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PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2020/1099

Date: 9 December 2020

Queensland Government

Groundwater Assessment
Oxley PDA - Stage 1A
Blackheath Road, Oxley

Prepared for
Economic Development Queensland

Project No.: 018-118D
15 September 2020

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SECTION 1 INTRODUCTION

1.1 Project

It is understood that Economic Development Queensland (EDQ) is proposing to develop Stage 1A of the Oxley PDA site (part of the former Oxley Secondary College), by the construction of a residential subdivision comprising forty-one new residential allotments and open space areas. The location and extent of the Stage 1A site are indicated in Figure 1 and attached Drawing No. 1.

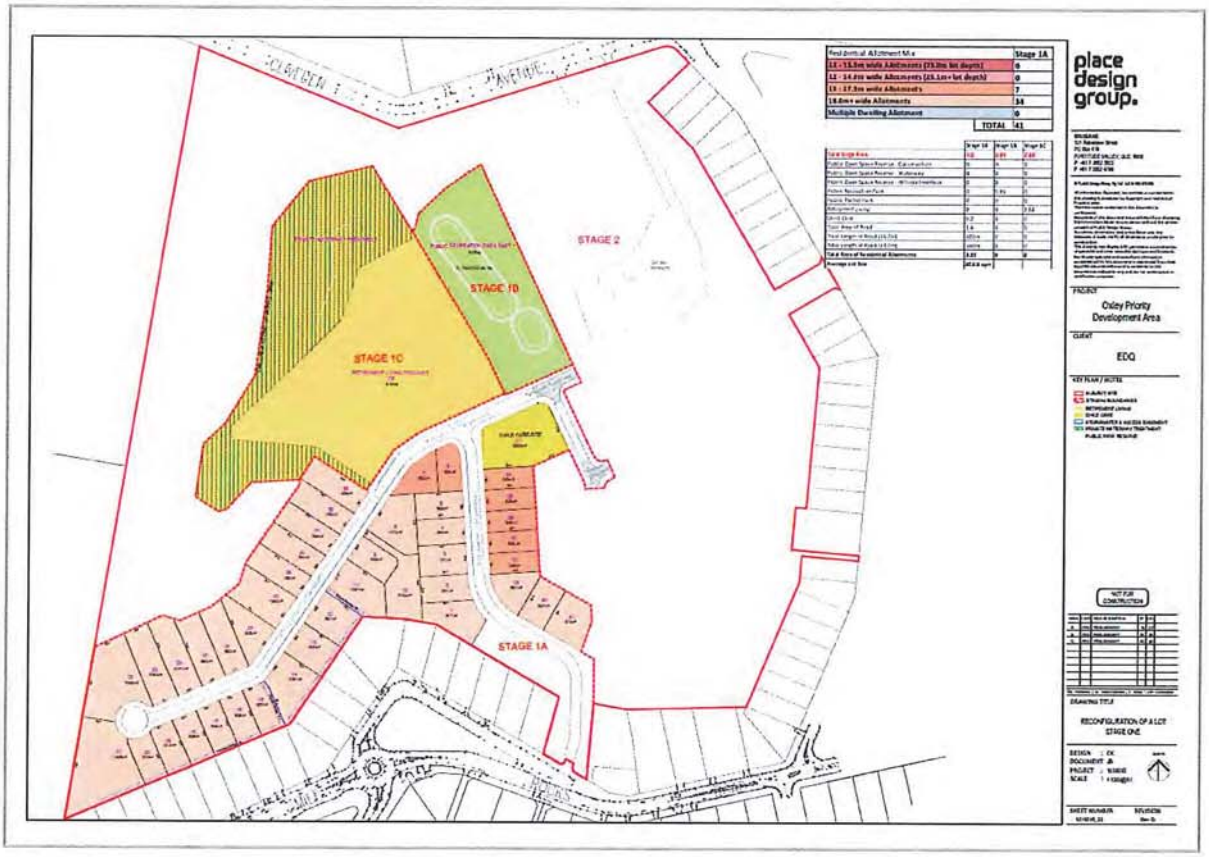


Figure 1: Oxley PDA Stage 1A Location and Extent

As input to the design and DA/EDQ approval processes for the Stage 1A portion of the overall Oxley Parkside development area, slope stability assessment of the Stage 1A site was required, considering relevant slope stability comments from the following two EDQ provided documents:

- Department of State Development, Manufacturing, Infrastructure and Planning's letter to EDQ of 23 April 2020 (Ref DEV2020/1099); and
- Appendix A of EDQ's submitted reports review.

A groundwater assessment of the site was required to be undertaken to provide an assessment of the maximum likely groundwater level at the Stage 1A site, as input to the geotechnical assessment of slope stability.

1.2 Scope of Work

The scope of work in relation to the groundwater assessment comprised the following:

- review of existing site subsurface information;
- installation of four groundwater monitoring wells;
- laboratory testing of selected samples;
- monitoring of the groundwater levels;
- performing insitu hydraulic tests;
- groundwater modelling to provide estimates of potential groundwater level changes; and
- preparation of a report summarising the laboratory test results, the groundwater model and estimates of potential groundwater level changes in the sloping sections of Stage 1A, resulting from various rainfall scenarios.

1.3 Technical Framework

The following references were used as part of the groundwater assessment:

- Middlemis H. (2001): Groundwater Flow Modelling Guideline, Murray-Darling Basin Commission;
- SKM and NCGRT (2012): Australia Groundwater Modelling Guidelines;
- Kruseman G.P. and de Ridder N.A. (1994) *Analysis and Evaluation of Pumping Test Data*;
- Freeze R.A. and Cherry, J.A. (1979) Groundwater. Prentice-Hall Inc. Englewood Cliffs, N.J. 604p; and
- McDonald M.G. and Harbaugh, A.W. (1988). *A modular three-dimensional finite-difference ground-water flow model*. USGS Techniques of Water Resources Investigations, Book 6, Chapter A1. Washington DC.

1.4 Commission

Based on the proposed development and anticipated subsurface conditions, a fee to undertake a groundwater assessment of the Stage 1A site (in conjunction with a geotechnical investigation), was presented in a proposal of 22 May 2020. Butler Partners Pty Ltd (Butler Partners) was subsequently commissioned by EDQ to conduct the groundwater assessment (following the geotechnical investigation), as proposed, which has been conducted in consultation with EDQ. This report was first issued in draft for comment on 24 August 2020.

The geotechnical investigation results are reported separately (refer Section 2.1).

SECTION 2 BACKGROUND

2.1 Previous Investigations

Butler Partners has previously undertaken a preliminary geotechnical investigation (in conjunction with a preliminary contamination assessment), of the overall Oxley Parkside development site; a broadscale slope stability assessment; a subsequent slope stability assessment of the eastern site slopes (below Blackheath Road); and a slope stability assessment of the Stage 1A section of the site, and the results are contained in the following reports:

Preliminary Geotechnical Investigation
Former Oxley Secondary College
Blackheath Road, Oxley
Project No.: 018-118A, Dated: 16 May 2018

Broadscale Slope Stability Assessment
Former Oxley Secondary College
Blackheath Road, Oxley
Project No.: 018-118B, Dated: 31 October 2018

Additional Slope Stability Assessment
Former Oxley Secondary College
Blackheath Road, Oxley
Project No.: 018-118B, Dated 26 August 2019

Geotechnical Investigation and Slope Stability Assessment
Oxley Parkside Development – Stage 1A
Blackheath Road, Oxley
Project No.: 018-118D, Dated 10 July 2020

Relevant Bore Report sheets from the 26 August 2019 report are included herein in Appendix B and relevant factual laboratory test data are also included herein. Six groundwater monitoring wells (Wells 21, 25 to 29), were installed, sampled and hydraulically tested during the previous investigations, and relevant results are also included herein.

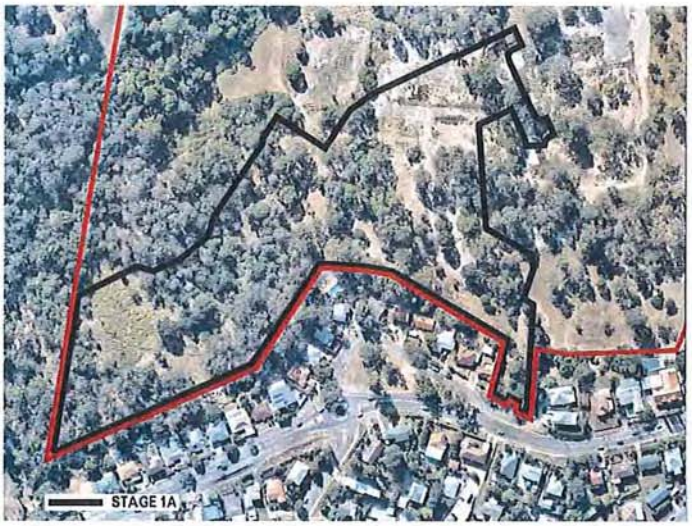
Relevant Bore Report sheets from the 10 July 2020 report are included herein in Appendix A and relevant factual laboratory test data are also included herein.

2.2 Site Description

The Stage 1A site is located close to, and to the north of, Seventeen Mile Rocks Road, close to its intersection with Blackheath Road. At the time of the investigation, the site was undeveloped and contained a moderate cover of medium to tall trees, with long and mown grass undergrowth. The southern portion of the site comprised (apparently) natural slopes (but with some fill zones), with overall slope angles generally downwards to the north, varying between 5° and 10° and up to 20° in localised areas. The ground surface level across the site is highly variable and non-uniform and varied at the bore locations between RL32.0m (Bore 105) and RL48.5m (Bore 100).

An aerial view of the overall Oxley Parkside site taken on 4 November 2018 is given in Photograph 1, and an aerial view of the Stage 1A site taken on 25 May 2020 is given in Photograph 2. A view of a section of the Stage 1A site, taken at the time of the investigation, is given in Photograph 3.

Photograph 1: An aerial view of the overall Oxley Parkside site on 4 November 2018. Source: NearMap



Photograph 2: Stage 1A portion of the Oxley Parkside site on 25 May 2020. Source: NearMap

Several of the existing (off-site) properties located along the southern boundary of the site (along Seventeen Mile Rocks Road), appear to have had fill placed along some sections of their rear (northern) boundaries to 'level' the sites. Concentrated surface water flow zones also emanate from several of the properties.

Photograph 3: View of the site looking north-east from Bore 102

2.3 Geology

The surface geology presented on Queensland Globe (https://qldglobe.information.qld.gov.au/) is shown in Figure 2, which also includes the locations of registered groundwater monitoring wells in the vicinity of the site. The geological units are separated by the doted lines. The area of lower elevation in the northern portion of the site (the light-green coloured area) is Quaternary sediments - Holocene Alluvium (mapped as Qha/2), consisting of gravel, sand, silt and clay. The rest of the site is mapped as Tertiary sedimentary rocks with the eastern slope area being the Corinda Formation (noted as '***Toc***' on the map), comprising mudstone, shale, minor sandstone and limestone, and the western portion being the Darra Formation (noted as '***Tod***' on the map) comprising sandstone, conglomerate, claystone and siltstone. It should be noted that the tertiary 'rocks' are semi-consolidated and are often identified as silty clay or sandy clay when broken down or weathered near the ground surface.

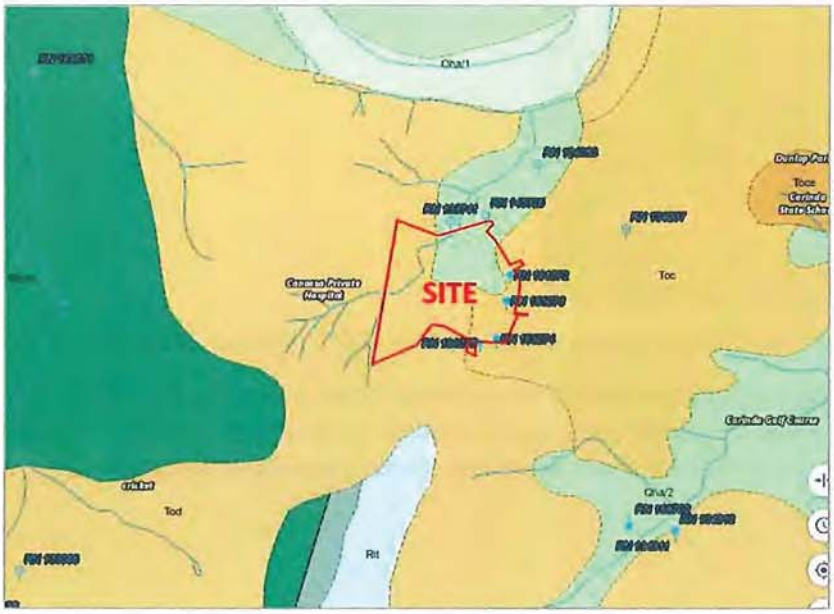


Figure 2: Surface geology and the locations of nearby registered groundwater monitoring wells

2.4 Hydrology

The site is located adjacent to the Brisbane River and forms part of a small local gully catchment. According to data from the Brisbane City Council (BCC), the peak flood level was RL11.4mAHD in January 2011. A portion of the site may be affected by flood as illustrated in Figure 3.

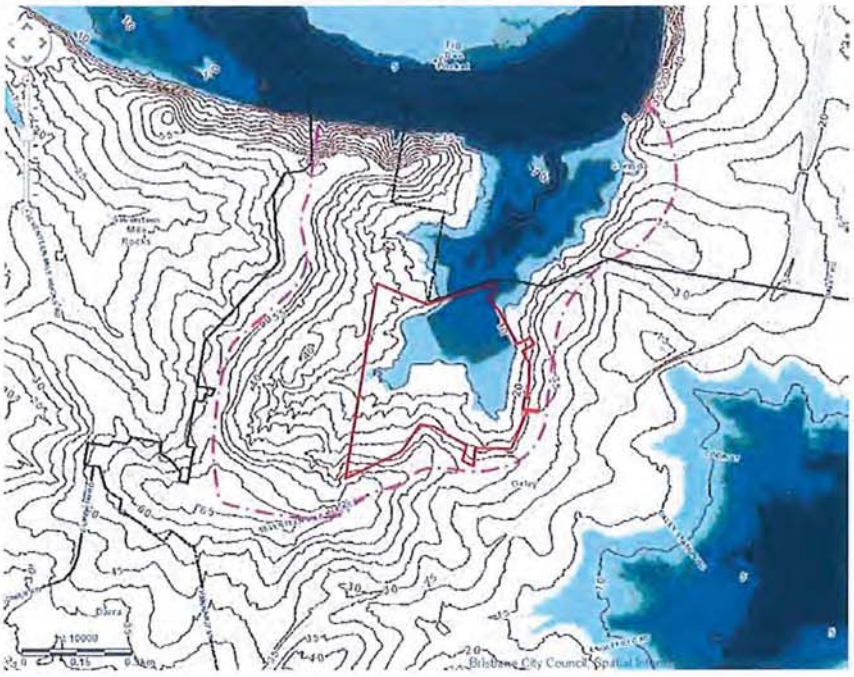


Figure 3: BCC Flood Map with the overall Oxley PDA site boundary shown in red

2.5 Rainfall

The Australian Government Bureau of Meteorology (BoM) rainfall data has been used to provide long term climate context for the site (refer to website http://www.bom.gov.au/climate). The rainfall data from the Oxley Station (#40463) has been used for this assessment. The long term, 1971 to 2020, average monthly rainfall recorded at this station is presented in Figure 4, and the statistics are summarised in Table 1. The long term average annual rainfall in this location is 1,036mm; February is the month of maximum rainfall and August and September generally have the least rainfall.

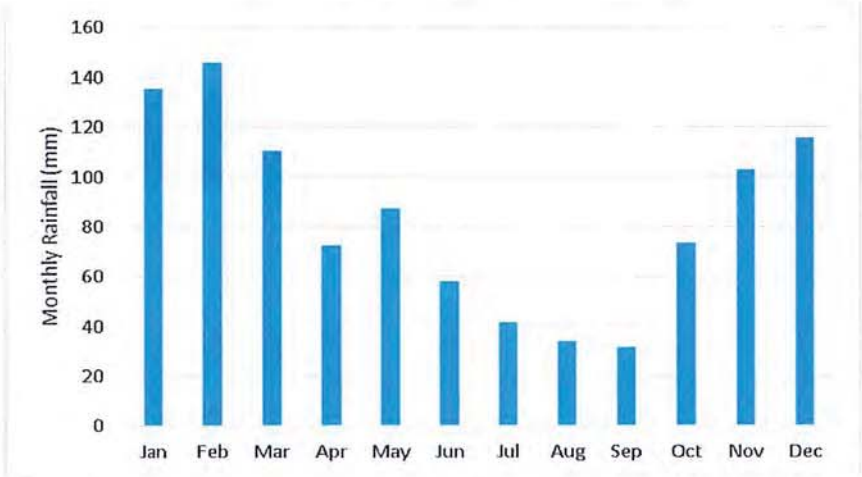


Figure 4: Long term average rainfall at the Oxley Station (Station No. 40463)

Table 1: Rainfall Statistics from Observations at the Oxley Weather Station between 1971 and 2020

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	135.6	145.9	110.7	72.7	87.3	58.0	41.8	34.1	31.4	73.3	102.8	115.8	1036.3
Lowest	17.2	14.6	3.4	2.6	3.0	2.0	0.0	0.0	0.8	6.0	7.0	30.2	504.7
5th %ile	30.5	24.6	10.8	7.7	8.8	4.2	2.3	0.6	1.5	17.5	14.8	36.2	559.2
10th %ile	39.5	41.3	18.0	9.2	13.4	9.9	4.0	3.4	1.9	20.3	25.1	48.9	695.6
Median	108.6	120.9	97.6	49.3	55.4	40.8	29.0	22.5	23.6	51.6	85.8	102.7	1028.2
90th %ile	266.6	291.1	197.8	151.1	190.4	116.1	74.7	75.6	74.4	138.0	207.1	197.1	1428.7
95th %ile	279.6	301.9	224.1	178.9	279.9	135.0	136.4	90.4	81.3	162.5	233.6	238.9	1518.9
Highest	485.2	362.5	437	412.3	570	301.6	315.5	102.5	98.8	351.1	353.4	377.7	1676.1

2.6 Past Landslides

It is understood that past significant landslides have previously occurred within the Corinda Formation (and overlying soils), along Seventeen Mile Rocks and Blackheath Roads site boundaries, in the general vicinity (and immediately to the east of) of the Stage 1A site.

General comment on the relationship between groundwater and landslides in the Brisbane area is as follows:

> Hoffman and Willmott (1984)[1] note that "*the prime cause of slope failure is excessive pore pressure in interbedded, inclined claystone and sandstone beds in the Tertiary units….* (due to) *….. infiltration of extra water (for example by earthworks, pipe trenches, garden watering, etc.) into permeable layers within the slope, or from compacting of soil at the toe of the slope thus prohibiting natural seepage into drainage channels. Most significant, however, is the rise of the water table, and pore pressure, when the natural forest cover of an area is cleared. Loss of root support also directly reduces the effective strength of the soil.*"

For supplementary information on site slope stability assessment results, the reports noted in Section 2.1 should be referred to.

2.7 Registered Groundwater Bores

A search of the Department of Natural Resources, Mines and Energy's (DNRME) registered bores identified nine registered groundwater bores that are located within or near the boundaries of the local groundwater system. The locations of these registered bores are included in Figure 2 and a summary is presented in Table 2. There is minimal hydrogeological information in the registered bores in the public domain, except for the geological logs of the bores which help to understand the geology in the surround areas.

Table 2: Summary of Registered Groundwater Bore Information

Registered Bore Number	Coordinate		Bore Depth (mbgl)	SWL (mbgl) Year	Aquifer Stratigraphy	Yield (L/s)
	Easting	Northing				
124053	497285	69529836	33		Clay	1.18
133086	495369	6951489	79			
133741	496950	6952768	54			
134207	497598	6952741	42			
145326	497080	6952792	45			
181272	497170	6952569	15	-3.7	Clay – Darra Formation	
181273	497157	6952475	15			
181274	497121	6952337	15	-5.3	Clay – Corinda Formation	
181275	497058	6952321	15			

[1] Hoffman, G.W. & Willmott, W.F. 1984 *Landslide Susceptibility of Natural Slopes in the City of Brisbane* Department of Natural Resources, Mines and Water 1984/10

SECTION 3 FIELDWORK

3.1 Groundwater Monitoring Wells

3.1.1 Drilling and Sampling Methods

The groundwater assessment was carried out in conjunction with geotechnical investigation of the Stage 1A site. The geotechnical investigation comprised the drilling and sampling of six bores (Bores 100 to 105) to between 15.25m and 21.95m depth, with truck and track mounted Hydrapower Scout drilling rigs. All bores were initially drilled using solid flight augers to between 2.5m and 3.0m depth, then extended using wash-bore drilling methods. Strata identification was based on inspection of cuttings recovered on the augers, supplemented with inspection of disturbed Standard Penetration test (SPT) and 'undisturbed' 50mm diameter tube samples, recovered at selected depths. At the completion of the drilling of Bores 100, 101, 102 and 105, a groundwater monitoring well was installed in each bore.

Experienced geotechnical engineers set out the bore locations, logged the subsurface profiles encountered, determined the insitu sampling and testing program and supervised the fieldwork and the installation of the groundwater monitoring wells.

3.1.2 Construction Details of the Monitoring Wells

The groundwater monitoring wells were constructed from threaded Class 18 UPVC with factory slotted screen (0.5mm slot width and 4mm slot spacing). A coarse sand pack was then placed around the screened section and up to a height of 0.4m to 0.5m above the screen, before being sealed with a 300mm to 400mm bentonite plug. The annulus above the bentonite seal was filled with concrete, and the bores were capped at the surface using a lockable cover over the UPVC. Construction details for each well (including for monitoring wells installed during previous investigations), are summarised in Table 3 and are also indicated on the relevant attached Bore Report sheets.

Table 3: Summary of Onsite Monitoring Well Construction Details

Well	Ground Level (mAHD)	Well Depth (mbgl)	Screen Depth (mbgl)		Screen Length (m)	Strata Screened	Completion Date
			Top	Bottom			
21	14.5	12.0	6.0	12.0	6.0	Silty Clay	26 September 2018
25	19.0	15.0	6.0	15.0	9.0	Mudstone	23 January 2019
26	20.5	15.0	6.0	15.0	9.0	Mudstone	24 January 2019
27	26.5	15.0	6.0	15.0	9.0	Sandstone/Mudstone	9 December 2016
28	25.0	15.0	6.0	15.0	9.0	Mudstone	25 January 2019
29	25.0	15.0	6.0	15.0	9.0	Mudstone	7 March 2019
100	48.5	20.0	7.5	20.0	12.5	Sandstone	29 June 2020
101	45.8	15.0	6.0	15.0	9.0	Clayey Sand	30 June 2020
102	38.0	16.7	5.0	16.5	11.5	Silty Clay/Sandstone	1 June 2020
105	32.0	15.0	9.0	15.0	6.0	Silty Clay	9 June 2020

3.2 Insitu Hydraulic Testing

Insitu hydraulic tests were carried out in all available monitoring wells, including four newly installed wells and six existing wells. On the basis of the well depth and anticipated well yield, hydraulic testing was performed using a slug test methodology, which is described in Section 4.3, along with a summary of the test results.

SECTION 4 RESULTS OF INVESTIGATIONS

4.1 Subsurface Conditions

The subsurface conditions encountered in the (current) Stage 1A bores are given on the Bore Report sheets included in Appendix A, using classification and descriptive terms defined in accompanying notes (which are based on Australian Standard AS1726-1993). It should be noted that the rock types indicated on the Bore Report sheets are based on visual assessment only; no petrographic analysis has been undertaken for confirmation.

For a description of the subsurface conditions encountered at the locations of Bores 18 and 100 to 105 (being the groundwater monitoring wells located in Stage 1A), the Bore Report sheets should be consulted. However, in broad summary the subsurface conditions encountered in the bores generally comprised a surface layer of either topsoil to between 0.1m and 0.5m depth in Bores 103 and 104, or fill which was encountered to between 0.2m and (possibly) up to 7.0m depth in Bores 18, 101 and 102. The fill is probably uncontrolled and in Bores 18 and 102, comprised silty/sandy clays that essentially had the same appearance as the natural soils, and it was therefore very difficult to distinguish the fill from the natural soils. As a result, the depth of fill indicated in the Bore Report sheets for Bores 18 and 102 should be considered as approximate only and subject to confirmation.

The topsoils and fill were underlain (or exposed from ground surface in Bore 105), by interbedded layers of stiff to hard silty/sandy clay and medium dense to very dense clayey sand, which are considered to be predominantly residual soils, derived from the in place weathering of predominantly mudstone and sandstone (rock). The soils were underlain in turn in all bores, except Bore 101, by extremely low to very low strength sandstone/mudstone/siltstone below 4.5m and 13.5m depth approximately. In Bore 102 a thin low strength band of mudstone was encountered within the clays and in Bores 103 and 104, bands of silty clay between 1.0m and 2.0m thick were encountered within the rock. It should be noted that 'harder' rock may exist close below bore termination depths and at shallower depth elsewhere on the site.

4.2 Water Level Observations

4.2.1 Spot Observations

The onsite groundwater level was measured in nine available wells on 31 July 2020. The measured water levels are presented in Table 4. The onsite groundwater level varied with location and ground surface elevation of the wells, with the lowest at RL4.4mAHD in Well 21 and the highest at RL39.3mAHD in Well 100. The water levels in the new wells (Wells 100 to 105) in the Stage 1A area are generally much higher than those in existing wells by 10m to 26m, mainly due to a higher ground level and lower permeability of the aquifers.

Table 4: Observed Groundwater Levels on 31 July 2020

Well	Ground Surface Elevation (AHD)	Water Level Measurements		Date
		Depth (m)	Reduced Level (AHD)	
21	14.5	10.07	RL4.4mAHD	31 July 2020
25	19.0	12.46	RL6.5mAHD	31 July 2020
26	20.5	13.60	RL6.9mAHD	31 July 2020
27	26.5	Dry	Dry	31 July 2020
29	25.0	12.17	RL12.8mAHD	31 July 2020
100	48.5	9.25	RL39.3mAHD	31 July 2020
101	45.8	7.28	RL38.5mAHD	31 July 2020
102	38.0	14.61	RL23.4mAHD	31 July 2020
105	32.0	10.71	RL21.3mAHD	31 July 2020

4.2.2 Historic Observations – Water Level Fluctuation

The groundwater level in the existing onsite wells was observed multiple times and the monitoring results are summarised in Table 5, and are plotted in Figure 5.

Table 5: Observed Groundwater Levels in Existing Wells between September 2018 and July 2020

Well	Ground Surface Elevation (AHD)	Water Level Measurements		Date
		Depth (m)	Reduced Level (AHD)	
21	RL14.5m	9.9	RL4.6m	27 September 2018
		10.9	RL3.6m	31 October 2018
		9.8	RL4.7m	19 February 2019
		9.8	RL4.7m	12 March 2019
		9.9	RL4.6m	20 March 2019
		9.8	RL4.7m	8 May 2019
		10.0	RL4.5m	20 May 2019
		3.1	RL11.4m	7 February 2020
		7.12	RL7.4m	10 March 2020
		10.11	RL4.4m	17 March 2020
		10.09	RL4.4m	29 June 2020
		10.07	RL4.4m	31 July 2020
		10.1	RL4.4m	10 August 2020
25	RL19.0m	12.3	RL6.7m	19 February 2019
		12.3	RL6.7m	12 March 2019
		12.3	RL6.7m	20 March 2019
		12.3	RL6.7m	8 May 2019
		12.5	RL6.5m	20 May 2019
		12.8	RL6.2m	11 July 2019
		12.6	RL6.4m	16 August 2019
		12.6	RL6.4m	7 February 2020
		12.65	RL6.4m	10 March 2020
		12.62	RL6.4m	17 March 2020
		12.6	RL6.4m	29 June 2020
		12.46	RL6.5m	31 July 2020
		12.5	RL6.5m	10 August 2020

Table 5: Observed Groundwater Levels in Existing Wells between September 2018 and July 2020 (Continued)

Well	Ground Surface Elevation (AHD)	Water Level Measurements		Date
		Depth (m)	Reduced Level (AHD)	
		12.9	RL7.6m	19 February 2019
		13.0	RL7.5m	12 March 2019
		12.6	RL7.9m	20 March 2019
26	RL20.5m	12.9	RL7.6m	8 May 2019
		13.3	RL7.2m	20 May 2019
		13.3	RL7.1m	11 July 2019
		13.2	RL7.3m	7 February 2020
		14.11	RL6.4m	10 March 2020
		13.98	RL6.5m	17 March 2020
		13.63	RL6.9m	29 June 2020
		13.6	RL6.9m	31 July 2020
		13.8	RL6.7m	10 August 2020
27*	RL26.5m	14.8	RL11.7m	19 February 2019
28	RL25.0m	12.2	RL12.8m	19 February 2019
		12.0	RL13.0m	12 March 2019
		12.0	RL13.0m	20 March 2019
		12.0	RL13.0m	8 May 2019
		11.9	RL13.1m	20 May 2019
		11.8	RL13.2m	11 July 2019
		12.2	RL12.8m	7 February 2020
		13.12	RL11.9m	10 March 2020
		13.02	RL12.0m	17 March 2020
		12.31	RL12.7m	29 June 2020
		12.17	RL12.8m	31 July 2020
		12.6	RL12.4m	10 August 2020
29	RL19.0m	11.7	RL7.3m	12 March 2019
		10.5	RL8.5m	20 March 2019
		10.6	RL8.4m	8 May 2019
		10.9	RL8.1m	20 May 2019
		11.4	RL7.6m	11 July 2019
		11.3	RL7.7m	16 August 2019
		14.0	RL5.0m	7 February 2020
		7.25	RL11.8m	10 March 2020
		9.5	RL9.5m	17 March 2020

* Well 27 was dry at other observation dates

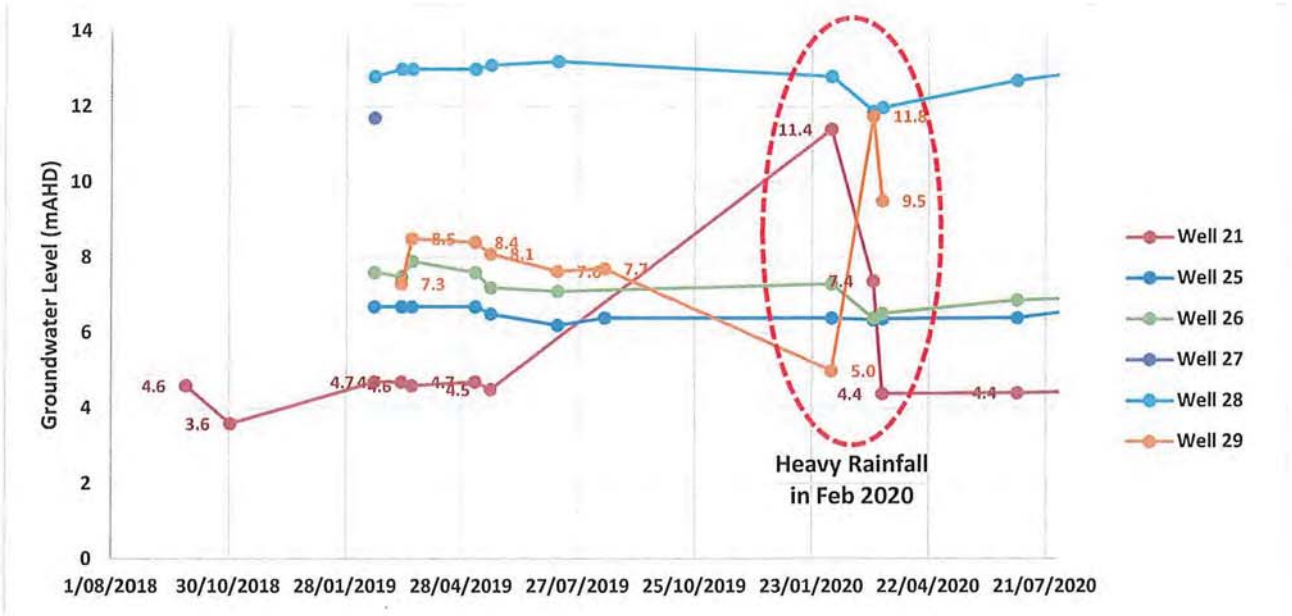


Figure 5: Historic groundwater observations in existing wells between September 2018 and July 2020

The groundwater level in each well is generally stable during the observation period between September 2018 and August 2020, with the exception of observations in Wells 21 and 29 in February and March 2020 during which there was a prolonged period of rainfall as shown in Figure 6. It is understood that the large fluctuation in Well 29 was caused by surface water leakage into the well rather than due to the rise of the water table. Well 21 is located in the low land area near the alluvium and groundwater in this well may be hydraulically connected to the alluvium aquifer because the water level in this well had been low, approximately RL4.5mAHD under average rainfall conditions, compared with RL11.4mAHD in February 2020.

In brief summary, rainfall and flood in the river may cause groundwater level rise in the alluvium aquifer in the low land area, but their impacts in the higher ground area appears to be minimal.

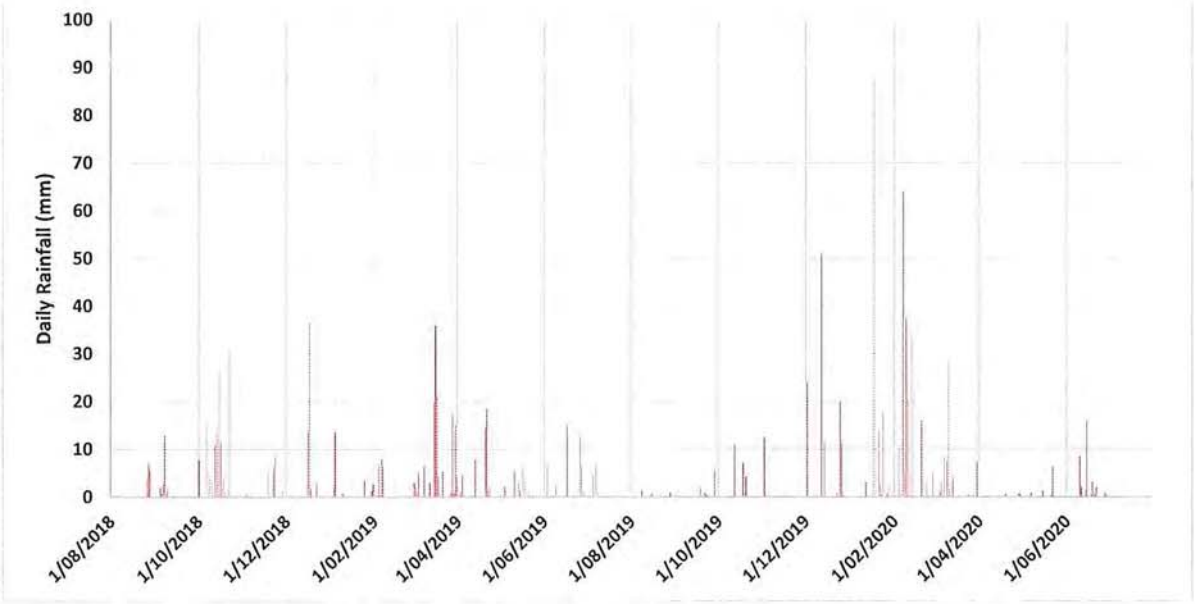


Figure 6: Daily rainfall at the Oxley Weather Station during the period of groundwater observation

4.2.3 Continuous Monitoring of Groundwater Levels

The groundwater level in the sloping areas of the site is considered to be mainly determined by the rainfall infiltration recharge. There was some notable rainfall on Friday, 7 August 2020 comprising 14.6mm for twenty-four hours to 9am 8 August 2020. In order to assess the magnitude of rainfall recharge on groundwater level, a data logger was installed in three monitoring wells (Well 25, 28 and 102) on Monday morning, 10 August 2020, and the groundwater level was continuously recorded at ten minute intervals for three days.

The monitoring results are presented in Figure 7 to Figure 9. It is appears that there is a slight upward trend in all three hydrographs from the start of monitoring (8am 10 August) to the midday of 12 August, up approximately 0.02m in Well 25; 0.1m in Well 28 and 0.08m in Well 102. The water level then started decline.

It is possible that the rise in water level was caused by rainfall infiltration recharge, but the magnitude of change is very small, approximately the same magnitude as the previously recorded daily tidal influence.

