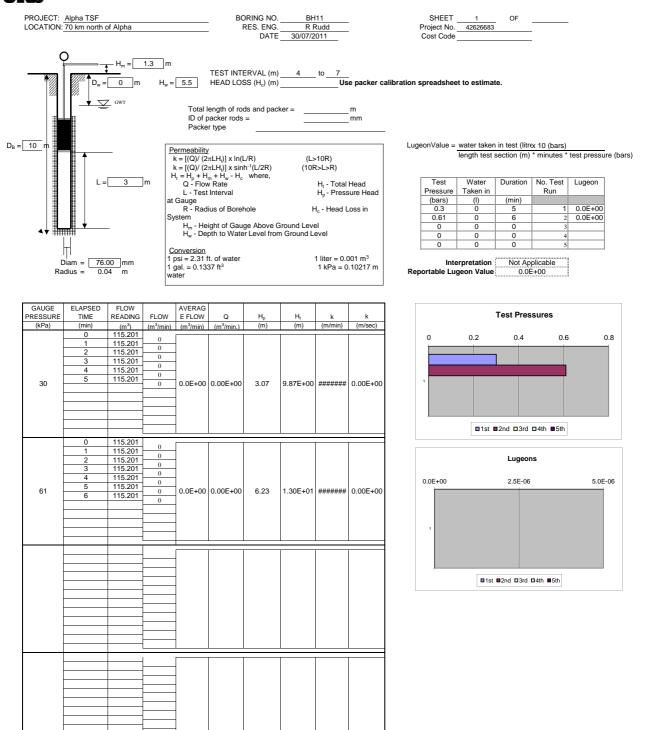
J:\Jobs\42626683\6 Deliv\6002 Final Report\6002-5 Appendix E In Situ Test Results\42626683_packer test.xls

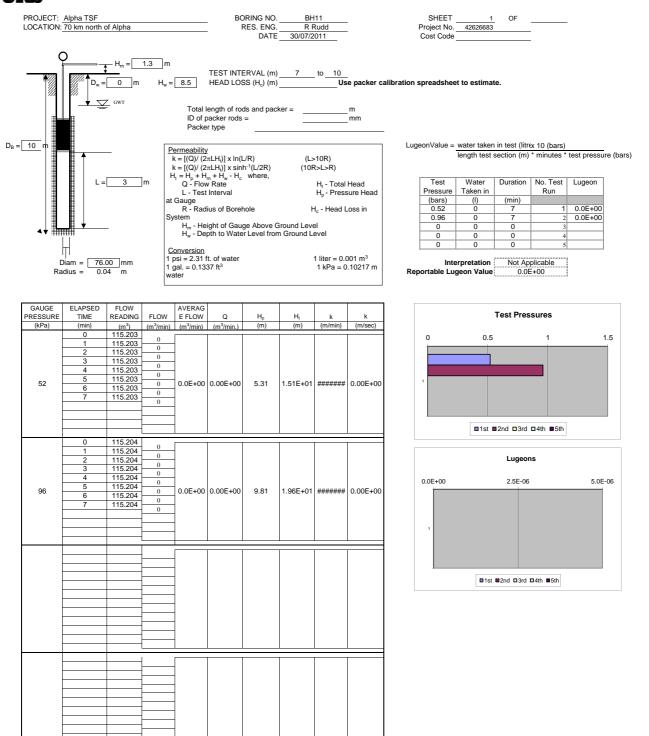
1 8.0E-08 2 3.3E-07 3 0.0E+00

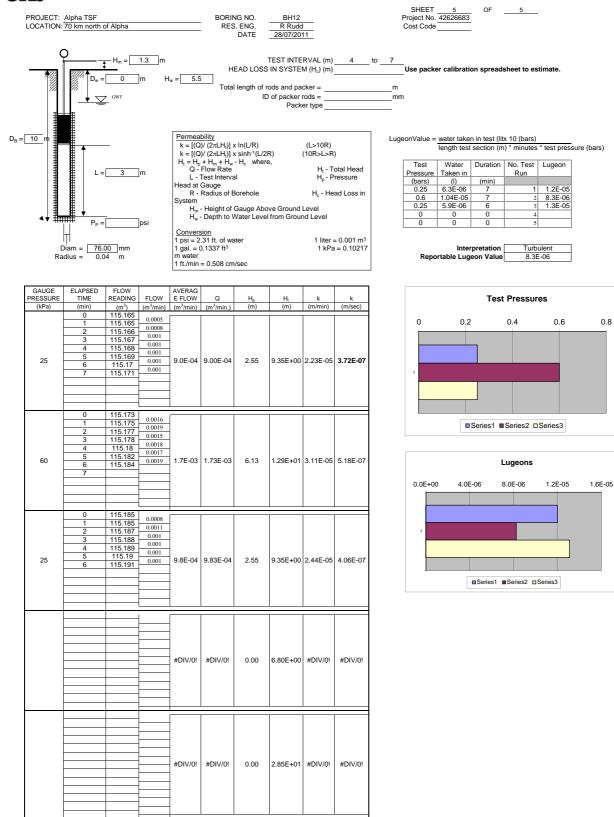
3

3.00E-07

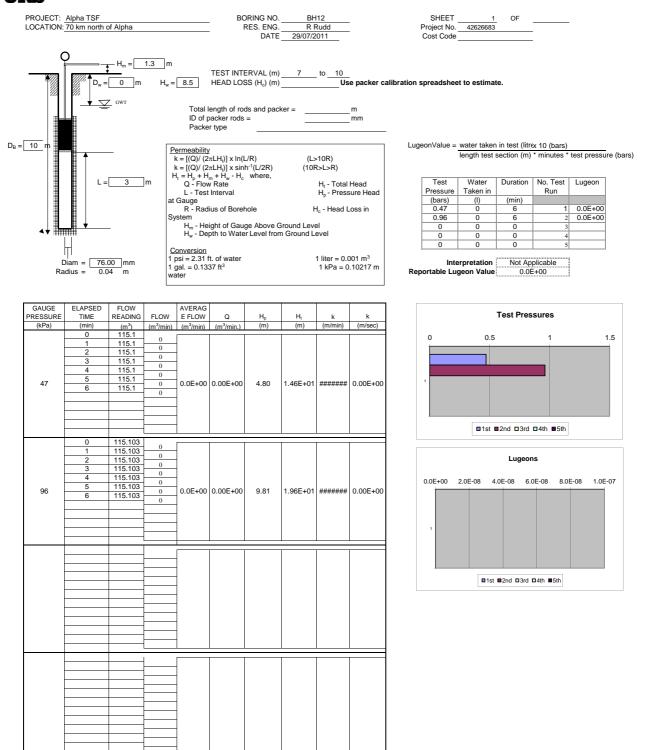








Page1



Appendix F Laboratory Test Results



F

42626683/01/01



Perth 2 Kimmer Place, Queens Park WA 6107 Ph: +61 8 9258 8323

	d		Report N	0.	11080521-	AL
a TSF Geotech			Test Date Report D		24/08-31/08/20 02/09/2011	
1108052	11080523	11080524	11080525	11080526	11080532]
TP01-03	3 TP03-02	TP04-01	TP05-01	TP05-02	TP12-02	
3.00	1.00	0.30	0.60	1.70	1.20	
31	43	21	15	29	23	
18	16	11	12	13	12	
13	27	10	3	16	11	1
5.0*	9.5+	3.0*	0.5	6.0*	6.0+	
nt (%) 9.3	11.4	8.8	7.8	12.2	11.0	
TP19-02 0.90	2 TP23-02 1.30	TP24-01 0.70	TP24-02 2.50	TP26-02 0.90	TP28/2-02 2.00	
0.90	1.30	0.70	2.50	0.90	2.00	
27	39	24	29	31	35	
18	12	13	14	11	13	
9	27	11	15	20	22	
2.5*	7.5+	3.5*	7.0	5.5+	7.5+	
nt (%) 7.2	11.3	5.0	11.7	10.0	12.3	
	3.00 31 18 13 5.0* nt (%) 9.3 1108053 TP19-02 0.90 27 18 9	3.00 1.00 31 43 18 16 13 27 5.0* 9.5+ nt (%) 9.3 11080537 11080539 TP19-02 TP23-02 0.90 1.30 27 39 18 12 9 27	3.00 1.00 0.30 31 43 21 18 16 11 13 27 10 5.0* 9.5+ 3.0* nt (%) 9.3 11.4 8.8 11080537 11080539 11080540 TP19-02 TP23-02 TP24-01 0.90 1.30 0.70 27 39 24 18 12 13 9 27 11	3.00 1.00 0.30 0.60 31 43 21 15 18 16 11 12 13 27 10 3 5.0^* $9.5+$ 3.0^* 0.5 nt (%) 9.3 11.4 8.8 7.8 11080537 11080539 11080540 11080541 TP19-02TP23-02TP24-01TP24-02 0.90 1.30 0.70 2.50 27 39 24 29 18 12 13 14 9 27 11 15	3.00 1.00 0.30 0.60 1.70 31 43 21 15 29 18 16 11 12 13 13 27 10 3 16 5.0* 9.5+ 3.0* 0.5 6.0* nt (%) 9.3 11.4 8.8 7.8 12.2 11080537 11080539 11080540 11080541 11080542 TP19-02 TP23-02 TP24-01 TP24-02 TP26-02 0.90 1.30 0.70 2.50 0.90 27 39 24 29 31 18 12 13 14 11 9 27 11 15 20	1000 1000 0.30 0.60 1.70 1.20 3.00 1.00 0.30 0.60 1.70 1.20 31 43 21 15 29 23 18 16 11 12 13 12 13 27 10 3 16 11 5.0* 9.5+ 3.0* 0.5 6.0* 6.0+ nt (%) 9.3 11.4 8.8 7.8 12.2 11.0 11080537 11080539 11080540 11080541 11080542 11080543 TP19-02 TP23-02 TP24-01 TP24-02 TP26-02 TP28/2-02 0.90 1.30 0.70 2.50 0.90 2.00 27 39 24 29 31 35 18 12 13 14 11 13 9 27 11 15 20 22

ACCURATE QUALITY RESULTS FOR TOMORROW'S ENGINEERING



Perth 2 Kimmer Place, Queens Park WA 6107 Ph: +61 8 9258 8323

	URS Austra	alia Pty Ltd		1289 3.6.1, 2.1.	Report No	0.	11080521-G
					_		
	Alpha TSF	Geotech			Test Date	•	18/08-02/09/
					Report Da	ate	02/09/2011
e No.	11080521	11080522	11080527	11080528	11080529	11080530	11080531
D	TP01-03	TP01-04	TP05-03	TP08-02	TP09-02	TP10-01	TP10-03
(m)	3.00	3.40	2.80	0.90	0.70	0.60	2.00
re (%)	9.3	9.8	10.1	11.5	10.3	4.2	11.7
VE SIZE			PE	RCENT PASSI	NG		
60							
5							
3							100
.5			100	100			88
.5	100		88	98			79
9	98	100	74	92			61
5	96	98	57	70			38
75	94	97	47	47			25
36	91	95	43	29	100	100	21
18	70	94	37	27	99	98	18
00	57	91	33	23	96	95	16
25	51	85	31	20	94	91	15
00	44	78	29	17	90	82	14
50	32	63	23	12	74	50	12
75	23	38	19	9	61	35	10
	D m) re (%) VE SIZE 0 5 5 5 6 8 6 18 00 25 00 50	No. 11080521 D TP01-03 m) 3.00 re (%) 9.3 VE SIZE	D TP01-03 TP01-04 m) 3.00 3.40 re (%) 9.3 9.8 VE SIZE	No. 11080521 11080522 11080527 D TP01-03 TP01-04 TP05-03 m) 3.00 3.40 2.80 re (%) 9.3 9.8 10.1 VE SIZE PE 0 100 5 100 5 100 88 9 98 100 74 5 96 98 57 75 94 97 47 86 91 95 43 98 100 74 37 90 91 93 92 43 91 95 43 37 90 57 91 33 18 70 94 37 90 32 63 23 91 33 31 92 51 85 31 93 32 63 23	No. 11080521 11080522 11080527 11080528 D TP01-03 TP01-04 TP05-03 TP08-02 m) 3.00 3.40 2.80 0.90 re (%) 9.3 9.8 10.1 11.5 VE SIZE PERCENT PASSI 0 3.00 3.40 2.80 0.90 re (%) 9.3 9.8 10.1 11.5 VE SIZE PERCENT PASSI 0 5.5 3.0 5.5 3.00 5.5 3.00 5.5 100 5.5 100 5.5 5.5	No. 11080521 11080522 11080527 11080528 11080529 D TP01-03 TP01-04 TP05-03 TP08-02 TP09-02 m) 3.00 3.40 2.80 0.90 0.70 re (%) 9.3 9.8 10.1 11.5 10.3 VE SIZE PERCENT PASSING 0	No. 11080521 11080522 11080527 11080528 11080529 11080530 D TP01-03 TP01-04 TP05-03 TP08-02 TP09-02 TP10-01 m) 3.00 3.40 2.80 0.90 0.70 0.60 re (%) 9.3 9.8 10.1 11.5 10.3 4.2 VE SIZE PERCENT PASSING 0 Image: Image



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			LASS NU Test Method:			U		
lient	URS Austra	lia Pty Ltd			Report N	0.	11080523-	EM
roject	Alpha TSF (Geotech			Test Date Report D		18/08-24/08 02/09/2011	
						T	T	-
Sample No.	11080523	11080524	11080526	11080532	11080536	11080541	11080545	
Client ID	TP03-02	TP04-01	TP05-02	TP12-02	TP15-01	TP24-02	TP29-01	
Depth (m)	1.00	0.30	1.70	1.20	0.60	2.50	0.40	
Description	Sandy Clay - Orange/ Brown	Sandy Silt - Brown	Sandy Clay - Red/Brown/G rey	Sandy Clay - Pale Brown	Silty Sand - Brown	Sandy Clay - Orange/ Brown	Silty Sand - Red/Brown	
Emerson Class Number	2	5	5	1	5	5	5	
			1				1	٦
Sample No.	11080547	-	-	-	-	-	-	4
Client ID	TP33-02	-	-	-	-	-	-	
Depth (m)	1.30	-	-	-	-	-	-	
Description	Silty Sandy Gravel - Brown	-	-	-	-	-	-	
Emerson Class Number	2	-	-	-	-	-	-	
Sample No.	-	-	-	-	-	-	-	ן
Client ID	-	-	-	-	-	-	-	
Depth (m)	-	-	-	-	-	-	-	
Description	-	-	-	-	-	-	-	
Emerson Class Number	-	-	-	-	-	-	-	
ES/REMARKS: nple/s supplied by the This document is is:	sued in accordanc			istilled water at Authorised	Signatory		Page 1 of 1	
accreditation require ISO/IES 17025. Th measurements inclu Australian/National	e results of the tes uded in this docum	sts, calibrations, a	nd/or	Jamin J. Rus	Quall sen	//		



