Annexure G – Borehole logs

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Explanatory Notes of Abbreviations and Terms

for Roads and Maritime Projects

Used on Borehole and Excavation Logs

General

Information obtained from site investigations is recorded on log sheets. The “Non-Core Drill Hole - Geological Log” presents data from drilling operations where a core barrel has not been used to recover material, and information is based on a combination of regular sampling and in-situ testing. The material penetrated in non-core drilling is commonly soil but may include rock. The “Core Drill Hole Log” presents data from drilling operations where a core barrel has been used to recover material – commonly rock. The “Excavation - Geological Log” presents data obtained on the subsurface profile from observations of excavations, either natural or man-made. It may contain a scaled, graphical presentation of the typical excavation profile. Refusal of the excavation plant is noted should it occur.

As far as is practicable, the data contained on the log sheets is factual. Some interpretation is inevitable in the assessment of material boundaries in areas of partial sampling, the location of areas of core loss, description and classification of material, estimation of strength and identification of drilling induced fractures. Material description and classification is generally based on AS1726-2017.

Drilling Method

Code	Description
AD/T	Auger drilling with TC-bit
AD/V	Auger drilling V-bit
AS	Auger screwing
AT	Air track
CC	Concrete core
CT	Cable tool rig
DB	Wash bore drag bit
DT	Diatube
HA	Hand auger
HMLC	Diamond core 62mm diameter
HQ	Wire line core barrel 64mm diameter
HQ3	Wire line core barrel 62mm diameter
MZ	Maizer
NDD	Non destructive drilling
NMLC	Diamond core 52mm diameter
NQ	Wire line core barrel 47mm diameter
NQ3	Wire line core barrel 45mm diameter
PT	Continuous push tube
	Pushed SPT
PQ	Wire line core barrel 85mm diameter
PQ3	Wireline core barrel 83mm diameter
	SPT Driven SPT
WB	Wash bore drilling

Drilling Penetration

Ease of penetration in non-core drilling

VE	Very easy
E	Easy
F	Firm
H	Hard
VH	Very hard

Support and Casing

Code	Description	Code	Description
AW	57.2mm	HQ	HQ
BW	73mm	NW	88.9 mm
C	Casing	NQ	47mm
M	Mud	PVC	PVC casing
W	Water	PVC150	150 mm
HW	114.3 mm	PW	PW 139.7mm

Core Run

Core lifts are identified by a line and depth with core loss per run as a percentage. Core loss is shown in the core run unless otherwise indicated.

Defect Spacing

The average distance between defects is measured parallel to the core axis in mm and may be expressed as a range or average.

Angle / Orientation

Angle from horizontal and orientation to magnetic north.

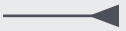
For inclined cored boreholes the Alpha and Beta angles are presented for orientated core. Alpha (α) is measured relative to the core axis, whilst Beta (β) is measured clockwise from the reference line looking down the core axis in the direction of drilling.

Excavation Method

N	Natural exposure
X	Existing excavation
BH	Backhoe bucket
E	Excavator
EH	Excavator with hammer
B	Bulldozer blade
R	Ripper

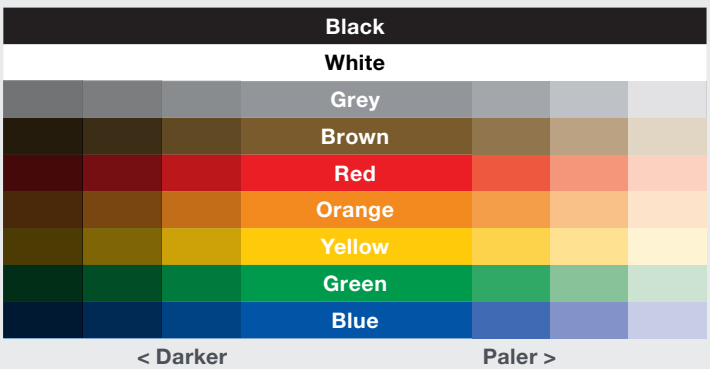
Water / Drilling Fluid

The drilling fluid used is identified and loss of return to the surface is estimated as a percentage, generally of each core lift.

Symbol	Description
	Water inflow
	Water outflow
	Water level: during drilling or immediately after completion of drilling
	Groundwater level with date observed prior to introduction of fluids or after standpipe construction
Not observed	The observation of groundwater, whether present or not, was not possible due to drilling water, surface seepage or cave in of the borehole / test pit.
Not encountered	The borehole / test pit was dry soon after excavation, however groundwater could be present in less permeable strata. Inflow may have been observed had the borehole / test pit been left open for a longer period.

Colour

The colour of a soil or rock is described in a moist/wet condition using simple terms, such as black, white, grey, red, brown, orange, yellow green or blue. These are modified as necessary by 'pale', 'dark' or 'mottled'. Borderline colours are described as a combination of these colours (e.g. orange-brown). Where a soil or rock consists of a primary colour with a secondary mottling it is described as (primary colour) mottled (first colour) and (secondary colour).



Description of Soil

i. Soil name (BLOCK LETTERS)

ii. Plasticity or particle size of soil

iii. Colour

iv. Secondary soil components names & estimated proportions, including their plasticity / particle characteristics, colour

v. Minor soil components name, estimated proportions, including their plasticity / particle characteristics, colour

vi. Other minor soil components

vii. Moisture condition

viii. Consistency / density

ix. Structure of soil, geological origin

x. Additional observations

Particle Size

Term		Grain Size
Clay		< 2 µm
Silt		2 – 75 µm
Sand	Fine	0.075 – 0.21 mm
	Medium	0.21 – 0.6 mm
	Coarse	0.6 – 2.36 mm
Gravel	Fine	2.36 – 6.7 mm
	Medium	6.7 – 19 mm
	Coarse	19 – 63 mm
Cobbles		63 – 200 mm
Boulders		> 200 mm

Fine Grained and Coarse Grained Soils

Term	Description
Fine Grained Soil (cohesive)	More than 35% of the material less than 63 mm is smaller than 0.075 mm (silts and clays)
Coarse Grained Soil	More than 65% of the material less than 63 mm is larger than 0.075 mm (sands, gravels and cobbles)

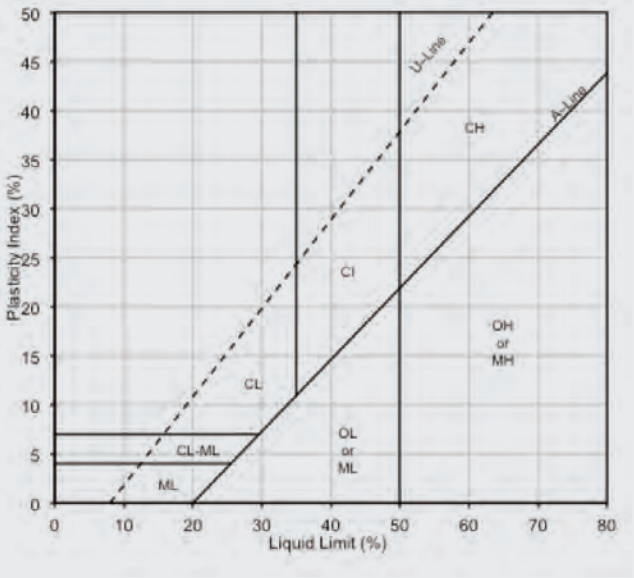
Descriptive Terms for Secondary and Minor Components

Designation of Components	In coarse grained soils				In fine grained soils	
	% Fines	Terminology	% Accessory coarse fraction	Terminology	% Sand / Gravel	Terminology
Minor	≤5	trace	≤15	trace	≤15	trace
	>5, ≤12	with	>15, ≤30	with	>15, ≤30	with
Secondary	>12	prefix	>30	prefix	>30	prefix

Plasticity – Fine Grained Soils

Liquid Limit (LL) %	Description
≤ 35	Low plasticity (L)
>35 to ≤ 50	Medium plasticity (I)
> 50	High plasticity (H)

Plasticity Chart– Fine Grained Soils



Consistency Terms – Fine Grained Soils

Term	Undrained shear strength (kPa)	Indicative SPT (N) Blow Count	Field Guide to Consistency
Very Soft (VS)	<12	0 – 2	Easily penetrated several centimetres by fist, exudes between fingers when squeezed in fist
Soft (S)	12 – 25	2 – 4	Easily penetrated several centimetres by thumb, easily moulded by light finger pressure
Firm (F)	25 – 50	4 – 8	Can be penetrated several centimetres by thumb with moderate effort, and moulded between the fingers by strong pressure
Stiff (St)	50 – 100	8 – 15	Readily indented by thumb but penetrated only with difficultly. Cannot be moulded by fingers
Very Stiff (VSt)	100 – 200	15 –30	Readily indented by thumb nail, still very tough
Hard (H)	>200	>30	Indented with difficulty by thumb nail, brittle
Friable (Fr)	-		Can be easily crumbled or broken into small pieces

Density Terms – Coarse Grained Soils

Term	Density Index (%)	SPT (N) Blow Count
Very Loose (VL)	< 15	0 – 4
Loose (L)	15 – 35	4 – 10
Medium Dense (MD)	35 – 65	10 – 30
Dense (D)	65 – 85	30 – 50
Very Dense (VD)	> 85	>50

Particle Characteristics – Coarse Grained Soils

Term	Description
Well Graded	Having good representation of all particle sizes
Poorly graded	With one or more intermediate size poorly represented
Gap graded	With one or more intermediate sizes absent
Uniform	Essentially of one size

Angularity – Coarse Grained Soils

	Rounded
	Sub-rounded
	Angular
	Sub-angular

Origin of Soil

Fill	Formed by humans
Aeolian	Formed by wind
Alluvial	Formed by streams and rivers
Colluvial	Formed on slopes (talus)
Estuarine	Formed in marine environments
Lacustrine	Formed in lakes
Residual	Formed by weathering insitu

Soil Moisture

	Term	Code	Description
Coarse Grained	Dry	D	Looks and feels dry and free running
	Moist	M	Soil feels cool, darkened in colour, soils tend to stick together, soil grains do not run freely through fingers and no visible free water
	Wet	W	Soil feels cool, darkened in colour, soils tend to stick together, free water on remoulding
Fine Grained	Moist, Less than Plastic Limit	W < PL	Hard and friable or powdery, moisture content well below Plastic Limit
	Moist, Near Plastic Limit	W ≈ PL	Soil feels cool, darkened in colour, can be moulded, near Plastic Limit
	Moist, Wet of Plastic Limit	W > PL	Soil feels cool, dark, usually weakened, free water, moisture content well above Plastic Limit
	Wet, Near Liquid Limit	W ≈ LL	Soil exudes easily
	Wet, Wet of Liquid Limit	W > LL	Soil behaves as a liquid

Boundary Classifications

Soils possessing characteristics of two groups are designated by combinations of group symbols. For example, GW-GC, well graded gravel-sand mixture with clay binder.

Graphic Symbols

	Asphalt		MH
	CH		ML
	CI		OH
	CL		OL
	Concrete		PT
	Fill		SC
	GC		SM
	GM		SP
	GP		SW
	GW		

Soil Classification

Soils are described in general accordance with AS1726-2017 as shown below.

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 63 mm and basing fractions on estimated mass)						GROUP SYMBOL	PRIMARY NAME
COARSE GRAINED SOILS More than 65% of the material is less than 63 mm and is larger than 0.075 mm	A particle size of 0.075 is about the smallest size distinguishable to the naked eye	**GRAVELS** More than half of coarse fraction is larger than 2.36 mm	**CLEAN GRAVELS** (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes, not enough fines to bind coarse grains, no dry strength; ≤ 5% fines		GW	GRAVEL
				Predominantly one size or a range of sizes with more intermediate sizes missing, not enough fines to bind coarse grains, no dry strength; ≤ 5% fines		GP	GRAVEL
			GRAVELS w/ FINES (Appreciable amount of fines)	'Dirty' materials with excess of non-plastic fines, none to medium dry strength; ≥ 12% silty fines		GM	SILTY GRAVEL
				'Dirty' materials with excess of plastic fines, medium to high dry strength; ≥ 12% clayey fines		GC	CLAYEY GRAVEL
		SANDS More than half of coarse fraction is smaller than 2.36 mm	**CLEAN SANDS** (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes, not enough fines to bind coarse grains, no dry strength; ≤ 5% fines		SW	SAND
				Predominantly one size or a range of sizes with more intermediate sizes missing, not enough fines to bind coarse grains, no dry strength; ≤ 5% fines		SP	SAND
			SANDS w/ FINES (Appreciable amount of fines)	'Dirty' materials with excess of non-plastic fines, none to medium dry strength; ≥ 12% silty fines		SM	SILTY SAND
				'Dirty' materials with excess of plastic fines, medium to high dry strength; ≥ 12% clayey fines		SC	CLAYEY SAND
FINE GRAINED SOILS More than 35% of the material less than 63 mm is less than 0.075 mm		**IDENTIFICATION PROCEDURES ON FRACTIONS** < 0.075 mm					
		SILTS AND CLAYS Liquid Limit < 50%	**DRY STRENGTH**	**DILATANCY**	**TOUGHNESS**	**GROUP SYMBOL**	**PRIMARY NAME**
			None to low	Slow to rapid	Low	ML	SILT
			Medium to high	≥ 12% clayey fines	Medium	CL, CI	CLAY
			Low to medium	Slow	Low	OL	ORGANIC SILT
		SILTS AND CLAYS Liquid Limit > 50%	Low to medium	None to slow	Low to medium	MH	SILT
			High to very high	None	High	CH	CLAY
			Medium to high	None to very slow	Low to medium	OH	ORGANIC CLAY
HIGHLY ORGANIC SOILS: readily identified by colour, odour, spongy feel and frequently fibrous texture						PT	PEAT

Description of Rock

i. Rock name (BLOCK LETTERS)

ii. Grain size and mineralogy

iii. Colour

iv. Fabric and texture

v. Features, inclusions, minor components, moisture content and durability

vi. Strength

vii. Weathering and/or alteration

viii. Rock mass properties – discontinuities and structure of rock

ix. Interpreted stratigraphic unit

x. Additional observations including geological structure

Simple rock names are used to provide a reasonable engineering description, rather than a precise geological classification. The rock name is chosen by considering the nature and shape of the grains or crystals, the texture and fabric of the rock material, the geological structure and setting, and information from the geological map of the area. Further guidance on the naming of rocks can be found in AS1726-2017, Tables 15, 16, 17 and 18. Typical rock types are described below, though subject to site specific variations.

Rock Type	Description	Example of Rock Name
Sedimentary	Formed by deposited beds of sediments, have grains that are cemented together and often rounded. Significant porosity	COMMON: Conglomerate, Breccia, Sandstone, Mudstone, Siltstone, Claystone ≥90% CARBONATE: Limestone, Dolomite, Calcirudite, Calcarenite, Calcisiltite, Calcilutite PYROCLASTIC: Agglomerate, Volcanic Breccia, Tuff
Igneous	Formed from molten rock and have a crystalline texture. Typically massive and low porosity. Rock types are from coarse to fine grained.	HIGH QUARTZ CONTENT: Granite, Microgranite, Rhyolite MODERATE QUARTZ CONTENT: Diorite, Microdiorite, Andesite LOW QUARTZ CONTENT: Gabbro, Dolerite, Basalt
Metamorphic	Formed when rocks are subject to heat and/or pressure and have typically have directional fabric. Typically have low porosity and crystalline structure. Rock types are from coarse to fine grained	FOLIATED: Gneiss, Schist, Phyllite, Slate NON-FOLIATED: Marble, Quartzite, Serpentinite, Hornfels
Duricrust	Formed as part of a weathering profile and show evidence of being cemented in situ. Cementation is typically irregular and exhibits replacement textures.	Ferricrete (Iron oxides and hydroxides) Silicrete (Silica) Calcrete (Calcium carbonate) Gypcrete (Gypsum)

Note: ( ) denotes dominant cementing mineralogy

Grain Size

Terms describing dominate grain size in sedimentary rocks.

Term	Grain size
Coarse	Mainly 0.6 mm to 2 mm
Medium	Mainly 0.2 mm to 0.6 mm
Fine	Mainly 0.06mm (just visible) to 0.2 mm

Terms describing dominate grain size in igneous and metamorphic rocks

Term	Grain size
Coarse	Mainly greater than 2 mm
Medium	0.06 mm to 2 mm
Fine	Mainly less than 0.06 mm (just visible) to 0.2mm

Texture and Fabric

Sedimentary rocks

Thickness	Bedding Term
< 6 mm	Thinly laminated
6 – 20 mm	Laminated
20 – 60 mm	Very thinly bedded
60 – 200 mm	Thinly bedded
0.2 – 0.6 m	Medium bedding
0.6 – 2 m	Thickly bedded
> 2 m	Very thickly bedded

Igneous rocks

Term	Definition
Amorphous	Indicates that the rock has no obvious crystalline structure
Crystalline	A regular molecular structure, showing crystal structure and symmetry.
Cryptocrystalline	The texture comprises crystals that are too small to recognise under an ordinary microscope. Indistinctly crystalline.
Porphyritic	Indicates the presence of phenocrysts (relatively large crystals in a fine grained ground mass) in igneous rocks.
Flow banded	Indicates visible flow lines in volcanic rocks and some intrusive rocks
Glassy	Entirely glass like. No crystalline units and without crystalline structure.
Vesicular	A texture of volcanic rocks that indicates the presence of vesicles (small gas bubbles). Where the vesicles are filled with a mineral substance they are termed Amygdales and the texture is Amygdaloidal.

Metamorphic

Term	Definition
Foliation	The parallel arrangement of minerals due to metamorphic process, which shall be defined by the terms in weak, moderate and strongly foliated.
Porphyroblastic	A texture indicating the presence of porphyroblasts (larger crystals formed by recrystallization during metamorphism, such as garnet or staurolite in a mica schist).
Cleavage	A type of foliation developed in fine grained metamorphic rocks such as slates.

Bedding and Fabric Development

Type	Definition
Massive	No obvious development of bedding – rock appears homogeneous
Poorly Developed	Bedding is barely obvious as faint mineralogical layering or grain size banding, but bedding planes are poorly defined.
Well Developed	Bedding is apparent in outcrops or drill core as distinct layers or lines marked by mineralogical or grain size layering.
Very Well Developed	Bedding is often marked by a distinct colour banding as well as by mineralogical or grain size layering.
Indistinct fabric	There is little effect on strength properties
Distinct Fabric	The rock may break more easily parallel to the fabric

Rock Strength

Term (Code)	UCS (MPa)	$Is_{(50)}$ (MPa)	Field Guide to Strength
Extremely Low (EL)	<0.6	<0.03	Easily remoulded by hand to a material with soil properties
Very Low (VL)	0.6 – 2	> 0.03 to ≤0.1	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 3 cm thick can be broken by finger pressure.
Low (L)	2 - 6	> 0.1 to ≤ 0.3	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blow of the pick point; has dull sound under hammer. A piece of core 150 mm long 50 mm in diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium (M)	6 - 20	> 0.3 to ≤ 1.0	Readily scored with a knife; a piece of core 150 mm long by 50 mm in diameter can be broken by hand with difficulty.
High (H)	20 - 60	> 1 to ≤ 3	A piece of core 150 mm long by 50 mm in 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)	60 -200	> 3 to ≤ 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High (EH)	>200	> 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

Rock strength is assessed by laboratory Uniaxial Compressive Strength (UCS) testing and/or Point Load Strength Index (PLT) testing to obtain the $Is_{(50)}$ the strength table implies a 20 times correlation between $Is_{(50)}$ and UCS used for classification. Note however, multiplier may range from 4 (e.g. some carbonated and low strength rocks) to 40 (e.g. some igneous rocks and/or some high strength rocks). A site specific correlation based on testing, previous investigation or literature may be used where available. These terms refer to the strength of the rock material and not to the strength of the rock mass which may be considered weaker due to the effect of rock defects.

Visual Log

A diagrammatic plot of defects showing type, spacing and orientation in relation to the core axis.

- Defects open in situ or clay sealed
- Defects closed in-situ
- Drill induced fractures or handling breaks
- Infilled seam

Rock Weathering and or Alteration Classification

Term (Code)	Definition
Residual soil (RS)	Soil developed on extremely weathered rock. The rock mass structure and substance fabric are no longer evident but the soil has not been significantly transported.
Extremely weathered (EW) Extremely altered (XA)	Rock is weathered to such an extent that it has 'soil' properties, i.e, it either disintegrates or can be remoulded in water, but the texture of original rock is still evident.
Highly weathered (HW) Highly Altered (HA)	Whole rock material is discoloured usually by extent that iron staining or bleaching 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 rock substance is no longer recognisable
Moderately weathered (MW) Moderately Altered (MA)	Whole rock material is discoloured usually by staining that original colour of the fresh rock is no longer recognisable
Slightly weathered (SW) Slightly altered (SA)	Rock is slightly discoloured but shows little or no change of strength from fresh rock
Fresh rock (F)	Rock shows no sign of decomposition or staining.

Rock Core Recovery

TCR = Total Core Recovery (%)

$$\frac{\text{Length of Core Recovered}}{\text{Length of Core run}} \times 100$$

SCR = Solid Core Recovery (%)

$$\frac{\text{Sum Length of Cylindrical Core Recovered}}{\text{Length of Core run}} \times 100$$

RQD = Rock Quality Designation (%)

$$\frac{\text{Sum Length of Sound Core Pieces > 100mm in length}}{\text{Length of Core run}} \times 100$$

Types of Discontinuities

Term	Code	Description
Bedding Parting	BP	A defect parallel or sub-parallel to a layered arrangement of mineral grains or micro-fractures, which has caused planar anisotropy in the rock substance.
Joint	JT	A defect across which the rock substance has little tensile strength, but that is not related to textural or depositional features within the rock substance.
Sheared Zone	SZ	A zone with roughly parallel planar boundaries of rock substance consisting of closely spaced joints with smooth slickensided surfaces often curved. The joints divide the rock mass into unit blocks usually of lenticular or wedge shape.
Crushed Zone	CZ	A zone or seam with roughly parallel planar boundaries of rock substance composed of disoriented, usually angular, fragments of the host rock substance
Seam	SM	A zone or seam with roughly parallel boundaries, infilled by soil (IS) or decomposed rock (DS)
Fault	F	A fracture (defect) in rock along which there has been an observable amount of displacement.
Vein	VN	A zone of minerals intruded into a joint or fissures.

Type of Structures

Term	Code	Description
Bedding	Bg	A layered arrangement of minerals parallel to the surface of deposition which has caused planar anisotropy in the rock substance.
Cleavage	C	An alignment of fine grained minerals caused by deformation.
Schistosity	SH	A layered arrangement of minerals to each other
Foliation	Fo	A planar alignment of minerals caused by deformation.
Void	Vo	A completely empty space
Dyke	DK	Sheet-like bodies of igneous rock that cut across sedimentary bedding or foliations in rocks. They may be single or multiple in nature
Sill	SI	A sill is an intrusion of magma that spreads underground between the layers of another kind of rock
Contact	Cn	A contact between intrusive and stratigraphic units.
Boundary	Bd	A distinct boundary between two stratigraphic units

Note: Drill breaks (DB) and handling breaks (HB) are not included as natural discontinuity.

Discontinuity Spacing

Spacing (mm)	Description
>6000	Extremely Widely Spaced
2000 - 6000	Very Widely Spaced
600 - 2000	Widely Spaced
200 - 600	Medium Spaced
60 - 200	Closely Spaced
20 - 60	Very Closely Spaced
<20	Extremely Closely Spaced

Discontinuity Planarity

Code	Description
CU	Curved – A defect with a gradual change in orientation
IR	Irregular – A defect with many sharp changes in orientation
PR	Planar – Defect forms a continuous plane without variation in orientation
ST	Stepped – A defect with distinct sharp steps or step
UN	Undulose – A defect with undulations

Discontinuity Roughness

Abbreviation	Description
RF	Rough – Many small surface irregularities generally related to the grain size of the parent rock
S	Smooth – Few or no surface irregularities related to the grain size of the parent rock
POL	Polished – Planes have a distinct sheen or a smoothness
SL	Slickensided – Planes have a polished, grooved or striated surface consistent with differential movement of the parent rocs along the plane
VR	Very rough – many large surface irregularities, amplitude generally more than 1mm

Infill Material

Code	Name	Code	Name
CA	Calcite	Um	Unidentified mineral
KT	Chlorite	Qz	Quartz
CLAY	Clay	X	Carbonaceous
Fe Clay	Iron oxide clay		

Discontinuity Observation

Term	Code	Description
Clean	CN	No visible coating or infill
Stain	SN	No visible coating or infill but surfaces are discoloured by mineral staining
Veneer <1 mm	VNR	A visible coating or soil or mineral substance but usually unable to be measured. If discontinuous over the plane, patchy veneer.
Coating >1 mm to <10 mm	CT	A visible coating or infilling of soil or mineral substance. Describe composition and thickness.
Filling (Filled) >10 mm	Filled	A visible filling of soil or mineral substance. Describe composition and thickness.

Samples and Field Tests

Code	Description
B	Bulk disturbed sample
BLK	Block sample
C	Core sample
CBR	CBR mould sample
D	Small disturbed sample
ES	Soil sample for environmental testing
EW	Water sample for environmental testing
G	Gas sample
H	Hydraulic fracturing
HP	Hand penetrometer test
$Is_{(50)}$	Point Load Index
LB	Large bulk disturbed sample
M	Mazier type sample
N	Standard penetration test result (N* denotes SPT sample recovery)
O	Core orientation
P	Piston sample
PID	Photoionisation detector reading in ppm
R	Hammer bouncing / refusal
SPT	Standard Penetration Test
U	Undisturbed push in sample
UCS	Uniaxial Compressive Strength
W	Water sample
● (A)	Axial Test
○ (D)	Diametral Test
□	Irregular Lump test

Laboratory Tests

Code	Description
ACM	Asbestos Containing Material
CD	Consolidated Drained
CU	Consolidated Undrained
LL	Liquid Limit
LS	Linear Shrinkage
MC	Moisture Content
MDD	Maximum Dry Density
OMC	Optimum Moisture Content
PBT	Plate Bearing Test
PI	Plasticity Index
PL	Plastic Limit
PSD	Particle Size Distribution
ρ_b	Bulk Density
ρ_p	Particle Density
ρ_d	Dry Density
UU	Undrained Unconsolidated

Backfill / Standpipe Detail

Symbol	Description	Symbol	Description
	Cement seal		Filter pack: sand filter
	Grout backfill		Filter pack: gravel filter
	Blank pipe		Bentonite seal
	Slotted pipe		Cutting – excavated material backfill
	Surface Completion: Monument Above Ground		Surface Completion: Gatic Ground Monument

Completion Details

Type	Description
Collapse	Exploratory hole collapsed before reaching planned depth
Equipment Failure	Boring or excavator equipment operational failure
Flooding	Flooding of excavation
Machine Limit	Limit of machine capability reached
Obstruction in the hole	Obstruction preventing further advancement
Possible services	Indication of possible services below
Services present	Services encountered during exploratory hole
Squeezing	Hole squeezing boring equipment
Target Depth	Depth reached as planned
Refusal	Refusal

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1300**
SHEET No:	1 of 3
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Rockdale Tennis Club Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328264.8, N: 6241003.7 (MGA94 Zone 56)
FINAL DEPTH: 17.5m

SURFACE ELEVATION : 2.530 (AHD)
TOP OF CASING: 2.370 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HA	CASING	2	1	3/11/2017	M		**Silty SAND**: fine grained, dark brown, with rootlets	BH1300	Concrete:	TOPSOIL
							FILL: Sandy Gravelly CLAY: high plasticity, dark brown, fine sub-angular gravel, fine to medium grained sand			FILL
					>PL		**Silty CLAY**: high plasticity, dark grey to black			ALLUVIUM
AD/T		0	2				**SAND**: fine to medium grained, dark brown			
			3							
			4						Cuttings:	
		-2	5		W					
WB			6							
		-4	7							

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 7/11/2017
COMPLETED: 8/11/2017

LOGGED BY: KL
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1300**
SHEET No:	2 of 3
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Rockdale Tennis Club Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328264.8, N: 6241003.7 (MGA94 Zone 56)
FINAL DEPTH: 17.5m

SURFACE ELEVATION : 2.530 (AHD)
TOP OF CASING: 2.370 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL			Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components		Construction Details	Construction notes	Notes (Structure, origin, etc)
WB		-6	9		W		**SAND**: fine to medium grained, dark brown *(continued)*				**ALLUVIUM**
							Sandy Silty CLAY: high plasticity, dark grey, fine grained sand				
		-8	10							Bentonite:	
			11								
		-10	12		>PL						
			13							Start Slotted 13m	
		-12	14							Sand:	
			15				**SILTSTONE**: dark grey, extremely weathered, estimated very low strength				**WEATHERED ROCK**

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 7/11/2017
COMPLETED: 8/11/2017

LOGGED BY: KL
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1300**
SHEET No:	3 of 3
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Rockdale Tennis Club Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328264.8, N: 6241003.7 (MGA94 Zone 56)
FINAL DEPTH: 17.5m

SURFACE ELEVATION : 2.530 (AHD)
TOP OF CASING: 2.370 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
RR		-14	17				**SANDSTONE**: fine to medium grained, brown and pale brown, extremely weathered, estimated very low strength *(continued)*		End Slotted 16m Bentonite:	**WEATHERED ROCK**
		-16	18 19 20				Hole Terminated at 17.50 m Target Stratum			
		-18	21 22							
		-20	23							

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 7/11/2017
COMPLETED: 8/11/2017

LOGGED BY: KL
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1303**
SHEET No:	1 of 5
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : West Botany Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328703.9, N: 6240469.4 (MGA94 Zone 56)
FINAL DEPTH: 36m

SURFACE ELEVATION : 5.020 (AHD)
TOP OF CASING: 4.900 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
AD/V		4	1		M		**FILL: SAND**: fine grained, pale brown mottled dark brown/dark grey, trace fine to medium grained, sub-angular to sub-rounded gravel, trace plastic fragments, trace fine grained sub-angular to angular charcoal fragments	BH1303	Concrete: PVC pipe stick down -0.14m	**FILL**
			2				1.4m: trace glass sand rubber fragments, trace fine to coarse grained sub-angular to sub-rounded gravel, trace silty clay pockets, low plasticity, dark grey			
		2	3	13/11/2017	W		**FILL: Sandy CLAY**: medium plasticity, dark grey, fine grained sand, trace plastic/metal/glass/rubber fragments, trace silt			
	CASING		4				**FILL: Silty SAND**: fine to coarse grained, dark grey, with fine to coarse grained, sub-angular to angular gravel, with fill materials (plastic, glass, metal, rubber fragments)		Bentonite:	
WB		0	5		>PL		**Silty CLAY**: high plasticity, grey mottled brown/dark grey, trace fine grained sand, trace timber fragments and organic material			**ALLUVIUM**
		-2	7		W		**SAND**: fine grained, pale grey/grey, trace fine shell fragments			

Notes: Inflow, Outflow, Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 23/10/2017
COMPLETED: 25/10/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1303**
SHEET No:	2 of 5
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : West Botany Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328703.9, N: 6240469.4 (MGA94 Zone 56)
FINAL DEPTH: 36m

SURFACE ELEVATION : 5.020 (AHD)
TOP OF CASING: 4.900 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL			Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components		Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-4	9		W		**SAND**: fine grained, pale grey/grey, trace fine shell fragments *(continued)*				**ALLUVIUM**
					>PL		**Sandy CLAY**: high plasticity, dark grey/grey, fine grained sand, trace silt				
			10		W		**SANDY SILT/SILTY SAND**: fine, dark grey/grey, trace low plasticity clay			Start Slotted 10m	
		-6	11								
			12		>PL		**Silty CLAY**: high plasticity, brown mottled pale brown/pale grey **Sandy CLAY**: high plasticity, pale grey, fine grained sand				
		-8	13		W		**SAND**: fine grained, pale grey, trace low plasticity clay **SAND**: fine grained, pale brown			End Slotted 13m Sand:	
			14								
		-10	15		>PL		**Silty CLAY**: high plasticity, pale grey/grey 14.82m: becoming dark grey mottled grey, fissured, trace sand lenses: fine grained, grey, 5-10mm thick, ~50-100mm spacing, trace rootlets				

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 23/10/2017
COMPLETED: 25/10/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1303**
SHEET No:	3 of 5
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : West Botany Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328703.9, N: 6240469.4 (MGA94 Zone 56)
FINAL DEPTH: 36m

SURFACE ELEVATION : 5.020 (AHD)
TOP OF CASING: 4.900 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL			Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components		Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-12	17		>PL		**Sandy CLAY**: high plasticity, dark grey, fine grained sand, with interbedded clayey sand bands: fine grained, dark grey, trace shell fragments ~100-150mm spacing 17m: becoming brown 17.3m: becoming dark grey			Start Slotted 16m	
					W		**SAND**: fine grained, grey mottled pale grey, trace fine shell fragments				ALLUVIUM
			18		~PL		**Silty CLAY**: high plasticity, pale grey/white, trace rootlets, trace fine grained, rounded gravel **Sandy CLAY**: high plasticity, pale grey/white, fine grained sand				RESIDUAL SOIL
		-14	19				**SANDSTONE**: fine to medium grained, dark brown/brown, extremely to highly weathered, estimated very low strength 19.2m to 19.5m: recovered as fine grained sand			End Slotted 19m	WEATHERED ROCK
HQ3			20				**SANDSTONE**: fine to medium grained, red brown, indistinctly bedded at 30deg, iron stained 20.04: becoming pale grey/white mottled red brown				BEDROCK
							CORE LOSS 0.25m (20.40-20.65)				
		-16	21				**SANDSTONE**: fine to medium grained, red brown, indistinctly bedded at 30deg, iron stained From 20.65m: becoming red brown mottled pale grey/white/yellow From 21.35m: fine to coarse grained				BEDROCK
			22				22m: becoming mottled pale grey/pink/dark grey, distinctly bedded at 10-20deg				
		-18	23				23m: becoming red brown mottled yellow/pink/pale grey 23.5m: becoming pink mottled pale grey/yellow 23.7m: distinctly cross-bedded at 10-20deg				

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 23/10/2017
COMPLETED: 25/10/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1303**
SHEET No:	4 of 5
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : West Botany Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328703.9, N: 6240469.4 (MGA94 Zone 56)
FINAL DEPTH: 36m

SURFACE ELEVATION : 5.020 (AHD)
TOP OF CASING: 4.900 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-20	25				**SANDSTONE**: fine to coarse grained, orange brown mottled pale grey, indistinctly bedded at 10-30deg		Bentonite:	**BEDROCK**
							SANDSTONE: fine to medium grained, pale grey mottled purple grey and orange brown, indistinctly bedded at 10-25deg, locally cross-bedded			
			26							
		-22	27				27.5m: becoming purple mottled purple/pale grey			
			28				28.1m to 28.4m: becoming yellow mottled purple/pale grey			
							SANDSTONE: fine to medium grained, pale grey and grey, indistinctly bedded at 10deg			
		-24	29				**SANDSTONE**: fine to medium grained, pale grey, indistinctly bedded at 10-20deg 29.35m to 29.55m: trace black carbonaceous flecks			
							CORE LOSS 0.22m (29.78-30.00)			
			30				**SANDSTONE**: fine to medium grained, pale grey and grey, indistinctly bedded at 10deg			**BEDROCK**
							SANDSTONE: medium grained, pale grey, massive			
		-26	31				**SANDSTONE**: fine to medium grained, pale grey and grey, indistinctly bedded at 10deg			
							SANDSTONE: fine to medium grained, pale grey, indistinct locally disturbed bedding			

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 23/10/2017
COMPLETED: 25/10/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1303**
SHEET No:	5 of 5
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : West Botany Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328703.9, N: 6240469.4 (MGA94 Zone 56)
FINAL DEPTH: 36m

SURFACE ELEVATION : 5.020 (AHD)
TOP OF CASING: 4.900 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-28	33				**SANDSTONE**: fine to medium grained, pale grey and grey, indistinctly bedded at 10deg *(continued)* From 32.45m: becoming cross-bedded **SANDSTONE**: fine to coarse grained, pale grey, indistinctly bedded at 10-20deg 32.75m to 33.08m: fine to coarse grained 33.06m to 33.08m: trace fine to medium grained sub-rounded to rounded siltstone clasts **SANDSTONE**: fine to medium grained, pale grey, distinctly bedded at 0-10deg			**BEDROCK**
		-30	34 35 36				Hole Terminated at 36.00 m Target Depth			
		-32	37 38							
		-34	39							

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 23/10/2017
COMPLETED: 25/10/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1314**
SHEET No:	1 of 4
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Spring Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328545.6, N: 6242493.9 (MGA94 Zone 56)
FINAL DEPTH: 25.21m

SURFACE ELEVATION : 7.950 (AHD)
TOP OF CASING: 7.790 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
NDD	CASING	6	1		M		**Silty SAND**: fine grained, dark brown, trace rootlets **FILL: Silty SAND**: fine grained, dark brown mottled brown, trace rootlets	BH1314	Concrete: Bentonite:	TOPSOIL FILL
AD/V	CASING	4	2	14/11/2017	M - W		**Clayey SAND**: fine grained, pale red brown mottled pale grey, low plasticity clay			ALLUVIUM
			3		W		**SILTY CLAY/CLAYEY SILT**: low plasticity, pale brown, trace fine grained sand			
		2	4		>PL		**Silty CLAY**: high plasticity, dark grey, trace fine grained sand **CLAY**: high plasticity, dark grey mottled black, trace silt, trace charcoal fragments **Sandy CLAY**: medium plasticity, grey mottled dark grey, fine grained sand, with interbedded clayey sand bands; fine grained, dark grey, 100-200mm thick, ~200-300mm spacing			
			5							
			6							
			7		M		**Clayey SAND**: fine to medium grained, pale grey, low plasticity clay, trace sand bands; fine grained, pale grey, 200mm thick, ~200mm spacing			
		0			W					

Notes: Inflow, Outflow, Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 31/10/2017
COMPLETED: 1/11/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1314**
SHEET No:	2 of 4
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Spring Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328545.6, N: 6242493.9 (MGA94 Zone 56)
FINAL DEPTH: 25.21m

SURFACE ELEVATION : 7.950 (AHD)
TOP OF CASING: 7.790 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
AD/V			9		W		**Clayey SAND**: fine to medium grained, pale grey, low plasticity clay, trace sand bands; fine grained, pale grey, 200mm thick, ~200mm spacing *(continued)* From 8.5m: trace fine grained sub-rounded to rounded quartz gravel		Cuttings:	**ALLUVIUM**
		-2	10				**Silty CLAY**: high plasticity, dark grey mottled black, trace charcoal/organic material			
WB	CASING		11		>PL					
		-4	12				**Silty CLAY**: high plasticity, pale grey/grey mottled orange			
			13							
		-6	14		<PL					
			15							
		-8								

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 31/10/2017
COMPLETED: 1/11/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1314**
SHEET No:	3 of 4
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Spring Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328545.6, N: 6242493.9 (MGA94 Zone 56)
FINAL DEPTH: 25.21m

SURFACE ELEVATION : 7.950 (AHD)
TOP OF CASING: 7.790 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-10	17		W		**SAND**: fine grained, grey mottled dark grey, trace sandy clay lenses; medium to high plasticity, grey		Bentonite:	**ALLUVIUM**
			18							
			19		>PL		**Silty CLAY**: high plasticity, dark brown/dark grey, with fine grained sand		Start Slotted 19m	
		-12	20				**SAND**: fine grained, pale brown			
			21		W				Sand:	
		-14	22				22m: becoming grey			
			23				**Silty SAND**: fine grained, dark grey mottled grey			
		-16								

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 31/10/2017
COMPLETED: 1/11/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1314**
SHEET No:	4 of 4
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Spring Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328545.6, N: 6242493.9 (MGA94 Zone 56)
FINAL DEPTH: 25.21m

SURFACE ELEVATION : 7.950 (AHD)
TOP OF CASING: 7.790 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING				W		**Silty SAND**: fine grained, dark grey mottled grey *(continued)*			**ALLUVIUM**
					W		**SAND**: fine grained, pale grey, trace silt			**RESIDUAL SOIL**
			25				**SANDSTONE**: fine grained, pale grey, extremely to highly weathered, estimated very low to low strength		End Slotted 25m Sand: backfilled with sand and bentonite	**WEATHERED ROCK**
							Hole Terminated at 25.21 m Target Stratum			
		-18	26							
			27							
		-20	28							
			29							
		-22	30							
			31							
		-24								

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 31/10/2017
COMPLETED: 1/11/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1315**
SHEET No:	1 of 4
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Beehag Reserve Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328708.3, N: 6242446.3 (MGA94 Zone 56)
FINAL DEPTH: 31.6m

SURFACE ELEVATION : 3.880 (AHD)
TOP OF CASING: 3.780 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
AD/V		2	1	14/11/2017	M		**Sandy SILT**: brown, fine grained sand, trace low plasticity clay, trace rootlets	BH1315	Concrete: PVC pipe stick down -0.1m	**TOPSOIL**
							FILL: Silty SAND: fine grained, brown mottled pale brown			**FILL**
							0.5m: becoming dark grey/dark brown			
							FILL: Sandy CLAY: medium plasticity, dark grey/black, fine grained sand, trace fine to coarse grained, angular to sub-angular gravel			
					M - W		0.8m to 0.85m: trace fine to coarse grained, sub-angular to angular gravel			**ALLUVIUM**
							Silty SAND: fine grained, dark grey, trace low plasticity clay, trace rootlets			
			2		W		**SAND**: fine grained, grey mottled dark grey			
							Silty CLAY: high plasticity, pale grey, with fine grained sand, trace rootlets			
			3		>PL		**Sandy CLAY**: high plasticity, pale grey, fine grained sand			
	CASING	0	4				**Clayey SAND**: fine grained, pale grey, low plasticity clay			
					W		**SAND**: fine grained, pale grey, trace low plasticity clay			
			5				**Clayey SAND**: fine grained, pale grey, medium plasticity clay			
WB		-2	6				**Silty CLAY**: high plasticity, pale grey mottled dark grey, trace fine grained sand			
					>PL		**Sandy CLAY**: medium plasticity, pale grey/grey mottled dark grey, fine grained sand			
			7				**SAND**: fine grained, pale brown			
					W		From 7.3m: trace shell fragments			
		-4								

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 26/10/2017
COMPLETED: 27/10/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1315**
SHEET No:	2 of 4
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Beehag Reserve Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328708.3, N: 6242446.3 (MGA94 Zone 56)
FINAL DEPTH: 31.6m

SURFACE ELEVATION : 3.880 (AHD)
TOP OF CASING: 3.780 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
					W		**SAND**: fine grained, pale brown *(continued)*			**ALLUVIUM**
			9		<PL		**Silty CLAY**: high plasticity, brown			
		-6	10		W		**Clayey SAND**: fine grained, pale grey, low plasticity clay			
							Sandy CLAY: medium plasticity, pale grey, fine grained sand			
			11		>PL					
WB	CASING	-8	12						Bentonite:	
			13				**Silty CLAY**: high plasticity, pale grey/pale brown			
							Silty CLAY: high plasticity, dark grey mottled brown/black, trace fine grained sand, trace charcoal fragments			
		-10	14		<PL		**Sandy CLAY**: medium plasticity, grey mottled dark grey, fine grained sand			
			15				**Silty CLAY**: high plasticity, dark grey mottled black			
		-12								

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 26/10/2017
COMPLETED: 27/10/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1315**
SHEET No:	3 of 4
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Beehag Reserve Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328708.3, N: 6242446.3 (MGA94 Zone 56)
FINAL DEPTH: 31.6m

SURFACE ELEVATION : 3.880 (AHD)
TOP OF CASING: 3.780 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING				<PL		**Silty CLAY**: high plasticity, dark grey mottled black *(continued)*			**ALLUVIUM**
			17				**INTERBEDDED CLAYEY SAND AND SILTY CLAY**: clayey sand is fine grained, dark grey, medium plasticity clay, ~200-300mm bands; silty clay is high plasticity, dark grey, beds are ~200-300mm thick			
		-14	18							
			19				From 19m: trace fine charcoal fragments			
		-16	20		>PL					
			21							
		-18	22							
			23							
		-20								

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 26/10/2017
COMPLETED: 27/10/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1315**
SHEET No:	4 of 4
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Beehag Reserve Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328708.3, N: 6242446.3 (MGA94 Zone 56)
FINAL DEPTH: 31.6m

SURFACE ELEVATION : 3.880 (AHD)
TOP OF CASING: 3.780 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-22	25		W		**Silty Clayey SAND**: fine grained, black/dark grey, low plasticity clay, trace organic material, trace rootlets			**ALLUVIUM**
							From 25m: with interbedded lenses of sand and clay; sand is fine grained, grey; clay is low to medium plasticity, grey/black, with silt, lenses are 10-30mm thick, ~50-100mm spacing		Start Slotted 25.6m	
			26							
			27						Sand:	
		-24	28							
					~PL / W		**SANDY CLAY/CLAYEY SAND**: fine, medium plasticity, pale grey, trace rootlets			**RESIDUAL SOIL**
		-26	29							
			30							
			31				**SANDSTONE**: fine grained, pale grey/white mottled pale yellow, extremely to highly weathered, estimated very low to low strength, recovered as sandy clay: medium plasticity, fine grained sand			**WEATHERED ROCK**
		-28					Hole Terminated at 31.60 m Target Stratum		End Slotted 31.6m	

Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 26/10/2017
COMPLETED: 27/10/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1316**
SHEET No:	1 of 5
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Garnet Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328438.8, N: 6241036.2 (MGA94 Zone 56)
FINAL DEPTH: 34m

SURFACE ELEVATION : 2.220 (AHD)
TOP OF CASING: 2.100 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth					MATERIAL	Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HA		2	1	14/11/2017	D		**Silty SAND**: fine grained, dark brown mottled pale grey, trace fine to coarse grained, sub-angular to sub-rounded gravel, trace rootlets	BH1316	Concrete:	TOPSOIL FILL
					M		**FILL: Sandy SAND**: fine to coarse grained, dark brown, trace low plasticity clay, trace fine to coarse grained, sub-angular to sub-rounded gravel, trace glass From 0.3m: with cobbles <200mm diameter			
					>PL		**Silty CLAY**: high plasticity, dark brown mottled brown, trace rootlets, trace clayey sand lenses; brown, fine grained up to 20-30mm thick			ALLUVIUM
AD/T	CASING	0	2				**Silty SAND**: fine grained, dark grey mottled pale brown, trace low plasticity clay			
			3				**SAND**: fine grained, dark grey, with silt 2.5m to 2.6m: trace organic material			
		-2	4		W		From 4m: trace silt, trace shell fragments, trace low plasticity clay			
			5							
		-4	6				**Clayey SAND**: fine grained, dark grey, low plasticity clay, trace organics, trace sand lenses; grey, fine grained, trace shell fragments			
			7							
WB							**Clayey SAND**: fine grained, dark grey, low plasticity clay			
					>PL		**Sandy CLAY**: high plasticity, dark grey, fine grained sand			

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 2/11/2017
COMPLETED: 6/11/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1316**
SHEET No:	2 of 5
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Garnet Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328438.8, N: 6241036.2 (MGA94 Zone 56)
FINAL DEPTH: 34m

SURFACE ELEVATION : 2.220 (AHD)
TOP OF CASING: 2.100 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL			Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components		Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-6	9		>PL		**Sandy CLAY**: high plasticity, dark grey, fine grained sand *(continued)*				**ALLUVIUM**
			10		W		**SAND**: fine grained, pale grey				
		-8					**Sandy CLAY**: high plasticity, pale grey, fine grained sand, trace silt				
			11				**Silty CLAY**: high plasticity, pale grey, with fine grained sand, trace silt 11m to 11.5m: becoming orange brown				
		-10	12				12.5m: becoming pale brown			Cuttings:	
			13		>PL		From 13m: with interbedded sandy clay: high plasticity, pale grey, fine grained sand, 200mm thick, ~200- 300mm spacing				
		-12	14								
			15								

Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 2/11/2017
COMPLETED: 6/11/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1316**
SHEET No:	3 of 5
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Garnet Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328438.8, N: 6241036.2 (MGA94 Zone 56)
FINAL DEPTH: 34m

SURFACE ELEVATION : 2.220 (AHD)
TOP OF CASING: 2.100 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL			Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components		Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-14					**Clayey SAND**: fine grained, pale brown, medium plasticity clay				**ALLUVIUM**
							Sandy CLAY: high plasticity, pale grey mottled pale orange, fine grained sand, with interbedded bands of clayey sand				
							16.7m to 17.2m: potential loose/soft band indicated by very easy drilling penetration				
			17		>PL						
			18								
		-16									
			19		W		**Clayey SAND**: fine grained, pale brown mottled red, low plasticity clay				
							Sandy CLAY: high plasticity, pale grey mottled red, fine grained sand				
			20								
		-18					20.4m: becoming red				
					<PL						
			21								
			22				22m: becoming pale brown mottled red/ grey				
		-20					**Silty CLAY**: high plasticity, dark grey mottled dark brown, trace fine grained sand, trace clayey sand lenses; medium plasticity, dark brown, fine grained, 50-100mm thick, 150-200mm spacing				
			23		>PL						

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 2/11/2017
COMPLETED: 6/11/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1316**
SHEET No:	4 of 5
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Garnet Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328438.8, N: 6241036.2 (MGA94 Zone 56)
FINAL DEPTH: 34m

SURFACE ELEVATION : 2.220 (AHD)
TOP OF CASING: 2.100 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-22	25		>PL		**Silty CLAY**: high plasticity, dark grey mottled dark brown, trace fine grained sand, trace clayey sand lenses; medium plasticity, dark brown, fine grained, 50-100mm thick, 150-200mm spacing *(continued)*		Bentonite:	**ALLUVIUM**
		-24	26 27 28		W		**Clayey SAND**: fine grained, grey mottled pale brown, medium plasticity clay, trace charcoal, trace high plasticity clay pockets, trace sand pockets, trace rootlets		Start Slotted 28m Sand:	
		-26	29 30				**SANDSTONE**: fine to medium grained, pale grey, highly to extremely weathered, estimated very low to low strength		End Slotted 31m	**WEATHERED ROCK**
		-28	31							

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 2/11/2017
COMPLETED: 6/11/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	**BH1316**
SHEET No:	5 of 5
PROJECT No:	***30012460***

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Garnet Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328438.8, N: 6241036.2 (MGA94 Zone 56)
FINAL DEPTH: 34m

SURFACE ELEVATION : 2.220 (AHD)
TOP OF CASING: 2.100 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB		-30			W		**SANDSTONE**: fine to medium grained, pale grey, highly to extremely weathered, estimated very low to low strength *(continued)*			**WEATHERED ROCK**
RR			33				**SILTSTONE**: dark grey, with fine grained sand, extremely weathered, estimated very low strength		Bentonite:	
							SANDSTONE: fine to medium grained, pale grey, highly weathered, estimated low strength			
			34				Hole Terminated at 34.00 m Target Stratum Note that indicated top of rock level is based upon drilling resistance and feed back from driller, due to lack of recovery in successive SPT tests towards base of soil column.			
		-32								
			35							
			36							
		-34								
			37							
			38							
		-36								
			39							

Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 2/11/2017
COMPLETED: 6/11/2017

LOGGED BY: FF
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

SMEC

HOLE No:	**BH2**
SHEET No:	1 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Brantwood Street Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327540.960, N: 6236281.150 (56 MGA94)
FINAL DEPTH: 50m

SURFACE ELEVATION : 3.010 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Construction notes	Notes (Structure, origin, etc)
HA	CASING	2	1			**Silty SAND**, fine to medium grained, brown, with organic material, roots/rootlets	Gatic Cover Concrete	**TOPSOIL** **FILL**
						FILL: SAND, fine to medium grained, sub-angular, grey, trace organic material		**ALLUVIUM**
AD/V			2			**Silty SAND**, fine to medium grained, sub-angular, grey and pale grey		
		0	3				Bentonite	2.50: Gypset - cave in, SPT test result and sample not representative and therefore not reported
			4					
		-2	5			**SAND**, fine to medium grained, sub-angular, dark brown, trace organic odour		
			6					
		-4	7			**Silty SAND**, fine to medium grained, sub-angular, dark grey-brown, trace clay		
			8					
WB	CASING	-6	9			**Silty SAND**, fine to medium grained, sub-angular, grey and dark-grey, trace fine organic material		
			10					
		-8	11					
			12					
		-10	13			**Silty SAND**, fine to medium grained, sub-angular, dark grey, with clay		
			14			**Sandy CLAY**, high plasticity, dark grey, fine to medium grained sand		

BH2

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: DR-017

COMMENCED: 11/08/2016
COMPLETED: 16/08/2016

LOGGED BY: MTw
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH2**
SHEET No:	2 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Brantwood Street Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327540.960, N: 6236281.150 (56 MGA94)
FINAL DEPTH: 50m

SURFACE ELEVATION : 3.010 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details Construction notes	Notes (Structure, origin, etc)
WB	CASING					**Sandy CLAY**, high plasticity, dark grey, fine to medium grained sand *(continued)*		ALLUVIUM- 30, 40, 40kPa
			16			**SAND**, fine to coarse grained, pale grey		
		-14	17			**Sandy CLAY**, high plasticity, dark grey, fine grained sand		16.45: HP - 80, 50, 30kPa
						CLAY, high plasticity, pale grey		17.50: HP - 200, 200, 180kPa
			18			**Clayey SAND**, fine to medium grained, pale grey, medium to high plasticity clay		
		-16	19			**Silty CLAY**, high plasticity, pale grey, with fine to medium grained sand		
			20					
						Clayey SAND, fine to medium grained, pale grey		
		-18	21					
			22			**Silty CLAY**, high plasticity, pale grey, trace fine grained sand	Cuttings	22.45: HP - 230, 200, 180kPa
		-20	23					23.50: HP - 200, 190, 230 kPa
			24					
		-22	25			**Silty CLAY**, high plasticity, grey, with fine to medium grained sand, trace organic material		
			26					25.95: HP - 100, 120, 100kPa
		-24	27					26.95: HP - 160, 180, 180kPa
			28					28.00: Too stiff for U75 sample
								28.45: HP - 250, 260, 250kPa
		-26	29					

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: DR-017

COMMENCED: 11/08/2016
COMPLETED: 16/08/2016

LOGGED BY: MTw
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH2**
SHEET No:	3 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Brantwood Street Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327540.960, N: 6236281.150 (56 MGA94)
FINAL DEPTH: 50m