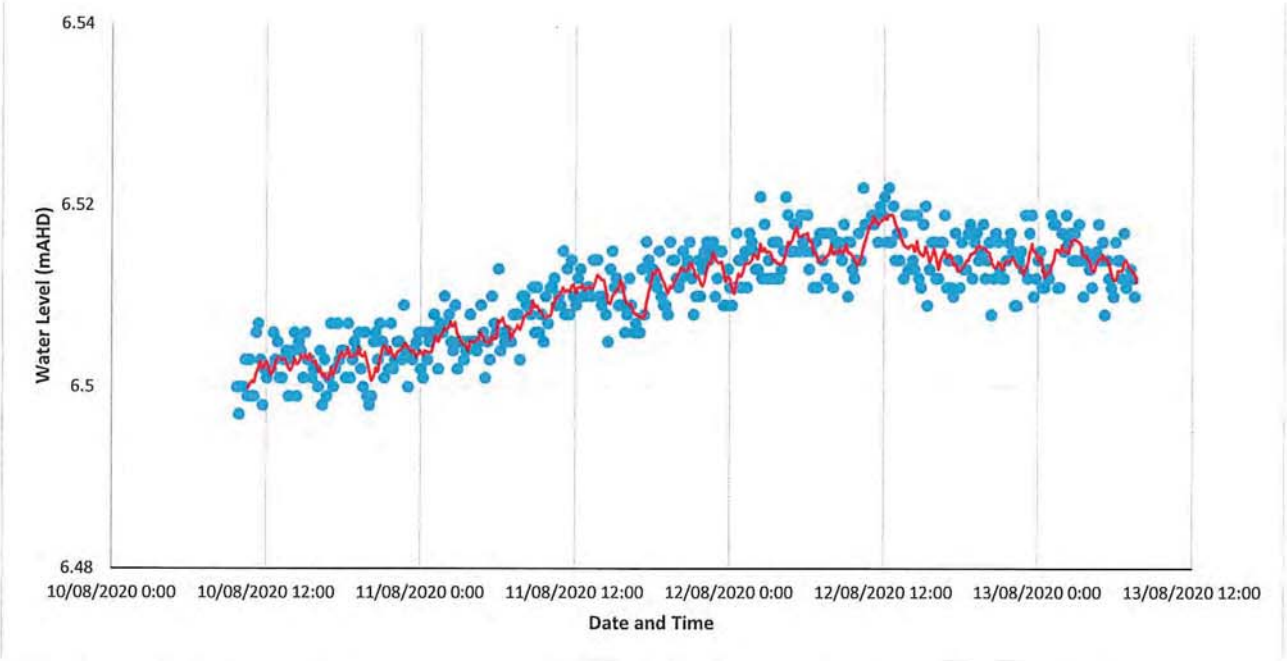


Figure 7: Hydrograph of continuous groundwater monitoring in Well 25 (10 to 13 August 2020)

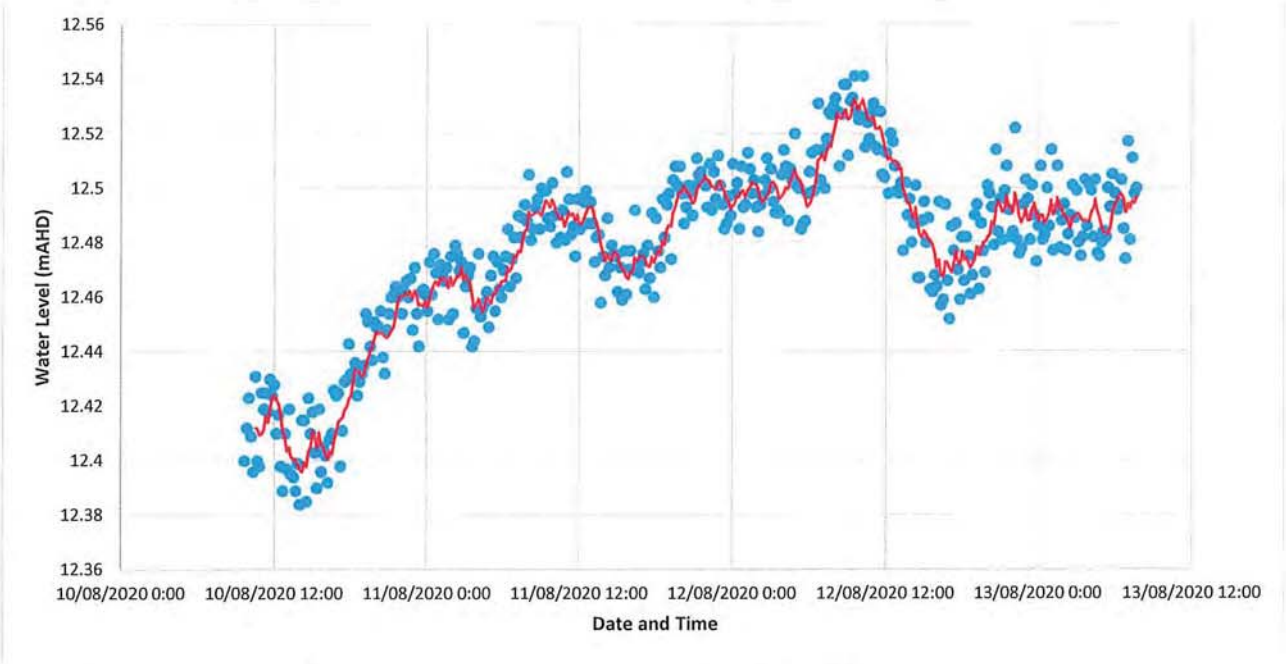


Figure 8: Hydrograph of continuous groundwater monitoring in Well 28 (10 to 13 August 2020)

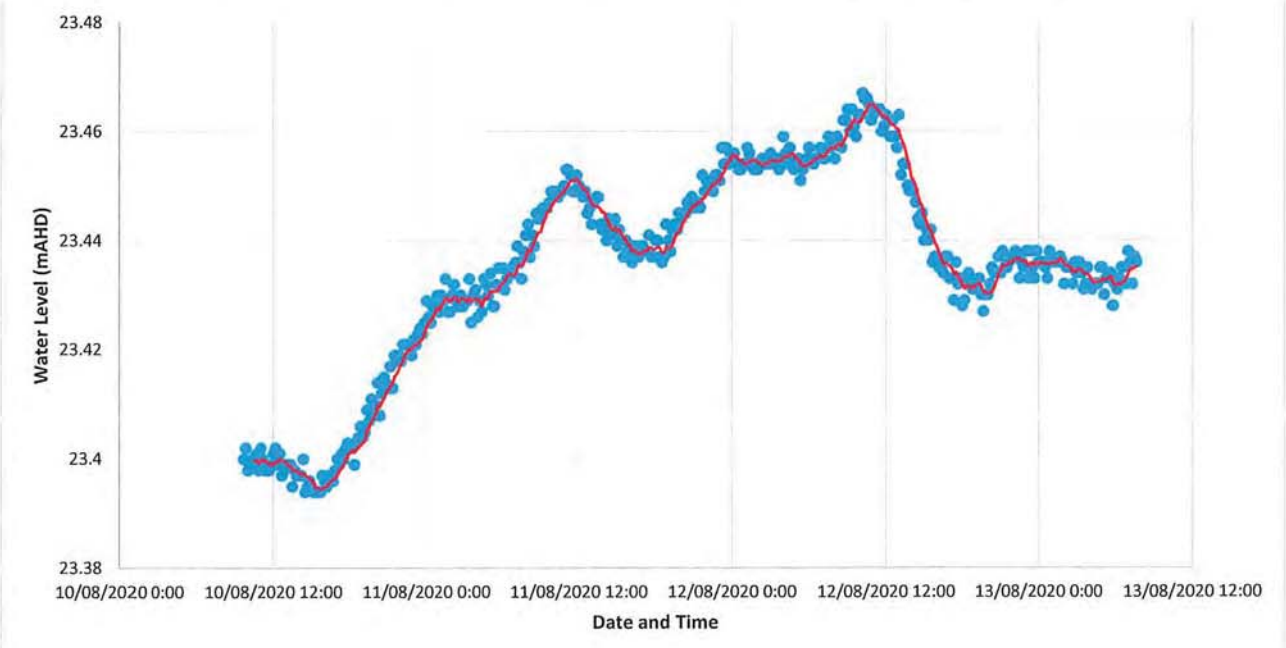


Figure 9: Hydrograph of continuous groundwater monitoring in Well 102 (10 to 13 August 2020)

4.3 Insitu Hydraulic Testing

4.3.1 Slug Test - Bouwer-Rice Method

On the basis of the anticipated well yields assessed during the process of well development, the insitu hydraulic tests were carried out using a slug test methodology. The slug test methodology involves 'instantaneous' injection or removal of water from a well and then measuring the variation of water level with time; the injection variation of the slug test method is also commonly known as a falling head test; the slug test method is suitable for shallow and low yield wells.

For the slug test, an approximate 2 litre volume of water was bailed out 'instantaneously' from the well. The water level recovery was automatically recorded every second with a data logger, which was installed 0.5m above the bottom of the well. During the test, a water level dipper was also used to monitor the recovering water level. The test was ended when 95% of initial drawdown was recovered or fifteen minutes from the start of the test had elapsed.

The two most popular methods to process the slug test data are the Hvorslev method (Hvorslev, 1951)[2] and the Bouwer-Rice method (Bouwer and Rice, 1974)[3]. The former is based on an analytical equation (Thiem Equation) for a fully penetrated well in a confined aquifer and the latter is an expansion of the former and can be used for unconfined aquifers and partially penetrating wells, through the introduction of three empirical coefficients that were determined through numerous Resistor-Capacitor Network models (an analogy modelling technique historically used before computer based methods were widely used and analogous to a current day finite difference calculation). The Bouwer-Rice method has been adopted because it's assumptions have been found to be closer to the real groundwater conditions (mostly unconfined aquifers for alluvial sediments) than the Hvorslev method.

In an ideal uniform aquifer and perfect execution of all testing procedures, the ratio of the time-varying water level and the initial water level (y/y_o) is a straight line on a semi-log plot, using the Bouwer-Rice method. The gradient of the slope reflects the hydraulic conductivity of the aquifer being tested; the steeper the slope, the greater the hydraulic conductivity.

In reality, the aquifer is not uniform and removal or injection of water is not 'instantaneous'. Therefore, the test data is often curvy on the semi-log plot. In such circumstances, instead of fitting the whole data with one straight line, two lines are used to define the range of hydraulic conductivity. An example of such a plot (Well 100) is presented in Figure 10. When the test data is not a straight line, two K values, an early-time and a late-time, are given to define the range of the K value of the tested materials.

[2] Hvorslev M.J. 1951 Time lag and soil permeability in groundwater observations, *Bull. No. 36. Waterways Experiment Station, Corps. Of Engineers. U.S. Army, 50pp*

[3] Bouwer H and Rice R.C. 1976 A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells, *Water Resources Research, Vol 12 No. 3 pp 423 - 428*

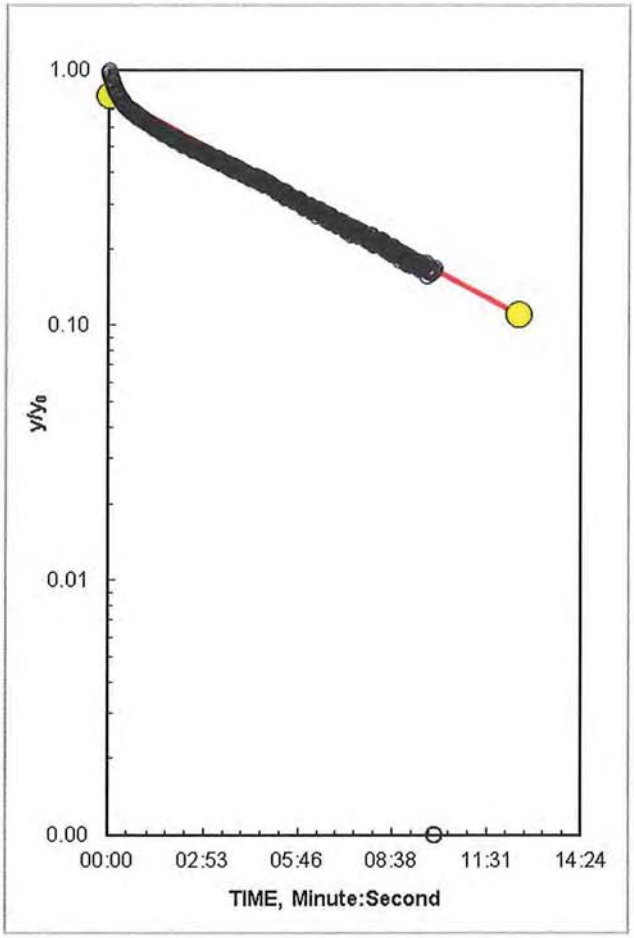


Figure 10: Slug test results for Well 100, using the Bouwer-Rice method

4.3.2 Insitu Test Results

The results of the insitu hydraulic testing are summarised in Table 6, and the processing sheets are attached in Appendix C. The calculated values of hydraulic conductivity (K) varied among wells but are generally within the typical range of the tested materials.

It should be noted that for the sake of easy identification of hydrogeological units in latter sections of this report and being consistent with the site geology map, the material above the sandstone (or RL30mAHD), is defined as 'Mudstone' and that below the sandstone as 'Siltstone', though different definitions such as clay or silty clay may be used in the geotechnical Bore Report sheets.

Table 6: Results of Interpreted Insitu Hydraulic Tests

Well	Screen Depth (mbgl)		Screen Aquifer	Methodology	Interpreted Hydraulic Conductivity (m/day)
	Top	Bottom			
21	6.0	12.0	Silty Clay	Slug Test - Bouwer-Rice	0.0191
25	6.0	15.0	Siltstone	Slug Test - Bouwer-Rice	0.7710
25*	6.0	15.0	Siltstone	Slug Test - Bouwer-Rice	0.8070
26	6.0	15.0	Siltstone	Slug Test - Bouwer-Rice	0.0181
27	6.0	15.0	Sandstone/Mudstone	Falling Head Test - Bouwer-Rice	0.1060
28	6.0	15.0	Siltstone	Slug Test - Bouwer-Rice-early	0.3000
28	6.0	15.0	Siltstone	Slug Test - Bouwer-Rice-late	0.0052
29*	6.0	15.0	Siltstone	Slug Test - Bouwer-Rice	0.0493
29*	6.0	15.0	Siltstone	Falling Head Test - Bouwer-Rice	0.0087
100	7.5	20.0	Sandstone	Slug Test - Bouwer-Rice	0.0273
101	6.0	15.0	Mudstone	Slug Test - Bouwer-Rice-early	0.1030
101	6.0	15.0	Mudstone	Slug Test - Bouwer-Rice-late	0.0066
102	5.0	16.5	Sandstone	Slug Test - Bouwer-Rice	0.7280
105	9.0	15.0	Siltstone	Slug Test - Bouwer-Rice	0.1670

* The test was performed during previous investigation conducted in 2019

Table 7: Statistics of Interpreted K Values for Each Aquifer

Aquifer	Screen RL(mAHD)		Statistics of K Values (m/day)				Bore
	Top	Bottom	Average	Median	Minimum	Maximum	
Mudstone	39.8	30.8	0.055	0.055	0.006	0.103	101
Sandstone	33.0	21.5	0.728	0.728	-	-	102
Siltstone	23.0	4.0	0.20212	0.0337	0.0052	0.771	25, 26, 28, 29, and 105
Alluvium			0.3	0.3	-	-	Estimate - no onsite data

4.4 ***Particle Size Distribution***

Twenty-four selected samples of soil recovered from Bores 100 to 105, drilled during the current geotechnical investigation, were tested for the measurement of particle size distribution using wash sieve grading techniques, and the reported results are summarised in Table 8, and detailed test result report sheets are attached in Appendix D. The highlighted samples in Table 8 indicate a sand zone in four of the six bores between RL22mAHD and RL30mAHD, as shown in Figure 11. The sand zone is likely the weakly cemented Tertiary sandstone of the Darra Formation, which appears as sand when weathered near the ground surface. The Tertiary sandstone is considered a local permeable zone though its K value is not as large as the Quaternary sand sediments present in the northern portion of the Oxley PDA site.

Two soil samples, one each from Bores 17 and 19, from previous preliminary geotechnical investigations were previously tested for particle size distribution and their results are included in Table 8 and Figure 11, indicate a sand zone between RL22mAHD and RL30mAHD, which is considered likely to consist of weakly cemented Tertiary sandstone of the Darra Formation; Bores 17 and 19 are located on the east slope of the overall site. It is noted that the result for the sample from Bore 19 at elevation RL23.9mAHD indicates it is within the sand zone, consistent with the results from the Stage 1A bores. The sample from Bore 17 at RL7.9mAHD, could indicate another sandstone (or the conglomerate), strata of the Darra Formation.

Table 8: Summary of Particle Size Distribution Test Results

Bore	Sample Depth (m)	Sample Description	Sample Moisture Content (%)	Percent Passing		
				Gravel Fraction[1] (%)	Sand Fraction[2] (%)	Silt and Clay Fraction[3] (%)
100	4.5 – 4.95	Silty Clay	28.1	4	10	86
	7.5 – 7.9	Clayey Silt	30	0	1	99
	10.5 – 10.63	Sandstone (XW)	23.4	3	41	56
	13.5 – 13.94	Sandstone (XW)	19.1	0	19	81
	18.0 – 18.44	Silty Clay	23.1	0	1	99
101	1.5 – 1.9	Silty Clay with Sand	22.4	1	10	89
	6.0 – 6.45	Sandy Clay	17.6	9	31	60
	9.0 – 9.43	Silty Clay	20.1	0	4	96
	12.0 – 12.45	Silty Clay	19.1	0	3	97
102	6.0 – 6.45	Silty Clay	20	0	8	92
	13.5 – 13.95	Sandstone (XW)	18.9	0	83	17
	15.0 – 15.45	Sandstone (XW)	21.3	0	78	22
103	1.5 – 1.85	Silty Clay	14.8	1	9	90
	4.6 – 4.72	Sandstone (XW)	16.5	0	85	15
	6.0 – 6.13	Sandstone (XW)	13.8	0	83	17
	10.5 – 10.77	Sandstone (XW)	20.8	2	84	14
104	3.0 – 3.45	Silty Clay	12.4	1	7	92
	6.0 – 6.14	Sandstone (XW)	22.4	0	84	16
	10.5 – 10.95	Silty Clay	7.6	0	0	100
	15.0 – 15.43	Mudstone (XW)	20.2	0	6	94
105	7.5 – 7.8	Silty Clay	20.8	0	4	96
	9.0 – 9.23	Clayey Sand	24.9	2	69	29
	10.0 – 10.45	Silty Clay	21.8	0	1	99
	10.5 – 10.75	Clayey Silt	22.6	0	4	96
17	9.0 - 9.05	Sand	4.7	12	75	13
19	4.5 - 4.95	Clayey Sand	10	0	60	40

[1] Particle size <60mm, >2mm; [2] Particle size (approximately) <2mm, >0.075mm; [3] Particle size (approximately) <0.075mm

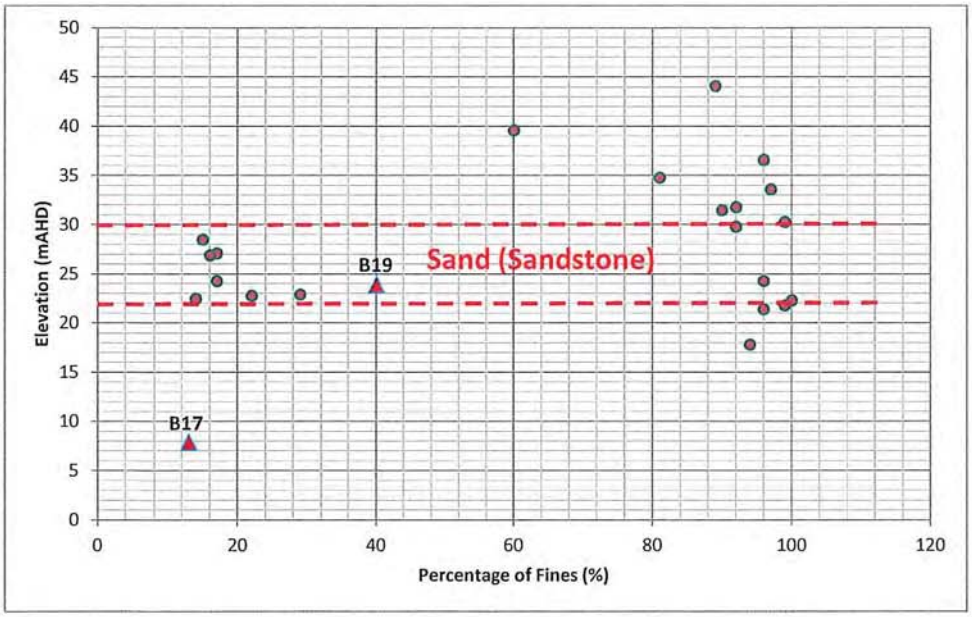


Figure 11: Results of the particle size distribution analysis

SECTION 5 CONCEPTUAL GROUNDWATER MODEL

5.1 General

Groundwater conditions are generally summarised into a conceptual groundwater model, based on which the numerical model is constructed. The conceptual model provides an understanding of how the groundwater system operates and is an idealised and simplified representation of the natural system. Development of a conceptual groundwater model requires qualitative interpretation of available data. The conceptual groundwater model that was used for this groundwater assessment at the site was developed on the basis of the results of the field investigation, the insitu and laboratory testing data, and third party information.

5.2 Local Geology and Hydrogeologic Units

The geologic units encountered in the bores across the site were highly variable in composition and layer depth/thickness. For the purposes of numerical modelling of groundwater flow, geologic units are typically combined into a smaller number of hydrogeologic units (aquifers), each of which has similar hydrologic characteristics and is distinct from other units.

Based on the 1:100,000 Series Geology Map (Figure 2), there are three geological units in the assessment area: Quaternary alluvial sediments (Qha/2), and two formations of Tertiary sediments (Toc and Tod). From groundwater perspective, the geological units can be generalised into four hydrogeological units, with the boundaries between units being determined by hydraulic properties rather than ages of the sediments.

The four adopted hydrogeological units are shown Figure 12 and a cross-sectional view is shown in Figure 13. The alluvium includes fill materials in the low land areas. The Tertiary sediments are generalised into three units: mudstone, sandstone and siltstone. The sandstone, which may appear as sand on or near the ground surface, is a significant hydrogeological unit with respect to its impacts on groundwater levels in the surrounding areas as it is the most permeable layer of the three.

According to the structures on the detailed surface geology presented on the Queensland Globe, the interface of the Tertiary units dips approximately 10° to the south-east. This dip direction and angle are consistent with the descriptions presented on the geotechnical Bore Report sheets for Bores 102 and 103, as depicted in Figure 13. However, for the groundwater modelling, it was assumed that the interfaces were horizontal.

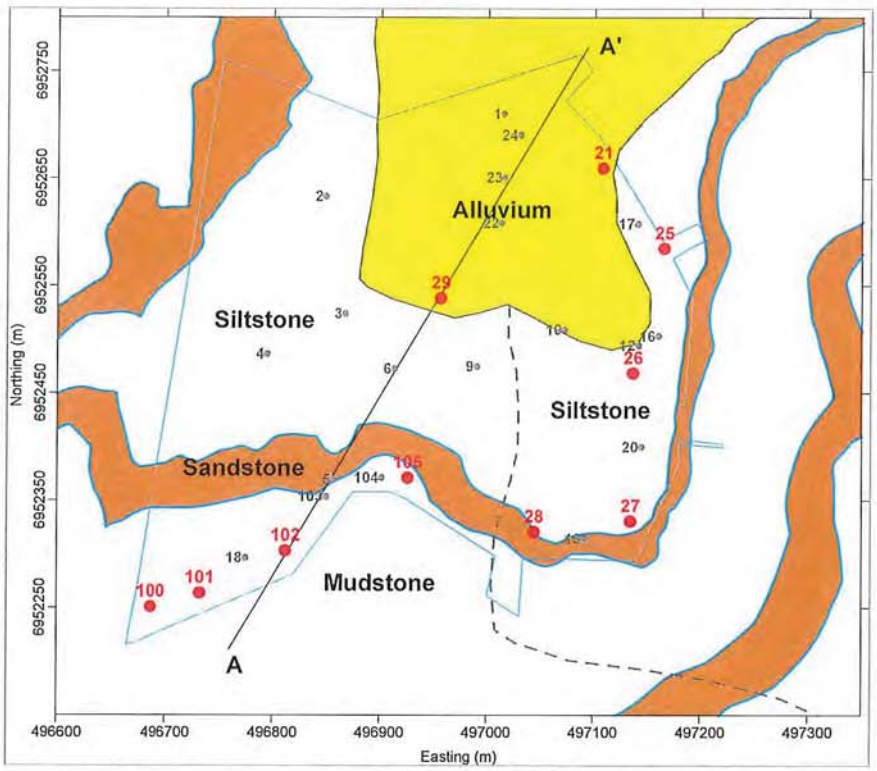


Figure 12: Hydrogeological units in the project area

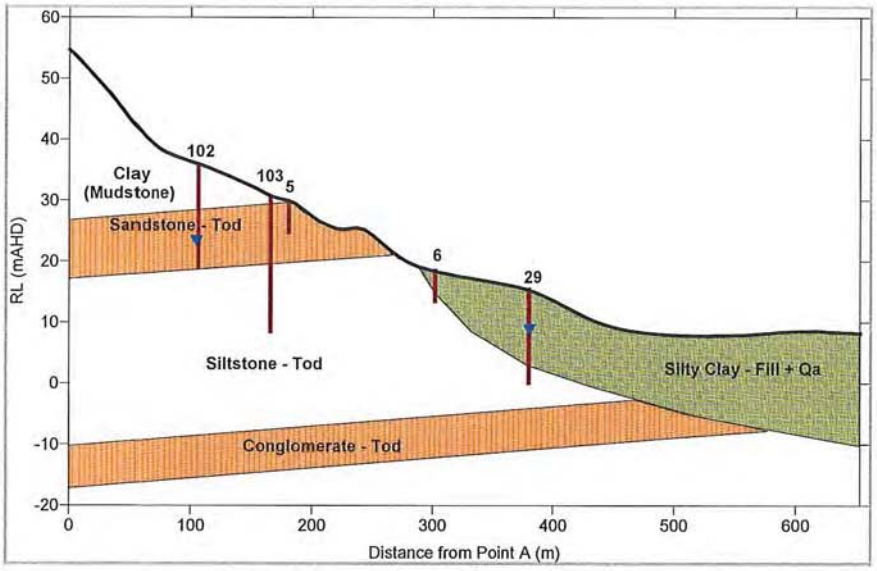


Figure 13: Geological cross-section along Line A-A'

5.3 Groundwater Flow, Recharge and Discharge

Given the Stage 1A site's location and elevation, rainfall infiltration is considered to be the only source of groundwater recharge in the hilly area of the site. Generally, groundwater flows toward the low land area and eventually discharges to the alluvium and the Brisbane River. Due to the low permeability of the site soils and the 'steep' slope, some groundwater may discharge to the ground surface through seepage after heavy rains.

SECTION 6 NUMERICAL MODEL

6.1 Model Objective and Complexity Level

Groundwater level is one of the key factors that affect the stability of slopes and the objective of the groundwater assessment was to estimate the maximum groundwater level in the sloping areas of the Stage 1A portion of the Oxley PDA site.

Based on data availability and the timeframe for the assessment, the model complexity is defined as BASIC according to the Australia Groundwater Modelling Guidelines (SKM and NCGRT, 2012).

6.2 Model Code

The numerical groundwater model was developed using the computer software MODFLOW-SURFACT (Hydrogeologic, Inc.), an enhancement variant of MODFLOW (Harbaugh, 2005)[4], the US Geological Survey modular groundwater model - a three-dimensional finite difference groundwater flow modelling code. The graphical user interface software Visual MODFLOW (Schlumberger Water Services) was used to create the model and to carry out post-processes. The model software is widely used throughout the world for groundwater modelling and is considered suitable for modelling at the site, as it can simulate a 3D groundwater regime with variable site geology.

6.3 Model Grid

The model grid was placed over an area of approximately 3,200m x 2,100m. The size of model cells was approximately 5m x 5m at the site, and gradually increased to 15m x 15m at the margins of the model. The model comprised two hundred rows and two hundred and seventy-eight columns and a plan view of the model grid is shown on Figure 14.

Figure 14: Plan-view of the model grid development site

[4] Harbaugh, A.W. 2005, *MODFLOW – 2005, A Modular Three Dimensional Finite Difference Groundwater Flow Model,* U.S. Geological Survey, Open File Report 91 – 536, Denver

The model comprises seven layers (refer Figure 15); the top of the model was made coincident with the elevation of the existing site ground surface and the bottom of the model was set at RL-30mAHD. As described in Section 5.1, it was assumed that the sandstone is horizontal and at an elevation between RL22mAHD and RL30mAHD.

The objective of the assessment was to calculate the water level in the elevated areas of the site, which is mainly affected by rainfall and the K values of the three hydrogeological units in the elevated area of the site where mudstone, sandstone and siltstone are present. Very little data is currently available on the alluvium over the 'low lying', northern sections of the site. On the basis of drilling experience in the broad Brisbane area by Butler Partners, the upper alluvium comprises mainly silty clay with a thickness of 10m. The extent of the alluvium aquifer was determined from the geology map. The thickness of alluvium generally increases toward the river and the lower portion of the alluvium comprises mainly sand which was assumed to be beyond the boundary of the site.

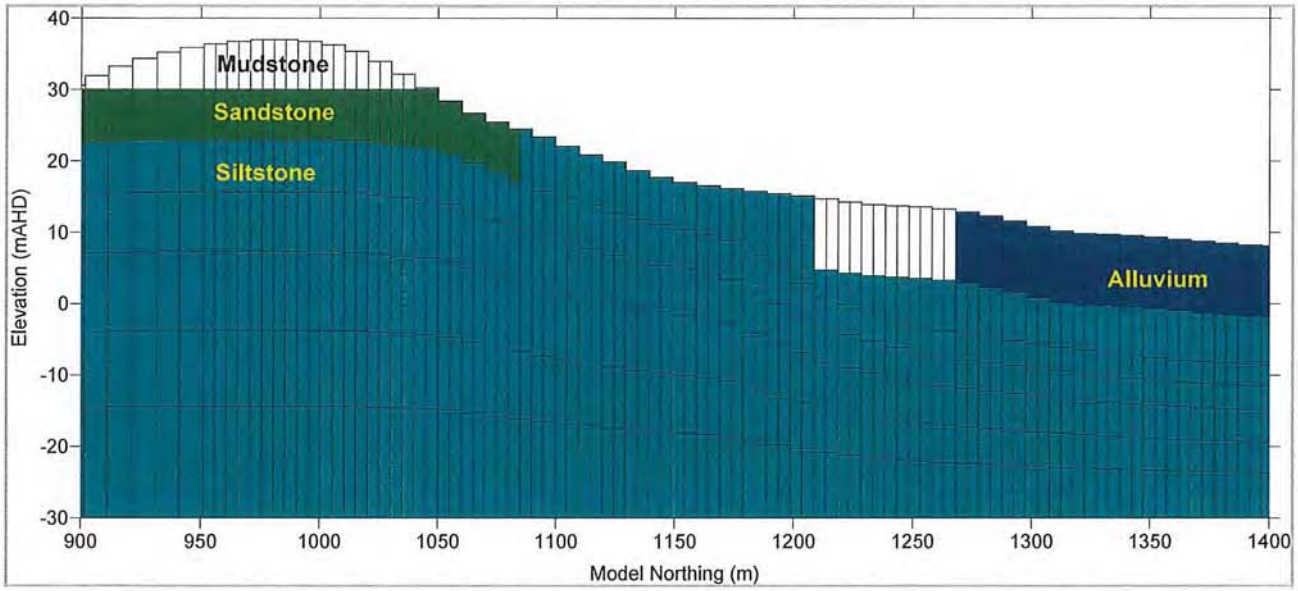


Figure 15: Cross-section view of the model layering near the site (vertical exaggeration ratio 1:3)

6.4 Boundary Conditions

6.4.1 Constant Head Boundaries

In order to reduce artificial impacts, the model extents were designed to be close to the natural groundwater boundaries, Brisbane River to the north; Jindalee Creek to the west; and Oxley Creek and its tributaries on the east and a portion of the south boundary. The river and the creeks were represented in the model using the Constant Head Boundary Package of MODFLOW. The value of the constant head was set respectively at RL1mAHD for the Brisbane River, RL2mAHD for Oxley Creek and RL3mAHD for Jindalee Creek. It should be noted that constant head values represent the water levels in the aquifer near the surface water bodies.

6.4.2 No-flow Boundaries

Apart from the constant head boundaries, the rest of the lateral boundaries were represented in the model as no-flow boundaries, as these boundaries are generally parallel to the groundwater flow lines or divide lines and groundwater flow through these lines is too small to have any significant impact on the model results for the purpose of the model.

6.4.3 Rainfall Recharge

Rainfall infiltration is considered to be the main source of groundwater recharge in the Stage 1A area, due to its 'high' elevation. Based on the surficial geology (mostly silty clay in the model domain), and the complexity level of the model, it was assumed that the recharge rate was uniform throughout the model domain. The recharge rate was determined through model calibration which is discussed in Section 6.5.

6.5 Model Calibration

6.5.1 Calibration Methods and Data

Based on data availability and model complexity level, a steady-state model calibration was performed. The calibration of the model was undertaken by adjusting the parameter values so as to achieve the 'goodness of fit' between the observed and the simulated groundwater levels. The calibration was carried out using a trial-and-error method.

The data used for the calibration is the observed water levels on 31 July 2020, as summarised in Table 4, with two additional water levels (refer to Table 5), one being the average water level in Well 29[5] (RL8.5mAHD) and the other being the average water level in Well 27 (RL11.7mAHD).

6.5.2 Calibrated Parameter Values

A summary of calibrated hydraulic conductivity (K) values is presented in Table 9. The model calibrated values are considered reasonable with respect to the typical values for the corresponding materials and also the range of insitu test results.

It should be noted that the insitu test results represent the horizontal K values only. The vertical K value is typically one-tenth of the horizontal K value, but the ratio may be reduced when the materials are separated into multiple layers. The vertical K values in the model were determined by calibration with consideration of the typical ratio.

Table 9: Results of Calibrated K Values

Parameter	Aquifer	Model Calibrated Values
Horizontal Hydraulic Conductivity (m/day)	Mudstone	0.12
	Sandstone	0.8
	Siltstone	0.05
	Upper Alluvium (Silty Clay)	0.5
	Lower Alluvium (Sand)	3
Vertical Hydraulic Conductivity (m/day)	Mudstone	0.03
	Sandstone	0.1
	Siltstone	0.01
	Upper Alluvium (Silty Clay)	0.1
	Lower Alluvium (Sand)	0.3

The calibrated recharge rate is 15mm/year, which is approximately 1.5% of the annual average rainfall. With consideration of the factors such as the low K value of surficial geology, sloping topography and more importantly, low fluctuation of the observed water levels during rainfall events, the calibrated recharge rate is considered to be reasonable.

[5] The well was destroyed in recent excavation

6.5.3 Comparison of Measured and Modelled Water Levels

Comparisons of the modelled and the observed water levels are summarised in Table 10 and a cross-plot of the two is shown in Figure 16. The normalized RMS (root mean squared of the differences) is 3.2% which is acceptable for a basic model, especially considering the heterogeneity of the actual aquifer and significant differences in water levels over a small area in the model domain.

Table 10: Comparison of Observed and Calculated Water Levels

Well	Groundwater Level (AHD)		
	Observed	Calculated	Difference
21	RL4.4m	RL6.3m	1.9m
25	RL6.5m	RL6.8m	0.3m
26	RL6.9m	RL7.7m	0.8m
27	RL11.7m	RL12.3m	0.6m
28	RL12.8m	RL12.4m	-0.4m
29	RL8.5m	RL7.8m	-0.7m
100	RL39.3m	RL41.4m	2.1m
101	RL38.5m	RL37.9m	-0.6m
102	RL23.4m	RL23.1m	-0.3m
105	RL21.3m	RL22.9m	1.6m

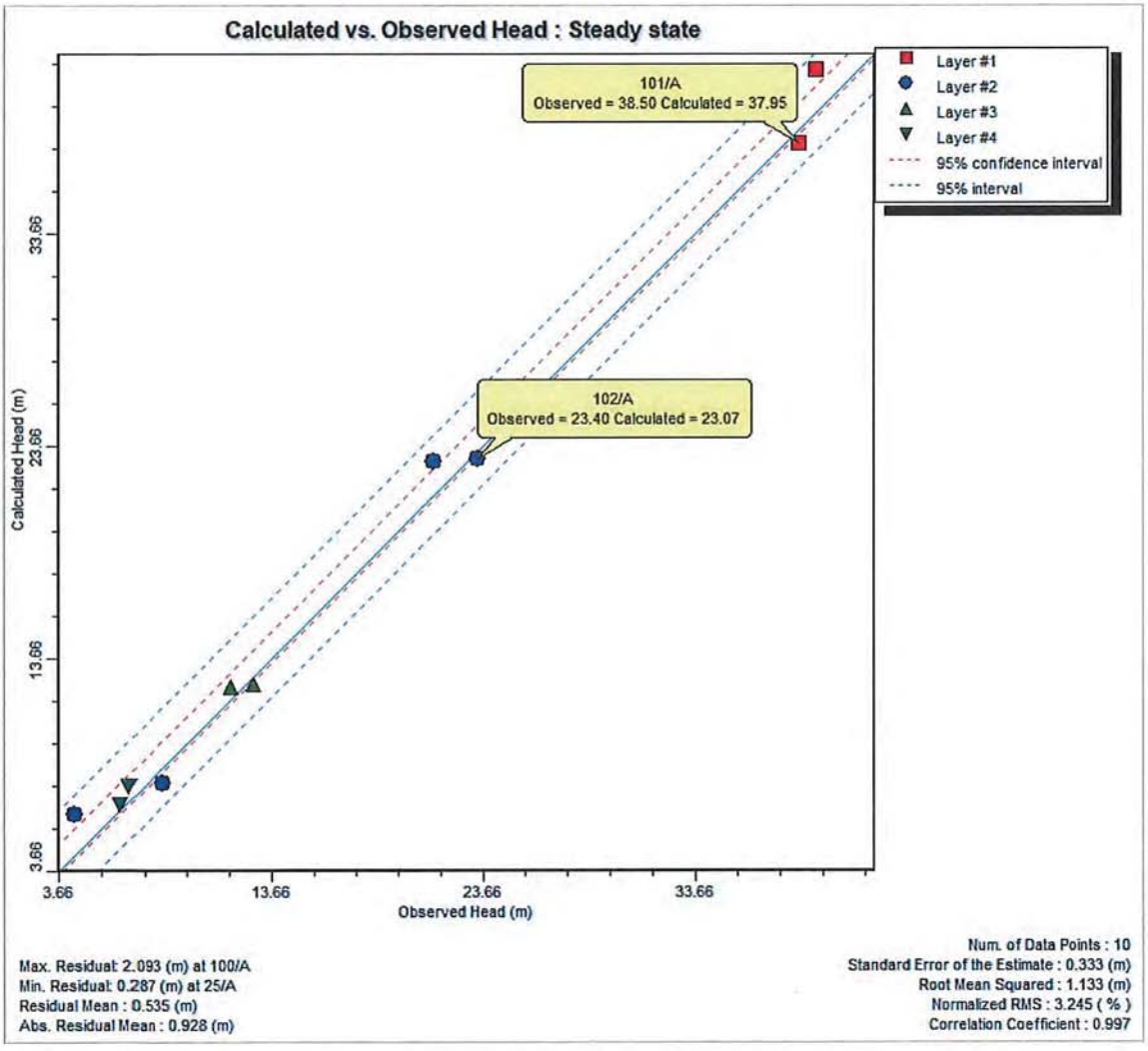


Figure 16: Comparison of modelled and observed groundwater levels

6.6 ***Modelled Groundwater Level***

Modelled contours of the groundwater table elevation are shown in Figure 17, and two cross-sectional views of the modelled results are shown in Figure 18 and Figure 19.