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URS Aus	stralia F	Pty L	td						R	ерс	rt N	lo.		_		110	805	523-	G	_
Alpha TS	SF Geo	tech							Т	est	Date	e				22-	24/0)8/2	201	1
									R	epc	rt D	ate	è			2/9/	/201	1		
TP03-02										-				1						
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%		100 T													Ш]
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										\mathbb{H}										
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100																				
97		70																	$\parallel \parallel$	
95								/	1											
91								/												
88		60 -		+++			+++	\parallel			$\parallel \mid$	+		++	+++	-	+	+	$\left\{ \left\ \right\ \right\}$	-
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	sing	50																		
	Pas	³⁰					Х													
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		20																		
		30 -																		1
		20 -		+++					$\left \right $								+	+		-
42																				
40		10 -																		1
40																				
39		0 -																		1
39		0.0	01		0.01						1				1	0			1	00
37								Particl	e Size	(mm)										
34																				
	TP03-02 Passing % 100 97 95 91 88 84 82 77 64 82 77 64 55 50 46 45 45 45 45 45 45 45 45 45 45 45 45 45	TP03-02 Passing % 100 97 95 91 88 84 82 77 64 55 50 46 45 55 50 46 45 45 45 45 45 45 45 45 45 45 45 45 45	TP03-02 Passing 100 % 100 90 90 100 90 100 90 100 90 100 90 100 90 100 90 100 90 100 90 100 90 100 90 100 90 91 80 82 70 64 55 50 40 45 30 45 20 45 20 45 20 42 10 40 0 39 0.00 37 0.00	Passing 100 90 90 90 80 100 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 91 80 92 70 93 90 90 90 91 90 60 90 91 90 60 40 45 40 42 10 40 90 39 0.001	TP03-02 Passing 100 % 90 80 100 90 80 100 90 80 100 90 80 100 90 80 100 90 80 100 90 80 100 90 80 100 90 80 91 88 82 77 64 50 40 40 30 45 45 40 45 45 40 42 40 0 0 30 0 0 0 39 39 0 0 37 37 0 0 0	TP03-02 Passing %	TP03-02 Passing % % 100 90 90 90 80 100 70 95 91 88 84 82 77 64 55 50 40 40 40 45 45 45 45 45 45 42 40 40 0 40 0 39 39 39 39 39 39	TP03-02 Passing 100 % 90 80 100 90 80 100 90 80 100 90 80 100 90 80 100 90 80 100 90 80 100 90 80 91 80 70 60 88 84 82 77 64 55 50 40 40 40 45 45 45 45 45 43 42 40 </th <th>TP03-02 Passing 90 90 90 90 80 100 90 91 80 88 84 82 70 60 91 60 60 88 84 82 77 64 55 50 40 46 30 40 45 45 45 45 45 45 42 40 0.01 0.1 39 39 39 37 0.01 0.01 0.1</th> <th>TP03-02 Passing % 100 90 90 90 80 100 90 91 80 95 91 88 84 82 77 64 55 50 40 46 45 45 20 46 45 45 20 42 42 40 0 39 0.001 0.01 39 0.001 0.01</th> <th>TP03-02 Deg Passing % 100 % 90 90 80 100 90 90 80 70 60 88 84 82 77 64 55 50 40 46 30 46 30 45 45 45 20 40 0 0 0.01 0.1 93 39 37</th> <th>TP03-02 Depth of Passing % 100 90 90 90 80 100 97 95 91 88 84 82 77 64 55 50 46 45 45 45 45 45 45 45 45 45 45 42 40 40 0 39 39 37 0.01 0.1 1</th> <th>TP03-02 Depth (m) Passing % 90</th> <th>Production Report Date TP03-02 Depth (m) Passing % % 0 100 90 90 80 70 0 91 80 88 84 82 77 64 55 50 40 40 40 42 42 42 42 40 0 39 39 37 0.01 0.1 1</th> <th>TP03-02 Depth (m) 1 Passing % 100 90 100 90 80 100 90 90 80 70 60 91 80 88 84 82 77 64 55 50 40 46 30 46 30 45 20 43 20 42 10 40 0 39 0 39 39 37 0</th> <th>Passing % Depth (m) 1.0 Passing % 0</th> <th>Report Date 2/9 TP03-02 Depth (m) 1.00 Passing % % 0 100 90 90 80 100 90 91 88 88 84 82 91 88 82 91 60 88 84 82 91 88 84 82 90 91 80 88 84 82 90 91 80 84 82 92 90 91 80 82 91 83 84 84 82 92 90 93 90 46 45 45 43 42 10 93 93 339 339 339 339 337 91</th> <th>$\begin{array}{c c c c c c c c c c c c c c c c c c c$</th> <th>Report Date 2/9/2011 TP03-02 Depth (m) 1.00 Passing 0 0 0 % 0 0 0 0 100 90 80 0 0 0 100 97 95 91 80 <</th> <th>Report Date 2/9/2011 PD3-02 Depth (m) 1.00 Passing 0 0 0 0 0 0 0 0 100 90 80 0 0 0 100 97 95 91 80 <t< th=""></t<></th>	TP03-02 Passing 90 90 90 90 80 100 90 91 80 88 84 82 70 60 91 60 60 88 84 82 77 64 55 50 40 46 30 40 45 45 45 45 45 45 42 40 0.01 0.1 39 39 39 37 0.01 0.01 0.1	TP03-02 Passing % 100 90 90 90 80 100 90 91 80 95 91 88 84 82 77 64 55 50 40 46 45 45 20 46 45 45 20 42 42 40 0 39 0.001 0.01 39 0.001 0.01	TP03-02 Deg Passing % 100 % 90 90 80 100 90 90 80 70 60 88 84 82 77 64 55 50 40 46 30 46 30 45 45 45 20 40 0 0 0.01 0.1 93 39 37	TP03-02 Depth of Passing % 100 90 90 90 80 100 97 95 91 88 84 82 77 64 55 50 46 45 45 45 45 45 45 45 45 45 45 42 40 40 0 39 39 37 0.01 0.1 1	TP03-02 Depth (m) Passing % 90	Production Report Date TP03-02 Depth (m) Passing % % 0 100 90 90 80 70 0 91 80 88 84 82 77 64 55 50 40 40 40 42 42 42 42 40 0 39 39 37 0.01 0.1 1	TP03-02 Depth (m) 1 Passing % 100 90 100 90 80 100 90 90 80 70 60 91 80 88 84 82 77 64 55 50 40 46 30 46 30 45 20 43 20 42 10 40 0 39 0 39 39 37 0	Passing % Depth (m) 1.0 Passing % 0	Report Date 2/9 TP03-02 Depth (m) 1.00 Passing % % 0 100 90 90 80 100 90 91 88 88 84 82 91 88 82 91 60 88 84 82 91 88 84 82 90 91 80 88 84 82 90 91 80 84 82 92 90 91 80 82 91 83 84 84 82 92 90 93 90 46 45 45 43 42 10 93 93 339 339 339 339 337 91	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Report Date 2/9/2011 TP03-02 Depth (m) 1.00 Passing 0 0 0 % 0 0 0 0 100 90 80 0 0 0 100 97 95 91 80 <	Report Date 2/9/2011 PD3-02 Depth (m) 1.00 Passing 0 0 0 0 0 0 0 0 100 90 80 0 0 0 100 97 95 91 80 0 <t< th=""></t<>



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lient		URS Austra	ia Pty Ltd	iest Method	: AS 1289 5.1.1	Report No.	11080523	-MDE
roject		Alpha TSF (Seotech			Test Date Report Date	20/08/201 2/09/2011	1
lient ID)	TP03-02				Depth (m)	1.00	
escript	ion	Sandy Clay	- Brown					
	1.900]
	1.850 —							
	1.800 —					•		
	1.750 —		•					
t/m³)	1.700 —						•	
Dry Density (t/m³)	1.650 -	•						
_	1.600 —							
	1.550 —							
	1.500	12.0	13.0	14.0	15.0	16.0 17	7.0 18.0	
				Moist	ure Content (%	()		
Maxi	mum Dr	y Density (t/m³)	1.80	Optimum	Moisture Con	tent (%)	14.5	_
Mois	ture Coi	ntent (%)	11.4	Percentag	je of Oversize/	/Sieve Size (mm)	0/19	
ES/REMA		This is a comp from the resul	-	-	nates may show	v some minor variations	Page 1 of 1	REP
This o accre ISO/II meas	document editation re ES 17025. surements	is issued in accordance quirements. Accredite . The results of the tes included in this docume	d for compliance s, calibrations, a	nd/or	3	l Signatory Dunll ssell		
Austr	alian/Natio	onal Standards.					Laborato	www.No

ACCURATE QUALITY RESULTS FOR TOMORROW'S ENGINEERING



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lient		URS	S Austral	ia Pty Ltd		od: AS 1289		eport No.	11080524	-MDD
roject	t	Alph	na TSF G	Geotech				est Date eport Date	20/08/201 2/09/2011	1
lient l	ID	TP0	4-01					Depth (m)	0.30	
escrij	ption	Silty	Sand -	Pale Brow	n					
	^{2.200} T]
	2.100 -									
							• •			
	2.000 -							•		
	1.900 -				×					
13)										
ity (t/m	1.800 -			<u> </u>						
Dry Density (t/m³)										
E E	1.700 -		•							
	1.600 -									
	1.000									
	1.500 -									
	4.0		5.0	6.0	7.0 Mo	8.0 isture Conte	9.0 ent (%)	10.0 1	1.0 12.0	
Ма	ximum D	ry Densit	y (t/m³)	2.05	Optimu	m Moisture	Content (%	%)	9.0	
Моі	isture Co	ntent (%))	8.8	Percen	tage of Ove	rsize/Sieve	Size (mm)	0/19	
ES/REM	MARKS:	This	is a comp	uter generat	ed plot so es	stimates may	show some	e minor variations		
iple/s s	upplied b	from y the clier		s summaris	ed.				Page 1 of 1	REP
acc ISC	creditation r D/IES 17025	equirements 5. The resul	s. Accredited Its of the test	e with NATA's d for complianc s, calibrations, ent are traceab	and/or		horised Signa		I	
		onal Standa		הו מוכ וומטפמט		\mathcal{V}	J. Russell		Laborato	COMPETENCI

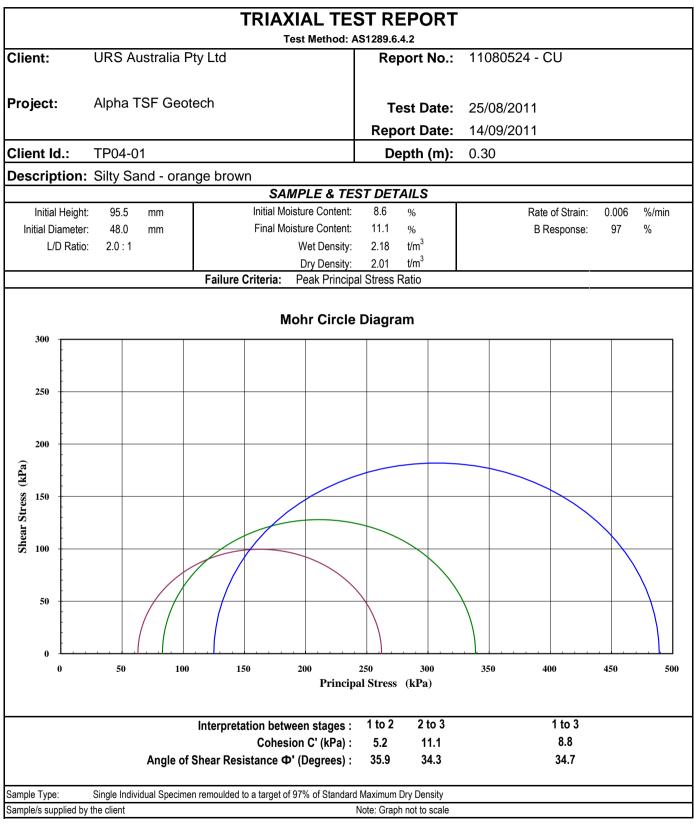
ACCURATE QUALITY RESULTS FOR TOMORROW'S ENGINEERING



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Test Method AS 1289 6.7.3, 5.1.1 / KH 2 (Based on K H Head Client URS Australia Pty Ltd Project Alpha TSF Geotech Sample No.	Test Date Report No. Test Date Report Date 1108052 TP04-0' 0.30 2.05 9.0 9.0 2.19 Distilled 50	11080524-CHP 08/09-03/10/2011 3/10/2011 4
Sample No. Client ID Depth (m) Standard Maximum Dry Density (t/m³) Standard Optimum Moisture Content (%) Placement Moisture Content (%) Placement Wet Density (t/m³) Water Used	Report Date 1108052 TP04-07 0.30 2.05 9.0 9.0 2.19 Distilled	3/10/2011 4
Client ID Depth (m) Standard Maximum Dry Density (t/m³) Standard Optimum Moisture Content (%) Placement Moisture Content (%) Placement Wet Density (t/m³) Water Used	1108052 TP04-0 ² 0.30 2.05 9.0 9.0 2.19 Distilled	4
Client ID Depth (m) Standard Maximum Dry Density (t/m³) Standard Optimum Moisture Content (%) Placement Moisture Content (%) Placement Wet Density (t/m³) Water Used	TP04-07 0.30 2.05 9.0 9.0 2.19 Distilled	
Depth (m) Standard Maximum Dry Density (t/m³) Standard Optimum Moisture Content (%) Placement Moisture Content (%) Placement Moisture Content (%) Placement Wet Density (t/m³) Water Used Placement Moisture Content (%)	0.30 2.05 9.0 9.0 2.19 Distilled	
Standard Maximum Dry Density (t/m³) Standard Optimum Moisture Content (%) Placement Moisture Content (%) Placement Wet Density (t/m³) Water Used	2.05 9.0 9.0 2.19 Distilled	
Standard Optimum Moisture Content (%) Placement Moisture Content (%) Placement Wet Density (t/m³) Water Used	9.0 9.0 2.19 Distilled	
Placement Moisture Content (%) Placement Wet Density (t/m³) Water Used	9.0 2.19 Distilled	
Placement Moisture Content (%) Placement Wet Density (t/m³) Water Used	2.19 Distilled	
Placement Wet Density (t/m ³) Water Used	2.19 Distilled	
Water Used	Distilled	
Pressure Applied (kPa)	50	
Flessure Applied (KPa)		
Specimen Dimensions		
Diameter (mm)	48.0	
Length (mm)	56.8	
PERMEABILITY	K ₂₀ = 8 X 10) ⁻¹⁰ m/s
Notes/Remarks: The above specimen was remoulded to a target of 98% of	of Standard Dry Density	
and at Optimum Moisture Content Sample/s supplied by client Tes	sted as received	Page: 1 of 1 REP01701
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The results of calibrations and tests performed apply only to the specific instrume	nt or sample at the time of te	Laboratory No. 9926







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Authorised Signatory amer Quell J. Russell