SURFACE ELEVATION : 3.010 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details Construction notes	Notes (Structure, origin, etc)
WB	CASING					**Silty CLAY**, high plasticity, grey, with fine to medium grained sand, trace organic material *(continued)*		ALLUVIUM 300, 350, 320kPa
		-28	31			**Silty CLAY**, high plasticity, grey mottled brown, trace iron staining, fissured		31.45: HP - 360, 300, 330kPa
			32					
		-30	33			**Silty SAND**, fine to medium grained, pale grey to grey, trace clay lenses		
			34					
		-32	35					
			36			**SANDSTONE**, fine to medium grained, pale grey, extremely weathered, extremely low strength, remoulds to clay		BEDROCK
		-34	37					
HQ3			38			**SANDSTONE**, fine to medium grained, pale grey with orange-brown and yellow-brown bands, indistinctly bedded at 5 to 10°		
		-36	39					
			40			**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 10 to 15°	Bentonite	
		-38	41				Start Slotted 41m	
			42					
		-40	43			**SANDSTONE**, fine to medium grained, massive, pale grey		
						SANDSTONE, fine to medium grained, pale grey, indistinctly bedded at 10 to 15°		
			44			**SANDSTONE**, fine to medium grained, massive, pale grey		
						SANDSTONE, fine to medium grained, pale grey, indistinctly bedded at 5 to 10°		
						SANDSTONE, fine to medium grained, massive, pale grey		

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: DR-017

COMMENCED: 11/08/2016
COMPLETED: 16/08/2016

LOGGED BY: MTw
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH2**
SHEET No:	4 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Brantwood Street Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327540.960, N: 6236281.150 (56 MGA94)
FINAL DEPTH: 50m

SURFACE ELEVATION : 3.010 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-44	46			**SANDSTONE**, fine to medium grained, pale grey, indistinctly to distinctly bedded at 5 to 10°		Sand	
			47						
			48			**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 0 to 5°			
		-46	49			**SANDSTONE**, fine to medium grained, massive, pale grey, trace siltstone flecks			
			50			Bore discontinued at 50.00m		End Slotted 50m End Cap at 50m	
		-48	51						
			52						
		-50	53						
			54						
		-52	55						
			56						
		-54	57						
			58						
		-56	59						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: DR-017

COMMENCED: 11/08/2016
COMPLETED: 16/08/2016

LOGGED BY: MTw
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH002**
SHEET No:	1 of 5
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Wickham Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328929.740, N: 6243012.520 (56 MGA94)
FINAL DEPTH: 70m

SURFACE ELEVATION : 21.180 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HA	CASING	20	1	14/07/2016 BH002		**FILL: Silty SAND**, fine to medium grained, brown to dark brown, trace gravels and cobbles, brown, coarse grained, subangular to angular	BH002	Gatic Cover Concrete	**FILL**
AD/V						**Sandy Clayey GRAVEL**, medium to coarse, sub-angular to angular, brown-grey, low plasticity clay, fine to medium grained sand			**possibly ALLUVIUM**
			2			**SANDSTONE**, medium to coarse, pale brown and pale grey, extremely weathered, estimated extremely low strength			**BEDROCK**
		18	3			**SANDSTONE**, medium to coarse grained, brown, recovered as subangular to angular gravel			
						SANDSTONE, medium to coarse grained, pale grey, indistinctly bedded at 0-10°			
			4						
			5						
		16				CORE LOSS 0.05m (5.38-5.43)			**BEDROCK**
			6			**SANDSTONE**, medium to coarse grained, pale grey and pale brown, indistinctly bedded at 0-10°			
						CORE LOSS 0.25m (6.18-6.43)			**BEDROCK**
			7			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 0 to 10° , with carbonaceous laminations			
		14				**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 15 to 20° , with shale clasts <5mm			
HQ3			8						
			9						
		12							
			10			**SANDSTONE**, fine to medium grained, pale grey and brown, indistinctly cross-bedded at 15°			
			11						
		10				**SANDSTONE**, fine to medium grained, orange-brown to pale grey, indistinctly cross-bedded at 10 to 25°			
			12			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 0 to 10°			
		8	13						
			14						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: LX6 DB525

COMMENCED: 14/07/2016
COMPLETED: 19/07/2016

LOGGED BY: KH
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH002**
SHEET No:	2 of 5
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Wickham Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328929.740, N: 6243012.520 (56 MGA94)
FINAL DEPTH: 70m

SURFACE ELEVATION : 21.180 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		6	16			**SANDSTONE**, fine to medium grained, pale grey, indistinctly cross-bedded at 5 to 15° *(continued)*			
		4	17						
			18			**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 5°			
		2	19						
			20			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 5°			
		0	21						
			22			**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 5° to massive			
		-2	23						
			24			**SILTSTONE**, dark grey, with fine grained sandstone laminations at 0°			
		-4	25						
			26			**SANDSTONE**, fine to medium grained, massive, pale grey and pale brown			
		-6	27					Grout	
			28						
			29			**SILTSTONE**, dark grey to grey, with some sandstone laminations at 0 to 5°			
		-8							

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: LX6 DB525

COMMENCED: 14/07/2016
COMPLETED: 19/07/2016

LOGGED BY: KH
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH002**
SHEET No:	3 of 5
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Wickham Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328929.740, N: 6243012.520 (56 MGA94)
FINAL DEPTH: 70m

SURFACE ELEVATION : 21.180 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-10	31			**SILTSTONE**, dark grey to grey, with some sandstone laminations at 0 to 5° *(continued)*			
			32						
		-12	33						
			34						
		-14	35			**Interbedded Siltstone (60%) And Sandstone (40%)**, siltstone is dark grey and grey, sandstone is fine to medium grained, pale grey, disturbed to irregularly bedded			
			36						
		-16	37						
			38						
		-18	39			**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 0 to 5°			
			40						
		-20	41						
			42			**SANDSTONE**, fine to medium grained, pale grey, indistinctly to distinctly bedded at 5 to 10°			
		-22	43						
			44						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: LX6 DB525

COMMENCED: 14/07/2016
COMPLETED: 19/07/2016

LOGGED BY: KH
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH002**
SHEET No:	4 of 5
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Wickham Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328929.740, N: 6243012.520 (56 MGA94)
FINAL DEPTH: 70m

SURFACE ELEVATION : 21.180 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-24	46			**SANDSTONE**, fine to medium grained, pale grey, indistinctly to distinctly bedded at 5 to 10° *(continued)*			
		-26	47			**Interbedded Siltstone (50%) And Sandstone (50%)**, siltstone is dark grey, sandstone bands are medium grained, pale grey, massive, with siltstone clasts up to 50mm and fine grained sandstone, pale grey, massive			
			48			**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 5 to 10° to massive			
						SANDSTONE, fine to medium grained, pale grey and grey, distinctly cross-bedded at 5 to 20°			
			49			**SILTSTONE**, pale grey to grey			
		-28				**SANDSTONE**, fine to medium grained, indistinctly bedded at 5° to massive			
			50			**SANDSTONE**, fine to medium grained, pale grey, indistinctly to distinctly cross-bedded at 5 to 20°			
		-30	51						
			52						
			53						
		-32				**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 5 to 10° , with carbonaceous laminations			
			54						
						SILTSTONE, dark grey to grey, with sandstone laminations at 5°		Bentonite	
		-34	55						
			56			**Interbedded Siltstone (60%) And Sandstone (40%)**, siltstone is dark grey, sandstone is fine to medium grained, pale grey, wavy at 5 to 15°			
		-36	57						
			58			**SANDSTONE**, fine to medium grained, distinctly bedded at 5 to 10°		Start Slotted 58m	
						SANDSTONE, fine to medium grained, pale grey, indistinctly bedded at 5 to 10° to massive			
		-38	59						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: LX6 DB525

COMMENCED: 14/07/2016
COMPLETED: 19/07/2016

LOGGED BY: KH
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH002**
SHEET No:	5 of 5
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Wickham Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328929.740, N: 6243012.520 (56 MGA94)
FINAL DEPTH: 70m

SURFACE ELEVATION : 21.180 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-40	61			**SANDSTONE**, fine to medium grained, pale grey, indistinctly to distinctly bedded at 5 to 15° *(continued)*			
						SANDSTONE, fine to medium grained, massive, pale grey		Sand	
		-42	63			**SANDSTONE**, fine to medium grained, pale grey and pale brown, indistinctly bedded at 5 to 10°			
			64			**Interbedded Siltstone (80%) And Sandstone (20%)**, siltstone is dark grey, sandstone is fine grained, pale grey			
		-44	65			**SANDSTONE**, fine to medium grained, pale grey, cross-bedded at 5 to 20° , with wavy carbonaceous laminations			
		-46	67						
		-48	69						
			70			Bore discontinued at 70.00m		End Slotted 70m End Cap at 70m	
		-50	71						
		-52	73						
			74						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: LX6 DB525

COMMENCED: 14/07/2016
COMPLETED: 19/07/2016

LOGGED BY: KH
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH005**
SHEET No:	1 of 5
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Cameron Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328444.110, N: 6241919.010 (56 MGA94)
FINAL DEPTH: 70.19m

SURFACE ELEVATION : 25.680 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
AD/V	CASING	24	1			**ASPHALT**	BH005	Gatic Cover	ROAD SURFACE
						FILL: SAND, fine to medium grained, dark grey, with subangular gravel			FILL
						SAND, fine to medium grained, pale yellow			RESIDUAL SOIL
						SANDSTONE, fine to medium grained, yellow-brown, extremely weathered, estimated extremely low strength			BEDROCK
						SANDSTONE, medium to coarse grained, orange-brown, indistinctly bedded, with red staining		Concrete	
			2			**SANDSTONE**, medium to coarse grained, pale red-white, indistinctly bedded at 20°			
		22	3			**SANDSTONE**, medium to coarse grained, grey, distinctly bedded at 15-20°, with cross-bedding at 5°			
			4			**SANDSTONE**, medium to coarse grained, pale grey, indistinctly to distinctly bedded at 0 to 5° with cross-bedding at 15-20°, with some orange staining			
		20	5						
			6			**SANDSTONE**, medium to coarse grained, orange and grey, distinctly bedded at 5-10° with cross-bedding at 20°			
HQ3		18	7						
			8						
			9						
		16	10			**SANDSTONE**, medium to coarse grained, grey and orange, indistinctly bedded at 5-10°			
						SANDSTONE, medium to coarse grained, grey and orange, distinctly bedded at 20°			
			11			**SANDSTONE**, medium to coarse grained, grey, massive			
		14				**SANDSTONE**, medium to coarse grained, orange, indistinctly bedded			
			12			**SANDSTONE**, medium to coarse grained, grey and orange, indistinctly bedded to massive			
						SANDSTONE, medium to coarse grained, orange, distinctly bedded at 0-10°			
			13			**SANDSTONE**, medium to coarse grained, grey and orange, indistinctly to distinctly bedded at 20°			
		12				**SANDSTONE**, medium to coarse grained, grey, indistinctly to distinctly bedded at 0-10°, with orange staining			
			14						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Drill Power
EQUIPMENT: Comacchio MC450P

COMMENCED: 9/08/2016
COMPLETED: 12/08/2016

LOGGED BY: KS
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH005**
SHEET No:	2 of 5
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Cameron Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328444.110, N: 6241919.010 (56 MGA94)
FINAL DEPTH: 70.19m

SURFACE ELEVATION : 25.680 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		10	16			**SANDSTONE**, medium to coarse grained, grey, distinctly bedded at 5-10°, with cross-bedding at 20° *(continued)*			
			17			**SANDSTONE**, medium to coarse grained, grey, distinctly bedded at 10° with cross-bedding at 0°			
		8	18	13/08/2016 BH005		**SANDSTONE**, medium to coarse grained, grey, distinctly bedded at 5°			
			19			**SANDSTONE**, coarse grained, grey, distinctly bedded at 5-10°, with bands of gravel, fine, up to 40mm thick			
		6	20						
			21						
		4	22			**SANDSTONE**, medium to coarse grained, grey, indistinctly bedded at 0-5°, cross-bedded at 20°			
			23						
		2	24			**SANDSTONE**, medium to coarse grained, grey, massive to indistinctly bedded			
			25			**SANDSTONE**, coarse grained, grey-brown, massive, with siltstone inclusions <70mm			
		0	26			**SANDSTONE**, fine to medium grained, grey, distinctly laminated at 10-20°		Grout	
			27						
		-2	28			**SANDSTONE**, medium to coarse grained, brown, massive to indistinctly bedded at 25°			
						SANDSTONE, medium to coarse grained, grey-brown, distinctly bedded at 20°, trace carbonaceous laminations			
			29			**SANDSTONE**, medium to coarse grained, grey, massive			
		-4							

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Drill Power
EQUIPMENT: Comacchio MC450P

COMMENCED: 9/08/2016
COMPLETED: 12/08/2016

LOGGED BY: KS
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH005**
SHEET No:	3 of 5
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Cameron Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328444.110, N: 6241919.010 (56 MGA94)
FINAL DEPTH: 70.19m

SURFACE ELEVATION : 25.680 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-6	31			**SANDSTONE**, medium to coarse grained, grey, massive *(continued)*			
			32			**SANDSTONE**, medium to coarse grained, grey, indistinctly bedded at 15-20°			
			33			**SANDSTONE**, medium to coarse grained, grey, massive			
		-8	34						
			35						
		-10	36						
			37						
		-12	38						
			39						
		-14	40						
			41						
		-16	42						
			43			**SANDSTONE**, medium to coarse grained, grey, distinctly bedded at 5°			
		-18	44			**SANDSTONE**, medium to coarse grained, grey, massive			

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Drill Power
EQUIPMENT: Comacchio MC450P

COMMENCED: 9/08/2016
COMPLETED: 12/08/2016

LOGGED BY: KS
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH005**
SHEET No:	4 of 5
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Cameron Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328444.110, N: 6241919.010 (56 MGA94)
FINAL DEPTH: 70.19m

SURFACE ELEVATION : 25.680 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details Construction notes	Notes (Structure, origin, etc)
HQ3		-20	46			**Interbedded Siltstone (80%) And Sandstone (20%)**, siltstone is dark grey, distinctly laminated at 0-5°, sandstone is fine to medium grained, grey, distinctly bedded at 0-5°		
			47			**Interbedded Siltstone (50%) And Sandstone (50%)**, siltstone is dark grey, distinctly laminated, sandstone is fine to medium grained, grey, indistinctly bedded, siltstone and sandstone beds are approximately 70mm thick at 0°		
		-22	48			**SANDSTONE**, medium to coarse grained, grey, indistinctly bedded at 5°		
			49			**Interlaminated Siltstone (80%) And Sandstone (20%)**, siltstone is dark grey, sandstone is fine grained, grey, laminated at 0° , some cross-bedding at 10°		
		-24	50					
			51					
		-26	52			**SANDSTONE**, medium to coarse grained, grey, indistinctly bedded at 15° , with wavy carbonaceous laminations		
			53				Bentonite	
		-28	54			**SANDSTONE**, fine to medium grained, grey, indistinctly bedded		
			55			**SANDSTONE**, medium to coarse grained, grey, indistinctly to distinctly bedded at 15-20° , some cross-bedding at 5-10°		
		-30	56				Start Slotted 56.3m	
			57			**SANDSTONE**, medium to coarse grained, grey		**BEDROCK**
		-32	58			CORE LOSS 0.13m (57.07-57.20) From stress testing - seating of core **SANDSTONE**, medium to coarse grained, grey, indistinctly to distinctly bedded at 15 , some cross-bedding at 0-5°, and some siltstone clasts up to 15mm		
			59			**SANDSTONE**, medium grained, grey, distinctly bedded at 20° , some cross-bedding at 5°		
		-34						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Drill Power
EQUIPMENT: Comacchio MC450P

COMMENCED: 9/08/2016
COMPLETED: 12/08/2016

LOGGED BY: KS
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH005**
SHEET No:	5 of 5
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Cameron Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328444.110, N: 6241919.010 (56 MGA94)
FINAL DEPTH: 70.19m

SURFACE ELEVATION : 25.680 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3			61			**SANDSTONE**, medium grained, grey, distinctly bedded at 20° , some cross-bedding at 5° *(continued)*			
						SANDSTONE, medium grained, grey, massive to indistinctly bedded			
		-36	62			**SANDSTONE**, medium grained, grey, indistinctly to distinctly bedded at 15°			
			63					Sand	
		-38	64						
						SANDSTONE, medium to coarse grained, grey, indistinctly bedded at 15°			
			65			**SANDSTONE**, fine to medium grained, grey, indistinctly to distinctly bedded at 0°			
		-40	66			**SANDSTONE**, medium to coarse grained, grey, with wavy carbonaceous bedding and siltstone clast			
						SANDSTONE, fine to medium grained, grey, indistinctly bedded at 0-5° with dark grey, subangular to subrounded siltstone clasts up to 50mm			
			67			**SANDSTONE**, medium to coarse grained, grey, massive to indistinctly bedded, with irregular carbonaceous bands 1 to 2mm thick			
		-42	68			**SANDSTONE**, fine to medium grained, grey, indistinctly to distinctly bedded at 0-5°			
						SANDSTONE, medium to coarse grained, grey, indistinctly bedded at 0-5°, with irregular carbonaceous laminations			
			69			**SANDSTONE**, medium to coarse grained, grey, distinctly bedded at 15° , some cross-bedding at 0-15°		End Slotted 68.7m	
		-44				**SANDSTONE**, medium to coarse grained, grey, indistinctly bedded at 20°			
			70			**Interlaminated Siltstone (80%) And Sandstone (20%)**, siltstone is dark grey, sandstone is fine grained, pale grey, distinctly laminated at 0-5°			
						SANDSTONE, fine to medium grained, grey, indistinctly to distinctly bedded at 0-5°		End Cap at 70.19m	
			71			Bore discontinued at 70.19m			
		-46	72						
			73						
		-48	74						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Drill Power
EQUIPMENT: Comacchio MC450P

COMMENCED: 9/08/2016
COMPLETED: 12/08/2016

LOGGED BY: KS
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH011**
SHEET No:	1 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Philips Road Kogarah NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327956.450, N: 6238882.620 (56 MGA94)
FINAL DEPTH: 50.28m

SURFACE ELEVATION : 6.390 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HA		6	1			**FILL: ASPHALT**	BH011	Gatic Cover Concrete	**FILL**
						FILL: Sandy Gravelly SILT, low plasticity, brown, fine, subangular gravel, fine to medium grained sand			
						FILL: Gravelly CLAY, medium plasticity, white, fine, subangular sandstone gravel			
			2			**FILL: SAND**, fine to medium grained, brown mottled orange, with fine, subangular gravel			**RESIDUAL SOIL**
AD/V	CASING	4				**Sandy CLAY**, medium plasticity, orange with grey and red, fine to medium grained, subrounded sand			2.50: HP - 180-270kPa
			3	02/08/2016 BH011					
			4						
		2				**SANDSTONE**, fine to medium grained, white with red and orange, extremely weathered, extremely low strength, recovered as Clayey SAND, sand is subrounded			**BEDROCK**
			5			CORE LOSS 0.13m (4.50-4.63)			4.40: Hammer bouncing excessively for minimal penetration
						SANDSTONE, medium to coarse grained, red with orange			**BEDROCK**
			6			CORE LOSS 0.09m (4.75-4.84)			
		0				**SANDSTONE**, fine to medium grained, pale grey and brown, indistinctly bedded at 10 to 15° , with 5-10mm quartz gravels			
			7			**SANDSTONE**, medium grained, red and white, distinctly bedded at 10 to 15°			
						SANDSTONE, medium to coarse grained, pale grey, distinctly bedded at 10 to 15°			
			8			**SANDSTONE**, medium grained, orange-red, distinctly bedded at 10 to 15°			
		-2				**SANDSTONE**, coarse grained, massive, red			
			9			**SANDSTONE**, medium to coarse grained, pale grey with orange, distinctly bedded at 10 to 15°			
						SANDSTONE, medium grained, pale grey, distinctly bedded at 10°			
			10						
		-4				**SANDSTONE**, medium to coarse grained, pale grey, indistinctly bedded at 5 to 10°, with orange staining			
			11			**SANDSTONE**, medium grained, pale grey, distinctly bedded at 10 to 15°			
			12						
		-6				**SANDSTONE**, coarse grained, orange-red with pale grey, indistinctly cross-bedded at 10 to 15°			
			13						
			14						
		-8							

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 1/08/2016
COMPLETED: 3/08/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH011**
SHEET No:	2 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Philips Road Kogarah NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327956.450, N: 6238882.620 (56 MGA94)
FINAL DEPTH: 50.28m

SURFACE ELEVATION : 6.390 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
						SANDSTONE, medium grained, pale grey, distinctly bedded at 10 to 15° *(continued)*			
			16			**SANDSTONE**, coarse grained, pale grey, indistinctly bedded at 10 to 15° , with discontinuous carbonaceous laminations			
		-10							
			17			**SANDSTONE**, medium grained, pale grey, distinctly cross-bedded at 10 to 15°			
			18						
		-12							
			19						
			20			**SANDSTONE**, fine to medium grained, red, indistinctly bedded at 10 to 15°			
		-14				**SANDSTONE**, coarse grained, red with orange, indistinctly bedded at 10 to 15°		Grout	
			21						
			22						
		-16				**SANDSTONE**, medium grained, pale grey, distinctly bedded at 10 to 15° , some cross-bedding at 10°			
			23						
			24						
		-18				**SANDSTONE**, coarse grained, massive, pale grey			
			25			**SANDSTONE**, medium grained, pale grey, distinctly bedded at 10 to 15°			
						SANDSTONE, coarse grained, pale grey, with carbonaceous laminations			
			26			**SHALE**, black			
		-20				**Interbedded Sandstone (60%) And Shale (40%)**, sandstone is fine grained, green-grey, 100-250mm beds, shale is black, occurs in beds up to 180mm thick and on laminations in sandstone			
			27			**SANDSTONE**, fine to medium grained, grey, indistinctly bedded at 5 to 10° , with carbonaceous laminations			
			28						
		-22				**Interlaminated Sandstone (25%) And Siltstone (75%)**, sandstone is fine grained, grey, siltstone is black			
			29			**SANDSTONE**, medium grained, grey, distinctly bedded at 10 to 15°			
						SANDSTONE, medium to coarse grained, grey, indistinctly bedded at 5 to			

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 1/08/2016
COMPLETED: 3/08/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH011**
SHEET No:	3 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Philips Road Kogarah NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327956.450, N: 6238882.620 (56 MGA94)
FINAL DEPTH: 50.28m

SURFACE ELEVATION : 6.390 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
		-24	31			10° , with carbonaceous laminations **SANDSTONE**, medium grained, grey, distinctly bedded at 5 to 10° , cross bedded at 5 to 10°			
			32						
		-26	33						
			34						
		-28	35						
			36						
		-30	37						
			38						
		-32	39						
			40			**SANDSTONE**, medium grained, massive, grey, with shale clasts up to 60mm			
		-34				**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 10 to 15°			
			41			**Interbedded Sandstone (40%) And Shale (60%)**, sandstone is fine to medium grained, grey to dark grey, shale is black			
			42			**SANDSTONE**, medium grained, massive, pale grey			
		-36						Bentonite	
			43			**SANDSTONE**, medium grained, grey, indistinctly bedded at 10 to 15°			
			44			**SANDSTONE**, medium grained, grey, distinctly bedded at 5 to 10°			
		-38				**SANDSTONE**, medium grained, grey, indistinctly bedded at 10 to 15°		Start Slotted 44.28m	

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 1/08/2016
COMPLETED: 3/08/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH011**
SHEET No:	4 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Philips Road Kogarah NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327956.450, N: 6238882.620 (56 MGA94)
FINAL DEPTH: 50.28m

SURFACE ELEVATION : 6.390 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
						SANDSTONE, medium to coarse grained, grey, indistinctly bedded at 10° , with carbonaceous laminations			
		-40	46			**SANDSTONE**, fine to medium grained, grey, distinctly bedded at 10 to 15°			
			47			**SANDSTONE**, medium grained, grey, massive to indistinctly bedded at 10 to 15°		Sand	
		-42	48			**SANDSTONE**, medium grained, massive, grey, with some carbonaceous specks			
			49						
			50			**SANDSTONE**, fine to medium grained, grey, distinctly bedded at 10 to 15° , with carbonaceous laminations		End Slotted 50.28m End Cap at 50.28m	
		-44				Bore discontinued at 50.28m			
			51						
			52						
		-46	53						
			54						
		-48	55						
			56						
		-50	57						
			58						
		-52	59						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 1/08/2016
COMPLETED: 3/08/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH014A**
SHEET No:	1 of 1
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : French Street/West Botany Street Kogarah NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328527.220, N: 6240411.640 (56 MGA94)
FINAL DEPTH: 10.2m

SURFACE ELEVATION : 4.710 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HA		4	1	29/08/2016 BH014A		**Silty SAND**, fine to medium grained, dark brown, with rootlets	BH014A	Concrete	**TOPSOIL**
						FILL: Sandy CLAY, medium plasticity, orange-brown, fine to medium grained sand			**FILL** 0.50: PASS Sample
			2			**FILL: Gravelly SAND**, medium to coarse grained, dark grey and dark brown, medium to coarse grained, brown-grey, sub-angular to angular gravel, with plastic and refuse			1.00: PASS Sample taken at 1.0-1.25m
		2	3			**FILL: Gravelly Sandy CLAY**, medium plasticity, black, fine to medium grained sand, medium to coarse grained, dark grey-brown, sub-angular to angular gravel, with plastic and refuse			2.70: PASS Sample taken from 2.7-2.97m
AD/V			4			**FILL: Gravelly Clayey SAND**, medium to coarse grained, black, low plasticity clay, medium to coarse grained, dark grey, sub-angular to angular gravel		Grout	
		0	5						4.20: Hydrocarbon odour noted. PASS Sample taken from 4.2-4.45m
			6			**SAND**, fine to medium grained, grey-brown		Bentonite	**ALLUVIUM**
		-2	7					Start Slotted 7m	
WB			8					Sand	
		-4	9			**Sandy CLAY**, high plasticity, pale grey, fine to medium grained sand			9.20: HP - 100, 120, 100kPa
			10					End Slotted 10m	
						Bore discontinued at 10.20m		End Cap at 10m	
		-6	11						
			12						
		-8	13						
			14						
		-10							

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: LX6 DB525

COMMENCED: 29/08/2016
COMPLETED: 30/08/2016

LOGGED BY: KH
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH015**
SHEET No:	1 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Evans Street Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327482.580, N: 6236926.640 (56 MGA94)
FINAL DEPTH: 50.26m

SURFACE ELEVATION : 5.900 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HA			1		**ASPHALT**	BH015	Gatic Cover Concrete	ROAD SURFACE
					FILL: SAND, medium to coarse grained, brown, with sub-angular gravel up to 10mm diameter			FILL
					FILL: SAND, fine medium grained, orange-brown, trace fine to medium gravel			
AD/V	CASING	4	2		**SAND**, fine to medium grained, yellow-brown			ALLUVIUM
			3	BH015 05/09/2016				
		2	4		**SANDSTONE**, medium to coarse, purple and grey, highly weathered, estimated extremely low strength			BEDROCK
			5		**SANDSTONE**, medium to coarse grained, red, pale grey and orange-brown, distinctly bedded at 20°			
		0	6					
			7		**SANDSTONE**, medium grained, pale grey, indistinctly bedded			
					CORE LOSS 0.11m (7.13-7.24)			
					SANDSTONE, medium grained, pale grey, indistinctly bedded at 0 to 10°			
		-2	8		**SANDSTONE**, medium grained, pale grey and orange-brown, indistinctly to distinctly bedded at 0 to 15°			
			9		**SANDSTONE**, medium to coarse grained, pale grey, distinctly bedded at 20°, some red and orange staining			
HQ3	CASING	-4	10		**SANDSTONE**, medium grained, pale grey and orange, distinctly laminated at 0 to 10°			
			11		**SANDSTONE**, medium grained, grey, indistinctly bedded, trace black carbonaceous lenticles			
		-6	12					
			13		**SANDSTONE**, medium to coarse grained, orange-brown with some grey, indistinctly to distinctly laminated at 20°			
		-8	14					

Notes: Inflow — Standing Water Level

CONTRACTOR: Drill Power
EQUIPMENT: Comacchio MC450P

COMMENCED: 1/09/2016
COMPLETED: 7/09/2016

LOGGED BY: KS
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH015**
SHEET No:	2 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Evans Street Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327482.580, N: 6236926.640 (56 MGA94)
FINAL DEPTH: 50.26m

SURFACE ELEVATION : 5.900 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3	CASING	-10	16			**SANDSTONE**, medium to coarse grained, pale grey, indistinctly to distinctly laminated at 15°, locally cross-bedded *(continued)*			
						SANDSTONE, medium to coarse grained, pale grey mottled red, indistinctly bedded at 10 to 30°			
			17			**SILTSTONE**, dark grey, distinctly laminated at 0 to 20°, trace fine grained sandstone laminations			
		-12	18			**SANDSTONE**, coarse grained, pale grey, massive, with sub-rounded siltstone clasts up to 60mm diameter			
						SANDSTONE, fine grained, pale grey, distinctly bedded at 0 to 10°			
						CORE LOSS 0.19m (18.17-18.36)			
			19			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 20°		Grout	
		-14	20			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 20°			
			21			**SANDSTONE**, medium grained, pale grey, distinctly laminated at 20°, locally cross-bedded			
		-16	22			**SANDSTONE**, medium to coarse grained, pale grey, indistinctly bedded at 20°, trace black carbonaceous lenticles			
			23			**SANDSTONE**, medium grained, pale grey, indistinctly bedded to massive			
						SANDSTONE, medium grained, pale grey, distinctly cross-bedded at 0 to 15°			
		-18	24			**SANDSTONE**, medium grained, pale grey, massive, trace carbonaceous lenticles			
			25						
		-20	26			**SANDSTONE**, medium grained, pale grey, indistinctly bedded at 0 to 10°			
			27			**SANDSTONE**, medium to coarse grained, pale grey, indistinctly to distinctly bedded at 20°, some wavy black carbonaceous lenticles			
		-22	28			**SANDSTONE**, medium grained, pale grey-brown, distinctly bedded at 20°			
						SANDSTONE, medium grained, pale grey-brown, distinct wavy bedding at 0 to 20°			
			29			**SANDSTONE**, medium grained, pale grey, distinctly bedded at 15 to 20°, trace black carbonaceous flecks			
		-24							

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Drill Power
EQUIPMENT: Comacchio MC450P

COMMENCED: 1/09/2016
COMPLETED: 7/09/2016

LOGGED BY: KS
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH015**
SHEET No:	3 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Evans Street Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327482.580, N: 6236926.640 (56 MGA94)
FINAL DEPTH: 50.26m

SURFACE ELEVATION : 5.900 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3	CASING	-26	31			**SANDSTONE**, medium grained, pale grey, distinctly bedded at 15 to 20°, trace black carbonaceous flecks *(continued)*			
						SANDSTONE, medium to coarse grained, pale grey, indistinctly bedded, trace black carbonaceous lenticles <5mm thick			
			32			**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 0 to 15°, locally cross-bedded			
			33			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 20°			
		-28	34			**SANDSTONE**, medium grained, pale grey, distinctly bedded at 20°			
			35						
		-30	36			**SANDSTONE**, medium to coarse grained, pale grey, indistinctly bedded at 0 to 20°			
						SANDSTONE, medium grained, pale grey, distinctly bedded at 20°			
			37						
		-32	38			**SANDSTONE**, medium grained, pale grey, indistinctly to distinctly bedded at 10°, locally cross-bedded			
						SANDSTONE, medium grained, pale grey-brown, indistinct wavy bedding at 0 to 15°			
			39			**SANDSTONE**, medium grained, grey, indistinct locally disturbed bedding, trace black carbonaceous flecks			
		-34	40			**SANDSTONE**, medium grained, pale grey-brown, indistinctly to distinctly bedded at 10 to 20°, locally cross-bedded		Bentonite	
			41						
						SILTSTONE, dark grey, distinctly laminated at 0°			
		-36	42			CORE LOSS 0.23m (41.56-41.79)			
						SANDSTONE, medium to coarse grained, pale grey, distinctly bedded at 0 to 20°, locally cross-bedded, trace black carbonaceous flecks			
			43						
		-38	44					Start Slotted 44m End Cap at 44m	

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Drill Power
EQUIPMENT: Comacchio MC450P

COMMENCED: 1/09/2016
COMPLETED: 7/09/2016

LOGGED BY: KS
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH015**
SHEET No:	4 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Evans Street Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327482.580, N: 6236926.640 (56 MGA94)
FINAL DEPTH: 50.26m

SURFACE ELEVATION : 5.900 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3	CASING	-40	46			**Possible Sandstone Dyke**, medium to coarse grained, dark grey to black, mottled grey, quartz and fine grained, rounded rock fragments and calcite *(continued)*			
						SANDSTONE, fine to medium grained, grey, distinctly bedded at 15°, locally cross-bedded			
			47			**SANDSTONE**, medium grained, pale grey, indistinctly bedded		Sand	
		-42	48			**SANDSTONE**, fine to medium grained, pale grey and dark grey, distinctly cross-bedded at 0 to 15°, with black carbonaceous laminations			
						SANDSTONE, fine to medium grained, grey, distinctly bedded at 20°			
			49			**SANDSTONE**, fine to medium grained, grey and dark grey, distinctly bedded at 20°, with black carbonaceous laminations			
		-44	50			**SANDSTONE**, fine to medium grained, grey, distinctly bedded at 20°, locally cross-bedded		End Slotted 50m	
						Bore discontinued at 50.26m			
			51						
		-46	52						
			53						
		-48	54						
			55						
		-50	56						
			57						
		-52	58						
			59						
		-54							

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Drill Power
EQUIPMENT: Comacchio MC450P

COMMENCED: 1/09/2016
COMPLETED: 7/09/2016

LOGGED BY: KS
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH020A**
SHEET No:	1 of 1
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Oakdale Avenue Kogarah NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328306.610, N: 6240036.920 (56 MGA94)
FINAL DEPTH: 6.5m

SURFACE ELEVATION : 8.490 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
AD/T		8	0			**FILL: Silty SAND**, fine to coarse grained, sub-rounded to sub-angular, dark brown, with clay	BH020A		FILL
			1			**Silty CLAY**, high plasticity, yellow-brown and pale grey		Grout	ALLUVIUM
			2			**Silty CLAY**, high plasticity, pale grey			
		6						Bentonite	
			3			**Sandy CLAY**, low plasticity, red-brown, fine to medium grained, sub-rounded to sub-angular sand			
			4			**Silty CLAY**, high plasticity, pale grey		Start Slotted 3.5m	
		4						Sand	
			5			**Sandy CLAY**, low plasticity, brown, fine to medium grained sand			
			6						
		2				Bore discontinued at 6.50m		End Slotted 6.5m End Cap at 6.5m	
			7						
			8						
		0							
			9						
			10						
		-2							
			11						
			12						
		-4							
			13						
			14						
		-6							

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Hydrapower Scout

COMMENCED: 5/09/2016
COMPLETED: 5/09/2016

LOGGED BY: OC
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH021**
SHEET No:	1 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Bado-berong Creek/Napoleon St Sandringham NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327870.830, N: 6236122.660 (56 MGA94)
FINAL DEPTH: 58.6m

SURFACE ELEVATION : 2.360 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HA		2	1	08/2016		**Silty SAND**, fine to medium grained, sub-angular, dark brown, low plasticity silt, with rootlets and root fibres	BH021	Gatic Cover Concrete	**TOPSOIL**
AD/V				BH021		**SAND**, fine to medium grained, sub-rounded to sub-angular, orange-brown			**ALLUVIUM**
		0	2					Grout	
			3					Bentonite	
	CASING	-2	4			**Clayey SAND**, fine to medium grained, dark grey, low to medium plasticity clay, with shells and shell fragments		Start Slotted 3m	
			5			**SAND**, fine to medium grained, sub-rounded to sub-angular, pale orange-brown		Sand	
		-4	6					End Slotted 6m End Cap at 6m	
WB			7			**SAND**, fine to medium grained, sub-rounded to sub-angular, dark brown			
		-6	8			**SAND**, fine to medium grained, sub-rounded to sub-angular, dark brown to grey			
			9						
		-8	10						
	CASING		11						
		-10	12						
			13						
		-12	14						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50/DR-017

COMMENCED: 25/07/2016
COMPLETED: 10/08/2016

LOGGED BY: JJC/MTw
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH021**
SHEET No:	2 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Bado-berong Creek/Napoleon St Sandringham NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327870.830, N: 6236122.660 (56 MGA94)
FINAL DEPTH: 58.6m

SURFACE ELEVATION : 2.360 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-14	16			**CLAY**, high plasticity, dark grey, abundant shells and shell fragments			**ALLUVIUM** 16.10: HP = 100kPa SPT N=0 not representative. Shells believed to have blocked SPT shoe. Too many shells for successful U75 sample
		-16	17 18 19			**Clayey SAND**, medium grained, pale grey with orange, low plasticity clay			
		-18	20 21						
		-20	22 23						
		-22	24			**CLAY**, high plasticity, dark grey, with fine grained, subrounded sand			23.50: HP = 100 - 150kPa
			25			**Clayey SAND**, fine to medium grained, sub-rounded, pale grey, low plasticity clay			
		-24	26			**CLAY**, high plasticity, pale grey, trace wood fragments			26.50: HP = 320 - 420kPa
			27 28						28.00: HP = 230 - 350kPa
		-26	29			**Sandy CLAY**, high plasticity, red with grey and orange, fine grained, subrounded sand, trace fine, subangular gravel			29.50: HP = 250 - 310kPa

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50/DR-017

COMMENCED: 25/07/2016
COMPLETED: 10/08/2016

LOGGED BY: JJC/MTw
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH021**
SHEET No:	3 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Bado-berong Creek/Napoleon St Sandringham NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327870.830, N: 6236122.660 (56 MGA94)
FINAL DEPTH: 58.6m

SURFACE ELEVATION : 2.360 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-28	31			**Sandy CLAY**, high plasticity, red with grey and orange, fine grained, subrounded sand, trace fine, subangular gravel *(continued)*			**ALLUVIUM**
						CLAY, high plasticity, grey with orange, fissured			31.00: HP = 350 - 450kPa
		-30	32						
			33						32.50: HP = 370 - 450kPa
			34						34.00: HP = 250 - 275kPa
		-32	35						
									35.50: HP = 150 - 200kPa
			36						
		-34	37						37.00: HP = 150kPa
			38						
		-36							38.50: HP = 270 - 300kPa
			39						
			40			**CLAY**, high plasticity, grey, with pockets of sandy clay, high plasticity, trace fine grained sand and organics			39.75: BH continued by MTw with rig DR-017 due to rig capacity 40.20: HP - 350, 150, 200kPa
		-38	41						
						SANDY CLAY/CLAY WITH SAND, high plasticity, dark grey, fine to medium grained sand , trace coarse grained sand and organics			41.50: HP - 200, 200, 200kPa
			42						
		-40							
			43						
						SAND, fine to coarse grained, sub-rounded to sub-angular, pale grey			
			44			**SANDSTONE**, fine to medium grained, pale grey and orange-brown, estimated as extremely weathered and extremely low strength, recovered as sand			**BEDROCK**
		-42							
HQ3						**SANDSTONE**, fine to medium grained,			44.76: HP - 320, 340, 300kPa

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50/DR-017

COMMENCED: 25/07/2016
COMPLETED: 10/08/2016

LOGGED BY: JJC/MTw
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH021**
SHEET No:	4 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Bado-berong Creek/Napoleon St Sandringham NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327870.830, N: 6236122.660 (56 MGA94)
FINAL DEPTH: 58.6m

SURFACE ELEVATION : 2.360 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-44 -46 -48 -50 -52 -54 -56	46 47 48 49 50 51 52 53 54 55 56 57 58 59			pale grey, indistinctly bedded at 0 to 5° **Clay**, high plasticity, pale grey, fissured, with sand, fine to medium grained, very stiff *(continued)* CORE LOSS 0.09m (45.04-45.13) **Sandy Clay**, high plasticity, pale grey, fine to medium grained sand, very stiff **Clay**, high plasticity, pale grey, fissured, with sand, fine to medium grained, very stiff **SANDSTONE**, fine to medium grained, orange-brown with grey bands, indistinctly bedded, with iron stained induration CORE LOSS 0.70m (46.15-46.85) **SANDSTONE**, fine to medium grained, orange-brown with grey bands, indistinctly bedded at 0 to 5° , with iron induration **SANDSTONE**, fine to medium grained, pale grey, speckled orange-brown **SANDSTONE**, fine to medium grained, orange-brown with grey and pale grey bands, with iron stained induration **SANDSTONE**, fine to medium grained, pale grey with grey bands, distinctly bedded at 5 to 10° **SANDSTONE**, fine to medium grained, pale grey with dark grey bands, distinctly bedded at 5 to 10° **SANDSTONE**, fine grained, pale grey, speckled grey, indistinctly thinly bedded at 0 to 5° **SANDSTONE**, fine to medium grained, grey, distinctly thinly bedded at 0 to 5° **SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 0 to 5° **SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 0 to 5° **SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 0 to 5° **SANDSTONE**, fine to medium grained, pale grey, distinctly thinly bedded at 0 to 5° **SANDSTONE**, fine to medium grained, massive, pale grey **SANDSTONE**, fine to medium grained, pale grey, distinctly very thinly bedded at 0 to 10° **SANDSTONE**, fine grained, grey, indistinctly bedded at 0 to 5° **SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 0 to 10°			45.20: HP - 300, 320, 300kPa 45.70: HP - 380, 360, 320kPa 46.10: HP - 380, 350, 400kPa **BEDROCK** **BEDROCK**
			59			Bore discontinued at 58.60m			

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50/DR-017

COMMENCED: 25/07/2016
COMPLETED: 10/08/2016

LOGGED BY: JJC/MTw
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH022A**
SHEET No:	1 of 2
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Barton Street Kogarah NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328462.140, N: 6239268.320 (56 MGA94)
FINAL DEPTH: 22.45m

SURFACE ELEVATION : 1.580 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HA	CASING	0	1	05/09/2016 BH022A		**Silty SAND**, fine to medium grained, dark brown, silt is low plasticity, with roots	BH022A	Gatic Cover Concrete	TOPSOIL FILL
						FILL: SAND, fine to medium grained, pale grey with orange, subangular to sub-rounded, with some fine to medium grained subangular sandstone gravel			ALLUVIUM
			2			**Silty CLAY**, high plasticity, dark grey, with wood fragments			1.50: HP = 30-50 kPa
		-2	3			**SAND**, fine to medium grained, pale grey, sub-rounded		Bentonite	
			4						
		-4	5						
			6						
		-6	7					Start Slotted 7m	
WB			8						
			9					Sand	
		-8	10					End Slotted 10m	
			11			**Silty CLAY**, high plasticity, dark grey, with shells and shell fragments			
		-10	12					End Cap at 11.7m	11.95: HP = 50-75 kPa
			13			**Clayey SAND**, fine to medium grained, dark grey, subangular to sub-rounded, clay is medium plasticity, with shells and shell fragments			
		-12	14			**SAND**, fine to medium grained, dark grey, subangular to sub-rounded		Bentonite	
						SAND, medium grained, pale grey, sub-rounded			

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 29/08/2016
COMPLETED: 5/09/2016

LOGGED BY: JJC
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH022A**
SHEET No:	2 of 2
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Barton Street Kogarah NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328462.140, N: 6239268.320 (56 MGA94)
FINAL DEPTH: 22.45m

SURFACE ELEVATION : 1.580 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
WB		-14	16			**SAND**, medium grained, pale grey, sub-rounded *(continued)*			**ALLUVIUM**
			17						16.45: First and second 150mm increments considered unrepresentative due to collapsed material in base of hole
		-16	18						17.50: First and second 150mm increments considered unrepresentative due to collapsed material in base of hole
			19			**Sandy CLAY**, high plasticity, grey with orange, sand is fine to medium grained, subrounded	← Sand		
		-18	20						19.45: HP = 150-200 kPa
			21						20.95: HP = 200 kPa
		-20	22						
						Bore discontinued at 22.45m			22.40: HP = 250-400 kPa
		-22	23						
			24						
		-24	25						
			26						
		-26	27						
			28						
		-28	29						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 29/08/2016
COMPLETED: 5/09/2016

LOGGED BY: JJC
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH023**
SHEET No:	1 of 3
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Sandringham Street Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328026.680, N: 6237266.860 (56 MGA94)
FINAL DEPTH: 30m

SURFACE ELEVATION : 1.660 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HA	CASING			28/07/2016 BH023		**Sandy SILT**, low plasticity, dark brown-black, fine to medium grained, subrounded sand, with rootlets	BH023	Gatic Cover Concrete	**TOPSOIL**
						SAND, fine to medium grained, sub-rounded, pale brown-grey			**ALLUVIUM**
WB	CASING	0 -2 -4 -6 -8 -10 -12	1 2 3 4 5 6 7 8 9 10 11 12 13 14			**CLAY**, medium plasticity, pale grey, with fine to medium grained, subangular sand		Grout	
						Clayey SAND, medium grained, sub-rounded, pale grey, low plasticity clay			
HQ3						**SANDSTONE**, fine to medium, pale grey, extremely weathered, extremely low strength, recovered as clayey sand			**BEDROCK** 14.50: SPT hammer bouncing for no penetration

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 28/07/2016
COMPLETED: 30/07/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH023**
SHEET No:	2 of 3
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Sandringham Street Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328026.680, N: 6237266.860 (56 MGA94)
FINAL DEPTH: 30m

SURFACE ELEVATION : 1.660 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-14	16			**SANDSTONE**, fine to medium grained, pale grey with black, distinctly bedded at 5 to 10° *(continued)*			
						SANDSTONE, medium to coarse grained, red and grey, distinctly bedded at 5 to 15°			
		-16	17						
			18						
			19			**SANDSTONE**, medium grained, pale grey, distinctly bedded at 5 to 15°			
		-18	20						
			21						
		-20	22			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 5 to 15°			
			23			**SANDSTONE**, coarse grained, grey, indistinctly bedded at 15°, with orange staining		Bentonite	
		-22	24			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 10 to 15°		Start Slotted 24m	
			25						
		-24	26						
			27					Sand	
		-26	28			**SANDSTONE**, medium grained, pale grey, with black carbonaceous laminations, distinctly bedded at 10 to 15° , locally cross-bedded at 10 to 15°			
			29			**SANDSTONE**, medium grained, pale grey, with discontinuous carbonaceous laminations, quartz and siltstone gravel up to 8mm diameter, indistinctly bedded at 10 to 15°			
		-28							

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 28/07/2016
COMPLETED: 30/07/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH023**
SHEET No:	3 of 3
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Sandringham Street Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328026.680, N: 6237266.860 (56 MGA94)
FINAL DEPTH: 30m

SURFACE ELEVATION : 1.660 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
						SANDSTONE, medium grained, pale grey, distinctly bedded at 10 to 15°		End Slotted 30m End Cap at 30m	
						Bore discontinued at 30.00m			

-30 31
-32 32
33
-34 34
35
-36 36
37
-38 38
39
-40 40
41
-42 42
43
44

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 28/07/2016
COMPLETED: 30/07/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1100**
SHEET No:	1 of 6
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Kyle Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 329023.590, N: 6243228.390 (56 MGA94)
FINAL DEPTH: 78m

SURFACE ELEVATION : 18.800 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
AD/T	CASING	18	1			**ASPHALT**	BH1100	Concrete	ROAD SURFACE
						Silty Sandy GRAVEL, fine to coarse, grey			BASECOURSE
						SANDSTONE, fine to medium grained, orange-brown, extremely weathered, estimated extremely to very low strength, remoulds to sand			BEDROCK
			2			**SANDSTONE**, fine to medium grained, pale grey and yellow-brown, highly to extremely weathered, estimated very low strength			
		16				**SANDSTONE**, medium to coarse grained, pale grey and pale brown, distinctly bedded at 0-5°			
			3			**SANDSTONE**, fine to medium grained, pale grey and yellow-brown, distinctly bedded, locally cross bedded at 5° to 20°, trace black carbonaceous laminations			
			4			**SANDSTONE**, fine to medium grained, pale grey and yellow-grey, distinctly bedded at 10°, with black carbonaceous laminations at 5-10°			
		14	5	03/09/2016		**SANDSTONE**, fine grained, pale grey, indistinctly bedded at 10°			
				BH1100					
			6			**SANDSTONE**, fine to medium grained, pale grey and yellow-grey, indistinctly bedded at 5-10°, trace black carbonaceous laminations			
		12	7			**SANDSTONE**, medium grained, pale brown, indistinctly bedded at 5-10°			
HQ3			8			**SANDSTONE**, medium grained, orange-brown and dark red-brown with pale grey, indistinctly bedded, with extensive liesegang ring staining			
		10	9			**SANDSTONE**, medium grained, pale yellow with some red-brown and orange-brown, indistinctly bedded at 10-20°			
			10			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 5-15°, locally cross-bedded, trace black carbonaceous laminations			
		8	11						
			12						
		6	13	31/08/2016		**SANDSTONE**, fine to medium grained, brown-grey, massive			
			14	BH1100					
		4		05/09/2016					

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Rockwell
EQUIPMENT: Hydrapower Scout

COMMENCED: 30/08/2016
COMPLETED: 3/09/2016

LOGGED BY: OC/KH
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1100**
SHEET No:	2 of 6
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Kyle Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 329023.590, N: 6243228.390 (56 MGA94)
FINAL DEPTH: 78m

SURFACE ELEVATION : 18.800 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		2 0 -2 -4 -6 -8 -10	BH1100 16 17 18 19 20 21 22 23 24 25 26 27 28 29			**SANDSTONE**, fine to medium grained, pale grey, distinctly laminated at 0°, with black carbonaceous laminations and flecks up to 2mm thick *(continued)* **SANDSTONE**, medium to coarse grained, pale grey, indistinctly bedded at 5-10°, with black carbonaceous flecks **SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 10-15°, locally cross-bedded, trace black carbonaceous laminations **SANDSTONE**, fine to medium grained, pale grey, indistinctly to distinctly bedded at 0-15° **SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 10-15° **SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 5-10° **SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 5-10°, with black carbonaceous laminations **SANDSTONE**, fine grained, grey and pale grey, distinctly bedded at 0-5° **SANDSTONE**, medium grained, grey and pale grey, distinctly cross-bedded at 0-40° **SANDSTONE**, fine to medium grained, grey-brown and pale brown, indistinctly bedded at 0-5° **Interlaminated Siltstone (80%) And Sandstone (20%)**, siltstone is dark grey, sandstone is fine grained, pale grey, laminated at 0° **SILTSTONE**, dark grey, trace sandy laminations, distinctly laminated at 0° **Silty SANDSTONE**, fine grained, dark grey and grey, indistinctly laminated at 0°		Grout	**BEDROCK**

Notes: Inflow ▽ Standing Water Level

CONTRACTOR:	Rockwell	COMMENCED:	30/08/2016	LOGGED BY:	OC/KH
EQUIPMENT:	Hydrapower Scout	COMPLETED:	3/09/2016	CHECKED BY:	ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1100**
SHEET No:	3 of 6
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Kyle Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 329023.590, N: 6243228.390 (56 MGA94)
FINAL DEPTH: 78m

SURFACE ELEVATION : 18.800 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-12	31			**Interlaminated Siltstone (70%) And Sandstone (30%)**, siltstone is dark grey, sandstone is grey and pale grey, fine grained, wavy lamination at 0-15° *(continued)*			**BEDROCK**
						SANDSTONE, fine grained, pale grey, indistinctly laminated at 0°, with black carbonaceous laminations			
			32			**SANDSTONE**, medium grained, pale grey and grey-white, indistinctly bedded at 0-5°			
		-14	33						
			34			**SANDSTONE**, fine to medium grained, pale grey, indistinctly to distinctly bedded at 5-10°			
		-16	35						
			36			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 25°			
		-18	37			**SANDSTONE**, fine to medium grained, pale grey, massive, with black carbonaceous flecks			
						SANDSTONE, fine to medium grained, pale grey, distinctly bedded at 5-10°			
			38			**SANDSTONE**, fine to medium grained, pale grey, massive			
						SANDSTONE, fine to medium grained, pale grey, indistinctly bedded at 5-10°, locally disturbed bedding			38.14: hole was sealed between 38.14-38.27m due to significant water loss
		-20	39						
			40			**Carbonaceous SANDSTONE**, fine grained, dark grey with some pale grey, distinctly laminated at 5°			
						SANDSTONE, fine to medium grained, pale grey, indistinctly bedded at 5-10°			
		-22	41						
						SANDSTONE, fine to medium grained, pale grey, distinctly bedded at 5-15°			
			42			**SANDSTONE**, medium grained, pale grey, indistinctly bedded at 5-10°			
		-24	43						
			44			**SANDSTONE**, fine to medium grained, pale grey, cross-bedded at 0-30°			
		-26				**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 0-10°			

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Rockwell
EQUIPMENT: Hydrapower Scout

COMMENCED: 30/08/2016
COMPLETED: 3/09/2016

LOGGED BY: OC/KH
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1100**
SHEET No:	4 of 6
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Kyle Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 329023.590, N: 6243228.390 (56 MGA94)
FINAL DEPTH: 78m

SURFACE ELEVATION : 18.800 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-28	46			**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 0-10° *(continued)*			**BEDROCK**
			47			**SANDSTONE**, fine to medium grained, pale grey, indistinctly to distinctly bedded at 10-25°, locally cross-bedded			
		-30	48			**SANDSTONE**, fine grained, pale grey, massive			
			49						
		-32	50			**SANDSTONE**, coarse grained, grey-brown, indistinctly bedded, with quartz and siltstone gravel up to 15mm diameter			
			51			**SANDSTONE**, fine becoming coarse grained, pale grey, indistinctly bedded at 0-5°, trace black carbonaceous lenticles, downward coarsening **SANDSTONE**, fine grained, grey, distinctly bedded at 0-5°			
			52			**SANDSTONE**, fine to medium grained, pale grey, distinctly cross-bedded at 0-5°			
		-34	53			**SANDSTONE**, fine to medium grained, pale grey, massive, trace black carbonaceous flecks			
			54						
		-36	55			**SANDSTONE**, fine to medium grained, pale grey-brown, indistinctly bedded at 5-10°			
			56			**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 0-5°, trace black carbonaceous laminations			
		-38	57						
			58			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 5-10°			
		-40	59			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 10-20°			59.80: attempted to seal hole 3
						SANDSTONE, fine to medium grained, pale grey, distinctly bedded at 5°			

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Rockwell
EQUIPMENT: Hydrapower Scout

COMMENCED: 30/08/2016
COMPLETED: 3/09/2016

LOGGED BY: OC/KH
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1100**
SHEET No:	5 of 6
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Kyle Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 329023.590, N: 6243228.390 (56 MGA94)
FINAL DEPTH: 78m