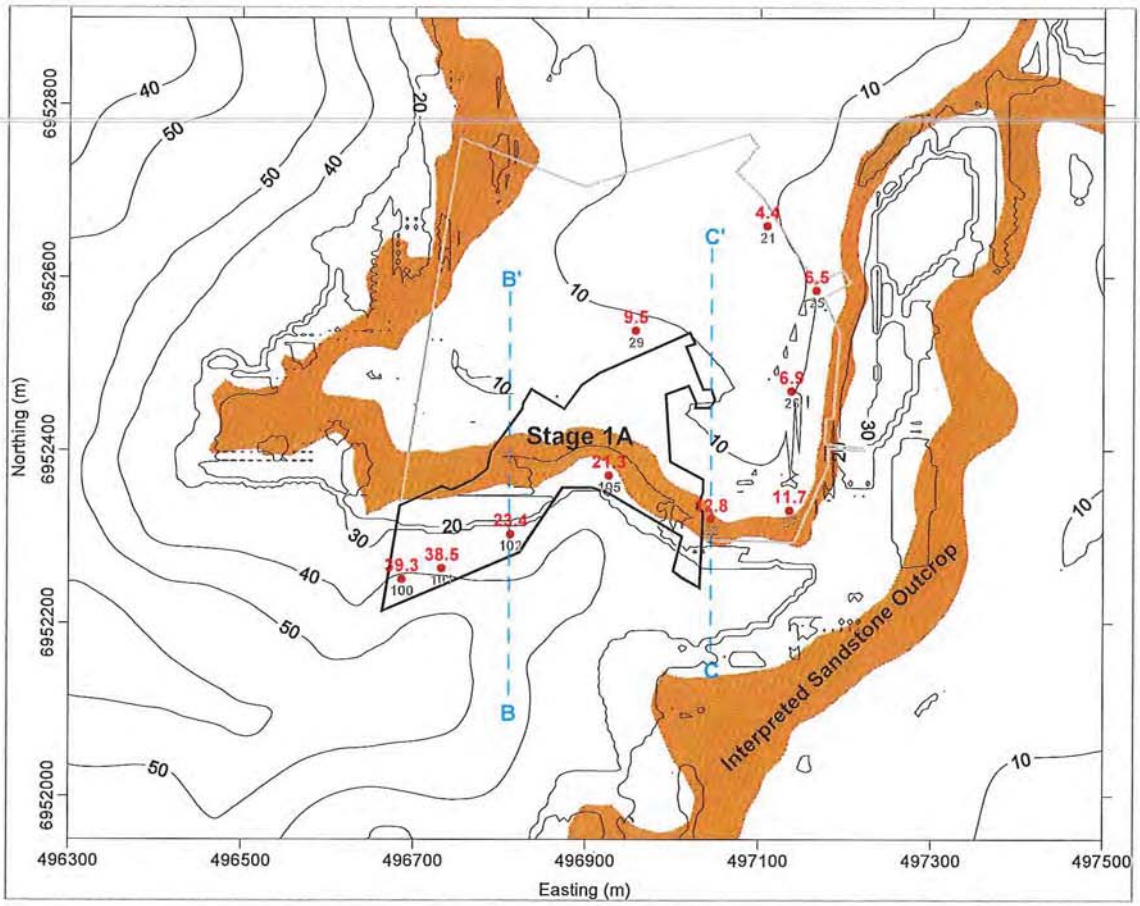


Figure 17: Model interpreted contours of water table elevation and the observed water levels (in red)

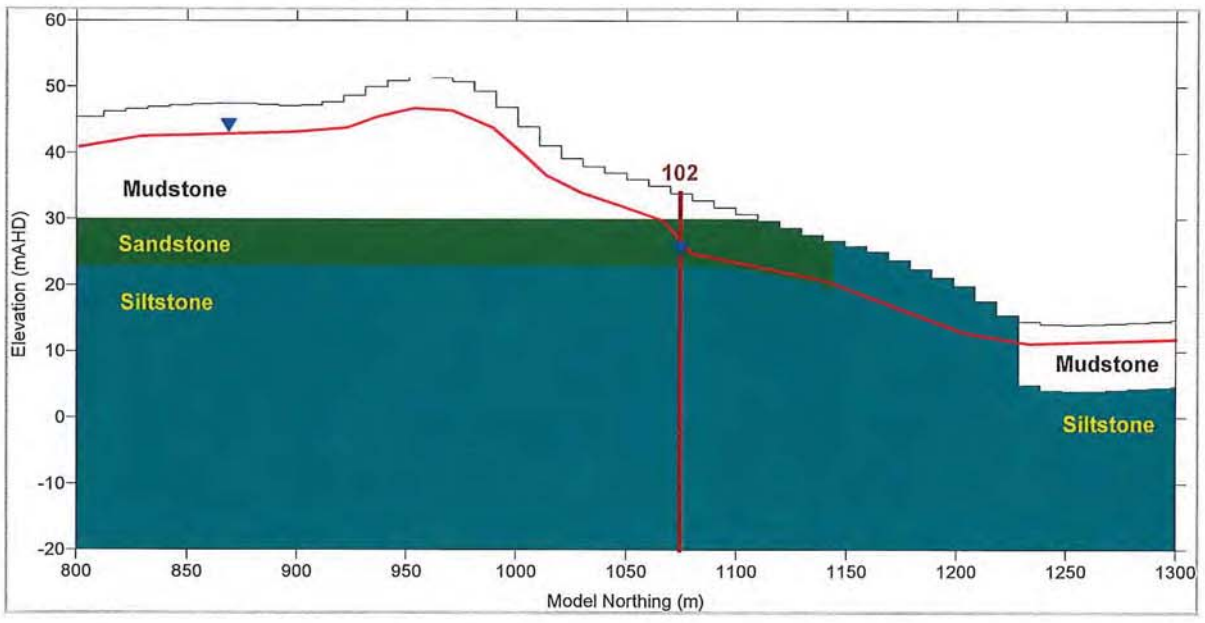


Figure 18: Cross-section view of modelled water table (in red) across Well 102 (Section B-B')

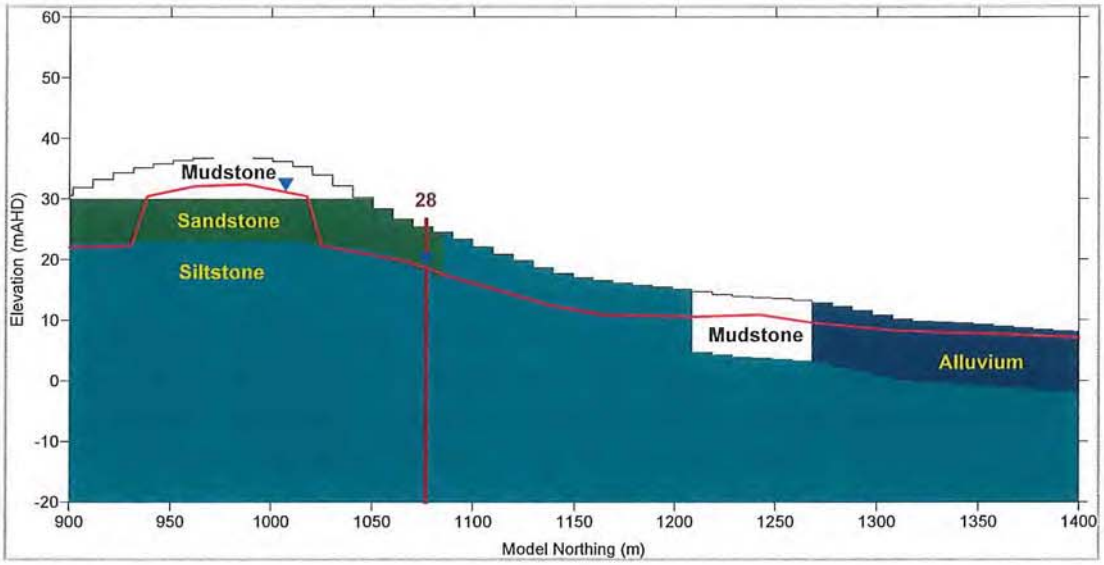


Figure 19: Cross-section view of modelled water table (in red) across Well 28 (Section C-C')

6.7 Discussion of Modelled Results

6.7.1 Water Table and Aquifer Saturation

It should be noted that it is an academic subject of discussion to determine the water table position in an unsaturated zone of low permeability materials, such as clay, because there is always water (moisture) in clayey materials, but the pore voids in the soil are not fully saturated. In other words, the 'aquifer' below the water table indicated in Figure 19 and Figure 20 does not necessarily indicate saturated materials. In the model, the position of the water table is determined using the van Genuchten Method (van Genuchten, 1980)[6]. As can be seen in the modelled results of saturation in Figure 20, the water table position is coincident with the 30% saturation contour line in the sandstone in Well 102; the saturation below the water table in the mudstone is less than 30%.

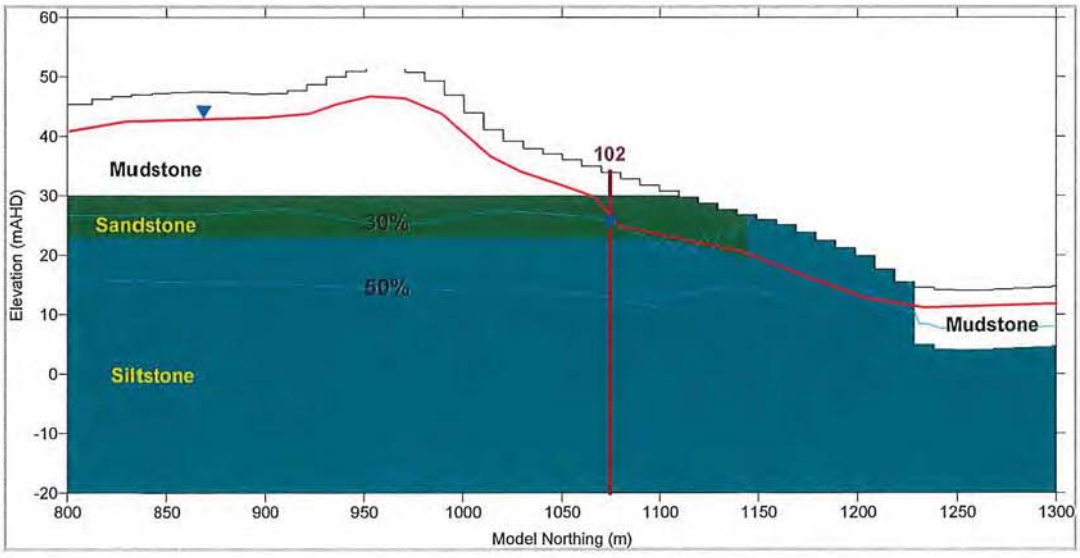


Figure 20: Cross-section view of modelled contours of aquifer pore saturation (in light-blue) across Well 102

[6] *van Genuchten, M.Th. (1980).A closed-form equation for predicting the hydraulic conductivity of unsaturated soils. Soil Science Society of America Journal. **44** (5): 892–898*

6.7.2 Water Level Fluctuation

The observed data is not sufficient to establish a quantitative relationship between rainfall and groundwater level, but it does indicate, as described in Section 4.2.2 and Section 4.2.3, that the fluctuation of the groundwater level is slow and small in response to rainfall events. Due to the low hydraulic conductivity of the near surface materials, especially (but not only) in the Stage 1A area, the effective recharge[7] is expected to be small; from the steady state calibration the effective recharge rate is 15mm per year, or approximately 1.5% of the annual rainfall.

Based on the observed data, the groundwater level in or near the low lying alluvium area, such as Wells 21 and 29, may be affected by short, intense rainfall events (storms). However, the water levels in the elevated areas of the site are not affected by rainfall in any significant manner, as the recharge rate is limited by the low permeability of the mudstone. In addition, the more permeable sandstone also drains any overlying mudstone, resulting in a relatively stable groundwater level in the mudstone.

In summary, groundwater in the elevated areas in Stage 1A is expected to experience only a small fluctuation from the current water levels, under average and storm rainfall conditions. It is recommended that monitoring of the groundwater levels in the monitoring wells be continued on a regular (at least monthly), basis for as long as possible through the upcoming wet season.

As indicated in Figure 19 and Figure 20, the minimum depth of the groundwater table level calculated from the model is approximately 5m; as noted above, the materials immediately beneath the indicated water table level are not saturated.

There are multiple water level observations in the existing monitoring wells. Though the observed data is not sufficient to establish a quantitative relationship between rainfall and water level, it does indicate that the fluctuation of the groundwater level in the elevated area of the site is very slow and very small. For example, there is no indication of groundwater level raised in March 2020 in the elevated site area (Wells 25, 26, 27 and 28), after a prolonged period of rainfall in February 2020.

Based on the permeability values of surficial geology, the observed hydrographs and modelled aquifer saturations, it is considered that the modelled water table elevations can be used as inputs for slope stability analysis under storm conditions. The water table level is more sensitive to the duration of the rainfall than the intensity of the rainfall, due to the low permeability value of the surficial geology and also the sloping topography. Also, the site is located in a ridge area and the sandstone outcrops on both sides of the ridge, therefore, there is insufficient lateral recharge to enable an upward hydraulic gradient that would lift the water level in the mudstone aquifer in the Stage 1A area.

It is noted that the modelled water level in Well 100 is 2m higher than the measured water level, which is higher than the anticipated range of water level fluctuation, therefore there is a margin for error when using the modelled results for slope stability analysis.

[7] Effective recharge refers to the rate at which groundwater in the unsaturated zone reaches the water table. Some water in the unsaturated zone returns to the surface through evaporation and transpiration

6.7.3 Predictive Uncertainty

The development of the groundwater model has involved a number of assumptions and approximations, due to data limitations and the heterogeneity of the aquifers and there are therefore predictive uncertainties associated with the assumptions and approximations. The modelled results represent the best fit on the basis of currently available data. Comprehensive uncertainty analysis requires more data and a significantly larger scope of work than was available for this assessment.

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Principal

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While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE
THE BEST PEOPLE ON EARTH

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

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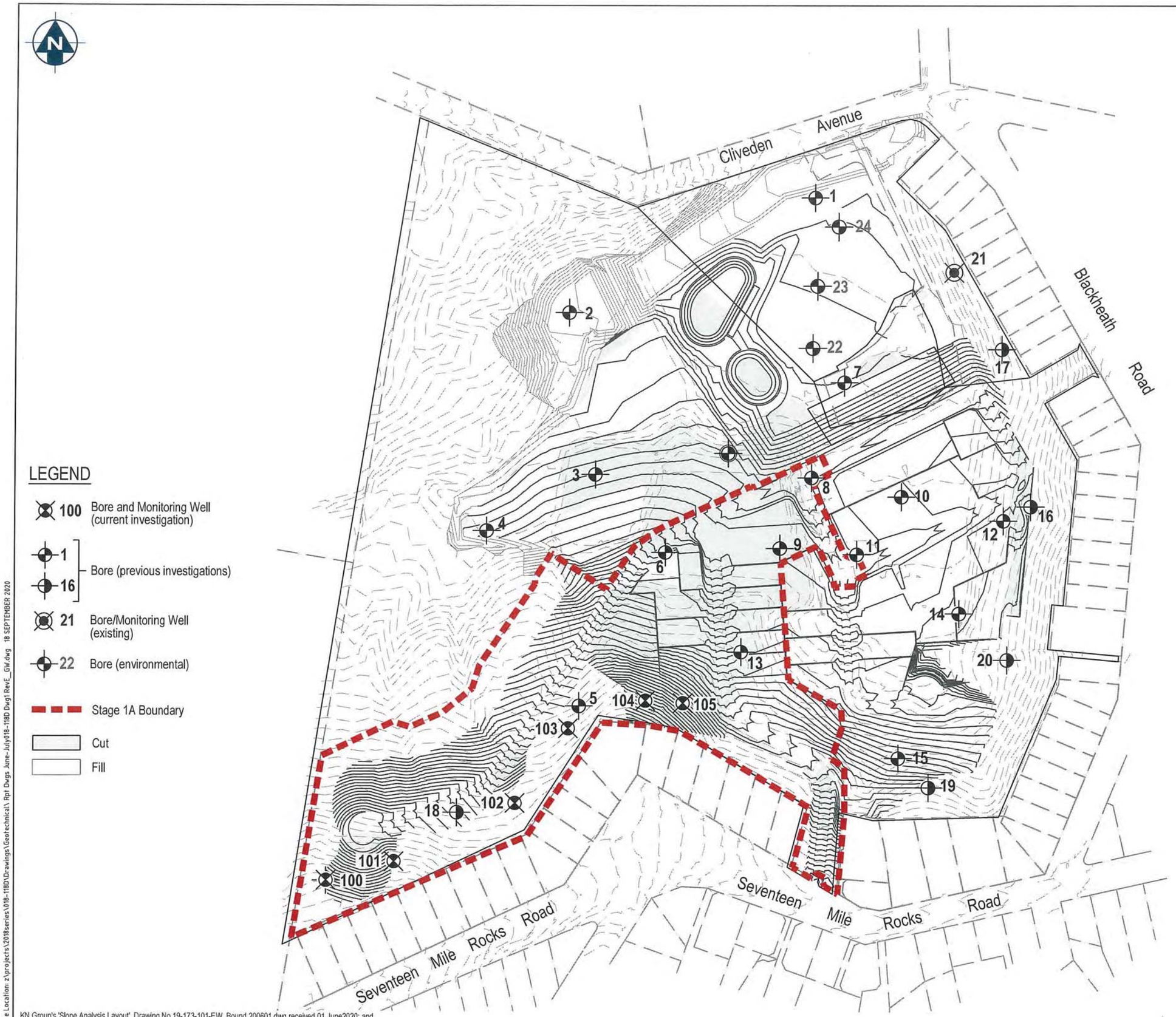

KN Group's 'Slope Analysis Layout', Drawing No.19-173-101-EW_Bound 200601.dwg received 01.June2020; and
DSDMIP's current site layout plan, Drawing 1018015_34-35D_ROL FIR_EXT20200826.dwg received 26 August 2020

File Location: z:\projects\2018series\018-118D\Drawings\Geotechnical\ Rpt Dwgs June-July\018-118D Dwg1 RevE_GW.dwg 18 SEPTEMBER 2020

Butler Partners
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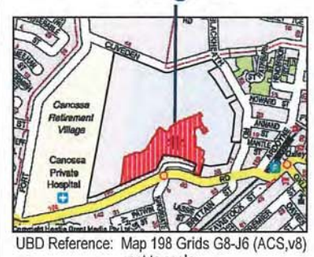
Stage 1A



UBD Reference: Map 198 Grids G8-J6 (ACS,v8)
not to scale

Groundwater Assessment Oxley PDA - Stage 1A

Seventeen Mile Rocks Road, Oxley

Locality Plan and Bore Locations

CLIENT: Economic Development Queensland

SCALE AT A3:

0 25 50 75 100m
1:2500

DATE:	SEPTEMBER 2020
DRAWN:	FD
APPROVED:	
PROJECT No:	018-118D RPT: GW
DRAWING No:	1 REV: E

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APPENDIX A

CURRENT BORE REPORT SHEETS WITH EXPLANATORY NOTES

BORE REPORT

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Client: Economic Development Queensland
Project: Oxley PDA - Stage 1A
Location: Blackheath Road, Oxley
Project No: 018-118D

BORE 100

Page No: 1 of 2
Date: 29 June 2020
Ground Surface Level: RL48.5m*

Depth (m)	Description	RL (m)	Sample Type	Sample Depth (m)	Test Results
0		48.5			
	SANDY CLAY (CH) - stiff, brown, fine grained sand		S	0.5	5,7,9 N=16
1	***SILTY CLAY (CL)*** - very stiff, brown mottled red-brown and grey		S	0.95	Bentonite
		47.0		1.5	5,11,13 N=24
2			S	1.95	
		46.0			
3	- hard, red-brown mottled brown, with fine grained sand, with slickensides		U	3.0	pp>600
		45.0		3.4	
4					Casing
	- very stiff, brown mottled grey, with bands of weathered sandstone and some small fissures	44.0	S	4.5	6,10,17 N=27
5				4.95	Sand
		43.0			
6			S	6.0	7,9,17 N=26
		42.0		6.45	
7					
	CLAYEY SILT (MH) - very stiff, grey	41.0	U	7.5	pp=500
8				7.9	Screen
		40.0			
9	- hard, grey, with small fissures		S	9.0	6,14,30 /130mm
		39.0		9.43	
10	***SANDSTONE (XW)*** - extremely low strength, red-brown mottled brown and grey, fine to medium grained				
		38.0	S	10.5	30/130mm
11				10.63	
	- medium to high strength bands	37.0			

U Undisturbed Tube Sample (50mm dia) | **S** Standard Penetration Test (SPT) | **E** Environmental Sample | **Is(50)** Point Load Test Result (MPa)
D Disturbed Sample | **HB** SPT Hammer Bouncing | **Up** Pushtube Sample | **(d)** Diametral Test
B Bulk Sample | **( )** No Sample Recovery | **C** NMLC Coring | **(a)** Axial Test
pp Pocket Penetrometer Test (kPa) | **V** Vane Shear Strength, Uncorrected (kPa) | **(i)** Lump Test

Rig: Hydrapower Scout
Logged by: PZ
Drilling Method: Auger to 3.0m, casing to 2.5m,then washbore
Groundwater: No free groundwater encountered during auger drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

BORE REPORT

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Client: Economic Development Queensland
Project: Oxley PDA - Stage 1A
Location: Blackheath Road, Oxley
Project No: 018-118D

BORE 100

Page No: 2 of 2
Date: 29 June 2020
Ground Surface Level: RL48.5m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results	Groundwater Monitoring Bore
12	***SANDSTONE (XW)*** - extremely low strength, with medium to high strength bands, grey mottled orange-brown, fine grained	36.0		S	12.0 12.4	13,29,30 /100mm	
13	- grey, fine grained	35.0		S	13.5 13.94	14,24,30 /140mm	
14		34.0					
15		33.0		S	15.0 15.44	28,29,30 /140mm	
16		32.0		S	16.5 16.94	18,29,30 /140mm	
17		31.0					
18	- with silty clay bands	30.0		S	18.0 18.44	15,23,30 /140mm	
19		29.0		S	19.5 19.94	15,24,30 /140mm	
20	End of Bore at 19.94 m	28.0					
21		27.0					
22		26.0					
23							

U	Undisturbed Tube Sample (50mm dia)	S	Standard Penetration Test (SPT)	E	Environmental Sample
D	Disturbed Sample	HB	SPT Hammer Bouncing	Up	Pushtube Sample
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)		

Is(50) Point Load Test Result (MPa)
(d) Diametral Test
(a) Axial Test
(i) Lump Test

Rig: Hydrapower Scout
Logged by: PZ
Drilling Method: Auger to 3.0m, casing to 2.5m,then washbore
Groundwater: No free groundwater encountered during auger drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

BORE REPORT

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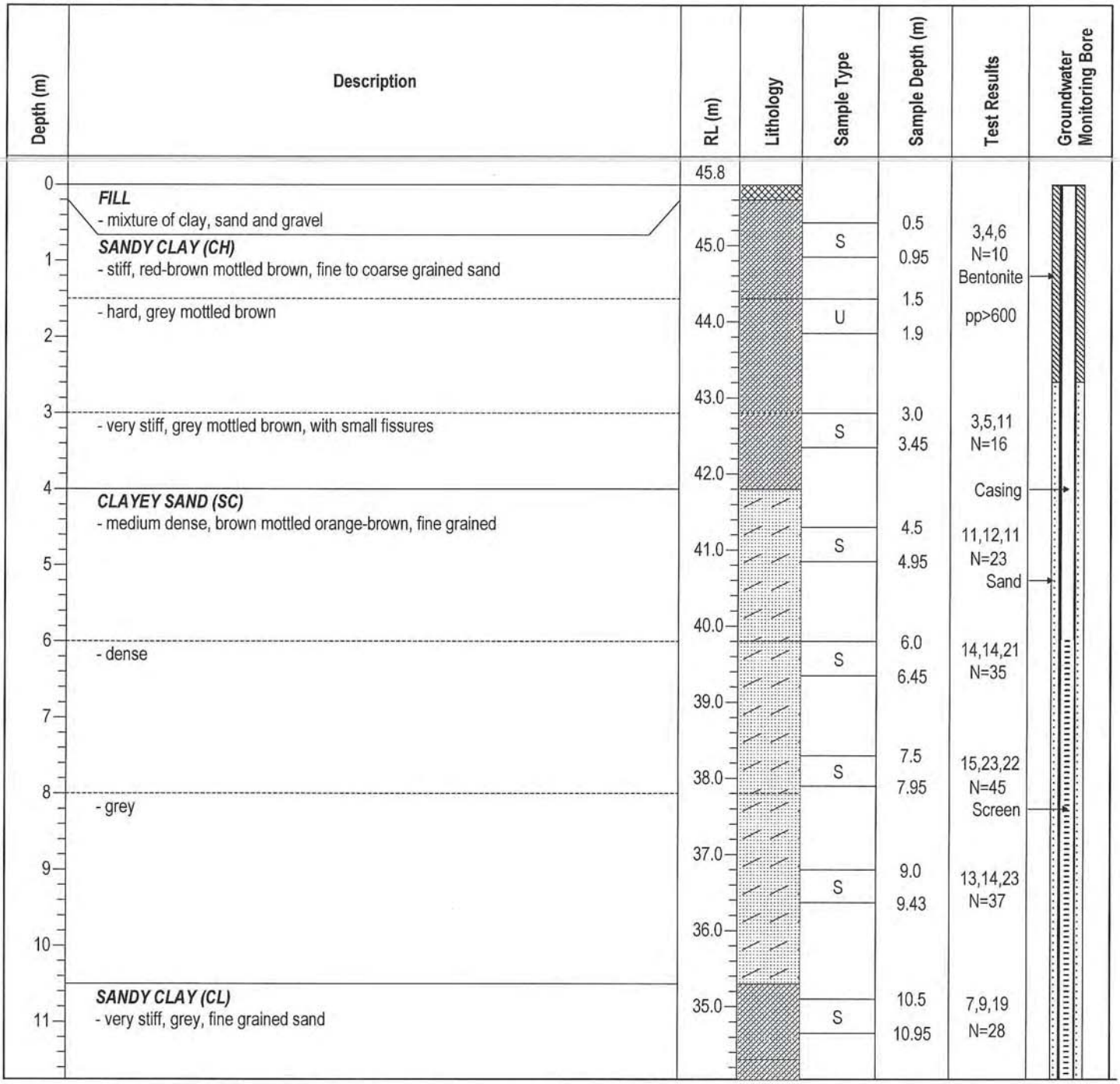
Client: Economic Development Queensland
Project: Oxley PDA - Stage 1A
Location: Blackheath Road, Oxley
Project No: 018-118D

BORE 101

Page No: 1 of 2
Date: 30 June 2020
Ground Surface Level: RL45.8m*



U	Undisturbed Tube Sample (50mm dia)	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
D	Disturbed Sample	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Hydrapower Scout

Logged by: PZ

Drilling Method: Auger to 3.0m, casing to 2.5m,then washbore

Groundwater: No free groundwater encountered during auger drilling

Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

BORE REPORT

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Client: Economic Development Queensland
Project: Oxley PDA - Stage 1A
Location: Blackheath Road, Oxley
Project No: 018-118D

BORE 101

Page No: 2 of 2
Date: 30 June 2020
Ground Surface Level: RL45.8m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results	Groundwater Monitoring Bore
12	***SANDY CLAY (CL)***	34.0					
	- very stiff, grey, fine grained sand			S	12.0	9,13,21	
	- hard				12.45	N=34	
13		33.0					
	- with relict rock joints				13.5	8,15,23	
14		32.0		S	13.95	N=38	
15		31.0			15.0		
	- very stiff			S	15.4	pp=540	
	End of Bore at 15.4 m						
16		30.0					
17		29.0					
18		28.0					
19		27.0					
20		26.0					
21		25.0					
22		24.0					
23		23.0					

U	Undisturbed Tube Sample (50mm dia)	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
D	Disturbed Sample	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Hydrapower Scout

Logged by: PZ

Drilling Method: Auger to 3.0m, casing to 2.5m,then washbore

Groundwater: No free groundwater encountered during auger drilling

Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

BORE REPORT

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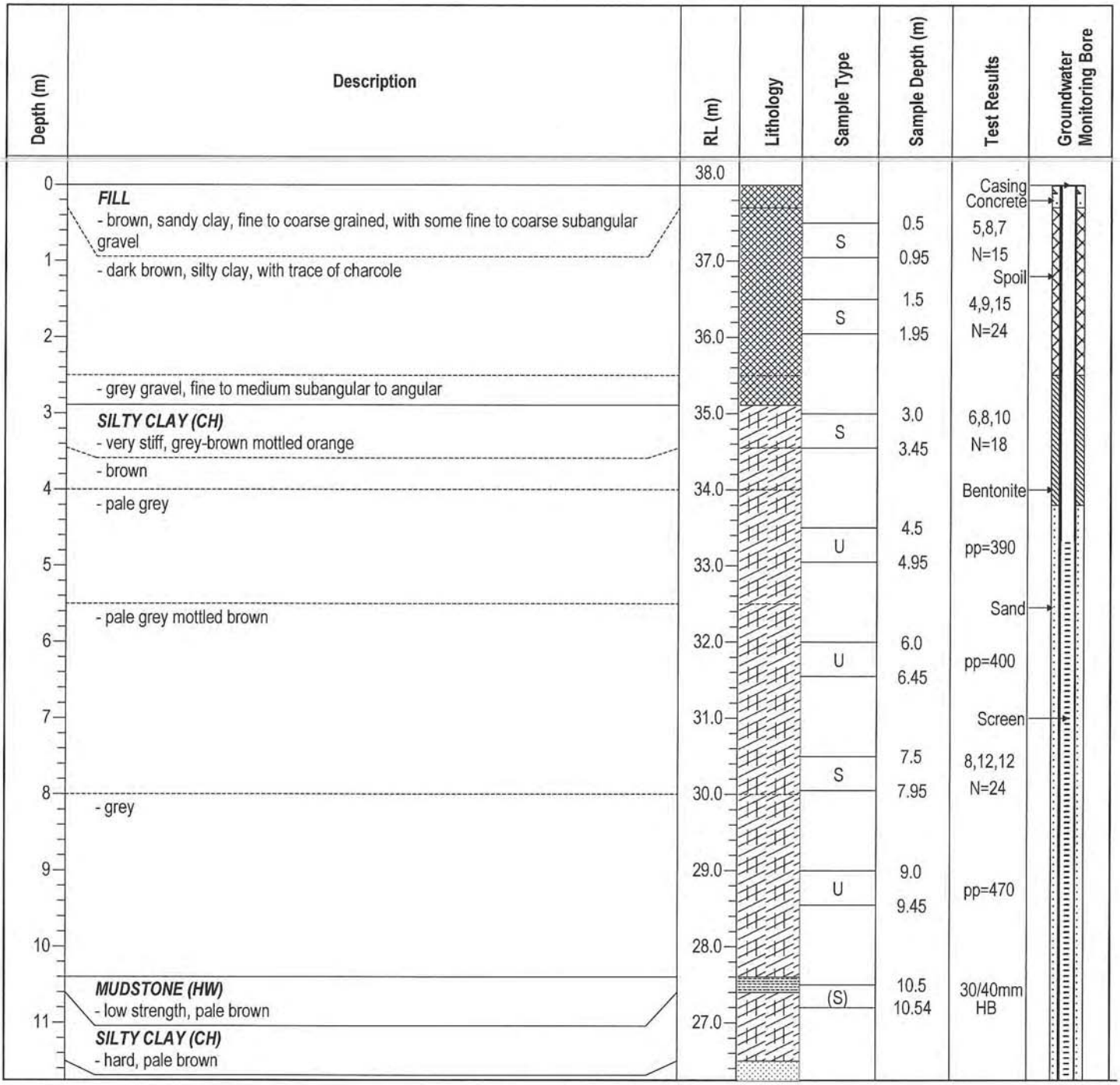
Client: Economic Development Queensland
Project: Oxley PDA - Stage 1A
Location: Blackheath Road, Oxley
Project No: 018-118D

BORE 102

Page No: 1 of 2
Date: 1 June 2020
Ground Surface Level: RL38.0m*



U	Undisturbed Tube Sample (50mm dia)	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
D	Disturbed Sample	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Hydrapower Scout

Logged by: NA

Drilling Method: Auger to 4.5m, casing to 4.5m, then washbore

Groundwater: No free groundwater encountered during auger drilling

Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

BORE REPORT

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Client: Economic Development Queensland
Project: Oxley PDA - Stage 1A
Location: Blackheath Road, Oxley
Project No: 018-118D

BORE 102

Page No: 2 of 2
Date: 1 June 2020
Ground Surface Level: RL38.0m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results	Groundwater Monitoring Bore
12	***SANDSTONE (XW)*** - extremely low strength, brown, fine to coarse grained	26.0		S	12.0 12.1	30/100mm	
13		25.0		S	13.5 13.59	30/90mm	
14		24.0					
15		23.0		S	15.0 15.45	30/145mm	
16		22.0		S	16.5 16.61	30/110mm	
17	End of Bore at 16.7 m	21.0					
18		20.0					
19		19.0					
20		18.0					
21		17.0					
22		16.0					
23		15.0					

U	Undisturbed Tube Sample (50mm dia)	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
D	Disturbed Sample	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Hydrapower Scout

Logged by: NA

Drilling Method: Auger to 4.5m, casing to 4.5m, then washbore

Groundwater: No free groundwater encountered during auger drilling

Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

BORE REPORT

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Client: Economic Development Queensland
Project: Oxley PDA - Stage 1A
Location: Blackheath Road, Oxley
Project No: 018-118D

BORE 103

Page No: 1 of 2
Date: 5 and 8 June 2020
Ground Surface Level: RL33.2m*

Depth (m)	Description	RL (m)	Sample Type	Sample Depth (m)	Test Results
0		33.2			
	SILTY SAND (SM) - loose, brown-dark brown, fine to coarse grained sand (topsoil)		S	0.5	6,6,8 N=14
1	***SILTY CLAY (CH)*** - stiff, brown mottled grey and white	32.0		0.95	
	- hard		U	1.5 1.85	pp>600
2		31.0			
	- orange-brown				
3			S	3.0	
	CLAYEY SAND (SC) - very dense, brown and orange-brown, fine grained sand, 4.0m to 4.5m, clay bands	30.0		3.24	4,30/90mm
4		29.0			
	SANDSTONE (SW) - extremely low strength, orange-brown, fine to medium grained		S	4.6	
5		28.0		4.72	30/120mm
6	- brown mottled grey-white	27.0	S	6.0 6.13	30/130mm
7		26.0			
			S	7.5	
8		25.0		7.63	30/120mm
			S	9.0	
9		24.0		9.09	30/90mm
10		23.0			
			S	10.5	
11		22.0		10.77	5,30/120mm

D	Disturbed Sample	V	Vane Shear Strength, Uncorrected (kPa)	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test
E	Environmental Sample	A	Asbestos Sample		

Rig: Hydrapower Scout
Logged By: PZ

Drilling Method: Auger to 3.0m, casing to 3.0m, then washbore

Groundwater: No free groundwater encountered during auger drilling

Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

BORE REPORT

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Client: Economic Development Queensland
Project: Oxley PDA - Stage 1A
Location: Blackheath Road, Oxley
Project No: 018-118D