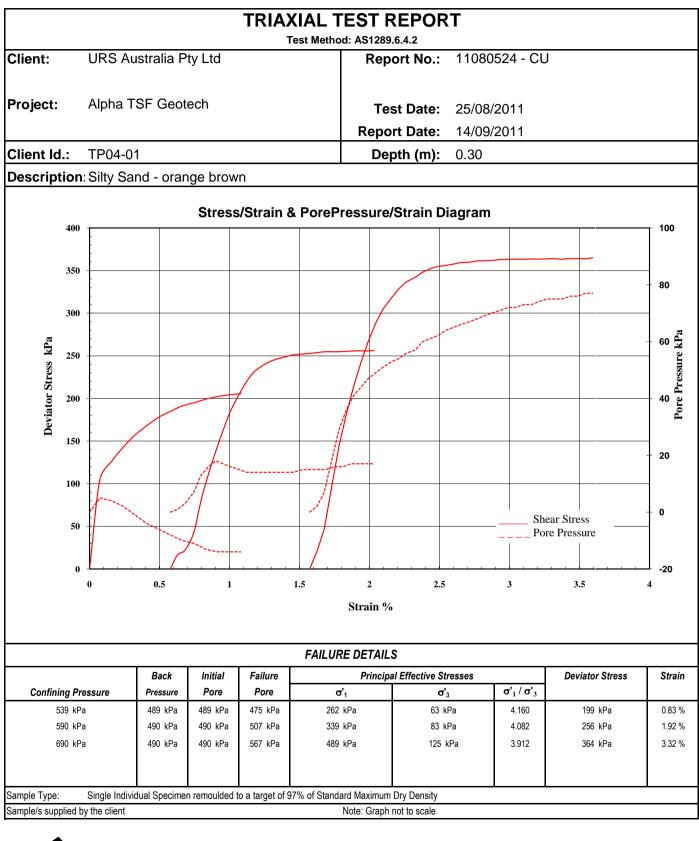
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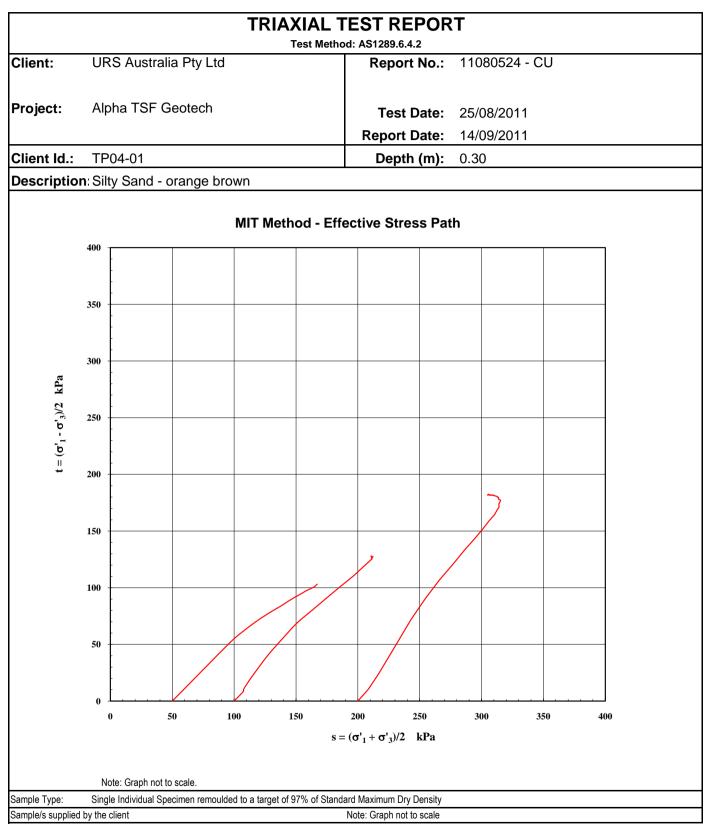
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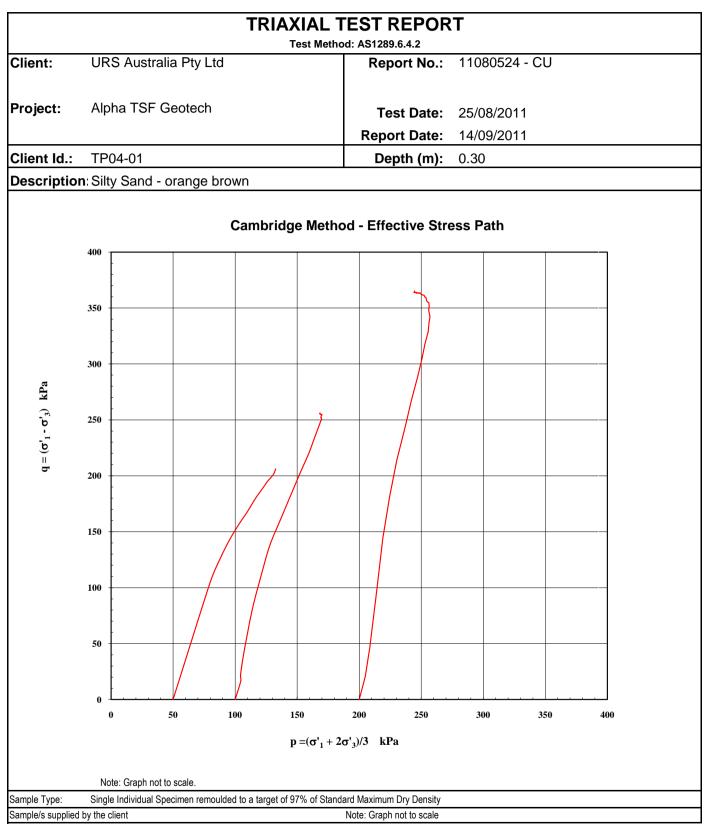
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Trilab Pty Ltd ABN 25 065 630 506



		EST REPOR	T	
Client: URS Australia Pt		Report No.:	11080524 - CU	
	-	-		
Project: Alpha TSF Geote	ech	Test Date:	25/08/2011	
		Report Date:	14/09/2011	
Client Id.: TP04-01		Depth (m):		
Description: Silty Sand - oran	ge brown			
CLIENT:	URS Australia	the second se		
PROJECT:	Alpha TSF Geo	tech	AFTER TEST	
LAB SAMPLE No	. 11080524		DATE: 07/09/11	
BOREHOLE:	TP04-01		DEPTH: 0.30	
Sample Ture:				
Sample Type: Single Individual Specimen Sample/s supplied by the client	remoulded to a target of 97% of Stand	Note: Graph not to scale		
ACCREDITED FOR COMPETENCE ISO/IEC 17025 measurements	nent is issued in accordance with NATA's equirements. Accredited for compliance with . The results of the tests, calibrations, and/or s included in this document are traceable to Australian/National standards	(Jam	ised Signatory	age 5



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Page 5

Doc. Id.: REP03001



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Client	URS Aus	tralia Pty I				: AS 12				Report	No.		1108	0524-	·G
Project	Alpha TS	F Geotecł	ı							Test Da	te		19-31	1/08/2	2011
										Report			2/9/20		
Client ID	TP04-01									Depth		0.3		011	
Sieve Size	Passing									Dopti	(,	0.0	<u> </u>		
(mm)	%	100	1												
150.0												H			
75.0		90													
53.0															
37.5															
26.5		80						++							
19.0															
9.5		70								/			\square	$\parallel \parallel$	
4.75										/					
2.36	100														
1.18	98	60													
0.600	94 88	Passing (%) 05													
0.425	79	uissa 50													
0.300	52	Ра													
0.075	37														
0.07	31	40													
0.05	29														
0.036	27	30							\mathbb{H}						
0.025	25														
0.019	23														
0.014	21	20			H	1									
0.0097	21														
0.0069	19	10					+	++	$\left \right $		$\left \right $		+	+++	
0.0049	19														
0.004	19	0													
0.0035	18 17	-	, D01		(0.01			(.1		1			10
0.0028	17							Parti	cle Si	ize (mm)					
0.0014	16														
DTES/REMARKS	Ν	/loisture Cor Sample/s su			ient	-2.3	36mn	n Soi	l Par	ticle Dens	ity(t/m ³)	2.65	Paç	ge 1 of 1	REP
requirement results of the	ent is issued in a ts. Accredited for e tests, calibratio re traceable to Au	r compliance w ns, and/or mea	rith ISO/IE asurement	S 17025 ts includ	5. The	his		12		uthorised Si <i>j</i> <i>junda []</i> J. Russel	Um	ll -	A FO		



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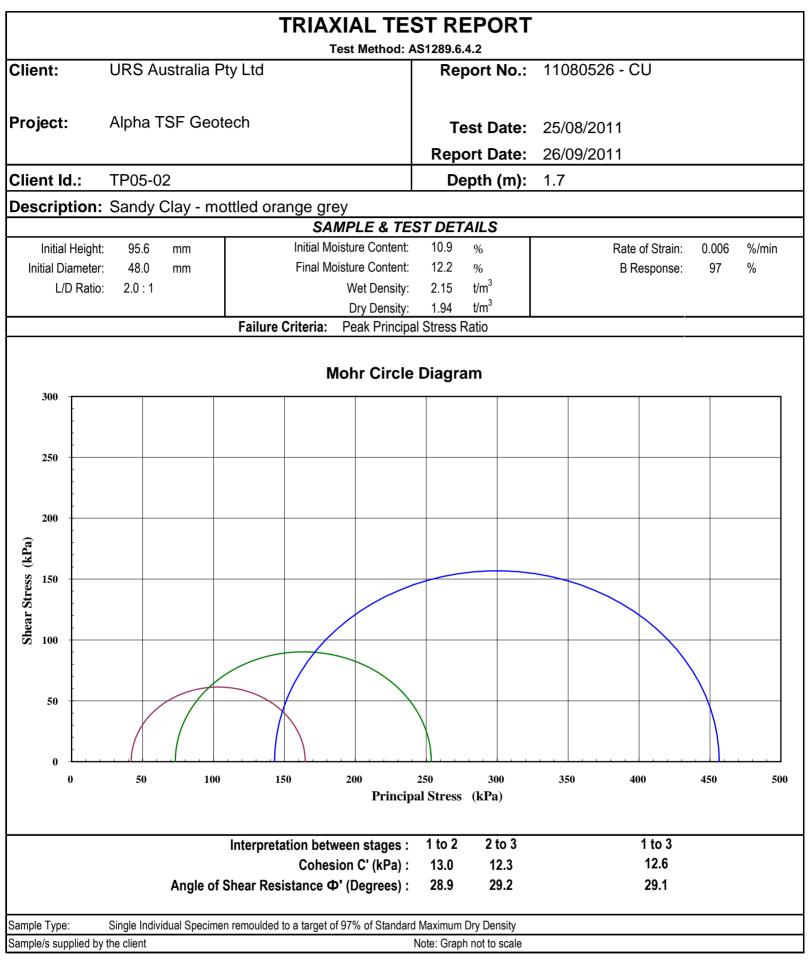
	URS Australia Pty Ltd						R	eport No.		11080525-G				
AIPHA 13F	- Geotech	า					т	est Date		22-	24/08	3/20	11	
							R	eport Date		2/9/	/2011			
TP05-01								-	0					
								Deptil (III)	0	.00				
-	100	1				ТП						HT	Π	
	90													
	50													
	80						++++					$\left \right $	\mathbb{H}	
100	70													
99	70													
97														
94	60	+	+ +		+	$\left \right $	++++	_/				$\left\{ \right\}$	H	
90	(%)													
87	sing													
80	Pas 20													
	40						+						\square	
-														
	30													
						11								
	20				\vdash									
			$\left \right \right $											
16														
16	10	1												
16														
15	0												Щ	
14	0.	001		0.01	_				1				10	
14					F	artic	ie Size	e (mm)						
12														
	99 97 94 90 87 80 54 36 32 28 25 22 22 19 16 16 15 14 14	% 100 % 90 90 80 100 70 99 70 97 60 90 50 80 50 54 36 36 40 28 30 22 20 19 16 16 10 16 10 16 0. 14 0.	% 100 90 90 90 80 100 70 99 70 97 60 90 60 80 50 51 50 52 30 22 22 22 20 101 10 102 10 103 10 104 10 105 0 104 0	$\frac{90}{90}$ 100 90 90 100 90 100 90 100 90 100 70 90 60 90 60 90 60 90 60 90 60 90 60 90 60 80 50 51 40 36 40 32 28 22 22 22 22 22 20 10 0.001	$\frac{9}{100}$ 100 90 90 90 80 100 70 99 97 94 60 90 60 90 60 90 60 87 80 54 36 36 40 32 28 22 22 22 22 22 20 10 0.01	Passing 100 90 90 90 80 100 90 99 97 94 90 90 60 90 60 80 50 80 50 54 36 32 28 25 20 10 0 10 0 10 0 10 0 10 0 10 0 10 0 114 14	Passing % 100 90 90 80 70 90 91 90 97 94 90 97 94 90 80 70 60 60 60 60 60 60 60 60 60 6	Passing % 100 90 80 70 90 80 70 90 80 70 90 80 70 90 80 70 90 80 70 90 80 70 90 80 70 90 80 70 90 80 70 90 80 70 90 80 70 90 80 70 90 80 70 90 80 70 90 80 50 50 40 40 40 40 51 22 22 22 22 22 22 22 22 19 10 10 10 10 10 10 10 10 10 10	Passing 100 90 90 100 90 90 80 70 60 90 60 80 60 80 60 80 60 80 60 80 60 80 60 80 60 80 60 80 60 80 60 92 50 80 60 92 90 80 90 80 90 91 60 92 90 92 90 92 90 92 90 92 90 92 90 92 90 92 90 92 90 92 90 92 90 92 90 92 90 92 90 92 90	Passing % 100 90 90 90 90 90 90 90 90 90	Passing 100 90 90 90 90 90 80 100 90 80 70 97 94 60 70 90 80 70 90 97 94 60 70 90 80 70 90 80 70 90 70 92 50 70 90 50 50 70 70 80 70 90 90 70 92 50 70 70 70 92 50 70 70 70 92 70 70 70 70 92 70 70 70 70 70 70 70 70 70 70 70 70 70 70 72 72 70 70 70 72 72 70 70	Passing % 100 99 97 94 90 80 70 99 97 94 90 80 70 60 60 50 50 50 50 50 50 50 50 50 5	Passing % 100 90 90 90 90 90 90 90 90 90	



Perth 2 Kimmer Place, Queens Park WA 6107 Ph: +61 8 9258 8323

	NSTANT HEAD TEST REPORT ed on K H Head (1988) Manual of Laboratory Testing, 10.7)
Client URS Australia Pty Ltd	Report No. 11080526-CHP
Project Alpha TSF Geotech	Test Date 18/08-03/10/2011
	Report Date 3/10/2011
Sample No.	11080526
Client ID	TP05-02
Depth (m)	1.70
Standard Maximum Dry Density (t/m ³)	198.00
Standard Optimum Moisture Content (%)	11.0
Placement Moisture Content (%)	1.9
Placement Wet Density (t/m ³)	2.07
Water Used	Distilled
Pressure Applied (kPa)	50
Specimen Dimensions	
Diameter (mm)	48.3
Length (mm)	58.8
PERMEABILITY	$K_{20} = 4 \times 10^{-10} \text{ m/s}$
<u>Notes/Remarks:</u> The above specimen was remoulded to a	target of 98% of Standard Dry Density
and at Optimum Moisture Content Sample/s supplied by client	Tested as received Page: 1 of 1 REP01707
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	specific instrument or sample at the time of test unless otherwise clearly stated dard Terms and Conditions of Business" for further details.







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Authorised Signatory tames Quest J. Russell