SURFACE ELEVATION : 18.800 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-42	61			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 5° *(continued)*			BEDROCK no success
						SANDSTONE, fine to medium grained, pale grey, indistinctly bedded			
			62			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 5-15°, locally cross-bedded at 20-30°, with black carbonaceous laminations			
		-44	63						
			64						
						SANDSTONE, fine to medium grained, pale grey, indistinctly bedded			
		-46	65			**SANDSTONE**, fine to medium grained, pale grey, disturbed bedding			
						SANDSTONE, fine to medium grained, pale grey, indistinctly to distinctly bedded at 0-20°, trace black carbonaceous laminations			
			66						
		-48	67					Bentonite	
			68			**SANDSTONE**, fine becoming medium grained, pale grey, distinctly bedded at 5-10°, downward coarsening			
		-50	69						
			70			**SANDSTONE**, fine to medium grained, pale grey, distinctly cross-bedded at 0-25°			
		-52	71			**SANDSTONE**, fine grained, pale grey, distinctly bedded at 5-20°, trace black carbonaceous laminations			
			72			**SANDSTONE**, fine to medium grained, pale grey, indistinctly to distinctly bedded at 5-20°, trace black carbonaceous laminations			
		-54	73						
						SANDSTONE, medium grained, pale grey, indistinctly bedded at 0-10°			
			74			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 5-10°			
		-56							

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Rockwell
EQUIPMENT: Hydrapower Scout

COMMENCED: 30/08/2016
COMPLETED: 3/09/2016

LOGGED BY: OC/KH
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1100**
SHEET No:	6 of 6
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Kyle Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 329023.590, N: 6243228.390 (56 MGA94)
FINAL DEPTH: 78m

SURFACE ELEVATION : 18.800 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-58	76			**SANDSTONE**, pale grey, interbedded coarse and fine to medium bands up to 100mm thick, distinctly bedded at 0-15°, trace black carbonaceous lenticles		Start Slotted 75m Sand	**BEDROCK**
			77			**SANDSTONE**, fine to coarse grained, pale grey, distinctly bedded at 0-15°			
			78			**SANDSTONE**, medium to coarse grained, pale grey and grey, with some elongated and subrounded quartz and siltstone clasts up to 10mm diameter		End Slotted 78m End Cap at 78m	
		-60	79			Bore discontinued at 78.00m			
			80						
		-62	81						
			82						
		-64	83						
			84						
		-66	85						
			86						
		-68	87						
			88						
		-70	89						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Rockwell
EQUIPMENT: Hydrapower Scout

COMMENCED: 30/08/2016
COMPLETED: 3/09/2016

LOGGED BY: OC/KH
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1102**
SHEET No:	1 of 5
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Marinea Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328558.660, N: 6242551.020 (56 MGA94)
FINAL DEPTH: 74m

SURFACE ELEVATION : 8.760 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
AD/V	CASING	8	1			**Silty SAND**, fine to medium grained, dark brown, with organic material	BH1102	Concrete	TOPSOIL
						FILL: Silty SAND, fine grained, dark grey, low plasticity silt, with organic material			FILL
			2			**FILL: Clayey Silty SAND**, fine to medium grained, orange-brown, pale grey and dark grey, high plasticity clay, with fine to medium, sub-rounded to sub-angular gravel			
		6	3	06/09/2016 BH1102		**FILL: Silty SAND**, fine to medium grained, pale brown, low plasticity silt			
			4			**SAND**, fine to medium grained, orange-brown, trace wood			ALLUVIUM
		4	5			**SAND**, fine to medium grained, pale grey, trace wood			
			6						
		2	7			**SAND**, fine to medium grained, pale grey			
			8						
		0	9			**SAND**, fine to medium grained, pale brown mottled red-brown			
WB			10			**Silty SAND**, fine to medium grained, pale brown mottled red-brown, trace clay			
		-2	11						
			12			**SAND**, fine to medium grained, pale brown mottled red-brown			
		-4	13			**Clayey SAND**, fine to medium grained, pale brown mottled red-brown, high plasticity clay			
			14						
		-6							

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Hydrapower Scout

COMMENCED: 6/09/2016
COMPLETED: 8/09/2016

LOGGED BY: OC
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1102**
SHEET No:	2 of 5
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Marinea Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328558.660, N: 6242551.020 (56 MGA94)
FINAL DEPTH: 74m

SURFACE ELEVATION : 8.760 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING		16			**Clayey SAND**, fine to coarse grained, pale brown mottled red-brown, high plasticity clay, clay content increasing with depth *(continued)*			**ALLUVIUM**
		-8	17			**Sandy CLAY**, high plasticity, red-brown mottled orange-brown and grey-brown, fine to medium grained sand, some rock structure visible			16.45: HP - 80-100kPa
			18			**Sandy CLAY**, high plasticity, red-brown mottled orange-brown and grey-brown, fine to medium grained sand, trace sandstone gravel, with some bands of Clayey SAND, fine to medium grained, orange-brown			
		-10	19			**SAND**, fine to medium grained, pale brown mottled orange-brown			
			20						
		-12	21						
			22			**SAND**, fine to medium grained, pale brown mottled orange-brown, trace high plasticity clay			
		-14	23						
HQ3			24			**SANDSTONE**, fine to medium grained, orange-brown and pale brown, distinctly bedded at 25-30°			**BEDROCK**
		-16	25			**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 35°, trace red-purple and yellow-brown bands			
			26						
		-18	27			**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 25°, trace yellow staining			
			28			**SANDSTONE**, medium grained, pale grey, indistinctly bedded at 5-15°, trace yellow staining			
		-20	29			**SANDSTONE**, medium to coarse grained, pale grey and pale yellow, distinctly bedded at 5-25°, with black carbonaceous laminations and lenticles			

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Hydrapower Scout

COMMENCED: 6/09/2016
COMPLETED: 8/09/2016

LOGGED BY: OC
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1102**
SHEET No:	3 of 5
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Marinea Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328558.660, N: 6242551.020 (56 MGA94)
FINAL DEPTH: 74m

SURFACE ELEVATION : 8.760 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-22	31			**SANDSTONE**, fine to medium grained, pale grey, massive, with black carbonaceous flecks *(continued)*			
						SANDSTONE, fine to medium grained, pale grey, indistinctly bedded at 5-25°, locally disturbed bedding, with black carbonaceous laminations			
						CORE LOSS 0.06m (31.67-31.73)			**BEDROCK**
			32			**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 5°			
		-24	33			**SANDSTONE**, fine grained, pale grey and grey, distinctly laminated at 5°			
						SANDSTONE, fine to medium grained, pale grey, indistinctly bedded at 5-10°			
			34			**SANDSTONE**, fine grained, pale grey and grey, distinctly bedded at 5-10°			
		-26	35					Grout	
			36			**SANDSTONE**, fine to medium grained, pale grey, massive			
		-28	37			**SANDSTONE**, fine grained, pale grey and grey, distinctly bedded at 5-10°, with bedding of indistinct laminations 40-60mm thick, with black carbonaceous laminations			
			38						
		-30	39			**SANDSTONE**, fine to medium grained, pale grey, indistinctly to distinctly bedded at 15-25°			
						CORE LOSS 0.15m (39.32-39.47)			**BEDROCK**
			40			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 15-25°			
						SANDSTONE, fine to medium grained, pale grey, distinctly bedded at 5-10°			
		-32	41			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 25°			
						SANDSTONE, fine to medium grained, pale grey, massive			
			42			**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 5-20°, with black carbonaceous, locally disturbed laminations			
		-34	43						
						SANDSTONE, fine to medium grained, pale grey, indistinctly bedded			
			44			**SANDSTONE**, fine to medium grained, pale grey, indistinctly to distinctly bedded, locally disturbed bedding at 5-20°			
		-36							

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Hydrapower Scout

COMMENCED: 6/09/2016
COMPLETED: 8/09/2016

LOGGED BY: OC
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1102**
SHEET No:	4 of 5
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Marinea Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328558.660, N: 6242551.020 (56 MGA94)
FINAL DEPTH: 74m

SURFACE ELEVATION : 8.760 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-38	46			**SANDSTONE**, fine to medium grained, pale grey, indistinctly to distinctly bedded, locally disturbed bedding at 5-20° *(continued)*			
			47			**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded to massive			
			48			**SANDSTONE**, fine to medium grained, pale grey, massive, trace black carbonaceous flecks			
		-40	49						
			50						
		-42	51						
			52						
		-44	53						
			54						
		-46	55						
			56			**Silty SANDSTONE**, fine grained, grey to dark grey, indistinctly bedded at 5° **SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 10-20°			
		-48	57			**SANDSTONE**, fine to medium grained, pale grey, distinctly cross-bedded at 0-20°			
			58						
		-50	59			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 20°, with occasional silty grey bands 10-20mm thick			
						SANDSTONE, fine to medium grained, pale grey, distinctly bedded at 10-20°, with black carbonaceous laminations, 50-100mm apart			

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Hydrapower Scout

COMMENCED: 6/09/2016
COMPLETED: 8/09/2016

LOGGED BY: OC
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1102**
SHEET No:	5 of 5
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Marinea Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328558.660, N: 6242551.020 (56 MGA94)
FINAL DEPTH: 74m

SURFACE ELEVATION : 8.760 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-52	61			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 10-20°, with black carbonaceous laminations, 50-100mm apart *(continued)*			
		-54	63			**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 5-20°, local cross-bedding and disturbed bedding			
		-56	65			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 5-20°, with black carbonaceous laminations			
		-58	67			**SANDSTONE**, fine to medium grained, pale grey, indistinctly cross-bedded at 5-20°			
						SANDSTONE, fine to medium grained, pale grey, distinctly bedded at 5-20°, trace black carbonaceous laminations			
		-60	69			**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 0-5°			
						SANDSTONE, fine to medium grained, pale grey, distinctly bedded at 5-20°, with black carbonaceous laminations		Bentonite	
			70			**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 5-10°			
		-62	71			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 0-5°, with black carbonaceous laminations		Start Slotted 71m	
			72			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 5-20°, locally cross-bedded, with black carbonaceous laminations		Sand	
		-64	73						
			74			Bore discontinued at 74.00m		End Slotted 74m End Cap at 74m	
		-66							

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Hydrapower Scout

COMMENCED: 6/09/2016
COMPLETED: 8/09/2016

LOGGED BY: OC
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1112A**
SHEET No:	1 of 1
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Bonanza Parade Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327738.040, N: 6237169.700 (56 MGA94)
FINAL DEPTH: 9m

SURFACE ELEVATION : 2.750 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HA		2	1	23/08/2016 BH1112A		**Silty SAND**, fine to medium grained, brown, with rootlets	BH1112A	Gatic Cover Concrete	**TOPSOIL**
						SAND, fine to medium grained, pale brown to brown			**ALLUVIUM**
			2						
		0	3					Grout	
			4						
AD/V		-2	5					Bentonite	5.50: HP = 180, 200, 170 kPa
			6			**Sandy Silty CLAY**, high plasticity, pale grey, medium to coarse grained sand **Silty CLAY**, high plasticity, red, with trace medium to coarse grained, red, subangular gravels		Start Slotted 6m	5.80: HP = 220, 230, 220 kPa **BEDROCK**
		-4	7			**SANDSTONE**, medium to coarse, red, estimated extremely low strength, extremely weathered **SAND SANDSTONE**, fine to medium grained, pale red-brown, extremely low strength, extremely weathered, recovered as fine to medium grained sand		Sand	
			8			**SANDSTONE**, medium to coarse, pale red-brown, estimated extremely low strength, extremely weathered			
		-6	9			**SAND SANDSTONE**, fine to medium grained, pale red-brown, extremely low strength, extremely weathered, recovered as fine to medium grained sand		End Slotted 9m End Cap at 9m	
			10			**SANDSTONE**, medium to coarse, pale red-brown, estimated extremely low strength, extremely weathered			
		-8	11			**SAND SANDSTONE**, fine to medium grained, pale red-brown, extremely low strength, extremely weathered, recovered as fine to medium grained sand			
			12			**SANDSTONE**, medium to coarse, pale red-brown, estimated extremely low strength, extremely weathered			
		-10	13			Bore discontinued at 9.00m			
			14						
		-12							

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: LX6 DB525

COMMENCED: 23/08/2016
COMPLETED: 23/08/2016

LOGGED BY: KH
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1121A**
SHEET No:	1 of 2
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : President Avenue Kogarah NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328691.490, N: 6240132.490 (56 MGA94)
FINAL DEPTH: 26.1m

SURFACE ELEVATION : 2.070 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HA AD/V RR	CASING	2 1 0 -2 -4 -6 -8 -10 -12	1 2 3 4 5 6 7 8 9 10 11 12 13 14	11/07/2016 BH1121A		**FILL: Silty SAND**, fine to medium grained, brown, low plasticity silt, with rootlets and root fibres **FILL: Sandy SILT**, medium plasticity, grey, fine to medium grained sand, with fine to medium gravel, with fine grained shale fragments **Silty CLAY**, high plasticity, dark grey and black, trace shell fragments, trace organic fibres **SAND**, fine to medium grained, sub-rounded to sub-angular, pale grey, trace shell fragments **CLAY**, high plasticity, dark grey **Clayey SAND**, medium to coarse grained, subrounded to subangular quartz, pale grey, in low plasticity clay **SAND**, fine to medium grained, subrounded to subangular quartz, pale grey and white	BH1121A	Gatic Cover Concrete Grout Bentonite Start Slotted 7m Sand End Slotted 10m End Cap at 10m	**FILL** **ESTUARINE DEPOSITS** 1.80: Drillers note - water loss due to pressure build up and washing out in sands 2.70: Full penetration under hammer weight. PP - 30 - 40 kPa 4.50: Drillers note - water loss in sands due to pressure build up **ALLUVIUM** 12.50: Drillers note - Water loss in sand due to pressure build up

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 11/07/2016
COMPLETED: 12/07/2016

LOGGED BY: JJC
CHECKED BY:

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1121A**
SHEET No:	2 of 2
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : President Avenue Kogarah NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328691.490, N: 6240132.490 (56 MGA94)
FINAL DEPTH: 26.1m

SURFACE ELEVATION : 2.070 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
RR	CASING	-14	16			**SAND**, fine to medium grained, subrounded to subangular quartz, pale grey and white *(continued)*			**ALLUVIUM** 16.30: SPT Hammer bouncing excessively
HQ3		-16	18			**SANDSTONE**, medium to coarse grained, white, thickly bedded, with orange staining		Grout	**BEDROCK**
		-18	20						
		-20	22			**SANDSTONE**, medium to coarse grained, white, thickly bedded, with black laminations			
		-22	24						
		-24	26			Bore discontinued at 26.10m			
		-26	28						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 11/07/2016
COMPLETED: 12/07/2016

LOGGED BY: JJC
CHECKED BY:

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1124**
SHEET No:	1 of 2
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Phil Austin Baseball Field Monterey NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328238.070, N: 6238567.140 (56 MGA94)
FINAL DEPTH: 21m

SURFACE ELEVATION : 5.170 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details Construction notes	Notes (Structure, origin, etc)
HA	CASING	4	1			**Sandy SILT**, low plasticity, dark brown, fine grained, subrounded sand, with roots and rootlets	Concrete	**TOPSOIL**
						FILL: CLAY, medium plasticity, brown mottled red and orange, with fine to medium, subrounded to subangular gravel, with fine to coarse grained, subrounded to subangular sand		**FILL** 1.00: Contamination and PASS sample. SPT bouncing on Sandstone gravels
AD/V		2	3			**FILL: SAND**, fine to medium grained, sub-rounded to sub-angular, brown with orange, with low plasticity clay	Cuttings	2.50: PASS sample
			4					4.00: PASS sample
		0	5	23/08/2016 BH1124		**SAND**, fine to medium grained, sub-rounded, grey		**ESTUARINE DEPOSITS**
WB	CASING	-2	7				Bentonite Start Slotted 7.2m	
		-4	9				Sand	
			10			**Sandy CLAY**, high plasticity, pale grey with orange, fine grained, subrounded sand	End Slotted 10.2m End Cap at 10.2m Bentonite	**RESIDUAL SOIL** 10.00: HP - 100kPa
		-6	11					11.50: HP - 450-500kPa
HQ3		-8	13			CORE LOSS 0.27m (12.50-12.77) **SANDSTONE**, medium grained, white and red, indistinctly bedded at 10°, with orange staining		**BEDROCK**
			14			**SANDSTONE**, coarse grained, red and white, with orange staining		

BH1124

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 22/08/2016
COMPLETED: 25/08/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1124**
SHEET No:	2 of 2
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Phil Austin Baseball Field Monterey NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328238.070, N: 6238567.140 (56 MGA94)
FINAL DEPTH: 21m

SURFACE ELEVATION : 5.170 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-10	16			**SANDSTONE**, medium grained, pale grey, indistinctly bedded at 10-15°, cross-bedded at 5-10°, with orange staining *(continued)*		Sand	
		-12	17			**SANDSTONE**, medium grained, pale grey, indistinctly bedded at 5-10°, with carbonaceous laminations			
						SANDSTONE, medium grained, pale grey, indistinctly bedded at 10-15°, cross-bedded at 5-10°			
			18			**SANDSTONE**, medium to coarse grained, pale grey, distinctly bedded at 10-15°			18.00: water loss between 18-21m assumed to occur at casing seal and not through bedrock
		-14	19			**SANDSTONE**, medium to coarse grained, pale grey-white, indistinctly bedded at 10-15°			
			20			**SANDSTONE**, medium grained, pale grey-white, indistinctly bedded at 5-10°, with carbonaceous laminations			
			21			**SANDSTONE**, coarse grained, pale grey-white, indistinctly bedded at 5-10°			
		-16				**SANDSTONE**, medium to coarse grained, pale grey-white, indistinctly bedded at 5-10°			
			22			Bore discontinued at 21.00m			
		-18	23						
			24						
		-20	25						
			26						
		-22	27						
			28						
		-24	29						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 22/08/2016
COMPLETED: 25/08/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1129**
SHEET No:	1 of 2
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Bado-berong Creek/Napoleon St Sandringham NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327998.140, N: 6236721.590 (56 MGA94)
FINAL DEPTH: 21.05m

SURFACE ELEVATION : 1.480 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details Construction notes	Notes (Structure, origin, etc)
HA AD/V	CASING			08/2016 BH1129		**Sandy SILT**, low plasticity, dark brown, fine to medium grained, subangular sand, with roots and rootlets	BH1129 Gatic Cover Concrete	TOPSOIL 0.10: Contamination test sample
			1			**FILL: Gravelly Sandy SILT**, fine to medium grained, brown to grey, subangular sand, fine to medium grained, subangular gravel, with refuse and building rubbish (barbed wire and household waste)	Grout	FILL 0.50: Contamination test sample ESTUARINE DEPOSITS
		0	2			**SAND**, fine to medium grained, sub-angular, brown-grey to grey, with some shells and shell fragments	Bentonite Start Slotted 2m	0.80: Contamination test sample 1.00: 1.0-1.45m - Contamination test sample
WB	CASING		3					
		-2	4				Sand	4.00: Hammer bouncing. 15 blows with minimal penetration (1st blow went 390mm)
			5			**SANDSTONE**, pale grey-white, recovered as clayey SAND, extremely weathered, extremely low strength		BEDROCK
						CORE LOSS 0.43m (5.00-5.43)	End Slotted 5m	
		-4	6			**SANDSTONE**, fine to medium grained, layered, pale grey, distinctly bedded at 10-15° , cross bedded at 10-15°	Bentonite	BEDROCK
						SANDSTONE, fine to medium grained, layered, pale grey, indistinctly bedded at 10°		6.00: Core loss due to different drilling. Drill bit got stuck in casing shoe and washed out core.
						CORE LOSS 0.28m (6.00-6.28)		BEDROCK
			7			**SANDSTONE**, fine to medium grained, layered, pale grey, indistinctly bedded at 10-15°		
		-6	8			**SANDSTONE**, fine to medium grained, layered, pale grey, distinctly bedded at 10-15° , cross bedded at 10-15°		
						SANDSTONE, fine to medium grained, layered, pale grey, indistinctly bedded at 10-15°		
			9			**SANDSTONE**, coarse grained, red and white, indistinctly bedded at 5-15°, with orange staining		
HQ3		-8	10			**SANDSTONE**, medium grained, orange and white, indistinctly bedded at 10-15°		
						SANDSTONE, coarse grained, red and white, distinctly bedded at 10-15°, orange staining		
		-10	11					
			12			**SANDSTONE**, medium grained, pale grey, indistinctly bedded at 10-15°		
						SANDSTONE, medium grained, pale grey with orange and red, undulose bedding at 5-15°		
		-12	13				Sand	
			14			**SANDSTONE**, medium grained, pale grey with brown, distinctly bedded at 10-15°		
						SANDSTONE, medium grained, pale grey and brown, undulose bedding at 5-15°, orange staining		

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 15/08/2016
COMPLETED: 17/08/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1129**
SHEET No:	2 of 2
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Bado-berong Creek/Napoleon St Sandringham NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327998.140, N: 6236721.590 (56 MGA94)
FINAL DEPTH: 21.05m

SURFACE ELEVATION : 1.480 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-14	16			**SANDSTONE**, medium grained, pale grey with brown, distinctly bedded at 10-15°			
						SANDSTONE, medium grained, pale grey with brown, indistinctly bedded at 10-15°			
			17			**SANDSTONE**, medium to coarse grained, pale grey with brown and red, distinctly bedded at 10-15°			
		-16				**SANDSTONE**, medium grained, pale grey, distinctly bedded at 10-15°			
			18			**SANDSTONE**, medium to coarse grained, pale grey with dark grey, indistinctly bedded at 5-15°			
			19						
		-18							
			20			**SANDSTONE**, medium to coarse grained, pale grey, distinctly bedded at 10-15°, indistinctly cross bedded at 5-10°			
			21						
		-20				Bore discontinued at 21.05m		End Cap at 21m	
			22						
			23						
		-22							
			24						
			25						
		-24							
			26						
			27						
		-26							
			28						
			29						
		-28							

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 15/08/2016
COMPLETED: 17/08/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1129A**
SHEET No:	1 of 1
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Bado-berong Creek/Napoleon St Sandringham NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327998.310, N: 6236719.300 (56 MGA94)
FINAL DEPTH: 9m

SURFACE ELEVATION : 1.500 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
AD/V	CASING		1	19/08/2016 BH1129A		**Silty SAND**, fine to medium grained, dark brown - black, low plasticity silt	BH1129A	Gatic Cover Concrete	TOPSOIL FILL
						FILL: Gravelly Sandy SILT, low plasticity, dark brown and grey, fine to medium grained, subangular sand, fine to medium grained, subangular sandstone gravel			ESTUARINE DEPOSITS 0.50: Density estimated based on drilling resistance
		0	2			**SAND**, fine to medium grained, sub-rounded, pale grey, with some shells and shell fragments		Cuttings	
		-2	3						
			4			**SANDSTONE**, fine to medium grained, pale grey-white, inferred to be XW rock, recovered as clayey SAND			BEDROCK
WB	CASING		5			**SANDSTONE**, fine to medium grained, pale grey-white, recovered as sand		Bentonite	
		-4	6					Start Slotted 5.7m	
			7					Sand	
		-6	8						
			9			Bore discontinued at 9.00m		End Slotted 8.7m Cuttings End Cap at 8.7m	
		-8	10						
			11						
		-10	12						
			13						
		-12	14						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 19/08/2016
COMPLETED: 19/08/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1130**
SHEET No:	1 of 2
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Fraters Avenue Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327219.660, N: 6235801.760 (56 MGA94)
FINAL DEPTH: 21.56m

SURFACE ELEVATION : 3.720 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HA				BH1130 05/08/2016		**Sandy SILT**, low plasticity, dark brown, fine grained, subrounded sand, with roots and rootlets		Gatic Cover Concrete	TOPSOIL FILL
AD/V	CASING		1	08/08/2016		**FILL: Sandy Gravelly SILT**, low plasticity, dark brown, fine, rounded to subangular gravel, fine to medium grained, subrounded sand			
		2		BH1130		**FILL: Silty SAND**, fine to medium grained, sub-rounded, pale to dark brown, low plasticity silt			ALLUVIUM
			2			**SAND**, fine to medium grained, sub-rounded, pale brown			BEDROCK
			3			**SANDSTONE**, extremely weathered, extremely low strength, recovered as medium grained sand			
						SANDSTONE, medium grained, white, indistinctly bedded at 10°			
		0	4			**SANDSTONE**, medium to coarse grained, red with white and orange, indistinctly bedded at 5 to 15°			
						SANDSTONE, medium grained, white, distinctly bedded at 10 to 15° , with discontinuous carbonaceous laminations			
			5			**SANDSTONE**, medium to coarse grained, white to pale grey, distinctly bedded at 10 to 15° , cross-bedded at 15° , with quartz gravels up to 10mm in diameter			
		-2	6			**SANDSTONE**, coarse grained, white, with fine quartz gravels up to 10mm in diameter			
			7			**SANDSTONE**, medium to coarse grained, white to pale grey, distinctly bedded at 10 to 15° , cross-bedded at 0 to 10°		Cuttings	
		-4	8			**SANDSTONE**, coarse grained, pale grey, distinctly bedded at 10 to 15°, with orange staining			
HQ3			9						
		-6	10			**SANDSTONE**, medium grained, pale grey with orange, indistinctly bedded at 5 to 10°			
			11						
		-8	12			**SANDSTONE**, coarse grained, pale grey to white, distinctly bedded at 10 to 15°			
			13	08/08/2016					
		-10		BH1130					
			14			**SANDSTONE**, coarse grained, pale grey to white with red and orange, distinctly bedded at 10 to 15°		Bentonite	

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 4/08/2016
COMPLETED: 8/08/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1130**
SHEET No:	2 of 2
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Fraters Avenue Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327219.660, N: 6235801.760 (56 MGA94)
FINAL DEPTH: 21.56m

SURFACE ELEVATION : 3.720 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-12	16			**SANDSTONE**, medium grained, pale grey to white, distinctly bedded at 10 to 15°		Start Slotted 15.56m	
			17			**SANDSTONE**, coarse grained, pale grey, indistinctly bedded at 10° , with carbonaceous laminations and fine quartz gravel up to 10mm in diameter **SANDSTONE**, medium grained, pale grey, distinctly bedded at 10 to 15° , with cross-bedding at 0 to 5°			
		-14	18					Sand	
			19						18.80: Shale clasts washed out
		-16	20			**SANDSTONE**, coarse grained, pale grey, with quartz gravel 5 to 10mm in diameter			
			21			**SANDSTONE**, medium grained, pale grey with black, distinctly bedded at 10 to 15°			
		-18	22			Bore discontinued at 21.56m		End Slotted 21.56m End Cap at 21.56m	
			23						
		-20	24						
			25						
		-22	26						
			27						
		-24	28						
			29						
		-26							

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 4/08/2016
COMPLETED: 8/08/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1131**
SHEET No:	1 of 2
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Sans Souci Park Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327132.280, N: 6235675.180 (56 MGA94)
FINAL DEPTH: 20m

SURFACE ELEVATION : 4.250 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HA		4	0			**Sandy SILT**, low plasticity, dark brown, fine to medium grained, sub-rounded sand, with roots and rootlets	BH1131	Concrete	TOPSOIL
AD/T	CASING		1			**FILL: Gravelly Clayey SAND**, fine to medium grained, sub-rounded to sub-angular, pale orange-red, low plasticity clay, medium, sub-rounded sandstone gravel			FILL
WB	CASING		2			**SANDSTONE**, extremely weathered, extremely low strength, recovered as Clayey SAND, fine to medium grained, orange			BEDROCK
		2	3	27/08/2016		**SANDSTONE**, medium to coarse grained, grey		Cuttings	BEDROCK
						CORE LOSS 0.27m (2.16-2.43)			
						SANDSTONE, medium to coarse grained, pale grey			
			4	BH1131		**SANDSTONE**, medium to coarse grained, orange and pale grey, distinctly bedded at 5-10°			
		0				**SANDSTONE**, medium to coarse grained, red-orange and pale grey, indistinctly bedded, iron stained			
			5			**SANDSTONE**, medium to coarse grained, red-orange, distinctly bedded at 20-30°, iron stained			
			6			**SANDSTONE**, medium to coarse grained, pale grey, distinctly bedded at 15-20°, cross-bedded at 0-5°		Bentonite	
		-2							
			7			**SANDSTONE**, medium to coarse grained, grey-orange, indistinctly bedded at 15-20°		Start Slotted 7m	
						SANDSTONE, medium to coarse grained, red-orange, distinctly bedded at 10-20°			
			8						
HQ3		-4				**SANDSTONE**, medium to coarse grained, red-orange, indistinctly bedded at 15-20°, cross-bedded at 0-5°		Sand	
			9						
			10			**SANDSTONE**, coarse grained, orange and white, indistinctly bedded at 10-20°		End Slotted 10m End Cap at 10m	
		-6							
			11			**SANDSTONE**, medium grained, pale grey, indistinctly bedded at 15-20°, indistinctly cross-bedded at 5-10°			
			12			**SANDSTONE**, medium grained, pale grey, distinctly bedded at 10-20°			
		-8							
			13						
			14						
		-10							

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 26/08/2016
COMPLETED: 27/08/2016

LOGGED BY: KH/JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1131**
SHEET No:	2 of 2
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Sans Souci Park Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327132.280, N: 6235675.180 (56 MGA94)
FINAL DEPTH: 20m

SURFACE ELEVATION : 4.250 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-12	16			**SANDSTONE**, coarse grained, pale grey, indistinctly bedded at 10-15° *(continued)*		Bentonite	
						SANDSTONE, coarse grained, pale grey-orange, indistinctly bedded at 10-15°, cross-bedded at 0-5°			
						SANDSTONE, coarse grained, pale grey, indistinctly bedded at 10-20°, with red and orange staining			
			17			**SANDSTONE**, medium to coarse grained, pale grey, indistinctly bedded at 10-15°, with orange staining			
		-14	18						
						SANDSTONE, medium to coarse grained, pale grey, distinctly bedded at 10-15°, cross-bedded at 0-5°, with orange staining			
			19						
						CORE LOSS 0.13m (19.54-19.67)			**BEDROCK**
			20			**SANDSTONE**, coarse grained, orange with white, massive			
		-16				Bore discontinued at 20.00m			
			21						
			22						
		-18							
			23						
			24						
		-20							
			25						
			26						
		-22							
			27						
			28						
		-24							
			29						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 26/08/2016
COMPLETED: 27/08/2016

LOGGED BY: KH/JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1133A**
SHEET No:	1 of 1
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Old Taren Point Road Taren Point NSW

CLIENT : Roads and Maritime Services
POSITION : E: 326976.590, N: 6235136.180 (56 MGA94)
FINAL DEPTH: 6.8m

SURFACE ELEVATION : 2.550 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HA		2	1			**Silty SAND**, fine to medium grained, dark brown, with fine to medium gravel, with rootlets	BH1133A	Gatic Cover Concrete	**TOPSOIL**
AD/V			2			**FILL: Clayey SAND**, fine to medium grained, brown and grey, medium plasticity clay, with some medium gravel, subrounded		Grout	**FILL** 0.50: Obstruction - possible boulder
		0	3			**SAND**, medium to coarse grained, dark grey, with shell fragments <5mm		Bentonite	2.35: Boulder or other obstruction **ALLUVIUM**
WB	CASING	-2	4					Start Slotted 3.5m	4.00: Drilling fluid added (WB-CR-650). May influence contamination results
		-4	5					Sand	
			6					End Slotted 6.5m	**BEDROCK**
			7			**SANDSTONE**, fine to medium, grey yellow, estimated low strength, moderately weathered		End Cap at 6.5m	
		-6	8			Bore discontinued at 6.80m			
			9						
		-8	10						
			11						
		-10	12						
			13						
		-12	14						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Drill Power
EQUIPMENT: Comacchio MC450P

COMMENCED: 19/08/2016
COMPLETED: 19/08/2016

LOGGED BY: KS
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1139**
SHEET No:	1 of 2
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Off Holt Road Taren Point NSW

CLIENT : Roads and Maritime Services
POSITION : E: 326453.530, N: 6234092.290 (56 MGA94)
FINAL DEPTH: 20m

SURFACE ELEVATION : 2.510 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HA		2	1	31/08/2016		**ASPHALT**	BH1139	Bentonite	ROAD SURFACE
AD/T	CASING			BH1139		**Clayey Sandy GRAVEL**, fine to medium, sub-angular, grey with red, fine to medium grained, sub-angular sand, low plasticity clay			BASECOURSE
						FILL: Sandy Gravelly CLAY, low to medium plasticity, orange, fine to medium, sub-angular sandstone gravel, fine to coarse grained, sub-angular sand			FILL
		0	2			**SAND**, fine to medium grained, sub-rounded to sub-angular, grey			ALLUVIUM
WB	CASING	-2	3					Grout	
		-4	4						4.45: Hammer bouncing
			5					Bentonite	
			6			**Sandy CLAY**, medium plasticity, orange with white, fine to coarse grained, sub-rounded to sub-angular sand			RESIDUAL SOIL
		-6	7					Start Slotted 7m	7.00: HP - 100kPa
			8						
			9			CORE LOSS 0.19m (9.00-9.19)		Sand	BEDROCK
HQ3		-8	10			**SANDSTONE**, fine to medium grained, white, indistinctly bedded at 10-15°		End Slotted 10m	
			11			**SANDSTONE**, medium grained, red and white, indistinctly bedded at 0-5°, cross-bedding at 10-15°, with orange staining		End Cap at 10m	
		-10	12			**SANDSTONE**, coarse grained, red and white, indistinctly bedded at 5-10°, with orange staining			
			13			**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 5-10°			
			14			**SANDSTONE**, coarse grained, red and white, indistinctly bedded at 5-10°, with orange staining			
		-12				**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 5-10°, stained orange			
						SANDSTONE, coarse grained, red and white, indistinctly bedded at 10-15°, with orange staining			
						SANDSTONE, medium to coarse grained, pale grey, indistinctly bedded at 5-10°			
						SANDSTONE, medium to coarse grained, pale grey and red, indistinctly bedded at 5-10°, with orange staining			
						SANDSTONE, medium to coarse grained, pale grey, indistinctly bedded at			

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 31/08/2016
COMPLETED: 31/08/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1139**
SHEET No:	2 of 2
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Off Holt Road Taren Point NSW

CLIENT : Roads and Maritime Services
POSITION : E: 326453.530, N: 6234092.290 (56 MGA94)
FINAL DEPTH: 20m

SURFACE ELEVATION : 2.510 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-14	16			5-10° **SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 10° **SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 10-15°, indistinctly cross-bedded at 5-10°, with carbonaceous laminations *(continued)*		Bentonite	
		-16	17			**SANDSTONE**, fine to medium grained, pale grey with dark grey, distinctly bedded at 10-15°, indistinctly cross-bedded at 5-10°			
			18						
			19						
			20			Bore discontinued at 20.00m			
		-18	21						
			22						
		-20	23						
			24						
		-22	25						
			26						
		-24	27						
			28						
		-26	29						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 31/08/2016
COMPLETED: 31/08/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1141**
SHEET No:	1 of 2
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Gwawley Park Taren Point NSW

CLIENT : Roads and Maritime Services
POSITION : E: 326251.200, N: 6233778.180 (56 MGA94)
FINAL DEPTH: 26.08m

SURFACE ELEVATION : 3.020 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details Construction notes	Notes (Structure, origin, etc)
AD/T	CASING	2	1	23/09/2016 BH1141		**Silty SAND**, fine and medium grained, brown, trace roots and rootlets	BH1141	TOPSOIL
						FILL: Silty Sandy GRAVEL, fine and medium, dark grey and dark brown, fine to medium grained sand, trace clay		FILL 0.40: Contamination and PASS sample taken from 0.4-0.5m 0.90: Contamination and PASS sample taken from 0.9-1.0m
						FILL: Silty Clayey SAND, fine and medium grained, dark grey-brown, with fine gravel, trace roots	Concrete	
			2	22/09/2016 BH1141		**Silty SAND**, fine and medium grained, grey and pale grey		ALLUVIUM
		0	3			**Clayey SAND**, fine and medium grained, sub-rounded to sub-angular, dark grey-brown, low plasticity clay, trace roots		2.40: PASS sample taken from 2.4-2.5m 2.50: SPT sunk under hammer weight. SPT sample taken for contamination test
							Bentonite	
			4			**SAND**, fine and medium grained, sub-rounded to sub-angular, pale grey and pale brown, trace shell fragments		4.00: SPT sample taken for contamination test
		-2	5					
			6					
		-4	7					6.80: Changed drill bit
			8					
WB	CASING	-6	9			**Silty SAND**, fine and medium grained, sub-rounded to sub-angular, grey and pale grey		
			10			**Silty SAND**, fine and medium grained, sub-rounded to sub-angular, grey and dark grey		
		-8	11				Cuttings	
			12			**Silty CLAY**, medium plasticity, dark grey		11.50: SPT sunk under hammer weight. HP - 0, 10, 10kPa
		-10	13			**Silty CLAY**, medium and high plasticity, pale grey, trace root fibres		13.00: HP - 60, 80, 130kPa
			14					14.50: HP - 275, 310, 320kPa

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 22/09/2016
COMPLETED: 23/09/2016

LOGGED BY: MTr
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1141**
SHEET No:	2 of 2
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Gwawley Park Taren Point NSW

CLIENT : Roads and Maritime Services
POSITION : E: 326251.200, N: 6233778.180 (56 MGA94)
FINAL DEPTH: 26.08m

SURFACE ELEVATION : 3.020 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING		16			**Silty CLAY**, high plasticity, grey with some yellow-brown and orange-brown, trace sand, medium grained, sub-angular to sub-rounded, and fine to medium ironstone gravel, sub-angular to sub-rounded *(continued)*			**ALLUVIUM**
						Silty CLAY, high plasticity, grey, yellow-brown and orange-brown, with fine to medium grained, sub-angular to sub-rounded sand			16.10: HP - 80, 120, 180kPa
		-14	17			**SANDSTONE**, fine to medium grained, pale grey and red-brown, extremely weathered, estimated extremely low strength, remoulds to Clayey SAND			**BEDROCK**
						CORE LOSS 0.10m (17.50-17.60)			
			18			**SANDSTONE**, fine to medium grained, pale grey, remoulds to sandy clay, medium plasticity			
		-16	19			**SANDSTONE**, fine to medium grained, pale grey		Bentonite	**BEDROCK**
						SANDSTONE, fine to medium grained, red-brown and orange-brown, indistinctly bedded at 0-10°			
			20			**SANDSTONE**, medium grained, red-brown and orange-brown with some pale grey, indistinctly bedded at 5°		Start Slotted 20.08m	
						SANDSTONE, fine to medium grained, orange-brown with some pale grey and red-brown, distinctly bedded at 0-5°			
HQ3		-18	21			**SANDSTONE**, fine to medium grained, orange-brown with some pale grey, indistinctly bedded at 10-15°			
			22			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 5-15°, with black carbonaceous laminations, locally cross-bedded at 20°			
						SANDSTONE, fine to medium grained, pale grey, distinctly bedded at 0-5°, with black wavy carbonaceous laminations			
		-20	23			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 20°, with black carbonaceous laminations		Sand	
			24						
						SANDSTONE, fine grained, pale grey, distinctly laminated at 0-5°			
		-22	25			**SANDSTONE**, fine to medium grained, pale grey, distinctly bedded at 10-20°, cross-bedded at 5-15°, with black carbonaceous laminations			
			26						
						Bore discontinued at 26.08m		End Slotted 26.08m End Cap at 26.08m	
		-24	27						
			28						
		-26	29						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 22/09/2016
COMPLETED: 23/09/2016

LOGGED BY: MTr
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1143**
SHEET No:	1 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : West Botany Street Sylvania Waters NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328596.540, N: 6240513.980 (56 MGA94)
FINAL DEPTH: 50.12m

SURFACE ELEVATION : 4.580 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details Construction notes	Notes (Structure, origin, etc)
HA	CASING	4	1			**Silty SAND**, fine grained, poorly graded, sub-rounded to sub-angular, dark brown, low plasticity silt, with some roots and root fibres	Concrete	**TOPSOIL** **FILL**
			2	14/09/2016		**FILL: SAND**, fine and medium grained, poorly graded, sub-rounded to sub-angular, brown becoming grey, with minor plastic, timber and refuse fragments		
		2	3	BH1143		**FILL: Clayey SAND**, fine and medium grained, dark grey, medium plasticity clay, with abundant refuse: glass, metal and plastic fragments		
AD/T			4					4.00: no SPT from 4.0-11.0m due to collapse of fill and poor ground conditions. Auger through to natural material before continuing sampling
		0	5					
			6					
		-2	7			**SAND**, fine and medium grained, sub-rounded, dark grey to pale grey, with some shells and shell fragments	Cuttings	**ESTUARINE DEPOSITS**
	CASING		8					
		-4	9			**CLAY**, high plasticity, grey, with fine grained sand		8.50: Too stiff for U-tube recovery
			10					
		-6	11			**SAND**, fine and medium grained, sub-rounded, grey		**ALLUVIUM**
			12					
WB		-8	13			**CLAY**, high plasticity, dark grey mottled orange, fissured		13.45: Too stiff for U-tube recovery
			14					
		-10				**Clayey SAND**, medium grained, poorly graded, sub-rounded, dark grey, low plasticity clay		

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 14/09/2016
COMPLETED: 19/09/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1143**
SHEET No:	2 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : West Botany Street Sylvania Waters NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328596.540, N: 6240513.980 (56 MGA94)
FINAL DEPTH: 50.12m

SURFACE ELEVATION : 4.580 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-12	16			**Clayey SAND**, medium grained, poorly graded, sub-rounded, dark grey, low plasticity clay *(continued)*		Start Slotted 15.4m Bentonite	ALLUVIUM
			17			**Sandy CLAY**, high plasticity, pale grey, fine and medium grained, sub-rounded sand			
		-14	18					End Slotted 18.4m Sand Cap at 18.4m	
			19						
			20						
		-16	21			**SAND**, fine and medium grained, sub-rounded, grey brown with red			
			22			**Sandy CLAY**, high plasticity, grey, fine and medium grained, sub-rounded sand			
		-18	23						
			24			**Sandy CLAY**, medium plasticity, pale grey mottled red and orange, fine and medium grained, sub-rounded sand			
		-20	25			**SAND**, medium and coarse grained, sub-rounded, pale grey white			RESIDUAL SOIL
			26			**Sandy CLAY**, high plasticity, red mottled orange brown, fine and medium grained, sub-rounded sand			BEDROCK
HQ3		-22	27			**SANDSTONE**, medium to coarse grained, red with white, indistinctly bedded at 10-15°			
			28			**SANDSTONE**, medium to coarse grained, pale grey-white, indistinctly bedded at 10-15°			
		-24	29			CORE LOSS 0.15m (28.91-29.06)			BEDROCK
						SANDSTONE, medium to coarse grained, pale grey-white, indistinctly bedded at 5-15°, cross-bedded at 20°			

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 14/09/2016
COMPLETED: 19/09/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1143**
SHEET No:	3 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : West Botany Street Sylvania Waters NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328596.540, N: 6240513.980 (56 MGA94)
FINAL DEPTH: 50.12m

SURFACE ELEVATION : 4.580 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-26	31			**SANDSTONE**, medium to coarse grained, pale grey-white, indistinctly bedded at 5-15°, cross-bedded at 20° *(continued)*			**BEDROCK**
						SANDSTONE, medium to coarse grained, pale grey-white, indistinctly bedded at 10-15°			
			32			**SANDSTONE**, medium to coarse grained, pale grey-white, indistinctly bedded at 10-15°, with carbonaceous laminations			
		-28	33			**SANDSTONE**, coarse grained, pale grey-white, massive			
						SANDSTONE, medium to coarse grained, pale grey-white, indistinctly bedded at 10-15°			
			34			**Interbedded Siltstone (70%) And Sandstone (30%)**, siltstone is dark grey to black, sandstone is pale grey, fine to medium grained, indistinctly bedded at 10-15°			
		-30	35			**SANDSTONE**, fine to medium grained, pale grey, massive, siltstone clast is dark grey within a sandstone matrix			
						SANDSTONE, fine to coarse grained, pale grey, massive		Bentonite	
			36			**SANDSTONE**, medium grained, pale grey-white, indistinctly bedded at 5-10°, cross-bedded at 10-15°			
		-32	37			**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 10-15°			
						CORE LOSS 0.18m (37.33-37.51)			**BEDROCK**
			38			**Interbedded Siltstone (50%) And Sandstone (50%)**, siltstone is dark grey to black, sandstone is pale grey, fine to medium grained, indistinctly bedded at 10-15°			
		-34				**SANDSTONE**, fine to medium grained, pale grey, indistinctly bedded at 0-5°			
			39			**SANDSTONE**, fine grained, grey, indistinctly bedded at 0-5°			
						SANDSTONE, fine to medium grained, pale grey, indistinctly bedded at 10-15°			
			40			**Interlaminated Siltstone (70%) And Sandstone (30%)**, siltstone is dark grey to black, sandstone is fine grained, pale grey, distinctly bedded at 0-5°			
		-36	41			**SILTSTONE**, black, trace (10%) fine grained, pale grey sandstone			
			42			**SANDSTONE**, medium grained, pale grey, indistinctly bedded at 0-5°			
		-38				**SANDSTONE**, medium grained, pale grey, indistinctly bedded at 0-5°, cross bedded at 10-15°			
			43			**SANDSTONE**, medium grained, pale grey, indistinctly bedded at 0-5°			
						SANDSTONE, medium grained, pale grey, massive, with 2-4mm lenticular shale clasts			
			44						
		-40							

Notes: Inflow — Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 14/09/2016
COMPLETED: 19/09/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1143**
SHEET No:	4 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : West Botany Street Sylvania Waters NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328596.540, N: 6240513.980 (56 MGA94)
FINAL DEPTH: 50.12m

SURFACE ELEVATION : 4.580 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-42	46			**SANDSTONE**, medium grained, pale grey, massive, with 2-4mm lenticular shale clasts			
		-44	47						
			48						
			49						
			50						
		-46	51			Bore discontinued at 50.12m			
			52						
		-48	53						
			54						
		-50	55						
			56						
		-52	57						
			58						
		-54	59						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 14/09/2016
COMPLETED: 19/09/2016

LOGGED BY: JJC
CHECKED BY: TW

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1150**
SHEET No:	1 of 2
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Gwawley Parade Miranda NSW

CLIENT : Roads and Maritime Services
POSITION : E: 325820.650, N: 6233424.630 (56 MGA94)
FINAL DEPTH: 20.2m

SURFACE ELEVATION : 6.030 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HA	CASING		BH1150 14/09/2016			**Silty CLAY**, medium plasticity, dark brown, low plasticity silt, with some roots and root fibres	BH1150	Concrete	TOPSOIL
AD/T			1			**CLAY**, high plasticity, pale orange-red			RESIDUAL SOIL
		4	2	13/09/2016 BH1150				Grout	
						CORE LOSS 0.20m (2.50-2.70)			BEDROCK
			3			**SANDSTONE**, fine to medium grained, dark orange-brown with some pale grey, indistinctly bedded at 5-10°			
						CORE LOSS 0.20m (3.00-3.20)			BEDROCK
		2	4			**SANDSTONE**, fine to medium grained, orange-brown, red and pale grey, indistinctly bedded at 5-10°			
						SANDSTONE, fine to medium grained, pale grey-white with some orange, indistinctly bedded at 5-10°, and cross-bedded at 15-20°			
			5			**SANDSTONE**, medium grained, pale grey-white, indistinctly bedded at 5-10°, trace orange-brown			
		0	6			**SANDSTONE**, medium to coarse grained, orange with some pale grey, indistinctly bedded at 5-10°		Bentonite	
						SANDSTONE, fine to medium grained, pale grey-white, distinctly bedded at 5-10°			
			7			**SANDSTONE**, fine to medium grained, pale grey-white, distinctly cross-bedded at 10-15°		Start Slotted 7.2m	
		-2	8			**Silty SANDSTONE**, fine grained, grey, distinctly bedded at 5-10°, with some black carbonaceous laminations			
HQ3						**SANDSTONE**, coarse grained, pale grey-white, indistinctly bedded at 10-15°		Sand	
			9						
		-4	10			**SANDSTONE**, coarse grained, pale grey-white, indistinct undulose cross-bedding at 0-10°		End Slotted 10.2m End Cap at 10.2m	
			11						
		-6	12			**SANDSTONE**, medium to coarse grained, pale grey-white, distinctly bedded at 10-20°			
						SANDSTONE, medium grained, pale grey-white, distinctly cross-bedded at 0-20°			
			13						
		-8	14			**SANDSTONE**, medium grained, pale grey-white, distinctly cross-bedded at 10-20°			

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 13/09/2016
COMPLETED: 14/09/2016

LOGGED BY: JJC
CHECKED BY: ACC

GEOLOGICAL LOG OF GROUNDWATER BORE HOLE

HOLE No:	**BH1150**
SHEET No:	2 of 2
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE :
LOCATION : Gwawley Parade Miranda NSW

CLIENT : Roads and Maritime Services
POSITION : E: 325820.650, N: 6233424.630 (56 MGA94)
FINAL DEPTH: 20.2m

SURFACE ELEVATION : 6.030 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL		Well Construction	OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	Description NAME: grain size / plasticity, color, structure, minor components	Well Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-10	16			**SANDSTONE**, medium grained, pale grey-white, distinctly cross-bedded at 10-20° *(continued)*		Bentonite	
						SANDSTONE, fine to medium grained, pale grey-white, indistinctly bedded at 5-10°			
			17			**SANDSTONE**, fine to medium grained, pale grey-white, distinctly bedded at 10-20°			
		-12	18			**SANDSTONE**, coarse grained, pale grey-white, indistinctly bedded at 5-15°			
			19			**SANDSTONE**, medium to coarse grained, pale grey-white, distinctly bedded at 10-20°			
		-14	20						
						Bore discontinued at 20.20m			
			21						
		-16	22						
			23						
		-18	24						
			25						
		-20	26						
			27						
		-22	28						
			29						

Notes: Inflow ▽ Standing Water Level

CONTRACTOR: Hagstrom
EQUIPMENT: Explorer E50

COMMENCED: 13/09/2016
COMPLETED: 14/09/2016

LOGGED BY: JJC
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	**BH1212**
SHEET No:	1 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE : Groundwater Monitoring
LOCATION : Memorial Fields, O'Neill Street, Brighton-le-Sands
CLIENT : Roads and Maritime Services
POSITION : E: 328761.5, N: 6240349.5 (MGA94 Zone 56)
FINAL DEPTH: 32.9m

SURFACE ELEVATION : 4.500 (AHD)
TOP OF CASING: 4.430 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HA		4	0		<PL		**Sandy SILT**: low plasticity, dark brown, fine grained sand , with rootlets	BH1212	Concrete:	TOPSOIL
							FILL: Clayey GRAVEL: fine to coarse, dark grey, low to medium plasticity clay			FILL
AD/T	CASING		1		M					
			2	16/05/2017			**Clayey SAND**: fine to medium grained, dark brown, high plasticity clay			ALLUVIUM
		2	3							
			4				**SAND**: fine to medium grained, dark brown, with fine to coarse, sub-rounded gravel, with shell fragments			MARINE DEPOSITS
		0	5							
			6						Bentonite:	
WB	CASING	-2	7		W		**SAND**: fine to medium grained, dark brown			
		-4	8							
			9							

Notes: Inflow, Outflow, Standing Water Level

Pipe Description: 50mm PVC Class 12 screwed

Pipe Screen Details: 50mm PVC 1mm machine slotted

CONTRACTOR: Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 15/05/2017
COMPLETED: 16/05/2017

LOGGED BY: IL
CHECKED BY: PR

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	**BH1212**
SHEET No:	2 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE : Groundwater Monitoring
LOCATION : Memorial Fields, O'Neill Street, Brighton-le-Sands

CLIENT : Roads and Maritime Services
POSITION : E: 328761.5, N: 6240349.5 (MGA94 Zone 56)
FINAL DEPTH: 32.9m

SURFACE ELEVATION : 4.500 (AHD)
TOP OF CASING: 4.430 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	4.5	0							
		-6	11		>PL		**Sandy CLAY**: low plasticity, dark grey, fine to medium grained sand			**SWAMP DEPOSITS**
			12				**Silty CLAY**: medium plasticity, dark grey			
		-8	13				**SAND**: fine to medium grained, pale grey		Start Slotted 13m	**ALLUVIUM**
			14		W				Sand:	
		-10	15							
			16		>PL		**Silty CLAY**: high plasticity, black		End Slotted 16m	**SWAMP DEPOSITS**
		-12	17							
			18		W		**SAND**: fine to medium grained, dark brown			**ALLUVIUM**
		-14	19							
					>PL		**Sandy CLAY**: low plasticity, pale grey, fine to medium grained sand			**RESIDUAL SOIL**

Notes: Inflow, Outflow, Standing Water Level

Pipe Description: 50mm PVC Class 12 screwed

Pipe Screen Details: 50mm PVC 1mm machine slotted

CONTRACTOR: Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 15/05/2017
COMPLETED: 16/05/2017

LOGGED BY: IL
CHECKED BY: PR

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	**BH1212**
SHEET No:	3 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE : Groundwater Monitoring
LOCATION : Memorial Fields, O'Neill Street, Brighton-le-Sands

CLIENT : Roads and Maritime Services
POSITION : E: 328761.5, N: 6240349.5 (MGA94 Zone 56)
FINAL DEPTH: 32.9m

SURFACE ELEVATION : 4.500 (AHD)
TOP OF CASING: 4.430 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-16	21		>PL		**Sandy CLAY**: low plasticity, pale grey, fine to medium grained sand *(continued)*			**RESIDUAL SOIL**
			22				**SANDSTONE**: fine to coarse grained, red and orange brown, indistinctly bedded at 10-25deg, with iron staining and carbonaceous clasts (up to 4mm in size)			**BEDROCK**
		-18	23				**SANDSTONE**: fine to coarse grained, brown to pale brown with red, indistinctly cross bedded at 10-25deg, with shale inclusions (up to 4mm in size)			
			24							
		-20	25						Bentonite:	
							SANDSTONE: fine to medium grained, grey, brown, orange, bedded at 0-10deg, trace carbonaceous inclusions			
HQ							**SANDSTONE**: fine to medium grained, pale grey, indistinctly bedded at 0-30deg, trace dark grey bands			
		-22	26							
			27				**SANDSTONE**: fine to medium grained, pale grey, bedded at 10-20deg, with dark grey bands			
			28							
		-24					**SANDSTONE**: pale grey with red, indistinctly bedded at 0-10deg, with dark grey bands and trace carbonaceous inclusions			
			29							