BORE 103

Page No: 2 of 2
Date: 5 and 8 June 2020
Ground Surface Level: RL33.2m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
12	***SANDSTONE (SW)*** - extremely low strength, brown mottled grey-white, fine to medium grained	21.0		S	12.0 12.1		30/100mm
	- 12.5m to 13.0m, clayey sand bands						
13		20.0		S	13.5 13.59		30/90mm
14	***MUDSTONE (XW)*** - extremely low strength, dark grey	19.0					
15		18.0		S	15.0 15.41		12,27,30/110mm
16		17.0					
17	***SILTY CLAY (CH)*** - hard, dark grey	16.0		S	16.5 16.95		8,17,24 N=41
	- very stiff, dark grey			U	17.0 17.4		pp=350
18	***MUDSTONE (XW)*** - extremely low strength, dark grey	15.0		S	18.0 18.43		17,23,30/130mm
19		14.0					
20		13.0		S	20.0 20.2		15,30/50mm
21	***SILTSTONE (DW)*** - very low to low strength, grey	12.0					
	MUDSTONE (XW) - extremely low strength, grey			S	21.5 21.95		15,21,26 N=47
22	End of Bore at 21.95 m	11.0					
23							

D	Disturbed Sample	V	Vane Shear Strength, Uncorrected (kPa)	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test
E	Environmental Sample	A	Asbestos Sample		

Rig: Hydrapower Scout
Logged By: PZ

Drilling Method: Auger to 3.0m, casing to 3.0m, then washbore

Groundwater: No free groundwater encountered during auger drilling

Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

BORE REPORT

Butler Partners
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Client: Economic Development Queensland
Project: Oxley PDA - Stage 1A
Location: Blackheath Road, Oxley
Project No: 018-118D

BORE 104

Page No: 1 of 2
Date: 2 June 2020
Ground Surface Level: RL33.0m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
0		33.0				
	SILTY CLAY (CH) - stiff, brown, trace of fine to coarse grained sand (topsoil)					
	- stiff			S	0.5	5,6,9 N=15
1		32.0			0.95	
	- very stiff, pale grey-brown				1.5	
				S		9,11,15 N=26
2		31.0			1.95	
3	***SILTY CLAY (CH)*** - hard, pale grey-brown	30.0		U	3.0	pp>600
					3.45	
4	- red	29.0				
				U	4.5	pp>600
5	***SANDSTONE (XW)*** - extremely low strength, brown, fine to coarse grained	28.0			4.95	
6		27.0		S	6.0	30/140mm
					6.14	
7		26.0				
				S	7.5	30/130mm
8		25.0			7.63	
9		24.0		S	9.0	30/130mm
					9.13	
10		23.0				
	SILTY CLAY (CH) - hard, grey mottled brown				10.5	
				U		pp>600
11		22.0			10.95	

U	Undisturbed Tube Sample (50mm dia)	S	Standard Penetration Test (SPT)	E	Environmental Sample
D	Disturbed Sample	HB	SPT Hammer Bouncing	Up	Pushtube Sample
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)		

Is(50) Point Load Test Result (MPa)
(d) Diametral Test
(a) Axial Test
(i) Lump Test

Rig: Hydrapower Scout
Logged by: NA
Drilling Method: Auger to 2.5m, casing to 3.0m, then washbore
Groundwater: No free groundwater encountered during auger drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

BORE REPORT

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Client: Economic Development Queensland
Project: Oxley PDA - Stage 1A
Location: Blackheath Road, Oxley
Project No: 018-118D

BORE 104

Page No: 2 of 2
Date: 2 June 2020
Ground Surface Level: RL33.0m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
12	***SILTY CLAY (CH)*** - hard, grey mottled brown	21.0		U	12.0	pp>600
	SANDSTONE (XW) - extremely low strength, brown, fine to coarse grained				12.45	
13	***SILTY CLAY (CH)*** - hard, grey, trace of fine grained sand	20.0		S	13.5	10,17,30 N=47
14	***MUDSTONE (XW)*** - extremely low strength, grey	19.0			13.95	
15		18.0		S	15.0	15,22,30/130mm
16		17.0			15.43	
17		16.0		S	16.5	16,22,30 N=52
18		15.0		S	16.95	
	End of Bore at 18.45 m				18.0	13,21,30 N=51
19		14.0			18.45	
20		13.0				
21		12.0				
22		11.0				
23		10.0				

U	Undisturbed Tube Sample (50mm dia)	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
D	Disturbed Sample	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Hydrapower Scout
Logged by: NA
Drilling Method: Auger to 2.5m, casing to 3.0m, then washbore
Groundwater: No free groundwater encountered during auger drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

BORE REPORT

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Client: Economic Development Queensland
Project: Oxley PDA - Stage 1A
Location: Blackheath Road, Oxley
Project No: 018-118D

BORE 105

Page No: 1 of 2
Date: 9 June 2020
Ground Surface Level: RL32.0m*

Depth (m)	Description	RL (m)	Sample Type	Sample Depth (m)	Test Results	Groundwater Monitoring Bore
0		32.0				
	SILTY CLAY (CH) - hard, brown, trace of fine grained sand		S	0.5	pp>600	
1	- grey	31.0		0.75	Cement	
			S	1.5	pp>600	
2		30.0		1.8		
	CLAYEY SAND (SC) - medium dense, orange-brown mottled grey and white, fine to coarse grained sand		S	3.0	9,7,8	
3		29.0		3.45	N=15	
	SILTY CLAY (CH) - stiff to very stiff, grey					
4		28.0			Casing	
	SILTY CLAY (CI) - hard, dark grey, with minor slickensides		U	4.5	pp>600	
5		27.0		4.75	Backfill	
			U	6.0		
6		26.0		6.3	pp>600	
7		25.0			Bentonite	
	SILTY CLAY (CH) - hard, dark grey		U	7.5	pp>600	
8		24.0		7.8		
	CLAYEY SAND (SC) - very dense, brown mottled orange-brown and grey		S	9.0	28,30/80mm	
9		23.0		9.23	Sand	
	SILTY CLAY (CI) - hard, brown				Screen	
10		22.0	U	10.0	pp>600	
	CLAYEY SILT (MH) - hard, grey and brown			10.45		
11		21.0	U	10.5	pp>600	
				10.75		

U	Undisturbed Tube Sample (50mm dia)	S	Standard Penetration Test (SPT)	E	Environmental Sample
D	Disturbed Sample	HB	SPT Hammer Bouncing	Up	Pushtube Sample
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)		

Is(50) Point Load Test Result (MPa)
(d) Diametral Test
(a) Axial Test
(i) Lump Test

Rig: Hydrapower Scout
Logged by: PZ
Drilling Method: Auger to 3.0m, casing to 3.0m, then washbore
Groundwater: No free groundwater encountered during auger drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

BORE REPORT

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Client: Economic Development Queensland
Project: Oxley PDA - Stage 1A
Location: Blackheath Road, Oxley
Project No: 018-118D

BORE 105

Page No: 2 of 2
Date: 9 June 2020
Ground Surface Level: RL32.0m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results	Groundwater Monitoring Bore
12	***SILTY CLAY (CH)*** - hard, grey	20.0		U	12.0 12.35	pp>600	
13		19.0					
14	***MUDSTONE (XW)*** - extremely low strength, grey	18.0		S	13.5 13.92	13,25,30 /120mm	
15		17.0		S	15.0 15.25	17,30/100mm	
	End of Bore at 15.25 m						
16		16.0					
17		15.0					
18		14.0					
19		13.0					
20		12.0					
21		11.0					
22		10.0					
23		9.0					

U	Undisturbed Tube Sample (50mm dia)	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
D	Disturbed Sample	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Hydrapower Scout

Logged by: PZ

Drilling Method: Auger to 3.0m, casing to 3.0m, then washbore

Groundwater: No free groundwater encountered during auger drilling

Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

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Notes on Description and Classification of Soil

The methods of description and classification of soils used in this report are generally based on Australian Standard AS1726-1993 Geotechnical Site Investigations.

Soil description is based on an assessment of disturbed samples, as recovered from bores and excavations, or from undisturbed materials as seen in excavations and exposures or in undisturbed samples. Descriptions given on report sheets are an interpretation of the conditions encountered at the time of investigation.

In the case of cone or piezocone penetrometer tests, actual soil samples are not recovered and soil description is inferred based on published correlations, past experience and comparison with bore and/or test pit data (if available).

Soil classification is based on the particle size distribution of the soil and the plasticity of the portion of the material finer than 0.425mm. The description of particle size distribution and plasticity is based on the results of visual field estimation, laboratory testing or both. When assessed in the field, the properties of the soil are estimated; precise description will always require laboratory testing to define soil properties.

Where soil can be clearly identified as FILL this will be noted as the main soil type followed by a description of the composition of the fill (e.g. FILL – yellow-brown, fine to coarse grained gravelly clay fill with concrete rubble). If the soil is assessed as possibly being fill this will be noted as an additional observation.

Soils are generally described using the following sequence of terms. In certain instances, not all of the terms will be included in the soil description.

MAIN SOIL TYPE (CLASSIFICATION GROUP SYMBOL)
- strength/density, colour, structure/grain size, secondary and minor components, additional observations

Information on the definition of descriptive and classification terms follows.

SOIL TYPE and CLASSIFICATION GROUP SYMBOLS

	Major Divisions	Particle Size	Classification Group Symbol	Typical Names
COARSE GRAINED SOILS (more than half of material is larger than 0.075mm)	BOULDERS	>200mm		
	COBBLES	63 – 200mm		
	GRAVELS (more than half of coarse fraction is larger than 2.36mm)	Coarse: 20 – 63mm Medium: 6 – 20mm Fine: 2.36 – 6mm	GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines, uniform gravels.
			GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (more than half of coarse fraction is smaller than 2.36mm)	Coarse: 0.6 – 2.36mm Medium: 0.2 – 0.6mm Fine: 0.075 – 0.2mm	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands and gravelly sands; little or no fines, uniform sands.
			SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (more than half of material is smaller than 0.075mm)	SILTS & CLAYS (liquid limit <50%)		ML	Inorganic silts and very fine sands, silty/clayey fine sands or clayey silts with low plasticity.
			CL and CI	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS & CLAYS (liquid limit >50%)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils.
			CH	Inorganic clays of high plasticity.
			OH	Organic clays of medium to high plasticity, organic silts.
	HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.

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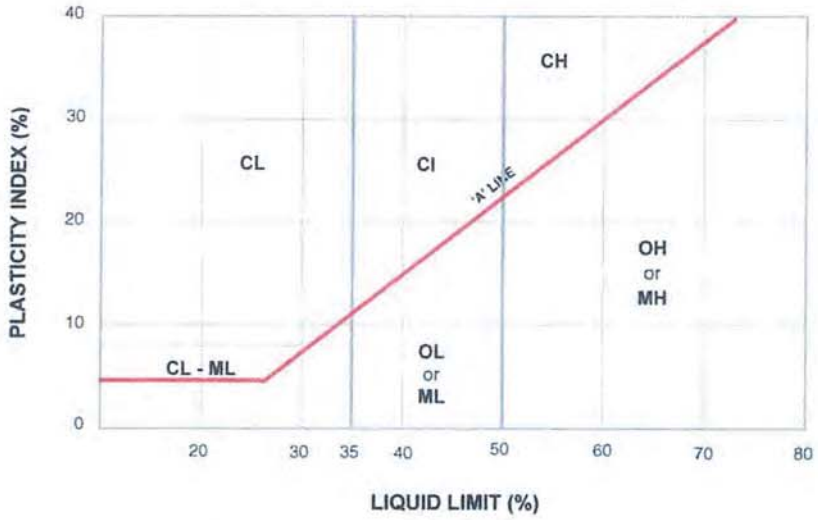
PLASTICITY CHART FOR CLASSIFICATION OF FINE GRAINED SOILS



(Reference: Australian Standard AS1726-1993 Geotechnical site investigations)

DESCRIPTIVE TERMS FOR MATERIAL PROPORTIONS

Coarse Grained Soils		Fine Grained Soils	
% Fines	Modifier	% Coarse	Modifier
<5	Omit, or use 'trace'	<15	Omit, or use trace.
5 – 12	Describe as 'with clay/silt' as applicable.	15 – 30	Describe as 'with sand/gravel' as applicable.
>12	Prefix soil as 'silty/clayey' as applicable	>30	Prefix soil as 'sandy/gravelly' as applicable.

STRENGTH TERMS – COHESIVE SOILS

Strength Term	Undrained Shear Strength	Field Guide to Strength
Very soft	<12kPa	Exudes between the fingers when squeezed in hand.
Soft	12 – 25kPa	Can be moulded by light finger pressure.
Firm	25 – 50kPa	Can be moulded by strong finger pressure.
Stiff	50 – 100kPa	Cannot be moulded by fingers, can be indented by thumb.
Very stiff	100 – 200kPa	Can be indented by thumb nail.
Hard	>200kPa	Can be indented with difficulty by thumb nail.

DENSITY TERMS – NON COHESIVE SOILS

Density Term	Density Index	SPT "N"	CPT Cone Resistance
Very loose	<15%	0 – 5	0 – 2MPa
Loose	15 – 35%	5 – 10	2 – 5MPa
Medium dense	35 – 65%	10 – 30	5 – 15MPa
Dense	65 – 85%	30 – 50	15 – 25MPa
Very dense	>85%	>50	>25MPa

COLOUR

The colour of a soil will generally be described in a 'moist' condition using simple colour terms (e.g. black, grey, red, brown etc.) modified as necessary by "pale", "dark", "light" or "mottled". Borderline colours will be described as a combination of colours (e.g. grey-brown).

EXAMPLE

e.g. CLAYEY SAND (SC) – medium dense, grey-brown, fine to medium grained with silt.

Indicates a medium dense, grey-brown, fine to medium grained clayey sand with silt.

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Notes on Description and Classification of Rock

The methods of description and classification of rock used in this report are generally based on Australian Standard AS1726-1993 *Geotechnical site investigations*.

Rock description is based on an assessment of disturbed samples, as recovered from bores and excavations, or from undisturbed materials as seen in excavations and exposures, or in core samples. Descriptions given on report sheets are an interpretation of the conditions encountered at the time of investigation.

Notes outlining the method and terminology adopted for the description of rock defects are given below, however, detailed information on defects can generally only be determined where rock core is taken, or excavations or exposures allow detailed observation and measurement.

Rocks are generally described using the following sequence of terms. In certain instances not all of the terms will be included in the rock description.

ROCK TYPE (WEATHERING SYMBOL), strength, colour, grain size, defect frequency

Information on the definition of descriptive and classification terms follows.

ROCK TYPE

In general, simple rock names are used rather than precise geological classifications.

ROCK MATERIALS WEATHERING CLASSIFICATION

Term	Weathering Symbol	Definition
Residual soil	RS	Soil developed from extremely weathered rock; the mass structure and substance fabrics are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely weathered	XW	Rock is weathered to such an extent that it has 'soil' properties, i.e. it either disintegrates or can be remoulded in water.
Distinctly weathered *	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by ironstaining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
- Highly weathered	HW	Rock substance affected by weathering to the extent that limonite staining or bleaching affects the whole of the rock substance and other signs of chemical or physical decomposition are evident. Porosity and strength may be increased or decreased compared to the fresh rock, usually as a result of iron leaching or deposition. The colour and strength of the original fresh rock substance is no longer recognisable.
- Moderately weathered	MW	Rock substance affected by weathering to the extent that staining extends throughout the whole of the rock substance and the original colour of the fresh rock may be no longer recognisable.
Slightly weathered	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh	FR	Rock shows no sign of decomposition or staining.

** Subdivision of this weathering grade into highly and moderately may be used where applicable.*

STRENGTH OF ROCK MATERIAL

Term	Symbol	Point Load Index I_s (50)	Field Guide To Strength
Extremely low	EL	<0.03MPa	Easily remoulded by hand to a material with soil properties.
Very low	VL	0.03 – 0.1MPa	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 30mm thick can be broken by finger pressure.
Low	L	0.1 – 0.3MPa	Easily scored with a knife; indentations 1mm to 3mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150mm long 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	M	0.3 – 1.0MPa	Readily scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High	H	1.0 – 3.0MPa	A piece of core 150mm long by 50mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very high	VH	3.0 – 10.0MPa	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely high	EH	>10MPa	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Notes:
1. *These terms refer to the strength of the rock material and not to the strength of the rock mass which may be considerably weaker due to the effect of rock defects.*
2. *The field guide visual assessment for rock strength may be used for preliminary assessment or when point load testing is not available.*
3. *Anisotropy of rock may affect the field assessment of strength.*

COLOUR

The colour of a rock will generally be described in a 'moist' condition using simple colour terms (e.g. black, grey, red, brown, etc) modified as necessary by 'pale', 'dark', 'light' or 'mottled'. Borderline colours will be described as a combination of colours (e.g. grey-brown).

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GRAIN SIZE

Descriptive Term	Particle Size Range
Coarse grained	0.6 – 2.0mm
Medium grained	0.2 – 0.6mm
Fine grained	0.06 – 0.2mm

DEFECT FREQUENCY

Where appropriate, a defect frequency may be recorded as part of the rock description and will be expressed as the number of natural (or interpreted natural) defects present in an equivalent one metre length of core; by use of the following defect frequency descriptive terms; or both. The descriptive terms refer to the spacing of all types of natural defects along which the rock is discontinuous and include, bedding plane partings, joints and other rock defects, but excludes known artificial fractures such as drilling breaks.

Defect Frequency	Description
Fragmented	Rock core is comprised primarily of fragments of length less than 20mm, and mostly of width less than the core diameter.
Highly Fractured	Core lengths are generally less than 20mm to 40mm with occasional fragments.
Fractured	Core lengths are mainly 30mm to 100mm with occasional shorter and longer sections.
Fractured to Slightly Fractured	Core lengths are mainly 100mm to 300mm with occasional shorter to longer sections.
Slightly Fractured	Core lengths are generally 300mm to 1,000mm with occasional longer sections and occasional sections of 100mm to 300mm.
Unbroken	The core does not contain any fractures.

EXAMPLE

e.g. SANDSTONE (XW) – low strength, pale brown, fine to coarse grained, slightly fractured.

ROCK DEFECT LOGGING

Defects are discontinuities in the rock mass and include joints, sheared zones, cleavages and bedding partings. The ability to observe and log defects will depend on the investigation methodology. Defects logged in core are described using the abbreviations noted in the following tables.

The *depth* noted in the description is measured in metres from the ground surface, the *defect angle* is measured in degrees from horizontal, and the defect *thickness* is measured normal to the plane of the defect and is in millimetres (unless otherwise noted).

Defects are generally described using the following sequence of terms:

Depth, Defect Type, Defect Angle (dip), Surface Roughness, Infill, Thickness

DEFECT TYPE

B	– Bedding
J	– Joint
S	– Shear Zone
C	– Crushed Zone

SURFACE ROUGHNESS

i	- rough or irregular, stepped
ii	- smooth, stepped
iii	- slickensided, stepped
iv	- rough or irregular, undulating
v	- smooth, undulating
vi	- slickensided, undulating
vii	- rough or irregular, planar
viii	- smooth planar
ix	- slickensided, planar

INFILL

Infill refers to secondary minerals or other materials formed on the surface of the defect and some common descriptions are given in the following table together with their abbreviations.

Ls	- limonite staining
Fe	- iron staining
Cl	- clay
Mn	- manganese staining
Qtz	- quartz
Ca	- calcite
Clean	- no visible infill

EXAMPLE

3.59m, J, 90, vii, Ls, 1mm

indicates a joint at 3.59m depth that is at 90° to horizontal (i.e. vertical), is rough or irregular and planar, limonite stained and 1mm thick.

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APPENDIX B

PREVIOUS BORE REPORT SHEETS

BORE REPORT

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Client: Economic Development Queensland
Project: Former Oxley Secondary College
Location: Blackheath Road, Oxley
Project No: 018-118A

BORE 1

Page No: 1 of 1
Date: 12 April 2018
Ground Surface Level: RL8.6m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		8.6			0.0		
	SILTY CLAY (CH) - firm, grey-brown with orange mottle, trace of fine grained sand, rootlets in top 50mm			E		B1-1	
					0.3		
					0.5		
		8.0		U/E		B1-2	pp=150
1					0.95		
					1.5		3,3,5
		7.0		S			
2					1.95		N=8
	- stiff	6.0					
3					3.0		3,4,6
				S			
					3.45		N=10
		5.0					
4	- firm						
					4.5		2,2,3
		4.0		S			
					4.95		N=5
5	End of Bore at 5 m						

D	Disturbed Sample	V	Vane Shear Strength, Uncorrected (kPa)	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test
E	Environmental Sample	A	Asbestos Sample		

Rig: Hydrapower Trekker
Logged By: NA
Drilling Method: Auger
Groundwater: Free groundwater encountered at approximately 2.8m depth
Remarks: *Approximate ground surface level estimated from a contour plan supplied by EDQ

BORE REPORT

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Client: Economic Development Queensland
Project: Former Oxley Secondary College
Location: Blackheath Road, Oxley
Project No: 018-118A

BORE 2

Page No: 1 of 1
Date: 12 April 2018
Ground Surface Level: RL10.6m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		10.6			0.0		
	SILTY CLAY (CI) - stiff, grey-brown mottled			E/B		B2-1	
					0.4		
					0.5		3,4,6
		10.0		S			
1					0.95		N=10
					1.0		
				E		B2-2	
					1.4		
	- very stiff, brown with red mottle, some ironstone				1.5		
		9.0		U			pp=450
2					1.95		
	- with zones of clayey sand						
		8.0					
3					3.0		9,10,10
				S			
					3.45		N=20
		7.0					
4	- stiff, pale grey						
					4.5		7,7,7
		6.0		S			
5					4.95		N=14
	End of Bore at 5 m						

D	Disturbed Sample	V	Vane Shear Strength, Uncorrected (kPa)	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test
E	Environmental Sample	A	Asbestos Sample		

Rig: Hydrapower Trekker
Logged By: NA
Drilling Method: Auger
Groundwater: No free groundwater encountered during drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by EDQ

BORE REPORT

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Client: Economic Development Queensland
Project: Former Oxley Secondary College
Location: Blackheath Road, Oxley
Project No: 018-118A

BORE 3

Page No: 1 of 1
Date: 11 April 2018
Ground Surface Level: RL16.0m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		16.0					
	BITUMINOUS CONCRETE - 20mm thick				0.2		
	PAVEMENT GRAVEL - pale brown, gravel, fine to coarse grained sand, fine to medium subangular gravel			E	0.5	B3-1	3,3,2
				S/E		B3-2	N=5
1	***FILL*** - brown, silty clay	15.0			0.95 1.0		
	- grey, silty clay, with some fine to coarse grained sand			E		B3-3	
					1.4 1.5		
				U			pp=400
2		14.0			1.95 2.0		
	SILTY CLAY (CI) - firm, grey with orange mottle			E		B3-4	
					2.4		
					2.6		
				E		B3-5	
3		13.0			3.0		2,3,2
				S			N=5
					3.45		
4	- stiff	12.0					
					4.5		3,4,7
				S			N=11
5		11.0			4.95		
	End of Bore at 5 m						

D	Disturbed Sample	V	Vane Shear Strength, Uncorrected (kPa)	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test
E	Environmental Sample	A	Asbestos Sample		

Rig: Hydrapower Trekker
Logged By: NA

Drilling Method: Auger

Groundwater: No free groundwater encountered during drilling

Remarks: *Approximate ground surface level estimated from a contour plan supplied by EDQ

BORE REPORT

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Client: Economic Development Queensland
Project: Former Oxley Secondary College
Location: Blackheath Road, Oxley
Project No: 018-118A

BORE 4

Page No: 1 of 1
Date: 11 April 2018
Ground Surface Level: RL14.8m*

Depth (m)	Description	RL (m)	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		14.8		0.0		
	PAVEMENT GRAVEL - pale brown, sandy gravel, fine to coarse grained sand, fine to coarse subangular gravel		E	0.2	B4-1	
			E		B4-2 QC05 QC06	
	FILL - dark brown, silty clay, some fine to medium grained sand			0.5		
		14.0	U/E		B4-3	pp=400
1				0.95 1.0		
	SANDY CLAY (CL) - firm, brown with orange mottle, fine to medium grained		E		B4-4	
				1.4 1.5		2,3,3
		13.0	S			N=6
2				1.95		
	SILTY CLAY (CH) - firm, brown, trace of fine to medium grained sand					
		12.0				
3			U	3.0		pp=100
				3.45		
		11.0				
4				4.5		3,4,7
		10.0	S			N=11
5				4.95		
	End of Bore at 5 m					

D Disturbed Sample
B Bulk Sample
U Undisturbed Tube (50mm diameter)
pp Pocket Penetrometer Test (kPa)
E Environmental Sample
V Vane Shear Strength, Uncorrected (kPa)
S Standard Penetrometer Test (SPT)
SPT Hammer Bouncing
( ) No Sample Recovery
A Asbestos Sample
C NMLC Coring
Is(50) Point Load Test Result (MPa)
(d) Diametral Point Load Strength Test
(a) Axial Point Load Strength Test

Rig: Hydrapower Trekker
Logged By: NA
Drilling Method: Auger
Groundwater: Free groundwater encountered at approximately 2.3m depth
Remarks: *Approximate ground surface level estimated from a contour plan supplied by EDQ

BORE REPORT

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Client: Economic Development Queensland
Project: Former Oxley Secondary College
Location: Blackheath Road, Oxley
Project No: 018-118A

BORE 5

Page No: 1 of 1
Date: 11 April 2018
Ground Surface Level: RL32.0m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		32.0			0.0		
	SANDY CLAY (CL) - dark brown, fine to coarse grained			E	0.2	B5-1	
	SANDY CLAY (CI) - stiff, pale brown, fine grained			E/B		B5-2	
					0.5		7,6,8
				S			N=14
1		31.0			0.95 1.0		
				E		B5-3	
					1.4		
					1.5		14,27,30
	- pale brown with red mottled, fine grained (possibly siltstone			S			
2		30.0			1.95		N=57
	SANDY CLAY (CL) - hard, pale grey, fine to coarse grained						
3		29.0			3.0		16,18,20
				S			
					3.45		N=38
4		28.0					
	SILTY CLAY (CI) - hard, grey						
					4.5		
				U			pp>600
5		27.0			4.95		
	End of Bore at 5 m						

D	Disturbed Sample	V	Vane Shear Strength, Uncorrected (kPa)	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test
E	Environmental Sample	A	Asbestos Sample		

Rig: Hydrapower Trekker
Logged By: NA

Drilling Method: Auger

Groundwater: No free groundwater encountered during drilling

Remarks: *Approximate ground surface level estimated from a contour plan supplied by EDQ

BORE REPORT

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Client: Economic Development Queensland
Project: Former Oxley Secondary College
Location: Blackheath Road, Oxley
Project No: 018-118A

BORE 6

Page No: 1 of 1
Date: 11 April 2018
Ground Surface Level: RL19.8m*

Depth (m)	Description	RL (m)	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		19.8				
	BITUMINOUS CONCRETE - 20mm thick		E	0.02	B6-1	
			E	0.2	B6-2	
	PAVEMENT GRAVEL - pale brown, sandy gravel, fine to coarse grained sand, fine to medium subangular gravel			0.5		
			U			pp>600
	FILL	19.0		0.95		
1	- red, silty clay, trace of fine grained sand			1.0		
	SANDY CLAY (CI) - stiff, red, fine to medium grained		E		B6-3	
				1.4		
	SILTY CLAY (CI) - very stiff, brown-orange mottled			1.5		5,8,12
		18.0	S			
2				1.95		N=20
		17.0				
3				3.0		6,10,14
			S			
				3.45		N=24
		16.0				
4	- hard, dark grey with orange mottle					
				4.5		8,14,18
			S			
		15.0				N=32
5				4.95		
	End of Bore at 5 m					

D	**Disturbed Sample**	**V**	**Vane Shear Strength, Uncorrected (kPa)**	**C**	**NMLC Coring**
B	**Bulk Sample**	**S**	**Standard Penetrometer Test (SPT)**	**Is(50)**	**Point Load Test Result (MPa)**
U	**Undisturbed Tube (50mm diameter)**	**SPT**	**Hammer Bouncing**	**(d)**	**Diametral Point Load Strength Test**
pp	**Pocket Penetrometer Test (kPa)**	**( )**	**No Sample Recovery**	**(a)**	**Axial Point Load Strength Test**
E	**Environmental Sample**	**A**	**Asbestos Sample**		

Rig: Hydrapower Trekker
Logged By: NA

Drilling Method: Auger

Groundwater: No free groundwater encountered during drilling

Remarks: *Approximate ground surface level estimated from a contour plan supplied by EDQ

BORE REPORT

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Client: Economic Development Queensland
Project: Proposed Retirement Village and Child Care Developments
Location: Former Oxley Secondary College, Blackheath Road, Oxley
Project No: 018-118A

BORE 7

Page No: 1 of 1
Date: 12 April 2018
Ground Surface Level: RL9.5m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		9.5			0.0		
	SILTY CLAY (CI) - firm, brown with orange mottle, trace of fine grained sand			E		B7-1	
					0.4		
		9.0			0.5		3,3,4
				S/E		B7-2	
1					0.95		N=7
		8.0			1.5		2,2,2
				S			
2					1.95		N=4
	SILTY CLAY (CH) - firm, dark grey, trace of fine grained sand	7.0					
3					3.0		
				U			pp=150
		6.0			3.45		
4	- stiff, grey-brown with orange mottle						
		5.0			4.5		3,5,7
				S			
					4.95		N=12
5	End of Bore at 5 m	4.0					

D	Disturbed Sample	V	Vane Shear Strength, Uncorrected (kPa)	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test
E	Environmental Sample	A	Asbestos Sample		

Rig: Hydrapower Trekker
Logged By: NA
Drilling Method: Auger
Groundwater: No free groundwater encountered during drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by EDQ

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Client: Economic Development Queensland
Project: Former Oxley Secondary College
Location: Blackheath Road, Oxley
Project No: 018-118A

BORE 8

Page No: 1 of 1
Date: 9 April 2018
Ground Surface Level: RL13.5m*

Depth (m)	Description	RL (m)	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		13.5				
	FILL			0.0		
	- brown, silty clay, trace of fine to coarse grained sand		E		B8-1	
		13.0		0.5		6,5,5
			S			
1				0.95		N=10
				1.0		
			E		B8-2	
	- pale grey with orange mottle, silty clay, trace of fine to coarse grained sand	12.0		1.5		
			U			pp>600
2				1.95		
				2.0		
			E		B8-3	
	- red, sandy clay, fine to coarse grained			2.3		
		11.0				
				2.7		
			E		B8-4	
3	***SILTY CLAY (CI)***			3.0		9,7,10
	- very stiff, red		S			
						N=17
		10.0		3.45		
			E		B8-5	
4				3.9		
	- hard					
		9.0		4.5		12,15,23
			S			
						N=38
5				4.95		
	End of Bore at 5 m					
		8.0				

D	Disturbed Sample	V	Vane Shear Strength, Uncorrected (kPa)	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test
E	Environmental Sample	A	Asbestos Sample		

Rig: Hydrapower Trekker
Logged By: NA
Drilling Method: Auger
Groundwater: No free groundwater encountered during drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by EDQ

BORE REPORT

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Client: Economic Development Queensland
Project: Former Oxley Secondary College
Location: Blackheath Road, Oxley
Project No: 018-118A

BORE 9

Page No: 1 of 1
Date: 11 April 2018
Ground Surface Level: RL19.4m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		19.4			0.0		
	FILL			E		B9-1	
	- dark brown, sandy clay, fine to coarse grained, rootlets (topsoil)				0.2		
	- brown, silty sand	19.0		E		B9-2	
					0.5		3,3,3
	- brown, silty clay, with some fine to coarse grained sand			S			N=6
1					0.95		
					1.1		
				E		B9-3	
		18.0			1.5		3,5,6
				S			N=11
2					1.95		
					2.0		
				E		B9-4	
		17.0			2.4		
					2.6		
				E		B9-5	
3					3.0		4,2,4
				S			
		16.0			3.45		N=6
					3.5		
				E		B9-6	
					3.9		
4					4.0		
				E		B9-7	
					4.3		
	SILTY CLAY (CI)	15.0		E		B9-8	
	- hard, red-brown mottled				4.5		
				U			pp>600
5					4.95		
	End of Bore at 5 m						
		14.0					

D	Disturbed Sample	V	Vane Shear Strength, Uncorrected (kPa)	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test
E	Environmental Sample	A	Asbestos Sample		

Rig: Hydrapower Trekker
Logged By: NA

Drilling Method: Auger

Groundwater: No free groundwater encountered during drilling

Remarks: *Approximate ground surface level estimated from a contour plan supplied by EDQ

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Client: Economic Development Queensland
Project: Former Oxley Secondary College
Location: Blackheath Road, Oxley
Project No: 018-118A

BORE 10

Page No: 1 of 1
Date: 9 April 2018
Ground Surface Level: RL13.2m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		13.2			0.0		
	FILL - pale brown, gravelly sandy clay, fine to coarse grained sand, fine subangular gravel			E/B		B10-1	
				E	0.3	B10-2	
	- brown, sandy silt, fine to coarse grained			E/S	0.5	B10-3	4,5,4
1					0.95		N=9
	SANDY CLAY (CL) - stiff, orange, fine to medium grained	12.0		E	1.0	B10-4	
					1.4		
				E/S	1.5	B10-5	3,5,4
2					1.95		N=9
		11.0					
	- brown, silty clay, trace of fine to coarse grained sand			E	2.7	B10-6	
3				S	3.0		5,7,9
		10.0			3.45		N=16
	SILTY CLAY (CL) - stiff to very stiff, grey-brown, with trace of fine to coarse grained sand, trace of charcoal				3.5		
				E		B10-7	
4					4.0		
		9.0					
					4.5		
				U			pp=350
5					4.95		
	End of Bore at 5 m	8.0					

D Disturbed Sample
B Bulk Sample
U Undisturbed Tube (50mm diameter)
pp Pocket Penetrometer Test (kPa)
E Environmental Sample
V Vane Shear Strength, Uncorrected (kPa)
S Standard Penetrometer Test (SPT)
SPT Hammer Bouncing
( ) No Sample Recovery
A Asbestos Sample
C NMLC Coring
Is(50) Point Load Test Result (MPa)
(d) Diametral Point Load Strength Test
(a) Axial Point Load Strength Test

Rig: Hydrapower Trekker
Logged By: NA
Drilling Method: Auger
Groundwater: No free groundwater encountered during drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by EDQ

BORE REPORT

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Client: Economic Development Queensland
Project: Former Oxley Secondary College
Location: Blackheath Road, Oxley
Project No: 018-118A

BORE 11

Page No: 1 of 1
Date: 10 April 2018
Ground Surface Level: RL14.5m*

Depth (m)	Description	RL (m)	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		14.5		0.0	B11-1	
	FILL		E		QC03	
	- pale brown, clayey gravel, fine to coarse subangular gravel, fibro fragments around building slab (GRAV-B11)			0.2	QC04	
			E		B11-2	
	- dark brown, gravelly clay, fine subangular gravel	14.0		0.5		6,5,5
	- brown, silty clay, with some fine to coarse grained sand		S/E		B11-3	
1				0.95		N=10
				1.2		
			E		B11-4	
		13.0		1.5		5,5,7
	SILTY CLAY		S			
	- stiff, grey, interbedded with sandy clay			1.95		N=12
2				2.0		
			E		B11-5	
		12.0		2.4		
	- hard					
3				3.0		
			U			pp>600
		11.0		3.45		
4	***SANDY CLAY (CL)***					
	- hard, dark brown					
		10.0		4.5		13,18,21
			S			
5				4.95		N=39
	End of Bore at 5 m					
		9.0				

D	**Disturbed Sample**	**V**	**Vane Shear Strength, Uncorrected (kPa)**	**C**	**NMLC Coring**
B	**Bulk Sample**	**S**	**Standard Penetrometer Test (SPT)**	**Is(50)**	**Point Load Test Result (MPa)**
U	**Undisturbed Tube (50mm diameter)**	**SPT**	**Hammer Bouncing**	**(d)**	**Diametral Point Load Strength Test**
pp	**Pocket Penetrometer Test (kPa)**	**( )**	**No Sample Recovery**	**(a)**	**Axial Point Load Strength Test**
E	**Environmental Sample**	**A**	**Asbestos Sample**		

Rig: Hydrapower Trekker
Logged By: NA

Drilling Method: Auger

Groundwater: No free groundwater encountered during drilling

Remarks: *Approximate ground surface level estimated from a contour plan supplied by EDQ

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Client: Economic Development Queensland
Project: Former Oxley Secondary College
Location: Blackheath Road, Oxley
Project No: 018-118A

BORE 12

Page No: 1 of 1
Date: 9 April 2018
Ground Surface Level: RL18.5m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Sample ID	Test Results
0	***SILTY CLAY (CI)*** - stiff to very stiff, red-brown	18.5		B/E	0.0	B12-1	
		18.0		U	0.5		pp=250
1				E	0.95 1.0	B12-2	
		17.0		S	1.4 1.5		4,7,9
2	- very stiff, brown				1.95		N=16
		16.0					
3				S	3.0		6,7,14
		15.0			3.45		N=22
4	- pale brown						
		14.0		S	4.5		6,11,14
5	End of Bore at 5 m				4.95		N=25
		13.0					

D Disturbed Sample
B Bulk Sample
U Undisturbed Tube (50mm diameter)
pp Pocket Penetrometer Test (kPa)
E Environmental Sample
V Vane Shear Strength, Uncorrected (kPa)
S Standard Penetrometer Test (SPT)
SPT Hammer Bouncing
( ) No Sample Recovery
A Asbestos Sample
C NMLC Coring
Is(50) Point Load Test Result (MPa)
(d) Diametral Point Load Strength Test
(a) Axial Point Load Strength Test