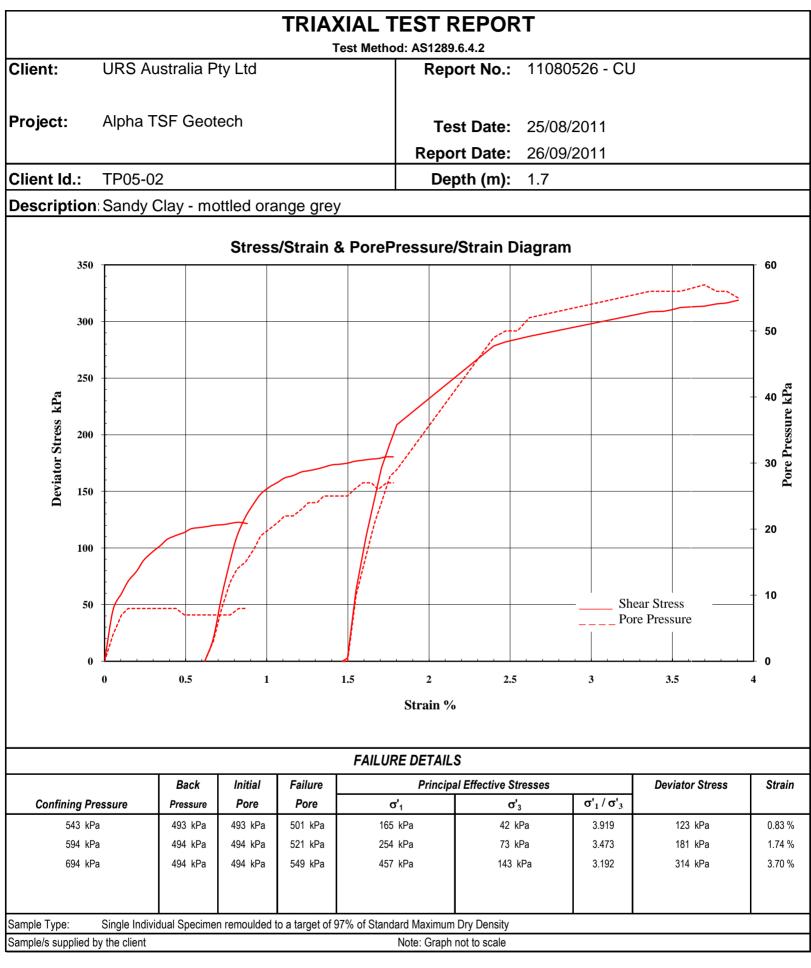
Page 1 Doc. Id.: REP03001

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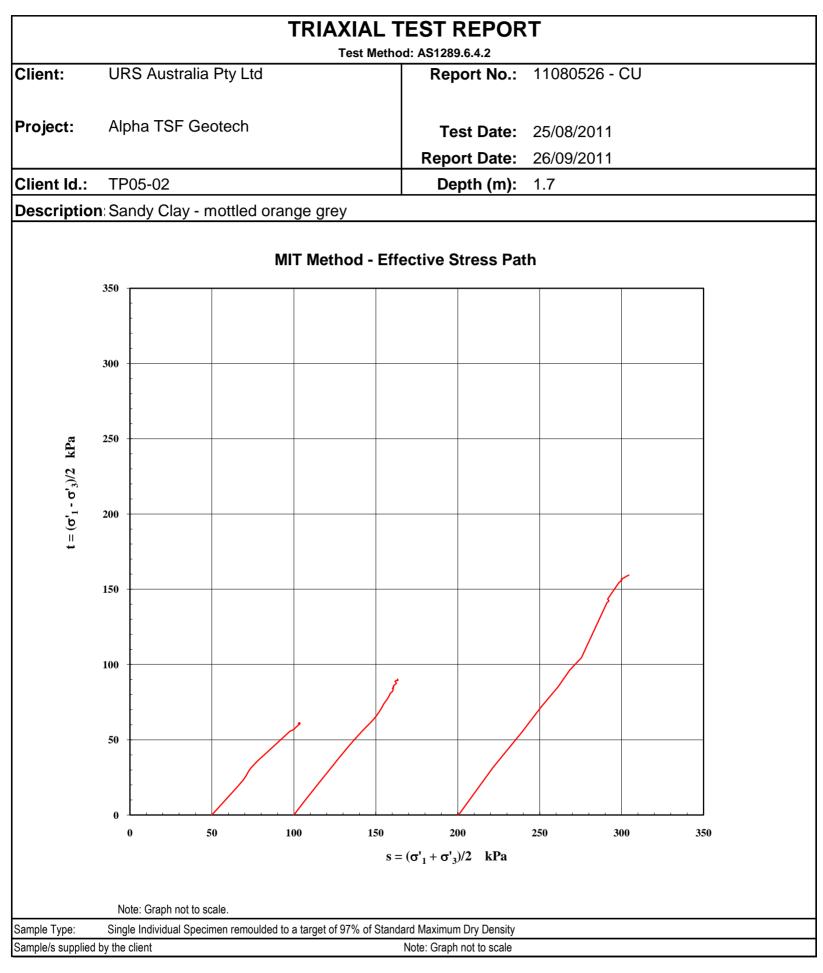
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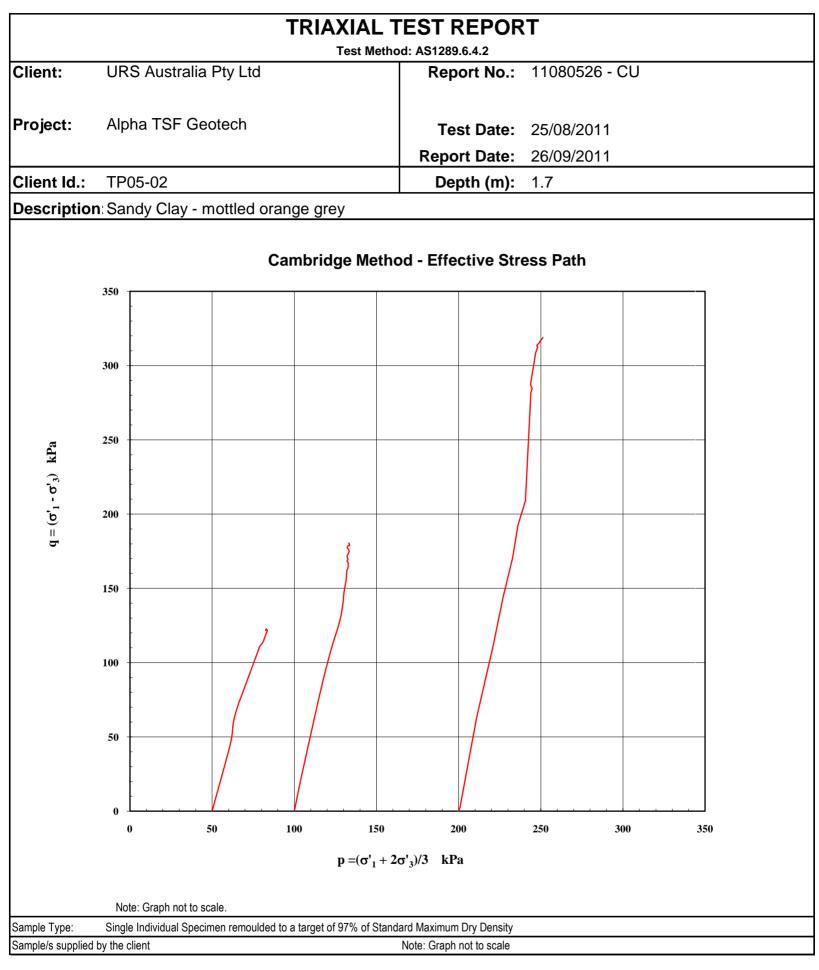
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			EST REPOR	RT
Client:	URS Australia Pty Ltd	Test Metho	Report No.:	11080526 - CU
			-	
Project:	Alpha TSF Geotech		Test Date:	25/08/2011
			Report Date:	26/09/2011
Client Id.:	: TP05-02		Depth (m):	1.7
Descripti	on: Sandy Clay - mottled o	range grey		
	CLIENT:	URS Austra	lia Pty I td	
	PROJECT:	Alpha TSF		
		. upin 151	Geoteen	AFTER TEST
	LAB SAMPLE No.	11080526		DATE: 15/09/11
	BOREHOLE:	TP05-02		DEPTH: 1.70
	A TO Shak	Phillippine		A REAL PROPERTY AND A REAL
	ANC DEF			
	- House	A BAR Y		
ample Type:	Single Individual Specimen remoulde	d to a target of 97% of Stand	ard Maximum Dry Density	
	ied by the client	~	Note: Graph not to scale	



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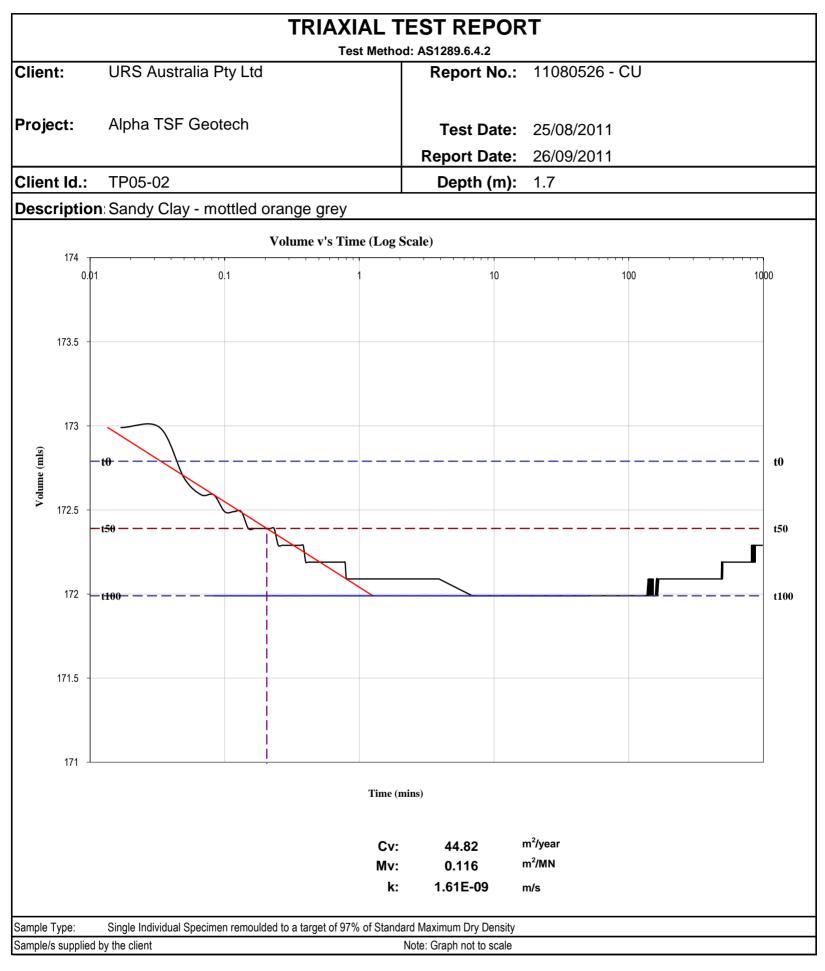
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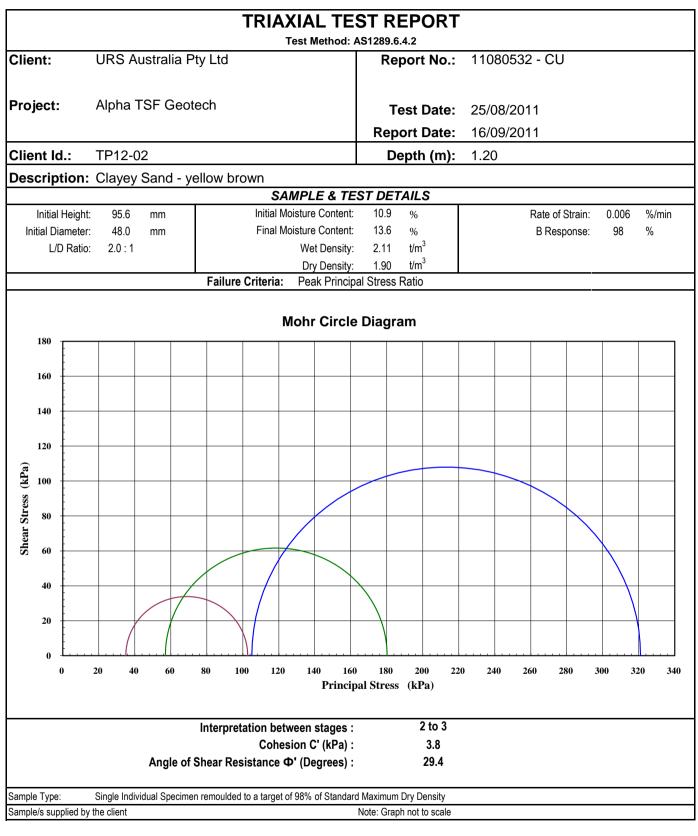
Perth 2 Kimmer Place, Queens Park WA 6107 Ph: +61 8 9258 8323

UKS Aust	tralia Pty	Report No.	11080526-G
Alpha TSI	F Geotec	Test Date	22-24/08/2011
			2/9/2011
TP05-02			1.70
1			1.70
-	100		
	90		
	50		
	80		
100	70		
97	70		
95			
91	60	<u> </u>	
88	(%)		
84	sing		
77	SB 50		
	40	+ + + + + + + + + + + + + + + + + + + +	
-	30		
	20	$\overline{1 + 1 + 1 + 1} + \overline{1 + 1 + 1 + 1} + \overline{1 + 1 + 1}$	
	10		
25			
24	0		
24	0	0.01 0.1	1 10
23		Particle Size (mm)	
22			
	97 95 91 88 84 77 54 41 35 32 31 29 29 28 27 26 25 24	Passing 100 90 90 90 80 100 70 97 95 91 60 88 84 77 54 41 40 35 30 31 30 29 20 28 20 27 26 24 0.001	Passing 100 90 100 90 90 80 00 00 100 90 80 00 00 91 60 60 00 00 88 84 77 60 00 00 91 60 00 00 00 00 88 84 77 50 00 00 00 00 29 29 20 20 00 0.01 0.01 0.1 26 25 0 0.001 0.01 0.01 0.1



	NSTANT HEAD TEST REPORT d on K H Head (1988) Manual of Laboratory Testing, 10.7)
Client URS Australia Pty Ltd	Report No. 11080532-CHP
Project Alpha TSF Geotech	Test Date 10/09-14/09/2011
	Report Date 3/10/2011
Sample No.	11080532
Client ID	TP12-02
Depth (m)	1.20
Standard Maximum Dry Density (t/m ³)	1.94
Standard Optimum Moisture Content (%)	10.5
Placement Moisture Content (%)	10.2
Placement Wet Density (t/m ³)	2.10
Water Used	Distilled
Pressure Applied (kPa)	50
Specimen Dimensions	
Diameter (mm)	48.0
Length (mm)	56.8
PERMEABILITY	$K_{20} = 2 \times 10^{-10} \text{ m/s}$
Notes/Remarks: The above specimen was remoulded to a	target of 98% of Standard Dry Density
and at Optimum Moisture Content Sample/s supplied by client	Tested as received Page: 1 of 1 REP01701
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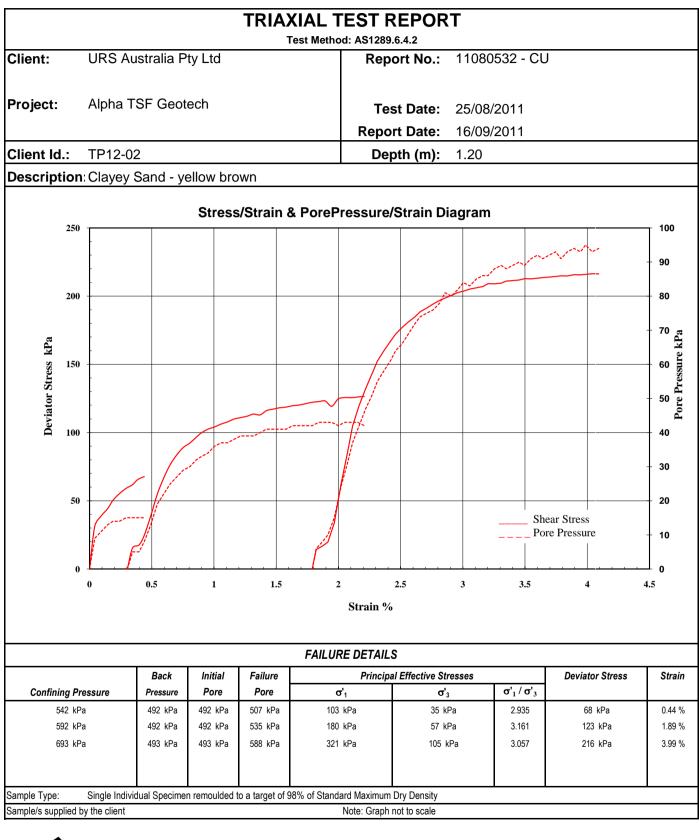
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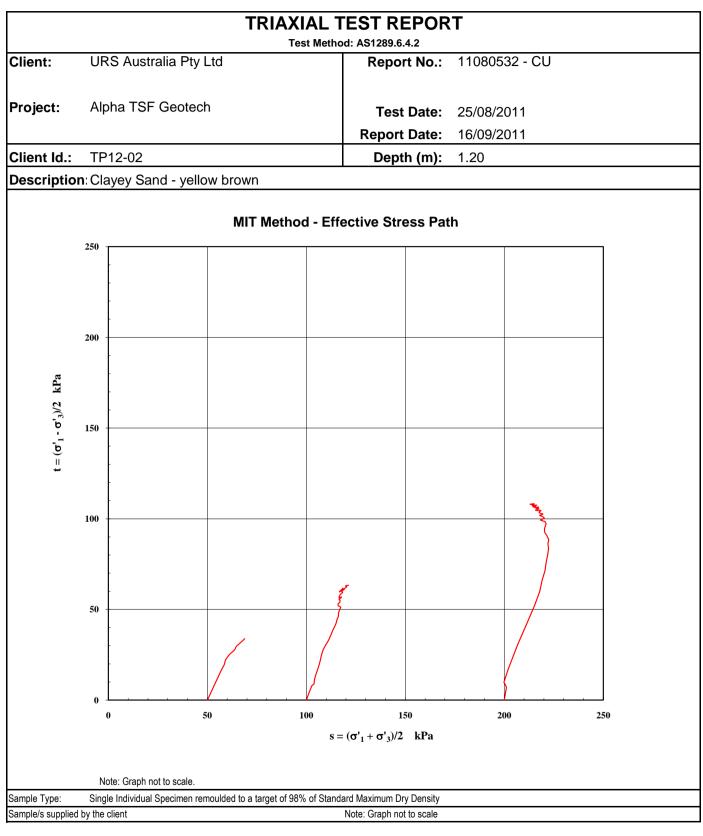
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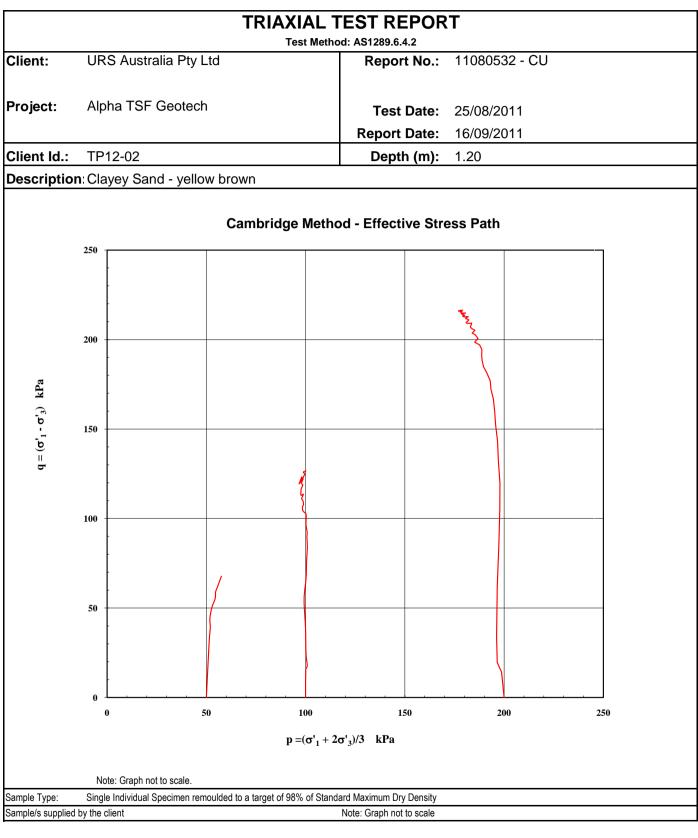
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				T
Client:	URS Australia Pty Ltd	Test Metho	od: AS1289.6.4.2 Report No.:	11080532 - CU
Project:	Alpha TSF Geotech		Test Date:	25/08/2011
			Report Date:	16/09/2011
Client Id.:	: TP12-02		Depth (m):	1.20
Description	on: Clayey Sand - yellow b	rown		
	CLIENT:	URS Austra	lia Pty Ltd	
	PROJECT:	Alpha TSF		
	TROULET.	pini 151	Geoteen	AFTER TEST
	LAB SAMPLE No.	11080532		DATE: 14/09/11
	BOREHOLE:	TP12-02		DEPTH: 1.20
		A A Second		
	The second second	2 Alexandre		
	The			
Sample Type:	Single Individual Specimen remoulde	d to a target of 98% of Stand	ard Maximum Dry Density	
Sample/s suppli			Note: Graph not to scale	
~				
NAT	This Document is issue	d in accordance with NATA's	1	ised Signatory
ACCREDITED F	accreditation requirements	 Accredited for compliance with s of the tests, calibrations, and/or 	1 Jam	u Aunell
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Doc. Id.: REP03001