Notes: Inflow, Outflow, Standing Water Level

Pipe Description: 50mm PVC Class 12 screwed

Pipe Screen Details: 50mm PVC 1mm machine slotted

CONTRACTOR: Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 15/05/2017
COMPLETED: 16/05/2017

LOGGED BY: IL
CHECKED BY: PR

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	**BH1212**
SHEET No:	4 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE : Groundwater Monitoring
LOCATION : Memorial Fields, O'Neill Street, Brighton-le-Sands

CLIENT : Roads and Maritime Services
POSITION : E: 328761.5, N: 6240349.5 (MGA94 Zone 56)
FINAL DEPTH: 32.9m

SURFACE ELEVATION : 4.500 (AHD)
TOP OF CASING: 4.430 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-26	31				**SANDSTONE**: fine to medium grained, orange brown and red, bedded at 10-30deg			**BEDROCK**
							CORE LOSS 0.30m (30.70-31.00)			
							SANDSTONE: fine to medium grained, orange brown, indistinctly bedded at 20deg, iron staining			**BEDROCK**
		-28	32				**SANDSTONE**: fine to medium grained, pale grey, indistinctly bedded at 0-10deg with trace dark grey bands at 0-5deg			
			33				Hole Terminated at 32.90 m Target depth.			
		-30	34							
			35							
			36							
		-32	37							
			38							
		-34	39							

Notes: Inflow — Outflow — Standing Water Level

Pipe Description: 50mm PVC Class 12 screwed

Pipe Screen Details: 50mm PVC 1mm machine slotted

CONTRACTOR: Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 15/05/2017
COMPLETED: 16/05/2017

LOGGED BY: IL
CHECKED BY: PR

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	**BH1214**
SHEET No:	1 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE : Groundwater Monitoring
LOCATION : Scarborough Park North, Civic Avenue, Kogarah, NSW
CLIENT : Roads and Maritime Services
POSITION : E: 328505.4, N: 6239810.2 (MGA94 Zone 56)
FINAL DEPTH: 40m

SURFACE ELEVATION : 1.397 (AHD)
TOP OF CASING: 1.970 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HA	CASING	0	1	11/05/2017	M		**Silty SAND**: fine to medium grained, dark brown, with rootlets	BH1214	Concrete:	TOPSOIL
							FILL: GRAVELLY SILTY SAND: fine to medium, dark brown, with fine to medium grained, sub-rounded to sub-angular gravel			FILL
AD/T					>PL		**SILTY SANDY CLAY**: high plasticity, dark brown, fine to medium grained sand			ALLUVIUM
			2							
							SAND: fine to medium grained, brown			
		-2	3							
			4							
			5						Cuttings:	
		-4								
					W		**SAND**: fine to coarse grained, brown, with fine to coarse sub-angular gravel			
WB			6							
	CASING		7							
		-6								
			8				8.5m: with shell fragments			
			9				**Sandy CLAY**: low plasticity, dark brown, fine to coarse grained sand , with shell fragments, tending towards clayey sand in parts			MARINE DEPOSITS
		-8			>PL					

Notes: Inflow, Outflow, Standing Water Level

Pipe Description: 50mm PVC Class 12 screwed

Pipe Screen Details: 50mm PVC 1mm machine slotted

CONTRACTOR: Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 10/05/2017
COMPLETED: 12/05/2017

LOGGED BY: IL
CHECKED BY: PR

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	**BH1214**
SHEET No:	2 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE : Groundwater Monitoring
LOCATION : Scarborough Park North, Civic Avenue, Kogarah, NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328505.4, N: 6239810.2 (MGA94 Zone 56)
FINAL DEPTH: 40m

SURFACE ELEVATION : 1.397 (AHD)
TOP OF CASING: 1.970 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth					MATERIAL	Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING				>PL					MARINE DEPOSITS
			11				**SAND**: fine to coarse grained, brown		Bentonite:	
		-10							Start Slotted 10.5m	
			12		W				Sand:	
			13							
		-12					**SANDSTONE**: fine to coarse, brown, highly weathered, very low strength			BEDROCK
			14				CORE LOSS 1.19m (13.50-14.69)		End Slotted 13.5m Bentonite:	
HQ			15				**SANDSTONE**: fine to coarse grained, orange brown, indistinctly bedded at 10-20deg, with iron staining 15.38m: pale red and pale grey band, 60mm thick			BEDROCK
		-14								
			16				**SANDSTONE**: fine to coarse grained, dark red pale grey and dark yellow brown, cross bedded at 0-20deg			
			17				16.83m: with dark grey carbonaceous laminations			
		-16								
			18				**SANDSTONE**: fine to medium grained, pale grey with brown, cross bedded at 0-20deg, with thinly laminated dark grey carbonaceous bands			
			19				**SANDSTONE**: fine to medium grained, pale grey, massive, with dark grey carbonaceous flecks up to 10mm and dark grey siltstone clasts up to 10mm			
		-18								

Notes: Inflow, Outflow, Standing Water Level

Pipe Description: 50mm PVC Class 12 screwed

Pipe Screen Details: 50mm PVC 1mm machine slotted

CONTRACTOR: Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 10/05/2017
COMPLETED: 12/05/2017

LOGGED BY: IL
CHECKED BY: PR

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	**BH1214**
SHEET No:	3 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE : Groundwater Monitoring
LOCATION : Scarborough Park North, Civic Avenue, Kogarah, NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328505.4, N: 6239810.2 (MGA94 Zone 56)
FINAL DEPTH: 40m

SURFACE ELEVATION : 1.397 (AHD)
TOP OF CASING: 1.970 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-20	21				**SANDSTONE**: fine to medium grained, pale grey to grey, bedded at 0-10deg, with dark grey carbonaceous flecks, with thin dark grey carbonaceous laminations, trace siltstone clasts			**BEDROCK**
							SANDSTONE: fine to medium grained, pale grey to grey, bedded at 0-20deg, with thinly laminated dark grey bands			
			22				22m: cross bedded at 0-20deg, trace of carbonaceous clasts			
		-22	23				**SANDSTONE**: fine to medium grained, pale grey, cross bedded at 10-20deg, with trace carbonaceous bands and grey bands			
			24				**SANDSTONE**: fine to medium grained, pale grey, indistinctly cross bedded, with a trace of dark grey bands undulating at 5-35deg			
			25				**SANDSTONE**: fine to medium grained, pale grey, cross bedded at 5-15deg, trace dark grey bands			
		-24					25.58m: cross bedding at 10-40deg			
			26				**SANDSTONE**: fine to coarse grained, pale grey to grey, cross bedded at 0-20deg, trace dark grey bands and bands of coarse grains 26.9m - 27.05m: with siltstone clasts			
							26.72m - 27m: brown iron staining			
			27				**SANDSTONE**: fine to coarse grained, pale grey, indistinctly bedded trace dark grey bands	Cuttings:		
		-26	28				**SANDSTONE**: fine to medium grained, pale grey, cross bedded at 10-20deg, trace dark grey bands and carbonaceous laminations			
			29							
		-28								

Notes: Inflow — Outflow — Standing Water Level

Pipe Description: 50mm PVC Class 12 screwed

Pipe Screen Details: 50mm PVC 1mm machine slotted

CONTRACTOR: Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 10/05/2017
COMPLETED: 12/05/2017

LOGGED BY: IL
CHECKED BY: PR

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	**BH1214**
SHEET No:	4 of 4
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE : Groundwater Monitoring
LOCATION : Scarborough Park North, Civic Avenue, Kogarah, NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328505.4, N: 6239810.2 (MGA94 Zone 56)
FINAL DEPTH: 40m

SURFACE ELEVATION : 1.397 (AHD)
TOP OF CASING: 1.970 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-30	31				**SANDSTONE**: fine to medium grained, pale grey, cross bedded at 0-15deg, with trace carbonaceous bands and dark grey bands *(continued)*			**BEDROCK**
			32				**SANDSTONE**: fine to medium grained, pale grey, bedded at 5-10deg, trace grey bands and carbonaceous laminations 32.16m: with siltstone clasts and lenticles			
		-32	33				**SANDSTONE**: fine to medium grained, pale grey, indistinctly bedded at 0-20deg, trace of dark grey carbonaceous laminations, trace of siltstone clasts and lenticles			
			34				**SANDSTONE**: fine to medium grained, pale grey, indistinctly bedded at 0-20deg, with 2-4mm in size quartz gravel clasts, carbonaceous laminations and lenticles			
			35				**SANDSTONE**: fine to medium grained, pale grey, distinctly bedded at 0-10deg, some grey bands **SANDSTONE**: fine to medium grained, pale grey, indistinctly cross bedded to massive, trace carbonaceous flecks and inclusions			
		-34	36				**SANDSTONE**: fine to medium grained, pale grey, cross bedded at 0-20deg, with trace carbonaceous bands and trace of some grey bands			
			37				**SANDSTONE**: fine to medium grained, pale grey, indistinctly bedded, with dark grey and carbonaceous bands at 10-20deg			
		-36	38				38.12m: trace of fine gravel size siltstone clasts			
			39				**SANDSTONE**: fine to medium grained, pale grey, cross bedded at 5-15deg, with trace dark grey bands and carbonaceous laminations			
		-38					39.66m - 40m: trace of fine gravel size siltstone clasts Hole Terminated at 40.00 m Target depth			

Notes: Inflow, Outflow, Standing Water Level

Pipe Description: 50mm PVC Class 12 screwed

Pipe Screen Details: 50mm PVC 1mm machine slotted

CONTRACTOR: Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 10/05/2017
COMPLETED: 12/05/2017

LOGGED BY: IL
CHECKED BY: PR

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	**BH1227**
SHEET No:	1 of 6
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE : Groundwater Monitoring
LOCATION : Kendall Street Reserve Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327291.3, N: 6236377.7 (MGA94 Zone 56)
FINAL DEPTH: 50.24m

SURFACE ELEVATION : 2.534 (AHD)
TOP OF CASING: 2.480 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HA							**Silty SAND**: dark brown, with rootlets			**TOPSOIL**
AD/T	CASING	2	1		M		**FILL: Gravelly SAND**: fine to medium grained, dark brown to black, fine to coarse sub-angular , with silt	BH1227	Concrete: Bentonite:	**FILL**
		0	3	03/05/2017			**SAND**: fine to coarse grained, brown		Cuttings:	**ALLUVIUM**
WB	CASING	-2	5		W				Bentonite: Start Slotted 7.5m Sand:	
		-4	7							
		-6	9							

Notes: Inflow, Outflow, Standing Water Level

Pipe Description: 50mm PVC Class 12 screwed

Pipe Screen Details: 50mm PVC 1mm machine slotted

CONTRACTOR: Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 3/05/2017
COMPLETED: 9/05/2017

LOGGED BY: IL
CHECKED BY: PR

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	**BH1227**
SHEET No:	2 of 6
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE : Groundwater Monitoring
LOCATION : Kendall Street Reserve Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327291.3, N: 6236377.7 (MGA94 Zone 56)
FINAL DEPTH: 50.24m

SURFACE ELEVATION : 2.534 (AHD)
TOP OF CASING: 2.480 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-8	11		W		**SAND**: fine to coarse grained, brown *(continued)*		End Slotted 10.5m	**ALLUVIUM**
							Sandy CLAY: high plasticity, pale grey, fine to medium grained sand			**RESIDUAL SOIL**
		-10	12		>PL				Bentonite:	
			13							
			14							
		-12			W		**Clayey SAND**: fine to medium grained, pale grey, low to medium plasticity clay			
			15				**SANDSTONE**: fine to medium, brown, highly to moderately weathered, very low to low strength			**BEDROCK**
			16				**SANDSTONE**: fine to medium grained, pale grey, indistinctly bedded, trace of thinly laminated dark grey carbonaceous bands 16.1m: brown			
HQ		-14					CORE LOSS 0.24m (16.24-16.48)			**BEDROCK**
			17				**SANDSTONE**: fine to medium grained, pale grey, indistinctly bedded, trace of thinly laminated dark grey carbonaceous bands			
							SANDSTONE: fine to coarse grained, red to dark red, indistinctly bedded at 10-20deg, with iron staining			
			18				**SANDSTONE**: fine to coarse grained, dark red with red and pale grey, distinctly bedded at 10-20deg, with iron staining 17.59m - 17.66m: yellow-brown and grey		Sand:	
		-16								
			19				**SANDSTONE**: fine to coarse grained, dark red and orange yellow with pale grey, distinctly bedded at 10-20deg, with iron staining			
							SANDSTONE: fine to coarse grained, red to dark red with orange brown, indistinctly bedded			

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description: 50mm PVC Class 12 screwed

Pipe Screen Details: 50mm PVC 1mm machine slotted

CONTRACTOR: Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 3/05/2017
COMPLETED: 9/05/2017

LOGGED BY: IL
CHECKED BY: PR

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	**BH1227**
SHEET No:	3 of 6
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE : Groundwater Monitoring
LOCATION : Kendall Street Reserve Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327291.3, N: 6236377.7 (MGA94 Zone 56)
FINAL DEPTH: 50.24m

SURFACE ELEVATION : 2.534 (AHD)
TOP OF CASING: 2.480 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-18	21				**SANDSTONE**: fine to coarse grained, orange dark red and grey, distinctly bedded at 10-20deg, locally disturbed bedding at 0-30deg			**BEDROCK**
							SANDSTONE: fine to coarse grained, pale grey, indistinctly bedded at 0-30deg, with dark grey carbonaceous flecks up to 3mm diameter			
			22							
		-20					CORE LOSS 0.46m (22.22-22.68)			
							SANDSTONE: fine to coarse grained, pale grey, indistinctly to distinctly bedded at 0-20deg, with thinly laminated dark grey carbonaceous flecks		Bentonite:	**BEDROCK**
			23							
			24				24.4m: locally cross bedded at 0-20deg			
		-22								
			25				**SANDSTONE**: fine to coarse grained, pale grey, indistinctly bedded			
							25.55m: siltstone clast, 100mm diameter			
			26				CORE LOSS 0.47m (25.63-26.10)			
		-24					**INTERBEDDED SANDSTONE (70%) AND SILTSTONE (30%)**: dark grey, sandstone is pale grey, medium grained, siltstone is dark grey; with angular siltstone rip-up clasts to 10mm diameter			**BEDROCK**
			27				27.03m: erosive contact **SANDSTONE**: fine to medium grained, pale grey, indistinctly bedded at 0-15deg			
							SANDSTONE: fine to medium grained, pale grey, massive, trace black carbonaceous flecks			
			28							
		-26							Sand:	
			29				**SANDSTONE**: fine to medium grained, pale grey, indistinctly bedded at 0-20deg			

Notes: Inflow, Outflow, Standing Water Level

Pipe Description: 50mm PVC Class 12 screwed

Pipe Screen Details: 50mm PVC 1mm machine slotted

CONTRACTOR: Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 3/05/2017
COMPLETED: 9/05/2017

LOGGED BY: IL
CHECKED BY: PR

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	**BH1227**
SHEET No:	4 of 6
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE : Groundwater Monitoring
LOCATION : Kendall Street Reserve Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327291.3, N: 6236377.7 (MGA94 Zone 56)
FINAL DEPTH: 50.24m

SURFACE ELEVATION : 2.534 (AHD)
TOP OF CASING: 2.480 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-28	31				**SANDSTONE**: fine to medium grained, pale grey, indistinctly bedded at 0-20deg *(continued)*			**BEDROCK**
			32				**SANDSTONE**: fine to medium grained, pale grey, massive			
		-30	33				**SANDSTONE**: fine to medium grained, pale grey, indistinctly bedded at 0-20deg			
			34						Bentonite:	
		-32	35				**SANDSTONE**: fine to medium grained, pale grey to grey, distinctly bedded at 10-20deg, trace black carbonaceous laminations			
		-34	36			m m m m m m m m	**META-SANDSTONE**: fine to medium grained, dark green and grey, indistinct bedding structure, with white and brown, fine gravel size crystals up to 2mm in size		Sand:	
			37							
			38				**DOLERITE**: fine grained, dark grey with pale grey, with white and brown, trace pyrite crystals up to 5mm in size, with some of healed joints (DYKE)			
		-36	39				**DOLERITE**: fine grained, dark green grey pale green and pale grey, with white and brown crystals up to 5mm in size, with many healed joints (DYKE)		Bentonite:	

Notes: Inflow — Outflow — Standing Water Level

Pipe Description: 50mm PVC Class 12 screwed

Pipe Screen Details: 50mm PVC 1mm machine slotted

CONTRACTOR: Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 3/05/2017
COMPLETED: 9/05/2017

LOGGED BY: IL
CHECKED BY: PR

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	**BH1227**
SHEET No:	5 of 6
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE : Groundwater Monitoring
LOCATION : Kendall Street Reserve Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327291.3, N: 6236377.7 (MGA94 Zone 56)
FINAL DEPTH: 50.24m

SURFACE ELEVATION : 2.534 (AHD)
TOP OF CASING: 2.480 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-38	41				**DOLERITE**: fine grained, dark green grey with grey, with white crystals up to 5mm in size, with a trace of orange staining (DYKE)			**BEDROCK**
							DOLERITE: fine grained, dark green grey and grey, with white fine gravel sized crystals, with healed joints (DYKE)			
			42			m m m m	**META-SANDSTONE**: fine to medium grained, dark green grey, with white crystals up to 5mm in size			
		-40				m	**META-SANDSTONE**: fine to medium grained, pale grey brown to pale grey, with dark grey siltstone clasts up to 10mm diameter			
			43				**INTERLAMINATED SANDSTONE (60%) AND SILTSTONE (40%)**: sandstone is pale grey, fine to medium grained, siltstone is dark grey; laminated at 0-10deg 43.37m: erosive contact			
			44				**SANDSTONE**: fine to medium grained, pale grey, indistinctly bedded			
		-42					**SANDSTONE**: medium grained, pale grey, distinctly bedded at 0-20deg, locally cross bedded at 0-20deg, trace black carbonaceous lenticles			
			45						Sand:	
			46							
		-44					**SANDSTONE**: medium grained, pale grey, indistinct to distinct disturbed bedding at 0-80deg			
			47							
							SANDSTONE: medium grained, pale grey, indistinctly bedded, trace of black carbonaceous flecks			
			48							
		-46					**SANDSTONE**: fine to coarse grained, pale grey, distinctly bedded at 0-20deg, trace black carbonaceous lenticles and flecks			
			49							

Notes: Inflow — Outflow — Standing Water Level

Pipe Description: 50mm PVC Class 12 screwed

Pipe Screen Details: 50mm PVC 1mm machine slotted

CONTRACTOR: Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 3/05/2017
COMPLETED: 9/05/2017

LOGGED BY: IL
CHECKED BY: PR

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	**BH1227**
SHEET No:	6 of 6
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE : Groundwater Monitoring
LOCATION : Kendall Street Reserve Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327291.3, N: 6236377.7 (MGA94 Zone 56)
FINAL DEPTH: 50.24m

SURFACE ELEVATION : 2.534 (AHD)
TOP OF CASING: 2.480 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ										**BEDROCK**
		-48	51				Hole Terminated at 50.24 m Target depth.			
		-50	52							
			53							
		-52	54							
			55							
		-54	56							
			57							
		-56	58							
			59							

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description: 50mm PVC Class 12 screwed

Pipe Screen Details: 50mm PVC 1mm machine slotted

CONTRACTOR: Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 3/05/2017
COMPLETED: 9/05/2017

LOGGED BY: IL
CHECKED BY: PR

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	**BH1229**
SHEET No:	1 of 3
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE : Groundwater Monitoring
LOCATION : Sans Souci Park Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327069.5, N: 6235841.7 (MGA94 Zone 56)
FINAL DEPTH: 25m

SURFACE ELEVATION : 6.505 (AHD)
TOP OF CASING: 7.090 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HA	CASING	6	1		M		**FILL: Clayey SAND**: fine to medium grained, dark brown to brown, low plasticity clay , with silt and rootlets	BH1229	Concrete:	FILL
AD/T							**SANDSTONE**: fine to coarse grained, orange brown to brown, highly weathered, very low to low strength			BEDROCK
			2				CORE LOSS 0.48m (1.90-2.38)			
		4					**SANDSTONE**: fine to coarse grained, brown and red, indistinctly bedded at 20-40deg			BEDROCK
			3	03/05/2017			CORE LOSS 0.09m (3.24-3.33)			
							SANDSTONE: fine to coarse grained, brown to orange brown, distinctly bedded at 10-20deg		Cuttings:	BEDROCK
			4				CORE LOSS 0.85m (3.85-4.70)			
		2					**SANDSTONE**: fine to coarse grained, orange brown, indistinctly bedded at 20-30deg			BEDROCK
			5				CORE LOSS 0.95m (4.90-5.85)			
HQ							**SANDSTONE**: fine to coarse grained, orange brown pale grey, red brown and brown, distinctly bedded at 30deg			BEDROCK
			6				CORE LOSS 0.25m (6.00-6.25)			BEDROCK
		0					**SANDSTONE**: fine to coarse grained, orange brown to brown and red, indistinctly bedded at 20-30deg			
			7				**SANDSTONE**: fine to coarse grained, pale grey and red, distinctly bedded at 5-10deg 7.36m - 7.74m: with black carbonaceous clasts (~1mm in size)		Bentonite:	
			8				**SANDSTONE**: fine to coarse grained, brown to dark brown, indistinctly bedded, with sub-angular gravel inclusions (~2mm in size)			
		-2							Start Slotted 8.8m	
			9				**SANDSTONE**: fine to medium grained, pale grey, indistinctly to distinctly bedded at 20-30deg, with rounded siltstone clasts up to 15mm diameter 9.68m - 10m: orange brown iron staining			

Notes: Inflow — Outflow — Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 1/05/2017
COMPLETED: 3/05/2017

LOGGED BY: IL
CHECKED BY: PR

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	**BH1229**
SHEET No:	2 of 3
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE : Groundwater Monitoring
LOCATION : Sans Souci Park Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327069.5, N: 6235841.7 (MGA94 Zone 56)
FINAL DEPTH: 25m

SURFACE ELEVATION : 6.505 (AHD)
TOP OF CASING: 7.090 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-4	11				**SANDSTONE**: fine to coarse grained, purple and brown, massive		Sand:	**BEDROCK**
							SANDSTONE: fine to medium grained, pale brown and pale grey, distinctly bedded at 0-20deg			
							SANDSTONE: fine to medium grained, pale grey, indistinctly bedded at 10-20deg, with black carbonaceous flecks and lenticles			
			12						End Slotted 11.8m	
		-6					**SANDSTONE**: fine to coarse grained, pale grey, distinctly bedded 10-20deg, with black carbonaceous flecks and lenticles			
			13				**SANDSTONE**: fine to medium grained, pale grey with some orange brown, indistinctly bedded, with black carbonaceous flecks		Bentonite:	
			14							
		-8					**SANDSTONE**: fine to medium grained, pale grey, distinctly bedded at 5-20deg, trace black carbonaceous flecks			
			15							
			16							
		-10								
			17							
			18							
		-12								
			19							
							SANDSTONE: fine to medium grained, pale grey with orange brown, indistinctly cross bedded at 10-20deg			

Notes: Inflow — Outflow — Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 1/05/2017
COMPLETED: 3/05/2017

LOGGED BY: IL
CHECKED BY: PR

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	**BH1229**
SHEET No:	3 of 3
PROJECT No:	***30012460***

PROJECT : Southlink Geotechnical Investigations - Northern
PURPOSE : Groundwater Monitoring
LOCATION : Sans Souci Park Sans Souci NSW

CLIENT : Roads and Maritime Services
POSITION : E: 327069.5, N: 6235841.7 (MGA94 Zone 56)
FINAL DEPTH: 25m

SURFACE ELEVATION : 6.505 (AHD)
TOP OF CASING: 7.090 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-14	21				**SANDSTONE**: fine to medium grained, pale grey with orange brown, indistinctly cross bedded at 10-20deg *(continued)*		Sand: backfilled with sand and bentonite	**BEDROCK**
							SANDSTONE: fine to medium grained, pale grey, with some orange brown staining, indistinctly bedded, locally disturbed bedding			
			22				**SANDSTONE**: fine to medium grained, pale grey with pale brown, distinctly cross bedded at 10-20deg, with carbonaceous laminations			
		-16	23				**SANDSTONE**: fine to medium grained, pale grey pale brown and dark red, indistinctly bedded at 10deg			
							SANDSTONE: fine to medium grained, pale grey, distinctly cross bedded at 10-20deg			
			24				**SANDSTONE**: fine to medium grained, pale grey, distinctly bedded at 5deg, with shale clasts 24m - 24.45m: with angular shale clasts, up to 60mm diameter			
		-18					**SANDSTONE**: fine to medium grained, grey to pale grey, indistinctly bedded, with black carbonaceous flecks			
			25				Hole Terminated at 25.00 m Target depth.			
			26							
		-20	27							
			28							
		-22	29							

Notes: Inflow — Outflow — Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 1/05/2017
COMPLETED: 3/05/2017

LOGGED BY: IL
CHECKED BY: PR

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	BH1313
SHEET No:	1 of 4
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : RMS Rockdale Depot West Botany Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328746.2, N: 6240866.8 (MGA94 Zone 56)
DEPTH: 29.13m

SURFACE ELEVATION : 2.900 (AHD)
TOP OF CASING: 2.900 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
AD/T	CASING	2	1		C		**FILL: Silty SAND**: fine to medium grained, brown, with rootlets	BH1313	Concrete:	FILL
							FILL: Silty SAND: fine to medium grained, brown, with fine to coarse grained, angular and sub-angular gravel, glass and ceramic fragments		Bentonite:	
							SAND: fine to medium grained, grey			ALLUVIUM
			2		M		**SAND**: medium to coarse grained, mottled grey and brown			
		0	3				**SAND**: fine to medium grained, brown, organic odour noted			
			4							
							SAND: fine to medium grained, pale grey, organic odour noted			
		-2	5		W					
WB			6							
		-4	7				**Clayey Silty SAND**: fine to medium grained, grey, low plasticity silt, with shells, with bands of organic material, organic odour noted			
					>PL		**Silty CLAY**: high plasticity, dark grey, trace fine grained sand, trace shells, trace clayey silt lenses and bands			

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Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description: 50mm PVC Class 18 screwed

Pipe Screen Details: 50mm Class 18 PVC 1mm machine slotted

CONTRACTOR:	SMEC/Terratest	COMMENCED:	13/12/2017	LOGGED BY:	BW
EQUIPMENT:	Comacchio 450P Track	COMPLETED:	19/12/2017	CHECKED BY:	ACC

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	BH1313
SHEET No:	2 of 4
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : RMS Rockdale Depot West Botany Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328746.2, N: 6240866.8 (MGA94 Zone 56)
DEPTH: 29.13m

SURFACE ELEVATION : 2.900 (AHD)
TOP OF CASING: 2.900 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB		-8	9				**Silty CLAY**: high plasticity, dark grey, trace fine grained sand, trace shells, trace clayey silt lenses and bands *(continued)*			ALLUVIUM
			10						Grout:	
		-9	11							
			12		>PL					
							Silty CLAY & CLAYEY SILT: high plasticity, dark grey, with fine grained sand, trace shells and fibrous organic material, organic odour noted			
		-10	13							
			14							
		-12	15							
					W					

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Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description: 50mm PVC Class 18 screwed

Pipe Screen Details: 50mm Class 18 PVC 1mm machine slotted

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 450P Track

COMMENCED: 13/12/2017
COMPLETED: 19/12/2017

LOGGED BY: BW
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	BH1313
SHEET No:	3 of 4
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : RMS Rockdale Depot West Botany Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328746.2, N: 6240866.8 (MGA94 Zone 56)
DEPTH: 29.13m

SURFACE ELEVATION : 2.900 (AHD)
TOP OF CASING: 2.900 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB		-14	17		W		**Silty SAND**: medium to coarse grained, mottled grey and brown, trace fine grained, angular gravel and charcoal fragments *(continued)*			ALLUVIUM
							Silty SAND: coarse grained, mottled grey and brown, trace fine grained, angular gravel and charcoal fragments			
			18				**Silty CLAY**: high plasticity, dark grey, trace fine grained sand			
		-16	19		>PL		**CLAY**: high plasticity, pale grey, trace fine grained sand, trace silt			
			20				**CLAY**: high plasticity, pale grey, trace fine grained sand, trace silt, with bands of clayey sand and sandy clay, grey, sand is fine to medium grained, clay is medium plasticity			
		-18	21		W		**SAND**: coarse grained, pale grey to white, trace clay, trace wood fragments		Bentonite:	
			22				**SAND**: fine to coarse grained, mottled grey and brown, trace clay, trace wood fragments			
		-20	23				**Clayey SAND & SANDY CLAY**: sand is fine to medium grained, grey, medium plasticity clay, trace wood and fibrous organic material		Start Slotted 23.13m	

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Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description: 50mm PVC Class 18 screwed

Pipe Screen Details: 50mm Class 18 PVC 1mm machine slotted

CONTRACTOR:	SMEC/Terratest	COMMENCED:	13/12/2017	LOGGED BY:	BW
EQUIPMENT:	Comacchio 450P Track	COMPLETED:	19/12/2017	CHECKED BY:	ACC

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	BH1313
SHEET No:	4 of 4
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : RMS Rockdale Depot West Botany Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328746.2, N: 6240866.8 (MGA94 Zone 56)
DEPTH: 29.13m

SURFACE ELEVATION : 2.900 (AHD)
TOP OF CASING: 2.900 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB		-22	25				**Clayey SAND & SANDY CLAY**: sand is fine to medium grained, grey, medium plasticity clay, trace wood and fibrous organic material, with coarse sand bands, pale grey *(continued)*			ALLUVIUM
			26		~PL		**Sandy CLAY**: low plasticity, grey, fine to medium grained sand, trace shells and wood fragments		Sand: 2mm washed	
		-24	27		>PL		**Clayey SAND & SANDY CLAY**: sand is fine to medium grained, grey, low plasticity clay			RESIDUAL SOIL
			28		~PL		**Clayey SAND & SANDY CLAY**: sand is medium to coarse grained, grey, low plasticity clay			
		-26	29				**SANDSTONE**: fine to medium, grey, extremely weathered, estimated very low strength			WEATHERED ROCK
							Hole Terminated at 29.13 m Target depth Borehole imaged upon completion Standpipe peizometer installed		End Slotted 29.13m	
		-28	30							
			31							

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Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description: 50mm PVC Class 18 screwed

Pipe Screen Details: 50mm Class 18 PVC 1mm machine slotted

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 450P Track

COMMENCED: 13/12/2017
COMPLETED: 19/12/2017

LOGGED BY: BW
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	BH1318
SHEET No:	1 of 3
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : President Avenue Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328557.6, N: 6240152.7 (MGA94 Zone 56)
FINAL DEPTH: 20m

SURFACE ELEVATION : 2.380 (AHD)
TOP OF CASING: 2.380 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
AD/T	CASING	2	1		M		**FILL: Silty SAND**: fine to medium grained, brown, trace sub-angular gravel, with rootlets	BH1318	Concrete:	FILL
					>PL		**FILL: Sandy CLAY**: medium plasticity, dark grey brown, fine grained sand, organic odour noted			
		0	2				**FILL: Clayey SAND**: fine to medium grained, dark grey		Bentonite:	
			3							
		-2	4				**Silty SAND**: fine to medium grained, grey, trace clay, trace silt lenses and bands			ALLUVIUM
			5		W		**SAND**: fine to medium grained, pale grey		Start Slotted 5.8m	
	CASING	-4	6							
			7						Sand: 2mm washed	

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Notes: Inflow Outflow Standing Water Level

Pipe Description: 50mm PVC Class 18 screwed

Pipe Screen Details: 50mm Class 18 PVC 1mm machine slotted

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 10/01/2018
COMPLETED: 11/01/2018

LOGGED BY: BC
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	BH1318
SHEET No:	2 of 3
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : President Avenue Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328557.6, N: 6240152.7 (MGA94 Zone 56)
FINAL DEPTH: 20m

SURFACE ELEVATION : 2.380 (AHD)
TOP OF CASING: 2.380 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
					W		**SAND**: fine to medium grained, pale grey *(continued)*			ALLUVIUM
		-8					**SANDSTONE**: medium grained, grey, indistinctly bedded			BEDROCK
			9						End Slotted 8.8m	
			10				**SANDSTONE**: fine to medium grained, dark orange-brown, indistinctly bedded, iron indurated			
		-9					**SANDSTONE**: fine to medium grained, pale grey, distinctly bedded at 0-5deg			
			11							
	CASING		12							
		-10								
			13							
			14				**SANDSTONE**: medium to coarse grained, orange-brown and pale grey, indistinctly bedded, with quartz inclusions, up to 8mm			
							CORE LOSS 0.09m (14.13-14.22)			BEDROCK
		-12					**SANDSTONE**: fine to medium grained, grey, distinctly bedded at 5deg		Grout:	
			15				**SANDSTONE**: medium grained, orange-brown and pale grey, indistinctly bedded			
							SILTSTONE: dark grey, remoulds as silty clay			
							CORE LOSS 0.06m (15.90-15.96)			

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Notes: Inflow Outflow Standing Water Level

Pipe Description: 50mm PVC Class 18 screwed

Pipe Screen Details: 50mm Class 18 PVC 1mm machine slotted

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 10/01/2018
COMPLETED: 11/01/2018

LOGGED BY: BC
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH STANDPIPE / PIEZOMETER

HOLE No:	BH1318
SHEET No:	3 of 3
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : President Avenue Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328557.6, N: 6240152.7 (MGA94 Zone 56)
FINAL DEPTH: 20m

SURFACE ELEVATION : 2.380 (AHD)
TOP OF CASING: 2.380 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
	CASING	-14	17				**SILTSTONE**: dark grey, remoulds as silty clay *(continued)* **SANDSTONE**: coarse grained, grey, with siltstone clasts, 20-40mm, angular **SANDSTONE**: medium grained, grey, indistinctly bedded at 5-15deg			BEDROCK
			18							
		-16	19				**SANDSTONE**: fine to medium grained, pale grey, distinctly bedded at 10deg			
			20				Hole Terminated at 20.00 m Target depth Standpipe piezometer installed			
		-18	21							
			22							
		-20	23							

Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description: 50mm PVC Class 18 screwed

Pipe Screen Details: 50mm Class 18 PVC 1mm machine slotted

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 10/01/2018
COMPLETED: 11/01/2018

LOGGED BY: BC
CHECKED BY: ACC

Draft

STANDPIPE INSTALLATION LOG

HOLE No:	BH1300
SHEET No:	1 of 3
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Rockdale Tennis Club Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328264.8, N: 6241003.7 (MGA94 Zone 56)
FINAL DEPTH: 17.5m

SURFACE ELEVATION : 2.530 (AHD)
TOP OF CASING: 2.370 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HA	CASING	2	1	8/11/2017	M		**Silty SAND**: fine grained, dark brown, with rootlets	BH1300	Concrete:	TOPSOIL
							FILL: Sandy Gravelly CLAY: high plasticity, dark brown, fine sub-angular gravel, fine to medium grained sand			FILL
					>PL		**Silty CLAY**: high plasticity, dark grey to black			ALLUVIUM
AD/T		0	2				**SAND**: fine to medium grained, dark brown			
			3							
			4						Cuttings:	
		-2	5		W					
WB			6							
		-4	7							

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 7/11/2017
COMPLETED: 8/11/2017

LOGGED BY: KL
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1300
SHEET No:	2 of 3
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Rockdale Tennis Club Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328264.8, N: 6241003.7 (MGA94 Zone 56)
FINAL DEPTH: 17.5m

SURFACE ELEVATION : 2.530 (AHD)
TOP OF CASING: 2.370 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB		-6	9		W		**SAND**: fine to medium grained, dark brown *(continued)*			**ALLUVIUM**
							Sandy Silty CLAY: high plasticity, dark grey, fine grained sand			
		-8	10						Bentonite:	
			11							
		-10	12		>PL					
			13						Start Slotted 13m	
			14						Sand:	
		-12	15				**SILTSTONE**: dark grey, extremely weathered, estimated very low strength			**WEATHERED ROCK**

Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 7/11/2017
COMPLETED: 8/11/2017

LOGGED BY: KL
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1300
SHEET No:	3 of 3
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Rockdale Tennis Club Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328264.8, N: 6241003.7 (MGA94 Zone 56)
FINAL DEPTH: 17.5m

SURFACE ELEVATION : 2.530 (AHD)
TOP OF CASING: 2.370 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
RR		-14	17				**SANDSTONE**: fine to medium grained, brown and pale brown, extremely weathered, estimated very low strength *(continued)*		End Slotted 16m Bentonite:	WEATHERED ROCK
		-16	18				Hole Terminated at 17.50 m Target Stratum			
			19							
		-18	20							
			21							
		-20	22							
			23							

Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 7/11/2017
COMPLETED: 8/11/2017

LOGGED BY: KL
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1303
SHEET No:	1 of 5
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : West Botany Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328703.9, N: 6240469.4 (MGA94 Zone 56)
FINAL DEPTH: 36m

SURFACE ELEVATION : 5.020 (AHD)
TOP OF CASING: 4.900 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
AD/V	CASING	4	1		M		**FILL: SAND**: fine grained, pale brown mottled dark brown/dark grey, trace fine to medium grained, sub-angular to sub-rounded gravel, trace plastic fragments, trace fine grained sub-angular to angular charcoal fragments	BH1303	Concrete: PVC pipe stick down -0.14m	FILL
			2				1.4m: trace glass sand rubber fragments, trace fine to coarse grained sub-angular to sub-rounded gravel, trace silty clay pockets, low plasticity, dark grey			
		2	3	13/11/2017	W		**FILL: Sandy CLAY**: medium plasticity, dark grey, fine grained sand, trace plastic/metal/glass/rubber fragments, trace silt			
			4				**FILL: Silty SAND**: fine to coarse grained, dark grey, with fine to coarse grained, sub-angular to angular gravel, with fill materials (plastic, glass, metal, rubber fragments;		Bentonite	
WB		0	5		>PL		**Silty CLAY**: high plasticity, grey mottled brown/dark grey, trace fine grained sand, trace timber fragments and organic material			ALLUVIUM
		-2	7		W		**SAND**: fine grained, pale grey/grey, trace fine shell fragments			

Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 23/10/2017
COMPLETED: 25/10/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1303
SHEET No:	2 of 5
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : West Botany Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328703.9, N: 6240469.4 (MGA94 Zone 56)
FINAL DEPTH: 36m

SURFACE ELEVATION : 5.020 (AHD)
TOP OF CASING: 4.900 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-4	9		W		**SAND**: fine grained, pale grey/grey, trace fine shell fragments *(continued)*			**ALLUVIUM**
					>PL		**Sandy CLAY**: high plasticity, dark grey/grey, fine grained sand, trace silt			
			10		W		**SANDY SILT/SILTY SAND**: fine, dark grey/grey, trace low plasticity clay		Start Slotted 10m	
		-E	11							
			12		>PL		**Silty CLAY**: high plasticity, brown mottled pale brown/pale grey **Sandy CLAY**: high plasticity, pale grey, fine grained sand			
		-8	13		W		**SAND**: fine grained, pale grey, trace low plasticity clay **SAND**: fine grained, pale brown		End Slotted 13m Sand:	
			14							
		-10	15		>PL		**Silty CLAY**: high plasticity. pale grey/grey 14.82m: becoming dark grey mottled grey fissured, trace sand lenses: fine grained. grey. 5-10mm thick, ~50-100mm spacing. trace rootlets			

Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 23/10/2017
COMPLETED: 25/10/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1303
SHEET No:	3 of 5
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : West Botany Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328703.9, N: 6240469.4 (MGA94 Zone 56)
FINAL DEPTH: 36m

SURFACE ELEVATION : 5.020 (AHD)
TOP OF CASING: 4.900 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth			MATERIAL			Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-12	17		>PL		**Sandy CLAY**: high plasticity, dark grey, fine grained sand, with interbedded clayey sand bands: fine grained, dark grey, trace shell fragments ~100-150mm spacing 17m: becoming brown 17.3m: becoming dark grey		Start Slotted 16m	
					W		**SAND**: fine grained, grey mottled pale grey, trace fine shell fragments			ALLUVIUM
			18		~PL		**Silty CLAY**: high plasticity, pale grey/white, trace rootlets, trace fine grained, rounded gravel **Sandy CLAY**: high plasticity, pale grey/white, fine grained sand			RESIDUAL SOIL
		-14	19				**SANDSTONE**: fine to medium grained, dark brown/brown, extremely to highly weathered, estimated very low strength 19.2m to 19.5m: recovered as fine grained sand		End Slotted 19m	WEATHERED ROCK
HQ3							**SANDSTONE**: fine to medium grained, red brown, indistinctly bedded at 30deg, iron stained 20.04: becoming pale grey/white mottled red brown			BEDROCK
							CORE LOSS 0.25m (20.40-20.65)			
		-16	21				**SANDSTONE**: fine to medium grained, red brown, indistinctly bedded at 30deg, iron stained From 20.65m: becoming red brown mottled pale grey/white/yellow From 21.35m: fine to coarse grained			BEDROCK
			22				22m: becoming mottled pale grey/pink/dark grey, distinctly bedded at 10-20deg			
		-18	23				23m: becoming red brown mottled yellow/pink/pale grey 23.5m: becoming pink mottled pale grey/yellow 23.7m: distinctly cross-bedded at 10-20deg			

Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 23/10/2017
COMPLETED: 25/10/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1303
SHEET No:	4 of 5
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : West Botany Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328703.9, N: 6240469.4 (MGA94 Zone 56)
FINAL DEPTH: 36m

SURFACE ELEVATION : 5.020 (AHD)
TOP OF CASING: 4.900 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-20	25				**SANDSTONE**: fine to coarse grained, orange brown mottled pale grey, indistinctly bedded at 10-30deg			BEDROCK
							SANDSTONE: fine to medium grained, pale grey mottled purple grey and orange brown, indistinctly bedded at 10-25deg, locally cross-bedded			
			26							
		-22	27				27.5m: becoming purple mottled purple/pale grey		Bentonite:	
			28				28.1m to 28.4m: becoming yellow mottled purple/pale grey			
							SANDSTONE: fine to medium grained, pale grey and grey, indistinctly bedded at 10deg			
		-24	29				**SANDSTONE** fine to medium grained, pale grey, indistinctly bedded at 10-20deg 29.35m to 29.55m trace black carbonaceous flecks			
							CORE LOSS 0.22m (29.78-30.00)			
			30				**SANDSTONE** fine to medium grained, pale grey and grey, indistinctly bedded at 10deg			BEDROCK
							SANDSTONE medium grained, pale grey, massive			
		-26	31				**SANDSTONE**: fine to medium grained, pale grey and grey, indistinctly bedded at 10deg			
							SANDSTONE: fine to medium grained, pale grey, indistinct locally disturbed bedding			

Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 23/10/2017
COMPLETED: 25/10/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1303
SHEET No:	5 of 5
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : West Botany Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328703.9, N: 6240469.4 (MGA94 Zone 56)
FINAL DEPTH: 36m

SURFACE ELEVATION : 5.020 (AHD)
TOP OF CASING: 4.900 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-28	33				**SANDSTONE**: fine to medium grained, pale grey and grey, indistinctly bedded at 10deg *(continued)* From 32.45m: becoming cross-bedded **SANDSTONE**: fine to coarse grained, pale grey, indistinctly bedded at 10-20deg 32.75m to 33.08m: fine to coarse grained 33.06m to 33.08m: trace fine to medium grained sub-rounded to rounded siltstone clasts **SANDSTONE**: fine to medium grained, pale grey, distinctly bedded at 0-10deg			BEDROCK
		-30	35							
			36				Hole Terminated at 36.00 m Target Depth			
		-32	37							
			38							
		-34	39							

Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level Pipe Description: Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 23/10/2017
COMPLETED: 25/10/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1314
SHEET No:	1 of 4
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Spring Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328545.6, N: 6242493.9 (MGA94 Zone 56)
FINAL DEPTH: 25.21m

SURFACE ELEVATION : 7.950 (AHD)
TOP OF CASING: 7.790 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
NDD	CASING	6	1		M		**Silty SAND**: fine grained, dark brown, trace rootlets **FILL: Silty SAND**: fine grained, dark brown mottled brown, trace rootlets	BH1314	Concrete: Bentonite	TOPSOIL FILL
ADW	CASING	4	2	14/11/2017	M - W		**Clayey SAND**: fine grained, pale red brown mottled pale grey, low plasticity clay			ALLUVIUM
			3		W		**SILTY CLAY/CLAYEY SILT**: low plasticity, pale brown, trace fine grained sand			
			4				**Silty CLAY**: high plasticity, dark grey, trace fine grained sand **CLAY**: high plasticity, dark grey mottled black, trace silt, trace charcoal fragments			
			5		>PL		**Sandy CLAY**: medium plasticity, grey mottled dark grey, fine grained sand, with interbedded clayey sand bands: fine grained, dark grey, 100-200mm thick, ~200-300mm spacing			
		2	6							
			7		M		**Clayey SAND**: fine to medium grained, pale grey, low plasticity clay, trace sand bands; fine grained, pale grey, 200mm thick, ~200mm spacing			
		0			W					

Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 31/10/2017
COMPLETED: 1/11/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1314
SHEET No:	2 of 4
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Spring Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328545.6, N: 6242493.9 (MGA94 Zone 56)
FINAL DEPTH: 25.21m

SURFACE ELEVATION : 7.950 (AHD)
TOP OF CASING: 7.790 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
AD/W		-2	10		W		**Clayey SAND**: fine to medium grained, pale grey, low plasticity clay, trace sand bands; fine grained, pale grey, 200mm thick, ~200mm spacing *(continued)* From 8.5m: trace fine grained sub-rounded to rounded quartz gravel		Cuttings:	**ALLUVIUM**
WB	CASING	-4	12		>PL		**Silty CLAY**: high plasticity, dark grey mottled black, trace charcoal/organic material			
		-6	14		<PL		**Silty CLAY**: high plasticity, pale grey/grey mottled orange			

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 31/10/2017
COMPLETED: 1/11/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1314
SHEET No:	3 of 4
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Spring Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328545.6, N: 6242493.9 (MGA94 Zone 56)
FINAL DEPTH: 25.21m

SURFACE ELEVATION : 7.950 (AHD)
TOP OF CASING: 7.790 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-10	17		W		**SAND**: fine grained, grey mottled dark grey, trace sandy clay lenses; medium to high plasticity, grey		Bentonite	**ALLUVIUM**
			18							
			19		>PL		**Silty CLAY**: high plasticity, dark brown/dark grey, with fine grained sand		Start Slotted 19m	
		-12	20				**SAND**: fine grained, pale brown			
			21		W				Sand:	
		-14	22				22m: becoming grey			
							Silty SAND: fine grained, dark grey mottled grey			
			23							
		-16								

Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 31/10/2017
COMPLETED: 1/11/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1314
SHEET No:	4 of 4
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Spring Street Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328545.6, N: 6242493.9 (MGA94 Zone 56)
FINAL DEPTH: 25.21m

SURFACE ELEVATION : 7.950 (AHD)
TOP OF CASING: 7.790 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING				W		**Silty SAND**: fine grained, dark grey mottled grey *(continued)*			**ALLUVIUM**
					W		**SAND**: fine grained, pale grey, trace silt			**RESIDUAL SOIL**
			25				**SANDSTONE**: fine grained, pale grey, extremely to highly weathered, estimated very low to low strength		End Slotted 25m Sand: backfilled with sand and bentonite	**WEATHERED ROCK**
							Hole Terminated at 25.21 m Target Stratum			
		-18	26							
			27							
		-20	28							
			29							
		-22	30							
			31							
		-24								

Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 31/10/2017
COMPLETED: 1/11/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1315
SHEET No:	1 of 4
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Beehag Reserve Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328708.3, N: 6242446.3 (MGA94 Zone 56)
FINAL DEPTH: 31.6m

SURFACE ELEVATION : 3.880 (AHD)
TOP OF CASING: 3.780 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
AD/V	CASING	2	1	14/11/2017	M		**Sandy SILT**: brown, fine grained sand, trace low plasticity clay, trace rootlets	BH1315	Concrete: PVC pipe stick down -0.1m	TOPSOIL
							FILL: Silty SAND: fine grained, brown mottled pale brown			FILL
							0.5m: becoming dark grey/dark brown			
							FILL: Sandy CLAY: medium plasticity, dark grey/black, fine grained sand, trace fine to coarse grained, angular to sub-angular gravel			
					M - W		0.8m to 0.85m: trace fine to coarse grained, sub-angular to angular gravel			ALLUVIUM
							Silty SAND: fine grained, dark grey, trace low plasticity clay, trace rootlets			
			2		W		**SAND**: fine grained, grey mottled dark grey			
			3				**Silty CLAY**: high plasticity, pale grey, with fine grained sand, trace rootlets			
					>PL		**Sandy CLAY**: high plasticity, pale grey, fine grained sand			
		0	4				**Clayey SAND**: fine grained, pale grey, low plasticity clay			
					W		**SAND**: fine grained, pale grey, trace low plasticity clay			
			5				**Clayey SAND**: fine grained, pale grey, medium plasticity clay			
WB		-2					**Silty CLAY**: high plasticity, pale grey mottled dark grey, trace fine grained sand			
			6				**Sandy CLAY**: medium plasticity, pale grey/grey mottled dark grey, fine grained sand			
					>PL					
			7				**SAND**: fine grained, pale brown			
					W		From 7.3m: trace shell fragments			
		-4								

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 26/10/2017
COMPLETED: 27/10/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1315
SHEET No:	2 of 4
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Beehag Reserve Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328708.3, N: 6242446.3 (MGA94 Zone 56)
FINAL DEPTH: 31.6m

SURFACE ELEVATION : 3.880 (AHD)
TOP OF CASING: 3.780 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING				W		**SAND**: fine grained, pale brown *(continued)*			**ALLUVIUM**
			9		<PL		**Silty CLAY**: high plasticity, brown			
		-6	10		W		**Clayey SAND**: fine grained, pale grey, low plasticity clay			
							Sandy CLAY: medium plasticity, pale grey, fine grained sand			
			11		>PL					
		-8	12						Bentonite:	
			13				**Silty CLAY**: high plasticity, pale grey/pale brown			
							Silty CLAY: high plasticity, dark grey mottled brown/black, trace fine grained sand, trace charcoal fragments			
		-10	14		<PL		**Sandy CLAY**: medium plasticity, grey mottled dark grey, fine grained sand			
			15				**Silty CLAY**: high plasticity, dark grey mottled black			
		-12								

Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 26/10/2017
COMPLETED: 27/10/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1315
SHEET No:	3 of 4
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Beehag Reserve Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328708.3, N: 6242446.3 (MGA94 Zone 56)
FINAL DEPTH: 31.6m

SURFACE ELEVATION : 3.880 (AHD)
TOP OF CASING: 3.780 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING		17		<PL		**Silty CLAY**: high plasticity, dark grey mottled black *(continued)*			ALLUVIUM
		-14	18				**INTERBEDDED CLAYEY SAND AND SILTY CLAY**: clayey sand is fine grained, dark grey, medium plasticity clay, ~200-300mm bands; silty clay is high plasticity, dark grey, beds are ~200-300mm thick			
			19				From 19m: trace fine charcoal fragments			
		-16	20		>PL					
			21							
		-18	22							
			23							
		-20								

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 26/10/2017
COMPLETED: 27/10/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1315
SHEET No:	4 of 4
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Beehag Reserve Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328708.3, N: 6242446.3 (MGA94 Zone 56)
FINAL DEPTH: 31.6m

SURFACE ELEVATION : 3.880 (AHD)
TOP OF CASING: 3.780 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING		25				**Silty Clayey SAND**: fine grained, black/dark grey, low plasticity clay, trace organic material, trace rootlets			**ALLUVIUM**
							From 25m: with interbedded lenses of sand and clay: sand is fine grained, grey; clay is low to medium plasticity, grey/black, with silt, lenses are 10-30mm thick, ~50-100mm spacing			
		-22	26		W				Start Slotted 25.6m	
			27						Sand:	
		-24	28				**SANDY CLAY/CLAYEY SAND**: fine, medium plasticity, pale grey, trace rootlets			**RESIDUAL SOIL**
			29		~PL / W					
		-26	30							
			31				**SANDSTONE**: fine grained, pale grey/white mottled pale yellow, extremely to highly weathered, estimated very low to low strength, recovered as sandy clay: medium plasticity, fine grained sand			**WEATHERED ROCK**
		-28					Hole Terminated at 31.60 m Target Stratum		End Slotted 31.6m	

Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 26/10/2017
COMPLETED: 27/10/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1316
SHEET No:	1 of 5
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Garnet Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328438.8, N: 6241036.2 (MGA94 Zone 56)
FINAL DEPTH: 34m

SURFACE ELEVATION : 2.220 (AHD)
TOP OF CASING: 2.100 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth					MATERIAL	Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HA		2	1	14/11/2017	D M		**Silty SAND**: fine grained, dark brown mottled pale grey, trace fine to coarse grained, sub-angular to sub-rounded gravel, trace rootlets **FILL: Sandy SAND**: fine to coarse grained, dark brown, trace low plasticity clay, trace fine to coarse grained, sub-angular to sub-rounded gravel, trace glass From 0.3m: with cobbles <200mm diameter	BH1316 Concrete:		TOPSOIL FILL
AD/T	CASING	0	2		>PL		**Silty CLAY**: high plasticity, dark brown mottled brown, trace rootlets, trace clayey sand lenses: brown, fine grained up to 20-30mm thick			ALLUVIUM
			3				**Silty SAND**: fine grained, dark grey mottled pale brown, trace low plasticity clay			
		-2	4		W		**SAND**: fine grained, dark grey, with silt 2.5m to 2.6m: trace organic material From 4m: trace silt, trace shell fragments trace low plasticity clay			
		-4	6				**Clayey SAND**: fine grained, dark grey, low plasticity clay, trace organics, trace sand lenses; grey, fine grained, trace shell fragments			
WB			7				**Clayey SAND**: fine grained, dark grey, low plasticity clay			
					>PL		**Sandy CLAY**: high plasticity, dark grey, fine grained sand			

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 2/11/2017
COMPLETED: 6/11/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1316
SHEET No:	2 of 5
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Garnet Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328438.8, N: 6241036.2 (MGA94 Zone 56)
FINAL DEPTH: 34m