Rig: Hydrapower Trekker
Logged By: NA
Drilling Method: Auger
Groundwater: No free groundwater encountered during drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by EDQ

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Client: Economic Development Queensland
Project: Former Oxley Secondary College
Location: Blackheath Road, Oxley
Project No: 018-118A

BORE 13

Page No: 1 of 1
Date: 10 April 2018
Ground Surface Level: RL24.8m*

Depth (m)	Description	RL (m)	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		24.8				
	BITUMINOUS CONCRETE - 20mm thick			0.2	B13-1 QC01 QC02	
	PAVEMENT GRAVEL - pale brown, sandy gravel, fine to coarse grained sand, fine to medium subangular gravel		E	0.5		4,5,6
	FILL - brown, silty clay	24.0	S	0.95		N=11
1	- dark grey, silty clay			1.0		
			E	1.3	B13-2	
				1.5		3,14,21
	SILTY SAND (SC) - dense, pale brown, fine to medium grained	23.0	S	1.95		N=35
2						
		22.0				
3				3.0		20,30,21
			S	3.45		N=51
		21.0				
4				4.5		
		20.0	U	4.95		pp>600
5	End of Bore at 5 m					

D	Disturbed Sample	V	Vane Shear Strength, Uncorrected (kPa)	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test
E	Environmental Sample	A	Asbestos Sample		

Rig: Hydrapower Trekker
Logged By: NA

Drilling Method: Auger

Groundwater: No free groundwater encountered during drilling

Remarks: *Approximate ground surface level estimated from a contour plan supplied by EDQ

BORE REPORT

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Client: Economic Development Queensland
Project: Former Oxley Secondary College
Location: Blackheath Road, Oxley
Project No: 018-118A

BORE 14

Page No: 1 of 1
Date: 10 April 2018
Ground Surface Level: RL16.0m*

Depth (m)	Description	RL (m)	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		16.0				
	BITUMINOUS CONCRETE - 20mm thick		E	0.02	B14-1	
			E	0.2	B14-2	
	PAVEMENT GRAVEL - pale brown, sandy gravel, fine to coarse grained sand, fine to medium subangular gravel		U	0.5		
			U/E	0.7	B14-3	pp>600
1	***FILL*** - brown, silty clay	15.0		0.95		
	- pale grey, sandy clay, fine to coarse grained, trace of fine to medium subangular gravel		E	1.1	B14-4	
	CLAYEY SAND (SC) - very dense, orange, fine to medium grained		S	1.5		18,30/125mm
	SILTY CLAY (CL)			1.775		
2	- very stiff, grey with orange zones, trace of fine to coarse grained sand	14.0				
3		13.0	S	3.0		18,15,14
				3.45		N=29
4	- hard, grey	12.0				
			S	4.5		15,25,30/ 130mm
5	End of Bore at 5 m	11.0		4.93		

D Disturbed Sample
B Bulk Sample
U Undisturbed Tube (50mm diameter)
pp Pocket Penetrometer Test (kPa)
E Environmental Sample
V Vane Shear Strength, Uncorrected (kPa)
S Standard Penetrometer Test (SPT)
SPT Hammer Bouncing
( ) No Sample Recovery
A Asbestos Sample
C NMLC Coring
Is(50) Point Load Test Result (MPa)
(d) Diametral Point Load Strength Test
(a) Axial Point Load Strength Test

Rig: Hydrapower Trekker
Logged By: NA
Drilling Method: Auger
Groundwater: No free groundwater encountered during drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by EDQ

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Client: Economic Development Queensland
Project: Former Oxley Secondary College
Location: Blackheath Road, Oxley
Project No: 018-118A

BORE 15

Page No: 1 of 1
Date: 10 April 2018
Ground Surface Level: RL24.2m*

Depth (m)	Description	RL (m)	Sample Type	Sample Depth (m)	Sample ID	Test Results
0		24.2				
	SANDY SILT (ML) - dark brown, fine to medium grained, rootlets (topsoil)		E	0.0	B15-1	
				0.2	B15-2	
	SILTY CLAY (CI) - stiff, pale brown, trace of fine to coarse grained sand		E/B	0.5		
	- very stiff to hard, grey		U	0.95		pp>600
1				1.0		
		23.0	E	1.4	B15-3	
				1.5		
	SILTY SAND (SC) - very dense, fine to medium grained		E	1.78		14,30/130mm
2		22.0				
	SILTSTONE (XW) - extremely low strength, grey with orange mottle					
3			S	3.0		19,30/90mm
		21.0		3.24		
4						
	SILTY CLAY (CI) - hard, grey with red mottle	20.0				
			S	4.5		13,22,25
				4.95		N=47
5	End of Bore at 5 m	19.0				

D	Disturbed Sample	V	Vane Shear Strength, Uncorrected (kPa)	C	NMLC Coring
B	Bulk Sample	S	Standard Penetrometer Test (SPT)	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	SPT	Hammer Bouncing	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	( )	No Sample Recovery	(a)	Axial Point Load Strength Test
E	Environmental Sample	A	Asbestos Sample		

Rig: Hydrapower Trekker
Logged By: NA

Drilling Method: Auger

Groundwater: No free groundwater encountered during drilling

Remarks: *Approximate ground surface level estimated from a contour plan supplied by EDQ

BORE REPORT

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Client: Economic Development Queensland
Project: Proposed Retirement Village and Child Care Developments
Location: Former Oxley Secondary College, Blackheath Road, Oxley
Project No: 018-118B

BORE 16

Page No: 1 of 1
Date: 24 September 2018
Ground Surface Level: RL21.3m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
0		21.3				
	SANDY CLAY (CL)					
	- brown, fine to coarse grained (topsoil)			S	0.5	3,6,6
1	***SILTY CLAY (CH)***				0.95	N=12
	- stiff, grey and brown mottled, trace of fine grained sand	20.0				
	- very stiff			U	1.5	pp=450
2					1.95	
	- pale brown with yellow mottle	19.0				
3	- hard, pale grey			S	3.0	8,14,16
		18.0			3.45	N=30
4						
		17.0		U	4.5	pp>600
5					4.95	
		16.0				
	- dark grey					
6				S	6.0	10,15,20
		15.0			6.45	N=35
7						
		14.0		U	7.5	pp>600
8					7.95	
		13.0				
9	***MUDSTONE (XW)***			S	9.0	17,30/80mm
	- extremely low strength, dark grey	12.0			9.23	
10						
		11.0		S	10.5	30/140mm
11					10.64	
		10.0				
12				S	12.0	28,30/130mm
		9.0			12.28	
	End of Bore at 12.28 m					
13						

U	Undisturbed Tube Sample (50mm dia)	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
D	Disturbed Sample	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Jacro 350
Logged by: NA
Drilling Method: Auger
Groundwater: No free groundwater encountered during drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

BORE REPORT

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Project: Broadscale Slope Stability Assessment
Location: Former Oxley Secondary College, Blackheath Road, Oxley
Project No: 018-118B

BORE 17

Page No: 1 of 1
Date: 24 September 2018
Ground Surface Level: RL17.1m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
0		17.1				
	SANDY CLAY (CL) -brown, fine to coarse grained (topsoil)			S	0.5	4,5,5
1	***SILTY CLAY (CI)*** - stiff, pale grey, with zones of dark grey, trace of fine grained sand	16.0			0.95	N=10
				U	1.5	pp>600
2		15.0			1.95	
3	- very stiff	14.0		S	3.0	7,8,11
					3.45	N=19
4		13.0				
				U	4.5	pp>600
5		12.0			4.95	
	- with ironstone					
6	- with slickensides	11.0		S	6.0	13,18,22
					6.45	N=40
7	***MUDSTONE (XW)*** - extremely low strength, grey with yellow-brown mottle	10.0				
				U	7.5	pp>600
8		9.0			7.95	
9	***CLAYEY SAND (SC)*** - very dense, brown, fine to coarse grained, with grained gravel	8.0		S	9.0	30/50mm
					9.05	
10		7.0				
				S	10.5	30/115mm
11		6.0			10.615	
	SANDSTONE (XW) - extremely low strength, orange-brown, fine grained					
12		5.0		S	12.0	30/100mm
	End of Bore at 12.1 m				12.1	
13		4.0				

U	Undisturbed Tube Sample (50mm dia)	S	Standard Penetration Test (SPT)	E	Environmental Sample
D	Disturbed Sample	HB	SPT Hammer Bouncing	Up	Pushtube Sample
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)		

Is(50) Point Load Test Result (MPa)
(d) Diametral Test
(a) Axial Test
(i) Lump Test

Rig: Jacro 350
Logged by: NA
Drilling Method: Auger
Groundwater: Free groundwater encountered at 10m during drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

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Client: Economic Development Queensland
Project: Proposed Retirement Village and Child Care Developments
Location: Former Oxley Secondary College, Blackheath Road, Oxley
Project No: 018-118B

BORE 18

Page No: 1 of 1
Date: 25 September 2018
Ground Surface Level: RL38.1m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
0		38.1				
	FILL					
	- brown, silty clay, trace of fine subrounded gravel (reworked natural)			S	0.5	5,7,8
1		37.0			0.95	N=15
	- brown with yellow and orange mottle				1.5	
				U		pp>600
2		36.0			1.95	
	- brown with orange and red mottle					
3		35.0		S	3.0	9,13,14
					3.45	N=27
4		34.0				
					4.5	
				U		pp=320
5		33.0			4.95	
6		32.0		S	6.0	7,9,10
					6.45	N=19
7	***SILTY CLAY (CI)***	31.0				
	- stiff, grey with red mottle				7.5	
				U		pp=220
8		30.0			7.95	
	- very stiff, with bands of fine subangular gravel					
9		29.0		S	9.0	7,9,11
					9.45	N=20
10		28.0			10.5	
				U		pp>600
	MUDSTONE (XW)			S	10.55	
11	- extremely low strength, pale brown, with slickensides	27.0			10.82	21,30/120mm
	- very low strength					
					12.0	
12		26.0		S	12.06	30/60mm
	End of Bore at 12.06 m					HB
13		25.0				

U	Undisturbed Tube Sample (50mm dia)	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
D	Disturbed Sample	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Jacro 350
Logged by: NA
Drilling Method: Auger
Groundwater: Free groundwater encountered at 7m during drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

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BORE 19

Page No: 1 of 1
Date: 25 September 2018
Ground Surface Level: RL28.6m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
0		28.6				
	SANDY CLAY (CL) - brown, fine to coarse grained (topsoil)			S	0.5	4,4,4
1	***SILTY CLAY (CH)*** - stiff, pale brown with orange mottle				0.95	N=8
	- very stiff, orange	27.0		U	1.5	pp>600
2					1.95	
	- pale grey with orange mottle	26.0				
3				S	3.0	10,10,14
		25.0			3.45	N=24
4	***CLAYEY SAND (SC)*** - dense, orange, fine grained	24.0		S	4.5	16,16,20
5					4.95	N=36
	SILTY CLAY (CL) - hard, red, with trace of fine grained sand	23.0				
6				U	6.0	pp>600
	SILTY CLAY (CI) - hard, grey	22.0			6.45	
7						
	- with slickensides	21.0		S	7.5	15,25,30/120mm
8					7.92	
	MUDSTONE (XW) - extremely low strength, grey	20.0		S	9.0	28,12/70mm
9					9.22	
	End of Bore at 9.22 m	19.0				
10						
		18.0				
11						
		17.0				
12						
		16.0				
13						

U	Undisturbed Tube Sample (50mm dia)	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
D	Disturbed Sample	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Jacro 350
Logged by: NA
Drilling Method: Auger
Groundwater: No free groundwater encountered during drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

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BORE 20

Page No: 1 of 2
Date: 26 September 2018
Ground Surface Level: RL21.8m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
0		21.8				
	SILTY SAND (SM)					
	- brown (topsoil)			S	0.5	4,4,5
1	***SILTY CLAY (CH)***	21.0			0.95	N=9
	- stiff, pale grey with red mottle, trace of fine grained sand				1.5	
	- very stiff, pale brown with orange mottle	20.0		U	1.95	pp=350
2						
	- stiff, pale brown	19.0			3.0	4,5,6
3				S	3.45	N=11
4		18.0				
	- hard, with some fine grained sand				4.5	
5		17.0		U	4.95	pp>600
6		16.0			6.0	10,17,24
				S	6.45	N=41
7		15.0				
					7.5	
8		14.0		U	7.95	pp>600
	SILTY CLAY (CL)	13.0			9.0	12,23,27
9	- hard, pale brown			S	9.45	N=50
10		12.0				
	SILTY CLAY (CI)				10.5	5,9,13
	- very stiff, dark grey	11.0		S	10.95	N=22
11						
12		10.0			12.0	8,16,23
	SILTY CLAY (CH)			S	12.45	N=39
	- hard, grey with brown mottle, with slickensides	9.0				
13						

U Undisturbed Tube Sample (50mm dia)
D Disturbed Sample
B Bulk Sample
pp Pocket Penetrometer Test (kPa)
S Standard Penetration Test (SPT)
HB SPT Hammer Bouncing
( ) No Sample Recovery
V Vane Shear Strength, Uncorrected (kPa)
E Environmental Sample
Up Pushtube Sample
C NMLC Coring
Is(50) Point Load Test Result (MPa)
(d) Diametral Test
(a) Axial Test
(i) Lump Test

Rig: Hydrapower Scout
Logged by: NA
Drilling Method: Auger to 1.5m, casing to 1.5m, then washbore
Groundwater: No free groundwater encountered during auger drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

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BORE 20

Page No: 2 of 2
Date: 26 September 2018
Ground Surface Level: RL21.8m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
14	***SILTY CLAY (CH)*** - hard, grey with brown mottle, with slickensides	8.0		S	13.5 13.95	12,18,27 N=45
15	***SANDSTONE (XW)*** - extremely low strength, orange-brown, fine grained	7.0		S	15.0 15.08	30/80mm
16	***MUDSTONE*** - extremely low strength, dark grey mottled black, with carbonaceous bands	6.0		S	16.5 16.92	17,29,30/120mm
17	End of Bore at 16.92 m	5.0				
18		4.0				
19		3.0				
20		2.0				
21		1.0				
22		0.0				
23		-1.0				
24		-2.0				
25		-3.0				
26		-4.0				

U	Undisturbed Tube Sample (50mm dia)	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
D	Disturbed Sample	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Hydrapower Scout
Logged by: NA
Drilling Method: Auger to 1.5m, casing to 1.5m, then washbore
Groundwater: No free groundwater encountered during auger drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

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BORE 21

Page No: 1 of 1
Date: 26 September 2018
Ground Surface Level: RL14.5m*

Depth (m)	Description	RL (m)	Sample Type	Sample Depth (m)	Test Results	Groundwater Monitoring Bore
0		14.5				
	SANDY CLAY (CL) - brown, fine to coarse grained (topsoil)		U	0.5	pp>600	Bentonite
1	***SILTY CLAY (CH)*** - very stiff, brown with orange mottle, with some fine to coarse grained sand			0.95		
		13.0	S	1.5	3,3,5	
2	- stiff, dark grey, with some fine to coarse grained sand			1.95	N=8	Spoil
	- hard, pale brown	12.0				
3			U	3.0	pp>600	
		11.0		3.45		Bentonite
4		10.0	S	4.5	8,21,26	
5	- hard, grey, with bands of orange sandy clay			4.95	N=47	Casing
	- very stiff	9.0				
6			U	6.0	pp=500	
		8.0		6.45		
7		7.0	S	7.5	13,25,30/130mm	
8	- hard			7.93		
		6.0				
9	***MUDSTONE (XW)*** - extremely low strength, dark grey, with bands of sandstone (XW) extremely low strength, orange, fine to coarse grained		S	9.0	30/70mm	
		5.0		9.07		Sand
10		4.0	(S)	10.5	30/100mm	
	SANDSTONE (XW)			10.6		Screen
11	- extremely low strength, grey and orange, fine grained	3.0				
12			S	12.0	29,30/70mm	
	End of Bore at 12.22 m	2.0		12.22		
13						

D Disturbed Sample
B Bulk Sample
U Undisturbed Tube (50mm diameter)
pp Pocket Penetrometer Test (kPa)
S Standard Penetrometer Test (SPT)
HB SPT Hammer Bouncing
( ) No Sample Recovery
V Vane Shear Strength, Uncorrected (kPa)
C NMLC Coring
Is(50) Point Load Test Result (MPa)
(d) Diametral Point Load Strength Test
(a) Axial Point Load Strength Test

Rig: Hydrapower Scout
Logged by: NA
Drilling Method: Auger to 1.5m, HW casing to 1.5m, NW casing to 6.0m, then washbore
Groundwater: No free groundwater encountered during auger drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

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BORE 22

Page No: 1 of 1
Date: 25 September 2018
Ground Surface Level: RL9.5m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
0		9.5			0.0	
	FILL - brown, sandy silt, fine to medium grained			E		B22-1 QC07 QC08
					0.4	
	- brown, silty clay	9.0			0.6	
				E		B22-2
1					0.9	
	- grey-brown				1.2	
				E		B22-3
		8.0			1.5	
					1.7	
				E		B22-4
2					2.0	
	SILTY CLAY (CH) - dark grey, trace of fine grained sand				2.2	
				E		B22-5
		7.0			2.5	
					2.7	
				E		B22-6
3					3.0	
					3.2	
				E		B22-7
	- brown, with fine to medium grained sand	6.0			3.5	
					3.7	
				E		B22-8
4					4.0	
	End of Bore at 4 m					
		5.0				
5						

U	Undisturbed Tube Sample (50mm dia)	S	Standard Penetration Test (SPT)	E	Environmental Sample
D	Disturbed Sample	HB	SPT Hammer Bouncing	Up	Pushtube Sample
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)		

Is(50) Point Load Test Result (MPa)
(d) Diametral Test
(a) Axial Test
(i) Lump Test

Rig: Jacro 350
Logged by: NA
Drilling Method: Auger
Groundwater: Free groundwater encountered at 2.1m during drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

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Location: Former Oxley Secondary College, Blackheath Road, Oxley
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BORE 23

Page No: 1 of 1
Date: 27 September 2018
Ground Surface Level: RL9.2m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
0		9.2			0.0	
	FILL - brown, sandy silt, fine to medium grained			E		B23-1
					0.4	
	- brown, silty clay (Cl), trace of fine to coarse grained sand				0.7	B23-2
1				E	1.0	
		8.0			1.2	B23-3
				E		
					1.5	
	- brown and dark grey mottled				1.7	B23-4
2				E	2.0	
	SILTY CLAY (CH) - brown and pale grey mottled	7.0			2.2	B23-5
				E		
					2.5	
					2.7	B23-6
3				E	3.0	
		6.0			3.3	B23-7
				E		
					3.5	
					3.7	B23-8
4				E	4.0	
	End of Bore at 4 m					
		5.0				
5						

U	Undisturbed Tube Sample (50mm dia)	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
D	Disturbed Sample	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Hydrapower Scout
Logged by: NA
Drilling Method: Auger
Groundwater: Free groundwater encountered at 3.9m during drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

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BORE 24

Page No: 1 of 1
Date: 27 September 2018
Ground Surface Level: RL9.0m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results
0		9.0				
	FILL				0.0	
	- brown, sandy silt, fine to medium grained			E		B24-1
					0.4	
	- brown, silty clay, trace of fine to coarse grained sand				0.7	
				E		B24-2
1		8.0			1.0	
					1.2	
				E		B24-3
	- brown with orange mottle				1.5	
					1.7	
				E		B24-4
2		7.0			2.0	
	SILTY CLAY (CH)				2.2	
	- dark grey, with some fine to coarse grained sand			E		B24-5
					2.5	
	- with some fine subangular gravel				2.7	
				E		B24-6
3		6.0			3.0	
	- grey-brown and orange mottled				3.2	
				E		B24-7
					3.5	
					3.7	
				E		B24-8
4		5.0			4.0	
	End of Bore at 4 m					
5		4.0				

U	Undisturbed Tube Sample (50mm dia)	S	Standard Penetration Test (SPT)	E	Environmental Sample	Is(50)	Point Load Test Result (MPa)
D	Disturbed Sample	HB	SPT Hammer Bouncing	Up	Pushtube Sample	(d)	Diametral Test
B	Bulk Sample	( )	No Sample Recovery	C	NMLC Coring	(a)	Axial Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)			(i)	Lump Test

Rig: Hydrapower Scout
Logged by: NA
Drilling Method: Auger
Groundwater: Free groundwater encountered at 2.1m during drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

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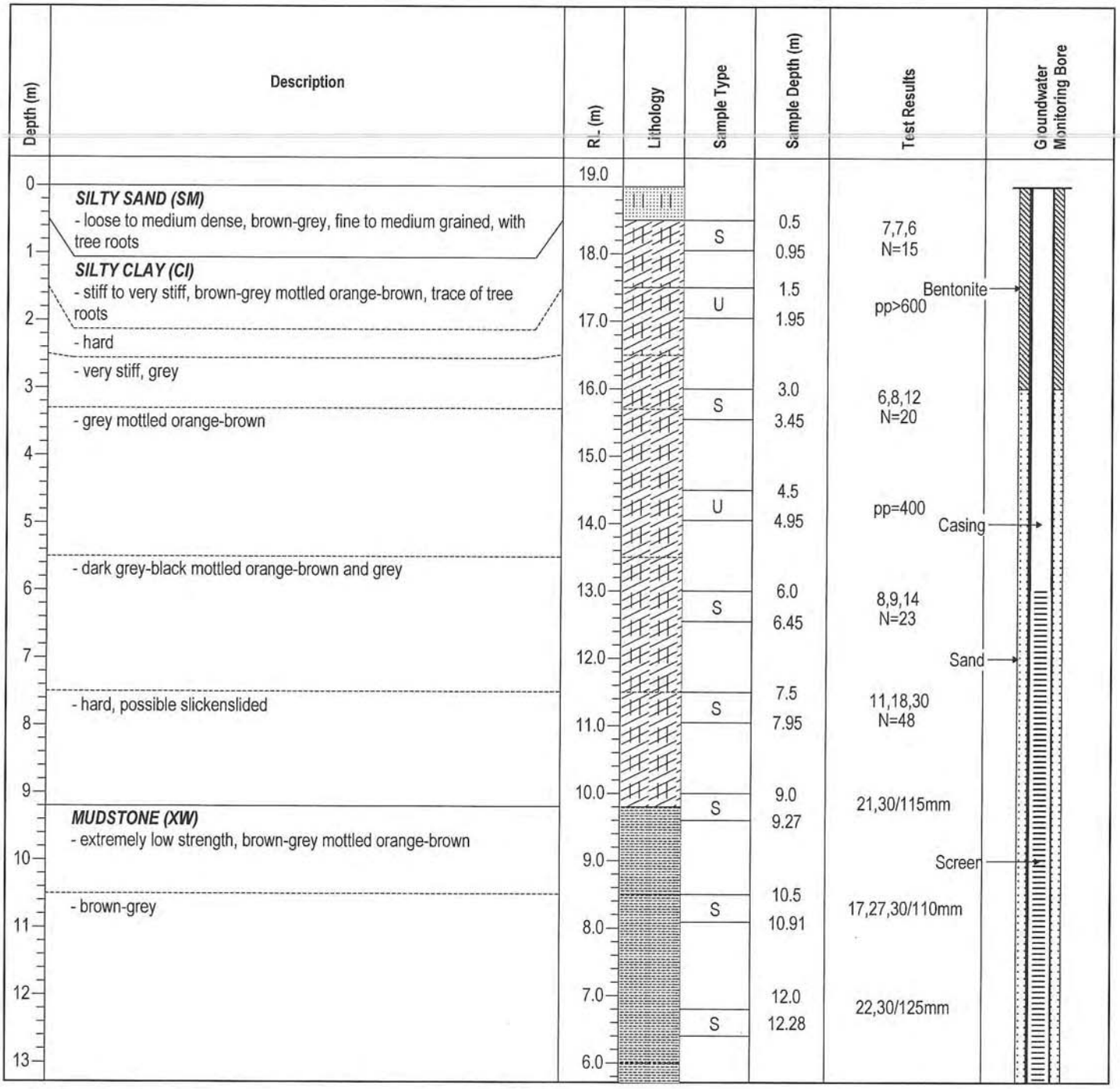
BORE 25

Page No: 1 of 2
Date: 23 January 2019
Ground Surface Level: RL19.0m*



D	Disturbed Sample	S	Standard Penetrometer Test (SPT)	C	NMLC Coring
B	Bulk Sample	HB	SPT Hammer Bouncing	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	( )	No Sample Recovery	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)	(a)	Axial Point Load Strength Test

Rig: Hydrapower Scout
Logged by: FL
Drilling Method: Auger to 3m, then washbore
Groundwater: No free groundwater encountered during auger drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

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Location: Former Oxley Secondary College, Blackheath Road, Oxley
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BORE 25

Page No: 2 of 2
Date: 23 January 2019
Ground Surface Level: RL19.0m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results	Groundwater Monitoring Bore
14	***MUDSTONE (XW)*** - extremely low to very low strength, brown-grey	5.0		(S)	13.5 13.58	30/80mm	
15		4.0		(S)	15.0 15.08	30/80mm	
	End of Bore at 15.08 m						
16		3.0					
17		2.0					
18		1.0					
19		0.0					
20		-1.0					
21		-2.0					
22		-3.0					
23		-4.0					
24		-5.0					
25		-6.0					
26		-7.0					

D Disturbed Sample	**S** Standard Penetrometer Test (SPT)	**C** NMLC Coring
B Bulk Sample	**HB** SPT Hammer Bouncing	**Is(50)** Point Load Test Result (MPa)
U Undisturbed Tube (50mm diameter)	**( )** No Sample Recovery	**(d)** Diametral Point Load Strength Test
pp Pocket Penetrometer Test (kPa)	**V** Vane Shear Strength, Uncorrected (kPa)	**(a)** Axial Point Load Strength Test

Rig: Hydrapower Scout
Logged by: FL
Drilling Method: Auger to 3m, then washbore
Groundwater: No free groundwater encountered during auger drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

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Location: Former Oxley Secondary College, Blackheath Road, Oxley
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BORE 26

Page No: 1 of 2
Date: 24 January 2019
Ground Surface Level: RL20.5m*

Depth (m)	Description	RL (m)	Sample Type	Sample Depth (m)	Test Results	Groundwater Monitoring Bore
0		20.5				
	SILTY SAND (SM) - loose to medium dense, grey-brown, fine to medium grained, with tree roots		S	0.5	4,3,5 N=8	
1				0.95		
	SILTY CLAY (CH) - firm to stiff, grey-brown mottled orange-brown, with tree roots	19.0	U	1.5	pp=200	Bentonite
2	- stiff			1.95		
	- grey	18.0				
3			S	3.0	3,6,8 N=14	
		17.0		3.45		
4						
	- hard, grey mottled orange-brown	16.0	U	4.5	pp>600	
5				4.95		Casing
		15.0				
6	- very stiff, grey mottled dark brown and orange, slickensided		S	6.0	6,8,11 N=19	
		14.0		6.45		
7						Sand
	- dark grey	13.0	U	7.5	pp>500	
8				7.95		
		12.0				
9	***MUDSTONE (XW)*** - extremely low strength, brown-grey mottled orange-brown		S	9.0	19,30,30/105mm	
		11.0		9.41		
10						Screen
		10.0	S	10.5	29,30/120mm	
11				10.77		
		9.0				
12	***SILTY CLAY (CH)*** - hard, brown-grey mottled black		S	12.0	12,22,29 N=52	
		8.0		12.45		
13						

D Disturbed Sample
B Bulk Sample
U Undisturbed Tube (50mm diameter)
pp Pocket Penetrometer Test (kPa)
S Standard Penetrometer Test (SPT)
HB SPT Hammer Bouncing
( ) No Sample Recovery
V Vane Shear Strength, Uncorrected (kPa)
C NMLC Coring
Is(50) Point Load Test Result (MPa)
(d) Diametral Point Load Strength Test
(a) Axial Point Load Strength Test

Rig: Hydrapower Scout
Logged by: FL
Drilling Method: Auger to 3m, then washbore
Groundwater: No free groundwater encountered during auger drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

BORE REPORT

Butler Partners
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Client: Economic Development Queensland
Project: Proposed Retirement Village and Child Care Developments
Location: Former Oxley Secondary College, Blackheath Road, Oxley
Project No: 018-118B

BORE 26

Page No: 2 of 2
Date: 24 January 2019
Ground Surface Level: RL20.5m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results	Groundwater Monitoring Bore
14	***MUDSTONE (XW)*** - extremely low strength, brown-grey	7.0		S	13.5 13.79	17,30/140mm	
15		6.0		S	15.0 15.42	14,22,30/120mm	
16	End of Bore at 15.42 m	5.0					
17		4.0					
18		3.0					
19		2.0					
20		1.0					
21		0.0					
22		-1.0					
23		-2.0					
24		-3.0					
25		-4.0					
26		-5.0					

D	Disturbed Sample	S	Standard Penetrometer Test (SPT)	C	NMLC Coring
B	Bulk Sample	HB	SPT Hammer Bouncing	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	( )	No Sample Recovery	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)	(a)	Axial Point Load Strength Test

Rig: Hydrapower Scout
Logged by: FL
Drilling Method: Auger to 3m, then washbore
Groundwater: No free groundwater encountered during auger drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

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Client: Economic Development Queensland

Project: Proposed Retirement Village and Child Care Developments

Location: Former Oxley Secondary College, Blackheath Road, Oxley

Project No: 018-118B

BORE 27

Page No: 1 of 2

Date: 25 January 2019

Ground Surface Level: RL26.5m*

Depth (m)	Description	RL (m)	Sample Type	Sample Depth (m)	Test Results	Groundwater Monitoring Bore
0		26.5				
	FILL - brown, silty sand, with organics and brick fragments		S	0.5	4,5,5 N=10	
1				0.95		
	SILTY CLAY (CH) - stiff, dark brown-grey mottled black and orange-brown, with fine to medium grained sand, with tree roots	25.0	S	1.5	3,4,6 N=10	Bentonite
2	***SANDY CLAY (CH)*** - stiff, brown-grey mottled orange and black, fine to medium grained sand			1.95		
		24.0				
3	- firm to stiff, grey mottled orange-brown		U	3.0	pp=150	
		23.0		3.45		
4	***SILTY CLAY (CH)*** - very stiff, grey mottled orange, tree roots	22.0	S	4.5	3,7,10 N=17	
5				4.95		Casing
		21.0				
6	- hard, grey		U	6.0	pp>600	
		20.0		6.45		
7						Sand
	SANDSTONE (XW) - extremely low strength, pale brown-orange	19.0	S	7.5	30/120mm	
8				7.62		
		18.0				
9	- pale grey		S	9.0	30/100mm	
		17.0		9.1		
10						Screen
	- very low strength, pale brown-orange	16.0	S	10.5	30/75mm	
11				10.58		
	SILTY CLAY (CH) - hard, grey, with slickensides	15.0				
12			S	12.0	16,22,29 N=51	
	- dark grey-black	14.0		12.45		
13						

D	Disturbed Sample	S	Standard Penetrometer Test (SPT)	C	NMLC Coring
B	Bulk Sample	HB	SPT Hammer Bouncing	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	( )	No Sample Recovery	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)	(a)	Axial Point Load Strength Test

Rig: Hydrapower Scout

Logged by: FL

Drilling Method: Auger to 3m, then washbore

Groundwater: No free groundwater encountered during auger drilling

Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

BORE REPORT

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Client: Economic Development Queensland
Project: Proposed Retirement Village and Child Care Developments
Location: Former Oxley Secondary College, Blackheath Road, Oxley
Project No: 018-118B

BORE 27

Page No: 2 of 2
Date: 25 January 2019
Ground Surface Level: RL26.5m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results	Groundwater Monitoring Bore
14	***MUDSTONE (XW)*** - extremely low strength, grey mottled pale grey	13.0		S	13.5 13.79	18,30/135mm	
15		12.0		S	15.0 15.42	17,25,30/120mm	
16	End of Bore at 15.42 m	11.0					
17		10.0					
18		9.0					
19		8.0					
20		7.0					
21		6.0					
22		5.0					
23		4.0					
24		3.0					
25		2.0					
26		1.0					

D	Disturbed Sample	S	Standard Penetrometer Test (SPT)	C	NMLC Coring
B	Bulk Sample	HB	SPT Hammer Bouncing	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	( )	No Sample Recovery	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)	(a)	Axial Point Load Strength Test

Rig: Hydrapower Scout
Logged by: FL
Drilling Method: Auger to 3m, then washbore
Groundwater: No free groundwater encountered during auger drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

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Client: Economic Development Queensland

Project: Proposed Retirement Village and Child Care Developments

Location: Former Oxley Secondary College, Blackheath Road, Oxley

Project No: 018-118B

BORE 28

Page No: 1 of 2

Date: 25 January 2019

Ground Surface Level: RL25.0m*

Depth (m)	Description	RL (m)	Sample Type	Sample Depth (m)	Test Results	Groundwater Monitoring Bore
0		25.0				
	FILL					
	- brown, fine to medium grained, with tree roots (topsoil)		S	0.5	6,8,9	
1	- brown-grey mottled orange-brown and black, sandy clay, fine to medium grained sand, with tree roots	24.0	S	0.95	N=17	
	SILTY CLAY (CH)			1.5		Bentonite
2	- stiff, brown-grey mottled black	23.0	S	1.95	4,5,5 N=10	
	- hard, dark grey					
3		22.0	U	3.0		
				3.45	pp>600	
4		21.0				
	- grey (residual mudstone)			4.5		
5		20.0	S	4.95	12,25,30/130mm	Casing
6	- grey mottled pale grey and black	19.0	S	6.0	13,22,29	
				6.45	N=51	
7		18.0				Sand
				7.5		
8	***MUDSTONE (XW)***	17.0	S	7.77	17,30/115mm	
	- extremely low strength, orange-brown with iron staining					
9	- grey mottled orange-brown	16.0	S	9.0	16,25,30/135mm	
	- grey mottled pale grey			9.44		
10		15.0				Screen
				10.5		
11	***SILTY CLAY (CH)***	14.0	S	10.95	14,21,30	
	- hard, grey mottled pale grey and pale brown (residual mudstone)				N=51	
12	***MUDSTONE (XW)***	13.0	S	12.0	16,27,30/110mm	
	- extremely low strength, grey			12.41		
13		12.0				

D	Disturbed Sample	S	Standard Penetrometer Test (SPT)	C	NMLC Coring
B	Bulk Sample	HB	SPT Hammer Bouncing	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	( )	No Sample Recovery	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)	(a)	Axial Point Load Strength Test

Rig: Hydrapower Scout

Logged by: FL

Drilling Method: Auger to 3m, then washbore

Groundwater: No free groundwater encountered during auger drilling

Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

BORE REPORT

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Client: Economic Development Queensland
Project: Proposed Retirement Village and Child Care Developments
Location: Former Oxley Secondary College, Blackheath Road, Oxley
Project No: 018-118B

BORE 28

Page No: 2 of 2
Date: 25 January 2019
Ground Surface Level: RL25.0m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results	Groundwater Monitoring Bore
14	***MUDSTONE (XW)*** - extremely low strength, grey	11.0		S	13.5 13.79	20,30/140mm	
15		10.0		S	15.0 15.25	22,30/100mm	
	End of Bore at 15.25 m						
16		9.0					
17		8.0					
18		7.0					
19		6.0					
20		5.0					
21		4.0					
22		3.0					
23		2.0					
24		1.0					
25		0.0					
26		-1.0					

D Disturbed Sample
B Bulk Sample
U Undisturbed Tube (50mm diameter)
pp Pocket Penetrometer Test (kPa)

S Standard Penetrometer Test (SPT)
HB SPT Hammer Bouncing
( ) No Sample Recovery
V Vane Shear Strength, Uncorrected (kPa)

C NMLC Coring
Is(50) Point Load Test Result (MPa)
(d) Diametral Point Load Strength Test
(a) Axial Point Load Strength Test

Rig: Hydrapower Scout
Logged by: FL
Drilling Method: Auger to 3m, then washbore
Groundwater: No free groundwater encountered during auger drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

BORE REPORT

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Client: Economic Development Queensland

Project: Proposed Retirement Village and Child Care Developments

Location: Former Oxley Secondary College, Blackheath Road, Oxley

Project No: 018-118B

BORE 29

Page No: 1 of 2

Date: 7 March 2019

Ground Surface Level: RL13.5m*

Depth (m)	Description	RL (m)	Sample Type	Sample Depth (m)	Test Results	Groundwater Monitoring Bore
0		13.5				
	BITUMINOUS CONCRETE - 200mm thick		S	0.5	3,4,6	
1	***FILL*** - pale grey, silty gravelly sand, pale brown (roadbase)			0.95	N=10	
	- brown, grey, sandy clay with gravel	12.0	U	1.5		Bentonite
2	***SILTY CLAY (CH)*** - stiff, brown mottled orange-brown			1.95	pp>600	
	- hard	11.0				
3			U	3.0	pp>600	
		10.0		3.45		
4						
	- very stiff, trace of iron staining	9.0	S	4.5	8,9,11	
5				4.95	N=20	Casing
		8.0				
6	- stiff to very stiff, grey-brown, with slickensides		S	6.0	5,7,8	
		7.0		6.45	N=15	
7						Sand
	- very stiff, mottled black, with sandy clay bands	6.0	S	7.5	5,8,12	
8				7.95	N=20	
		5.0				
9			U	9.0	pp=550	
		4.0		9.45		
10						Screen
		3.0	S	10.5	8,12,15	
11				10.95	N=27	
		2.0				
12	***SILTSTONE (XW)*** - extremely low strength, brown-grey, with thin coal seams		S	12.0	11,17,30/125mm	
		1.0		12.43		
13						

D	Disturbed Sample	S	Standard Penetrometer Test (SPT)	C	NMLC Coring
B	Bulk Sample	HB	SPT Hammer Bouncing	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	( )	No Sample Recovery	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)	(a)	Axial Point Load Strength Test

Rig: Hydrapower Scout

Logged by: FL

Drilling Method: Auger to 3m, then washbore

Groundwater: No free groundwater encountered during auger drilling

Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

BORE REPORT

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Client: Economic Development Queensland
Project: Proposed Retirement Village and Child Care Developments
Location: Former Oxley Secondary College, Blackheath Road, Oxley
Project No: 018-118B

BORE 29

Page No: 2 of 2
Date: 7 March 2019
Ground Surface Level: RL13.5m*

Depth (m)	Description	RL (m)	Lithology	Sample Type	Sample Depth (m)	Test Results	Groundwater Monitoring Bore
14	***SILTSTONE (XW)***	0.0					
	- extremely low strength, brown-grey, with thin coal seams			S	13.5	27,30/95mm	
	- with interbedded sandstone bands				13.75		
15		-1.0		S	15.0	23,30/85mm	
	End of Bore at 15.24 m	-2.0			15.24		
16		-3.0					
17		-4.0					
18		-5.0					
19		-6.0					
20		-7.0					
21		-8.0					
22		-9.0					
23		-10.0					
24		-11.0					
25		-12.0					
26							

D	Disturbed Sample	S	Standard Penetrometer Test (SPT)	C	NMLC Coring
B	Bulk Sample	HB	SPT Hammer Bouncing	Is(50)	Point Load Test Result (MPa)
U	Undisturbed Tube (50mm diameter)	( )	No Sample Recovery	(d)	Diametral Point Load Strength Test
pp	Pocket Penetrometer Test (kPa)	V	Vane Shear Strength, Uncorrected (kPa)	(a)	Axial Point Load Strength Test

Rig: Hydrapower Scout
Logged by: FL
Drilling Method: Auger to 3m, then washbore
Groundwater: No free groundwater encountered during auger drilling
Remarks: *Approximate ground surface level estimated from a contour plan supplied by Economic Development Queensland

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APPENDIX C

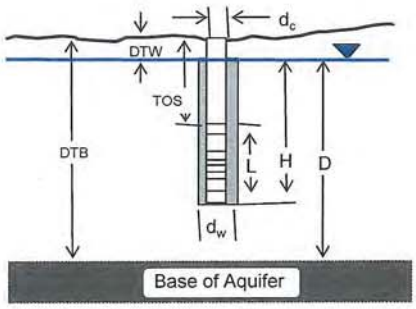
HYDRAULIC TESTING PROCESSING SHEETS

WELL ID: 21

Local ID: Oxley
Date: 31/07/2020
Time: 0:06

INPUT

Construction:		
Casing dia. (d_c)	0.05	Meter
Annulus dia. (d_w)	0.1	Meter
Screen Length (L)	6	Meter
Depths to:		
water level (DTW)	10	Meter
top of screen (TOS)	6	Meter
Base of Aquifer (DTB)	12	Meter
Annular Fill:		
across screen --	Coarse Sand	
above screen --	Bentonite	
Aquifer Material --	Silty Clay	



COMPUTED

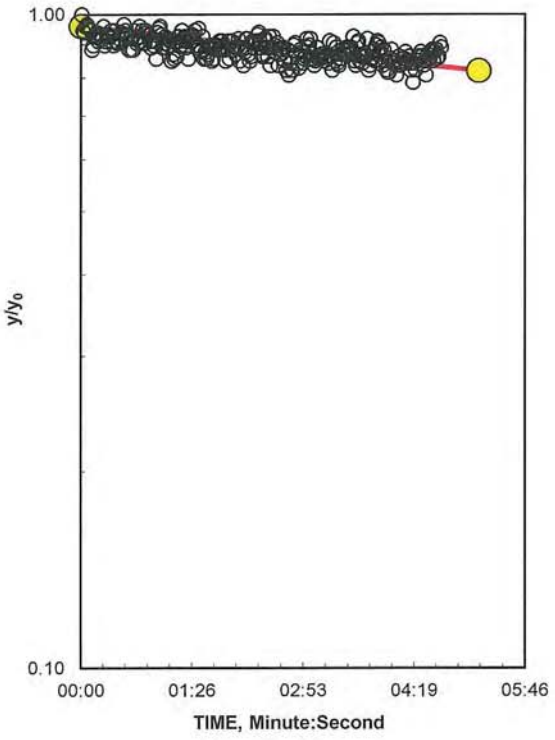
L_{wetted}	2	Meter
D =	2	Meter
H =	2	Meter
L/r_w =	40.00	
$y_{0\text{-DISPLACEMENT}}$ =	0.15	Meter
$y_{0\text{-SLUG}}$ =	0.15	Meter

From look-up table using L/r_w

Fully penetrate C =	2.451	
ln(Re/rw) =	2.782	
Re =	2.65	Meter
Slope =	0.000221	$\log_{10}$/sec
$t_{90\%}$ recovery =	4528	sec

Input is consistent.