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Alpha TSF TP12-02	Geotech		
TD 40.00		Test Date	22-24/08/2011
TD40.00		Report Date	2/9/2011
1P12-02		Depth (m)	1.20
Passing		Doptii (iii)	1.20
-	100		
	90		
	80		
100	70		
99			
96			
	60		
	(%) f		
	juiss 20		
	Pa		
	40		
	30		
-			
38			
35	20		
33			
31	10		
29			
27			
27	0		
26	0.		1 10
22			
	99 96 95 93 91 87 68 53 46 42 40 38 35 33 31 29 27 26 24	$ \begin{array}{c} 90\\ 90\\ 90\\ 90\\ 90\\ 90\\ 90\\ 90\\ 90\\ 90\\$	9% 90 90 80 100 99 96 95 93 91 87 68 53 46 42 40 38 38 38 35 33 31 29 27 27 26 24



ient		U	RS Austra	llia Pty Ltd				Rep	ort No.		110	80532-	MD
oject		AI	pha TSF (Geotech					t Date ort Dat	e		08/2011 9/2011	l
ient l	D	TF	P12-02						Depth (m)	1.20	0	
escrip	otion	Sa	andy Clay	- Brown									
	2.100												
	2.050 -												
	2.000 -												
	1.950 -												
(t/m³)	1.900 -				_								
Dry Density (t/m³)	1.850 -												
D	1.800 -												
	1.750 -												
	1.700 - 5.0	1	6.0 7	.0 8.0	g	9.0	10.0 11.	0 12	2.0	13.0	14.0	15.0	
						Moistu	e Content (%	%)					
Мах	kimum D	ry Den	sity (t/m³)	1.94	Ор	timum N	loisture Cor	itent (%)				10.5]
Moi	sture Co	ontent (%)	11.0	Pe	rcentage	of Oversize	/Sieve S	ize (mm)			0/19	
	<u>MARKS:</u> upplied b	fro	om the resu	outer generat Its summaris		so estima	ites may sho	w some r	ninor vari	ations	Pa	ige 1 of 1	REI
Thi: acc ISC mea	s documen reditation r)/IES 1702	t is issued equireme 5. The re s included	d in accordanc ents. Accredite esults of the tes d in this docum	e with NATA's ed for complianc sts, calibrations, nent are traceab	and/or		James	d Signator		,	<u> </u>	Ň	



Brisbane 346A Bilsen Road, Geebung QLD 4034 Ph: +61 7 3265 5656 Perth 2 Kimmer Place, Queens Park WA 6107 Ph: +61 8 9258 8323

MISSING / NOT TESTABLE SHEET

Client:	GHD	-	Job No.	41 - 24336 -15 RIVET HEART PARKLANDS	Date:	3/10/11
Sample No.	Client ID BH	Depth (m)	E	xplanation		By:
11090855	BHS	1.0-1.3		RECEEVED	But WE	AS
		80	1			
				- F	т. Б.,	6
				5		

General Comments:

DOC03001 ACCURATE QUALITY RESULTS FOR TOMORROW'S ENGINEERING



Perth 2 Kimmer Place, Queens Park WA 6107 Ph: +61 8 9258 8323

Client	URS Austra			<u>1289 3.6.1, 2.1.</u>	Report No	0.	11080534-	G
Project	Alpha TSF	Geotech			Test Date	9	18/08-02/0	9/201
					Report Da	ate	02/09/2011	1
	1						1	-
Sample No.	11080534	11080535	11080536	11080537	11080538	11080540	11080541	
Client ID	TP13-01	TP14-01	TP15-01	TP19-02	TP23-01	TP24-01	TP24-02	
Depth (m)	0.40	0.30	0.60	0.90	0.50	0.70	2.50	
Moisture (%)	3.8	4.5	7.7	7.2	6.7	5.0	11.7	
AS SIEVE SIZE (mm)			PE	RCENT PASSI	NG			
150								
75				100				
53				82				
37.5				82				
26.5				68				
19				65				
9.5				53		100		
4.75		100	100	47		91		
2.36	100	96	97	46	100	72	100	
1.18	99	90	96	40	97	64	94	
0.600	95	86	95	36	91	62	85	
0.425	88	82	94	34	83	60	78	
0.300	76	74	90	31	70	56	71	
0.150	43	47	68	17	43	40	54	
0.075	29	29	50	12	29	28	43	
TES/REMARKS:	-							
	Sample/s sup	plied by the clie	ent				Page 1 of 1	REP
This document is is accreditation require ISO/IES 17025. The transmission of the test of	rements. Accredite	ed for compliance		Authorised	signatory Aunto sell	/	į	

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Client URS Australia Pty Ltd							Report No.		No.	11080536-ME	
roject								20/08/2011 2/09/2011	l		
lient IC)	TP1	5-01					Dep	oth (m)	0.60	
escrip	tion	Clay	ey San	d - Pale Gre	ey						
	2.100										
	2.050 —										
	2.000										
	1.950 —										
(t/m³)	1.900 —										
Dry Density (t/m³)	1.850 —										
E	1.800 —		•						•		
	1.750 —										
	1.700	7	.0	8.0 9	9.0	10.0	11.0	12.0	13.0 1	4.0 15.0	
					М	oisture Co	ontent (%)				
Maxi	mum Dry	/ Density	/ (t/m³)	1.91	Optim	num Moist	ture Conte	nt (%)		11.5]
Mois	sture Cor	ntent (%)		7.7	Perce	entage of (Oversize/S	ieve Size (mm)	0/19	
ES/REM	<u>ARKS:</u> pplied by	from	the resu	outer generate Its summarise	-	estimates	may show	some mino	r variations	Page 1 of 1	REP
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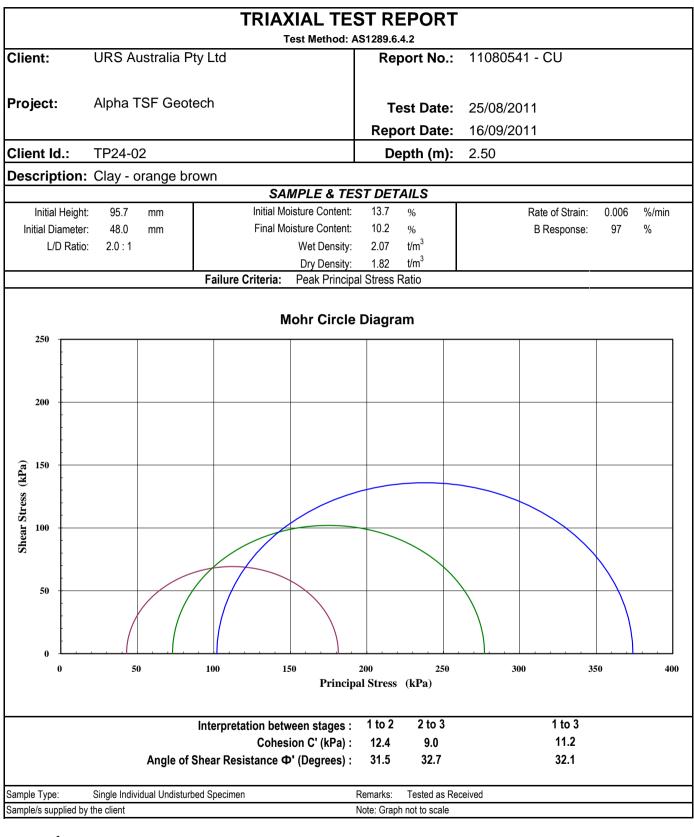
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	ralia Pty I						Rep	ort No.		110	80539	9-G
Alpha TSF	Geotech	'n					Tes	t Date		22-2	24/08/	/2011
							Rep	ort Date	!	2/9/	2011	
TP23-02										.30		
Passing								<u> </u>				
%	100	1										+111
	90											
	80		$\left \right $					+	4:::::			
100												
98	70	1										
92								/				
88	60	+				+++			+++++		+++	
82	(%)							Λ				
77	sing (/	/				
69	SS 50											
51												
41	40						1					
34												
32						\mathbb{H}						
29	30					++						
	20											
	20											
	10	+	$\left \right $			+++		+ $+$ $+$	+++++		+++	+++++
	-											
		+'' 001		0.01			0.1		1	I		<u>بىبىب</u> 1
	0.				Pa	article		n)				
20												
	Passing % 	Passing 100 $\%$ 90 00 90 00 80 100 70 98 60 92 88 82 50 77 69 51 41 41 40 34 30 29 30 29 20 27 20 25 10 23 0 23 0	Passing 100 90 90 90 90 80 90 100 70 98 70 92 60 88 60 82 50 77 50 69 51 41 40 34 32 29 30 29 20 27 25 25 10 23 0 22 0.001	Passing 100 90 90 90 80 100 70 98 92 88 60 82 77 69 50 51 41 34 32 29 20 27 27 25 25 23 0 22 0.001	$\frac{90}{6}$ 100 90 0 90 0 100 0 90 0 100 0 90 0 100 0 90 0 100 0 100 0 90 0 100 0 90 0 100 0 90 0 100 0 92 80 80 0 92 60 82 77 60 0 50 0 50 0 51 40 32 0 29 20 25 10 23 0 23 0 23 0 0 0.01	Passing 100 90 90 90 80 100 70 92 80 92 80 92 80 92 60 88 82 77 69 51 41 34 32 29 30 29 20 27 27 25 25 23 0 23 0 22 0.001	Passing % 100 90 90 90 80 70 60 70 60 80 70 60 60 80 70 60 60 60 60 60 70 60 50 50 50 50 50 21 27 27 25 25 23 23 23 22 0.001 0.01 80 80 80 90 80 90 80 90 90 90 90 90 90 90 90 90 9	Passing 100 90 90 90 80 100 90 90 80 70 90 92 80 92 60 88 82 77 69 51 41 34 32 29 29 27 27 25 23 23 0 22 0	Passing % 100 90 90 80 70 90 80 70 90 80 70 90 80 70 90 80 70 90 80 70 90 80 70 90 80 70 90 80 70 90 92 88 80 70 90 90 92 88 80 70 90 90 90 92 88 80 92 88 80 92 88 80 92 88 80 92 88 80 92 80 90 90 90 91 90 90 90 91 90 90 90 90 90 90 90 90 90 90	Passing 100 90 90 92 90 90 90 90 90 91 90 92 90 92 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90 90	Passing % 100 90 90 90 90 90 90 90 90 90	Passing % 100 90 80 70 90 80 70 90 80 70 90 80 70 90 80 70 90 80 70 90 80 70 90 92 88 82 77 60 50 50 50 50 51 41 41 34 32 29 29 27 27 27 27 25 23 23 22 00 00 100 100 100 100 100 1



	NSTANT HEAD TEST REPORT d on K H Head (1988) Manual of Laboratory Testing, 10.7)
Client URS Australia Pty Ltd	Report No. 11080541-CHP
Project Alpha TSF Geotech	Test Date 18/09-03/10/2011
	Report Date 3/10/2011
Sample No.	11080541
Client ID	TP24-02
Depth (m)	2.50
Standard Maximum Dry Density (t/m ³)	1.86
Standard Optimum Moisture Content (%)	14.0
Placement Moisture Content (%)	15.0
Placement Wet Density (t/m ³)	2.08
Water Used	Distilled
Pressure Applied (kPa)	50
Specimen Dimensions	
Diameter (mm)	48.6
Length (mm)	55.9
PERMEABILITY	$K_{20} = 3 \times 10^{-9} \text{ m/s}$
Notes/Remarks: The above specimen was remoulded to a f	target of 98% of Standard Dry Density
and at Optimum Moisture Content Sample/s supplied by client	Tested as received Page: 1 of 1 REP01701
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Authorised Signatory ames Quell J. Russell