SURFACE ELEVATION : 2.220 (AHD)
TOP OF CASING: 2.100 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL			Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components		Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-6	9		>PL		**Sandy CLAY**: high plasticity, dark grey, fine grained sand *(continued)*				**ALLUVIUM**
			10		W		**SAND**: fine grained, pale grey				
		-8					**Sandy CLAY**: high plasticity, pale grey, fine grained sand, trace silt				
			11				**Silty CLAY**: high plasticity, pale grey, with fine grained sand, trace silt 11m to 11.5m: becoming orange brown				
		-10	12				12.5m: becoming pale brown		Cuttings:		
			13		>PL		From 13m: with interbedded sandy clay: high plasticity, pale grey, fine grained sand, 200mm thick, ~200- 300mm spacing				
		-12	14								
			15								

Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level Pipe Description: Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 2/11/2017
COMPLETED: 6/11/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1316
SHEET No:	3 of 5
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Garnet Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328438.8, N: 6241036.2 (MGA94 Zone 56)
FINAL DEPTH: 34m

SURFACE ELEVATION : 2.220 (AHD)
TOP OF CASING: 2.100 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-14					**Clayey SAND**: fine grained, pale brown, medium plasticity clay			ALLUVIUM
			17		>PL		**Sandy CLAY**: high plasticity, pale grey mottled pale orange, fine grained sand, with interbedded bands of clayey sand 16.7m to 17.2m: potential loose/soft band indicated by very easy drilling penetration			
		-16	18							
			19		W		**Clayey SAND**: fine grained, pale brown mottled red, low plasticity clay			
		-18	20		<PL		**Sandy CLAY**: high plasticity, pale grey mottled red, fine grained sand 20.4m: becoming red			
			21							
			22				22m: becoming pale brown mottled red/ grey			
		-20					**Silty CLAY**: high plasticity, dark grey mottled dark brown, trace fine grained sand, trace clayey sand lenses; medium plasticity, dark brown, fine grained, 50-100mm thick, 150-200mm spacing			
			23		>PL					

Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 2/11/2017
COMPLETED: 6/11/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1316
SHEET No:	4 of 5
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Garnet Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328438.8, N: 6241036.2 (MGA94 Zone 56)
FINAL DEPTH: 34m

SURFACE ELEVATION : 2.220 (AHD)
TOP OF CASING: 2.100 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-22	25		>PL		**Silty CLAY**: high plasticity, dark grey mottled dark brown, trace fine grained sand trace clayey sand lenses: medium plasticity, dark brown, fine grained, 50-100mm thick, 150-200mm spacing *(continued)*		Bentonite:	ALLUVIUM
		-24	26 27 28		W		**Clayey SAND**: fine grained, grey mottled pale brown, medium plasticity clay, trace charcoal, trace high plasticity clay pockets trace sand pockets, trace rootlets		Start Slotted 28m Sand:	
		-26	29 30							
		-28	31				**SANDSTONE**: fine to medium grained, pale grey, highly to extremely weathered, estimated very low to low strength		End Slotted 31m	WEATHERED ROCK

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 2/11/2017
COMPLETED: 6/11/2017

LOGGED BY: FF
CHECKED BY: ACC

STANDPIPE INSTALLATION LOG

HOLE No:	BH1316
SHEET No:	5 of 5
PROJECT No:	30012460

PROJECT : F6 Extension - Northern Section
PURPOSE : Groundwater Monitoring
LOCATION : Garnet Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328438.8, N: 6241036.2 (MGA94 Zone 56)
FINAL DEPTH: 34m

SURFACE ELEVATION : 2.220 (AHD)
TOP OF CASING: 2.100 (AHD)
ANGLE FROM HORIZONTAL : 90°

Drilling		Depth				MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Moisture Condition	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB		-30			W		**SANDSTONE**: fine to medium grained, pale grey, highly to extremely weathered, estimated very low to low strength *(continued)*			**WEATHERED ROCK**
RR			33				**SILTSTONE**: dark grey, with fine grained sand, extremely weathered, estimated very low strength		Bentonite:	
							SANDSTONE: fine to medium grained, pale grey, highly weathered, estimated low strength			
			34				Hole Terminated at 34.00 m Target Stratum Note that indicated top of rock level is based upon drilling resistance and feed back from driller, due to lack of recovery in successive SPT tests towards base of soil column.			
		-32								
			35							
			36							
		-34								
			37							
			38							
		-36								
			39							

Notes: ▶ Inflow ◀ Outflow ▼ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 2/11/2017
COMPLETED: 6/11/2017

LOGGED BY: FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1306
SHEET No:	1 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Rockdale Tennis Club Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328373.9, N: 6240983.8 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 2.600 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 091°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
AD/T	CASING	2	0			**Silty SAND**: fine grained, brown, trace rootlets	BH1306	Concrete:	TOPSOIL
			1			**FILL: Gravelly Clayey SAND**: medium to coarse grained, brown, sub-angular gravel, sandstone, with fragments of bitumen			FILL
			2			**FILL: Clayey Sandy GRAVEL**: fine to medium, sub-rounded to sub-angular, brown, medium plasticty clay, trace glass, metal, bitumen, concrete fragments and construction waste <5%			
WB			3			**FILL: Gravelly SAND**: medium to coarse grained, red-brown, fine, sub-rounded to sub-angular gravel			
		0				**SAND**: fine to medium grained, pale grey, trace clay			ALLUVIUM
			4						
			5						
		-2							
			6						
			7						
		-4							

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Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Geo 305 Track

COMMENCED: 1/02/2018
COMPLETED: 8/02/2018

LOGGED BY: KS
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1306
SHEET No:	2 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Rockdale Tennis Club Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328373.9, N: 6240983.8 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 2.600 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 091°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-6	10			**SAND**: fine to medium grained, pale grey, trace clay *(continued)*			**ALLUVIUM**
		-8	11						
			12						
			13						
			14						
		-10	15						

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Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Geo 305 Track

COMMENCED: 1/02/2018
COMPLETED: 8/02/2018

LOGGED BY: KS
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1306
SHEET No:	3 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Rockdale Tennis Club Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328373.9, N: 6240983.8 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 2.600 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 091°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-12	17			**SAND**: fine to medium grained, pale grey, trace clay *(continued)*			ALLUVIUM
			18						
		-14	19			**SANDSTONE**: medium to coarse grained, pale grey, remoulds as sandy clay, high plasticity, sand is medium to coarse grained			BEDROCK
HQ			20						
		-16	21						
			22						
			23						
		-18							

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Geo 305 Track

COMMENCED: 1/02/2018
COMPLETED: 8/02/2018

LOGGED BY: KS
CHECKED BY: ACC

Draft

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1306
SHEET No:	4 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Rockdale Tennis Club Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328373.9, N: 6240983.8 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 2.600 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 091°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-20	25			**SANDSTONE**: medium to coarse grained, pale grey, remoulds as sandy clay, high plasticity, sand is medium to coarse grained *(continued)*			BEDROCK
			26			CORE LOSS 0.48m (25.72-26.20)			
		-22	27			**SANDSTONE**: medium to coarse grained, orange and yellow with some grey, remoulds as sandy clay, high plasticity, sand is medium to coarse grained			BEDROCK
			28						
			29			CORE LOSS 0.34m (28.86-29.20)			
						SANDSTONE: medium grained, pale grey to grey, remoulds as sandy clay			BEDROCK
			30			**SANDSTONE**: medium to coarse grained, pale grey, indistinctly bedded at 30-50deg			
		-24	31			**SANDSTONE**: medium to coarse grained, orange-brown, indistinctly bedded at 30-40deg			

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Notes: Inflow Outflow Standing Water Level Pipe Description: Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Geo 305 Track

COMMENCED: 1/02/2018
COMPLETED: 8/02/2018

LOGGED BY: KS
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1306
SHEET No:	5 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Rockdale Tennis Club Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328373.9, N: 6240983.8 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 2.600 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 091°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-26	33			**SANDSTONE**: medium grained, red and orange with some pale grey, indistinctly bedded			BEDROCK
						INTERLAMINATED SILTSTONE (60%) AND SANDSTONE (40%): white to pale grey with some red, remoulds as silty clay			
			34			CORE LOSS 1.20m (34.00-35.20)			
			35						
		-28				**INTERLAMINATED SILTSTONE (60%) AND SANDSTONE (40%)**: siltstone is grey, sandstone is pale grey, fine grained, distinctly disturbed lamination at 30deg, remoulds as silty clay			BEDROCK
			36			**SANDSTONE**: fine grained, purple, distinctly bedded at 30deg, remoulds as sandy clay			
						SANDSTONE: medium to coarse grained, orange-brown, massive, with black carbonaceous flecks and lenticles, <1mm thick			
			37						
		-30							
			38						
			39			**SANDSTONE**: medium to coarse grained, orange-brown, massive, with black carbonaceous flecks and lenticles, <1mm thick			
		-32							

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Geo 305 Track

COMMENCED: 1/02/2018
COMPLETED: 8/02/2018

LOGGED BY: KS
CHECKED BY: ACC

Draft

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1306
SHEET No:	6 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Rockdale Tennis Club Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328373.9, N: 6240983.8 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 2.600 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 091°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ			41			**SANDSTONE**: medium to coarse grained, orange-brown, massive, with black carbonaceous flecks and lenticles, <1mm thick *(continued)*			BEDROCK
			42						
		-34				**SANDSTONE**: medium grained, pale grey, massive, trace black carbonaceous flecks			
			43					Grout:	
			44			**SANDSTONE**: medium to coarse grained, pale grey, indistinctly bedded at 30deg, trace black carbonaceous flecks			
		-36							
			45			**SANDSTONE**: medium to coarse grained, grey, massive, trace dark grey, sub-rounded siltstone clasts up to 10mm diameter			
			46						
		-38				**INTERLAMINATED SILTSTONE (70%) AND SANDSTONE (30%)**: siltstone is dark grey, sandstone is pale grey, fine grained, distinctly laminated at 40deg			
			47						

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Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Geo 305 Track

COMMENCED: 1/02/2018
COMPLETED: 8/02/2018

LOGGED BY: KS
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1306
SHEET No:	7 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Rockdale Tennis Club Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328373.9, N: 6240983.8 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 2.600 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 091°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ			49			**INTERLAMINATED SILTSTONE (70%) AND SANDSTONE (30%)**: siltstone is dark grey, sandstone is pale grey, fine grained, distinctly laminated at 40deg *(continued)*			BEDROCK
		-40				**SILTY SANDSTONE**: fine grained, dark grey, distinctly bedded at 25deg			
						SANDSTONE: fine to medium grained, grey, indistinctly bedded at 25deg			
			50			**SANDSTONE**: fine grained, grey and dark grey, distinctly bedded at 20deg			
			51			**SANDSTONE**: medium to coarse grained, grey, indistinctly cross bedded at 20-50deg			
		-42				**SANDSTONE**: fine to medium grained, pale grey, distinctly cross bedded at 10-30deg, with wavy black carbonaceous lenticles			
			52						
						SANDSTONE: medium to coarse grained, pale grey, indistinctly bedded at 20-30deg			
			53						
		-44							
			54			**SANDSTONE**: fine grained, grey, massive, with black carbonaceous flecks			
						SANDSTONE: medium grained, pale grey, distinctly bedded at 30deg			
			55						

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level Pipe Description: Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Geo 305 Track

COMMENCED: 1/02/2018
COMPLETED: 8/02/2018

LOGGED BY: KS
CHECKED BY: ACC

Draft

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1306
SHEET No:	8 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Rockdale Tennis Club Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328373.9, N: 6240983.8 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 2.600 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 091°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-46	57			**SANDSTONE**: medium to coarse grained, pale grey, distinctly cross bedded at 30-50deg, trace black carbonaceous flecks *(continued)*			BEDROCK
			58			**SANDSTONE**: fine grained, grey, distinctly bedded at 30deg, with some carbonaceous bedding, locally cross-bedded			
		-48	59			**CONGLOMERATE**: sub-rounded to rounded dark grey siltstone and white quartz clasts up to 30mm diameter (30%) in a matrix of pale grey, medium to coarse grained sandstone **SANDSTONE**: medium grained, pale grey, indistinctly to distinctly bedded at 30deg			
			60			**SANDSTONE**: medium grained, pale grey and grey, distinctly bedded at 30deg			
		-50	61			**SANDSTONE**: medium grained, pale grey, indistinctly to distinctly bedded at 10-20deg			
			62						
		-52	63			**SANDSTONE**: medium grained, pale grey, indistinctly to distinctly bedded at 10-20deg, trace black carbonaceous lenticles			

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Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Geo 305 Track

COMMENCED: 1/02/2018
COMPLETED: 8/02/2018

LOGGED BY: KS
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1306
SHEET No:	9 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Rockdale Tennis Club Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328373.9, N: 6240983.8 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 2.600 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 091°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-54	65			**SANDSTONE**: fine to medium grained, grey, massive, trace black carbonaceous flecks			BEDROCK
			66						
			67						
		-56				**SANDSTONE**: fine to medium grained, grey, massive, trace black carbonaceous flecks			
			68						
			69						
						SANDSTONE: medium to coarse grained, pale grey, massive, with angular to sub-rounded siltstone rip up clasts up to 50mm diameter, upward fining			
		-58	70						
						INTERLAMINATED SILTSTONE (20%) AND SANDSTONE (80%): siltstone is dark grey, sandstone is pale grey, fine grained, distinctly laminated at 30deg			
			71			**INTERLAMINATED SILTSTONE (70%) AND SANDSTONE (30%)**: siltstone is dark grey, sandstone is pale grey, fine grained, distinctly laminated at 30deg			
						SILTSTONE: dark grey to black, distinctly laminated at 25deg, trace fine grained sandstone laminations			

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Geo 305 Track

COMMENCED: 1/02/2018
COMPLETED: 8/02/2018

LOGGED BY: KS
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1306
SHEET No:	10 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Rockdale Tennis Club Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328373.9, N: 6240983.8 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 2.600 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 091°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-60	73			**SILTSTONE**: dark grey to black, distinctly laminated at 25deg, trace fine grained sandstone laminations *(continued)*			BEDROCK
			74			**SANDSTONE**: fine to medium grained, pale grey and grey, distinct wavy bedding at 30deg, with black carbonaceous lenticles			
		-62				**SANDSTONE**: medium grained, pale grey and grey, distinctly bedded at 50deg			
			75			**SANDSTONE**: medium grained, pale grey to grey, massive, distinct wavy bedding at 30deg, with black carbonaceous flecks and lenticles, <10mm long, randomly oriented			
			76						
						SANDSTONE: fine to medium grained, grey, massive, trace black carbonaceous flecks			
		-64	77						
			78						
			79						
		-66							

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Geo 305 Track

COMMENCED: 1/02/2018
COMPLETED: 8/02/2018

LOGGED BY: KS
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1306
SHEET No:	11 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Rockdale Tennis Club Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328373.9, N: 6240983.8 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 2.600 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 091°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-68	81			**SANDSTONE**: fine to medium grained, pale grey, massive, trace black carbonaceous flecks			BEDROCK
			82			**SANDSTONE**: fine to medium grained, pale grey, massive, locally indistinctly bedded at 30deg			
		-70	83						
			84						
			85			**SANDSTONE**: coarse grained, pale grey, indistinctly bedded at 30deg, with fine to medium grained gravel particles, <10mm diameter, rounded to sub-rounded, with black carbonaceous flecks and lenticles			
						SANDSTONE: fine to medium grained, grey, massive, distinctly bedded at 50deg			
		-72	86			**SANDSTONE**: medium grained, grey, massive			
			87			Hole Terminated at 87.00 m Target depth VWP installed to 80m and backfilled with grout			

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Geo 305 Track

COMMENCED: 1/02/2018
COMPLETED: 8/02/2018

LOGGED BY: KS
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1307
SHEET No:	1 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Aboukir Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328355.2, N: 6241124.3 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 3.080 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 212°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
NDD	CASING	2	1			ASPHALT FILL: **Gravelly SAND**: fine to coarse grained, grey, fine to coarse, sub-angular to sub-rounded gravel, trace silt FILL: **SAND**: fine grained, brown, trace silt	BH1307	Concrete:	ROAD SURFACE FILL
			2			**Sandy CLAY**: pale grey mottled brown, fine grained sand			ALLUVIUM 2.00: HP samp = 75 - 100 kPa
			3						
		0	4						
WB			5						
	CASING	-2	6			**SAND**: fine to medium grained, red brown mottled pale grey, trace silt			
			7						

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR:	SMEC/Hagstrom	COMMENCED:	16/01/2018	LOGGED BY:	FF
EQUIPMENT:	Delta Base 525 Track	COMPLETED:	23/01/2018	CHECKED BY:	ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1307
SHEET No:	2 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Aboukir Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328355.2, N: 6241124.3 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 3.080 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 212°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
WB	CASING	-4	9			**SAND**: fine to medium grained, red brown mottled pale grey, trace silt *(continued)*			ALLUVIUM
		-8	10						
			11						
			12						
		-9	13			**Clayey SAND**: fine grained, pale grey mottled red brown, medium plasticity clay, trace silt			RESIDUAL SOIL
			14			**SANDSTONE**: fine grained, pale grey mottled red brown, extremely weathered, estimated very low to low strength			WEATHERED ROCK
HQ3		-10	15			**SANDSTONE**: fine to medium grained, pale grey mottled red and purple, indistinctly bedded at 20deg			BEDROCK

Draft

Notes: Inflow Outflow Standing Water Level Pipe Description: Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 16/01/2018
COMPLETED: 23/01/2018

LOGGED BY: FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1307
SHEET No:	3 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Aboukir Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328355.2, N: 6241124.3 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 3.080 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 212°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-12	17			**SANDSTONE**: fine to medium grained, purple mottled yellow, grey, red-brown indistinctly bedded at 20deg			BEDROCK
						SANDSTONE: fine to medium grained, pale grey mottled red and purple, indistinctly bedded at 20deg			
			18			CORE LOSS 1.30m (17.30-18.60)			
		-14	19			**SANDSTONE**: fine to medium grained pale grey mottled purple and orange, indistinctly bedded at 20deg			BEDROCK
			20						
			21			**SANDSTONE**: fine to medium grained, pale grey, massive, trace black carbonaceous flecks			
		-16	22						
			23						

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 16/01/2018
COMPLETED: 23/01/2018

LOGGED BY: FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1307
SHEET No:	4 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Aboukir Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328355.2, N: 6241124.3 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 3.080 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 212°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-18	25			CORE LOSS 0.50m (24.00-24.50)			
						SANDSTONE: fine to medium grained pale grey, massive, trace black carbonaceous flecks			BEDROCK
		-20	26						
			27						
			28						
						SANDSTONE: fine to coarse grained, grey mottled pale grey, distinctly bedded at 30-40deg, trace black carbonaceous flecks			
						CORE LOSS 0.20m (28.73-28.93)			
		-22	29			**INTERLAMINATED SILTSTONE (70%) AND SANDSTONE (30%)**: siltstone is dark grey, sandstone is fine to medium grained, grey to pale grey, distinctly laminated at 20deg to 30deg			BEDROCK
			30			**INTERLAMINATED SILTSTONE (80%) AND SANDSTONE (20%)**: siltstone is dark grey, sandstone is fine to medium grained, grey to pale grey, distinctly laminated at 20deg to 30deg			
			31						
		-24							

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 16/01/2018
COMPLETED: 23/01/2018

LOGGED BY: FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1307
SHEET No:	5 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Aboukir Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328355.2, N: 6241124.3 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 3.080 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 212°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-26	33 34 35 36 37 38 39			**INTERLAMINATED SILTSTONE (50%) AND SANDSTONE (50%)**: siltstone is dark grey, sandstone is fine to medium grained, grey to pale grey, distinct wavy lamination at 20deg to 30deg **INTERLAMINATED SILTSTONE (20%) AND SANDSTONE (80%)**: siltstone is dark grey, sandstone is fine grained, pale grey, distinctive disturbed lamination at 0-25deg **SANDSTONE**: fine to coarse grained, pale grey, distinctly bedded at 20-40deg, trace black carbonaceous lenticles, locally disturbed bedding -28 -30 **SANDSTONE**: fine to coarse grained, pale grey, massive to indistinctly bedded at 30deg			BEDROCK

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 16/01/2018
COMPLETED: 23/01/2018

LOGGED BY: FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1307
SHEET No:	6 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Aboukir Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328355.2, N: 6241124.3 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 3.080 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 212°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-32	41			**SANDSTONE**: fine to coarse grained, pale grey, massive to indistinctly bedded at 30deg *(continued)*			BEDROCK
			42			**SANDSTONE**: medium to coarse grained, pale grey, distinctly bedded at 30deg, trace black carbonaceous flecks			
		-34	43			**SANDSTONE**: fine to coarse grained, pale grey, massive, trace black carbonaceous lenticles and flecks		Grout:	
			44						
		-36	45			**INTERLAMINATED SILTSTONE (80%) AND SANDSTONE (20%)**: siltstone is dark grey, sandstone is fine grained, pale grey, small scale bioturbation throughout, distinctly laminated at 30deg			
			46			**SILTY SANDSTONE**: medium grained, grey and dark grey, distinctly bedded at 20-30deg, trace siltstone lenticles			
			47			**SANDSTONE**: medium grained, pale grey, distinctly bedded at 20-30deg, with black carbonaceous lenticles			
		-38							

Draft

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 16/01/2018
COMPLETED: 23/01/2018

LOGGED BY: FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1307
SHEET No:	7 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Aboukir Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328355.2, N: 6241124.3 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 3.080 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 212°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-40	49 50 51 52 53			**SANDSTONE**: medium grained, pale grey, distinctly bedded at 20-30deg, with black carbonaceous lenticles *(continued)*			BEDROCK
		-42							
		-44	54 55			**SILTY SANDSTONE**: fine grained, dark grey and grey, distinctly bedded at 20-30deg, with black carbonaceous lenticles **SANDSTONE**: medium grained, pale grey and grey, distinctly cross-bedded at 10-20deg			

Draft

Notes: Inflow Outflow Standing Water Level Pipe Description: Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 16/01/2018
COMPLETED: 23/01/2018

LOGGED BY: FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1307
SHEET No:	8 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Aboukir Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328355.2, N: 6241124.3 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 3.080 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 212°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-46	57			**SANDSTONE**: fine to medium grained, grey, distinctly bedded at 10-20deg			BEDROCK
						SANDSTONE: medium grained, grey, indistinctly bedded at 10-20deg			
		-48	58			**SANDSTONE**: medium grained grey, distinctly bedded at 15-25deg			
			59						
			60						
		-50	61			**SANDSTONE**: fine to medium grained, pale grey, massive, trace black carbonaceous flecks			
			62						
			63						
		-52							

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level Pipe Description: Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 16/01/2018
COMPLETED: 23/01/2018

LOGGED BY: FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1307
SHEET No:	9 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Aboukir Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328355.2, N: 6241124.3 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 3.080 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 212°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3			65			**SANDSTONE**: medium grained, pale grey, indistinctly bedded at 20deg			BEDROCK
		-54	66			**SANDSTONE**: fine to medium grained pale grey, massive			
			67						
			68			**SANDSTONE**: medium grained, pale grey mottled grey, distinctly bedded at 30deg, with black carbonaceous lenticles			
		-56				**SANDSTONE**: medium grained, pale grey mottled grey, distinctly bedded at 30deg, with black carbonaceous lenticles			
			69						
			70						
		-58							
			71						

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 16/01/2018
COMPLETED: 23/01/2018

LOGGED BY: FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1307
SHEET No:	10 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Aboukir Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328355.2, N: 6241124.3 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 3.080 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 212°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3		-60	73			**SANDSTONE**: fine to medium grained, pale grey mottled grey, distinct disturbed bedding, trace black carbonaceous flecks *(continued)*			BEDROCK
			74						
		-62	75			**SANDSTONE**: medium grained, pale grey mottled grey, distinctly bedded at 30deg, trace black carbonaceous flecks			
			76			**SANDSTONE**: fine to medium grained, pale grey to grey, distinctly bedded at 30deg, trace black carbonaceous lenticles			
		-64	77						
			78			**SANDSTONE**: medium grained, pale grey, indistinctly bedded at 20deg, with black carbonaceous flecks			
			79			**SANDSTONE**: fine to medium grained, grey, distinctly bedded at 30deg **SANDSTONE**: medium to coarse grained, pale grey mottled dark grey, distinctly bedded at 30deg, with black carbonaceous lenticles and flecks			
		-66							

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level Pipe Description: Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 16/01/2018
COMPLETED: 23/01/2018

LOGGED BY: FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1307
SHEET No:	11 of 11
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Aboukir Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328355.2, N: 6241124.3 (MGA94 Zone 56)
FINAL DEPTH: 87m

SURFACE ELEVATION : 3.080 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 212°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ3			81			**SANDSTONE**: medium to coarse grained, pale grey mottled dark grey, distinctly bedded at 30deg, with black carbonaceous lenticles and flecks *(continued)*			BEDROCK
						SANDSTONE: medium grained, pale grey, distinctly bedded at 30deg			
		-68	82			**SANDSTONE**: medium to coarse grained, pale grey mottled dark grey, distinctly bedded at 30deg, with black carbonaceous lenticles and flecks			
			83						
			84			**SANDSTONE**: medium to coarse grained, pale grey mottled dark grey, distinctly bedded at 30deg, with black carbonaceous lenticles and flecks			
		-70							
			85						
			86			**SANDSTONE**: medium to coarse grained, pale grey mottled pale brown-grey, distinctly bedded at 20-30deg, trace fine sub-rounded to rounded siltstone and quartz gravel			
		-72				**SANDSTONE**: fine to medium grained, grey, indistinctly bedded at 30deg			
			87			Hole Terminated at 87.00 m Target depth Borehole imaged upon completion Vibrating wire piezometer installed to 70m and backfilled with grout			

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level Pipe Description: Pipe Screen Details:

CONTRACTOR: SMEC/Hagstrom
EQUIPMENT: Delta Base 525 Track

COMMENCED: 16/01/2018
COMPLETED: 23/01/2018

LOGGED BY: FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1310
SHEET No:	1 of 14
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Gibbes Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328577.1, N: 6242164.4 (MGA94 Zone 56)
FINAL DEPTH: 110m

SURFACE ELEVATION : 11.720 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 209°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
NDD						ASPHALT	BH1310	Concrete:	ROAD SURFACE
			1			FILL: **Silty SAND**: fine to medium grained, brown, with angular, coarse gravel			FILL
AD/T	CASING	10	2			**Clayey SAND**: fine to medium grained, orange-brown mottled red			RESIDUAL SOIL
			3						
			4						
			5			**SANDSTONE**: fine grained, red-brown			BEDROCK
			6			**SANDSTONE**: fine to medium grained, grey mottled pink-orange, indistinctly bedded at 10deg			
HQ						CORE LOSS 1.12m (6.35-7.47)			
			7			**SANDSTONE**: medium grained, orange-brown, indistinctly bedded at 10deg			BEDROCK
						SANDSTONE: medium grained, grey and orange-brown, indistinctly bedded at 10deg			

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 305 Track

COMMENCED: 6/12/2017
COMPLETED: 13/12/2017

LOGGED BY: BC/FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1310
SHEET No:	2 of 14
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Gibbes Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328577.1, N: 6242164.4 (MGA94 Zone 56)
FINAL DEPTH: 110m

SURFACE ELEVATION : 11.720 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 209°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		4	9			**SANDSTONE**: medium grained, grey and orange-brown, indistinctly bedded at 10deg *(continued)*			BEDROCK
						SANDSTONE: medium to coarse grained, orange-brown, massive			
						SANDSTONE: medium to coarse grained pale grey, massive			
			10			**SANDSTONE**: medium to coarse grained, grey mottled red-orange and purple, distinctly bedded at 10deg			
		2	11			**SANDSTONE**: fine to coarse grained, grey, massive, with black carbonaceous flecks			
			12			CORE LOSS 0.29m (11.81-12.10)			
						SANDSTONE: medium to coarse grained, grey, distinctly bedded at 10deg			BEDROCK
						CORE LOSS 0.08m (12.55-12.63)			
			13			**SANDSTONE**: medium to coarse grained, grey, distinctly bedded at 10-20deg, trace black carbonaceous lenticles and flecks			BEDROCK
		-2	14						
			15						

Draft

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR:	SMEC/Terratest	COMMENCED:	6/12/2017	LOGGED BY:	BC/FF
EQUIPMENT:	Comacchio 305 Track	COMPLETED:	13/12/2017	CHECKED BY:	ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1310
SHEET No:	3 of 14
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Gibbes Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328577.1, N: 6242164.4 (MGA94 Zone 56)
FINAL DEPTH: 110m

SURFACE ELEVATION : 11.720 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 209°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-4	17 18 19 20			**SANDSTONE**: medium to coarse grained, grey, distinctly bedded at 10-20deg, trace black carbonaceous lenticles and flecks *(continued)* **SANDSTONE**: fine to coarse grained, grey, distinctly bedded at 15-20deg, trace black carbonaceous flecks			BEDROCK
		-6	21 22			**SANDSTONE**: medium to coarse grained, grey, indistinctly bedded at 10-25deg			
		-8	23			**SANDSTONE**: fine to coarse grained, grey, distinctly bedded at 20deg, upward fining **SANDSTONE**: medium to coarse grained, grey, massive			

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level Pipe Description: Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 305 Track

COMMENCED: 6/12/2017
COMPLETED: 13/12/2017

LOGGED BY: BC/FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1310
SHEET No:	4 of 14
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Gibbes Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328577.1, N: 6242164.4 (MGA94 Zone 56)
FINAL DEPTH: 110m

SURFACE ELEVATION : 11.720 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 209°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-10	25			**SANDSTONE**: medium to coarse grained, grey, massive *(continued)*			BEDROCK
			26						
		-12	27			**SANDSTONE**: medium grained, pale grey, massive, with dark grey siltstone clasts up to 30mm diameter			
			28			**SILTSTONE**: dark grey, distinctly laminated at 30deg **SANDSTONE**: medium to coarse grained, grey, massive, with elongated angular siltstone clasts up to 40mm diameter			
		-14	29			**Interbedded INTERLAMINATED SILTSTONE (90%) AND SANDSTONE (10%) with SANDSTONE (10%)**: is siltstone is dark grey, distinctly laminated at 15deg; sandstone is grey, medium grained. sandstone is medium grained, grey			
			30			CORE LOSS 0.22m (30.33-30.55)			BEDROCK
			31			**Interbedded INTERLAMINATED SILTSTONE (85%) AND SANDSTONE (15%) with SANDSTONE (15%)**: is siltstone is dark grey, distinctly laminated; sandstone is grey, fine grained; sandstone is medium grained, grey			
						SANDSTONE: coarse grained, grey, indistinctly bedded, with siltstone rip-up clasts (40%)			

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 305 Track

COMMENCED: 6/12/2017
COMPLETED: 13/12/2017

LOGGED BY: BC/FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1310
SHEET No:	5 of 14
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Gibbes Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328577.1, N: 6242164.4 (MGA94 Zone 56)
FINAL DEPTH: 110m

SURFACE ELEVATION : 11.720 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 209°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-18	33			CORE LOSS 0.50m (32.00-32.50)			BEDROCK
			34			**SANDSTONE**: fine to coarse grained, grey, distinctly bedded at 10deg, trace black carbonaceous lenticles and flecks			
			35						
		-20	36			**SILTY SANDSTONE**: dark grey, distinctly bedded at 15deg, with black carbonaceous lenticles **SANDSTONE**: medium to coarse grained, grey, indistinctly cross-bedded at 10-25deg			
			37			**SANDSTONE**: medium to coarse grained, grey, distinctly bedded at 20deg			
			38						
		-22	39			**SANDSTONE**: medium to coarse grained, grey, indistinctly bedded at 10-20deg			

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR:	SMEC/Terratest	COMMENCED:	6/12/2017	LOGGED BY:	BC/FF
EQUIPMENT:	Comacchio 305 Track	COMPLETED:	13/12/2017	CHECKED BY:	ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1310
SHEET No:	6 of 14
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Gibbes Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328577.1, N: 6242164.4 (MGA94 Zone 56)
FINAL DEPTH: 110m

SURFACE ELEVATION : 11.720 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 209°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ			41			**SANDSTONE**: medium to coarse grained grey, indistinctly bedded at 10-20deg *(continued)*			BEDROCK
						SANDSTONE: medium to coarse grained grey, distinctly bedded at 0-10deg, with sub-rounded quartz gravel up to 10mm diameter			
		-24				**SANDSTONE**: fine to coarse grained, grey, distinctly bedded at 20-30deg, trace black carbonaceous lenticles and flecks			
			42						
			43						
		-26							
			44						
			45			**SILTY SANDSTONE**: fine grained, dark grey, distinctly bedded at 0-10deg			
						SANDSTONE: medium grained, pale grey, distinctly cross-bedded at 30-45deg			
		-28				**SANDSTONE**: medium to coarse grained, pale grey, distinctly bedded at 0-20deg			
			46						
			47						
						SANDSTONE: medium to coarse grained, grey, indistinctly bedded at 10-20deg			

Draft

Notes: Inflow Outflow Standing Water Level Pipe Description: Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 305 Track

COMMENCED: 6/12/2017
COMPLETED: 13/12/2017

LOGGED BY: BC/FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1310
SHEET No:	7 of 14
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Gibbes Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328577.1, N: 6242164.4 (MGA94 Zone 56)
FINAL DEPTH: 110m

SURFACE ELEVATION : 11.720 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 209°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-30	49			**SANDSTONE**: medium to coarse grained, grey, indistinctly bedded at 10-20deg *(continued)*			BEDROCK
						SANDSTONE: medium to coarse grained, grey, distinctly bedded at 15-20deg			
			50			**SANDSTONE**: medium to coarse grained, grey, indistinctly bedded at 15deg, trace black carbonaceous lenticles			
		-32	51			**SANDSTONE**: medium grained, grey, distinctly bedded at 10-20deg			
			52			**SANDSTONE**: medium to coarse grained, grey, indistinctly to distinctly cross-bedded at 0-25deg			
		-34	53						
			54						
		-36	55			**SANDSTONE**: fine to medium grained, pale grey, distinctly bedded at 20deg		Grout:	
						SANDSTONE: fine to medium grained, pale grey, indistinctly bedded at 25deg			

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Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level Pipe Description: Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 305 Track

COMMENCED: 6/12/2017
COMPLETED: 13/12/2017

LOGGED BY: BC/FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1310
SHEET No:	8 of 14
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Gibbes Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328577.1, N: 6242164.4 (MGA94 Zone 56)
FINAL DEPTH: 110m

SURFACE ELEVATION : 11.720 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 209°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-38	57			**SANDSTONE**: fine to medium grained, pale grey, indistinctly bedded at 25deg *(continued)*			BEDROCK
						CORE LOSS 0.15m (57.00-57.15)			
			58			**SANDSTONE**: medium grained grey, distinctly bedded at 15-20deg			BEDROCK
			59			**SANDSTONE**: medium grained, pale grey and grey, indistinctly bedded at 20-30deg			
		-40	60			**SANDSTONE**: fine to coarse grained, pale grey and grey, distinctly bedded at 15deg			
			61			**SANDSTONE**: fine to medium grained, pale grey, indistinctly bedded at 10-15deg			
		-42	62			**SILTY SANDSTONE**: fine to medium grained, grey, distinctly bedded at 15-25deg			
			63			**SANDSTONE**: medium to coarse grained, grey, indistinctly bedded at 30-40deg			
						SANDSTONE: medium grained, grey, distinctly bedded at 20-30deg, trace black carbonaceous lenticles			

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 305 Track

COMMENCED: 6/12/2017
COMPLETED: 13/12/2017

LOGGED BY: BC/FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1310
SHEET No:	9 of 14
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Gibbes Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328577.1, N: 6242164.4 (MGA94 Zone 56)
FINAL DEPTH: 110m

SURFACE ELEVATION : 11.720 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 209°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-44	65			**SANDSTONE**: medium grained, grey, distinctly bedded at 20-30deg, trace black carbonaceous lenticles *(continued)*			BEDROCK
			66			**SANDSTONE**: fine to medium grained, pale grey to grey, massive, locally indistinctly bedded at 20deg, with black carbonaceous flecks			
		-46	67						
			68			**SANDSTONE**: fine to medium grained, pale grey, indistinctly bedded at 20deg, with black carbonaceous flecks			
		-48	69			**SANDSTONE**: fine to medium grained, pale grey, massive, with black carbonaceous flecks			
			70						
			71			**SANDSTONE**: fine to medium grained, pale grey and grey, distinctly bedded at 20-30deg, with black carbonaceous lenticles			
		-50							

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level Pipe Description: Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 305 Track

COMMENCED: 6/12/2017
COMPLETED: 13/12/2017

LOGGED BY: BC/FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1310
SHEET No:	10 of 14
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Gibbes Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328577.1, N: 6242164.4 (MGA94 Zone 56)
FINAL DEPTH: 110m

SURFACE ELEVATION : 11.720 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 209°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-52	73			**SANDSTONE**: fine to medium grained, pale grey and grey, distinctly bedded at 20-30deg, with black carbonaceous lenticles *(continued)*			BEDROCK
			74			**SANDSTONE**: fine to medium grained, pale grey, distinctly bedded at 20-25deg			
		-54	75						
			76						
			77			**SILTSTONE**: dark grey, distinctly laminated at 20deg			
			78			**SANDSTONE**: fine to medium grained, grey, distinctly cross-bedded at 20-30deg, trace black carbonaceous lenticles			
		-56	79						
						SANDSTONE: fine to medium grained, pale grey and grey, locally cross-bedded at 20-45deg			

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR:	SMEC/Terratest	COMMENCED:	6/12/2017	LOGGED BY:	BC/FF
EQUIPMENT:	Comacchio 305 Track	COMPLETED:	13/12/2017	CHECKED BY:	ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1310
SHEET No:	11 of 14
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Gibbes Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328577.1, N: 6242164.4 (MGA94 Zone 56)
FINAL DEPTH: 110m

SURFACE ELEVATION : 11.720 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 209°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-58	81			**SANDSTONE**: fine to medium grained, pale grey and grey, locally cross-bedded at 20-45deg *(continued)*			BEDROCK
			82			**SANDSTONE**: fine to medium grained, pale grey and grey, indistinctly bedded at 10-15deg			
		-60	83			**SANDSTONE**: fine to medium grained, pale grey and grey, locally cross-bedded			
			84			**SANDSTONE**: pale grey, massive, trace black carbonaceous flecks			
		-62	85						
			86						
			87						
		-64							

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 305 Track

COMMENCED: 6/12/2017
COMPLETED: 13/12/2017

LOGGED BY: BC/FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1310
SHEET No:	12 of 14
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Gibbes Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328577.1, N: 6242164.4 (MGA94 Zone 56)
FINAL DEPTH: 110m

SURFACE ELEVATION : 11.720 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 209°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-66	89			**SANDSTONE**: pale grey, massive, trace black carbonaceous flecks *(continued)*			BEDROCK
			90						
			91						
		-68	92						
						SANDSTONE: medium grained, pale grey and grey, distinctly bedded at 10-20deg, trace black carbonaceous lenticles			
			93						
			94			**SANDSTONE**: fine to medium grained, dark grey and grey, distinctly bedded at 20-30deg, silty			
		-70							
			95						
						SANDSTONE: fine to medium grained, pale grey, indistinctly bedded at 20deg			

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Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level Pipe Description: Pipe Screen Details:

CONTRACTOR:	SMEC/Terratest	COMMENCED:	6/12/2017	LOGGED BY:	BC/FF
EQUIPMENT:	Comacchio 305 Track	COMPLETED:	13/12/2017	CHECKED BY:	ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1310
SHEET No:	13 of 14
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Gibbes Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328577.1, N: 6242164.4 (MGA94 Zone 56)
FINAL DEPTH: 110m

SURFACE ELEVATION : 11.720 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 209°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-72	97			**SANDSTONE**: medium to coarse grained, pale grey and dark grey, distinctly bedded at 10-15deg, trace black carbonaceous flecks and lenticles, locally cross-bedded at 10deg to 30deg			BEDROCK
			98			**SANDSTONE**: medium grained, pale grey, indistinctly bedded at 10-20deg, with black carbonaceous flecks and lenticles			
		-74	99						
			100			**SANDSTONE**: medium to coarse grained, pale grey and grey, distinctly cross-bedded at 0-30deg, with black carbonaceous flecks and lenticles			
		-76	101			**SANDSTONE** medium to coarse grained, grey, dark grey and white, distinctly beddec at 10-30deg, with bands of sub-rounded gravel up to 12mm diameter and coaly lenticles, locally cross-bedded			
			102						
			103						
		-78				**SANDSTONE**: medium to coarse grained, pale grey and grey, distinctly cross-bedded at 0-30deg, with black carbonaceous flecks and lenticles			

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Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 305 Track

COMMENCED: 6/12/2017
COMPLETED: 13/12/2017

LOGGED BY: BC/FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1310
SHEET No:	14 of 14
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Gibbes Street Rockdale NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328577.1, N: 6242164.4 (MGA94 Zone 56)
FINAL DEPTH: 110m

SURFACE ELEVATION : 11.720 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 209°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-80	105 106 107 108 109 110			**SANDSTONE**: medium to coarse grained, pale grey and grey, distinctly cross-bedded at 0-30deg, with black carbonaceous flecks and lenticles *(continued)* **SANDSTONE**: medium grained, pale grey and grey, distinctly bedded at 10-20deg, with dark grey silty bands and black carbonaceous flecks and lenticles, locally cross-bedded at 10deg to 30deg			BEDROCK
		-82							
		-84	111			Hole Terminated at 110.00 m Target depth Borehole imaged upon completion Vibrating wire piezometer installed to 100m and backfilled with grout			

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 305 Track

COMMENCED: 6/12/2017
COMPLETED: 13/12/2017

LOGGED BY: BC/FF
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1312
SHEET No:	1 of 17
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Marinea Park Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328777.0, N: 6242796.0 (MGA94 Zone 56)
FINAL DEPTH: 130.28m

SURFACE ELEVATION : 23.040 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 312°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
AD/T	CASING	22	1			**Sandy SILT / SILTY SAND**: silt is non plastic, brown, fine grained sand, trace rootlets	BH1312	Concrete:	TOPSOIL
						FILL: Silty SAND: fine to medium grained, grey, trace fine grained gravel, trace ceramic fragments			FILL
			2			**SANDSTONE**: medium grained, brown and orange, extremely weathered, estimated very low strength, remoulds as sandy clay			WEATHERED ROCK
						SANDSTONE: medium to coarse grained, pale grey and brown, highly to moderately weathered, estimated low to medium strength CORE LOSS 0.53m (2.20-2.73)			
HQ		20	3			**SANDSTONE**: medium to coarse grained, pale grey mottled pale orange and orange-brown, indistinctly bedded at 50deg, upward fining			BEDROCK
			5			**SANDSTONE**: medium grained, pale grey, indistinctly bedded to massive			
		18	6			**SANDSTONE**: medium grained, pale grey mottled brown, indistinctly bedded at 30-50deg, trace black carbonaceous flecks			
			7						

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Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR:	SMEC/Terratest	COMMENCED:	8/01/2018	LOGGED BY:	BW
EQUIPMENT:	Comacchio 450P Track	COMPLETED:	19/01/2018	CHECKED BY:	ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1312
SHEET No:	2 of 17
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Marinea Park Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328777.0, N: 6242796.0 (MGA94 Zone 56)
FINAL DEPTH: 130.28m

SURFACE ELEVATION : 23.040 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 312°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		16	8			**SANDSTONE**: medium grained, pale grey mottled brown, indistinctly bedded at 30-50deg, trace black carbonaceous flecks *(continued)*			BEDROCK
		14	10			**SANDSTONE**: fine to medium grained, mottled pale grey and brown, distinctly bedded at 40-50deg			
			11						
			12			**SANDSTONE**: medium grained, mottled pale grey and brown, distinctly bedded at 20deg, with coarse grained bands			
		12	13			**SANDSTONE**: fine to coarse grained, mottled pale grey, pale pink and purple, indistinctly bedded, locally distinct disturbed bedding at 0-50deg, trace fine to medium grained gravel			
			14						
		10	15						

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Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 450P Track

COMMENCED: 8/01/2018
COMPLETED: 19/01/2018

LOGGED BY: BW
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1312
SHEET No:	3 of 17
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Marinea Park Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328777.0, N: 6242796.0 (MGA94 Zone 56)
FINAL DEPTH: 130.28m

SURFACE ELEVATION : 23.040 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 312°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		8	17			**SANDSTONE**: fine to coarse grained, mottled pale grey, pale pink and purple indistinctly bedded, locally distinct disturbed bedding at 0-50deg, trace fine to medium grained gravel *(continued)*			BEDROCK
						SANDSTONE: fine to medium grained, pale grey, indistinctly bedded, trace black carbonaceous flecks			
			18			**SANDSTONE**: fine to medium grained, pale grey, distinctly bedded at 40-50deg, trace black carbonaceous flecks			
			19			**SANDSTONE**: medium grained, pale grey-brown, distinctly cross-bedded at 30-50deg			
		4	22			**SANDSTONE**: grey, orange-brown, purple pink, indistinctly bedded at 20-40deg			
			23			**SANDSTONE**: medium grained, grey, indistinctly bedded at 30-45deg, with siltstone inclusions and black carbonaceous flecks and laminations			

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Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level Pipe Description: Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 450P Track

COMMENCED: 8/01/2018
COMPLETED: 19/01/2018

LOGGED BY: BW
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1312
SHEET No:	4 of 17
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Marinea Park Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328777.0, N: 6242796.0 (MGA94 Zone 56)
FINAL DEPTH: 130.28m

SURFACE ELEVATION : 23.040 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 312°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		2	25			**SANDSTONE**: medium grained, grey, indistinctly bedded at 30-45deg, with siltstone inclusions and black carbonaceous flecks and laminations *(continued)*			BEDROCK
			26			**SANDSTONE**: fine to medium grained, grey, distinctly bedded at 30-40deg, locally cross-bedded, with black carbonaceous laminations			
		0	27			**SANDSTONE**: medium to coarse grained, pale grey, indistinctly bedded to massive			
			28			**SANDSTONE**: medium grained, grey distinctly bedded at 25deg			
		-2	29			**SANDSTONE**: fine to medium grained, pale grey, distinctly bedded at 40deg			
			30						
			31						
		-4							

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 450P Track

COMMENCED: 8/01/2018
COMPLETED: 19/01/2018

LOGGED BY: BW
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1312
SHEET No:	5 of 17
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Marinea Park Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328777.0, N: 6242796.0 (MGA94 Zone 56)
FINAL DEPTH: 130.28m

SURFACE ELEVATION : 23.040 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 312°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-6 -8 -10	33 34 35 36 37 38 39			**SANDSTONE**: medium grained, pale grey, indistinctly bedded, trace black carbonaceous laminations *(continued)* **CONGLOMERATIC SANDSTONE**: fine to coarse grained, dark grey, fine to medium, rounded and sub-rounded gravel, matrix supported **SANDSTONE**: fine to medium grained, pale grey and brown, indistinctly bedded at 20-30deg, with coarse grained bands **SILTSTONE**: dark grey, distinctly laminated at 30deg, trace laminations of sandstone, fine grained, grey **INTERLAMINATED SILTSTONE (30%) AND SANDSTONE (70%)**: fine grained, distinctly laminated at 20deg, siltstone is dark grey, sandstone is grey, fine grained, distinctly laminated at 0deg to 5deg **SANDSTONE**: medium to coarse grained grey, massive, with brecciated siltstone inclusions up to 10mm diameter **INTRAFORMATIONAL CONGLOMERATE**: massive, angular siltstone clasts (30%) in a matrix of pale grey, medium grained sandstone **SANDSTONE**: medium grained, pale grey, massive, with siltstone inclusions up to 30mm diameter			BEDROCK

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Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 450P Track

COMMENCED: 8/01/2018
COMPLETED: 19/01/2018

LOGGED BY: BW
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1312
SHEET No:	6 of 17
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Marinea Park Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328777.0, N: 6242796.0 (MGA94 Zone 56)
FINAL DEPTH: 130.28m

SURFACE ELEVATION : 23.040 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 312°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-12	41			**SANDSTONE**: medium grained pale grey, massive, with siltstone inclusions up to 30mm diameter *(continued)*			BEDROCK
			42			**SANDSTONE**: medium grained, grey, distinctly bedded at 40-50deg, locally cross-bedded, with black carbonaceous laminations, trace siltstone inclusions			
		-14	43						
			44						
		-16	45						
			46						
						SANDSTONE: fine to medium grained, grey, distinctly bedded at 35-40deg			
			47			**SANDSTONE**: medium grained, pale grey distinctly bedded at 60deg			
		-18							
						SANDSTONE: fine to medium grained, grey, distinctly bedded at 30-35deg, locally cross-bedded			

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Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level Pipe Description: Pipe Screen Details:

CONTRACTOR:	SMEC/Terratest	COMMENCED:	8/01/2018	LOGGED BY:	BW
EQUIPMENT:	Comacchio 450P Track	COMPLETED:	19/01/2018	CHECKED BY:	ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1312
SHEET No:	7 of 17
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Marinea Park Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328777.0, N: 6242796.0 (MGA94 Zone 56)
FINAL DEPTH: 130.28m

SURFACE ELEVATION : 23.040 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 312°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-20	49			**SANDSTONE**: fine to medium grained, grey, distinctly bedded at 30-35deg, locally cross-bedded *(continued)*			BEDROCK
			50			**SANDSTONE**: fine to medium grained, pale grey and pale brown, distinctly bedded at 10-25deg, trace black carbonaceous laminations			
			51			**SANDSTONE**: medium grained, pale grey, massive, indistinctly bedded			
		-22	52			**SANDSTONE**: medium grained, pale grey to grey, massive, indistinctly bedded at 5-20deg			
			53			**SANDSTONE**: medium grained, pale grey to grey, massive, with black carbonaceous flecks			
		-24	54			**SANDSTONE**: medium grained, grey, massive, indistinctly bedded, with black carbonaceous flecks, trace fine, sub-rounded siltstone inclusions up to 10mm diameter			
			55			**SANDSTONE**: medium grained, grey distinctly bedded at 30deg			

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Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 450P Track

COMMENCED: 8/01/2018
COMPLETED: 19/01/2018

LOGGED BY: BW
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1312
SHEET No:	8 of 17
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Marinea Park Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328777.0, N: 6242796.0 (MGA94 Zone 56)
FINAL DEPTH: 130.28m

SURFACE ELEVATION : 23.040 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 312°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-26	57			**SANDSTONE**: medium grained, grey, distinctly bedded at 30deg *(continued)*			BEDROCK
						SANDSTONE: fine to medium grained, grey, massive, indistinctly bedded			
						SANDSTONE: medium to coarse grained, grey, distinctly cross-bedded at 20-50deg			
			58			**CONGLOMERATE**: pale grey, fine, sub-rounded gravel (40%) within fine to coarse quartz sandstone matrix			
						SANDSTONE: fine to medium grained, pale grey and grey, distinctly bedded at 20-30deg			
		-28	59						
						SANDSTONE: fine to medium grained, pale grey and grey, distinctly bedded at 45-50deg			
			60						
			61						
		-30							
			62			**SANDSTONE**: medium to coarse grained, pale grey and grey, with pale brown staining with black carbonaceous flecks and lenticles			
			63						
		-32				**CONGLOMERATE**: pale grey, grey and dark grey, fine to medium, rounded siltstone and quartz (50%) in a matrix of coarse grained sandstone			
						SANDSTONE: fine to medium grained grey, massive, indistinctly bedded, trace black carbonaceous flecks			

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Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 450P Track

COMMENCED: 8/01/2018
COMPLETED: 19/01/2018

LOGGED BY: BW
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1312
SHEET No:	9 of 17
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Marinea Park Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328777.0, N: 6242796.0 (MGA94 Zone 56)
FINAL DEPTH: 130.28m

SURFACE ELEVATION : 23.040 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 312°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-34	65 66 67 68 69 70 71			**SANDSTONE**: medium to coarse grained, pale grey and pale brown, indistinctly bedded **SILTSTONE**: dark grey, laminated at 25deg, trace fine grained sandstone laminations **INTERLAMINATED SANDSTONE (60%) AND SILTSTONE (40%)**: fine grained, dark grey and grey, laminated at 30deg **SANDSTONE**: fine to medium grained, grey, distinctly cross-bedded at 25-30deg **SANDSTONE**: medium to coarse grained, pale grey, indistinctly bedded at 0-15deg **SANDSTONE**: medium grained, pale grey and grey, distinctly bedded at 5-15deg, locally disturbed bedding, with black carbonaceous flecks and lenticles		Grout:	BEDROCK
		-36							
		-38							

Draft

Notes: Inflow Outflow Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 450P Track

COMMENCED: 8/01/2018
COMPLETED: 19/01/2018

LOGGED BY: BW
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1312
SHEET No:	10 of 17
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Marinea Park Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328777.0, N: 6242796.0 (MGA94 Zone 56)
FINAL DEPTH: 130.28m

SURFACE ELEVATION : 23.040 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 312°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-40	73			**SANDSTONE**: medium grained, pale grey and grey, distinctly bedded at 5-15deg, locally disturbed bedding, with black carbonaceous flecks and lenticles *(continued)*			BEDROCK
		-42	74 75			**SANDSTONE**: medium to coarse grained, grey, cross-bedded at 0-20deg, trace black carbonaceous laminations			
		-44	76 77 78			**SANDSTONE**: medium grained, grey, massive, indistinctly bedded, trace black carbonaceous laminations at 30deg			
		-46	79			**SANDSTONE**: medium to coarse grained, grey, distinctly bedded at 5-15deg, with black carbonaceous flecks and lenticles			

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Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 450P Track

COMMENCED: 8/01/2018
COMPLETED: 19/01/2018

LOGGED BY: BW
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1312
SHEET No:	11 of 17
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Marinea Park Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328777.0, N: 6242796.0 (MGA94 Zone 56)
FINAL DEPTH: 130.28m

SURFACE ELEVATION : 23.040 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 312°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-48	81 82 83 84 85 86 87			**SANDSTONE**: medium grained, grey, distinctly bedded at 30deg **SANDSTONE**: fine to medium grained, grey, distinctly bedded at 35deg **SANDSTONE**: medium grained, pale grey, indistinctly bedded at 10-30deg **SANDSTONE**: fine to medium grained, pale grey to grey, massive, distinctly bedded at 35deg, with black carbonaceous flecks **SANDSTONE**: medium grained, pale grey, massive, trace black carbonaceous flecks			BEDROCK

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 450P Track

COMMENCED: 8/01/2018
COMPLETED: 19/01/2018

LOGGED BY: BW
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1312
SHEET No:	12 of 17
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Marinea Park Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328777.0, N: 6242796.0 (MGA94 Zone 56)
FINAL DEPTH: 130.28m

SURFACE ELEVATION : 23.040 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 312°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-54	89			**SANDSTONE**: fine to medium grained, grey, massive, indistinctly bedded, with black carbonaceous flecks and lenticles, trace fine siltstone inclusions up to 10mm diameter			BEDROCK
			90						
			91						
		-56				**SANDSTONE**: fine to medium grained, grey, distinctly cross-bedded at 10-40deg, with black carbonaceous laminations and flecks, with siltstone inclusions, trace bands of medium grained, pale grey sandstone		
			92						
			93						
		-58				**SANDSTONE**: fine to medium grained, grey, distinctly bedded at 30deg, trace black carbonaceous laminations, ~50mm spacing		
			94						
			95						
		-60							

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 450P Track

COMMENCED: 8/01/2018
COMPLETED: 19/01/2018

LOGGED BY: BW
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1312
SHEET No:	13 of 17
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Marinea Park Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328777.0, N: 6242796.0 (MGA94 Zone 56)
FINAL DEPTH: 130.28m

SURFACE ELEVATION : 23.040 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 312°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-62	97 98 99 100			**SANDSTONE**: fine to medium grained, grey, distinctly bedded at 30deg, trace black carbonaceous laminations, ~50mm spacing *(continued)* **SANDSTONE**: medium grained, grey and pale grey, indistinct disturbed bedded at 30deg, with coarse grained bands, with bands of black carbonaceous/coal veins up to 5mm thick, trace fine gravel			BEDROCK
		-64	101			**SANDSTONE**: medium grained, grey and pale brown, indistinctly bedded at 20-30deg with black carbonaceous bands, trace fine gravel **SANDSTONE**: fine to medium grained, grey, distinctly bedded at 40deg **SANDSTONE**: medium to coarse grained, pale grey and pale brown, distinctly bedded at 10deg			
			102			**SANDSTONE**: medium grained, pale grey and grey, indistinctly bedded at 20deg			
		-66	103			**SANDSTONE**: medium grained, grey and pale brown, distinctly bedded at 20deg, with black carbonaceous laminations and flecks, with coarse grained bands, 10-60mm thick			

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 450P Track

COMMENCED: 8/01/2018
COMPLETED: 19/01/2018

LOGGED BY: BW
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1312
SHEET No:	14 of 17
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Marinea Park Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328777.0, N: 6242796.0 (MGA94 Zone 56)
FINAL DEPTH: 130.28m

SURFACE ELEVATION : 23.040 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 312°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-68	105			**SANDSTONE**: medium grained, grey and pale brown, distinctly bedded at 20deg, with; black carbonaceous laminations and flecks, with coarse grained bands, 10-60mm thick *(continued)*			BEDROCK
			106			**SANDSTONE**: medium to coarse grained, pale grey, indistinctly bedded at 40deg, trace sub-rounded fine gravel			
						SILTSTONE: dark grey to black, laminated at 40deg			
			107			**SANDSTONE**: fine grained, grey to dark grey, with sub-angular to angular siltstone rip-up clasts up to 60mm diameter, with lenses of pale grey/white sandstone			
		-70				**SILTY SANDSTONE**: fine grained, grey to dark grey, distinctly laminated at 20deg			
			108			**SANDSTONE**: coarse grained, pale grey, indistinctly bedded, with fine to medium sub-rounded gravel up to 10mm diameter			
			109			**SANDSTONE**: coarse grained, pale grey, distinctly bedded at 40-60deg, with black carbonaceous flecks and lenticles			
		-72							
			110			**SANDSTONE**: medium grained, grey, distinctly bedded at 50deg			
						SANDSTONE: medium to coarse grained, pale grey, indistinctly bedded at 50-60deg			
			111			**SANDSTONE**: medium to coarse grained, pale grey, distinctly bedded at 50deg			

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level Pipe Description: Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 450P Track

COMMENCED: 8/01/2018
COMPLETED: 19/01/2018

LOGGED BY: BW
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1312
SHEET No:	15 of 17
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Marinea Park Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328777.0, N: 6242796.0 (MGA94 Zone 56)
FINAL DEPTH: 130.28m

SURFACE ELEVATION : 23.040 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 312°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-74	113			**SANDSTONE**: medium to coarse grained, pale grey, distinctly bedded at 50deg *(continued)*			BEDROCK
						CONGLOMERATE: fine to medium grained, grey, sub-rounded to rounded gravel (60%) up to 15mm diameter in matrix of medium to coarse sandstone			
			114			**SANDSTONE**: fine grained, grey, massive, distinctly bedded at 30deg, with black carbonaceous flecks and laminations			
		-76	115			**SANDSTONE**: fine grained, pale grey, distinctly bedded at 30deg			
						SANDSTONE: fine grained, grey, massive, with black carbonaceous flecks			
			116						
		-78	117						
			118			**SANDSTONE**: fine grained, grey, indistinctly bedded at 25deg			
		-80	119			**SANDSTONE**: fine grained, grey, massive, with black carbonaceous flecks			
						SANDSTONE: medium grained, pale grey, distinctly cross-bedded at 10-20deg			

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 450P Track

COMMENCED: 8/01/2018
COMPLETED: 19/01/2018

LOGGED BY: BW
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1312
SHEET No:	16 of 17
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Marinea Park Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328777.0, N: 6242796.0 (MGA94 Zone 56)
FINAL DEPTH: 130.28m

SURFACE ELEVATION : 23.040 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 312°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-82	121			**SANDSTONE**: fine grained, grey, massive, with black carbonaceous flecks			BEDROCK
						SANDSTONE: fine grained, grey, distinct disturbed bedding			
						CONGLOMERATE: sub-rounded to rounded quartz and siltstone clasts up to 30mm diameter in a matrix of pale grey, medium grained sandstone (50%)			
			122			**SANDSTONE**: medium to coarse grained, pale grey, massive, with black carbonaceous flecks			
			123						
		-84							
			124						
			125						
		-86	126						
			127						
						CONGLOMERATE: sub-rounded to rounded quartz and siltstone clasts up to 50mm diameter in a massive matrix of pale grey, coarse grained sandstone (30%)			
						SANDSTONE: medium grained, pale grey, massive			

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level Pipe Description: Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 450P Track

COMMENCED: 8/01/2018
COMPLETED: 19/01/2018

LOGGED BY: BW
CHECKED BY: ACC

GEOLOGICAL LOG BORE HOLE WITH INSTRUMENTATION

HOLE No:	BH1312
SHEET No:	17 of 17
PROJECT No:	30012161

PROJECT : F6 Extension Stage 1
PURPOSE
LOCATION : Marinea Park Arncliffe NSW

CLIENT : Roads and Maritime Services
POSITION : E: 328777.0, N: 6242796.0 (MGA94 Zone 56)
FINAL DEPTH: 130.28m

SURFACE ELEVATION : 23.040 (AHD)
TOP OF CASING:
ANGLE FROM HORIZONTAL : 60° TO 312°

Drilling		Depth			MATERIAL		Standpipe Construction		OTHER OBSERVATIONS
Method	Support	Elev (AHD)	Depth (m)	Water	Graphic Log	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Construction Details	Construction notes	Notes (Structure, origin, etc)
HQ		-88	129 130			**SANDSTONE**: medium grained, pale grey, massive *(continued)*			BEDROCK
		-90	131 132 133 134 135			Hole Terminated at 130.28 m Target depth Borehole imaged upon completion Vibrating wire piezometer installed to 119m and backfilled with grout			
		-92							
		-94							

Draft

Notes: ▶ Inflow ◀ Outflow ▽ Standing Water Level

Pipe Description:

Pipe Screen Details:

CONTRACTOR: SMEC/Terratest
EQUIPMENT: Comacchio 450P Track

COMMENCED: 8/01/2018
COMPLETED: 19/01/2018

LOGGED BY: BW
CHECKED BY: ACC

1.0 Explanatory Notes and Abbreviations

General

Soil and rock descriptions on the engineering log sheets are generally in accordance with the recommendations of AS1726 - 1993. The sequence of descriptive terms used to describe soil and rock on the engineering log sheets is outlined below.