K = 0.0191 Meter/Day



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

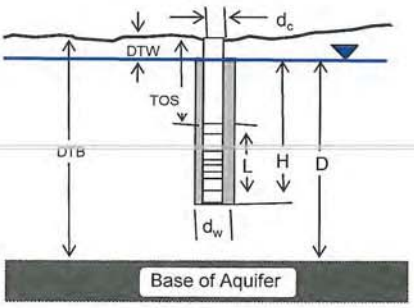
PROJECT NO: 018-118B
PROJECT SITE: Blackheath Road, Oxley
CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

WELL ID: 25

Local ID: Oxley
Date: 31/07/2020
Time: 0:23

INPUT

Construction:	
Casing dia. (d_c)	0.05 Meter
Annulus dia. (d_w)	0.1 Meter
Screen Length (L)	9 Meter
Depths to:	
water level (DTW)	12.5 Meter
top of screen (TOS)	6 Meter
Base of Aquifer (DTB)	15 Meter
Annular Fill:	
across screen --	Coarse Sand
above screen --	Bentonite
Aquifer Material --	Mudstone



COMPUTED

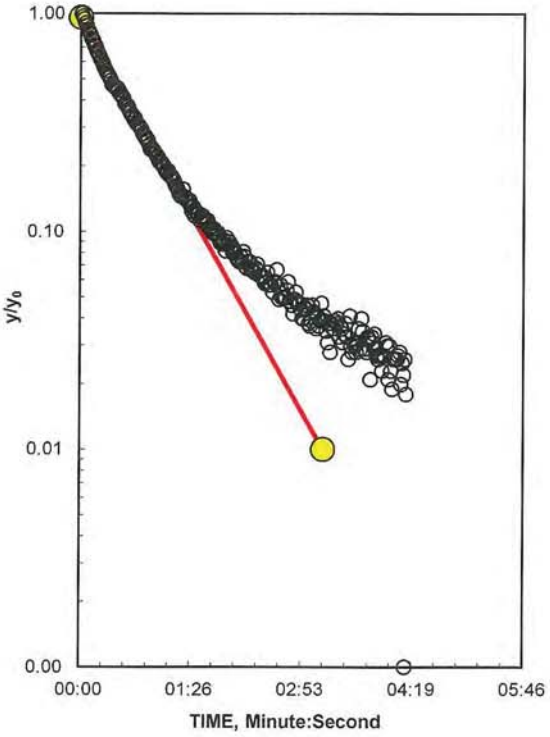
L_{wetted}	2.5 Meter
D =	2.5 Meter
H =	2.5 Meter
L/r_w =	50.00
$y_{0\text{-DISPLACEMENT}}$ =	1.01 Meter
$y_{0\text{-SLUG}}$ =	0.98 Meter

From look-up table using L/r_w

Fully penetrate C =	2.754
ln(Re/rw) =	2.974
Re =	3.21 Meter
Slope =	0.010433 $\log_{10}$/sec
$t_{90\%}$ recovery =	96 sec

Input is consistent.

K = 0.771 Meter/Day



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

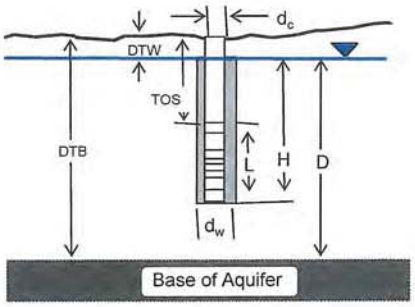
PROJECT NO: 018-118B
PROJECT SITE: Blackheath Road, Oxley
CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

WELL ID: Bore 25

Local ID: Oxley
Date: 16/08/2019
Time: 0:28

INPUT

Construction:		
Casing dia. (d_c)	0.05	Meter
Annulus dia. (d_w)	0.1	Meter
Screen Length (L)	2	Meter
Depths to:		
water level (DTW)	13	Meter
top of screen (TOS)	13	Meter
Base of Aquifer (DTB)	15	Meter
Annular Fill:		
across screen --	Coarse Sand	
above screen --	Bentonite	
Aquifer Material --	Mudstone	



COMPUTED

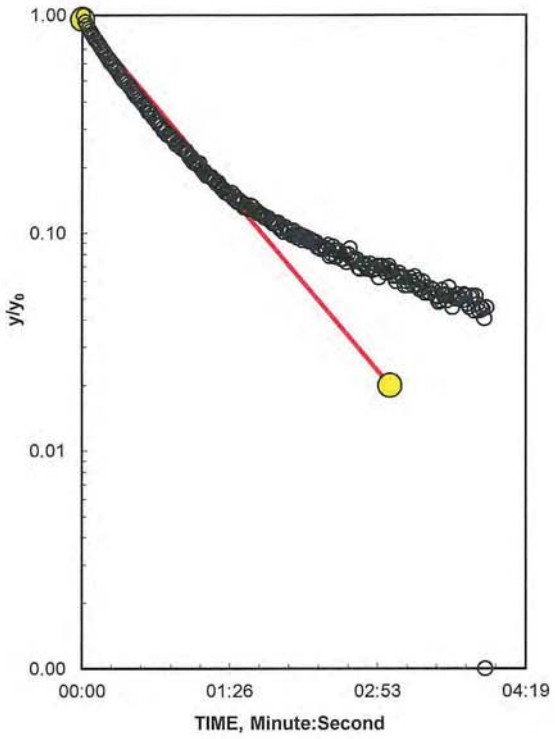
L_{wetted}	2	Meter
D =	2	Meter
H =	2	Meter
L/r_w =	40.00	
$y_{0\text{-DISPLACEMENT}}$ =	1.19	Meter
$y_{0\text{-SLUG}}$ =	0.98	Meter

From look-up table using L/r_w

Fully penetrate C =	2.451	
ln(Re/rw) =	2.782	
Re =	2.65	Meter
Slope =	0.00934	$\log_{10}$/sec
$t_{90\%}$ recovery =	107	sec

Input is consistent.

K = 0.807 Meter/Day



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

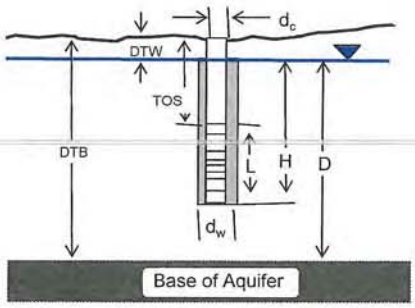
PROJECT NO: 018-118C
PROJECT SITE: Blackheath Road, Oxley
CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

WELL ID: 26

Local ID: Oxley
Date: 31/07/2020
Time: 0:07

INPUT

Construction:	
Casing dia. (d_c)	0.05 Meter
Annulus dia. (d_w)	0.1 Meter
Screen Length (L)	9 Meter
Depths to:	
water level (DTW)	13.6 Meter
top of screen (TOS)	6 Meter
Base of Aquifer (DTB)	15 Meter
Annular Fill:	
across screen --	Coarse Sand
above screen --	Bentonite
Aquifer Material --	Mudstone



COMPUTED

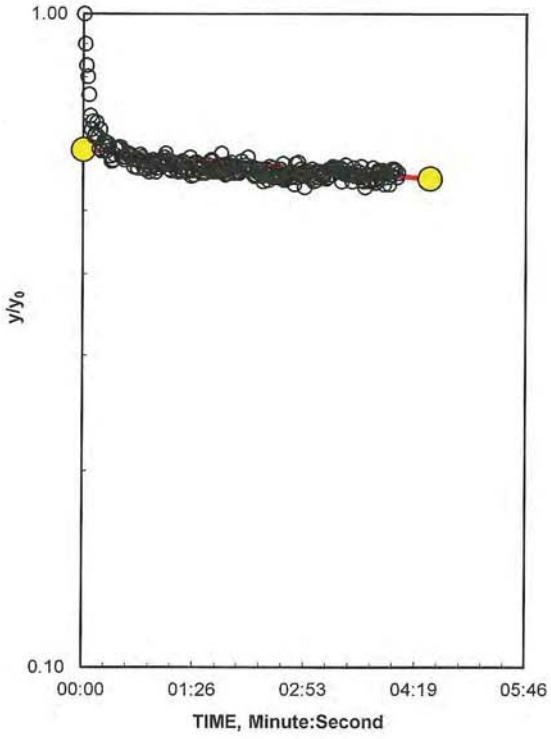
L_{wetted}	1.4 Meter
D =	1.4 Meter
H =	1.4 Meter
L/r_w =	28.00
$y_{0\text{-DISPLACEMENT}}$ =	0.37 Meter
$y_{0\text{-SLUG}}$ =	0.34 Meter

From look-up table using L/r_w

Fully penetrate C =	2.003
ln(Re/rw) =	2.490
Re =	1.98 Meter
Slope =	0.000164 $\log_{10}$/sec
$t_{90\%}$ recovery =	6108 sec

Input is consistent.

K = 0.0181 Meter/Day



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

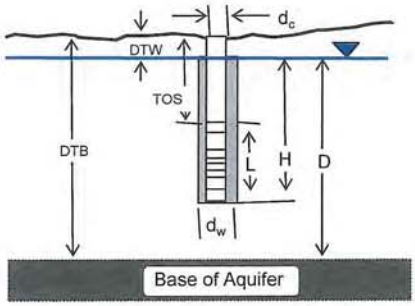
PROJECT NO: 018-118B
PROJECT SITE: Blackheath Road, Oxley
CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

WELL ID: 27

Local ID: Oxley
Date: 31/07/2020
Time: 0:07

INPUT

Construction:		
Casing dia. (d_c)	0.05	Meter
Annulus dia. (d_w)	0.1	Meter
Screen Length (L)	9	Meter
Depths to:		
water level (DTW)	0	Meter
top of screen (TOS)	6	Meter
Base of Aquifer (DTB)	15	Meter
Annular Fill:		
across screen -- Coarse Sand		
above screen -- Bentonite		
Aquifer Material -- Mudstone		



COMPUTED

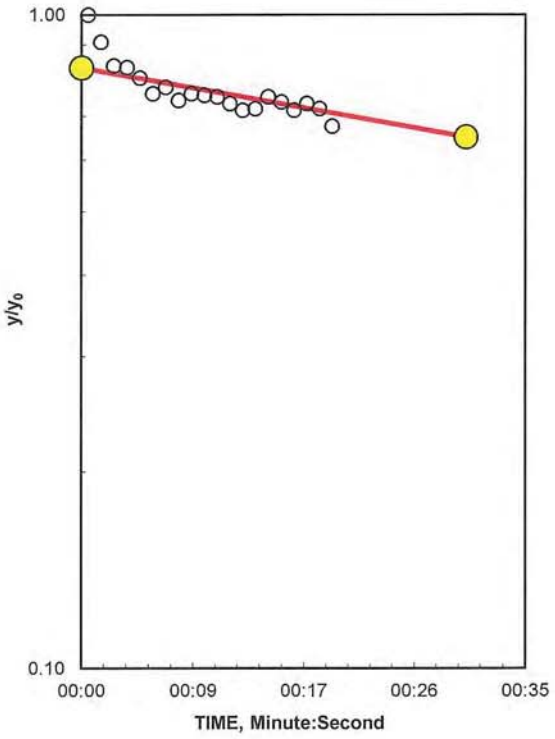
L_{wetted}	9	Meter
D =	15	Meter
H =	15	Meter
L/r_w =	180.00	
$y_{0\text{-DISPLACEMENT}}$ =	0.23	Meter
$y_{0\text{-SLUG}}$ =	0.25	Meter

From look-up table using L/r_w

Fully penetrate C =	6.593	
ln(Re/rw) =	4.358	
Re =	12.82	Meter
Slope =	0.003539	$\log_{10}$/sec
$t_{90\%}$ recovery =	283	sec

Input is consistent.

K = 0.106 Meter/Day



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

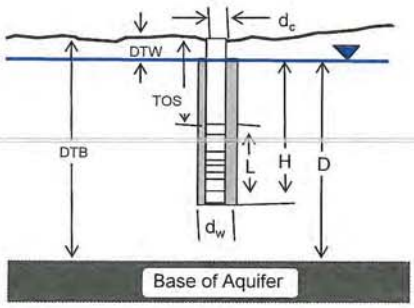
PROJECT NO: 018-118B
PROJECT SITE: Blackheath Road, Oxley
CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

WELL ID: 28

Local ID: Oxley
Date: 31/07/2020
Time: 0:05

INPUT

Construction:	
Casing dia. (d_c)	0.05 Meter
Annulus dia. (d_w)	0.1 Meter
Screen Length (L)	9 Meter
Depths to:	
water level (DTW)	0 Meter
top of screen (TOS)	6 Meter
Base of Aquifer (DTB)	15 Meter
Annular Fill:	
across screen -- Coarse Sand	
above screen -- Bentonite	
Aquifer Material -- Mudstone	



COMPUTED

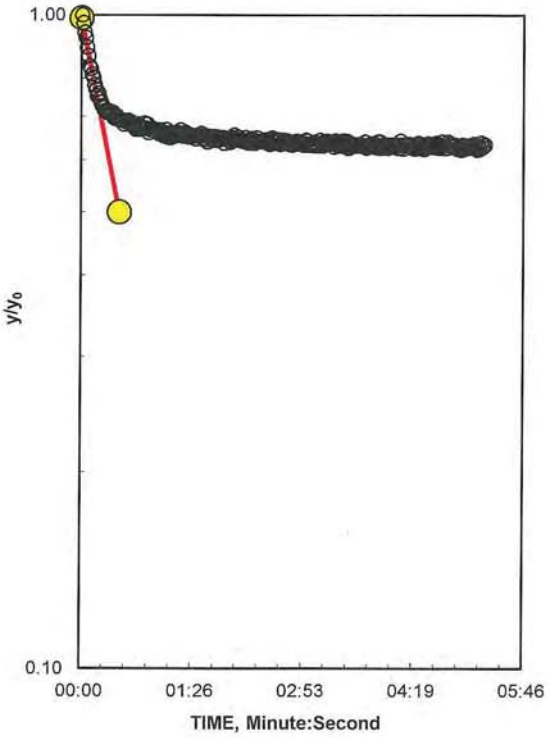
L_{wetted}	9 Meter
D =	15 Meter
H =	15 Meter
L/r_w =	180.00
$y_{0\text{-DISPLACEMENT}}$ =	0.93 Meter
$y_{0\text{-SLUG}}$ =	0.98 Meter

From look-up table using L/r_w

Fully penetrate C =	6.593
ln(Re/rw) =	4.358
Re =	12.82 Meter
Slope =	0.009889 $\log_{10}$/sec
$t_{90\%}$ recovery =	101 sec

Input is consistent.

K = 0.297 Meter/Day



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

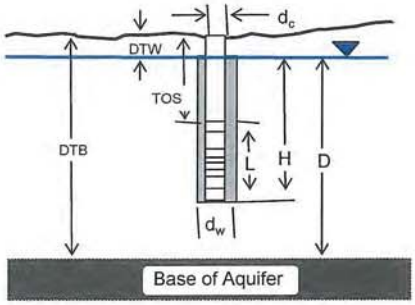
PROJECT NO: 018-118B
PROJECT SITE: Blackheath Road, Oxley
CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

WELL ID: 28

Local ID: Oxley
Date: 31/07/2020
Time: 0:05

INPUT

Construction:		
Casing dia. (d_c)	0.05	Meter
Annulus dia. (d_w)	0.1	Meter
Screen Length (L)	9	Meter
Depths to:		
water level (DTW)	0	Meter
top of screen (TOS)	6	Meter
Base of Aquifer (DTB)	15	Meter
Annular Fill:		
across screen --	Coarse Sand	
above screen --	Bentonite	
Aquifer Material --	Mudstone	



COMPUTED

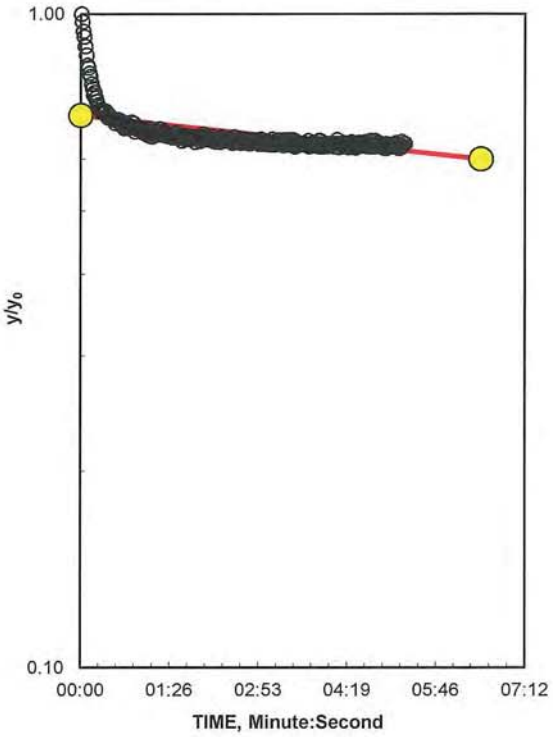
L_{wetted}	9	Meter
D =	15	Meter
H =	15	Meter
L/r_w =	180.00	
$y_{0\text{-DISPLACEMENT}}$ =	0.93	Meter
$y_{0\text{-SLUG}}$ =	0.98	Meter

From look-up table using L/r_w

Fully penetrate C =	6.593	
ln(Re/rw) =	4.358	
Re =	12.82	Meter
Slope =	0.000172	$\log_{10}$/sec
$t_{90\%}$ recovery =	5826	sec

Input is consistent.

K = 0.00516 Meter/Day



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

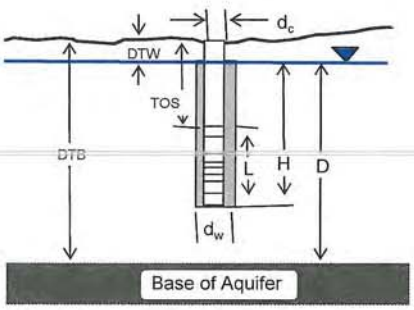
PROJECT NO: 018-118B
PROJECT SITE: Blackheath Road, Oxley
CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

WELL ID: Bore 29

Local ID: Oxley
Date: 16/08/2019
Time: 1:16

INPUT

Construction:	
Casing dia. (d_c)	0.05 Meter
Annulus dia. (d_w)	0.1 Meter
Screen Length (L)	2 Meter
Depths to:	
water level (DTW)	13 Meter
top of screen (TOS)	13 Meter
Base of Aquifer (DTB)	15 Meter
Annular Fill:	
across screen --	Coarse Sand
above screen --	Bentonite
Aquifer Material --	Siltstone



COMPUTED

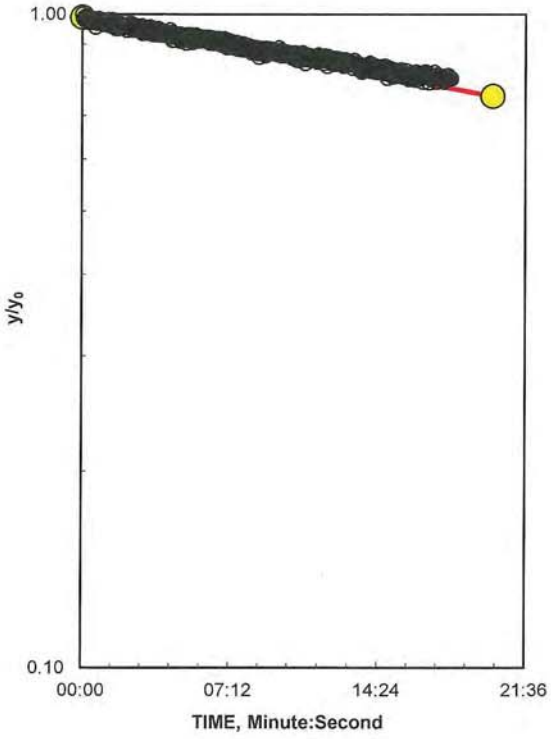
L_{wetted}	2 Meter
D =	2 Meter
H =	2 Meter
L/r_w =	40.00
$y_{0\text{-DISPLACEMENT}}$ =	0.56 Meter
$y_{0\text{-SLUG}}$ =	0.65 Meter

From look-up table using L/r_w

Fully penetrate C =	2.451
ln(Re/rw) =	2.782
Re =	2.65 Meter
Slope =	0.0001 $\log_{10}$/sec
$t_{90\%}$ recovery =	9952 sec

Input is consistent.

K = 0.00868 Meter/Day



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

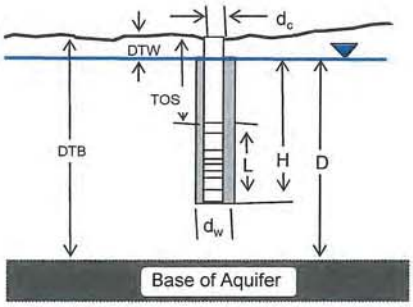
PROJECT NO: 018-118C
PROJECT SITE: Blackheath Road, Oxley
CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

WELL ID: Bore 29

Local ID: Oxley
Date: 16/08/2019
Time: 0:28

INPUT

Construction:		
Casing dia. (d_c)	0.05	Meter
Annulus dia. (d_w)	0.1	Meter
Screen Length (L)	2	Meter
Depths to:		
water level (DTW)	13	Meter
top of screen (TOS)	13	Meter
Base of Aquifer (DTB)	15	Meter
Annular Fill:		
across screen -- Coarse Sand		
above screen -- Bentonite		
Aquifer Material -- Siltstone		



COMPUTED

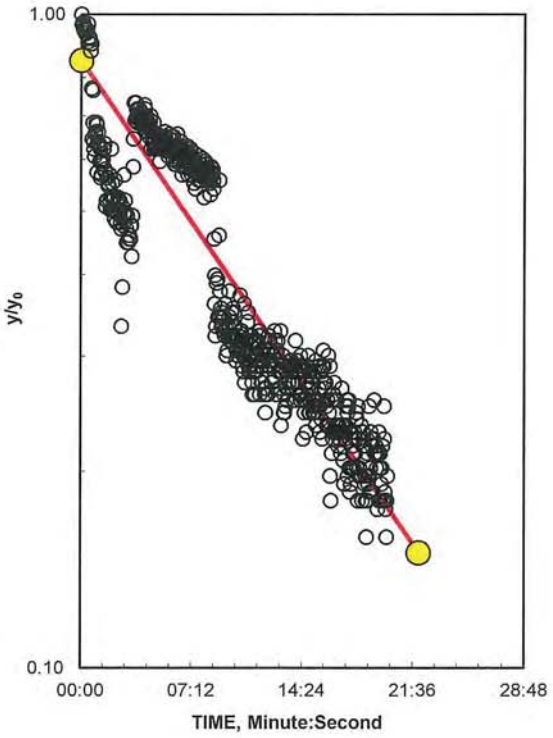
L_{wetted}	2	Meter
D =	2	Meter
H =	2	Meter
L/r_w =	40.00	
$y_{0\text{-DISPLACEMENT}}$ =	0.18	Meter
$y_{0\text{-SLUG}}$ =	0.17	Meter

From look-up table using L/r_w

Fully penetrate C =	2.451	
ln(Re/rw) =	2.782	
Re =	2.65	Meter
Slope =	0.000571	$\log_{10}$/sec
$t_{90\%}$ recovery =	1752	sec

Input is consistent.

K = 0.0493 Meter/Day



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

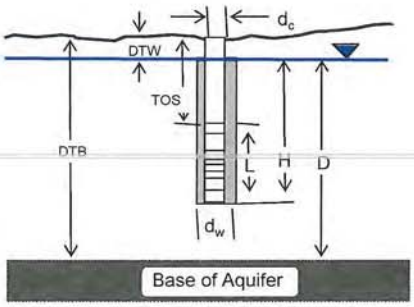
PROJECT NO: 018-118C
PROJECT SITE: Blackheath Road, Oxley
CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

WELL ID: 100

Local ID: Oxley
Date: 31/07/2020
Time: 0:02

INPUT

Construction:	
Casing dia. (d_c)	0.05 Meter
Annulus dia. (d_w)	0.1 Meter
Screen Length (L)	12.5 Meter
Depths to:	
water level (DTW)	9 Meter
top of screen (TOS)	7.5 Meter
Base of Aquifer (DTB)	20 Meter
Annular Fill:	
across screen --	Coarse Sand
above screen --	Bentonite
Aquifer Material --	Sandstone-Tertiary



COMPUTED

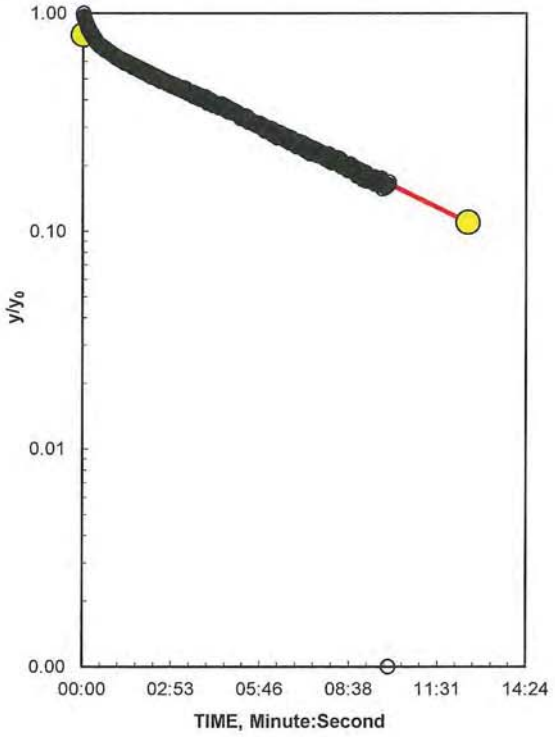
L_{wetted}	11 Meter
D =	11 Meter
H =	11 Meter
L/r_w =	220.00
$y_{0\text{-DISPLACEMENT}}$ =	0.89 Meter
$y_{0\text{-SLUG}}$ =	0.98 Meter

From look-up table using L/r_w

Fully penetrate C =	7.475
ln(Re/rw) =	4.203
Re =	10.98 Meter
Slope =	0.001149 $\log_{10}$/sec
$t_{90\%}$ recovery =	870 sec

Input is consistent.

K = 0.0273 Meter/Day



REMARKS: Bouwer and Rice analysis of slug test, WRR 1976

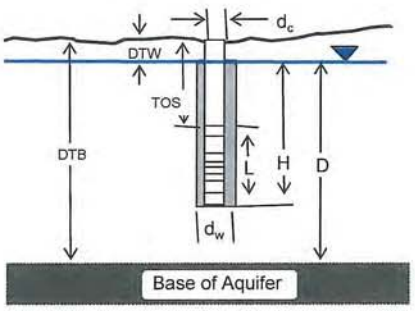
PROJECT NO: 018-118B
PROJECT SITE: Blackheath Road, Oxley
CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

WELL ID: 101

Local ID: Oxley
Date: 31/07/2020
Time: 0:03

INPUT

Construction:	
Casing dia. (d_c)	0.05 Meter
Annulus dia. (d_w)	0.1 Meter
Screen Length (L)	9 Meter
Depths to:	
water level (DTW)	7 Meter
top of screen (TOS)	6 Meter
Base of Aquifer (DTB)	15 Meter
Annular Fill:	
across screen -- Coarse Sand	
above screen -- Bentonite	
Aquifer Material -- Sandstone-Tertiary	



COMPUTED

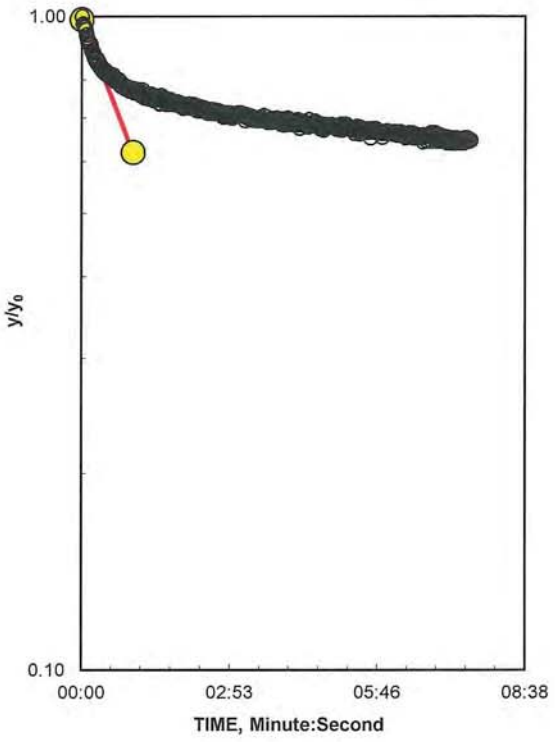
L_{wetted}	8 Meter
D =	8 Meter
H =	8 Meter
L/r_w =	160.00
$y_{0\text{-DISPLACEMENT}}$ =	0.92 Meter
$y_{0\text{-SLUG}}$ =	0.98 Meter

From look-up table using L/r_w

Fully penetrate C =	6.133
ln(Re/rw) =	3.920
Re =	8.28 Meter
Slope =	0.003387 $\log_{10}$/sec
$t_{90\%}$ recovery =	295 sec

Input is consistent.

K = 0.103 Meter/Day



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

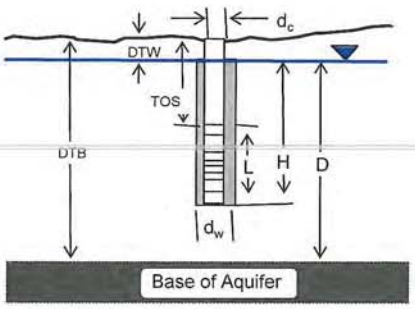
PROJECT NO: 018-118B
PROJECT SITE: Blackheath Road, Oxley
CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

WELL ID: 101

Local ID: Oxley
Date: 31/07/2020
Time: 0:03

INPUT

Construction:	
Casing dia. (d_c)	0.05 Meter
Annulus dia. (d_w)	0.1 Meter
Screen Length (L)	9 Meter
Depths to:	
water level (DTW)	7 Meter
top of screen (TOS)	6 Meter
Base of Aquifer (DTB)	15 Meter
Annular Fill:	
across screen --	Coarse Sand
above screen --	Bentonite
Aquifer Material --	Sandstone-Tertiary



COMPUTED

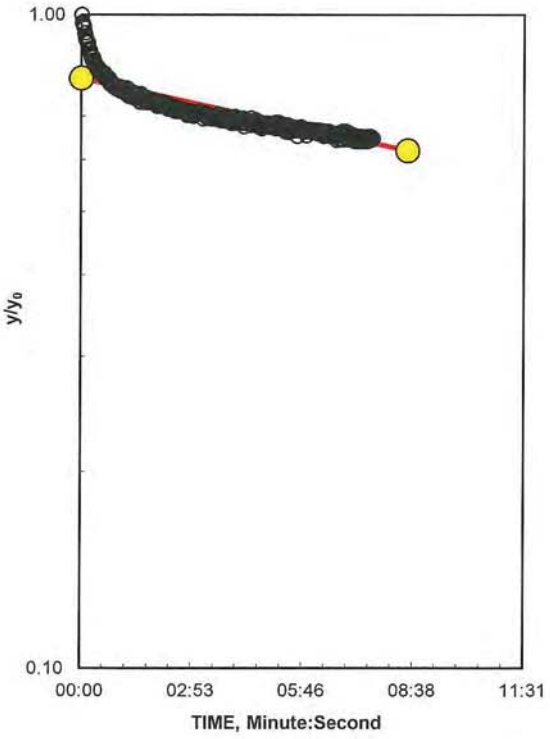
L_{wetted}	8 Meter
D =	8 Meter
H =	8 Meter
L/r_w =	160.00
$y_{0\text{-DISPLACEMENT}}$ =	0.92 Meter
$y_{0\text{-SLUG}}$ =	0.98 Meter

From look-up table using L/r_w

Fully penetrate C =	6.133
ln(Re/rw) =	3.920
Re =	8.28 Meter
Slope =	0.000217 $\log_{10}$/sec
$t_{90\%}$ recovery =	4607 sec

Input is consistent.