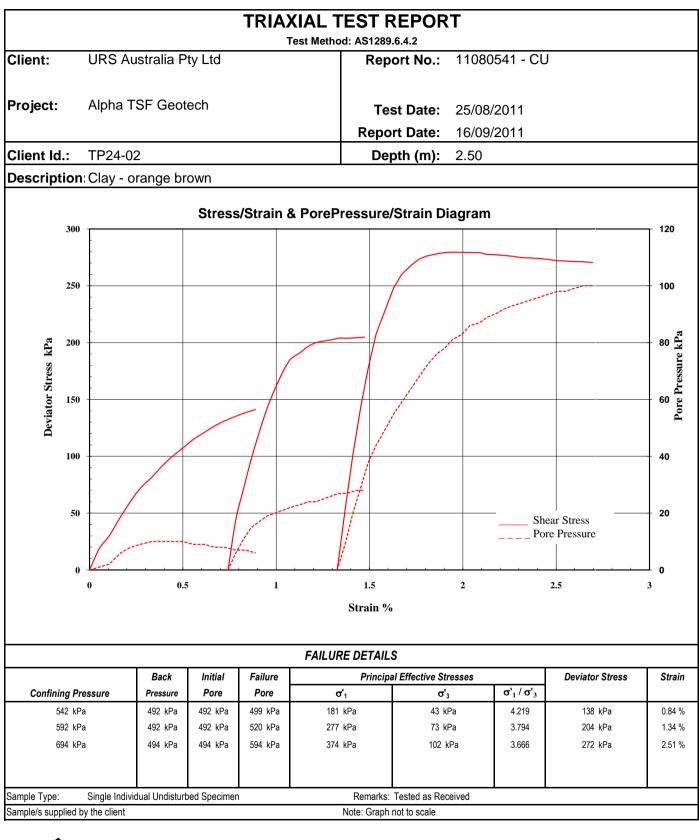
Page 1
Doc. Id.: REP03001

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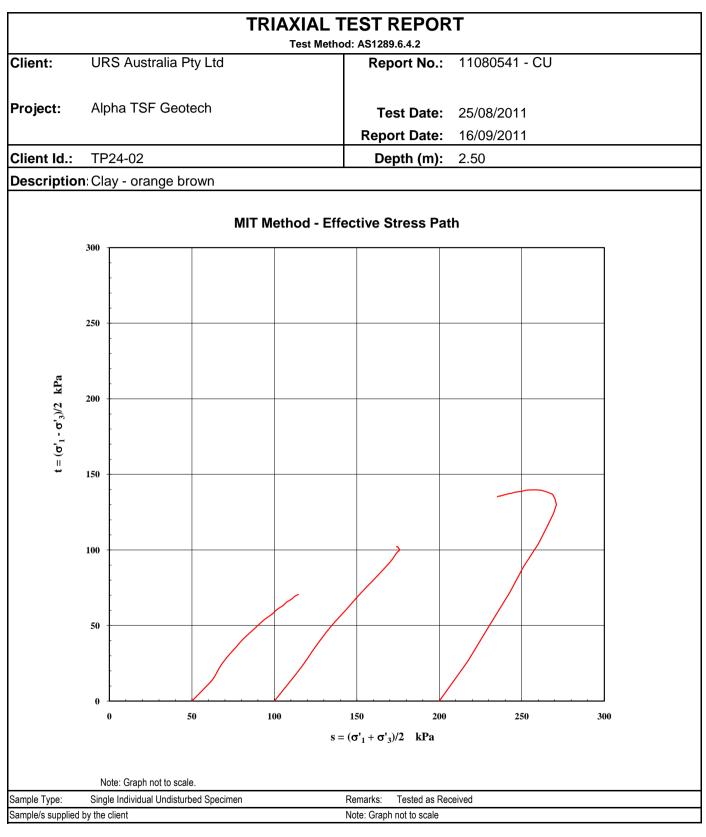
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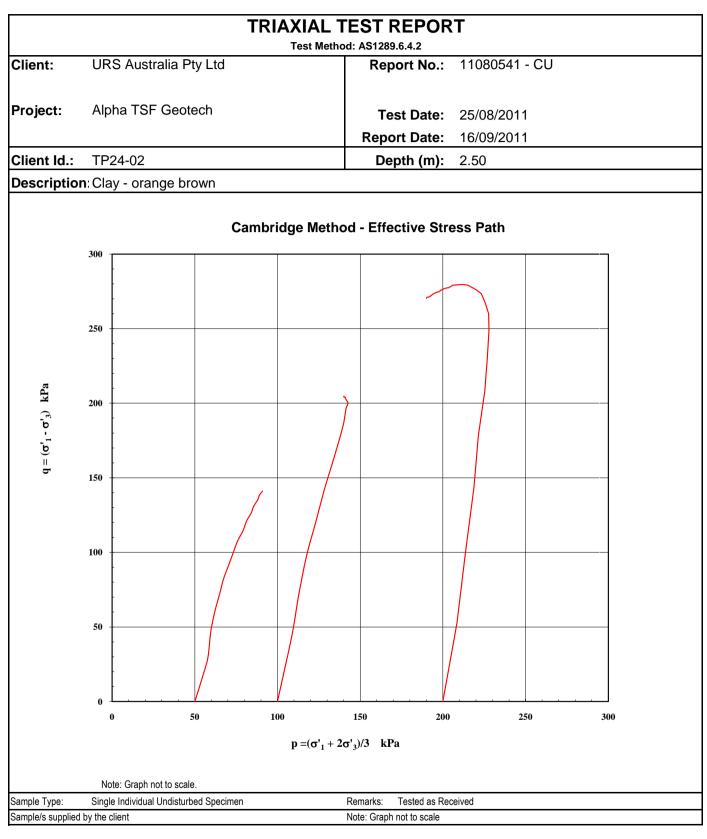
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Trilab Pty Ltd ABN 25 065 630 506



			EST REPOR	T
Client:	URS Australia Pty Ltd		Report No.:	11080541 - CU
Project:	Alpha TSF Geotech		Test Date:	25/08/2011
			Report Date:	16/09/2011
Client Id			Depth (m):	2.50
Descript	ion: Clay - orange brown			
	CLIENT:	URS Austra	lia Pty Ltd	
	PROJECT:	Alpha TSF (Geotech	AFTER TEST
	LAB SAMPLE No.	11080541		DATE: 10/09 II
	BOREHOLE:	TP24-02		DEPTH: 2.50
				2.50
Sample Type:	Single Individual Undisturbed Specin	nen	Remarks: Tested as Rev Note: Graph not to scale	ceived



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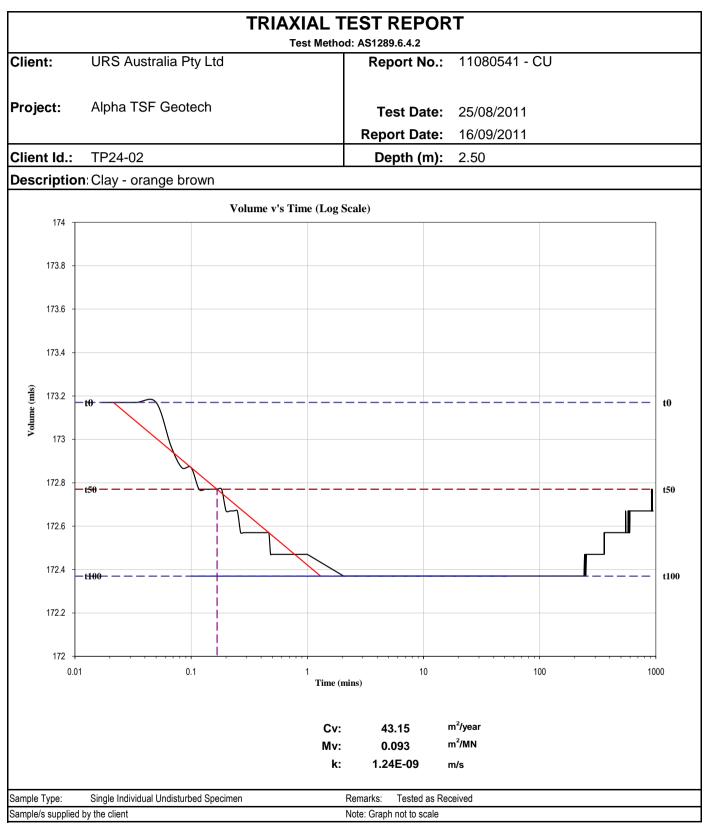
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Trilab Pty Ltd ABN 25 065 630 506



lient	URS Austra	lia Pty Ltd		d: AS 1289 5		Report No).	11080541-	MDE
roject	Alpha TSF (Geotech				Fest Date Report Da		20/08/2011 2/09/2011	I
lient ID	TP24-02					Depth	(m)	2.50	
escription	Sandy Clay	- Red/Grey							
2.000									
1.950									
1.900									
1.850					-				
(1.800 (پ									
Dry Density (t/m ³) 1.220 1.220									
ם גם 1.700									
1.650									
1.600									
8	3.0 9.0	10.0 11.		13.0 Sure Conter		4.0 1	5.0 16	.0 17.0	
Maximum	Dry Density (t/m ³)	1.86	Optimum	Moisture	Content	(%)		14.0]
Moisture (Content (%)	11.7	Percenta	ge of Overs	size/Siev	e Size (mr	1)	0/19	
ES/REMARKS:	from the resul	-	-	mates may	show son	ne minor va	riations	Page 4 of 4	
accreditation ISO/IES 170 measureme	ent is issued in accordance n requirements. Accredite 25. The results of the tes nts included in this docum	d for compliance ts, calibrations, a	nd/or	(Jan	orised Sign	7	/	Page 1 of 1	



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Client	URS Aust	ralia Pty L		 	: AS 12				Repo	ort No			11	0805	642-	G
Project	Alpha TSF	- Geotech	1						Test	Date			22	2-24/0)8/2	011
										ort Da	te			9/201		
Client ID	TP26-02								-	oth (n		().90			
Sieve Size	Passing								20		<u>.</u> ,					
(mm)	%	100 ·														\square
150.0											\square					
75.0		90 ·														
53.0																
37.5										/						
26.5		80 -									++	$\left \right $				
19.0																
9.5																
4.75		70 -									$\uparrow\uparrow$					
2.36	100								/							
1.18	99	60 ·														
0.600	97	(%)							\mathbb{R}^{2}							
0.425	95	Passing (%) 05														
0.300	90	ss 50 ·					+	+						-++		
0.150	61	_				+1										
0.075	55	40 -														
0.067	50															
0.048	49															
0.034	48	30 ·												\rightarrow		
0.024	46															
0.018	46	20 -														
0.013	46	20 -														
0.0092	46															
0.0066	44	10 -				+	++	++		$\left \right $	++			-+	++	$\left \right \left \right $
0.0046	44															
0.0038	42															
0.0033	42	0 · 0.0	 01	 , ,).01				0.1			بنين 1				 10
0.0026	41	5.0		,			Parti		ize (mm)						
0.0023	40															
0.0014	38															
TES/REMARKS		loisture Cor	tent 10 0	 	-2	36mn	n Soi	l Pa	rticle D	ensity/4	/m ³	26	2	_		
		ample/s sup		ient	-2.	50111	100	. i d		onony(, iii)	2.0	~	Page 1	l of 1	REP
	ent is issued in ac							А	uthorise	d Signat	tory				<u>\</u>	
	 Accredited for tests, calibratior 							م					//	NA NA		
	e traceable to Au			u				- 9	Gara 11	1 1.1 1	1 14	11	/		-	



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Client	URS Aust	tralia Pty Lt		Report No.	11080543-G
Project	Alpha TS	F Geotech		Test Date	22-24/08/2011
Client ID	TP28/2-02	<u>, , , , , , , , , , , , , , , , , , , </u>		Report Date	2/9/2011 2.00
Sieve Size	Passing	2		Depth (m)	2.00
(mm)	" assing %	¹⁰⁰ ⊤			
150.0	70				
75.0					
53.0		90 -			
37.5					
26.5		80 -			
19.0	100				
9.5	97				
4.75	92	70 -			
2.36	88				
1.18	85	60 -		 	
0.600	80	(%)			
0.425	75	Passing (%)			
0.300	66	Bass Pass			
0.150	50				
0.075	42	40 -			
0.067	37	-			
0.048	35				
0.034	32	30 -			
0.024	31				
0.018	31	20 -	$\uparrow \downarrow		
0.013	29				
0.0094	27 27				
0.0066	27	10 -			
0.0047	25				
0.0033	23	0			
0.0033	24	0.00	0.01	D.1 1	10 100
0.0023	23			Particle Size (mm)	
0.0014	22				
	• •				
DTES/REMARKS		loisture Cont	nt 12.3% -2.36mm	Soil Particle Density(t/m ³)	2.62
			ied by the client		Page 1 of 1 REP
			ATA's accreditation	Authorised Signatory	
			SO/IES 17025. The rements included in this	James Quest	
	re traceable to Au			(TAMAR UKILAM	



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Client	URS Austra	llia Pty Ltd		<u>1289 3.6.1, 2.1.</u>	Report No	0.	11080544-	G
Project	Alpha TSF	Geotech			Test Date	•	18/08-02/0	9/20 ⁻
					Report Da	ate	02/09/2011	
Sample No.	11080544	11080545	11080546	11080547	11080548	11080549	11080550	
Client ID	TP28-02	TP29-01	TP30-02	TP33-02	TP34-03	TP37-01	TP39-02	
Depth (m)	1.20	0.40	1.20	1.30	1.50	0.40	1.30	
Moisture (%)	11.6	5.4	8.0	9.4	10.7	3.1	8.3	
AS SIEVE SIZE (mm)								
150								
75								
53								
37.5			100	100				
26.5			95	93				
19	100		93	73	100			
9.5	95		68	33	80		100	4
4.75	85		42	23	65		98	
2.36	78	100	34	22	61	100	95	
1.18	75	98	32	22	59	99	91	
0.600	72	91	31	21	57	97	87	
0.425	69	83	29	19	53	93	82	
0.300	63	70	26	17	48	86	75	
0.150	49	40	17	10	33	60	55	
0.075	41	25	13	7	22	40	45	
0.150	49	40	17	10	33	60	55	
	Complete et	aliad butter of					D. 4 44	
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 Laboratory No. 9926

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 ABN 25 065 630 506



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		MO	ISTUF	RE/DENS		RELAT		HIP TES	ST REP	OR1	Г	
Client		URS	S Austra	lia Pty Ltd	ICSLIM	<u>unou. Ao 1</u>	<u>200 J.I.I</u>	Repor	t No.		11080545-	MDD
Project		Alpł	na TSF (Geotech				Test D Repor			20/08/201 ² 2/09/2011	
Client I	D	TP2	9-01					De	pth (m)		0.40	
Descrip	otion	Silty	Sand -	Red/Browr	1							
	^{2.100} T			1]
	2.050 -											
	2.000											
13)	1.950 -				-							
ity (t/n												
Dry Density (t/m³)	1.900 -								•			
Ē												
	1.850 -											
	1.800											
	4.0	Ę	5.0	6.0	7.0 N	8.0 Moisture Co	9.0 Ontent (%	10.0)	11.0	12.0	13.0	
Мах	cimum D	ry Densit	y (t/m³)	1.97	Opti	mum Moist	ure Cont	ent (%)			8.5	
Moi	sture Co	ntent (%))	5.4	Perc	entage of (Oversize/	Sieve Size	(mm)		0/19	
LES/REM	/ARKS:	This	is a comp	outer generate	ed plot so	estimates	may show	some mind	or variations			
nple/s s	upplied b	from y the clier		ts summarise	ed.						Page 1 of 1	REPO
acc ISO mea	reditation r 0/IES 17028 asurements	equirements 5. The resu s included in	 Accredite Its of the tes this docum 	e with NATA's d for compliance sts, calibrations, ent are traceabl	and/or	17	Authorised	Signatory Aum sell	U.		Ĩ	
Aus	stralian/Nat	onal Standa	ards.	formed apply c							Laborato	

ACCURATE QUALITY RESULTS FOR TOMORROW'S ENGINEERING



Alpha TSF	11080545						
				Test Date Report Dat	е	24/08-31/0 02/09/2011	
		11080553	11080554	11080555	-	-]
	TP29-01	TP46-02	TP47-02	TP51-02	-	-	
1)	0.40	1.70	1.60	1.30	-	-	
mit (%)	Not Obtainable	22	25	23	-		
imit (%)	Not Obtainable	15	10	11	-	-	
/ Index (%)	Non Plastic	7	15	12	-	-	
hrinkage (%)	Not Obtainable	3.0*	4.5	6.0	-	-	
isture Content (%)	5.4	16.9	12.4	8.3	-	-	
n) imit (%) imit (%)	-	-	-	-	-	- - -	
/ Index (%)	-	-	-	-	-	-	
hrinkage (%)	-	-	-	-	-	-	4
						1	
	imit (%) r Index (%) nrinkage (%) isture Content (%) isture Content (%) isture Content (%) isture Content (%) init (%) imit (%) r Index (%)	mit (%) Obtainable imit (%) Not Obtainable Not vindex (%) Non Plastic nrinkage (%) Not obtainable Not isture Content (%) 5.4 No. - isture Content (%) - isture Content (%) - init (%) - init (%) - vindex (%) -	Obtainable 22 imit (%) Not Obtainable 15 index (%) Non Plastic 7 ininkage (%) Not Obtainable 3.0* isture Content (%) 5.4 16.9 istore Content (%) 5.4 16.9 istore Content (%) - - imit (%) - - imit (%) - - index (%) - -	Obtainable 22 25 imit (%) Not Obtainable 15 10 i Index (%) Non Plastic 7 15 i Index (%) 5.4 16.9 12.4 io. - - - imit (%) - - - i Index (%) - - -	Imit (%) Obtainable 22 25 23 imit (%) Not Obtainable 15 10 11 r Index (%) Non Plastic 7 15 12 init (%) Non Plastic 7 15 12 init (%) Non Plastic 7 15 12 init (%) Not Obtainable 3.0* 4.5 6.0 isture Content (%) 5.4 16.9 12.4 8.3 io. - - - - imit (%) - - - - imit (%) - - - - -	Imit (%) Obtainable 22 25 23 - imit (%) Not Obtainable 15 10 11 - Index (%) Non Plastic 7 15 12 - Index (%) Non Plastic 7 15 12 - Index (%) Non Plastic 7 15 6.0 - Intinkage (%) Not Obtainable 3.0* 4.5 6.0 - isture Content (%) 5.4 16.9 12.4 8.3 - Io. - - - - - - - Io. - - - - - - - - - - - - - - -	Mit (%) Obtainable Not Obtainable 22 25 23 - - imit (%) Not Obtainable 15 10 11 - - / Index (%) Non Plastic 7 15 12 - - / Index (%) Non Plastic 7 15 12 - - / Index (%) Non Plastic 7 15 6.0 - - // Index (%) Not Obtainable 3.0* 4.5 6.0 - - // Index (%) 5.4 16.9 12.4 8.3 - - // Index (%) - - - - - - // Index (%) - - - - - - // Index (%) - - - - - - // Index (%) - - - - - -