Soil

SOIL NAME: plasticity and particle characteristics, colour, structure, secondary and other minor components. The AS1726 Group Symbol, consistency/density and moisture condition are listed as abbreviations in separate columns. Geological origin and additional observations as required such as soil origin i.e. FILL, ALLUVIUM and other significant details are recorded in a separate column.
Dashed lines between material descriptions in auger and wash-drilled logs represent uncertainty regarding depth of transition.

Rock

ROCK NAME: grain size, colour, texture and fabric, structure, bedding dip and geological formation. The rock mass defect spacing and defect descriptions are listed under separate columns. If the defect is greater than 100 mm thick it is described using relevant soil properties in the description column of the engineering log sheet.

Field Samples and Tests

Field samples and tests are recorded in the relevant column using abbreviations described in Section 5.0.

Sample recovery is indicated on the log by a bar marker extending over a proportion of the sample interval.

Field tests have been used to assess soil consistency/density and rock strength, and unless specifically stated otherwise, have been transferred directly to the engineering log sheets and not modified to coincide with laboratory results. Field descriptions may be used as an independent estimate of material properties which can be correlated with other data.

Moisture Condition

Term	Symbol	Description	
		Cohesive	Granular
Dry	D	Cohesive; hard and friable or powdery, dry of Plastic Limit (PL)	Cohesion-less and free running
Moist	M	Soil feels cool, darkened in colour, can be moulded, near PL	Soil feels cool, darkened in colour, tends to cohere
Wet	W	Soil feels cool, dark, usually weakened, free water, >> PL	Soil feels cool, darkened in colour, tends to cohere, free water

Colour

Colour has been assessed in the “moist” condition using basic colours and the modifiers pale, dark and mottled. Borderline colours are described as a combination of the two colours (e.g. red-brown). When describing the colour of defect infill, the following abbreviations are used in the defect description column.

Table 1 Colour abbreviations

Term	Pantone Colour Code
Light grey	GC4
Grey	GC10
Dark Grey	405
Brown-grey	409
Green	355
Red	194
Red-brown	696
Orange	803
Orange-brown	471
Yellow-brown	139
Light yellow-brown	7502
Light brown	728
Brown	4635
Dark Brown	462

Structure

The structure of soil (or rock) is usually applicable to cohesive soils or rock. Typical terms that are used on the engineering log sheets include; **intact** (no joints), **fissured** (closed joints), **voided**, **vesicular**, **slickensided** (sheared), **interbedded, laminated** and **cemented**.

Geological Origin

Term		Description
Residual	Residual soils	Structure and fabric of parent rock not visible
Transported Soils	Aeolian soil	Deposited by wind
	Alluvial soil	Deposited by streams and rivers
	Colluvial soil	Deposited on slopes (transported downslope)
	Lacustrine soil	Deposited by lakes
	Marine soil	Deposited in oceans, bays, beaches and estuaries
Fill Materials	Soil Fill	Soil placed by humans in either controlled or uncontrolled conditions
	Rock Fill	Rock placed by humans in either controlled or uncontrolled conditions
	Waste Fill	Refuse from domestic or industrial sources

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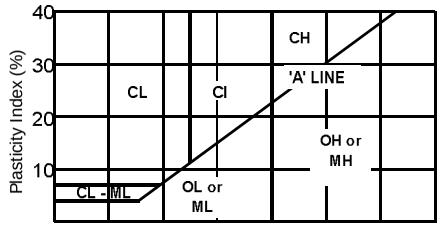
2.0 Soil Classification

Field Identification Procedures (Excluding particles larger than 60mm and basing fractions on estimated mass)									Group Symbol	Typical Names	Laboratory Classification Criteria			
Coarse Grained Soils More than 50% of material less than 63 mm is larger than 0.075 mm	GRAVELS More than 50% of coarse fraction is larger than 2.36mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength						GW	Well graded gravels, gravel-sand mixtures, little or no fines	Grain size curve used in identifying the fractions as given under field identification	Determine percentages of gravel and sand from grain size curve Depending on percentage smaller than 0.06mm size coarse grained soils are classified as follows: Less than 5% GW, GP, SW, SP More than 12 % GM, GC, SM, SC 5% to 12% Borderline cases requiring use of dual symbols	$C_u = \frac{D_{60}}{D_{10}}$ $C_U \geq 4$	$C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Cc=1 – 3
			Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength						GP	Poorly graded gravels and gravel-sand mixtures, little or no fines, uniform gravels			Not meeting all gradation requirements for GW.(i.e. Cu < 4 or Cc ≠ 1 – 3)	
		GRAVELS WITH FINES (Appreciable amount of fines)	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength						GM	Silty gravels, gravel-sand-silt mixtures			Atterberg limits below 'A' line or I_p less than 4.	Above 'A' line with PI between 4 and 7 are borderline cases requiring use of dual symbols.
			'Dirty' materials with excess of plastic fines, medium to high dry strength						GC	Clayey gravels, gravel-sand-clay mixtures			Atterberg limits above 'A' line with I_p greater than 7.	
	SANDS More than 50% of coarse fraction is smaller than 2.36mm	CLEAN SANDS (little or no fines)	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength						SW	Well graded sands, gravelly sands, little or no fines			$C_u = \frac{D_{60}}{D_{10}}$ $C_U \geq 6$	$C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Cc=1–3
			Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength						SP	Poorly graded sands and gravelly sands; little or no fines, uniform sands			Not meeting all gradation requirements for SW. (i.e. Cu < 6 or Cc ≠ 1 – 3)	
		SANDS WITH FINES (Appreciable amount of fines)	'Dirty' materials with excess of non-plastic fines, zero to medium dry strength						SM	Silty sands, sand-silt mixtures			Atterberg limits below 'A' line or I_p less than 4.	Above 'A' line with PI between 4 and 7 are *borderline cases requiring use of dual* symbols.
			'Dirty' materials with excess of plastic fines, medium to high dry strength						SC	Clayey sands, sand-clay mixtures			Atterberg limits above 'A' line with I_p greater than 7.	
Fine Grained Soils More than 50% of material less than 63 mm is smaller than 0.075 mm	IDENTIFICATION PROCEEDURES ON FRACTIONS < 0.2 mm		DRY STRENGTH	DILATANCY	TOUGHNESS									
	SILTS AND CLAYS Liquid limit less than 50		None to low	Quick to slow	None				ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with low plasticity. Silts of low to medium Liquid Limit.				
			Medium to high	None to very slow	Medium				CL, CI	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.				
			Low to medium	Slow	Low				OL	Organic silts and organic silt-clays of low to medium plasticity				
	SILTS AND CLAYS Liquid limit greater than 50		Low to medium	Slow to none	Low to medium				MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, silts of high Liquid Limit				
			High to very high	None	High				CH	Inorganic clays of high plasticity, fat clays				
			Medium to high	None to very slow	Low to medium				OH	Organic clays of medium to high plasticity, organic clays				
HIGHLY ORGANIC SOILS			Readily identified by colour, odour, spongy feel and frequently by fibrous texture						Pt	Peat and other highly organic soils				



Plasticity chart for classification of fine-grained soils

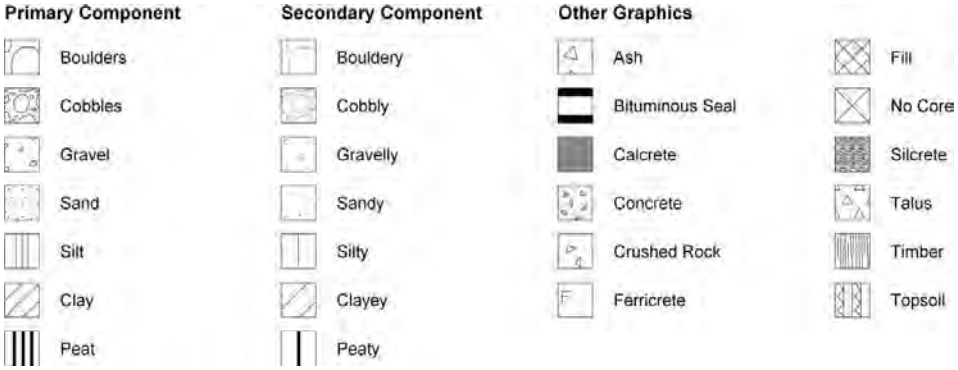
Boundary classifications – Soils possessing characteristics of two groups are designated by combinations of group symbols. For example GW-GC, well graded gravel-sand mixture with clay binder.

3.0 Soil Description

Soil Type

Classification of soils for engineering purposes is based on *AS1726 - 1993*.

Graphic Symbols



Minor Components

	Trace	With	Prefix Sandy/Gravelly/Silty/Clayey
% Minor/Secondary Component	Coarse grained soils: < 5% Fine grained soils: <15%	Coarse grained soils: 5-12% Fine grained soils: 15-30%	Coarse grained soils: 12-50% Fine grained soils: 30-50%
Field Guide	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary components	Presence easily detectable by feel or eye, soil properties little different to general properties of primary component	Presence very easily detected by feel or eye, typically has some influence on soil properties

Organic and Artificial Material

Organic and artificial material cannot be adequately described using the terms above. They are mentioned, at the end of the description using qualitative terms such as “rare”, “occasional” or “frequent”, e.g. “SAND with rare gravel size brick fragments”. These qualitative terms are relative, for which no definition of percentage is given.

Organic matter is described using terms such as fibrous peat, charcoal, wood fragments, roots (>2mm diameter) or root fibres (<2mm diameter)

Waste fill is described using terms such as domestic refuse, oil, bitumen, brickbats, concrete rubble, fibrous plaster, wood pieces, wood shavings, sawdust, iron filings, drums, steel bars, steel scrap, bottles, broken glass, or leather.

Plasticity

Descriptive Term	Range of Liquid Limit (%)
Low plasticity	≤ 35
Medium plasticity	> 35 ≤ 50
High plasticity	> 50

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Grain Size

Soil Type	Clay	Silt	Sand			Gravel			Cobbles
			Fine	Medium	Coarse	Fine	Medium	Coarse	
Grain Size	< 2 µm	2-75 µm	0.075-0.2 mm	0.2-0.6 mm	0.6-2.36 mm	2.36-6 mm	6-20 mm	20-63 mm	63-200 mm
Shape & Texture	Not visible to naked eye		angular / sub-angular / sub-rounded / rounded - low/high sphericity						
Field Guide	Shiny, Not visible under 10x	Dull, Visible under 10x	Visible by eye	Visible at < 1 m	Visible at < 3 m	Visible at < 5 m	Road gravel	Rail ballast	Beaching

Grain Shape

	Angular	Sub-angular	Sub-rounded	Rounded
High Sphericity				
Low Sphericity				

Grading

Descriptive Term	Definition
Well Graded	Good representation of all particle size from largest to the smallest.
Poorly Graded	One or more intermediate size poorly represented.
Gap Graded	One or more intermediate sizes absent.
Uniform	Essentially one size.

Density (non-cohesive soils)

Based on range of SPT blow counts for fine to medium grained sands

Term	Very Loose	Loose	Medium Dense	Dense	Very Dense
Symbol	VL	L	MD	D	VD
SPT (N) Blow count	0 - 4	4 - 10	10 - 30	30 - 50	> 50
Density Index (%)	≤ 15	> 15 ≤ 35	> 35 ≤ 65	> 65 ≤ 85	> 85
Field Guide	Easily penetrated with 13 mm reinforcing rod pushed by hand. Can be excavated with a spade; 50 mm wooden peg can be driven easily.	Easily penetrated with 13 mm reinforcing rod pushed by hand. Can be excavated with a spade; 50 mm wooden peg can be driven easily.	Penetrated with 13 mm reinforcing rod driven with 2 kg hammer - hard shovelling.	Penetrated 300 mm with 13 mm reinforcing rod driven with 2 kg hammer, requires pick for excavation; 50 mm wooden peg hard to drive.	Penetrated only 25 - 50 mm with 13 mm reinforcing rod driven with 2 kg hammer.

Consistency (cohesive soils)

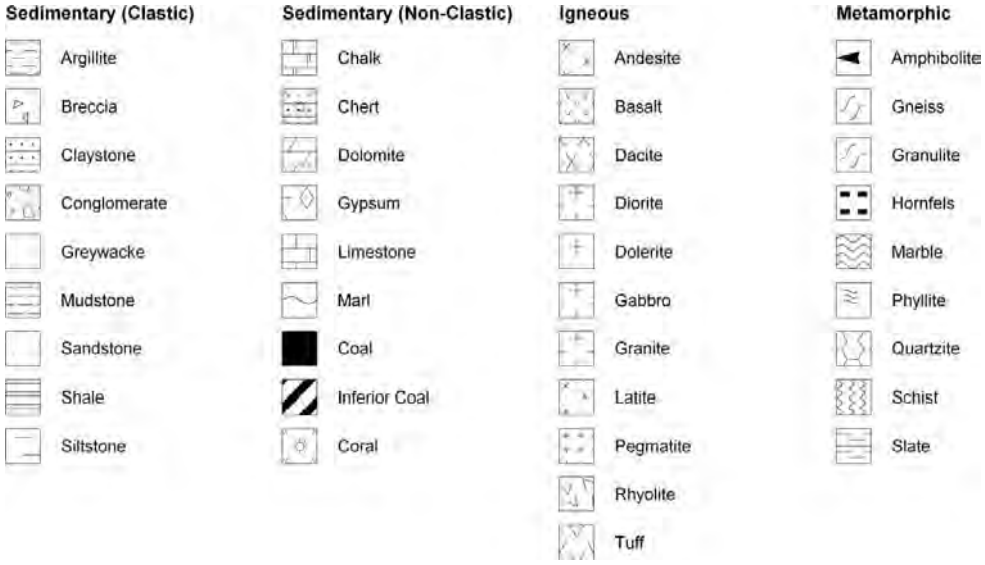
Based on undrained strength (S_u) (estimated in field from pocket penetrometer or shear vane)

Term	Very Soft	Soft	Firm	Stiff	Very Stiff	Hard
Symbol	VS	S	F	St	VSt	H
SPT (N) Blowcount	0 - 2	2 - 4	4 - 8	8 - 15	15 - 30	> 30
Undrained Shear Strength (kPa)	≤12	>12 ≤ 25	>25 ≤ 50	>50 ≤100	>100 ≤ 200	>200
Field Guide	Easily penetrated 40 mm by thumb. Exudes between thumb and fingers when squeezed.	Easily penetrated 10 mm by thumb. Can be moulded by light finger	Impression made by thumb with moderate effort. Can be moulded by strong finger pressure.	Slight impression made by thumb, cannot be moulded by fingers.	Readily indented by thumbnail.	Brittle. Indented with difficulty by thumbnail.

Term	Very Soft	Soft	Firm	Stiff	Very Stiff	Hard
		pressure.				

4.0 Rock Description

Graphic Symbols



Strength

Term	Extremely Low	Very Low	Low	Medium	High	Very High	Extremely High
SYMBOL	EL	VL	L	M	H	VH	EH
$I_{s\,(50)}$ (MPa)	≤ 0.03	> 0.03 ≤ 0.1	> 0.1 ≤ 0.3	> 0.3 ≤ 1	> 1 ≤ 3	> 3 ≤ 10	> 10
FIELD GUIDE	Easily remoulded by hand to a material with soil properties	Material crumbles under firm blow with sharp end of pick. Can be peeled with a knife. Too hard to cut a triaxial sample by hand. Pieces up to 3 cm thick can be broken by finger pressure.	Easily scored with a knife. Indentations of 1mm - 3mm in the specimen with firm blows of the pick point. Has dull sound under hammer. A piece of core 150 mm long 50 mm diameter may be broken by hand	Readily scored with a knife. A piece of core 150 mm long 50 mm diameter can be broken by hand with difficulty	A piece of core 150 mm long 50 mm diameter cannot be broken by hand but can be broken with by a pick with a single firm blow. Rock rings under hammer	Hand specimen breaks with a pick after more than one blow. Rock rings under hammer	Specimen requires many blows with a geological pick to break through intact material. Rock rings under hammer

Note:
1. $I_{s(50)}$ is in accordance with AS1726-1993.
2. The strength noted above is a measure of the strength of the rock material not the rock mass
3. Anisotropy of rock material samples may affect the field assessment of strength
4. The unconfined compressive typically ranges from 10 to 20 times the $I_{s(50)}$ but the multiplier may vary widely for different rock types

Degree of Weathering

Degree of Weathering	Symbol	Weathering Description
Residual Soil	RS	Soil developed from weathering of rock in-situ. The mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely Weathered Rock	EW	Rock is weathered to such an extent that it has soil properties. With chemical weathering it disintegrates or can be remoulded in water. It shows a rock fabric but is described as a soil. Mechanical weathering may reduce hard rock to gravel.
Highly Weathered Rock	HW	Secondary minerals often weathered to clay. Staining of most grain boundaries and some disintegration due to weakening of grain bonds. Often significant loss of strength. However cementing of joints can occasionally lead to strengthening.
Moderately Weathered Rock	MW	Staining and pitting of most secondary minerals and other grain boundaries. The loss of strength depends on the weathering and extent of secondary minerals in the rock matrix. The rock substance may be highly discoloured, usually by iron-staining.
Slightly Weathered Rock	SW	Secondary minerals are stained but not pitted, slight staining at some grain boundaries. Slight loss of strength indicated by amount of colour change.
Fresh Rock	FR	Rock is uniform and shows no sign of decomposition or staining. Relatively strong.

Note – Definitions based on RMS specifications, which may differ from AS1726-1993

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Grain Size, Defect Spacing and Planar Structure (Rock Description Only)

Size/Spacing Thickness	Soil Grain Size Term	Rock Type		Defect Spacing Term	Symbol	Bedding Thickness Term
		Sedimentary	Igneous Metamorphic			
< 2 µm	CLAY	CLAYSTONE	FINE	EXTREMELY CLOSE	EC	VERY THINLY LAMINATED
2 - 60 µm	SILT	SILTSTONE				
0.06 - 0.2 mm	fine grained SAND	SANDSTONE	MEDIUM			
0.2 - 0.6 mm	medium grained SAND					
0.6 - 2.0 mm	coarse grained SAND					
2 - 6 mm	fine grained GRAVEL	CONGLOMERATE (rounded boulders, cobbles and gravel cemented in a finer matrix) *or* BRECCIA (irregular rock fragments in a finer matrix)	COARSE			THINLY LAMINATED
6 - 20 mm	medium grained GRAVEL					LAMINATED
20 - 60 mm	Coarse grained GRAVEL			VERY CLOSE	VC	VERY THINLY BEDDED
60 - 200 mm	COBBLES			CLOSE	C	THINLY BEDDED
0.2 - 0.6 m	small BOULDERS			MEDIUM	M	MEDIUM BEDDED
0.6 - 2m	medium BOULDERS			WIDE	W	THICKLY BEDDED
> 2m	large BOULDERS			VERY WIDE	VW	VERY THICKLY BEDDED

Vesicularity

Symbol	Description	Porosity
D	Dense	Negligible
NV	Non-vesicular	< 10%
SV	Slightly vesicular	10 - 20%
HV	Highly vesicular	> 20%

Common Defects in Rock Masses

Defects are described in the description column in the following order, defined by abbreviations:

- Type, dip/direction, planarity, roughness, infill/coating, colour. To indicate the defect has been healed, “healed” is printed at the end of the description. The term “closed” is used if the defect is closed, with no obvious cementation. E.g. B,30/145°,PL,ro,1mm,CH,gy indicates a bedding joint with 30° dip, 145° dip direction, planar rough surfaces, 1mm thick, filled with grey high plasticity clay.

Defects up to 5 mm thick are described as bedding joints or joints. Defects 5mm to 100mm thick are described as seams. Defects greater than 100mm thick are described as new material strata.

Defect Type

Log Symbol	Term	Definition
B	**Bedding Joint**	A discontinuity or crack, parallel or sub-parallel to layering, across which the rock has little or no tensile strength.
J	**Joint**	A discontinuity or crack, planar, curved or irregular across which the rock usually has little tensile strength.
FZ	**Fracture Zone**	
CZ	**Crushed Zone**	Zone of roughly parallel, planar boundaries (commonly slickensided) containing disoriented usually angular rock fragments of variable size often in a soil matrix.
NF	**In filled Seam**	Seam with distinct roughly parallel boundaries. The infill is caused by migration of soil into open joints.
EW	**Extremely Weathered Seam**	Seam of soil substance weathered from host rock.
MB	**Mechanical Break**	A break in rock mass not caused by natural effects. Example causes include drilling, testing and storage
SZ	**Sheared Zone:**	A zone with roughly parallel planar boundaries of rock material intersected by closely spaced (generally <50 mm) joints and/or cleavage planes.
VN	**Vein**	

Log Symbol	Term	Definition
HB	**Handling Break:**	Any artificial break caused by handling of the core following the drilling operation.
DB	**Drilling Break**	Any artificial break caused by the drilling operation
F	**Foliation Parting**	
C	**Cleavage Parting**	

Defect Planarity

Symbol	Description
PL	planar
UN	undulating
CU	curved
ST	stepped
IR	irregular
DIS	discontinuous

Defect Roughness

Symbol	Description
sm	smooth
ro	rough
sl	slickensided

Infill/Coating

Symbol	Description
cn	clean
sn	stained
vn	Veneered (<1mm)
co	Coated (<1mm)
op	open/voided
Ca	Calcium Carbonate
Fe	Iron Oxide
Ch	Chlorite
Qtz	Quartz
X	Carbonaceous Material
Clay	Clay
MN	Manganese
MS	Secondary Mineral
MU	Unidentified Mineral

5.0 General Symbols and Abbreviations

Field Sampling and Testing Abbreviations

Symbol	Description
V	Uncorrected Vane Shear (kPa) – Peak/Residual
PP	Pocket Penetrometer (kPa)
SPT	Standard Penetration Test
N	Uncorrected SPT blow count for 300 mm
N*	SPT with sample collected
N (in sample column)	Hollow SPT with no recovery
RW	SPT rod weight only (SPT N < 1)
HW	SPT rod and hammer weight (SPT N < 1)
HB	SPT Hammer Bouncing
FPM	Field Permeability
Lu	Lugeon/Packer Test (L/m/min)
$Is_{(50)}$(A)	Axial Point Load Strength Index (MPa)
$Is_{(50)}$(D)	Diametral Point Load Strength Index (MPa)
$Is_{(50)}$(I)	Irregular Point Load Strength Index (MPa)
U(X)	Undisturbed Sample (X) mm diameter
UP	Undisturbed Piston Sample
DS	Disturbed Sample
BS	Bulk Sample
E	Environmental Sample
RQD	Rock Quality Designation (%)
SCR	Solid Core Recovery (%)
TCR	Total Core Recovery (%)
DCP	Dynamic Cone Penetration Resistance (blows/100 mm)
PSP	Perth Sand Penetrometer Resistance (blows/ 150 mm)
PID	Photoionisation Detector

Water

Symbol	Description
	Water level (static)
	Water level (during drilling)
	Water inflow
	Water outflow
	Complete water loss

Drilling Method

Drilling Method Symbol	Description
AD	Auger Drilling
ADT	Auger Drilling – Tungsten-Bit (100mm)
ADV	Auger Drilling – V-Bit (100mm)
AS	Auger Screwing
WB	Wash Boring
B	Blank Bit*
T	Tungsten Carbide Bit*
RR	Rock Roller/Tricone
DHH	Down Hole Hammer
PD	Percussion Drilling
CT	Cable Tool
HA	Hand Auger
DT	Diatube (114mm)
NMLC	NMLC Size Core – Double Tube (50mm diameter)
NQ, HQ, PQ	Wireline Size Core – Triple Tube (45mm, 61mm, 83mm diameter)
RC	Reverse Circulation
CA	Casing Advancer
VC	Vibro Coring
SC	Sonic Coring
GP	Geoprobe Continuous Sampling

*Drill bit symbol used as suffix to drilling method symbol, e.g. ADV indicates auger drilling with V-bit

Drilling Support

Symbol	Description
U	Unsupported
C	Casing
M	Mud
W	Water

Engineering Log — Final

PIEZOMETER No. BH018

Sheet: 1 of 3

Client:	WDA	**Project No:**	60327128
Project:	WestConnex Stage 2: M5	**Logged by:**	BH — **Checked by:** PC
Location:	Moore St., Bardwell Park	**Start Date:**	10/11/2014 — **End Date:** 14/11/2014

Driller:	Terratest Pty. Ltd.	**Hole Diameter:**	96 mm	**Easting:**	326717.0 m — **RL:** 34.84 m
Drill Rig:	Hydrapower Scout	**Inclination:**	-90°	**Northing:**	6243421.8 m — **Ver. Datum:** m AHD
		Bearing:	N/A	**Hor. Proj/Dat:**	MGA94/GDA94 — **Surface:** Grass

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
HQ3	Run 1	98	95		34.0	0.0		Silty SAND, fine to medium grained, brown	
					32.0	2.0		SANDSTONE	
	Run 2	100	96		30.0	4.0		NO CORE	
					28.0	6.0		SANDSTONE, fine to medium grained, light grey to yellow brown	
	Run 3	100	97		26.0	8.0		SANDSTONE	
					24.0	10.0		SANDSTONE, orange-brown to red-brown	
	Run 4	100	98		22.0	12.0		SANDSTONE, medium grained, light yellow-brown	
					20.0	14.0		SANDSTONE, medium to coarse grained, light yellow-brown	
	Run 5	100	99		18.0	16.0		SANDSTONE, medium grained, light grey	
	Run 6	100	64		16.0	18.0		SANDSTONE	
	Run 7	100	87		14.0	20.0			
	Run 8	100	83		12.0	22.0		SANDSTONE, medium grained, light grey	
	Run 9	100	96		10.0	24.0			
	Run 10	100	100		8.0	26.0		SANDSTONE, medium to coarse grained, orange-brown to brown	
	Run 11	100	93		6.0	28.0			
						30.0		SANDSTONE, medium grained, light yellow-brown	

Piezometer Details

Construction details:	PVC slotted screen, 2 mm sand
Pipe diameter:	50 mm
Pipe Top:	0.0 mBGL
Pipe Base:	53.5 mBGL
Screen Top:	50.5 mBGL
Screen/Sensor Base:	53.5 mBGL
Instrument Details:	Level Troll 400 non-vented
Installation Date:	16/12/2014
Development Date:	11/12/2014

Depth 0.0 to 0.2 m — Lockable Gatic cover
Depth 0.2 to 1.0 m — Bentonite plug
Depth 1.0 to 48.3 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH018

Sheet: 2 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Moore St., Bardwell Park

Project No: 60327128
Logged by: BH **Checked by:** PC
Start Date: 10/11/2014 **End Date:** 14/11/2014

Driller: Terratest Pty. Ltd.
Drill Rig: Hydrapower Scout

Hole Diameter: 96 mm
Inclination: -90°
Bearing: N/A

Easting: 326717.0 m **RL:** 34.84 m
Northing: 6243421.8 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 53.5 mBGL
Screen Top: 50.5 mBGL
Screen/Sensor Base: 53.5 mBGL
Instrument Details: Level Troll 400 non-vented
Installation Date: 16/12/2014
Development Date: 11/12/2014

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
HQ3	Run 12	100	98		4.0	32.0		SANDSTONE, medium grained, light yellow-brown	
	Run 13	100	100		2.0	34.0			
	Run 14	100	100		0.0	36.0			
	Run 15	100	87		-2.0	38.0		SANDSTONE, fine to medium grained, light yellow-brown	
	Run 16	100	99		-4.0	40.0		SANDSTONE, fine grained, grey	
	Run 17	100	92		-6.0	42.0		SANDSTONE	
	Run 18	100	100		-8.0	44.0			
	Run 19	100	90		-10.0	46.0		SHALE BRECCIA	
	Run 20	100	100		-12.0	48.0		SANDSTONE, medium grained, light yellow-brown	
	Run 21	100	100		-14.0	50.0		SANDSTONE, fine to medium grained, light grey	
	Run 22	100	100		-16.0	52.0		SANDSTONE, medium grained, light grey	
	Run 23	100	99		-18.0	54.0		SANDSTONE, medium grained, light grey	
					-20.0	56.0		SANDSTONE, medium grained	
					-22.0	58.0		SANDSTONE	
					-24.0	60.0			

Defect Spacing (mm): 20, 60, 200, 600, 2000

Depth 1.0 to 48.3 m — Cement grout
Depth 48.3 to 49.4 m — Bentonite plug
Depth 49.4 to 50.5 m — 2 mm sand backfill
Depth 50.5 to 53.5 m — Slotted screen, 2 mm sand
Depth 53.5 to 54.6 m — 2 mm sand backfill
Depth 54.6 to 55.7 m — Bentonite plug
Depth 55.7 to 69.1 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

AECOM Engineering Log

Final

PIEZOMETER No. BH018

Sheet: 3 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Moore St., Bardwell Park

Project No: 60327128
Logged by: BH **Checked by:** PC
Start Date: 10/11/2014 **End Date:** 14/11/2014

Driller: Terratest Pty. Ltd.
Drill Rig: Hydrapower Scout

Hole Diameter: 96 mm
Inclination: -90°
Bearing: N/A

Easting: 326717.0 m **RL:** 34.84 m
Northing: 6243421.8 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
HQ3	Run 24	100	96		62.0	26.0		SANDSTONE *continued*	
					64.0	28.0		SANDSTONE	
	Run 25	100	100		66.0	30.0			
					68.0	32.0		SANDSTONE, medium to coarse grained, light grey	
	Run 26	100	97		70.0	34.0		SANDSTONE	
					72.0	36.0		*BH018 Terminated at 69.10 m.*	
					74.0	38.0			
					76.0	40.0			
					78.0	42.0			
					80.0	44.0			
					82.0	46.0			
					84.0	48.0			
					86.0	50.0			
					88.0	52.0			
					90.0	54.0			

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 53.5 mBGL
Screen Top: 50.5 mBGL
Screen/Sensor Base: 53.5 mBGL
Instrument Details: Level Troll 400 non-vented
Installation Date: 16/12/2014
Development Date: 11/12/2014

Depth 55.7 to 69.1 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

AECOM Engineering Log — Final

PIEZOMETER No. BH024

Sheet: 1 of 2

Client:	WDA	**Project No:**	60327128
Project:	WestConnex Stage 2: M5	**Logged by:**	NJ
Location:	Wilson St., Bardwell Park	**Start Date:**	20/11/2014
Checked by:	PC	**End Date:**	25/11/2014

Driller:	Terratest Pty. Ltd.	**Hole Diameter:**	Varies	**Easting:**	327221.9 m
Drill Rig:	AUSROC 4000	**Inclination:**	-90°	**Northing:**	6243305.9 m
		Bearing:	N/A	**Hor. Proj/Dat:**	MGA94/GDA94
				RL:	8.17 m
				Ver. Datum:	m AHD
				Surface:	Grass

Field Data | **Rock Description** | **Piezometer Details**

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
					8.0	0.0		Clayey SAND, fine grained, brown	
					6.0	2.0		Clayey SAND, fine to medium grained	
					4.0	4.0		Silty CLAY, light grey mottled orange-brown	
					2.0	6.0		Clayey SAND, fine to medium grained, yellow-brown mottled orange-brown	
					0.0	8.0		Sandy CLAY	
					-2.0	10.0		Clayey SAND, fine to medium grained, light grey mottled orange-brown	
					-4.0	12.0		Sandy CLAY	
					-6.0	14.0		Clayey SAND, fine to medium grained, light grey mottled orange-brown	
					-8.0	16.0		Sandy CLAY, light grey mottled orange-brown	
					-10.0	18.0		CLAY, dark brown	
					-12.0	20.0		Sandy CLAY	
HQ3	Run 1	100	100					SAND, fine to medium grained	
	Run 2	100	100					SANDSTONE, fine to medium grained, light grey	
	Run 3	82	70		-14.0	22.0		NO CORE	
	Run 4	100	83		-16.0	24.0		SANDSTONE, fine to medium grained, light grey	
	Run 5	100	100		-18.0	26.0		NO CORE	
					-20.0	28.0		SANDSTONE, fine to medium grained, light grey	
					-12.0	30.0		SANDSTONE, fine to medium grained, light grey	

Piezometer Details

Construction details:	PVC slotted screen, 2 mm sand
Pipe diameter:	50 mm
Pipe Top:	0.0 mBGL
Pipe Base:	29.1 mBGL
Screen Top:	26.1 mBGL
Screen/Sensor Base:	29.1 mBGL
Instrument Details:	Level Troll 400
Installation Date:	18/12/2014
Development Date:	11/12/2014

- Depth 0.0 to 0.2 m — Lockable gatic cover
- Depth 0.2 to 1.0 m — Bentonite plug
- Depth 1.0 to 22.8 m — Cement grout
- Depth 22.8 to 25.0 m — Bentonite plug
- Depth 25.0 to 26.1 m — 2 mm sand backfill
- Depth 26.1 to 29.1 m — Slotted screen, 2 mm sand
- Depth 29.1 to 30.5 m — 2 mm sand backfill

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

Engineering Log — Final — PIEZOMETER No. BH024

Sheet: 2 of 2

Client: WDA
Project: WestConnex Stage 2: M5
Location: Wilson St., Bardwell Park
Project No: 60327128
Logged by: NJ
Checked by: PC
Start Date: 20/11/2014
End Date: 25/11/2014

Driller: Terratest Pty. Ltd.
Drill Rig: AUSROC 4000
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 327221.9 m
Northing: 6243305.9 m
Hor. Proj/Dat: MGA94/GDA94
RL: 8.17 m
Ver. Datum: m AHD
Surface: Grass

Field Data

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log
HQ3	Run 6	100	100		22.0	32.0	
					24.0	34.0	
	Run 7	100	89		26.0	36.0	
	Run 8	100	86		28.0	38.0	
	Run 9	100	98		30.0	40.0	
					32.0	42.0	
	Run 10	100	100		34.0	44.0	
					36.0	46.0	
	Run 11	100	100		38.0	48.0	
	Run 12	100	100		40.0	50.0	
					42.0	52.0	
					44.0	54.0	
					46.0	56.0	
					48.0	58.0	
					50.0	60.0	

Rock Description

Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
Silty CLAY, light grey	
SANDSTONE, fine to medium grained, light grey	
SANDSTONE, fine grained, light brown-grey	
SANDSTONE, medium grained, light yellow-brown *continued*	
SANDSTONE, fine to medium grained, light brown-grey	
SANDSTONE, medium grained, light grey	
SANDSTONE, fine grained, light brown-grey	
SANDSTONE, fine to medium grained, light brown-grey	
SANDSTONE, medium grained, light grey	
SANDSTONE, fine to medium grained, light brown-grey	
SANDSTONE, medium to coarse grained, light yellow-brown	
SANDSTONE, medium grained, light brown-grey	
SANDSTONE, medium to coarse grained, light grey	
BH024 Terminated at 50.00 m.	

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 29.1 mBGL
Screen Top: 26.1 mBGL
Screen/Sensor Base: 29.1 mBGL
Instrument Details: Level Troll 400
Installation Date: 18/12/2014
Development Date: 11/12/2014

Depth 30.5 to 33.0 m
Depth 33.0 to 50.0 m

- 2 mm sand backfill
- Bentonite plug
- Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH025

Sheet: 1 of 3

Client:	WDA	**Project No:**	60327128
Project:	WestConnex Stage 2: M5	**Logged by:**	LD — **Checked by:** PC
Location:	Queen Street, Arncliffe	**Start Date:**	26/11/2014 — **End Date:** 4/12/2014

Driller:	Terratest Pty Ltd	**Hole Diameter:**	Varies	**Easting:** 328636.7 m	**RL:** 23.85 m
Drill Rig:	Boart Longyear DB-8	**Inclination:**	-90°	**Northing:** 6243271.0 m	**Ver. Datum:** m AHD
		Bearing:	N/A	**Hor. Proj/Dat:** MGA94/GDA94	**Surface:** Asphalt

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
								ASPHALT	
HQ3	Run 1	91	87	90%	22.0	2.0		Silty GRAVEL, fine grained, dark brown	
								Clayey SAND, fine to medium grained	
	Run 2	95	86	28/11/2014	20.0	4.0		SANDSTONE	
								NO CORE	
	Run 3	98	89		18.0	6.0		SANDSTONE, fine to medium grained, light yellow-brown	
								NO CORE	
	Run 4	100	91		16.0	8.0		SANDSTONE, fine to medium grained, light yellow-brown	
	Run 5	100	89		14.0	10.0		SANDSTONE, medium to coarse grained, light yellow-brown	
								NO CORE	
	Run 6	100	92		12.0	12.0		SANDSTONE, medium to coarse grained, light yellow-brown	
								SANDSTONE, medium grained, orange-brown	
	Run 7	100	91		10.0	14.0		SANDSTONE, medium grained, light grey to yellow-brown	
								SANDSTONE, fine grained, light grey	
	Run 8	100	97		8.0	16.0		SANDSTONE, medium grained, light grey	
								SANDSTONE, fine to medium grained, light yellow-brown	
	Run 9	100	96		6.0	18.0		SANDSTONE, fine grained, light yellow-brown	
								NO CORE	
	Run 10	103	100		4.0	20.0		SANDSTONE, fine grained, light yellow-brown	
								SANDSTONE, medium grained, light grey	
	Run 11	96	96		2.0	22.0		SANDSTONE, fine to medium grained, light grey	
					0.0	24.0			
					-2.0	26.0			
					-4.0	28.0			
					-6.0	30.0			

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 60 mm
Pipe Top: 0.0 mBGL
Pipe Base: 57.7 mBGL
Screen Top: 54.7 mBGL
Screen/Sensor Base: 57.7 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 11/12/2014

Depth 0.0 to 0.2 m — Lockable gatic cover
Depth 0.2 to 1.0 m — Bentonite plug
Depth 1.0 to 52.0 m — Cement grout

Final

REMARKS: Volume of benonite used higher than hole annulus volume - possible washout of hole
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH025

Sheet: 2 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Queen Street, Arncliffe

Project No: 60327128
Logged by: LD **Checked by:** PC
Start Date: 26/11/2014 **End Date:** 4/12/2014

Driller: Terratest Pty Ltd
Drill Rig: Boart Longyear DB-8

Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 328636.7 m **RL:** 23.85 m
Northing: 6243271.0 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Asphalt

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
HQ3	Run 12	100	82		32.0	8.0		NO CORE	
								SANDSTONE, fine to medium grained, light grey	
	Run 13	100	100		34.0	10.0		SANDSTONE, medium grained, yellow-brown	
								SILTSTONE, dark grey	
	Run 14	100	100		36.0	12.0		SANDSTONE, fine to medium grained, light brown-grey	
					38.0	14.0		SANDSTONE, medium grained, light grey	
	Run 15	100	100		40.0	16.0		SANDSTONE, medium grained, light grey	
	Run 16	100	100		42.0	18.0			
					44.0	20.0		SANDSTONE, fine grained, grey	
	Run 17	100	100		46.0	22.0		SANDSTONE, medium grained, light grey	
					48.0	24.0		SANDSTONE, medium grained, light grey	
	Run 18	99	95		50.0	26.0		SANDSTONE, fine to medium grained, light grey	
					52.0	28.0		NO CORE	
	Run 19	100	96					SANDSTONE, fine to medium grained, light grey	
					54.0	30.0		SANDSTONE, fine to medium grained, light yellow-brown	
	Run 20	100	100		56.0	32.0		SILTSTONE, dark grey	
								SANDSTONE, medium grained, light grey	
	Run 21	100	98		58.0	34.0		SANDSTONE, medium to coarse grained, light grey	
					60.0				

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 60 mm
Pipe Top: 0.0 mBGL
Pipe Base: 57.7 mBGL
Screen Top: 54.7 mBGL
Screen/Sensor Base: 57.7 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 11/12/2014

Depth 1.0 to 52.0 m — Cement grout
Depth 52.0 to 53.0 m — Bentonite plug
Depth 53.0 to 54.7 m — 2 mm sand backfill
Depth 54.7 to 57.7 m — Slotted screen, 2 mm sand
Depth 57.7 to 59.0 m — 2 mm sand backfill
Depth 59.0 to 60.0 m — Bentonite plug

Final

REMARKS:Volume of benonite used higher than hole annulus volume - possible washout of hole
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH025

Sheet: 3 of 3

Client:	WDA	**Project No:**	60327128
Project:	WestConnex Stage 2: M5	**Logged by:**	LD
Location:	Queen Street, Arncliffe	**Start Date:**	26/11/2014
Checked by:	PC	**End Date:**	4/12/2014

Driller:	Terratest Pty Ltd	**Hole Diameter:**	Varies	**Easting:**	328636.7 m
Drill Rig:	Boart Longyear DB-8	**Inclination:**	-90°	**Northing:**	6243271.0 m
		Bearing:	N/A	**Hor. Proj/Dat:**	MGA94/GDA94
				RL:	23.85 m
				Ver. Datum:	m AHD
				Surface:	Asphalt

Field Data | **Rock Description** | **Piezometer Details**

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
HQ3	Run 22	100	97		38.0	62.0		SANDSTONE, medium grained, light grey *continued*	
								SANDSTONE, medium to coarse grained, light grey	
	Run 23	100	97		40.0	64.0			
					42.0	66.0		SANDSTONE, fine to medium grained, light yellow-brown	
	Run 24	100	100		44.0	68.0		SANDSTONE, medium to coarse grained, light yellow-brown	
	Run 25	100	91	95%	46.0	70.0			
					48.0	72.0		SANDSTONE, fine grained, grey	
	Run 26	100	100		50.0	74.0		SANDSTONE, fine to medium grained, light yellow-brown	
	Run 27	100	98		52.0	76.0		SANDSTONE, fine to medium grained, light grey	
					54.0	78.0		SANDSTONE, medium grained, light grey	
	Run 28	100	100		56.0	80.0			
	Run 29	100	95		58.0	82.0		SANDSTONE, medium grained, light grey	
								SHALE BRECCIA, light grey to grey	
	Run 30	100	100		60.0	84.0		SANDSTONE, fine grained, brown-grey	
								SANDSTONE, medium grained, light grey	
					62.0	86.0		SANDSTONE, fine to medium grained, light grey	
					64.0	88.0		*BH025 Terminated at 85.00 m.*	
						90.0			

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details:	PVC slotted screen, 2 mm sand
Pipe diameter:	60 mm
Pipe Top:	0.0 mBGL
Pipe Base:	57.7 mBGL
Screen Top:	54.7 mBGL
Screen/Sensor Base:	57.7 mBGL
Instrument Details:	Level Troll 400
Installation Date:	16/12/2014
Development Date:	11/12/2014

Depth 60.0 to 85.0 m — Cement grout

Final

REMARKS: Volume of benonite used higher than hole annulus volume - possible washout of hole

GROUNDWATER MONITORING NOTES:

AECOM Engineering Log — Final

PIEZOMETER No. BH029

Sheet: 1 of 2

Client: WDA
Project: WestConnex Stage 2: M5
Location: Barton Driving Range, Arncliffe

Project No: 60327128
Logged by: AC/ST **Checked by:** PC
Start Date: 15/10/2014 **End Date:** 17/10/2014

Driller: Macquarie Drilling Pty. Ltd. **Hole Diameter:** Varies
Drill Rig: Hydrapower Scout **Inclination:** -90° **Bearing:** N/A

Easting: 329349.6 m **RL:** 4.28 m
Northing: 6242708.8 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 36.0 mBGL
Screen Top: 33.0 mBGL
Screen/Sensor Base: 36.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 13/11/2014

Core Run	TCR (%)	RQD (%)	Reduced Level (m)	Depth (m)	Summary Geology
			4.0	0.0	Silty SAND, fine to medium grained, dark brown
			2.0	2.0	Silty SAND, fine to coarse grained, dark brown to black
			0.0	4.0	SAND
			-2.0	6.0	SAND, fine to medium grained, dark grey
			-4.0	8.0	Clayey SAND, fine to medium grained, grey
			-6.0	10.0	SAND, fine to medium grained, light grey
Run 1	97	74	-8.0	12.0	SAND
Run 2	100	91	-10.0	14.0	Silty SAND, medium to coarse grained, light grey to yellow brown
Run 3	100	100	-12.0	16.0	SANDSTONE, medium to coarse grained, red-brown
Run 4	100	90	-14.0	18.0	SANDSTONE, medium to coarse grained, light grey
Run 5	100	88	-16.0	20.0	SILTSTONE, dark grey
Run 6	100	93	-18.0	22.0	SANDSTONE, fine grained, light brown-grey
			-20.0	24.0	SANDSTONE, fine grained, light grey
Run 7	100	62	-22.0	26.0	SANDSTONE, medium to coarse grained, light yellow-brown
			-24.0	28.0	
			-26.0	30.0	SILTSTONE, dark grey

Depth 0.0 to 0.2 m — Lockable Gatic cover
Depth 0.2 to 1.0 m — Bentonite plug
Depth 1.0 to 30.0 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH029

Sheet: 2 of 2

Client: WDA
Project: WestConnex Stage 2: M5
Location: Barton Driving Range, Arncliffe

Project No: 60327128
Logged by: AC/ST **Checked by:** PC
Start Date: 15/10/2014 **End Date:** 17/10/2014

Driller: Macquarie Drilling Pty. Ltd.
Drill Rig: Hydrapower Scout
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 329349.6 m **RL:** 4.28 m
Northing: 6242708.8 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

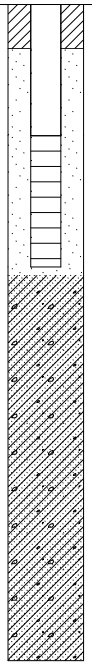
Field Data / Rock Description / Piezometer Details

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
	Run 8	100	93		32.0 / 28.0	26.0		SILTSTONE, dark grey *continued*	
	Run 9	100	58		34.0 / 30.0	30.0		SHALE BRECCIA, coarse grained, light grey	
	Run 10	100	97		36.0 / 32.0	36.0		SANDSTONE, fine grained, light grey	
					38.0 / 34.0	32.0		SILTSTONE, grey	
						34.0		SANDSTONE, fine grained, grey	
	Run 11	100	93		40.0 / 36.0	38.0		SANDSTONE, fine grained, light grey, mottled yellow-brown	
					42.0 / 38.0	40.0		SANDSTONE, medium grained, light grey	
	Run 12	100	97		44.0 / 40.0	42.0		SANDSTONE, medium grained, light grey	
					46.0 / 42.0	44.0		*BH029 Terminated at 44.95 m.*	
					48.0 / 44.0	46.0			
					50.0 / 46.0	48.0			
					52.0 / 48.0	50.0			
					54.0 / 50.0	52.0			
					56.0 / 52.0	54.0			
					58.0 / 54.0	56.0			
					60.0	58.0			

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 36.0 mBGL
Screen Top: 33.0 mBGL
Screen/Sensor Base: 36.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 13/11/2014



- Depth 30.0 to 31.0 m — Bentonite plug
- Depth 31.0 to 33.0 m — 2 mm sand backfill
- Depth 33.0 to 36.0 m — Slotted screen, 2 mm sand
- Depth 36.0 to 36.2 m — 2 mm sand backfill
- Depth 36.2 to 45.0 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH036

Sheet: 1 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Cahill Park, Wolli Creek

Project No: 60327128
Logged by: DS/PH/ST **Checked by:** PC
Start Date: 16/10/2014 **End Date:** 23/10/2014

Driller: Terratest Pty Ltd
Drill Rig: Hydrapower Scout
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 329402.6 m **RL:** 1.58 m
Northing: 6243808.7 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass / Sand

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
					0.0	2.0		Silty SAND, medium grained, dark brown	
								SAND, medium to coarse grained, dark brown	
					2.0	4.0		CLAY, dark brown	
								SAND, fine to coarse grained, light yellow-brown	
					4.0	6.0		Sandy CLAY, dark grey to black	
								ORGANIC SILT, brown-grey	
					6.0	8.0		Sandy CLAY	
								Clayey SAND	
					8.0	10.0		Silty CLAY, brown-grey	
								Sandy CLAY, grey	
					10.0	12.0		SAND, fine to medium grained, light grey	
								Silty CLAY, grey	
					12.0	14.0		Sandy CLAY, fine to medium grained, grey	
								CLAY	
					14.0	16.0		Silty SAND, fine to medium grained, grey	
								SAND, fine to medium grained, brown-grey	
					16.0	18.0			
HQ3	Run 1	100	58		18.0	20.0		SANDSTONE, fine to medium grained, light yellow-brown	
	Run 2	97	58		20.0	22.0			
	Run 3	100	96		22.0	24.0		SANDSTONE	
								NO CORE	
					24.0	26.0		SANDSTONE	
	Run 4	100	95		26.0	28.0		SANDSTONE, fine to medium grained	
					28.0	30.0			

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 63.0 mBGL
Screen Top: 60.0 mBGL
Screen/Sensor Base: 63.0 mBGL
Instrument Details: Level Troll 400 non-vented
Installation Date: 18/11/2014
Development Date: 13/11/2014

Depth 0.0 to 0.2 m — Lockable Gatic cover
Depth 0.2 to 1.0 m — Bentonite plug
Depth 1.0 to 58.3 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

AECOM Engineering Log — Final

PIEZOMETER No. BH036

Sheet: 2 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Cahill Park, Wolli Creek

Project No: 60327128
Logged by: DS/PH/ST **Checked by:** PC
Start Date: 16/10/2014 **End Date:** 23/10/2014

Driller: Terratest Pty Ltd
Drill Rig: Hydrapower Scout
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 329402.6 m **RL:** 1.58 m
Northing: 6243808.7 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass / Sand

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
HQ3	Run 5	96	75		30.0	32.0		SANDSTONE, fine to medium grained *continued*	
	Run 6	98	77		32.0	34.0		NO CORE	
	Run 7	100	83		34.0	36.0		SANDSTONE, fine to medium grained, light grey SANDSTONE	
	Run 8	100	97		36.0	38.0			
	Run 9	100	98		38.0	40.0		SANDSTONE SANDSTONE	
	Run 10	100	88		40.0	42.0			
	Run 11	100	99		42.0	44.0		SANDSTONE SANDSTONE	
	Run 12	100	95		44.0	46.0			
	Run 13	100	100		46.0	48.0		SANDSTONE, fine to medium grained, light grey SANDSTONE, fine to medium grained, light grey	
	Run 14	100	96		48.0	50.0			
	Run 15	100	98		50.0	52.0			
					52.0	54.0			
					54.0	56.0			
					56.0	58.0			
					58.0	60.0			

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 63.0 mBGL
Screen Top: 60.0 mBGL
Screen/Sensor Base: 63.0 mBGL
Instrument Details: Level Troll 400 non-vented
Installation Date: 18/11/2014
Development Date: 13/11/2014

Depth 1.0 to 58.3 m — Cement grout
Depth 58.3 to 59.3 m — Bentonite plug
2 mm sand backfill

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH036

Sheet: 3 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Cahill Park, Wolli Creek
Project No: 60327128
Logged by: DS/PH/ST
Checked by: PC
Start Date: 16/10/2014
End Date: 23/10/2014

Driller: Terratest Pty Ltd
Drill Rig: Hydrapower Scout
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 329402.6 m
Northing: 6243808.7 m
Hor. Proj/Dat: MGA94/GDA94
RL: 1.58 m
Ver. Datum: m AHD
Surface: Grass / Sand

Field Data

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log
HQ3		100	98		60.0	62.0	
	Run 16	100	81		62.0	64.0	
	Run 17	100	100		64.0	66.0	
	Run 18	100	100		66.0	68.0	
					68.0	70.0	
					70.0	72.0	
					72.0	74.0	
					74.0	76.0	
					76.0	78.0	
					78.0	80.0	
					80.0	82.0	
					82.0	84.0	
					84.0	86.0	
					86.0	88.0	
					88.0	90.0	

Rock Description

Summary Geology (refer to geological log for full descriptions)

Defect Spacing (mm): 20, 60, 200, 600, 2000

SANDSTONE, medium to coarse grained, grey *continued*

SANDSTONE

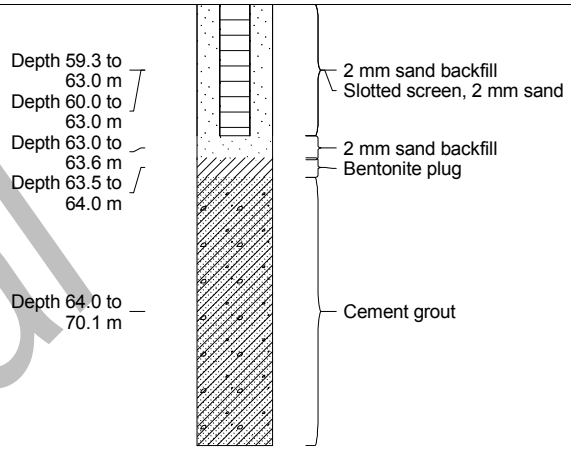
SANDSTONE, medium to coarse grained, light grey

SANDSTONE, medium grained, light grey

BH036 Terminated at 70.08 m.