K = 0.00661 Meter/Day



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

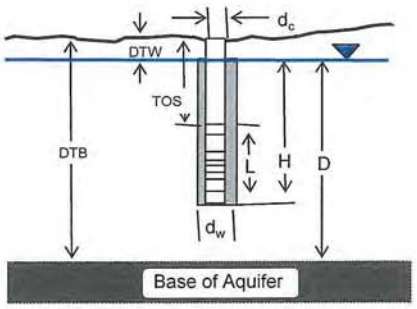
PROJECT NO: 018-118B
PROJECT SITE: Blackheath Road, Oxley
CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

WELL ID: 102

Local ID: Oxley
Date: 31/07/2020
Time: 0:02

INPUT

Construction:		
Casing dia. (d_c)	0.05	Meter
Annulus dia. (d_w)	0.1	Meter
Screen Length (L)	11.5	Meter
Depths to:		
water level (DTW)	14.6	Meter
top of screen (TOS)	5	Meter
Base of Aquifer (DTB)	16.5	Meter
Annular Fill:		
across screen --	Coarse Sand	
above screen --	Bentonite	
Aquifer Material --	Sandstone-Tertiary	



COMPUTED

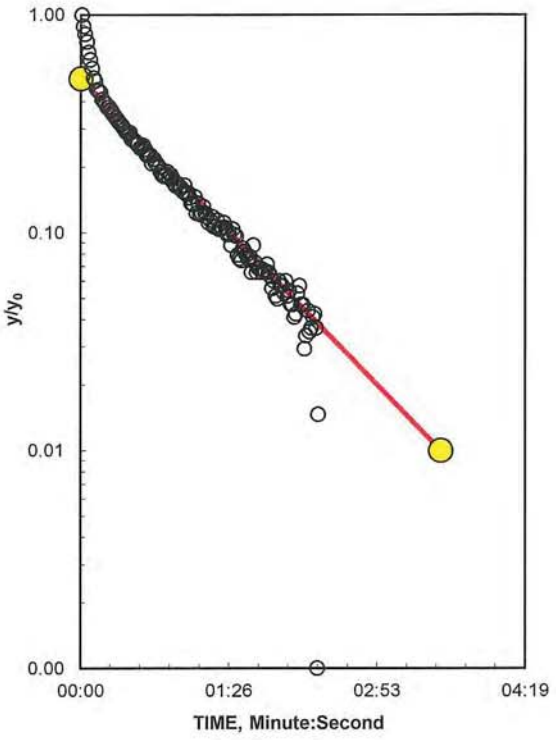
L_{wetted}	1.9	Meter
D =	1.9	Meter
H =	1.9	Meter
L/r_w =	38.00	
$y_{0\text{-DISPLACEMENT}}$ =	0.68	Meter
$y_{0\text{-SLUG}}$ =	0.74	Meter

From look-up table using L/r_w

Fully penetrate C =	2.385	
ln(Re/rw) =	2.739	
Re =	2.54	Meter
Slope =	0.008131	$\log_{10}$/sec
$t_{90\%}$ recovery =	123	sec

Input is consistent.

K = 0.728 Meter/Day



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

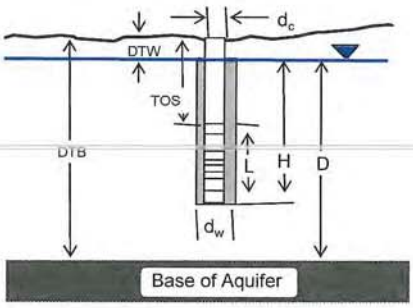
PROJECT NO: 018-118B
PROJECT SITE: Blackheath Road, Oxley
CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

WELL ID: 105

Local ID: Oxley
Date: 31/07/2020
Time: 0:02

INPUT

Construction:	
Casing dia. (d_c)	0.05 Meter
Annulus dia. (d_w)	0.1 Meter
Screen Length (L)	6 Meter
Depths to:	
water level (DTW)	10.7 Meter
top of screen (TOS)	9 Meter
Base of Aquifer (DTB)	15 Meter
Annular Fill:	
across screen --	Coarse Sand
above screen --	Bentonite
Aquifer Material --	Sandstone-Tertiary

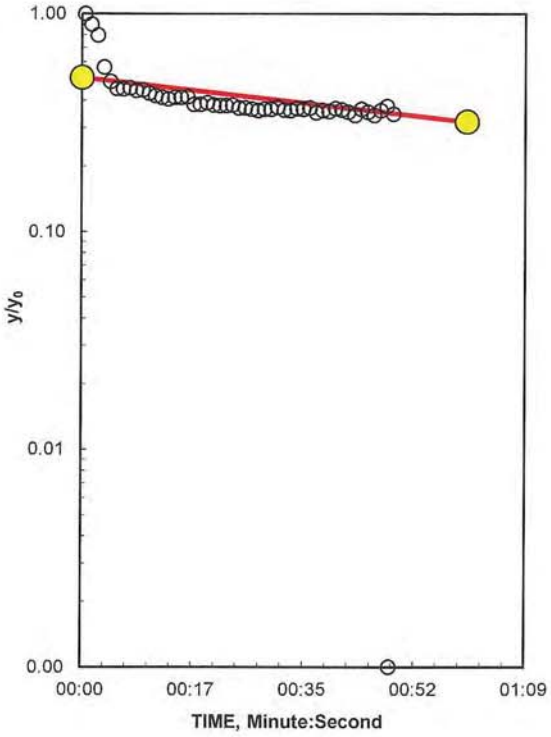


COMPUTED

L_{wetted}	4.3 Meter
D =	4.3 Meter
H =	4.3 Meter
L/r_w =	86.00
$y_{0\text{-DISPLACEMENT}}$ =	0.43 Meter
$y_{0\text{-SLUG}}$ =	0.49 Meter
From look-up table using L/r_w	
Fully penetrate C =	3.887
ln(Re/rw) =	3.423
Re =	5.03 Meter
Slope =	0.003374 $\log_{10}$/sec
$t_{90\%}$ recovery =	296 sec

Input is consistent.

K = 0.167 Meter/Day



REMARKS:

Bouwer and Rice analysis of slug test, WRR 1976

PROJECT NO: 018-118B
PROJECT SITE: Blackheath Road, Oxley
CLIENT: ECONOMIC DEVELOPMENT QUEENSLAND

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APPENDIX D

RESULTS OF PARTICLE SIZE DISTRIBUTION ANALYSIS

GROUND TESTING SERVICES

Albion Laboratory
11 Moore Street
ALBION QLD 4010
Telephone 61 (07) 3256 2900
Accreditation No. 19529

NATA ACCREDITED FOR TECHNICAL COMPETENCE

TQCSI ISO 9001:2015 Quality Certified

Accredited for compliance with ISO/IEC 17025 - Testing

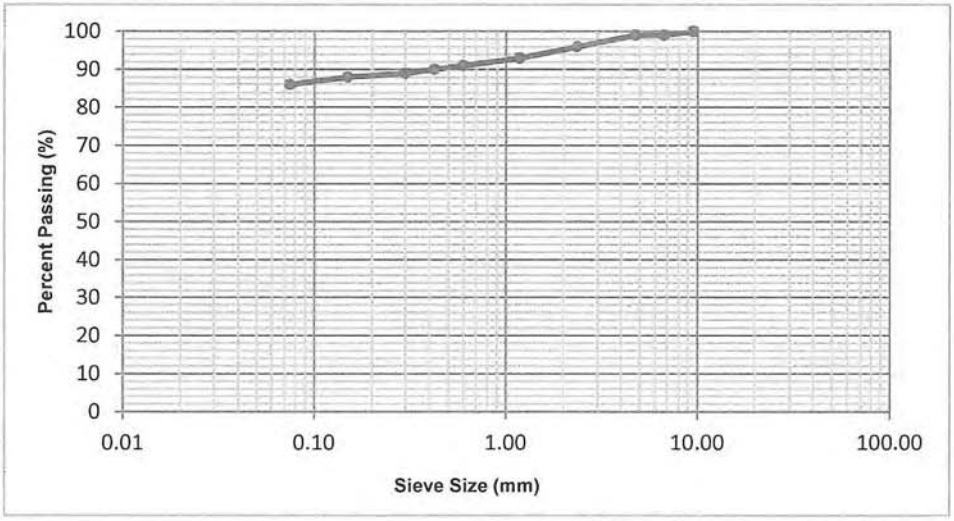
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	29/06/2020	Tested by and Date:	CT 4/07/2020
Project:	Slope Stability Assessment	Checked by:	CT 4/07/2020	Date:	6/07/2020
Location:	Oxley PDA - Stage 1A Blackheath Road, Oxley	**Report No.:**	**018-118D_PSD_T2007-02**		
Project No:	018-118D				

Sample No.:	T2007-02
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	28.1
Bore:	100
Depth (m):	4.5-4.95

AS SIEVE SIZE (mm)	PERCENT PASSING
9.5	100
6.7	99
4.75	99
2.36	96
1.18	93
0.600	91
0.425	90
0.300	89
0.150	88
0.075	86



Comments:

Authorised Signatory

Craig Tucker

6 July 2020

Date

Material Test Report

Report Number:	**018-118D-2A**
Issue Number:	1
Date Issued:	07/07/2020
Client:	Economic Development Queensland Level 14, 1 William Street, Brisbane QLD 4000
Project Number:	018-118D
Project Name:	Oxley PDA - Stage 1A
Project Location:	Seventeen Mile Rocks Road, Oxley
Work Request:	1175
Sample Number:	G20-1175A
Date Sampled:	29/06/2020
Dates Tested:	02/07/2020 - 06/07/2020
Sampling Method:	AS 1289.1.2.1 6.5.3 - Power auger drilling
Sample Location:	**Bore 100, Depth: 7.5 - 7.9m**

Particle Size Distribution (AS1289 3.6.1)						
Sieve	Passed %	Passing Limits		Retained %	Retained Limits	
0.3 mm	**100**			0		
0.15 mm	**100**			0		
0.075 mm	**99**			1		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	30.0

GROUND TESTING SERVICES

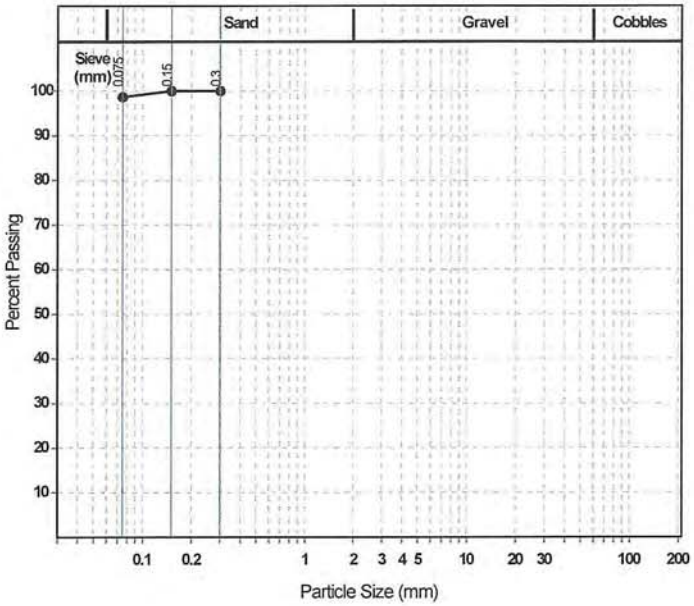
Ground Testing Services Pty Ltd
Gold Coast Laboratory
2/23 Traders Way Currumbin QLD 4223
Phone: (07) 5535 2539
Email: enquiries@groundtestingservices.com.au

Accredited for compliance with ISO/IEC 17025 - Testing

NATA
WORLD RECOGNISED ACCREDITATION

Approved Signatory: Rede Irwin
Laboratory Manager
NATA Accredited Laboratory Number: 18820

Particle Size Distribution



GROUND TESTING SERVICES

Albion Laboratory
11 Moore Street
ALBION QLD 4010
Telephone 61 (07) 3256 2900
Accreditation No. 19529

Accredited for compliance with ISO/IEC 17025 - Testing

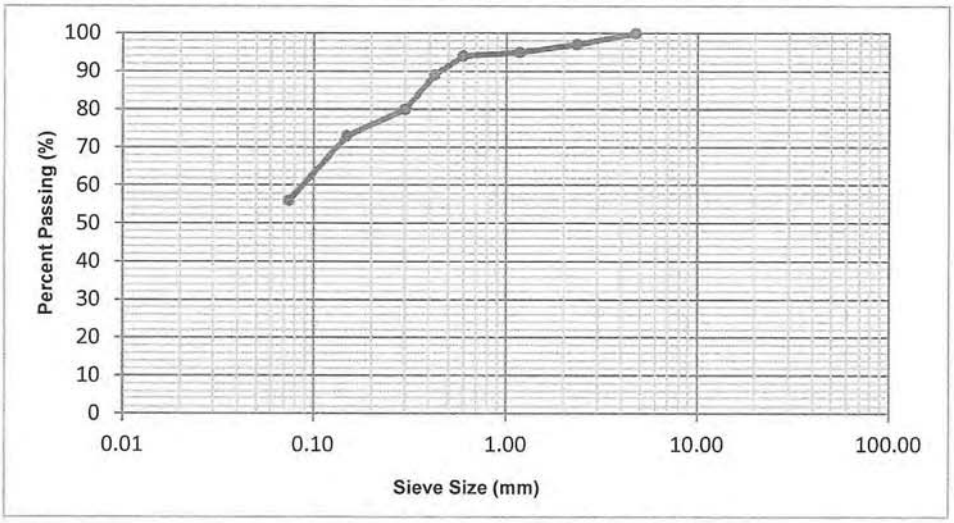
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	29/06/2020	Tested by and Date:	CT 4/07/2020
Project:	Slope Stability Assessment	Checked by:	CT 4/07/2020	Date:	6/07/2020
Location:	Oxley PDA - Stage 1A Blackheath Road, Oxley	**Report No.:**	**018-118D_PSD_T2007-03**		
Project No:	018-118D				

Sample No.:	T2007-03
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	23.4
Bore:	100
Depth (m):	10.5-10.63

AS SIEVE SIZE (mm)	PERCENT PASSING
4.75	100
2.36	97
1.18	95
0.600	94
0.425	89
0.300	80
0.150	73
0.075	56



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6 July 2020

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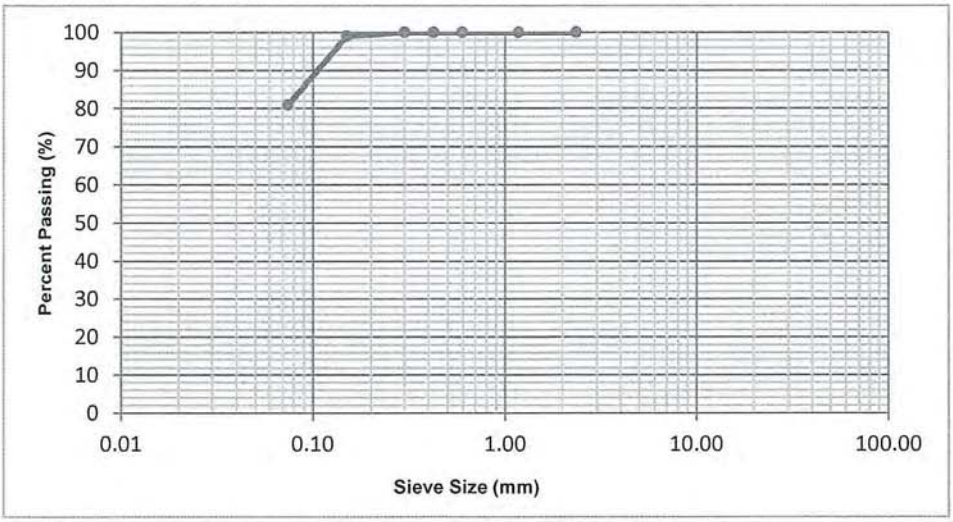
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	29/06/2020	Tested by and Date:	CT 4/07/2020
Project:	Slope Stability Assessment	Checked by:	CT 4/07/2020	Date:	6/07/2020
Location:	Oxley PDA - Stage 1A Blackheath Road, Oxley	**Report No.:**	**018-118D_PSD_T2007-04**		
Project No:	018-118D				

Sample No.:	T2007-04
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	19.1
Bore:	100
Depth (m):	13.5-13.94

AS SIEVE SIZE (mm)	PERCENT PASSING
2.36	100
1.18	100
0.600	100
0.425	100
0.300	100
0.150	99
0.075	81



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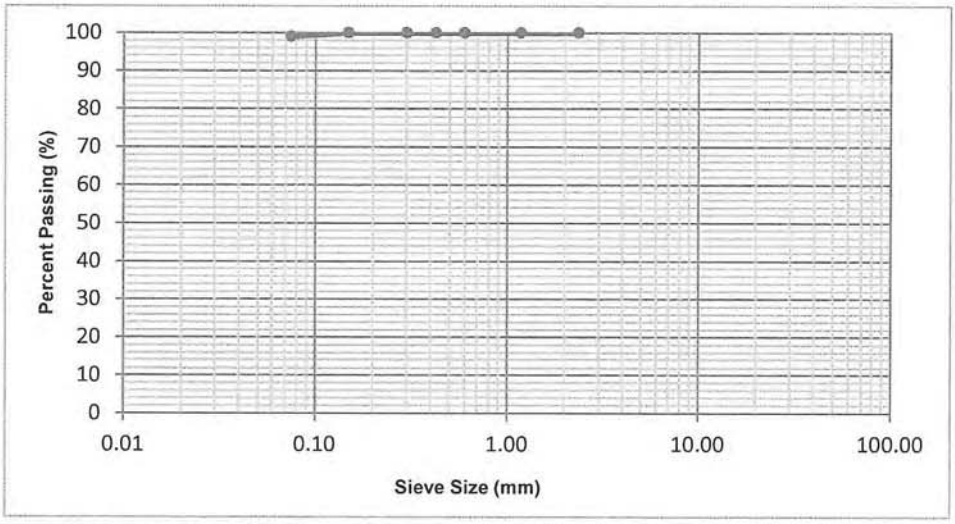
Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	29/06/2020	Tested by and Date:	CT 4/07/2020
Project:	Slope Stability Assessment	Checked by:	CT 4/07/2020	Date:	6/07/2020
Location:	Oxley PDA - Stage 1A Blackheath Road, Oxley	**Report No.:**	**018-118D_PSD_T2007-05**		
Project No:	018-118D				

Sample No.:	T2007-05
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	23.1
Bore:	100
Depth (m):	18.0-18.44

AS SIEVE SIZE (mm)	PERCENT PASSING
2.36	100
1.18	100
0.600	100
0.425	100
0.300	100
0.150	100
0.075	99



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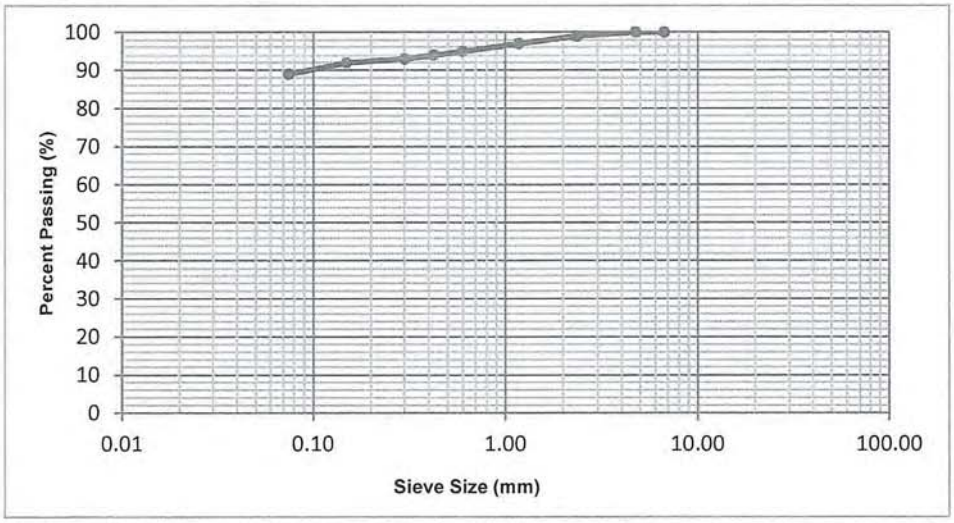
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	30/06/2020	Tested by and Date:	CT 4/07/2020
Project:	Slope Stability Assessment	Checked by:	CT 4/07/2020	Date:	6/07/2020
Location:	Oxley PDA - Stage 1A Blackheath Road, Oxley	**Report No.:**	**018-118D_PSD_T2007-06**		
Project No:	018-118D				

Sample No.:	T2007-06
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	22.4
Bore:	101
Depth (m):	1.5-1.95

AS SIEVE SIZE (mm)	PERCENT PASSING
6.7	100
4.75	100
2.36	99
1.18	97
0.600	95
0.425	94
0.300	93
0.150	92
0.075	89



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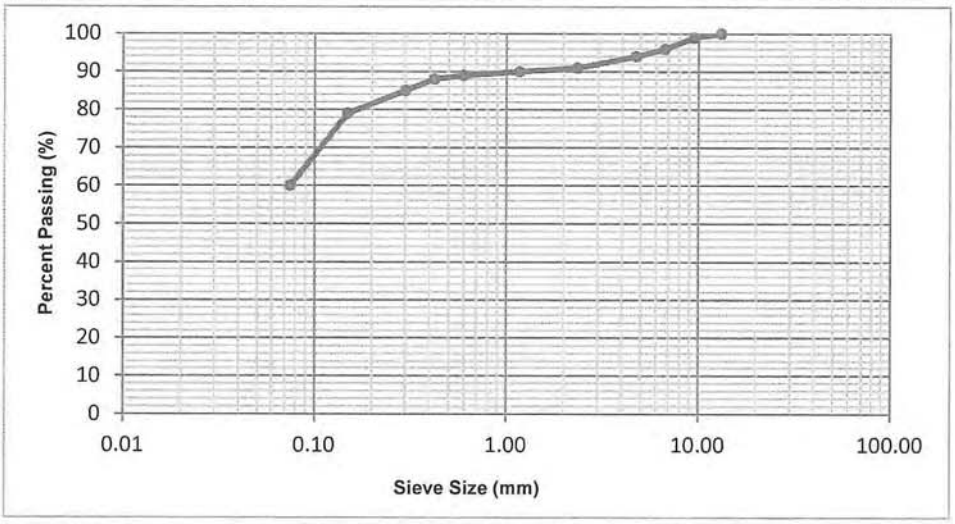
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	30/06/2020	Tested by and Date:	CT 4/07/2020
Project:	Slope Stability Assessment	Checked by:	CT 4/07/2020	Date:	6/07/2020
Location:	Oxley PDA - Stage 1A Blackheath Road, Oxley	**Report No.:**	**018-118D_PSD_T2007-07**		
Project No:	018-118D	THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL			

Sample No.:	T2007-07
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	17.6
Bore:	101
Depth (m):	6.0-6.45

AS SIEVE SIZE (mm)	PERCENT PASSING
13.2	100
9.5	99
6.7	96
4.75	94
2.36	91
1.18	90
0.600	89
0.425	88
0.300	85
0.150	79
0.075	60



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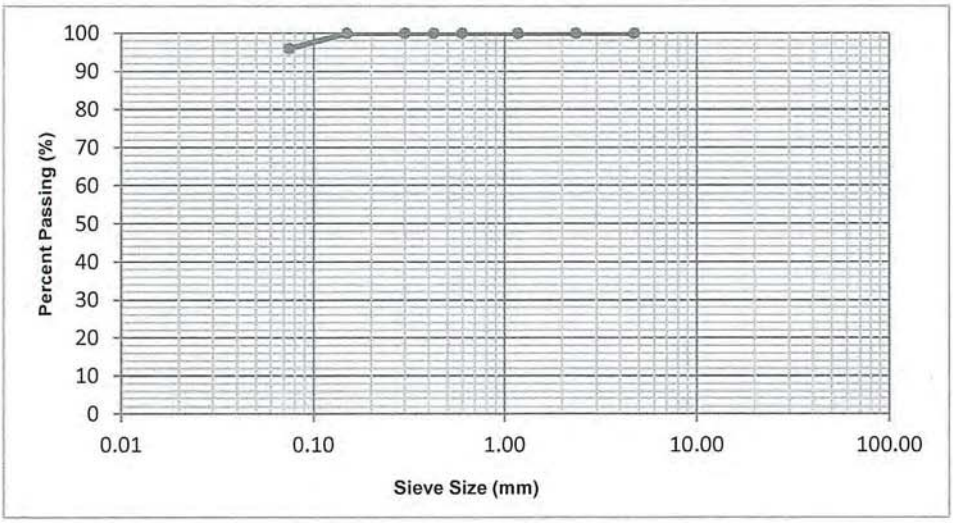
Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	30/06/2020	Tested by and Date:	CT 4/07/2020
Project:	Slope Stability Assessment	Checked by:	CT 4/07/2020	Date:	6/07/2020
Location:	Oxley PDA - Stage 1A Blackheath Road, Oxley	**Report No.:**	**018-118D_PSD_T2007-08**		
Project No:	018-118D				

Sample No.:	T2007-08
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	20.1
Bore:	101
Depth (m):	9.0-9.43

AS SIEVE SIZE (mm)	PERCENT PASSING
4.75	100
2.36	100
1.18	100
0.600	100
0.425	100
0.300	100
0.150	100
0.075	96



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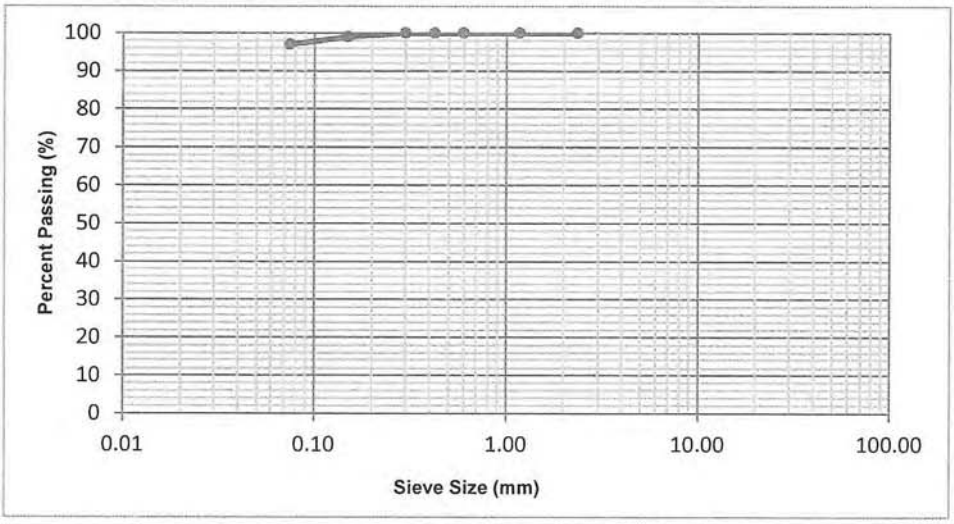
Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	30/06/2020	Tested by and Date:	CT 4/07/2020
Project:	Slope Stability Assessment	Checked by:	CT 4/07/2020	Date:	6/07/2020
Location:	Oxley PDA - Stage 1A Blackheath Road, Oxley	**Report No.:**	**018-118D_PSD_T2007-09**		
Project No:	018-118D				

Sample No.:	T2007-09
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	19.1
Bore:	101
Depth (m):	12.0-12.45

AS SIEVE SIZE (mm)	PERCENT PASSING
2.36	100
1.18	100
0.600	100
0.425	100
0.300	100
0.150	99
0.075	97



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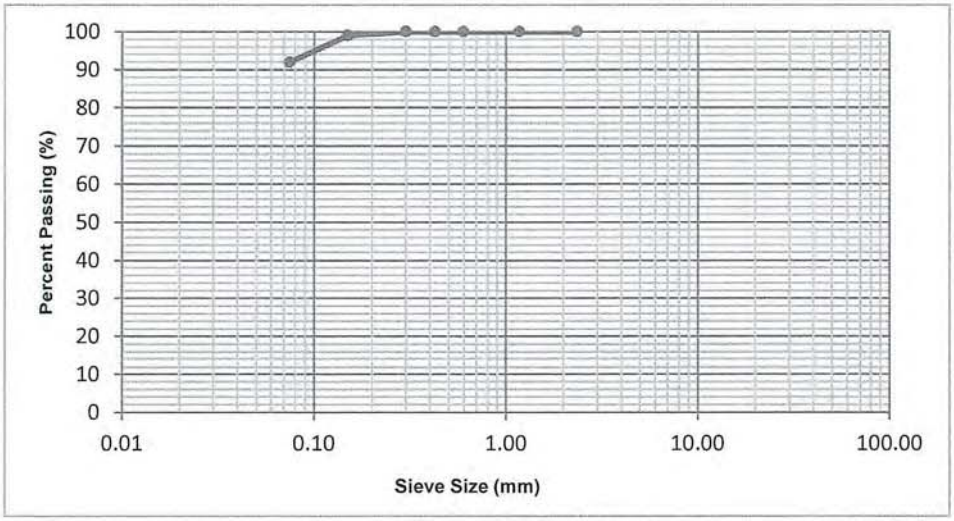
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	1/06/2020	Tested by and Date:	FC/CT 23/06/2020
Project:	Oxley PDA - Stage 1A	Checked by:	CT	Date:	23/06/2020
Location:	Seventeen Mile Rocks Road, Oxley	**Report No.:**	**018-118D_PSD_T2006-17**		
Project No:	018-118D				

Sample No.:	T2006-17
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	20.0
Bore:	102
Depth (m):	6.0-6.45

AS SIEVE SIZE (mm)	PERCENT PASSING
2.36	100
1.18	100
0.600	100
0.425	100
0.300	100
0.150	99
0.075	92



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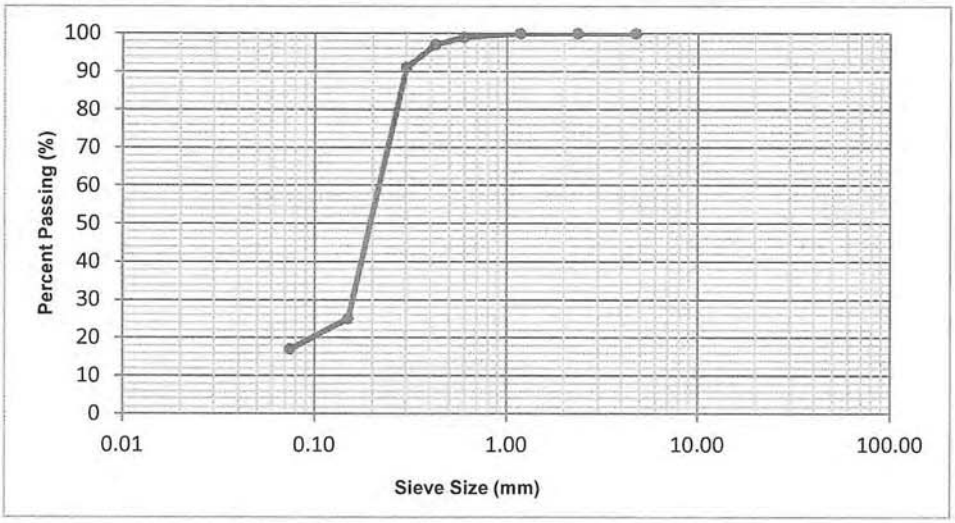
Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	1/06/2020	Tested by and Date:	FC/CT 23/06/2020
Project:	Oxley PDA - Stage 1A	Checked by:	CT	Date:	23/06/2020
Location:	Seventeen Mile Rocks Road, Oxley	**Report No.:**	**018-118D_PSD_T2006-19**		
Project No:	018-118D				

Sample No.:	T2006-19
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	18.9
Bore:	102
Depth (m):	13.5-13.95

AS SIEVE SIZE (mm)	PERCENT PASSING
4.75	100
2.36	100
1.18	100
0.600	99
0.425	97
0.300	91
0.150	25
0.075	17



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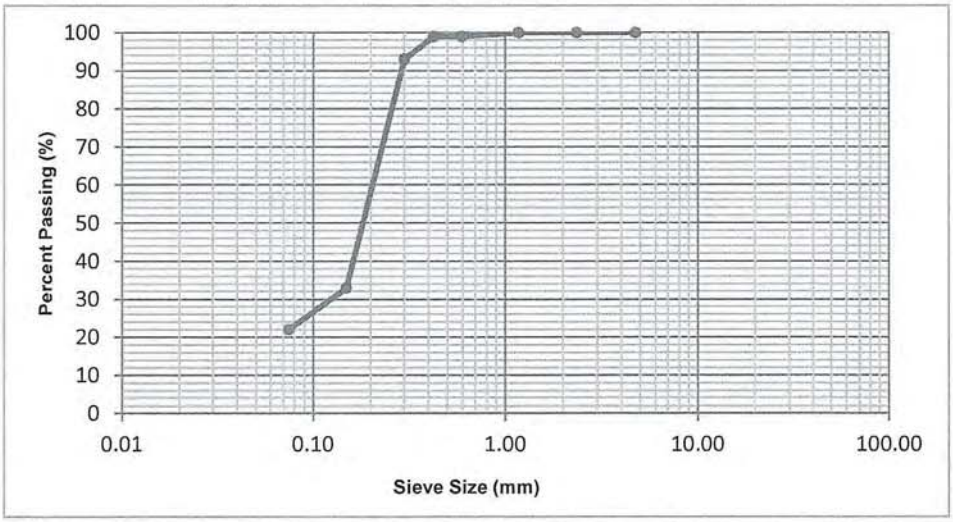
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	1/06/2020	Tested by and Date:	FC/CT 16/06/2020
Project:	Oxley PDA - Stage 1A	Checked by:	CT	Date:	17/06/2020
Location:	Seventeen Mile Rocks Road, Oxley	**Report No.:**	**018-118D_PSD_T2006-04**		
Project No:	018-118D				

Sample No.:	T2006-04
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	21.3
Bore:	102
Depth (m):	15.0-15.45

AS SIEVE SIZE (mm)	PERCENT PASSING
4.75	100
2.36	100
1.18	100
0.600	99
0.425	99
0.300	93
0.150	33
0.075	22



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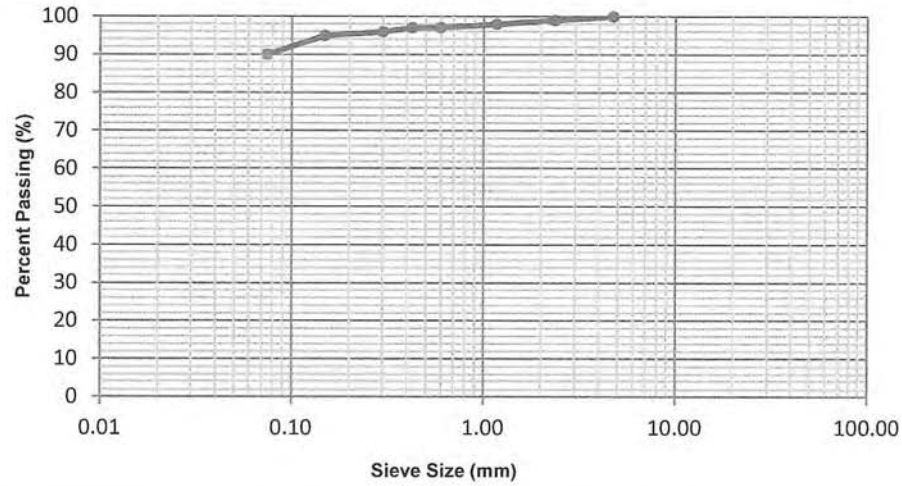
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	5/06/2020	Tested by and Date:	FC/CT 23/06/2020
Project:	Oxley PDA - Stage 1A	Checked by:	CT	Date:	23/06/2020
Location:	Seventeen Mile Rocks Road, Oxley	**Report No.:**	**018-118D_PSD_T2006-20**		
Project No:	018-118D				

Sample No.:	T2006-20
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	14.8
Bore:	103
Depth (m):	1.5-1.85

AS SIEVE SIZE (mm)	PERCENT PASSING
4.75	100
2.36	99
1.18	98
0.600	97
0.425	97
0.300	96
0.150	95
0.075	90



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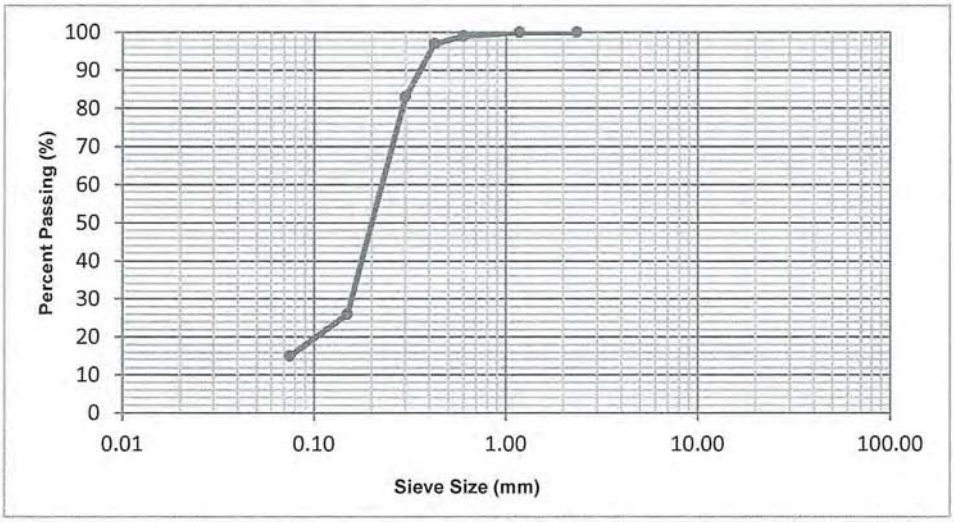
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	5/06/2020	Tested by and Date:	FC/CT 23/06/2020
Project:	Oxley PDA - Stage 1A	Checked by:	CT	Date:	23/06/2020
Location:	Seventeen Mile Rocks Road, Oxley	**Report No.:**	**018-118D_PSD_T2006-21**		
Project No:	018-118D				