	URS Austra	alia Pty Ltd		<u>1289 3.6.1, 2.1</u>	Report No	D.	11080551-	G
Project	Alpha TSF	Geotech			Test Date Report Da		18/08-02/09 02/09/2011	
							02/03/2011	
Sample No.	11080551	11080552	-	-	-	-	-]
Client ID	TP41-02	TP43-01	-	-	-	-	-	
Depth (m)	2.20	0.60	-	-	-	-	-	
Moisture (%)	17.0	8.2	-	-	-	-	-	
AS SIEVE SIZE (mm)			PE	RCENT PASS	ING			-
150			-	-	-	-	-	
75			-	-	-	-	-	
53			-	-	-	-	-	
37.5			-	-	-	-	-	
26.5			-	-	-	-	-	
19		100	-	-	-	-	-	
9.5		94	-	-	-	-	-	
4.75		90	-	-	-	-	-	
2.36	100	82	-	-	-	-	-	
1.18	95	78	-	-	-	-	-	
0.600	88	74	-	-	-	-	-	
0.425	82	71	-	-	-	-	-	
0.300	74	66	-	-	-	-	-	
0.150	55	50	-	-	-	-	-	
0.075	41	38	-	-	-	-	-	



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Alpha TSF			11080553-G
	Geotec	Test Date	18-31/08/2011
		Report Date	2/9/2011
TP46-02		Depth (m)	1.70
Passing			
%	100		
	90		1
	30		
	80	<u> </u>	
	70		
	70		
100			
96	60		
92	(%)		
88	sing		
79	SSE 50		
49			
32	40		
24			
22			
-	30		
	20		
	10		
	0		
		0.01 0.1	1 10
14		Particle Size (mm)	
1.1			
	% 100 96 92 88 79 49 32 24	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c} $



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Client	URS Aus	stralia Pty	Ltd										F	Rep	001	rt l	١o	•				11	080)55	4-0	3
Project	Alpha TS	F Geotec	า										Т	es	t C	Dat	te					22	-24	/08	/20	11
													F	Rep	001	rt [Dat	te				2/9	9/20	011		
Client ID	TP47-02													-			(m			1	.6			-		
Sieve Size	Passing														- 1-		(-/				-				
(mm)	%	100	1																	\mathbb{H}	₩	-				
150.0																	_	\vdash	Π							
75.0		90													H	\parallel										
53.0														Л												
37.5														1												
26.5		80		++								_	+	++	+++			-				\vdash			+	
19.0	100												/													
9.5	99	70																								
4.75	98	70					_					1													\prod	\square
2.36	95											/														
1.18	93	60	┫──┼	++							\parallel	·		++	$\left \right $				$\left \right $	++		-	_		+	++
0.600	91	(%)									$\ $															
0.425	88	Passing (%) 05									X															
0.300	83	SS 50																								
0.150	64																									
0.075	45	40																								
0.068	37									V																
0.049	34																									
0.035	31	30		++				\square																		
0.025	30					Ш	/																			
0.018	27	20		\pm	1																					
0.014	26																									
0.0096	24																									
0.0068	24	10	┫──┼	++					\vdash	$\left \right \right $	\parallel	+	+	++	$\left \right $	\parallel		-	$\left \right $	++		+	+	+	++	++
0.0048	22 22																									
0.0039	22	0																								
0.0034	21		- 001			0.0)1				.1					1					1	10				10
0.0027	21										Part	icle	Size	e (m	m)											
0.0014	19																									
TES/REMARKS																		, .	3		_					
		Moisture Co Sample/s su				lier	nt	-2	2.36	mn	n So	11 P	arti	cie	De	nsi	ty(t	/m`) 2	2.65	C		Pag	e 1 o	f1	RE
requirement	ent is issued in a s. Accredited for etests, calibration	or compliance v	vith ISO/	IES 1	702	5. 1	Гhe						Aut	hori 7 M J.]		-		-			11	,	Ň		Ä	



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Client	URS Aust	ralia Pty I		t Method				Report No.	1	1080555-	G
Project	Alpha TSF	- Geotech	ו					Test Date	1	9-31/08/2	011
								Report Date		2/9/2011	-
Client ID	TP51-02							Depth (m)	1.30		
Sieve Size	Passing							Boptii (iii)	1.00		
(mm)	%	100	1								TTT
150.0											
75.0		90									
53.0											
37.5											
26.5		80									+++
19.0								/			
9.5	<u> </u>	70						/			
4.75								/			
2.36	100										
1.18	98	60									+++
0.600	93	(%) B									
0.425	87	Passing (%)									
0.300	79 55	Ба									
0.150	40										
0.069	35	40					\square				+++
0.049	32										
0.035	29	30					111				
0.025	29				\vdash						
0.018	29										
0.013	27	20									++++
0.0095	27										
0.0067	25	10	+	+++++			$\left \right \left \right $			+ + + + +	<u>+</u>
0.0048	24										
0.0039	24										
0.0034	24	0	↓⊥ 001		0.01			0.1	1		 10
0.0027	24	5.		ų		Par		ize (mm)	•		
0.0023	23										
0.0014											
TES/REMARKS	<u>S:</u>										
			ntent 8.3% pplied by the	e client	-2.36	Smm So	oil Pa	rticle Density(t/m ³)	2.67	Page 1 of 1	REP
	ent is issued in ac						А	uthorised Signatory			
	 Accredited for e tests, calibration 				nis		Â	im <i>es Ques</i>	0//		
	re traceable to Au						1	TAAA LA IIN IINA	11		



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Client URS Austra		<u>AS 1289 2.1.1,</u>		Report No	D.	11090045-	AL
Project 42626683				Test Date Report Da		01/10-06/1 07/10/2011	
Sample No.	11090045	11090046	11090047	11090048	11090050	11090051	1
Client ID	BH01-01	BH01-04	BH01-06	BH01-08	BH01-11	BH01-12	
Depth (m)	1.00	6.40	8.50	10.50	13.50	14.50	
Liquid Limit (%)	18	90	17	20	18	20	1
Plastic Limit (%)	10	20	10	13	12	-	
Plasticity Index (%)	8	70	7	7	6	-	
Linear Shrinkage (%)	2.0*	12.5*+	2.5*	2.5*	4.0	3.5	
Field Moisture Content (%)	5.7	23.8	10.4	10.6	11.9	12.3	
Client ID	BH01-13	BH02-02	BH02-04	BH02-05	BH02-07	BH03-05	
Client ID	BH01-13	BH02-02	BH02-04	BH02-05	BH02-07	BH03-05	
Depth (m)	15.50	2.00	4.00	5.00	7.00	5.00	
Liquid Limit (%)	19	20	21	25	32	20	-
Plastic Limit (%)	13	12	-	13	22	11	
Plasticity Index (%)	6	8	-	12	10	9	
Linear Shrinkage (%)	3.0*	1.0*	1.5	3.0+	6.0	3.0*	
Field Moisture Content (%)	12.0	8.1	11.5	8.1	18.6	9.0	
	12.0					9.0]
mple/s supplied by the client		* Crumbling c	ccurred	+ Curling occ	curred	Page 1 of 1	REP0
This document is issued in accordance accreditation requirements. Accrediture ISO/IES 17025. The results of the te measurements included in this docume Australian/National Standards.	ed for compliance sts, calibrations, a	nd/or	Authorised	Runl	/		
Australian/mational Stanuarus.						Laborator	

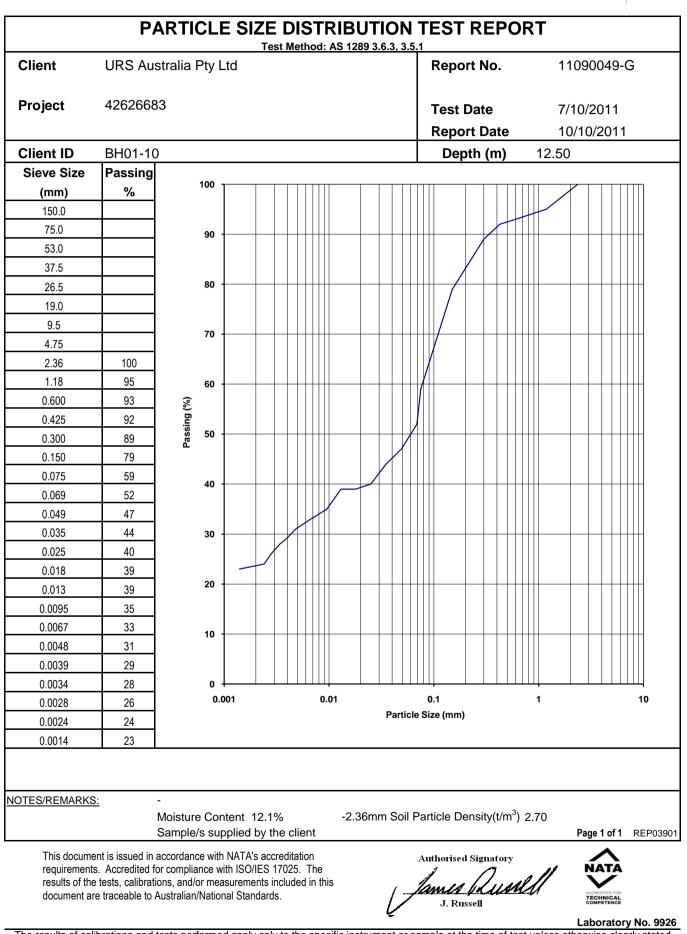
ACCURATE QUALITY RESULTS FOR TOMORROW'S ENGINEERING



Client	URS Austra	llia Pty Ltd			Report No	0.	11090045	-G
Project	42626683				Test Date	•	27/09-06/1	0/201
					Report Da	ate	07/10/201	1
Sample No.	11090045	11090046	11090047	11090048	11090050	11090052	11090053	
Client ID	BH01-01	BH01-04	BH01-06	BH01-08	BH01-11	BH01-13	BH02-02	
Depth (m)	1.00	6.40	8.50	10.50	13.50	15.50	2.00	1
Moisture (%)	5.7	23.8	10.4	10.6	11.9	12.0	8.1	
AS SIEVE SIZE (mm)			PE	RCENT PASSI	NG			
150								
75								
53								
37.5		100						
26.5		87						
19		87						
9.5		87						
4.75		87	100	100				
2.36	100	85	97	99	100	100	100	
1.18	99	83	91	95	96	98	99	
0.600	98	82	86	91	92	96	96	
0.425	96	81	83	88	89	95	91	
0.300	93	79	78	82	84	92	78	
0.150	73	70	64	69	73	80	42	
0.075	54	60	42	52	54	56	31	
TES/REMARKS:	- Sample/s supp	plied by the clie	ent				Page 1 of 1	REP
accreditation requi	ssued in accordance irements. Accredite he results of the test luded in this docum I Standards.	ed for compliance sts, calibrations, a	nd/or	Authorised	signatory Aumlu sell	//	Laborato	ACCREDITED FO TECHNICAT COMPETENCIA TY No.



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	Test Method: AS 1289 3.6.1, 2.1. URS Australia Pty Ltd				Report No.		11090055-G		
Project	42626683	42626683				Test Date Report Date		27/09-05/10-2011 07/10/2011	
					Report Da		07/10/2011		
Sample No.	11090055	11090056	11090057	11090059	11090060	11090061	11090062	ו	
Client ID	BH02-05	BH02-07	BH03-05	BH03-07	BH04-01	BH04-02	BH04-05		
Depth (m)	5.00	7.00	5.00	7.00	1.00	2.00	6.00	-	
Moisture (%)	8.1	18.6	9.0	25.6	10.2	7.9	14.6		
AS SIEVE SIZE (mm)	PERCENT PASSING								
150									
75									
53									
37.5									
26.5	100								
19	93								
9.5	93	100							
4.75	92	99	100						
2.36	89	99	99			100	100		
1.18	79	95	99	100	100	99	96		
0.600	58	90	98	98	98	96	93		
0.425	47	87	97	97	96	94	91		
0.300	39	83	91	96	91	85	88		
0.150	27	72	64	92	72	55	79		
0.075	23	55	48	90	58	35	59		



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lient URS Austra	<u>Test Method:</u> alia Pty Ltd	·		Report N	0.	11090058-	AL
roject 42626683				Test Date Report Date		28/09-06/1 07/10/2011	
Sample No.	11090058	11090059	11090060	11090061	11090062	11090063	٦
Client ID	BH03-06	BH03-07	BH04-01	BH04-02	BH04-05	BH04-09	
Depth (m)	6.00	7.00	1.00	2.00	6.00	19.00	
Liquid Limit (%)	45	121	31	19	30	33	
Plastic Limit (%)	-	25	13	12	20	23	
Plasticity Index (%)	-	96	18	7	10	10	
Linear Shrinkage (%)	7.5	17.0*+	8.0+	3.0*	5.5	6.5	
Field Moisture Content (%)	6.6	25.6	10.2	7.9	14.6	16.6	
Client ID Depth (m)	BH05-01 1.00	BH06-03 3.00	BH06-04 4.00	BH06-05 5.00	BH08-01 1.00	BH11-01 1.00	
	1.00	3.00	4.00	5.00	1.00	1.00	
Liquid Limit (%) Plastic Limit (%)	25	24	25	24	26	20	_
Plasticity Index (%)	12 13	13 11	14	17 7	13 13	15 5	
Linear Shrinkage (%)	5.5	4.0*	4.0*	3.0*	5.5+	1.5*	
Field Moisture Content (%)	12.4	9.0	14.8	11.1	10.4	10.2	
ES/REMARKS: The samples ple/s supplied by the client This document is issued in accordanc accreditation requirements. Accreditu ISO/IES 17025. The results of the te	ed for compliance	* Crumbling c	occurred Authorised	+ Curling occ		Page 1 of 1	
measurements included in this docun			J. Rus	- ANTERN		AC	CREDITED FOR

ACCURATE QUALITY RESULTS FOR TOMORROW'S ENGINEERING



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Client	URS Austra	<u>Test Meth</u> lia Pty Ltd		Report No	D.	11090063-0	3
Project	42626683			Test Date Report Da		27/09-06/10 07/10/2011)/20 ⁻
Sample No.	11090063	11090064	11090065	11090067	11090070	11090080	
Client ID	BH04-09	BH05-01	BH06-03	BH06-05	BH08-01	BH11-01	
Depth (m)	19.00	1.00	3.00	5.00	1.00	1.00	
Moisture (%)	16.6	12.4	9.0	11.1	10.4	10.2	
AS SIEVE SIZE (mm)	E						
150							
75							
53							
37.5						100	
26.5				100		94	
19			100	100		92	
9.5 4.75		100	100 97	99 97	100	89 83	
2.36		99	97 95	97	99	72	
1.18		99	89	85	99	68	
0.600		94	82	81	93	62	
0.425		91	77	79	89	57	
0.300	100	86	71	77	83	48	
0.150	99	66	47	65	65	26	
0.075	95	46	32	48	51	16	

NOTES/REMARKS:

Page 1 of 1 REP01101

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Authorised Signatory tames Quell J. Russell

TECHNICAL

 Laboratory No. 9926

 results of calibrations and tests performed apply only to the specific instrument or sample at the time of test unless otherwise clearly sta