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 63.0 mBGL
Screen Top: 60.0 mBGL
Screen/Sensor Base: 63.0 mBGL
Instrument Details: Level Troll 400 non-vented
Installation Date: 18/11/2014
Development Date: 13/11/2014



REMARKS:
GROUNDWATER MONITORING NOTES:

Final

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

Engineering Log — Final — PIEZOMETER No. BH039

Sheet: 1 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Discovery Park, Tempe
Project No: 60327128
Logged by: HB
Checked by: PC
Start Date: 12/01/2015
End Date: 14/01/2015

Driller: Numac Drilling Services Pty Ltd
Drill Rig: Boart Longyear DB-520
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 329553.2 m
Northing: 6244157.9 m
Hor. Proj/Dat: MGA94/GDA94
RL: 3.32 m
Ver. Datum: m AHD
Surface: Grass

Field Data

Method: HQ3
Core Run: Run 2, Run 3, Run 4, Run 5, Run 6, Run 7, Run 8, Run 9, Run 10, Run 11
TCR (%): 100, 100, 100, 100, 100, 100, 100, 100, 100, 100
RQD (%): 100, 98, 88, 98, 100, 78, 98, 91, 73, 88, 91
Ground Water: 12/01/2015 8:00:00 AM; 90%
Reduced Level (m): 2.0, 0.0, -2.0, -4.0, -6.0, -8.0, -10.0, -12.0, -14.0, -16.0, -18.0, -20.0, -22.0, -24.0, -26.0
Depth (m): 2.0, 4.0, 6.0, 8.0, 10.0, 12.0, 14.0, 16.0, 18.0, 20.0, 22.0, 24.0, 26.0, 28.0, 30.0
Graphic Log

Rock Description

Summary Geology (refer to geological log for full descriptions)

- 0.0 – 2.0 m: Clayey SAND, fine to medium grained, brown, mottled orange
- 2.0 – 4.0 m: Silty SAND, fine to medium grained, light brown, mottled orange
- 4.0 – 6.0 m: Gravelly SAND, fine to medium grained
- 6.0 – 8.0 m: Clayey SAND, fine to medium grained
- 8.0 – 10.0 m: SAND, fine to medium grained, light brown
- 10.0 – 12.0 m: Clayey SAND, fine to medium grained, brown, mottled grey and red
- 12.0 – 14.0 m: SANDSTONE, medium to coarse grained, red-brown to yellow-brown
- 14.0 – 16.0 m: SANDSTONE, medium to coarse grained, light grey
- 16.0 – 20.0 m: SILTSTONE, light grey
- 20.0 – 22.0 m: SANDSTONE, light yellow-brown
- 22.0 – 24.0 m: SILTSTONE, dark grey
- 24.0 – 26.0 m: SANDSTONE, fine grained, brown-grey
- 26.0 – 28.0 m: SILTSTONE, grey
- 28.0 – 30.0 m: SANDSTONE, medium to coarse grained, light yellow-brown
- 30.0 m: SANDSTONE, medium grained, light grey

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 70.3 mBGL
Screen Top: 49.0 mBGL
Screen/Sensor Base: 52.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 2/02/2015
Development Date: 23/01/2015

Depth 0.0 to 0.2 m — Lockable gatic cover
Depth 0.2 to 1.0 m — Bentonite plug
Depth 1.0 to 46.0 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

Engineering Log — Final — PIEZOMETER No. BH039

Sheet: 2 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Discovery Park, Tempe
Project No: 60327128
Logged by: HB
Checked by: PC
Start Date: 12/01/2015
End Date: 14/01/2015

Driller: Numac Drilling Services Pty Ltd
Drill Rig: Boart Longyear DB-520
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 329553.2 m
Northing: 6244157.9 m
Hor. Proj/Dat: MGA94/GDA94
RL: 3.32 m
Ver. Datum: m AHD
Surface: Grass

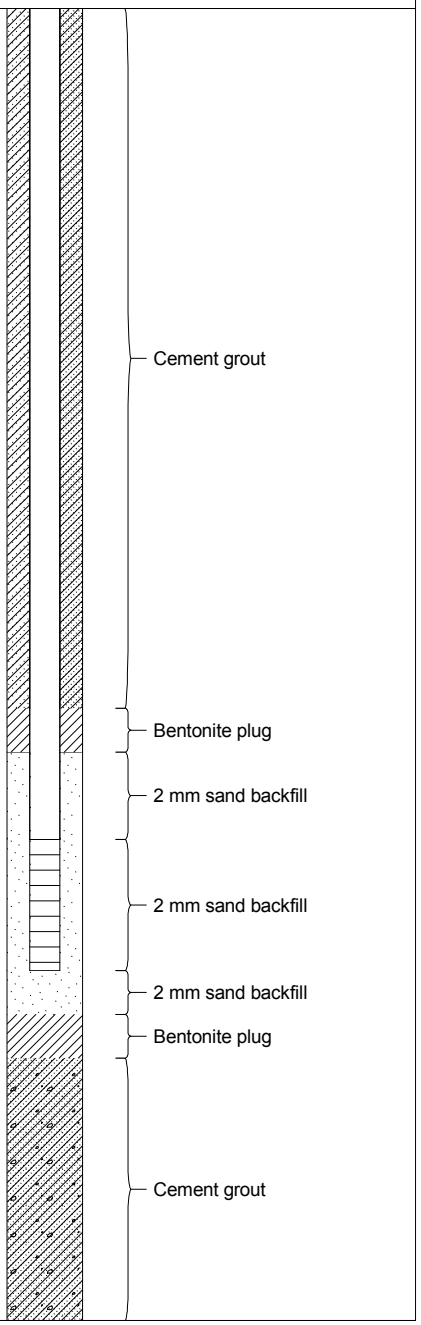
Field Data / Rock Description / Piezometer Details

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
HQ3	Run 12	100	100		28.0	32.0		SANDSTONE, medium to coarse grained, light yellow-brown	
	Run 13	100	99		30.0	34.0		SANDSTONE, fine to medium grained, light grey	
	Run 14	100	10		32.0	36.0		SANDSTONE, medium to coarse grained, light brown-grey	
	Run 15	100	93		34.0	38.0			
	Run 16	100	93		36.0	40.0			
	Run 17	100	100		38.0	42.0		SANDSTONE, fine to medium grained, light grey	
	Run 18	100	72	50%	40.0	44.0		SANDSTONE, medium to coarse grained, light grey to brown-grey	
	Run 19	100	97		42.0	46.0		SANDSTONE, fine to medium grained, light grey	
	Run 20	100	99		44.0	48.0		SANDSTONE, medium grained, brown-grey	
	Run 21	100	100		46.0	50.0		SANDSTONE, medium grained, light grey	
	Run 22	100	100		48.0	52.0		SANDSTONE, coarse grained, light grey, speckled brown	
					50.0	54.0		SANDSTONE, medium grained, light grey	
					52.0	56.0		SILTSTONE, dark grey	
					54.0	58.0		SHALE BRECCIA	
					56.0	60.0		SANDSTONE, medium grained, light grey	

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 70.3 mBGL
Screen Top: 49.0 mBGL
Screen/Sensor Base: 52.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 2/02/2015
Development Date: 23/01/2015



Final

REMARKS:
GROUNDWATER MONITORING NOTES:

Engineering Log — Final — PIEZOMETER No. BH039

Sheet: 3 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Discovery Park, Tempe
Project No: 60327128
Logged by: HB
Checked by: PC
Start Date: 12/01/2015
End Date: 14/01/2015

Driller: Numac Drilling Services Pty Ltd
Drill Rig: Boart Longyear DB-520
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 329553.2 m
Northing: 6244157.9 m
Hor. Proj/Dat: MGA94/GDA94
RL: 3.32 m
Ver. Datum: m AHD
Surface: Grass

Field Data

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log
HQ3	Run 23	100	100		58.0	62.0	
	Run 24	100	96		60.0	64.0	
					62.0	66.0	
	Run 25	100	98		64.0	68.0	
	Run 26	100	95		66.0	70.0	
					68.0	72.0	
					70.0	74.0	
					72.0	76.0	
					74.0	78.0	
					76.0	80.0	
					78.0	82.0	
					80.0	84.0	
					82.0	86.0	
					84.0	88.0	
					86.0	90.0	

Rock Description

Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
SANDSTONE, medium grained, light grey *continued*	
SANDSTONE, coarse grained, light yellow-brown to light grey	
SANDSTONE, medium to coarse grained, light yellow-brown	
BH039 Terminated at 70.25 m.	

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 70.3 mBGL
Screen Top: 49.0 mBGL
Screen/Sensor Base: 52.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 2/02/2015
Development Date: 23/01/2015

Depth 54.0 to 70.3 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM **Engineering Log** **Final** **PIEZOMETER No. BH040**

Sheet: 1 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: View St. / Princess Highway, Parkland
Project No: 60327128
Logged by: DW **Checked by:** PC
Start Date: 9/12/2014 **End Date:** 17/12/2014

Driller: Numac Drilling Services Pty Ltd
Drill Rig: Boart Longyear DB-520
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 329679.8 m **RL:** 1.69 m
Northing: 6244313.5 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 68.0 mBGL
Screen Top: 65.0 mBGL
Screen/Sensor Base: 68.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 30/01/2015
Development Date: 23/01/2015

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
					0.0	2.0		Clayey SAND, fine to coarse grained, black	
					-2.0	4.0		Silty SAND Clayey SAND	
					-4.0	6.0			
					-6.0	8.0		SANDSTONE	
HQ3	Run 1	99	99		-8.0	10.0		SANDSTONE, medium to coarse grained, light yellow and pink	
	Run 2	100	73		-10.0	12.0		NO CORE	
	Run 3	97	80		-12.0	14.0		SANDSTONE, fine to medium grained, grey and pink SANDSTONE, medium to coarse grained, pink to light red-brown	
	Run 4	100	29		-14.0	16.0		NO CORE	
	Run 5	85	37		-16.0	18.0		SANDSTONE, medium to coarse grained, pink to light red-brown SANDSTONE, fine to medium grained, light grey	
	Run 6	83	13		-18.0	20.0		SANDSTONE, medium to coarse grained, light grey	
	Run 7	92	62		-20.0	22.0		NO CORE	
	Run 8	100	83		-22.0	24.0		SANDSTONE, medium to coarse grained, light grey NO CORE	
	Run 9	86	43		-24.0	26.0		SANDSTONE, medium grained, light grey	
	Run 10	80	25					NO CORE	
	Run 11	67	36		-26.0	28.0		SANDSTONE, medium grained, light grey	
	Run 12	90	60					NO CORE	
	Run 13	100	58		-28.0	30.0		SANDSTONE, medium grained, light grey	

Depth 0.0 to 0.2 m — Lockable gatic cover
Depth 0.2 to 1.0 m — Bentonite plug
Depth 1.0 to 63.4 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

AECOM Engineering Log — Final

PIEZOMETER No. BH040

Sheet: 2 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: View St. / Princess Highway, Parkland
Project No: 60327128
Logged by: DW
Checked by: PC
Start Date: 9/12/2014
End Date: 17/12/2014

Driller: Numac Drilling Services Pty Ltd
Drill Rig: Boart Longyear DB-520
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 329679.8 m
Northing: 6244313.5 m
Hor. Proj/Dat: MGA94/GDA94
RL: 1.69 m
Ver. Datum: m AHD
Surface: Grass

Field Data / Rock Description / Piezometer Details

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
HQ3	Run 14	112	71					NO CORE	
	Run 15	79	39		-30.0	32.0		SANDSTONE, medium grained, light grey	
	Run 16	75	28					NO CORE	
	Run 17	100	71						
	Run 18	100	100		-32.0	34.0		SANDSTONE, medium grained, light grey	
	Run 19	89	32						
	Run 20	100	0					SANDSTONE, medium grained, light grey	
	Run 21	100	87		-34.0	36.0		SANDSTONE, fine to medium grained, light grey *continued*	
	Run 22	100	100						
	Run 23	100	100		-36.0	38.0		NO CORE	
	Run 24	100	63		-38.0	40.0		SANDSTONE, medium to coarse grained, light yellow-brown	
	Run 25	100	70					SANDSTONE, fine grained, light grey	
	Run 26	100	73		-40.0	42.0		NO CORE	
	Run 27	100	83		-42.0	44.0		SANDSTONE, fine to medium grained, light grey	
	Run 28	100	58		-44.0	46.0		SANDSTONE, fine grained, light grey	
	Run 29	100	100		-46.0	48.0		SANDSTONE, medium grained, light yellow-brown to light brown-grey	
	Run 30	100	72		-48.0	50.0		SILTSTONE	
	Run 31	100	90		-50.0	52.0		SANDSTONE, medium grained, light grey	
	Run 32	100	100		-52.0	54.0		SANDSTONE, coarse grained, light grey	
	Run 33	100	100		-54.0	56.0		SANDSTONE, medium to coarse grained, light grey	
					-56.0	58.0		SANDSTONE, coarse grained, light brown-grey	
					-58.0	60.0		SANDSTONE, fine to medium grained, light brown-grey	
								SANDSTONE, fine grained, light grey	

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 68.0 mBGL
Screen Top: 65.0 mBGL
Screen/Sensor Base: 68.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 30/01/2015
Development Date: 23/01/2015

Depth 1.0 to 63.4 m

Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH040

Sheet: 3 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: View St. / Princess Highway, Parkland

Project No: 60327128
Logged by: DW — **Checked by:** PC
Start Date: 9/12/2014 — **End Date:** 17/12/2014

Driller: Numac Drilling Services Pty Ltd
Drill Rig: Boart Longyear DB-520
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 329679.8 m — **RL:** 1.69 m
Northing: 6244313.5 m — **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 — **Surface:** Grass

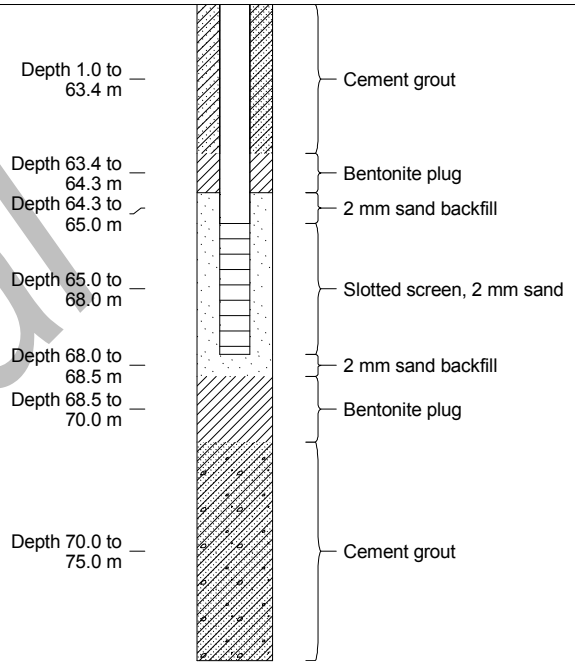
Field Data / Rock Description

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
HQ3		100	100		60.0	62.0		SANDSTONE, medium grained, light grey *continued*	
	Run 34	100	96		62.0	64.0		SANDSTONE, medium grained, light grey	
	Run 35	100	53		64.0	66.0		BASALT, light grey-green	
								Sandy CLAY, light grey-green	
	Run 36	100	59		66.0	68.0		BASALT, light grey-green	
	Run 37	100	91		68.0	70.0		SANDSTONE, medium to coarse grained, light grey	
								BASALT, light grey-green	
	Run 38	100	96		70.0	72.0		SANDSTONE, medium to coarse grained, light grey	
								SANDSTONE, coarse grained, light grey	
	Run 39	100	87		72.0	74.0		SANDSTONE, medium grained, light brown-grey	
					74.0	76.0		SANDSTONE, medium grained, light grey	
								SILTSTONE, dark grey	
					76.0	78.0		SANDSTONE, medium grained, light grey	
								BH040 Terminated at 75.00 m.	
					78.0	80.0			
					80.0	82.0			
					82.0	84.0			
					84.0	86.0			
					86.0	88.0			
					88.0	90.0			

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 68.0 mBGL
Screen Top: 65.0 mBGL
Screen/Sensor Base: 68.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 30/01/2015
Development Date: 23/01/2015



Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH042

Sheet: 1 of 3

Client:	WDA	**Project No:**	60327128
Project:	WestConnex Stage 2: M5	**Logged by:** DW	**Checked by:** PC
Location:	Kendrick Park / View St, Tempe	**Start Date:** 15/12/2012	**End Date:** 16/12/2014

Driller:	Terratest Pty Ltd	**Hole Diameter:**	Varies	**Easting:** 329718.6 m	**RL:** 1.85 m
Drill Rig:	Hydrapower Scout	**Inclination:**	-90°	**Northing:** 6244348.1 m	**Ver. Datum:** m AHD
		Bearing:	N/A	**Hor. Proj/Dat:** MGA94/GDA94	**Surface:** Grass

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 48.0 mBGL
Screen Top: 45.0 mBGL
Screen/Sensor Base: 48.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 30/01/2015
Development Date: 23/01/2015

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
					0.0	2.0		Silty SAND, fine to coarse grained, dark brown	
					-2.0	4.0		SAND, fine to coarse grained, light brown	
					-4.0	6.0		SAND, fine to coarse grained, dark brown-grey	
HQ3	Run 1	93	69		-6.0	8.0		NO CORE	
	Run 2	100	85		-8.0	10.0		SANDSTONE, fine to medium grained, light grey	
	Run 3	100	69		-10.0	12.0		SANDSTONE, medium to coarse grained, light grey	
	Run 4	100	92		-12.0	14.0		SANDSTONE, medium grained, red-brown, light grey and orange	
	Run 5	100	70		-14.0	16.0		SANDSTONE, medium to coarse grained, light grey and orange	
	Run 6	100	99		-16.0	18.0		SANDSTONE, medium to coarse grained, light grey	
	Run 7	100	74		-18.0	20.0		SANDSTONE, fine to medium grained, light grey	
	Run 8	100	95		-20.0	22.0		SANDSTONE, medium grained, light grey	
					-22.0	24.0		SANDSTONE, fine to medium grained, grey	
					-24.0	26.0		SANDSTONE, medium to coarse grained, light grey	
					-26.0	28.0		SANDSTONE, coarse grained, light yellow-brown	
						30.0		SANDSTONE, medium grained, light grey	
								SANDSTONE, medium to coarse grained, light grey	
								SANDSTONE, fine to medium grained, light grey	
								SANDSTONE, fine grained, grey	

Defect Spacing (mm): 20, 60, 200, 600, 2000

Depth 0.0 to 0.2 m — Lockable gatic cover

Depth 0.2 to 42.5 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH042

Sheet: 2 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Kendrick Park / View St, Tempe
Project No: 60327128
Logged by: DW
Checked by: PC
Start Date: 15/12/2012
End Date: 16/12/2014

Driller: Terratest Pty Ltd
Drill Rig: Hydrapower Scout
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 329718.6 m
Northing: 6244348.1 m
Hor. Proj/Dat: MGA94/GDA94
RL: 1.85 m
Ver. Datum: m AHD
Surface: Grass

Field Data | **Rock Description** | **Piezometer Details**

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 48.0 mBGL
Screen Top: 45.0 mBGL
Screen/Sensor Base: 48.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 30/01/2015
Development Date: 23/01/2015

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
HQ3	Run 9	100	98		32.0 / 30.0			SANDSTONE, coarse grained, grey-brown *continued*	
	Run 10	100	93		34.0 / 32.0			SANDSTONE, fine grained, grey	
								SANDSTONE, fine to medium grained, light grey	
	Run 11	100	77		36.0 / 34.0			SANDSTONE, medium to coarse grained, light grey-brown	
	Run 12	100	90	25%	38.0 / 36.0			SANDSTONE, medium grained, light grey	
	Run 13	100	84		40.0 / 38.0			SILTSTONE, dark grey	
					42.0 / 40.0			SANDSTONE, medium grained, light grey	
	Run 14	100	75		44.0 / 42.0			SILTSTONE, dark grey	
					46.0 / 44.0			SANDSTONE, medium grained, light grey	
	Run 15	100	83		48.0 / 46.0			SANDSTONE, medium grained, light grey	
					50.0 / 48.0			SANDSTONE, medium grained, light grey	
	Run 16	100	90		52.0 / 50.0			SANDSTONE, medium grained, light grey	
	Run 17	100	98		54.0 / 52.0			SILTSTONE, dark grey	
					56.0 / 54.0			SANDSTONE, medium grained, light grey	
								SANDSTONE, medium grained, light grey	
	Run 18	100	95		58.0 / 56.0			SANDSTONE, medium grained, light grey	
					60.0			SANDSTONE, medium to coarse grained, light grey	

Defect Spacing (mm): 20, 60, 200, 600, 2000

Depth 0.2 to 42.5 m — Cement grout
Depth 42.5 to 43.5 m — Bentonite plug
Depth 43.5 to 45.0 m — 2 mm sand backfill
Depth 45.0 to 48.0 m — Slotted screen, 2 mm sand
Depth 48.0 to 49.0 m — 2 mm sand backfill
Depth 49.0 to 50.0 m — Bentonite plug
Depth 50.0 to 70.7 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM **Engineering Log** **Final** **PIEZOMETER No. BH042**

Sheet: 3 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Kendrick Park / View St, Tempe
Project No: 60327128
Logged by: DW **Checked by:** PC
Start Date: 15/12/2012 **End Date:** 16/12/2014

Driller: Terratest Pty Ltd **Hole Diameter:** Varies
Drill Rig: Hydrapower Scout **Inclination:** -90° **Bearing:** N/A
Easting: 329718.6 m **RL:** 1.85 m
Northing: 6244348.1 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
HQ3	Run 19	100	97		62.0	60.0		SANDSTONE, medium grained, light grey *continued*	
								SANDSTONE, fine to medium grained, grey	
	Run 20	100	89		64.0	62.0		SANDSTONE, medium grained, light grey	
	Run 21	100	100		66.0	64.0		SANDSTONE, medium to coarse grained, light grey	
	Run 22	100	89		68.0	66.0		SANDSTONE, medium to coarse grained, light grey	
					70.0	68.0		*BH042 Terminated at 70.68 m.*	
					72.0	70.0			
					74.0	72.0			
					76.0	74.0			
					78.0	76.0			
					80.0	78.0			
					82.0	80.0			
					84.0	82.0			
					86.0	84.0			
					88.0	86.0			
					90.0				

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 48.0 mBGL
Screen Top: 45.0 mBGL
Screen/Sensor Base: 48.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 30/01/2015
Development Date: 23/01/2015

Depth 50.0 to 70.7 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH061a

Sheet: 1 of 1

Client: WDA
Project: WestConnex Stage 2: M5
Location: Barton Park, Banksia

Project No: 60327128
Logged by: BH/PH **Checked by:** PC
Start Date: 13/10/2014 **End Date:** 13/10/2014

Driller: Terratest Pty Ltd
Drill Rig: Boart Longyear DB-8
Hole Diameter: 100 mm
Inclination: -90°
Bearing: N/A
Easting: 329288.9 m **RL:** 0.85 m
Northing: 6242258.6 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Asphalt

Field Data

Method | Core Run | TCR (%) | RQD (%) | Ground Water | Reduced Level (m) | Depth (m) | Graphic Log

Rock Description

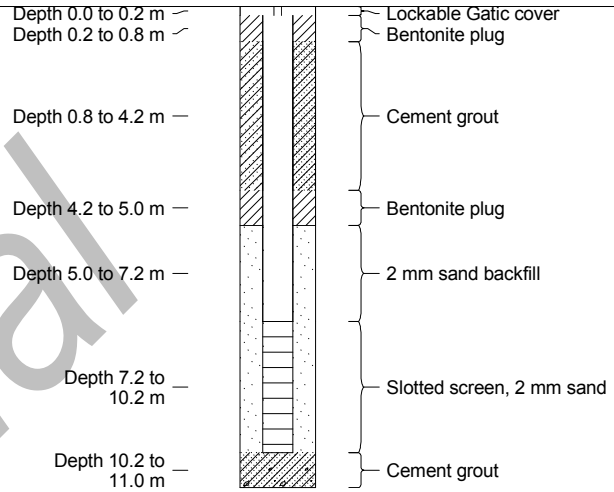
Summary Geology (refer to geological log for full descriptions)

Defect Spacing (mm) 20 60 200 600 2000

Depth (m)	Reduced Level (m)	Summary Geology
0.0	0.0	
2.0	-2.0	Gravelly SAND
4.0	-4.0	Silty SAND, fine to medium grained, dark brown
6.0	-6.0	Clayey SAND
8.0	-8.0	SAND, fine to medium grained, light grey
10.0	-10.0	Silty SAND, fine to medium grained, dark grey
12.0	-12.0	Sandy SILT
14.0	-14.0	SAND
16.0	-16.0	Clayey SAND, medium grained
18.0	-18.0	SAND, medium grained, light grey
20.0	-20.0	Clayey SAND, medium grained, light grey
22.0	-22.0	*BH061a Terminated at 11.00 m.*
24.0	-24.0	
26.0	-26.0	
28.0	-28.0	
30.0		

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 16.2 mBGL
Screen Top: 7.2 mBGL
Screen/Sensor Base: 10.2 mBGL
Instrument Details: Level Troll 400 non-vented
Installation Date: 18/12/2014
Development Date: 11/12/2014



Final

REMARKS:Lithology inferred from BH061
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

Engineering Log — Final

PIEZOMETER No. BH063a

Sheet: 1 of 1

Client:	WDA	**Project No:**	60327128
Project:	WestConnex Stage 2: M5	**Logged by:**	AC — **Checked by:** PC
Location:	Banksia Field, Arncliffe	**Start Date:**	21/10/2014 — **End Date:** 24/10/2014

Driller:	Macquarie Drilling Pty. Ltd.	**Hole Diameter:**	150 mm	**Easting:**	329206.3 m — **RL:** 3.30 m
Drill Rig:	Hydrapower Scout	**Inclination:**	-90°	**Northing:**	6242449.9 m — **Ver. Datum:** m AHD
		Bearing:	N/A	**Hor. Proj/Dat:**	MGA94/GDA94 — **Surface:** Grass

Field Data

Method | Core Run | TCR (%) | RQD (%) | Ground Water | Reduced Level (m) | Depth (m) | Graphic Log

Rock Description

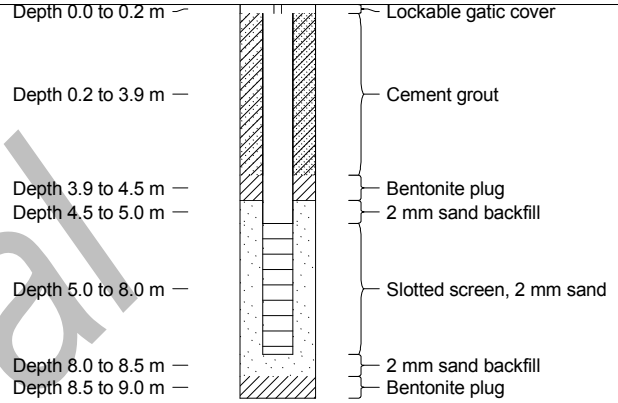
Summary Geology (refer to geological log for full descriptions)

Defect Spacing (mm): 20 60 200 600 2000

Depth (m)	Reduced Level (m)	Summary Geology
0.0	2.0	Clayey SAND, fine grained
2.0	0.0	Clayey SAND, fine grained, brown
4.0	-2.0	Silty SAND, fine grained, brown
6.0	-4.0	Silty SAND, fine to medium grained, dark grey
8.0	-6.0	SAND, fine to medium grained, light grey
9.00	-7.0	*BH063a Terminated at 9.00 m.*
10.0	-8.0	
12.0	-10.0	
14.0	-12.0	
16.0	-14.0	
18.0	-16.0	
20.0	-18.0	
22.0	-20.0	
24.0	-22.0	
26.0	-24.0	
28.0	-26.0	
30.0		

Piezometer Details

Construction details:	PVC slotted screen, 2 mm sand
Pipe diameter:	50 mm
Pipe Top:	0.0 mBGL
Pipe Base:	8.0 mBGL
Screen Top:	5.0 mBGL
Screen/Sensor Base:	8.0 mBGL
Instrument Details:	Level Troll 400
Installation Date:	18/11/2014
Development Date:	13/11/2014



REMARKS: Lithology inferred from BH063

GROUNDWATER MONITORING NOTES:

Final

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH063

Sheet: 1 of 2

Client:	WDA	**Project No:**	60327128
Project:	WestConnex Stage 2: M5	**Logged by:**	AC — **Checked by:** PC
Location:	Banksia Field, Arncliffe	**Start Date:**	21/10/2014 — **End Date:** 24/10/2014

Driller:	Macquarie Drilling Pty. Ltd.	**Hole Diameter:**	Varies	**Easting:** 329206.3 m	**RL:** 3.30 m
Drill Rig:	Hydrapower Scout	**Inclination:**	-90°	**Northing:** 6242449.9 m	**Ver. Datum:** m AHD
		Bearing:	N/A	**Hor. Proj/Dat:** MGA94/GDA94	**Surface:** Grass

Field Data | **Rock Description** | **Piezometer Details**

Method | Core Run | TCR (%) | RQD (%) | Ground Water | Reduced Level (m) | Depth (m) | Graphic Log

Depth (m)	Reduced Level (m)	Summary Geology (refer to geological log for full descriptions)
0.0 – 2.0	3.3 – 1.3	Clayey SAND, fine grained
2.0 – 4.0	1.3 – 0.0	Clayey SAND, fine grained, brown
4.0 – 6.0	0.0 – -2.0	Silty SAND, fine grained, brown
6.0 – 8.0	-2.0 – -4.0	Silty SAND, fine to medium grained, dark grey
8.0 – 10.0	-4.0 – -6.0	SAND, fine to medium grained, light grey
10.0 – 12.0	-6.0 – -8.0	Silty organic CLAY, dark brown
12.0 – 14.0	-8.0 – -10.0	Silty SAND, fine grained, grey
14.0 – 16.0	-10.0 – -12.0	SAND, medium to coarse grained, light grey
16.0 – 18.0	-12.0 – -14.0	Silty SAND, fine grained, grey
18.0 – 20.0	-14.0 – -16.0	SAND, medium grained, yellow-brown
20.0 – 30.0	-16.0 – -26.0	SAND, fine to medium grained, brown-grey

Defect Spacing (mm): 20 60 200 600 2000

Piezometer Details

Construction details:	PVC slotted screen, 2 mm sand
Pipe diameter:	50 mm
Pipe Top:	0.0 mBGL
Pipe Base:	44.8 mBGL
Screen Top:	41.0 mBGL
Screen/Sensor Base:	44.0 mBGL
Instrument Details:	Level Troll 400
Installation Date:	16/12/2014
Development Date:	13/11/2014

Depth 0.0 to 0.2 m — Lockable gatic cover

Depth 0.2 to 39.5 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

AECOM Engineering Log — Final

PIEZOMETER No. BH063

Sheet: 2 of 2

Client: WDA
Project: WestConnex Stage 2: M5
Location: Banksia Field, Arncliffe

Project No: 60327128
Logged by: AC **Checked by:** PC
Start Date: 21/10/2014 **End Date:** 24/10/2014

Driller: Macquarie Drilling Pty. Ltd.
Drill Rig: Hydrapower Scout
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 329206.3 m **RL:** 3.30 m
Northing: 6242449.9 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Field Data

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log
HQ3	Run 1	96	61		32.0 to 28.0	36.0 to 32.0	
	Run 2	93	100		34.0 to 30.0	38.0 to 34.0	
	Run 3	97	96		36.0 to 32.0	40.0 to 36.0	
	Run 4	100	77		38.0 to 34.0	42.0 to 38.0	
	Run 5	100	81		40.0 to 36.0	44.0 to 40.0	
					42.0 to 38.0	46.0 to 42.0	
					44.0 to 40.0	48.0 to 44.0	
					46.0 to 42.0	50.0 to 46.0	
					48.0 to 44.0	52.0 to 48.0	
					50.0 to 46.0	54.0 to 50.0	
					52.0 to 48.0	56.0 to 52.0	
					54.0 to 50.0	58.0 to 54.0	
					56.0 to 52.0	60.0 to 56.0	

Rock Description

Summary Geology (refer to geological log for full descriptions)

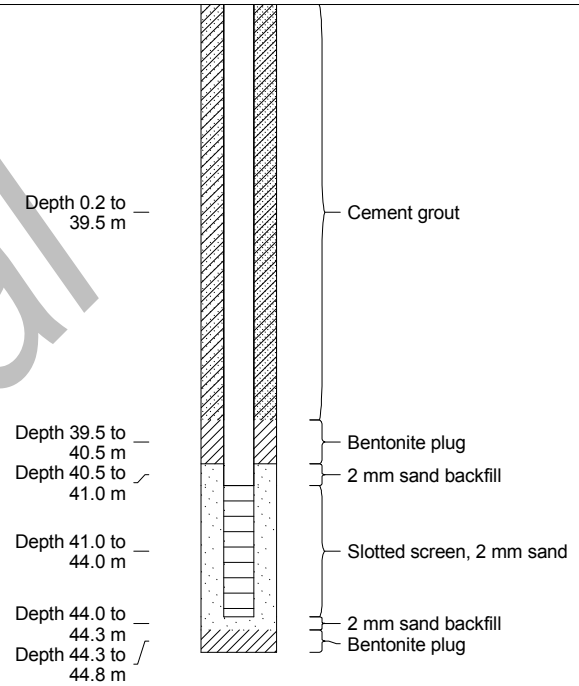
Defect Spacing (mm): 20 60 200 600 2000

- SAND, fine grained, dark grey
- SAND, fine to medium grained, dark grey
- SANDSTONE, fine grained, light grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, medium to coarse grained, light yellow-brown
- SANDSTONE, coarse grained, light yellow-brown
- SANDSTONE, fine grained, light grey
- SANDSTONE, fine grained, dark grey
- SHALE BRECCIA
- SANDSTONE, medium to coarse grained, light grey

BH063 Terminated at 44.81 m.

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 44.8 mBGL
Screen Top: 41.0 mBGL
Screen/Sensor Base: 44.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 13/11/2014



REMARKS:
GROUNDWATER MONITORING NOTES:

Final

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH070

Sheet: 1 of 3

Client:	WDA	**Project No:**	60327128
Project:	WestConnex Stage 2: M5	**Logged by:**	AC
Location:	Bellevue Court, Arncliffe	**Start Date:**	3/11/2014
Checked by:	PC	**End Date:**	7/11/2014

Driller:	Macquarie Drilling Pty. Ltd.	**Hole Diameter:**	Varies	**Easting:**	329041.8 m
Drill Rig:	Hydrapower Scout	**Inclination:**	-90°	**Northing:**	6242920.4 m
		Bearing:	N/A	**Hor. Proj/Dat:**	MGA94/GDA94
RL:	17.54 m				
Ver. Datum:	m AHD				
Surface:	Grass				

Field Data | **Rock Description** | **Piezometer Details**

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
								SAND, fine grained, dark brown	
HQ3	Run 1	49	30		16.0	2.0		SAND, fine grained, light grey-brown	
	Run 2	97	49		14.0	4.0		SANDSTONE	
								SANDSTONE	
								NO CORE	
	Run 3	94	78	18/11/2014	12.0	6.0		SANDSTONE, medium to coarse grained, light orange-brown, mottled light yellow brown	
				7/11/2014	10.0	8.0		SANDSTONE, coarse grained, light yellow-brown	
	Run 4	100	94		8.0	10.0		NO CORE	
								SANDSTONE, coarse grained, red-brown	
	Run 5	100	82		6.0	12.0		SANDSTONE, medium grained, light brown	
								SANDSTONE, medium to coarse grained	
	Run 6	100	97		4.0	14.0			
					2.0	16.0		SANDSTONE, fine to medium grained, light grey	
	Run 7	100	81		0.0	18.0		SANDSTONE, medium to coarse grained, light yellow-brown	
					-2.0	20.0		SANDSTONE, fine to medium grained, light grey	
	Run 8	100	95		-4.0	22.0		SANDSTONE, coarse grained, light yellow-brown	
								SANDSTONE, medium grained, grey	
	Run 9	100	80		-6.0	24.0		SANDSTONE, coarse grained, light yellow-brown	
					-8.0	26.0		SANDSTONE, medium to coarse grained, light yellow-brown	
	Run 10	100	71		-10.0	28.0		SANDSTONE, coarse grained, light yellow-brown	
					-12.0	30.0		SANDSTONE, medium grained, light grey	

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details:	PVC slotted screen, 2 mm sand
Pipe diameter:	50 mm
Pipe Top:	0.0 mBGL
Pipe Base:	38.0 mBGL
Screen Top:	35.0 mBGL
Screen/Sensor Base:	38.0 mBGL
Instrument Details:	Level Troll 400
Installation Date:	18/11/2014
Development Date:	13/11/2014

Depth 0.0 to 0.2 m — Lockable gatic cover

Depth 0.2 to 31.0 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

Engineering Log — Final — PIEZOMETER No. BH070

Sheet: 2 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Bellevue Court, Arncliffe

Project No: 60327128
Logged by: AC — **Checked by:** PC
Start Date: 3/11/2014 — **End Date:** 7/11/2014

Driller: Macquarie Drilling Pty. Ltd.
Drill Rig: Hydrapower Scout
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 329041.8 m — **RL:** 17.54 m
Northing: 6242920.4 m — **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 — **Surface:** Grass

Field Data

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log
HQ3	Run 11	100	98		14.0	32.0	
	Run 12	100	99		16.0	34.0	
	Run 13	99	55		18.0	36.0	
	Run 14	100	99		20.0	38.0	
	Run 15	100	84		22.0	40.0	
	Run 16	100	86		24.0	42.0	
	Run 17	100	86		26.0	44.0	
	Run 18	100	88		28.0	46.0	
	Run 19	100	92		30.0	48.0	
	Run 20	100	99		32.0	50.0	
					34.0	52.0	
					36.0	54.0	
					38.0	56.0	
					40.0	58.0	
					42.0	60.0	

Rock Description

Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
SANDSTONE, medium to coarse grained, light yellow-brown	20 60 200 600 2000
SANDSTONE, medium grained, light grey	
SANDSTONE, medium to coarse grained, brown-grey *continued*	
NO CORE	
SHALE BRECCIA	
SANDSTONE, medium to coarse grained, brown-grey	
SHALE BRECCIA	
SANDSTONE, medium to coarse grained, brown-grey	
SANDSTONE, fine to medium grained, light grey	
SANDSTONE, coarse grained, brown-grey	
SHALE BRECCIA	
SANDSTONE, coarse grained, light brown-grey	
SANDSTONE, fine to medium grained, light brown-grey	
SANDSTONE, coarse grained, brown-grey	
SANDSTONE, fine to medium grained, brown-grey	
SANDSTONE, coarse grained, light grey	
SANDSTONE, medium to coarse grained, light grey	
SILTSTONE, dark grey	

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 38.0 mBGL
Screen Top: 35.0 mBGL
Screen/Sensor Base: 38.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 18/11/2014
Development Date: 13/11/2014

Depth 0.2 to 31.0 m	Cement grout
Depth 31.0 to 33.0 m	Bentonite plug
Depth 33.0 to 35.0 m	2 mm sand backfill
Depth 35.0 to 38.0 m	Slotted screen, 2 mm sand
Depth 38.0 to 39.0 m	2 mm sand backfill
Depth 39.0 to 42.8 m	Bentonite plug
Depth 42.8 to 65.0 m	Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

Engineering Log — Final — PIEZOMETER No. BH070

Sheet: 3 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Bellevue Court, Arncliffe
Project No: 60327128
Logged by: AC
Checked by: PC
Start Date: 3/11/2014
End Date: 7/11/2014

Driller: Macquarie Drilling Pty. Ltd.
Drill Rig: Hydrapower Scout
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 329041.8 m
Northing: 6242920.4 m
Hor. Proj/Dat: MGA94/GDA94
RL: 17.54 m
Ver. Datum: m AHD
Surface: Grass

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	
HQ3	Run 21	100	99		44.0	62.0		SANDSTONE, medium to coarse grained, light yellow-brown *continued*	
	Run 22	100	98		46.0	64.0			
					48.0	66.0		*BH070 Terminated at 65.00 m.*	
					50.0	68.0			
					52.0	70.0			
					54.0	72.0			
					56.0	74.0			
					58.0	76.0			
					60.0	78.0			
					62.0	80.0			
					64.0	82.0			
					66.0	84.0			
					68.0	86.0			
					70.0	88.0			
					72.0	90.0			

Defect Spacing (mm): 20, 60, 200, 600, 2000

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 38.0 mBGL
Screen Top: 35.0 mBGL
Screen/Sensor Base: 38.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 18/11/2014
Development Date: 13/11/2014

Depth 42.8 to 65.0 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

Engineering Log — Final — PIEZOMETER No. BH072

Sheet: 1 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Bexley Rd., Kingsgrove
Project No: 60327128
Logged by: AC
Checked by: PC
Start Date: 19/11/2014
End Date: 20/11/2014

Driller: Numac Drilling Services Pty. Ltd.
Drill Rig: Boart Longyear DB-520
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 325560.6 m
Northing: 6243242.8 m
Hor. Proj/Dat: MGA94/GDA94
RL: 7.47 m
Ver. Datum: m AHD
Surface: Grass

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
					6.0	2.0		Silty SAND, fine to medium grained, brown	
								Silty SAND, fine to medium grained, brown	
					4.0	4.0		Sandy CLAY, brown	
								Silty SAND, fine grained, brown	
					2.0	6.0		Silty SAND, fine to medium grained, yellow-brown	
HQ3	Run 1	95	53		0.0	8.0		Sandy CLAY, grey	
	Run 2	100	100					SANDSTONE	
								NO CORE	
	Run 3	100	100		-2.0	10.0		SANDSTONE, coarse grained, yellow-brown	
					-4.0	12.0		SANDSTONE, fine grained, brown-grey	
	Run 4	85	100		-6.0	14.0		SANDSTONE, medium to coarse grained, light grey	
								SANDSTONE, coarse grained, light brown	
	Run 5	100	88		-8.0	16.0		SANDSTONE, fine to medium grained, light yellow-brown	
					-10.0	18.0		SANDSTONE, medium grained, light brown-grey	
								SANDSTONE, coarse grained, brown-grey	
	Run 6	100	84		-12.0	20.0		SILTSTONE, dark grey	
								LAMINITE	
	Run 7	100	97		-14.0	22.0		SANDSTONE, medium to coarse grained, brown-grey	
					-16.0	24.0			
	Run 8	100	100		-18.0	26.0			
	Run 9	100	90		-20.0	28.0		SANDSTONE, fine to medium grained, light grey	
					-22.0	30.0		SANDSTONE, medium to coarse grained, light grey	

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 30.9 mBGL
Screen Top: 27.9 mBGL
Screen/Sensor Base: 30.9 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 11/12/2014

- Depth 0.0 to 0.2 m — Lockable Gatic cover
- Depth 0.2 to 1.0 m — Bentonite plug
- Depth 1.0 to 6.0 m — Cement grout
- Depth 6.0 to 26.0 m — Bentonite plug
- Depth 26.0 to 27.9 m — 2 mm sand backfill
- Depth 27.9 to 30.9 m — Slotted screen, 2 mm sand

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH072

Sheet: 2 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Bexley Rd., Kingsgrove

Project No: 60327128
Logged by: AC **Checked by:** PC
Start Date: 19/11/2014 **End Date:** 20/11/2014

Driller: Numac Drilling Services Pty. Ltd.
Drill Rig: Boart Longyear DB-520
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 325560.6 m **RL:** 7.47 m
Northing: 6243242.8 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Field Data

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log
HQ3	Run 10	100	83	19/11/2014	24.0	32.0	
	Run 11	100	79		26.0	34.0	
	Run 12	100	83		28.0	36.0	
	Run 13	100	99		30.0	38.0	
	Run 14	100	100		32.0	40.0	
	Run 15	100	100		34.0	42.0	
	Run 16	100	96		36.0	44.0	
	Run 17	100	100		38.0	46.0	
	Run 18	100	85		40.0	48.0	
	Run 19	100	84		42.0	50.0	
	Run 20	100	84		44.0	52.0	
	Run 21	100	99		46.0	54.0	
	Run 22	100	100		48.0	56.0	
	Run 23	100	58		50.0	58.0	
					52.0	60.0	

Rock Description

Summary Geology (refer to geological log for full descriptions)

- SANDSTONE, fine to medium grained, light grey
- SANDSTONE, medium to coarse grained, light brown-grey *continued*
- SANDSTONE, medium to coarse grained, light brown-grey
- SANDSTONE, medium to coarse grained, light brown-grey
- SANDSTONE, fine to medium grained, brown-grey
- SANDSTONE, medium to coarse grained, light brown-grey
- SANDSTONE, fine to medium grained, grey to dark grey
- SANDSTONE, medium to coarse grained, light brown-grey
- SANDSTONE, medium grained, light grey
- SHALE BRECCIA
- SANDSTONE, medium to coarse grained, light brown-grey
- SANDSTONE, coarse grained, light grey

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 30.9 mBGL
Screen Top: 27.9 mBGL
Screen/Sensor Base: 30.9 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 11/12/2014

- Depth 30.9 to 32.0 m — Slotted screen, 2 mm sand
- 2 mm sand backfill
- Depth 32.0 to 33.0 m — Bentonite plug
- Depth 33.0 to 35.0 m — 2 mm sand backfill
- Depth 35.0 to 64.6 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

AECOM Engineering Log — Final

PIEZOMETER No. BH072

Sheet: 3 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Bexley Rd., Kingsgrove

Project No: 60327128
Logged by: AC **Checked by:** PC
Start Date: 19/11/2014 **End Date:** 20/11/2014

Driller: Numac Drilling Services Pty. Ltd.
Drill Rig: Boart Longyear DB-520
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 325560.6 m **RL:** 7.47 m
Northing: 6243242.8 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Field Data: Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Rock Description: Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
HQ3	Run 24	100	50		54.0	62.0		SANDSTONE, fine to medium grained, grey *continued*	
								SANDSTONE, coarse grained, light grey	
	Run 25	100	98		56.0	64.0		SILTSTONE, dark grey	
								SANDSTONE, fine to medium grained, brown-grey	
					58.0	66.0		SANDSTONE, medium to coarse grained, light brown-grey	
								BH072 Terminated at 64.55 m.	
					60.0	68.0			
					62.0	70.0			
					64.0	72.0			
					66.0	74.0			
					68.0	76.0			
					70.0	78.0			
					72.0	80.0			
					74.0	82.0			
					76.0	84.0			
					78.0	86.0			
					80.0	88.0			
					82.0	90.0			

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 30.9 mBGL
Screen Top: 27.9 mBGL
Screen/Sensor Base: 30.9 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 11/12/2014

Depth 35.0 to 64.6 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH074

Sheet: 1 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Argyle St., Arncliffe

Project No: 60327128
Logged by: AC/JCB **Checked by:** PC
Start Date: 12/11/2014 **End Date:** 18/11/2014

Driller: Numac Drilling Services Pty. Ltd.
Drill Rig: Boart Longyear DB-520
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 329227.9 m **RL:** 2.58 m
Northing: 6243670.2 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Asphalt

Field Data / Rock Description / Piezometer Details

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
					2.0	0.0		ASPHALT	
					0.0	2.0		Sandy GRAVEL, fine grained, dark brown	
					-2.0	4.0		SAND, fine to coarse grained, light yellow-brown	
					-4.0	6.0		Silty SAND, fine to medium grained, dark brown	
					-6.0	8.0		Silty SAND, fine grained, light yellow-brown	
					-8.0	10.0		Silty CLAY, dark brown	
					-10.0	12.0		SAND, fine to medium grained, light brown	
					-12.0	14.0		Organic CLAY, dark brown	
					-14.0	16.0		CLAY, grey	
					-16.0	18.0		SAND, fine to medium grained, light grey	
					-18.0	20.0		Clayey SAND, fine to medium grained	
					-20.0	22.0		SAND, fine to medium grained, brown-grey	
HQ3	Run 1	66	61		-22.0	24.0		SANDSTONE, red mottled orange-brown	
	Run 2	97	91		-24.0	26.0		NO CORE	
	Run 3	97	97		-26.0	28.0		SANDSTONE, medium grained, light grey	
	Run 4	100	100		-28.0	30.0		NO CORE	
	Run 5	100	96					SANDSTONE, medium grained, light grey	
	Run 6	100	97					SANDSTONE, medium to coarse grained, red-brown	
								NO CORE	
								SANDSTONE, medium grained, light grey	
								SANDSTONE, fine to medium grained, light yellow-brown	
								SANDSTONE, medium to coarse grained, light yellow-brown	
								SANDSTONE, medium to coarse grained, light brown to yellow-brown	
								SANDSTONE, coarse grained, light yellow-brown	

Defect Spacing (mm): 20 60 200 600 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 42.0 mBGL
Screen Top: 39.0 mBGL
Screen/Sensor Base: 42.0 mBGL
Instrument Details: Level Troll 400 non-vented
Installation Date: 2/02/2015
Development Date: 23/01/2015

Depth 0.0 to 0.2 m — Lockable gatic cover
Depth 0.2 to 35.8 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log

Final

PIEZOMETER No. BH074

Sheet: 2 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Argyle St., Arncliffe

Project No: 60327128
Logged by: AC/JCB **Checked by:** PC
Start Date: 12/11/2014 **End Date:** 18/11/2014

Driller: Numac Drilling Services Pty. Ltd.
Drill Rig: Boart Longyear DB-520

Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 329227.9 m **RL:** 2.58 m
Northing: 6243670.2 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Asphalt

Field Data

Method: HQ3

Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)
Run 7	100	95		28.0	32.0
Run 8	100	97		30.0	34.0
Run 9	100	98		32.0	36.0
Run 10	100	74		34.0	38.0
Run 11	100	79		36.0	40.0
Run 12	100	95		38.0	42.0
Run 13	100	100		40.0	44.0
Run 14	100	100		42.0	46.0
Run 15	100	100		44.0	48.0
Run 16	100	100		46.0	50.0
				48.0	52.0
				50.0	54.0
				52.0	56.0
				54.0	58.0
				56.0	60.0

Rock Description

Summary Geology (refer to geological log for full descriptions)

Defect Spacing (mm): 20, 60, 200, 600, 2000

- SANDSTONE, medium grained, light yellow-brown *continued*
- SANDSTONE, fine to medium grained, light grey
- SANDSTONE, coarse grained, brown-grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, coarse grained, light brown-grey
- SANDSTONE, fine to medium grained, light grey
- SILTSTONE, dark grey
- SANDSTONE, fine to medium grained, light yellow-brown
- SILTSTONE, dark grey
- SANDSTONE, fine to medium grained, light yellow-brown
- SANDSTONE, medium to coarse grained, brown-grey

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 42.0 mBGL
Screen Top: 39.0 mBGL
Screen/Sensor Base: 42.0 mBGL
Instrument Details: Level Troll 400 non-vented
Installation Date: 2/02/2015
Development Date: 23/01/2015

- Depth 0.2 to 35.8 m — Cement grout
- Depth 35.8 to 36.8 m — Bentonite plug
- Depth 36.8 to 39.0 m — 2 mm sand backfill
- Depth 39.0 to 42.0 m — Slotted screen, 2 mm sand
- Depth 42.0 to 44.0 m — 2 mm sand backfill
- Depth 44.0 to 46.2 m — Bentonite plug
- Depth 46.2 to 66.1 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log

Final

PIEZOMETER No. BH074

Sheet: 3 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Argyle St., Arncliffe

Project No: 60327128
Logged by: AC/JCB **Checked by:** PC
Start Date: 12/11/2014 **End Date:** 18/11/2014

Driller: Numac Drilling Services Pty. Ltd.
Drill Rig: Boart Longyear DB-520

Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 329227.9 m **RL:** 2.58 m
Northing: 6243670.2 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Asphalt

Field Data

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log
HQ3	Run 17	99	63		58.0	62.0	
					60.0		
	Run 18	100	81		64.0	62.0	
					62.0		
					66.0		
					64.0		
					68.0	66.0	
					66.0	70.0	
					68.0		
					70.0	72.0	
					72.0		
					74.0	76.0	
					76.0		
					78.0	80.0	
					80.0		
					82.0	84.0	
					84.0		
					86.0	88.0	
					88.0		
					90.0	86.0	

Rock Description

Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
SANDSTONE, medium to coarse grained, brown-grey *continued*	
NO CORE	
SILTSTONE	
SANDSTONE, fine grained	
SILTSTONE	
SANDSTONE, fine grained	
SANDSTONE, medium to coarse grained, light grey	
BH074 Terminated at 66.12 m.	