Sample No.:	T2006-21
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	16.5
Bore:	103
Depth (m):	4.6-4.72

AS SIEVE SIZE (mm)	PERCENT PASSING
2.36	100
1.18	100
0.600	99
0.425	97
0.300	83
0.150	26
0.075	15



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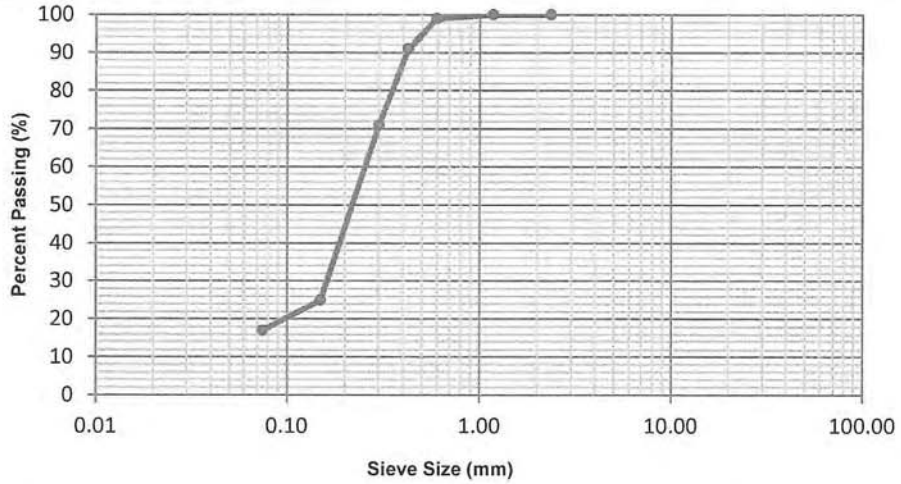
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	5/06/2020	Tested by and Date:	FC/CT 16/06/2020
Project:	Oxley PDA - Stage 1A	Checked by:	CT	Date:	17/06/2020
Location:	Seventeen Mile Rocks Road, Oxley	**Report No.:**	**018-118D_PSD_T2006-06**		
Project No:	018-118D				

Sample No.:	T2006-06
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	13.8
Bore:	103
Depth (m):	6.0-6.13

AS SIEVE SIZE (mm)	PERCENT PASSING
2.36	100
1.18	100
0.600	99
0.425	91
0.300	71
0.150	25
0.075	17



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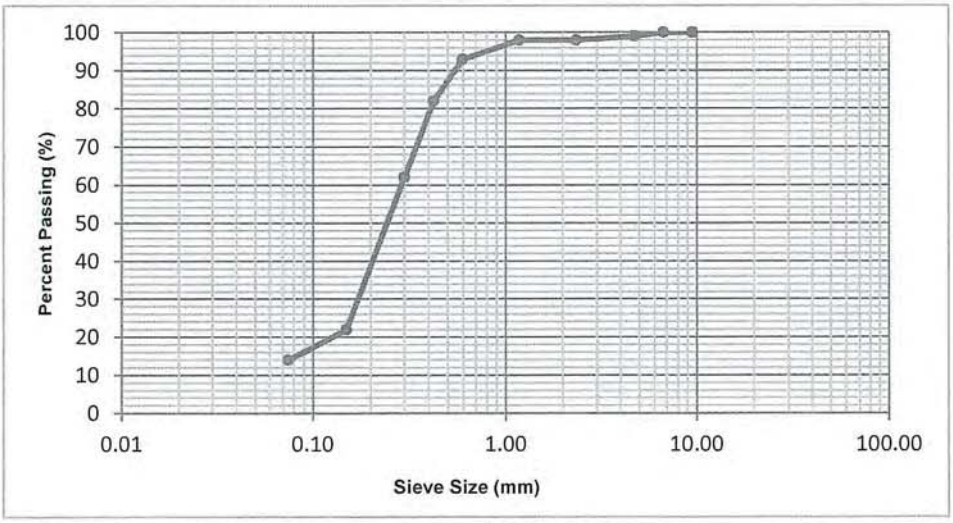
Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	5/06/2020	Tested by and Date:	FC/CT 23/06/2020
Project:	Oxley PDA - Stage 1A	Checked by:	CT	Date:	23/06/2020
Location:	Seventeen Mile Rocks Road, Oxley	**Report No.:**	**018-118D_PSD_T2006-22**		
Project No:	018-118D				

Sample No.:	T2006-22
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	20.8
Bore:	103
Depth (m):	10.5-10.77

AS SIEVE SIZE (mm)	PERCENT PASSING
9.5	100
6.7	100
4.75	99
2.36	98
1.18	98
0.600	93
0.425	82
0.300	62
0.150	22
0.075	14



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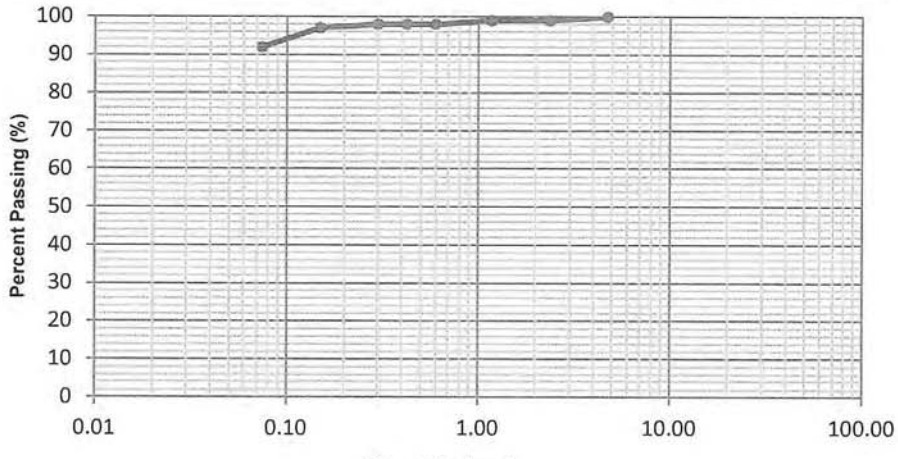
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	2/06/2020	Tested by and Date:	FC/CT 23/06/2020
Project:	Oxley PDA - Stage 1A	Checked by:	CT	Date:	23/06/2020
Location:	Seventeen Mile Rocks Road, Oxley	**Report No.:**	**018-118D_PSD_T2006-23**		
Project No:	018-118D	THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL			

Sample No.:	T2006-23
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	12.4
Bore:	104
Depth (m):	3.0-3.45

AS SIEVE SIZE (mm)	PERCENT PASSING
4.75	100
2.36	99
1.18	99
0.600	98
0.425	98
0.300	98
0.150	97
0.075	92



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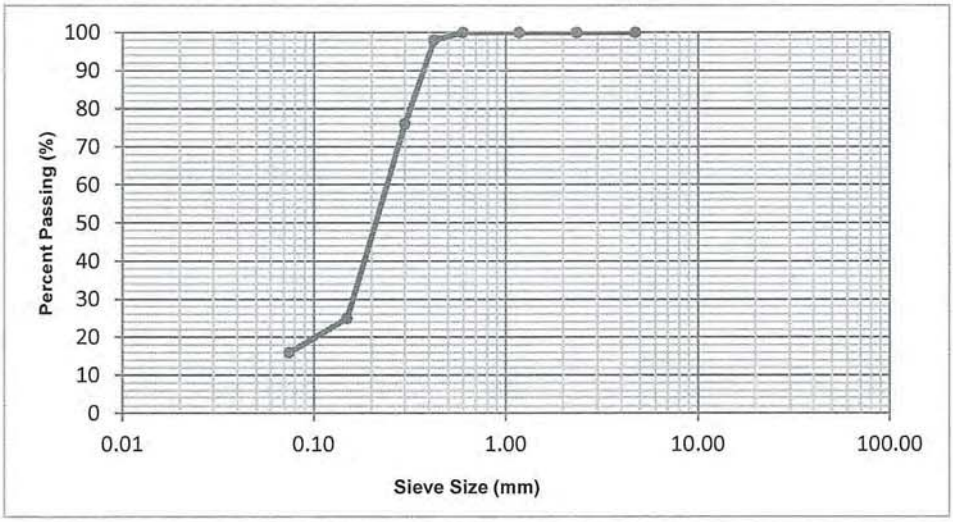
Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	2/06/2020	Tested by and Date:	FC/CT 16/06/2020
Project:	Oxley PDA - Stage 1A	Checked by:	CT	Date:	17/06/2020
Location:	Seventeen Mile Rocks Road, Oxley	**Report No.:**	**018-118D_PSD_T2006-11**		
Project No:	018-118D	THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL			

Sample No.:	T2006-11
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	22.4
Bore:	104
Depth (m):	6.0-6.14

AS SIEVE SIZE (mm)	PERCENT PASSING
4.75	100
2.36	100
1.18	100
0.600	100
0.425	98
0.300	76
0.150	25
0.075	16



Comments:

Authorised Signatory

Craig Tucker

17 June 2020

Date

GROUND TESTING SERVICES

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11 Moore Street
ALBION QLD 4010
Telephone 61 (07) 3256 2900
Accreditation No. 19529

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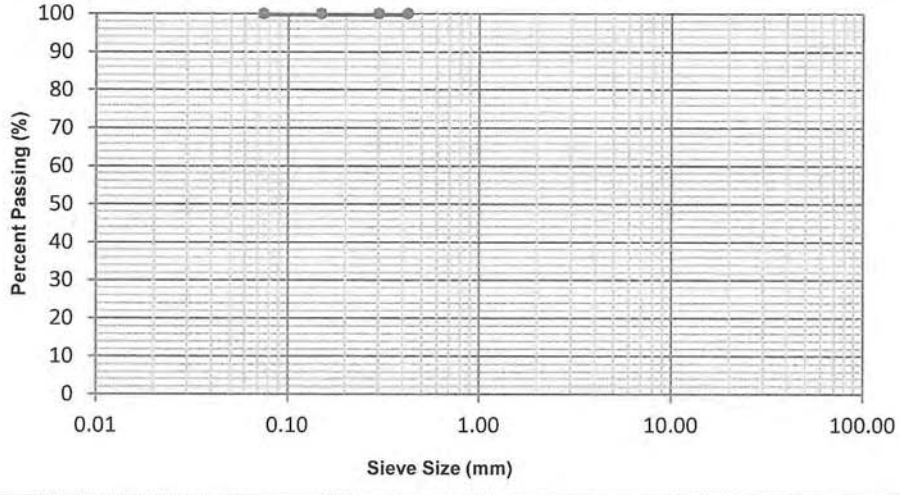
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	2/06/2020	Tested by and Date:	FC/CT 23/06/2020
Project:	Oxley PDA - Stage 1A	Checked by:	CT	Date:	23/06/2020
Location:	Seventeen Mile Rocks Road, Oxley	**Report No.:**	**018-118D_PSD_T2006-24**		
Project No:	018-118D				

Sample No.:	T2006-24
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	7.6
Bore:	104
Depth (m):	10.5-10.95

AS SIEVE SIZE (mm)	PERCENT PASSING
0.425	100
0.300	100
0.150	100
0.075	100



Comments:

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23 June 2020

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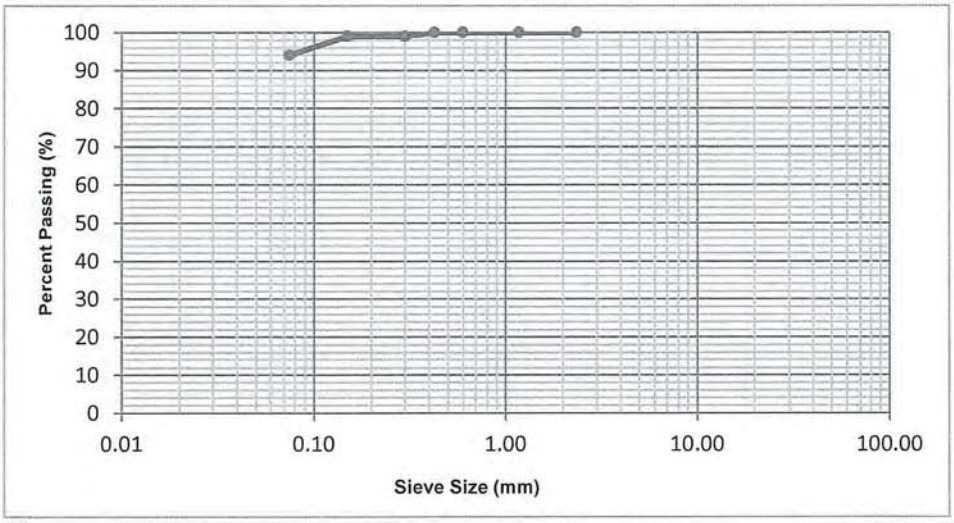
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	2/06/2020	Tested by and Date:	FC/CT 23/06/2020
Project:	Oxley PDA - Stage 1A	Checked by:	CT	Date:	23/06/2020
Location:	Seventeen Mile Rocks Road, Oxley	**Report No.:**	**018-118D_PSD_T2006-25**		
Project No:	018-118D				

Sample No.:	T2006-25
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	20.2
Bore:	104
Depth (m):	15.0-15.43

AS SIEVE SIZE (mm)	PERCENT PASSING
2.36	100
1.18	100
0.600	100
0.425	100
0.300	99
0.150	99
0.075	94



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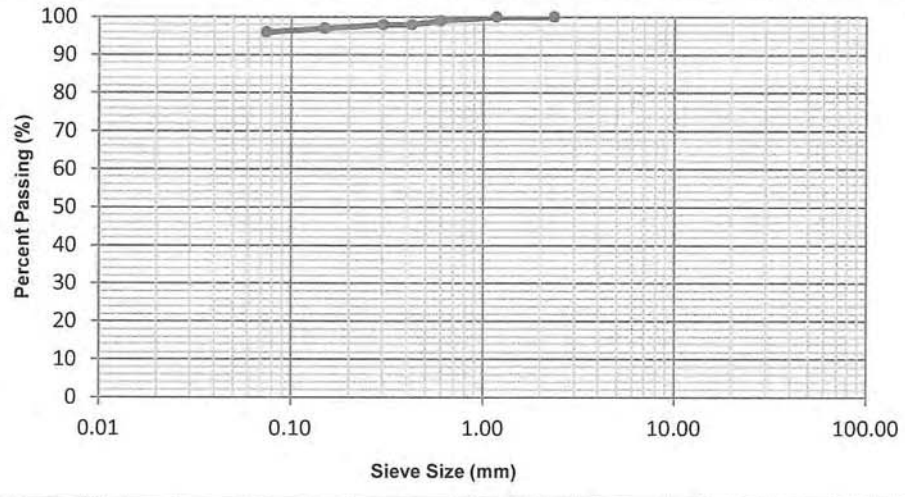
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	9/06/2020	Tested by and Date:	FC/CT 23/06/2020
Project:	Oxley PDA - Stage 1A	Checked by:	CT	Date:	23/06/2020
Location:	Seventeen Mile Rocks Road, Oxley	**Report No.:**	**018-118D_PSD_T2006-26**		
Project No:	018-118D				

Sample No.:	T2006-26
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	20.8
Bore:	105
Depth (m):	7.5-7.8

AS SIEVE SIZE (mm)	PERCENT PASSING
2.36	100
1.18	100
0.600	99
0.425	98
0.300	98
0.150	97
0.075	96



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23 June 2020

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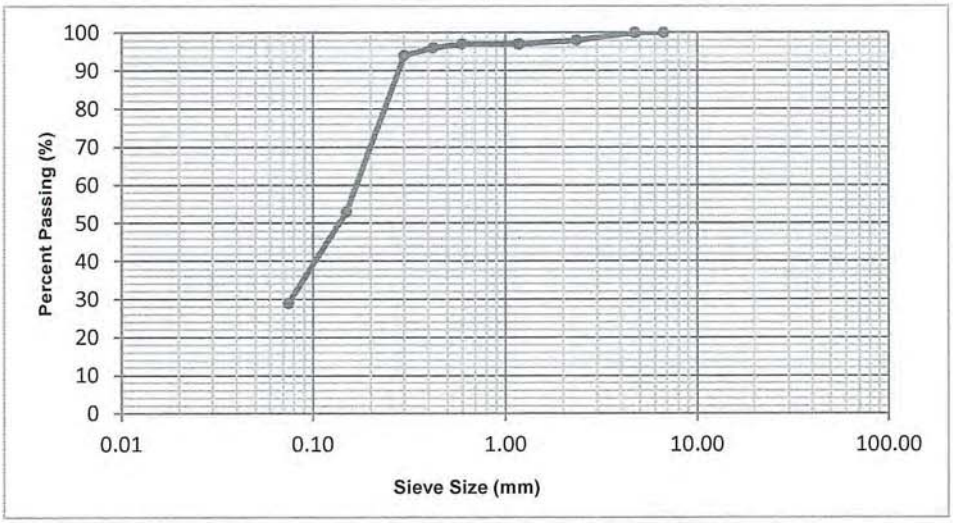
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	9/06/2020	Tested by and Date:	FC/CT 16/06/2020
Project:	Oxley PDA - Stage 1A	Checked by:	CT	Date:	17/06/2020
Location:	Seventeen Mile Rocks Road, Oxley	**Report No.:**	**018-118D_PSD_T2006-15**		
Project No:	018-118D	THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL			

Sample No.:	T2006-15
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	24.9
Bore:	105
Depth (m):	9.0-9.23

AS SIEVE SIZE (mm)	PERCENT PASSING
6.7	100
4.75	100
2.36	98
1.18	97
0.600	97
0.425	96
0.300	94
0.150	53
0.075	29



Comments:

Authorised Signatory

Craig Tucker

17 June 2020

Date

Material Test Report

Report Number:	**018-118D-3A**
Issue Number:	1
Date Issued:	13/07/2020
Client:	Economic Development Queensland
	Level 14, 1 William Street, Brisbane QLD 4000
Project Number:	018-118D
Project Name:	Oxley PDA - Stage 1A
Project Location:	Seventeen Mile Rocks Road, Oxley
Work Request:	1188
Sample Number:	G20-1188A
Date Sampled:	04/07/2020
Dates Tested:	08/07/2020 - 10/07/2020
Sampling Method:	AS 1289.1.2.1 6.5.3 - Power auger drilling
Sample Location:	**Bore 105, Depth: 10.0 - 10.45m**

GROUND TESTING SERVICES

Ground Testing Services Pty Ltd
Gold Coast Laboratory
2/23 Traders Way Currumbin QLD 4223
Phone: (07) 5535 2539
Email: enquiries@groundtestingservices.com.au

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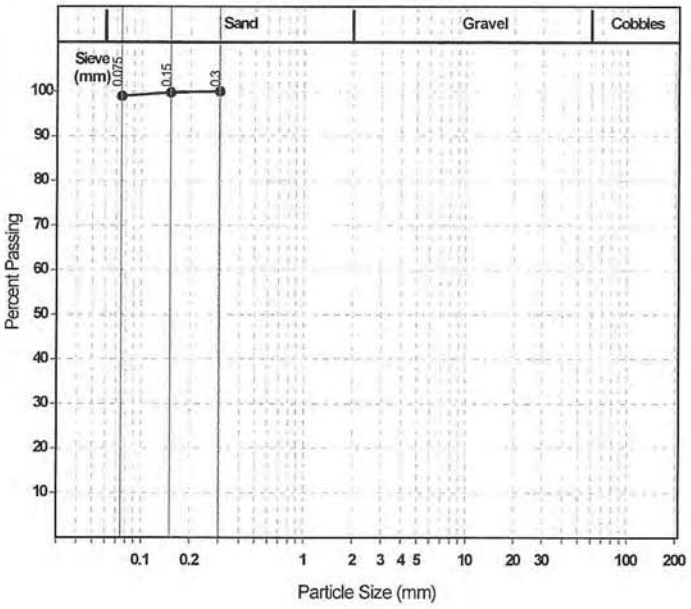
NATA
WORLD RECOGNISED ACCREDITATION

Approved Signatory: Rede Irwin
Laboratory Manager
NATA Accredited Laboratory Number: 18820

Particle Size Distribution (AS1289 3.6.1)						
Sieve	Passed %	Passing Limits		Retained %	Retained Limits	
0.3 mm	**100**			0		
0.15 mm	**100**			0		
0.075 mm	**99**			1		

Moisture Content (AS 1289 2.1.1)	
Moisture Content (%)	21.8

Particle Size Distribution



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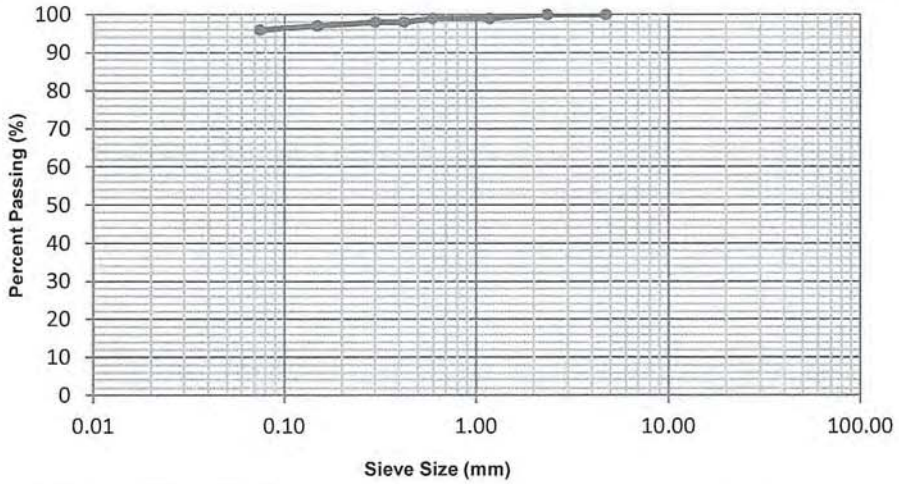
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Sample Date:	9/06/2020	Tested by and Date:	FC/CT 23/06/2020
Project:	Oxley PDA - Stage 1A	Checked by:	CT	Date:	23/06/2020
Location:	Seventeen Mile Rocks Road, Oxley	**Report No.:**	**018-118D_PSD_T2006-27**		
Project No:	018-118D				

Sample No.:	T2006-27
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	22.6
Bore:	105
Depth (m):	10.5-10.75

AS SIEVE SIZE (mm)	PERCENT PASSING
4.75	100
2.36	100
1.18	99
0.600	99
0.425	98
0.300	98
0.150	97
0.075	96



Comments:

Authorised Signatory

Craig Tucker

23 June 2020

Date

GROUND TESTING SERVICES

Albion Laboratory
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Accreditation No. 19529

NATA TECHNICAL COMPETENCE

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PARTICLE SIZE DISTRIBUTION TEST REPORT

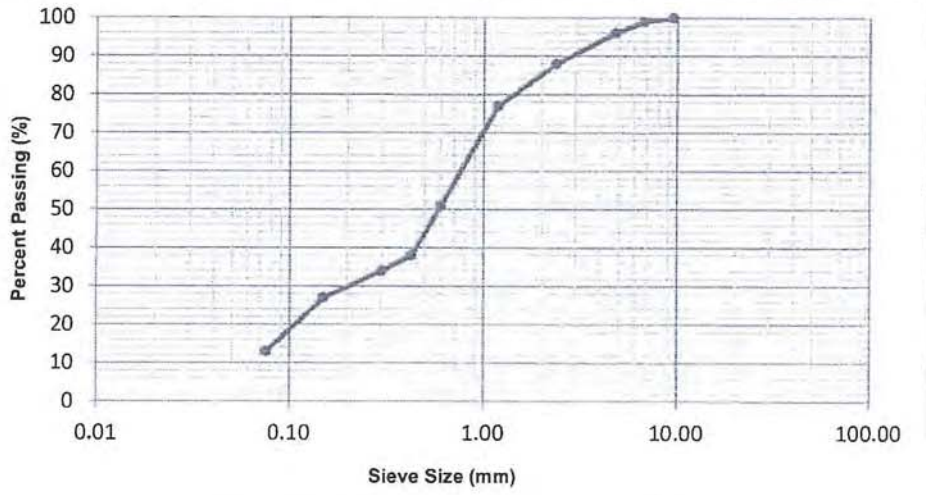
Test Procedure: AS1289.3.6.1 ✓ *Test Procedure: Q103A*

Test Procedure: AS1289.2.1.1 ✓ *Test Procedure: Q103B*

Client:	Economic Development Queensland	Tested by:	NJ	Date:	5/10/2018
Project:	Broadscale Slope Stability Assessment	Checked by:	CT	Date:	8/10/2018
Location:	Former Oxley Secondary College, Blackheath Road, Oxley	**Report No.:**	**018-118B_PSD_T1810-02**		
Project No:	018-118B	THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL			

Sample No.:	T1810-02
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	4.7
Bore:	17
Depth (m):	9.0 - 9.05

AS SIEVE SIZE (mm)	PERCENT PASSING
9.5	100
6.7	99
4.75	96
2.36	88
1.18	77
0.600	51
0.425	38
0.300	34
0.150	27
0.075	13



Comments:

Authorised Signatory

Chris Luxton *Date* 30.10.18

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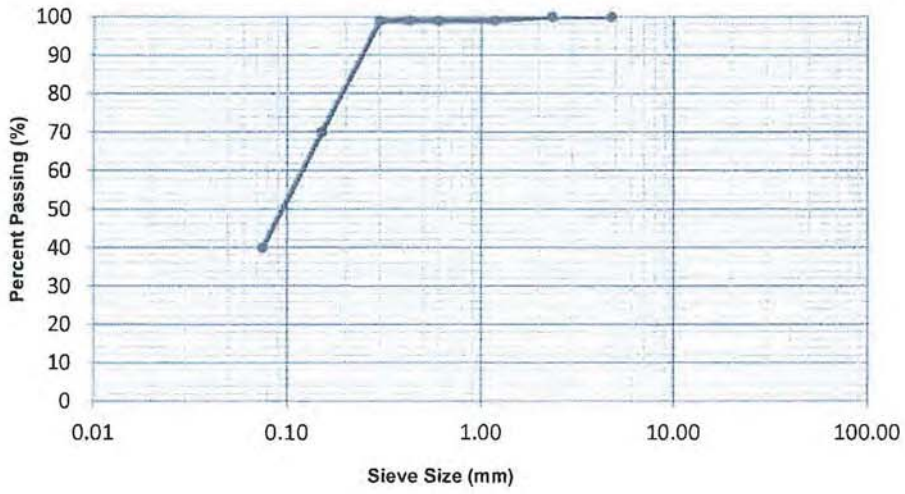
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	**Tested by:**	NJ	Date:	5/10/2018
Project:	Broadscale Slope Stability Assessment	**Checked by:**	CT	Date:	8/10/2018
Location:	Former Oxley Secondary College, Blackheath Road, Oxley	**Report No.:**	**018-118B_PSD_T1810-12**		
Project No:	018-118B	THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL			

Sample No.:	T1810-12
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	10.0
Bore:	19
Depth (m):	4.5 - 4.95

AS SIEVE SIZE (mm)	PERCENT PASSING
4.75	100
2.36	100
1.18	99
0.600	99
0.425	99
0.300	99
0.150	70
0.075	40



Comments:

Authorised Signatory

Chris Luxton ***Date*** 30.10.18

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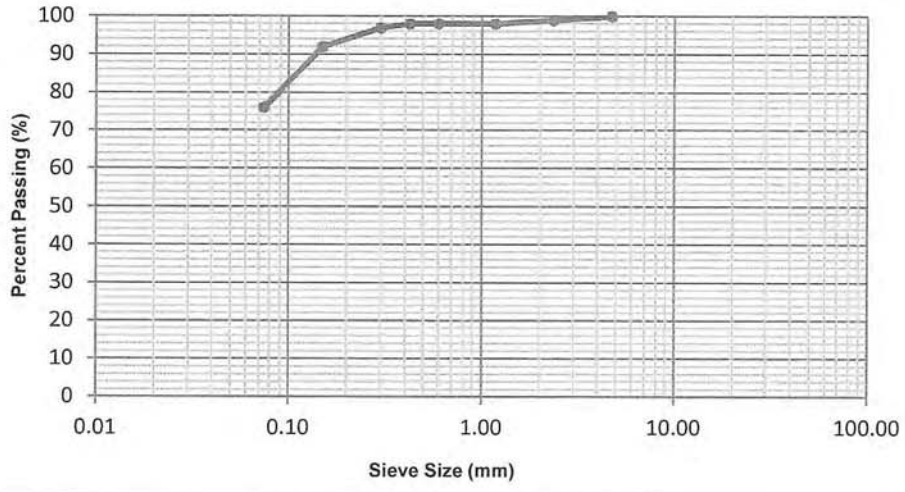
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Tested by:	KH	Date:	4/02/2019
Project:	Broadscale Slope Stability Assessment	Checked by:	CT	Date:	5/02/2019
Location:	Former Oxley Secondary College, Blackheath Road, Oxley	**Report No.:**	**018-118B_PSD_T1901-207**		
Project No:	018-118B				

Sample No.:	T1901-207
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	12.4
Bore:	27
Depth (m):	0.5-0.95

AS SIEVE SIZE (mm)	PERCENT PASSING
4.75	100
2.36	99
1.18	98
0.600	98
0.425	98
0.300	97
0.150	92
0.075	76



Comments:

Authorised Signatory

Craig Tucker

5 February 2019

Date

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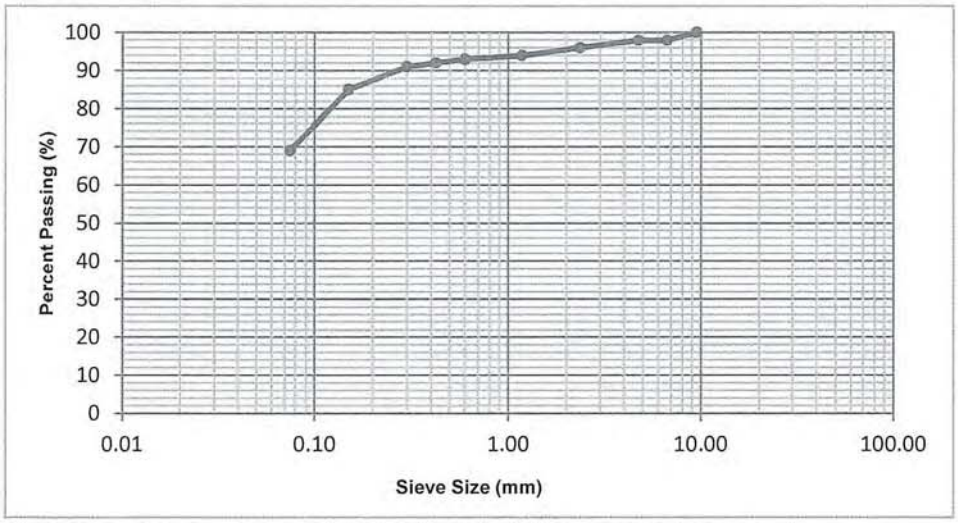
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Tested by:	KH	Date:	6/02/2019
Project:	Broadscale Slope Stability Assessment	Checked by:	CT	Date:	6/02/2019
Location:	Former Oxley Secondary College, Blackheath Road, Oxley	**Report No.:**	**018-118B_PSD_T1901-208**		
Project No:	018-118B				

Sample No.:	T1901-208
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	14.1
Bore:	27
Depth (m):	1.5-1.95

AS SIEVE SIZE (mm)	PERCENT PASSING
9.5	100
6.7	98
4.75	98
2.36	96
1.18	94
0.600	93
0.425	92
0.300	91
0.150	85
0.075	69



Comments:

Authorised Signatory

Craig Tucker

6 February 2019

Date

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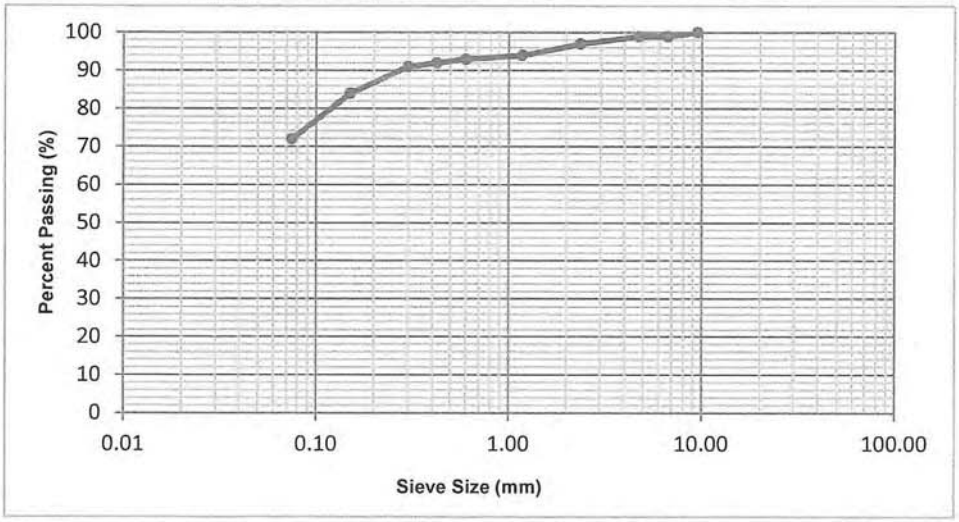
PARTICLE SIZE DISTRIBUTION TEST REPORT

Test Procedure: AS1289.3.6.1	✓	*Test Procedure: Q103A*	
Test Procedure: AS1289.2.1.1	✓	*Test Procedure: Q103B*	

Client:	Economic Development Queensland	Tested by:	KH	Date:	4/02/2019
Project:	Broadscale Slope Stability Assessment	Checked by:	CT	Date:	5/02/2019
Location:	Former Oxley Secondary College, Blackheath Road, Oxley	**Report No.:**	**018-118B_PSD_T1901-209**		
Project No:	018-118B	THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL			

Sample No.:	T1901-209
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	10.4
Bore:	28
Depth (m):	0.5-0.95

AS SIEVE SIZE (mm)	PERCENT PASSING
9.5	100
6.7	99
4.75	99
2.36	97
1.18	94
0.600	93
0.425	92
0.300	91
0.150	84
0.075	72



Comments:

Authorised Signatory

Craig Tucker

5 February 2019

Date

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PARTICLE SIZE DISTRIBUTION TEST REPORT

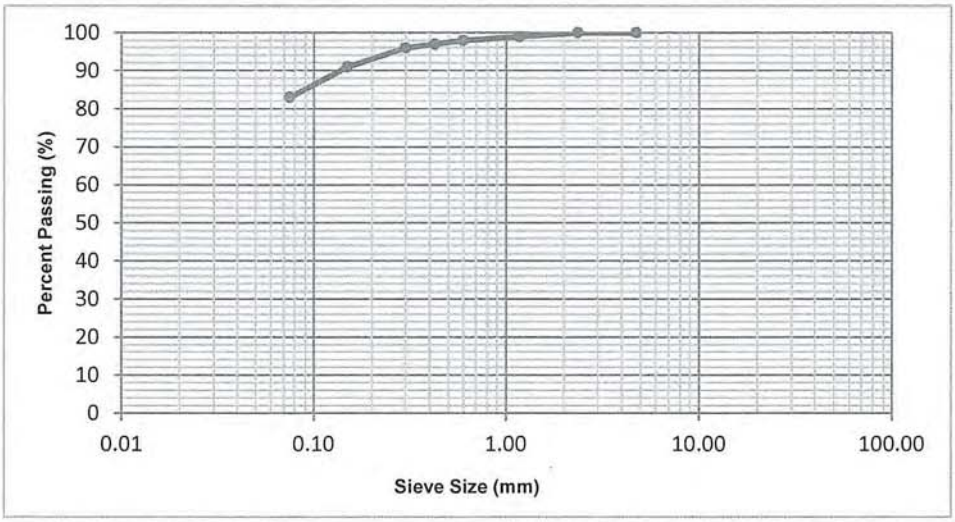
Test Procedure: AS1289.3.6.1 ✓ *Test Procedure: Q103A*

Test Procedure: AS1289.2.1.1 ✓ *Test Procedure: Q103B*

Client:	Economic Development Queensland	Tested by:	CT	Date:	1/05/2019
Project:	Proposed Retirement Village and Child Care Developments	Checked by:	CT	Date:	8/05/2019
Location:	Former Oxley Secondary College, Blackheath Road, Oxley	**Report No.:**	**018-118B_PSD_T1905-02**		
Project No:	018-118B				

Sample No.:	T1905-02
Sampling Method:	AS1289.1.2.1 Cl.6.5.3
Sample Moisture Content (%):	25.0
Bore:	38
Depth (m):	3.0-3.45

AS SIEVE SIZE (mm)	PERCENT PASSING
4.75	100
2.36	100
1.18	99
0.600	98
0.425	97
0.300	96
0.150	91
0.075	83



Comments:

Authorised Signatory

Craig Tucker

8 May 2019

Date