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 ABN 25 065 630 506



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ent URS Austra		<u>AO 1200 2.1.1,</u>	<u>3.1.1, 3.1.2, 3.2.</u>	Report No	0.	11090068-	AL
piect 42626683							
oject 42626683				Test Date		12/09/2011	
				Report Da	ate	13/09/2011	
Sample No.	11090068	11090069	11090071	11090072	11090073	11090074]
Client ID	BH07-01	BH07-05	BH09-04	BH09-07	BH09-08	BH10-01	
Depth (m)	1.00	6.00	4.00	7.00	8.00	1.00	
Liquid Limit (%)	22	31	23	24	22	43	
Plastic Limit (%)	10	13	15	13	11	16	
Plasticity Index (%)	12	18	8	11	11	27	
Linear Shrinkage (%)	5.5	8.0	Insufficient Sample	2.5*	2.0*	11.5+	
Field Moisture Content (%)	5.3	8.4	4.3	7.2	6.7	13.5	
Client ID	BH10-06	BH10-08	BH10-10	BH10-14	BH13-01	BH13-05	
Depth (m)	7.50	10.50	13.50	19.50	1.00	6.00	
Liquid Limit (%)	23	46	31	22	40	35	
Plastic Limit (%)	13	17	14	12	12	16	
Plasticity Index (%)	10	29	17	10	28	19	
Linear Shrinkage (%)	4.5	7.0+	8.0	3.5*	11.0	10.0	
Field Moisture Content (%)	10.2	21.2	13.7	14.6	10.0	10.9	
S/REMARKS: The samples le/s supplied by the client This document is issued in accordan accreditation requirements. Accredit ISO/IES 17025. The results of the te	ed for compliance	* Crumbling c	occurred Authorised ع	+ Curling occ		Page 1 of 1	RE
measurements included in this docur Australian/National Standards.			J. Rus	alund di sella			
Australian/Hational Stanuarus.		~ ~ ~				Laborator	NI

ACCURATE QUALITY RESULTS FOR TOMORROW'S ENGINEERING



Client	URS Austra	lia Pty Ltd			Report No	D .	11090068-	G
Project	42626683				Test Date Report Da		08/09-12/0 13/09/2011	
Sample No.	11090068	11090069	11090071	11090073	11090074	11090075	11090076]
Client ID	BH07-01	BH07-05	BH09-04	BH09-08	BH10-01	BH10-06	BH10-08]
Depth (m)	1.00	6.00	4.00	8.00	1.00	7.50	10.50	-
Moisture (%)	5.3	8.4	4.3	6.7	13.5	10.2	21.2	
AS SIEVE SIZE (mm)			PE	RCENT PASSI	NG			-
150								
75								
53								
37.5								
26.5								
19								
9.5								
4.75			100	100				
2.36	100	100	98	99	100	100	100	
1.18	98	98	96	97	98	98	98	
0.600	93	92	95	94	96	95	94	
0.425	88	84	94	91	94	91	89	
0.300	81	69	92	84	89	85	81	
0.150	62	35	73	52	74	62	61]
0.075	49	26	46	37	63	43	51	
1.18 0.600 0.425 0.300 0.150	98 93 88 81 62 49	98 92 84 69 35	96 95 94 92 73 46	97 94 91 84 52	98 96 94 89 74	98 95 91 85 62	98 94 89 81 61	
	ssued in accordance	ce with NATA's		Authorised	Signatory			REF
ISO/IES 17025. T	irements. Accredite he results of the teal luded in this docum	sts, calibrations, a	nd/or	James 1	<u>Lund</u>	/		
Australian/Nationa			L	J. Russ	ец		Laborator	



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Client	URS Austra	lia Pty L				d: AS 1				Repo	rt No.		11	0900)78-	G
Project	42626683									Test	Dato		<u>م</u>	5/09-1	2/0	a/20
-											ort Date			3/9/20		9/20
Client ID	BH10-12									-	oth (m)		16.50		, , ,	
Sieve Size	Passing									Dep	un (m)		0.50			
(mm)	" assing %	100 J											_			\square
150.0	78															
75.0		90 -										1				
53.0		90 -														
37.5																
26.5		80 -														
19.0																
9.5										,	$\langle $					
4.75		70 -								/					\square	
2.36	100									/						
1.18	98	60 -														
0.600	94									/						
0.425	91	") gui								V						
0.300	86	Passing (%) 05							\mathbb{H}							
0.150	64	-														
0.075	47	40 -							Л							
0.068	43	40														
0.049	37															
0.035	33	30 -					\square		$\left \right $							
0.025	32															
0.018	30															
0.013	28	20 -		\square												
0.0096	24															
0.0068	22	10 -														
0.0049	20															
0.004	19															
0.0034	19	0 +	01			0.01				Ч <u> </u>	1 1					
0.0027	18	0.0	01			0.01		Partic		0.1 ize (mm)	1	1				10
0.0024	16									,,						
0.0014	14															
TES/REMARKS	Moi	sture Con				-2	.36mm	n Soil	Pa	rticle D	ensity(t/	m ³) 2.6	5			
requirement	San ent is issued in acco s. Accredited for co e tests, calibrations,	mpliance wi	NATA's ac th ISO/IES	ccredita 1702	ation 5. The				A		d Signato	-	//	Page 1		REP



		lia Pty Ltd		<u>1289 3.6.1, 2.1.</u>	Report No	0.	11090079-	G
Project	42626683				Test Date Report Da		08/09-12/0 13/09/2011	
Sample No.	11090079	11090082	11090083	11090084	-	-	-]
Client ID	BH10-14	BH13-01	BH13-05	BH13-14	-	-	-	
Depth (m)	19.50	1.00	6.00	19.50	-	-	-	
Moisture (%)	14.6	10.0	10.9	14.8	-	-	-	
AS SIEVE SIZE (mm)			PE	RCENT PASSI	NG			
150					-	-	-	
75					-	-	-	
53					-	-	-	
37.5					-	-	-	
26.5					-	-	-	
19					-	-	-	
9.5					-	-	-	
4.75				100	-	-	-	
2.36	100	100	100	99	-	-	-	
1.18	94	99	99	94	-	-	-	
0.600	87	97	96	90	-	-	-	
0.425	82	93	93	87	-	-	-	4
0.300	74	87	87	82	-	-	-	4
0.150	50	66	69	69	-	-	-	1
0.075	33	51	55	56	-	-	-	



Client URS Austra	<u>Test Method:</u> alia Pty Ltd			Report No.		11090081	-AL
Project 42626683				Test Date Report Dat	٩	29/09-06/1 07/10/201 ⁻	
				Report Dat	E	07/10/201	1
Sample No.	11090081	11090085	11090086	11090087	-	-	
Client ID	BH12-01	BH14-03	BH14-05	BH14-07	-	-	
Depth (m)	1.00	3.00	6.00	9.00	-	-	
Liquid Limit (%)	32	16	15	16	-	-	
Plastic Limit (%)	13	11	-	12	-	-	
Plasticity Index (%)	19	5	-	4	-	-	
Linear Shrinkage (%)	7.0*	1.0*	1.5	1.5	-	-	
Field Moisture Content (%)	12.6	5.9	22.3	7.9	-	-	
Client ID Depth (m)	-	-	-	-	-	-	-
Depth (m)	-	-	-	-	-	-	
Liquid Limit (%)	-	-	-	-	-	-	
Plastic Limit (%)	-	-	-	-	-	-	
Plasticity Index (%)	-	-	-	-	-	-	
Linear Shrinkage (%)	-	-	-	-	-	-	
Field Moisture Content (%)	-	-	-	-	-	-	
			eved and in a	- 125-250mm mou + Curling occu	ld.	- Page 1 of 1	REP
This document is issued in accordan			Authorised				
accreditation requirements. Accredit ISO/IES 17025. The results of the te measurements included in this docur	sts, calibrations, a	nd/or	James.	Rundl	1	Ĩ	
Australian/National Standards.		~ L	J. Rus	sell			COMPETENCE



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42626683 11090081 BH12-01	11090085 BH14-03	11090087		Test Date Report Da	ate	27/09-06/1 07/10/2011	
BH12-01		11090087	-				
BH12-01		11090087	-				
	BH14-03			-	-	-	
	2.114.00	BH14-07	-	-	-	-	
1.00	3.00	9.00	-	-	-	-	
12.6	5.9	7.9	-	-	-	-	
E		PER	CENT PASS	SING			
			-	-	-	-	
			-	-	-	-	
			-	-	-	-	
			-	-	-	-	
			-	-	-	-	
			-	-	-	-	
			-	-	-	-	
100	100		-	-	-	-	
99	98	100	-	-	-	-	
96	97	97	-	-	-	-	
92	95	85	-	-	-	-	
89	93	73	-	-	-	-	
81	87	61	-	-	-	-	
59	54	43	-	-	-	-	
46	35	34	-	-	-	-	
	99 96 92 89 81 59	Image: Constraint of the second state of the second sta	PERC Image: Im	PERCENT PASS Image:	PERCENT PASSING Image: Imag	PERCENI PASSING Image: Percent Passing </td <td>PERCENT PASSING Image: Constraint of the stress of the</td>	PERCENT PASSING Image: Constraint of the stress of the

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	lia Pty Ltd	<u>S 1289 2.1.1,</u>		Report N	0.	11090084-	AL
roject 42626683				Test Date	•	12/09/2011	
				Report D	ate	13/09/2011	
Sample No.	11090084	-	-	-	-	-]
Client ID	BH13-14	-	-	-	-	-	
Depth (m)	19.50	-	-	-	-	-	
Liquid Limit (%)	31	-	-	-	-	-	
Plastic Limit (%)	17	-	-	-	-	-	
Plasticity Index (%)	14	-	-	-	-	-	
Linear Shrinkage (%)	6.0	-	-	-	-	-	
Field Moisture Content (%)	14.8	-	-	-	-	-	
Client ID Depth (m)	-	- -	-	-	-	-	
Liquid Limit (%)	-	-	-	-	-	-	
Plastic Limit (%)	-	-	-	-	-	-	
Plasticity Index (%)	-	-	-	-	-	-	_
Linear Shrinkage (%)	-	-	-	-	-	-	
Field Moisture Content (%)	-	-	-	-	-	-	



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Project 42626683 Test Date 5/10/201	Oliant	Test Method: /		44000000 1100
Sample No. 11090088 Client ID BH04-Run01 Depth (m) 12.25-12.40 Description - Wet Density (t/m ³) 2.08 Moisture Content (%) 1.9 Specimen Length (mm) 119.6 Specimen Diameter (mm) 44.4 Mode of Failure Shear Test Duration (Min:Sec) 6:32	Client	URS Australia Pty Ltd	Report No.	11090088-UCS
Sample No. 11090088 Client ID BH04-Run01 Depth (m) 12.25-12.40 Description - Wet Density (t/m ³) 2.08 Moisture Content (%) 1.9 Specimen Length (mm) 119.6 Specimen Diameter (mm) 44.4 Mode of Failure Shear Test Duration (Min:Sec) 6:32	Project	42626683	Test Date	5/10/2011
Client ID BH04-Run01 Depth (m) 12.25-12.40 Description - Wet Density (t/m ³) 2.08 Moisture Content (%) 1.9 Specimen Length (mm) 119.6 Specimen Diameter (mm) 44.4 Mode of Failure Shear Test Duration (Min:Sec) 6:32			Report Date	6/10/2011
Client ID BH04-Run01 Depth (m) 12.25-12.40 Description - Wet Density (t/m ³) 2.08 Moisture Content (%) 1.9 Specimen Length (mm) 119.6 Specimen Diameter (mm) 44.4 Mode of Failure Shear Test Duration (Min:Sec) 6:32				
Depth (m) 12.25-12.40 Description - Wet Density (t/m ³) 2.08 Moisture Content (%) 1.9 Specimen Length (mm) 119.6 Specimen Diameter (mm) 44.4 Mode of Failure Shear Test Duration (Min:Sec) 6:32		Sample No.	11090088	
Description - Wet Density (t/m³) 2.08 Moisture Content (%) 1.9 Specimen Length (mm) 119.6 Specimen Diameter (mm) 44.4 Mode of Failure Shear Test Duration (Min:Sec) 6:32		Client ID	BH04-Run01	
Wet Density (t/m ³) 2.08 Moisture Content (%) 1.9 Specimen Length (mm) 119.6 Specimen Diameter (mm) 44.4 Mode of Failure Shear Test Duration (Min:Sec) 6:32 CLIENT: URS Australia Pty Ltd PROJECT: 42626683 AFTER TEST LAB SAMPLE No. 11090088 DATE: \$/join		Depth (m)	12.25-12.40	
Moisture Content (%) 1.9 Specimen Length (mm) 119.6 Specimen Diameter (mm) 44.4 Mode of Failure Shear Test Duration (Min:Sec) 6:32 CLIENT: URS Australia Pty Ltd PROJECT: 42626833 DATE: 5/10/0 DATE: 5/10/0		Description	-	
Specimen Length (mm) 119.6 Specimen Diameter (mm) 44.4 Mode of Failure Shear Test Duration (Min:Sec) 6:32 CLIENT: URS Australia Pty Ltd PROJECT: 42626683 AFTER TEST LAB SAMPLE No. 11090088 DATE: 5/10/11		Wet Density (t/m ³)	2.08	
Specimen Diameter (mm) 44.4 Mode of Failure Shear Test Duration (Min:Sec) 6:32		Moisture Content (%)	1.9	
Mode of Failure Shear Test Duration (Min:Sec) 6:32		Specimen Length (mm)	119.6	
Test Duration (Min:Sec) 6:32 CLIENT: URS Australia Pty Ltd		Specimen Diameter (mm)	44.4	
CLIENT: URS Australia Pty Ltd PROJECT: 42626683 AFTER TEST LAB SAMPLE No. 11090088		Mode of Failure	Shear	
PROJECT: 42626683 AFTER TEST LAB SAMPLE No. 11090088 DATE: 5∫to∫tt		Test Duration (Min:Sec)	6:32	
UCS (MPa) 15.8		UCS (MPa)	15.8	
Stored and tested as received Pho			Jiang Tugong 100 kN Compression M	Photo no lachine Page: 1 of
	require results	ocument is issued in accordance with NATA's accreditation ements. Accredited for compliance with ISO/IES 17025. The of the tests, calibrations, and/or measurements included in the nent are traceable to Australian/National Standards.		



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	Client	URS Australia Pty Ltd	S1289 4133.4.2.1 Report No. 1109	0089-UCS
Image: Control of the second decided as received polefs supplied by the client Test Aparatus - ZheJiang Tugong 10t kN Compression Machine	Decised	4000000		
Sample No. 11090089 Client ID BH07-Run04 Depth (m) 13.90-14.04 Description - Wet Density (t/m³) 2.07 Moisture Content (%) 3.0 Specimen Length (mm) 122.8 Specimen Diameter (mm) 44.0 Mode of Failure End Failure Test Duration (Min:Sec) 2:57 Improve the failure for the failure Test Duration (Min:Sec) 2:57 UCS (MPa) UCS (MPa) 4.80 Test Apparatus - ZheJiang Tugong 100 kN Compression Machine Test Apparatus - ZheJiang Tugong 100 kN Compression Machine	Project	42626683		10/2011
Client ID BH07-Run04 Depth (m) 13.90-14.04 Description			Report Date 6/	10/2011
Client ID BH07-Run04 Depth (m) 13.90-14.04 Description		Sample No	11090089	
Depth (m) 13.90-14.04 Description		· · · ·		
Description				
Wet Density (t/m ³) 2.07 Moisture Content (%) 3.0 Specimen Length (mm) 122.8 Specimen Diameter (mm) 44.0 Mode of Failure End Failure Test Duration (Min:Sec) 2:57 Image: Specimen Diameter (mm) Image: Specimen Diameter (mm) Moisture Content (%) Test Duration (Min:Sec) Image: Specimen Diameter (mm) Mode of Failure Test Duration (Min:Sec) Differ: 12020833 DIFFIC: 12020833 DIFFIC: 1309-1400 DIFFIC: 1309-1400 DIFFIC: 12020833 DIFFIC: 12020833 DICS (MPa) Locs (MPa) Test Apparatus - ZheJiang Tugong 100 kN Compression Machine			-	
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		KIAL COMPRESSIVE STF Test Method: AS1289		
Client	URS Aus	tralia Pty Ltd	Report No. 11090	090-UCS
Project	42626683	3	Test Date 5/10	0/2011
			Report Date 6/10	0/2011
	-			_
		Sample No.	11090090	
		Client ID	BH07-Run04	
		Depth (m)	14.90-15.05	
		Description	-	
		Wet Density (t/m ³)	2.09	
		Moisture Content (%)	5.2	
		Specimen Length (mm)	129.2	_
		Specimen Diameter (mm)	43.6	_
		Mode of Failure	End Failure	
		Test Duration (Min:Sec)	4:34	
	-	BH: BH07-Run04	5.22	
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			-	Laboratory No.





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