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 42.0 mBGL
Screen Top: 39.0 mBGL
Screen/Sensor Base: 42.0 mBGL
Instrument Details: Level Troll 400 non-vented
Installation Date: 2/02/2015
Development Date: 23/01/2015

Depth 46.2 to 66.1 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH084

Sheet: 1 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Johnston St., Earlwood

Project No: 60327128
Logged by: NJ/ST/PH **Checked by:** PC
Start Date: 25/09/2014 **End Date:** 30/09/2014

Driller: Macquarie Drilling Pty. Ltd.
Drill Rig: Hydrapower Scout

Hole Diameter: 96.1 mm
Inclination: -90°
Bearing: N/A

Easting: 325612.9 m **RL:** 30.02 m
Northing: 6243435.4 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Asphalt

Field Data

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)
HQ3	Run 1	82	59		28.0	2.0
	Run 2	100	100		26.0	4.0
	Run 3	100	98		24.0	6.0
	Run 4	100	100		22.0	8.0
	Run 5	100	98		20.0	10.0
	Run 6	100	95		18.0	12.0
	Run 7	100	98		16.0	14.0
	Run 8	100	90		14.0	16.0
	Run 9	100	92		12.0	18.0
	Run 10	100	57		10.0	20.0
					8.0	22.0
					6.0	24.0
					4.0	26.0
					2.0	28.0
						30.0

Rock Description

Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
ASPHALT	
Clayey SAND, fine to medium grained, light grey, mottled red	
SANDSTONE	
NO CORE	
SANDSTONE, medium grained, red-brown; light grey; and yellow-brown, mottled red-brown	
SANDSTONE, medium grained, light grey	
SANDSTONE, fine to medium grained, light yellow-grey	
SANDSTONE	
SANDSTONE	
SANDSTONE, light grey	

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 50.5 mBGL
Screen Top: 47.5 mBGL
Screen/Sensor Base: 50.5 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 11/12/2014

Depth 0.0 to 0.2 m — Lockable Gatic cover
Depth 0.2 to 46.4 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

AECOM Engineering Log — Final

PIEZOMETER No. BH084

Sheet: 2 of 3

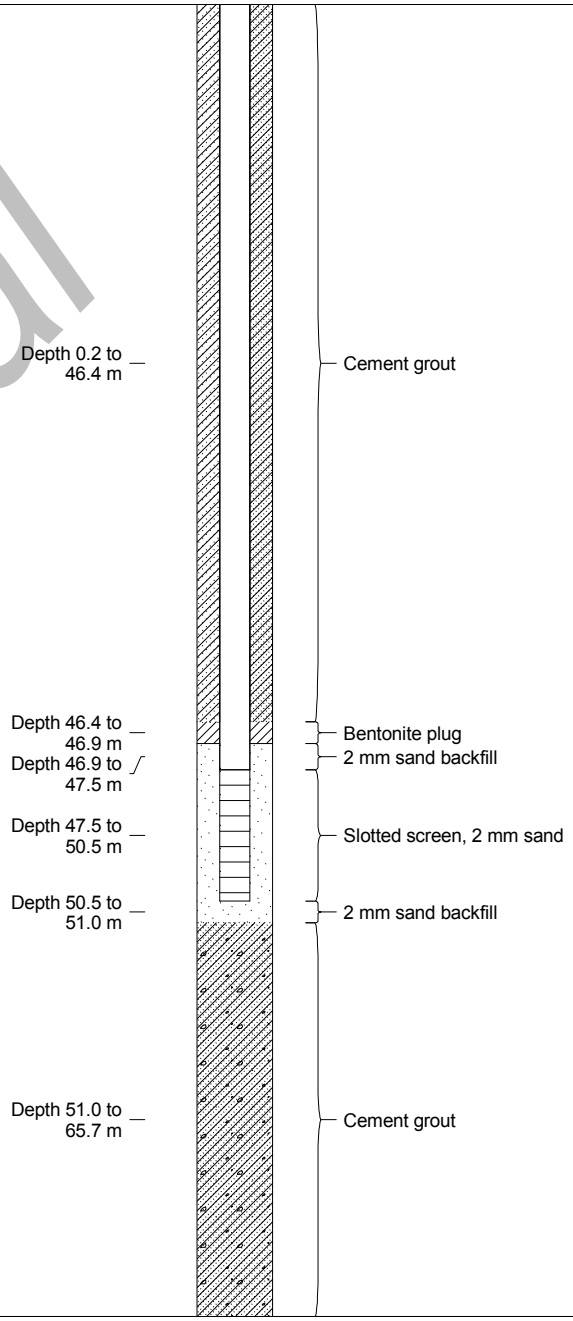
Client: WDA
Project: WestConnex Stage 2: M5
Location: Johnston St., Earlwood

Project No: 60327128
Logged by: NJ/ST/PH **Checked by:** PC
Start Date: 25/09/2014 **End Date:** 30/09/2014

Driller: Macquarie Drilling Pty. Ltd.
Drill Rig: Hydrapower Scout
Hole Diameter: 96.1 mm
Inclination: -90°
Bearing: N/A
Easting: 325612.9 m **RL:** 30.02 m
Northing: 6243435.4 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Asphalt

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
HQ3	Run 11	100	73		32.0	0.0		SANDSTONE	
		100	73			2.0			
	Run 12	100	92		34.0	4.0		SANDSTONE, medium grained, light grey	
	Run 13	100	93		36.0	6.0		SILTSTONE	
	Run 14	100	100		38.0	8.0		SANDSTONE	
	Run 15	100	93		40.0	10.0		SANDSTONE, medium to coarse grained, light grey	
	Run 16	100	100		42.0	12.0			
	Run 17	100	100		44.0	14.0			
	Run 18	100	100		46.0	16.0			
	Run 19	100	100		48.0	18.0		SANDSTONE	
	Run 20	100	100		50.0	20.0			
	Run 21	100	100		52.0	22.0		SANDSTONE	
					54.0	24.0			
					56.0	26.0			
					58.0	28.0		SANDSTONE	
					60.0			SANDSTONE	

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 50.5 mBGL
Screen Top: 47.5 mBGL
Screen/Sensor Base: 50.5 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 11/12/2014



Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH084

Sheet: 3 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Johnston St., Earlwood

Project No: 60327128
Logged by: NJ/ST/PH **Checked by:** PC
Start Date: 25/09/2014 **End Date:** 30/09/2014

Driller: Macquarie Drilling Pty. Ltd.
Drill Rig: Hydrapower Scout
Hole Diameter: 96.1 mm
Inclination: -90°
Bearing: N/A

Easting: 325612.9 m **RL:** 30.02 m
Northing: 6243435.4 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Asphalt

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
HQ3	Run 22	100	100		30.0	62.0		SANDSTONE	
					32.0			SANDSTONE *continued*	
	Run 23	100	100		34.0	64.0		SANDSTONE	
					36.0	66.0		*BH084 Terminated at 65.65 m.*	
					38.0	68.0			
					40.0	70.0			
					42.0	72.0			
					44.0	74.0			
					46.0	76.0			
					48.0	78.0			
					50.0	80.0			
					52.0	82.0			
					54.0	84.0			
					56.0	86.0			
					58.0	88.0			
						90.0			

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 50.5 mBGL
Screen Top: 47.5 mBGL
Screen/Sensor Base: 50.5 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 11/12/2014

Depth 51.0 to 65.7 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

AECOM **Engineering Log** **Final** **PIEZOMETER No. BH088**

Sheet: 1 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: 176 Slade Rd, Bardwell
Project No: 60327128
Logged by: NJ/DW **Checked by:** PC
Start Date: 4/11/2014 **End Date:** 7/11/2014

Driller: Numac Drilling Services Pty Ltd
Drill Rig: Boart Longyear DB-520
Hole Diameter: 96 mm
Inclination: -90°
Bearing: N/A
Easting: 326181.7 m **RL:** 16.78 m
Northing: 6243434.4 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
					16.0	2.0		FILL	
					14.0	4.0		Clayey SAND	
					12.0	6.0		Silty SAND	
								SAND	
HQ3	Run 1	100	99		10.0	8.0		Clayey SAND	
	Run 2	100	97		8.0	10.0		SANDSTONE, medium grained, light grey	
	Run 3	100	98		6.0	12.0			
	Run 4	100	92	18/11/2014	4.0	14.0			
	Run 5	100	84		2.0	16.0		NO CORE	
					0.0	18.0		SANDSTONE	
	Run 6	100	100		-2.0	20.0		SANDSTONE, medium grained, light grey	
	Run 7	99	96		-4.0	22.0			
					-6.0	24.0			
	Run 8	103	99		-8.0	26.0		SANDSTONE, fine grained, brown-grey	
					-10.0	28.0			
	Run 9	100	99		-12.0	30.0		SANDSTONE, medium to coarse grained, light yellow-brown	

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 44.0 mBGL
Screen Top: 41.0 mBGL
Screen/Sensor Base: 44.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 18/11/2014
Development Date: 13/11/2014

Depth 0.0 to 0.2 m — Lockable Gatic cover
Depth 0.2 to 1.0 m — Bentonite plug
Depth 1.0 to 37.0 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM **Engineering Log** **Final** **PIEZOMETER No. BH088**

Sheet: 2 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: 176 Slade Rd, Bardwell
Project No: 60327128
Logged by: NJ/DW **Checked by:** PC
Start Date: 4/11/2014 **End Date:** 7/11/2014

Driller: Numac Drilling Services Pty Ltd
Drill Rig: Boart Longyear DB-520
Hole Diameter: 96 mm
Inclination: -90°
Bearing: N/A
Easting: 326181.7 m **RL:** 16.78 m
Northing: 6243434.4 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
HQ3	Run 10	100	93		14.0 32.0			SANDSTONE, medium grained, grey *continued*	
					16.0 34.0			SANDSTONE	
	Run 11	100	98		18.0 36.0			SANDSTONE, fine to medium grained, light grey	
	Run 12	100	100		20.0 38.0			SANDSTONE, medium grained, light grey	
	Run 13	100	100		22.0 40.0				
					24.0 42.0			SANDSTONE	
	Run 14	98	89		26.0 44.0			SHALE BRECCIA	
					28.0 46.0			SANDSTONE	
	Run 15	100	97		30.0 48.0			SANDSTONE, fine to medium grained, light grey	
	Run 16	100	95		32.0 50.0				
	Run 17	100	95		34.0 52.0				
					36.0 54.0			SANDSTONE, medium to coarse grained, light yellow-brown	
	Run 18	100	97		38.0 56.0				
					40.0 58.0				
	Run 19	100	98		42.0 60.0				

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 44.0 mBGL
Screen Top: 41.0 mBGL
Screen/Sensor Base: 44.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 18/11/2014
Development Date: 13/11/2014

Depth 1.0 to 37.0 m — Cement grout
Depth 37.0 to 39.0 m — Bentonite plug
Depth 39.0 to 41.0 m — 2 mm sand backfill
Depth 41.0 to 44.0 m — Slotted screen, 2 mm sand
Depth 44.0 to 44.5 m — Bentonite plug
Depth 44.5 to 46.0 m
Depth 46.0 to 75.0 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH088

Sheet: 3 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: 176 Slade Rd, Bardwell

Project No: 60327128
Logged by: NJ/DW **Checked by:** PC
Start Date: 4/11/2014 **End Date:** 7/11/2014

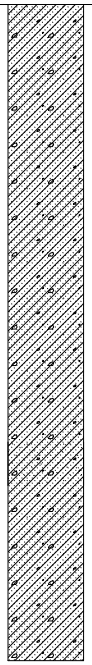
Driller: Numac Drilling Services Pty Ltd
Drill Rig: Boart Longyear DB-520
Hole Diameter: 96 mm
Inclination: -90°
Bearing: N/A
Easting: 326181.7 m **RL:** 16.78 m
Northing: 6243434.4 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
HQ3	Run 20	100	100		44.0 / 62.0	46.0 / 64.0		SANDSTONE, medium grained, light yellow-brown *continued*	
	Run 21	100	100		48.0 / 66.0	50.0 / 68.0		SANDSTONE, medium to coarse grained, light grey	
	Run 22	100	100		52.0 / 70.0	54.0 / 72.0		SANDSTONE, coarse grained, light grey mottled brown	
	Run 23	100	99		56.0 / 74.0	58.0 / 76.0		SANDSTONE, fine to medium grained, light grey-brown	
	Run 24	100	100		60.0 / 78.0	62.0 / 80.0		SANDSTONE, medium grained, light grey-brown	
	Run 25	100	100		64.0 / 82.0	66.0 / 84.0		*BH088 Terminated at 75.40 m.*	
					68.0 / 86.0	70.0 / 88.0			
					72.0 / 90.0				

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 44.0 mBGL
Screen Top: 41.0 mBGL
Screen/Sensor Base: 44.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 18/11/2014
Development Date: 13/11/2014



Depth 46.0 to 75.0 m — Cement grout
Depth 70.0 to 71.0 m — 2 mm sand backfill

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

Engineering Log — Final — PIEZOMETER No. BH093

Sheet: 1 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Lorraine Ave, Bardwell Valley

Project No: 60327128
Logged by: HB/ST/AC — **Checked by:** PC
Start Date: 1/12/2014 — **End Date:** 3/12/2014

Driller: Terratest Pty Ltd
Drill Rig: Comacchio Geo 305
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 327657.0 m — **RL:** 36.39 m
Northing: 6243183.2 m — **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 — **Surface:** Asphalt

Field Data / Rock Description / Piezometer Details

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
HQ3	Run 1	84		3/12/2014	36.0	0.0		ASPHALT	
					34.0	2.0		GRAVEL, fine to coarse grained, dark grey	
	Run 2	100	73					GRAVEL, medium to coarse grained, dark red	
					32.0	4.0		SAND, fine to coarse grained, orange	
	Run 3	53	21					NO CORE	
					30.0	6.0		SANDSTONE	
	Run 4	97	77					SANDSTONE, medium grained, light grey	
					28.0	8.0		SANDSTONE, fine to medium grained, light grey	
	Run 5	90	81					NO CORE	
					26.0	10.0		SANDSTONE, medium to coarse grained, light red-brown	
	Run 6	100	97					SANDSTONE, medium grained, light grey	
	Run 7	100	77		24.0	12.0		NO CORE	
								SANDSTONE, medium to coarse grained, light grey	
	Run 8	100	100		22.0	14.0		SANDSTONE, medium to coarse grained, light grey	
	Run 9	100	76						
					20.0	16.0			
	Run 10	100	94		18.0	18.0		SANDSTONE, medium grained, light yellow-brown	
					16.0	20.0		SANDSTONE, medium grained, light yellow-brown	
	Run 11	100	62		14.0	22.0		NO CORE	
					12.0	24.0		SANDSTONE, medium grained, light yellow-brown	
	Run 12	93	90		10.0	26.0			
					8.0	28.0			
	Run 13	100	71			30.0			

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 50.5 mBGL
Screen Top: 47.5 mBGL
Screen/Sensor Base: 50.5 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 10/12/2014

Depth 0.0 to 0.2 m — Lockable gatic cover
Depth 0.2 to 1.0 m — Bentonite plug
Depth 1.0 to 43.8 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH093

Sheet: 2 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Lorraine Ave, Bardwell Valley

Project No: 60327128
Logged by: HB/ST/AC — **Checked by:** PC
Start Date: 1/12/2014 — **End Date:** 3/12/2014

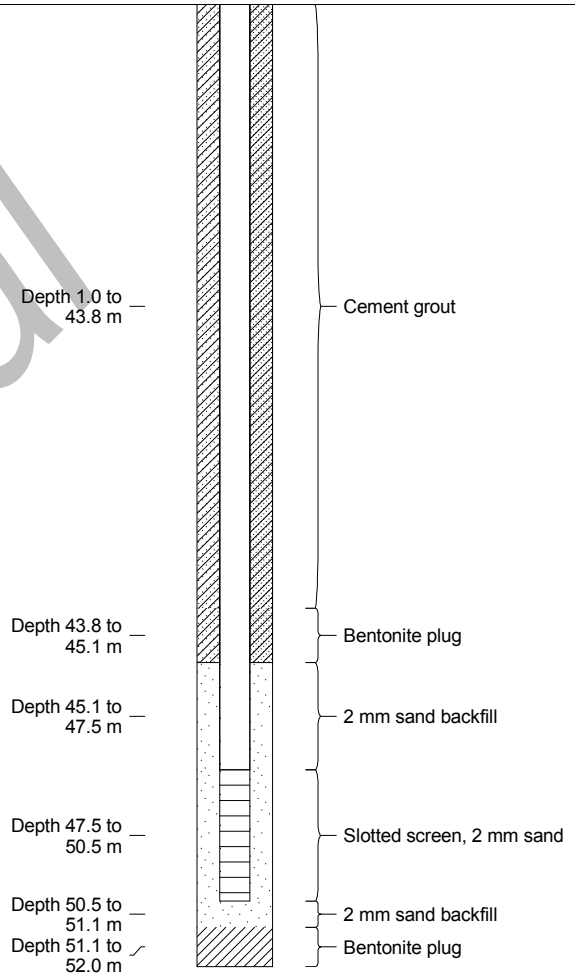
Driller: Terratest Pty Ltd
Drill Rig: Comacchio Geo 305
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 327657.0 m — **RL:** 36.39 m
Northing: 6243183.2 m — **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 — **Surface:** Asphalt

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
HQ3		100	71		6.0	32.0			
	Run 14	100	59		4.0	34.0		SANDSTONE, fine to medium grained, light grey to light red-brown	
	Run 15	100	98		2.0	36.0			
	Run 16	100	98		0.0	38.0			
	Run 17	100	90		-2.0	40.0		SANDSTONE, medium grained, light yellow-brown	
	Run 18	100	98		-4.0	42.0			
	Run 19	100	95		-6.0	44.0		SANDSTONE, medium grained, light grey	
	Run 20	79	0		-8.0	46.0			
	Run 21	100	93		-10.0	48.0		INTERBEDDED SILTSTONE/SANDSTONE, fine grained	
	Run 22	100	100		-12.0	50.0		SANDSTONE, medium grained, light grey	
	Run 23	100	100		-14.0	52.0		SILTSTONE, dark grey	
	Run 24	100	100		-16.0	54.0		SANDSTONE, medium grained, light grey to light yellow-brown	
					-18.0	56.0		SILTSTONE, dark grey	
					-20.0	58.0		NO CORE	
					-22.0	60.0		SILTSTONE, dark grey	
								SANDSTONE, fine to medium grained, light grey	
								SILTSTONE, dark grey	
								SANDSTONE, medium grained, light yellow-brown	

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 50.5 mBGL
Screen Top: 47.5 mBGL
Screen/Sensor Base: 50.5 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 10/12/2014



Final

REMARKS:
GROUNDWATER MONITORING NOTES:

AECOM Engineering Log — Final

PIEZOMETER No. BH093

Sheet: 3 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Lorraine Ave, Bardwell Valley

Project No: 60327128
Logged by: HB/ST/AC **Checked by:** PC
Start Date: 1/12/2014 **End Date:** 3/12/2014

Driller: Terratest Pty Ltd
Drill Rig: Comacchio Geo 305
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 327657.0 m **RL:** 36.39 m
Northing: 6243183.2 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Asphalt

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 50.5 mBGL
Screen Top: 47.5 mBGL
Screen/Sensor Base: 50.5 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 10/12/2014

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
HQ3		100	100		24.0			SANDSTONE, fine to medium grained, light grey to grey	
	Run 25	100	100		62.0			SANDSTONE, medium grained, light grey *continued*	
					26.0				
					64.0			SANDSTONE, fine grained, brown-grey	
	Run 26	100	97		28.0			SANDSTONE, coarse grained, light yellow-brown	
					66.0				
	Run 27	100	100		30.0			SANDSTONE, fine to medium grained, brown-grey	
					68.0				
					32.0			SANDSTONE, medium to coarse grained, light yellow-brown	
					70.0			SANDSTONE, medium grained, brown-grey	
	Run 28	100	100		34.0			SANDSTONE, medium to coarse grained, light yellow-brown	
	Run 29	100	71		72.0				
					36.0				
	Run 30	100	100		74.0				
					38.0				
					76.0				
	Run 31	100	97		40.0			SANDSTONE, coarse grained, brown-grey	
					78.0				
					42.0				
	Run 32	100	100		80.0			SANDSTONE, medium grained, grey	
					44.0				
					82.0			*BH093 Terminated at 80.90 m.*	
					46.0				
					84.0				
					48.0				
					86.0				
					50.0				
					88.0				
					52.0				
					90.0				

Defect Spacing (mm): 20, 60, 200, 600, 2000

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH094

Sheet: 1 of 3

Client:	WDA	**Project No:**	60327128
Project:	WestConnex Stage 2: M5	**Logged by:**	AC
Location:	7 Athelstane Ave, Arncliffe	**Start Date:**	9/12/2014
Checked by:	PC	**End Date:**	11/12/2014

Driller:	Terratest Pty Ltd	**Hole Diameter:**	Varies	**Easting:**	327867.3 m
Drill Rig:	Comacchio Geo305	**Inclination:**	-90°	**Northing:**	6243174.3 m
		Bearing:	N/A	**Hor. Proj/Dat:**	MGA94/GDA94
				RL:	31.17 m
				Ver. Datum:	m AHD
				Surface:	Grass

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
HQ3	Run 1	100	49		30.0	2.0		SAND, fine to medium grained, dark brown	
								SAND, fine to medium grained, dark brown	
					28.0	4.0		SAND, fine to coarse grained, light yellow-brown	
	Run 2	100	61					SANDSTONE, medium to coarse grained, light grey	
					26.0	6.0		SANDSTONE, coarse grained, light grey, mottled orange-brown and red-brown	
	Run 3	100	85		24.0	8.0		SANDSTONE, medium to coarse grained, light grey	
					22.0	10.0		SANDSTONE, medium grained, light grey	
	Run 4	100	84					SANDSTONE, medium grained, light grey	
					20.0	12.0		SANDSTONE, coarse grained, red-brown mottled light grey	
	Run 5	95	62		18.0	14.0		NO CORE	
								SILTSTONE	
					16.0	16.0		SANDSTONE, medium to coarse grained, light brown-grey	
	Run 6	100	68		14.0	18.0		SANDSTONE, coarse grained, brown-grey	
	Run 7	100	91		12.0	20.0		SANDSTONE, fine grained, brown-grey	
	Run 8	90	66		10.0	22.0		SANDSTONE, medium grained, light brown-grey	
					8.0	24.0		NO CORE	
	Run 9	100	87		6.0	26.0		SANDSTONE, medium grained, brown-grey	
								SANDSTONE, medium to coarse grained, grey	
	Run 10	100	95		4.0	28.0		SANDSTONE, medium to coarse grained, brown-grey	
					2.0	30.0		SANDSTONE, medium to coarse grained, light yellow-brown	

Piezometer Details

Construction details:	PVC slotted screen, 2 mm sand
Pipe diameter:	50 mm
Pipe Top:	0.0 mBGL
Pipe Base:	57.0 mBGL
Screen Top:	54.0 mBGL
Screen/Sensor Base:	57.0 mBGL
Instrument Details:	NA
Installation Date:	-
Development Date:	23/01/2015

Defect Spacing (mm): 20, 60, 200, 600, 2000

Depth 0.0 to 0.2 m — Lockable gatic cover

Depth 0.2 to 1.0 m — Bentonite plug

Depth 1.0 to 50.6 m — Cement grout

Final

REMARKS:

GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

Engineering Log — Final — PIEZOMETER No. BH094

Sheet: 2 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: 7 Athelstane Ave, Arncliffe
Project No: 60327128
Logged by: AC
Checked by: PC
Start Date: 9/12/2014
End Date: 11/12/2014

Driller: Terratest Pty Ltd
Drill Rig: Comacchio Geo305
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 327867.3 m
Northing: 6243174.3 m
Hor. Proj/Dat: MGA94/GDA94
RL: 31.17 m
Ver. Datum: m AHD
Surface: Grass

Field Data

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log
HQ3	Run 11	98	48		32.0	0.0	
	Run 12	100	100		34.0	2.0	
	Run 13	100	78		36.0	4.0	
	Run 14	100	99		38.0	6.0	
	Run 15	100	95		40.0	8.0	
	Run 16	100	92		42.0	10.0	
	Run 17	100	99		44.0	12.0	
	Run 18	100	79		46.0	14.0	
	Run 19	100	74		48.0	16.0	
	Run 20	100	99		50.0	18.0	
					52.0	20.0	
					54.0	22.0	
					56.0	24.0	
					58.0	26.0	
					60.0	28.0	

Rock Description

Summary Geology (refer to geological log for full descriptions)

- SANDSTONE, coarse grained, light grey
- SANDSTONE, medium to coarse grained, light grey mottled red-brown
- SANDSTONE, medium grained, light grey
- SANDSTONE, medium grained, light yellow-brown *continued*
- NO CORE
- SANDSTONE, medium grained, light yellow-brown
- SANDSTONE, medium grained, brown-grey
- SANDSTONE, medium to coarse grained, light yellow-brown
- SANDSTONE, coarse grained, light grey
- SANDSTONE, medium to coarse grained, light brown-grey
- SANDSTONE, medium grained, grey
- SANDSTONE, coarse grained, brown-grey
- SANDSTONE, medium to coarse grained, light brown-grey
- SANDSTONE, fine to medium grained, grey
- SANDSTONE, medium to coarse grained, light brown-grey
- SANDSTONE, fine to medium grained, brown-grey
- SANDSTONE, medium to coarse grained, light brown-grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, medium grained, light brown-grey
- SANDSTONE, fine to medium grained, brown-grey

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 57.0 mBGL
Screen Top: 54.0 mBGL
Screen/Sensor Base: 57.0 mBGL
Instrument Details: NA
Installation Date: -
Development Date: 23/01/2015

- Depth 1.0 to 50.6 m — Cement grout
- Depth 50.6 to 51.8 m — Bentonite plug
- Depth 51.8 to 54.0 m — 2 mm sand backfill
- Depth 54.0 to 57.0 m — Slotted screen, 2 mm sand
- Depth 57.0 to 58.1 m — 2 mm sand backfill
- Depth 58.1 to 59.6 m — Bentonite plug
- Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM **Engineering Log** **Final** **PIEZOMETER No. BH094**

Sheet: 3 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: 7 Athelstane Ave, Arncliffe
Project No: 60327128
Logged by: AC **Checked by:** PC
Start Date: 9/12/2014 **End Date:** 11/12/2014

Driller: Terratest Pty Ltd
Drill Rig: Comacchio Geo305
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 327867.3 m **RL:** 31.17 m
Northing: 6243174.3 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
HQ3	Run 21	100	87		30.0	62.0		SANDSTONE, fine grained, brown-grey *continued*	
					32.0	64.0		SANDSTONE, medium to coarse grained, light brown-grey	
	Run 22	100	97		34.0	66.0			
	Run 23	100	83		36.0	68.0			
					38.0	70.0			
	Run 24	100	79		40.0	72.0		SANDSTONE, medium to coarse grained, light yellow-brown	
								SANDSTONE, medium grained, light yellow-brown	
	Run 25	100	97		42.0	74.0		SANDSTONE, fine grained, grey	
					44.0	76.0		SANDSTONE, coarse grained, light yellow-brown	
					46.0	78.0		SANDSTONE, medium to coarse grained, light brown-grey	
					48.0	80.0		*BH094 Terminated at 75.43 m.*	
					50.0	82.0			
					52.0	84.0			
					54.0	86.0			
					56.0	88.0			
					58.0	90.0			

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 57.0 mBGL
Screen Top: 54.0 mBGL
Screen/Sensor Base: 57.0 mBGL
Instrument Details: NA
Installation Date: -
Development Date: 23/01/2015

Depth 59.6 to 75.4 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH103

Sheet: 1 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Samuel St., Tempe

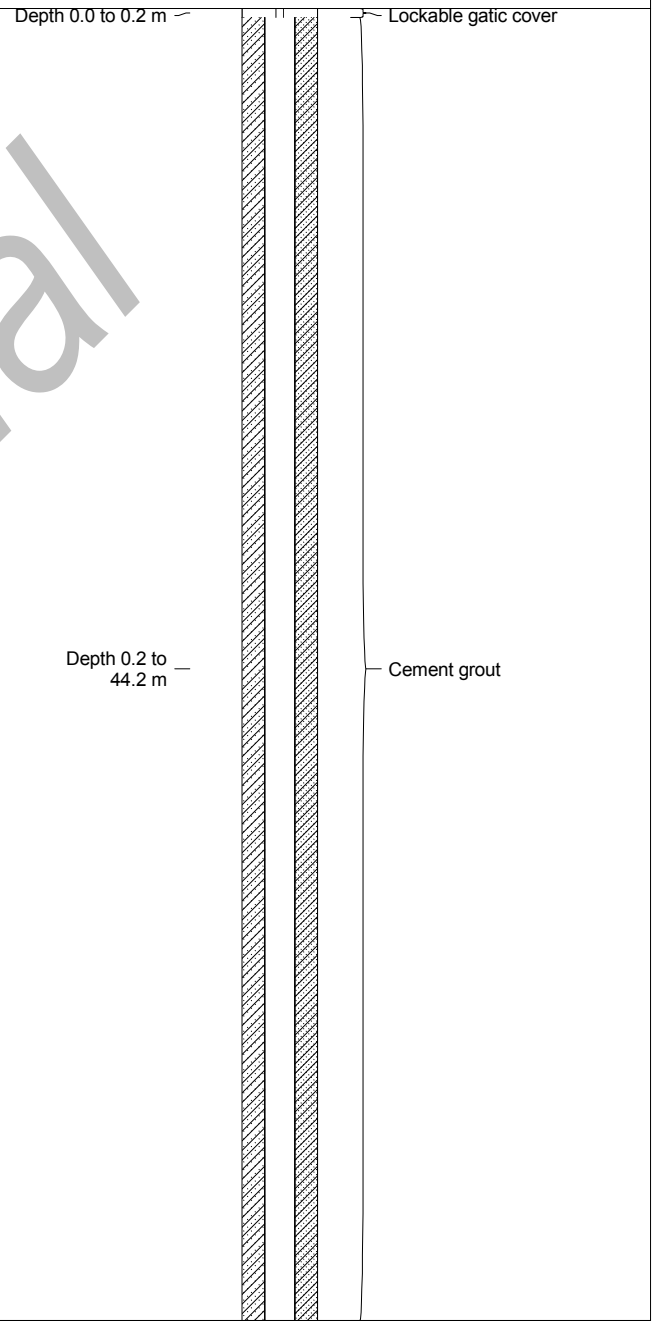
Project No: 60327128
Logged by: DW/HB **Checked by:** PC
Start Date: 26/11/2014 **End Date:** 28/11/2014

Driller: Numac Drilling Services Pty. Ltd.
Drill Rig: Boart Longyear DB-520
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 330430.7 m **RL:** 11.10 m
Northing: 6245201.0 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Asphalt

Field Data: Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Rock Description: Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
					10.0	0.0		ASPHALT	
						0.2		Clayey SAND, fine to coarse grained	
	Run 1					0.4		Clayey SAND, fine to medium grained	
	Run 2	100			8.0	2.0		CLAY, grey mottled red-brown	
	Run 3	100				4.0		Sandy CLAY	
	Run 4	93	55		6.0	6.0		CLAY, red-brown	
	Run 5	100	48		4.0	8.0		SILTSTONE, light grey	
	Run 6	100	38		2.0	10.0		LAMINITE, grey	
	Run 7	100	36		0.0	12.0		NO CORE	
	Run 8	100	59		-2.0	14.0		LAMINITE	
	Run 9	100	58		-4.0	16.0		SILTSTONE, (90%), dark grey	
	Run 10	100	98		-6.0	18.0		SILTSTONE, dark grey	
	Run 11	100	100		-8.0	20.0		SANDSTONE, fine grained, grey-brown	
	Run 12	97	94		-10.0	22.0		SANDSTONE, fine grained, light grey	
					-12.0	24.0		SANDSTONE, fine grained, dark grey	
					-14.0	26.0		SANDSTONE, fine to medium grained, light grey	
					-16.0	28.0		SANDSTONE, coarse grained, light grey	
					-18.0	30.0		SANDSTONE, medium to coarse grained, light grey	

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 50.8 mBGL
Screen Top: 47.8 mBGL
Screen/Sensor Base: 50.8 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 10/12/2014



Final

REMARKS:
GROUNDWATER MONITORING NOTES:

AECOM **Engineering Log** **Final** **PIEZOMETER No. BH103**

Sheet: 2 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Samuel St., Tempe
Project No: 60327128
Logged by: DW/HB **Checked by:** PC
Start Date: 26/11/2014 **End Date:** 28/11/2014

Driller: Numac Drilling Services Pty. Ltd.
Drill Rig: Boart Longyear DB-520
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 330430.7 m **RL:** 11.10 m
Northing: 6245201.0 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Asphalt

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
	Run 13	100	100		20.0	32.0		NO CORE	
								SANDSTONE, medium to coarse grained, light grey *continued*	
	Run 14	100	96		22.0	34.0			
	Run 15	100	100		24.0	36.0			
					26.0	38.0			
	Run 16	100	99		28.0	40.0			
	Run 17	100	69		30.0	42.0			
					32.0	44.0		SHALE BRECCIA	
	Run 18	100	97		34.0	46.0		SANDSTONE, coarse grained, light grey	
								SANDSTONE, coarse grained, light grey	
	Run 19	100	96		36.0	48.0		SANDSTONE, medium to coarse grained, light grey	
	Run 20	100	97		38.0	50.0			
					40.0	52.0			
	Run 21	100	95		42.0	54.0			
					44.0	56.0			
	Run 22	100	91		46.0	58.0			
					48.0	60.0			

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 50.8 mBGL
Screen Top: 47.8 mBGL
Screen/Sensor Base: 50.8 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 10/12/2014

Depth 0.2 to 44.2 m — Cement grout
Depth 44.2 to 46.0 m — Bentonite plug
Depth 46.0 to 47.8 m — 2 mm sand backfill
Depth 47.8 to 50.8 m — Slotted screen, 2 mm sand
Depth 50.8 to 52.0 m — 2 mm sand backfill
Depth 52.0 to 53.0 m — Bentonite plug
Depth 53.0 to 60.3 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM **Engineering Log** **Final** **PIEZOMETER No. BH103**

Sheet: 3 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Samuel St., Tempe
Project No: 60327128
Logged by: DW/HB **Checked by:** PC
Start Date: 26/11/2014 **End Date:** 28/11/2014

Driller: Numac Drilling Services Pty. Ltd.
Drill Rig: Boart Longyear DB-520
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 330430.7 m **RL:** 11.10 m
Northing: 6245201.0 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Asphalt

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
					50.0	62.0		SANDSTONE, fine to medium grained, light grey	
					52.0	64.0		SANDSTONE, medium to coarse grained, yellow-brown *continued*	
					54.0	66.0		*BH103 Terminated at 60.30 m.*	
					56.0	68.0			
					58.0	70.0			
					60.0	72.0			
					62.0	74.0			
					64.0	76.0			
					66.0	78.0			
					68.0	80.0			
					70.0	82.0			
					72.0	84.0			
					74.0	86.0			
					76.0	88.0			
					78.0	90.0			

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 50.8 mBGL
Screen Top: 47.8 mBGL
Screen/Sensor Base: 50.8 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 10/12/2014

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH109

Sheet: 1 of 2

Client: WDA
Project: WestConnex Stage 2: M5
Location: Southern Cross Hotel Car Park, Sydenham

Project No: 60327128
Logged by: SBS/PH **Checked by:** PC
Start Date: 10/11/2014 **End Date:** 13/11/2014

Driller: Terratest Pty. Ltd.
Drill Rig: Hydrapower Scout
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 331220.5 m **RL:** 6.91 m
Northing: 6245632.2 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Concrete

Field Data

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log
HQ3	Run 1	100	63		6.0	2.0	
					4.0	4.0	
	Run 2	99	88		2.0	6.0	
					0.0	8.0	
	Run 3	100	89		-2.0	10.0	
	Run 4	100	0		-4.0	12.0	
	Run 5	99	82		-6.0	14.0	
	Run 6	100	95		-8.0	16.0	
					-10.0	18.0	
	Run 7	100	91		-12.0	20.0	
	Run 8	100	97		-14.0	22.0	
					-16.0	24.0	
	Run 9	100	100		-18.0	26.0	
					-20.0	28.0	
	Run 10	100	100		-22.0	30.0	

Rock Description

Summary Geology (refer to geological log for full descriptions)

Defect Spacing (mm): 20, 60, 200, 600, 2000

- CONCRETE
- SILT
- CLAY, dark brown mottled dark grey and light grey
- CONCRETE
- Clayey SILT, yellow-brown
- Silty CLAY, light grey mottled red
- SILTSTONE (85%), dark grey
- SILTSTONE, dark grey
- LAMINITE

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 36.0 mBGL
Screen Top: 33.0 mBGL
Screen/Sensor Base: 36.0 mBGL
Instrument Details: Level Troll 400 non-vented
Installation Date: 18/12/2014
Development Date: 11/12/2014

- Depth 0.0 to 0.2 m — Lockable gatic cover
- Depth 0.2 to 1.0 m — Bentonite plug
- Depth 1.0 to 29.6 m — Cement grout
- Bentonite plug

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH109

Sheet: 2 of 2

Client:	WDA	**Project No:**	60327128
Project:	WestConnex Stage 2: M5	**Logged by:**	SBS/PH — **Checked by:** PC
Location:	Southern Cross Hotel Car Park, Sydenham	**Start Date:**	10/11/2014 — **End Date:** 13/11/2014

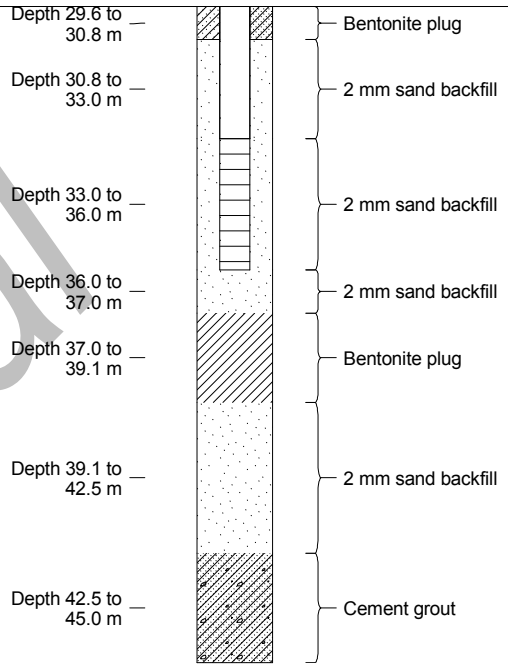
Driller:	Terratest Pty. Ltd.	**Hole Diameter:**	Varies	**Easting:**	331220.5 m — **RL:** 6.91 m
Drill Rig:	Hydrapower Scout	**Inclination:**	-90°	**Northing:**	6245632.2 m — **Ver. Datum:** m AHD
		Bearing:	N/A	**Hor. Proj/Dat:**	MGA94/GDA94 — **Surface:** Concrete

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
HQ3	Run 11	100	100		24.0 – 32.0			SILTSTONE, dark grey	
	Run 12	100	39		26.0 – 34.0				
					28.0 – 36.0			SANDSTONE, fine grained, dark brown	
	Run 13	100	100		30.0 – 38.0			INTERBEDDED SILTSTONE/SANDSTONE	
	Run 14	100	73		32.0 – 40.0			SANDSTONE, fine grained, light grey	
					34.0 – 42.0			SILTSTONE, dark grey	
	Run 15	100	70		36.0 – 44.0			SANDSTONE, fine grained, light grey	
					38.0			LAMINITE	
					46.0			*BH109 Terminated at 45.00 m.*	
					40.0 – 48.0				
					42.0 – 50.0				
					44.0 – 52.0				
					46.0 – 54.0				
					48.0 – 56.0				
					50.0 – 58.0				
					52.0 – 60.0				

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details:	PVC slotted screen, 2 mm sand
Pipe diameter:	50 mm
Pipe Top:	0.0 mBGL
Pipe Base:	36.0 mBGL
Screen Top:	33.0 mBGL
Screen/Sensor Base:	36.0 mBGL
Instrument Details:	Level Troll 400 non-vented
Installation Date:	18/12/2014
Development Date:	11/12/2014



Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH115

Sheet: 1 of 2

Client:	WDA	**Project No:**	60327128
Project:	WestConnex Stage 2: M5	**Logged by:** DS	**Checked by:** PC
Location:	Sydney Park, Alexandria	**Start Date:** 18/11/2014	**End Date:** 20/11/2014

Driller:	Terratest Pty. Ltd.	**Hole Diameter:**	Varies	**Easting:** 331875.1 m	**RL:** 20.33 m
Drill Rig:	Boart Longyear DB-8	**Inclination:**	-90°	**Northing:** 6246376.3 m	**Ver. Datum:** m AHD
		Bearing:	N/A	**Hor. Proj/Dat:** MGA94/GDA94	**Surface:** Grass

Field Data | **Rock Description** | **Piezometer Details**

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
					20.0	0.0		SAND, fine to medium grained, dark brown	
					18.0	2.0		Clayey SAND, fine grained, dark brown	
					16.0	4.0		Gravelly CLAY	
					14.0	6.0		Gravelly SAND, fine to coarse grained	
					12.0	8.0		GRAVEL, fine to coarse grained	
					10.0	10.0		Gravelly SAND, medium to coarse grained	
					8.0	12.0			
					6.0	14.0			
					4.0	16.0			
					2.0	18.0			
					0.0	20.0			
					-2.0	22.0		Gravelly CLAY, grey and red	
HQ3	Run 1	100	97		-2.0	22.0		SILTSTONE	
	Run 2	100	96		-4.0	24.0		SILTSTONE, (80%), dark grey	
	Run 3	100	99		-6.0	26.0			
					-8.0	28.0			
					-10.0	30.0			

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 32.5 mBGL
Screen Top: 29.5 mBGL
Screen/Sensor Base: 32.5 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 10/12/2014

- Depth 0.0 to 0.2 m — Lockable Gatic cover
- Depth 0.2 to 1.0 m — Bentonite plug
- Depth 1.0 to 27.8 m — Cement grout
- Depth 27.8 to 28.8 m — Bentonite plug
- Depth 28.8 to 29.5 m — 2 mm sand backfill
- Slotted screen, 2 mm sand

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH115

Sheet: 2 of 2

Client: WDA
Project: WestConnex Stage 2: M5
Location: Sydney Park, Alexandria

Project No: 60327128
Logged by: DS **Checked by:** PC
Start Date: 18/11/2014 **End Date:** 20/11/2014

Driller: Terratest Pty. Ltd.
Drill Rig: Boart Longyear DB-8

Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 331875.1 m **RL:** 20.33 m
Northing: 6246376.3 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Field Data: Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Rock Description: Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
HQ3	Run 4	100	74		10.0 / 32.0 / 12.0			SILTSTONE, (80%), dark grey *continued*	
								BH115 Terminated at 32.68 m.	

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 32.5 mBGL
Screen Top: 29.5 mBGL
Screen/Sensor Base: 32.5 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 10/12/2014

Depth 29.5 to 32.5 m — Slotted screen, 2 mm sand
Depth 32.5 to 32.7 m — 2 mm sand backfill

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH120

Sheet: 1 of 2

Client:	WDA	**Project No:**	60327128
Project:	WestConnex Stage 2: M5	**Logged by:**	LD — **Checked by:** PC
Location:	Edith St., St. Peters	**Start Date:**	20/11/2014 — **End Date:** 25/11/2014

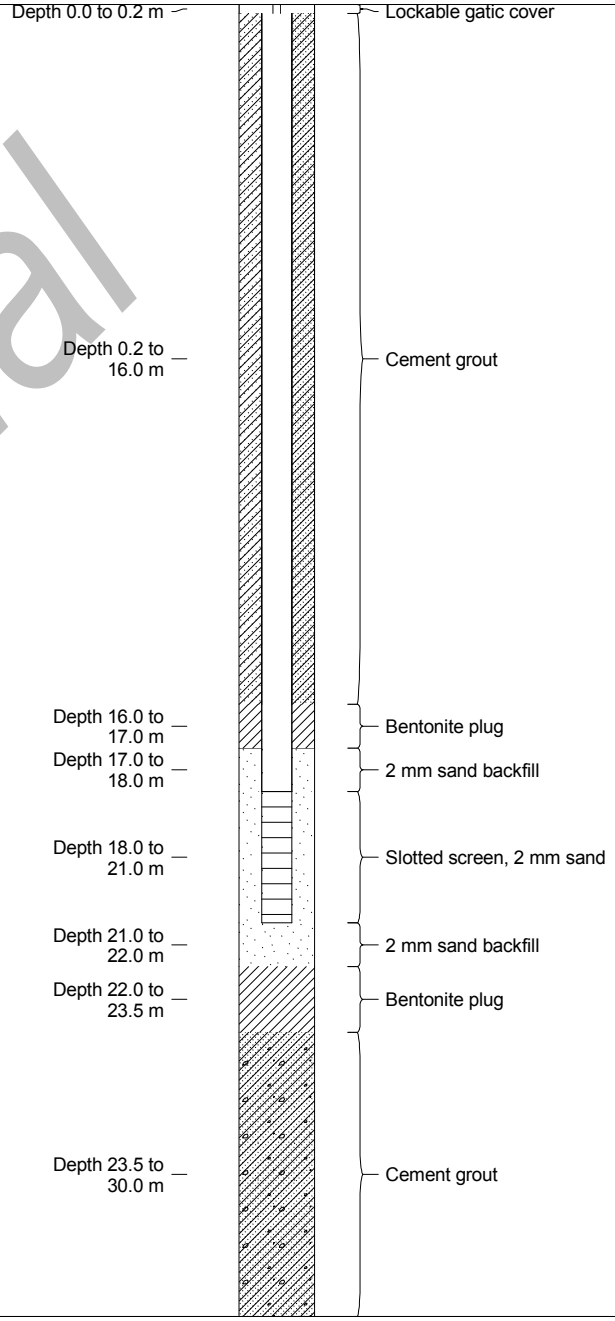
Driller:	Terratest Pty. Ltd.	**Hole Diameter:**	Varies	**Easting:** 331178.2 m	**RL:** 15.28 m
Drill Rig:	Boart Longyear DB-8	**Inclination:**	-90°	**Northing:** 6245983.1 m	**Ver. Datum:** m AHD
		Bearing:	N/A	**Hor. Proj/Dat:** MGA94/GDA94	**Surface:** Asphalt

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
					14.0	2.0		ASPHALT	
								COBBLES	
	Run 1	100			12.0	4.0		Silty CLAY, brown	
	Run 2	75						SILTSTONE, light grey	
					10.0	6.0		SILTSTONE, light grey and red-brown	
								NO CORE	
	Run 3	97	69		8.0	8.0		SILTSTONE, dark grey	
	Run 4	100	84		6.0	10.0		SILTSTONE, (95%), dark grey	
	Run 5	100	38		4.0	12.0			
	Run 6	97	89		2.0	14.0			
					0.0	16.0			
	Run 7	100	63		-2.0	18.0		NO CORE	
					-4.0	20.0		SILTSTONE, (95%), dark grey	
	Run 8	100	93		-6.0	22.0		LAMINITE	
	Run 9	100	95		-8.0	24.0			
					-10.0	26.0			
	Run 10	100	100		-12.0	28.0			
					-14.0	30.0			

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details:	PVC slotted screen, 2 mm sand
Pipe diameter:	50 mm
Pipe Top:	0.0 mBGL
Pipe Base:	21.0 mBGL
Screen Top:	18.0 mBGL
Screen/Sensor Base:	21.0 mBGL
Instrument Details:	Level Troll 400
Installation Date:	16/12/2014
Development Date:	10/12/2014



Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM **Engineering Log** **Final** **PIEZOMETER No. BH120**

Sheet: 2 of 2

Client: WDA **Project No:** 60327128

Project: WestConnex Stage 2: M5 **Logged by:** LD **Checked by:** PC

Location: Edith St., St. Peters **Start Date:** 20/11/2014 **End Date:** 25/11/2014

Driller: Terratest Pty. Ltd. **Hole Diameter:** Varies **Easting:** 331178.2 m **RL:** 15.28 m

Drill Rig: Boart Longyear DB-8 **Inclination:** -90° **Northing:** 6245983.1 m **Ver. Datum:** m AHD

Bearing: N/A **Hor. Proj/Dat:** MGA94/GDA94 **Surface:** Asphalt

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
					-16.0	32.0		*BH120 Terminated at 30.29 m.*	
					-18.0	34.0			
					-20.0	36.0			
					-22.0	38.0			
					-24.0	40.0			
					-26.0	42.0			
					-28.0	44.0			
					-30.0	46.0			
					-32.0	48.0			
					-34.0	50.0			
					-36.0	52.0			
					-38.0	54.0			
					-40.0	56.0			
					-42.0	58.0			
					-44.0	60.0			

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 21.0 mBGL
Screen Top: 18.0 mBGL
Screen/Sensor Base: 21.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 10/12/2014

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH122

Sheet: 1 of 1

Client:	WDA	**Project No:**	60327128
Project:	WestConnex Stage 2: M5	**Logged by:**	SBS — **Checked by:** PC
Location:	Sydney Park, Alexandria	**Start Date:**	17/11/2014 — **End Date:** 18/11/2014

Driller:	Terratest Pty. Ltd.	**Hole Diameter:**	Varies	**Easting:** 332029.6 m	**RL:** 5.72 m
Drill Rig:	Commachio-Geo 305	**Inclination:**	-90°	**Northing:** 6245872.9 m	**Ver. Datum:** m AHD
		Bearing:	N/A	**Hor. Proj/Dat:** MGA94/GDA94	**Surface:** Concrete

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 17.9 mBGL
Screen Top: 14.9 mBGL
Screen/Sensor Base: 17.9 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/12/2014
Development Date: 10/12/2014

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)	Piezometer Details
					4.0	2.0		CONCRETE		Depth 0.0 to 0.2 m — Lockable gatic cover
										Depth 0.2 to 2.0 m — Bentonite plug
					2.0	4.0		Sandy GRAVEL and COBBLES, fine to coarse grained, brown-grey gravel		
								Clayey SILT, grey-brown mottled red-brown		
					0.0	6.0		ASH		
								Clayey SILT, grey-brown mottled red-brown		Depth 2.0 to 8.8 m — Cement grout
					-2.0	8.0		SAND, fine grained, dark grey		
								SAND, fine grained, grey		
					-4.0	10.0		Clayey SAND, fine grained		
								Silty CLAY, dark grey		Depth 8.8 to 14.1 m — Bentonite plug
					-6.0	12.0				
					-8.0	14.0		Clayey SILT		Depth 14.1 to 14.9 m — 2 mm sand backfill
HQ3	Run 1	100	69							
	Run 2	100	88					LAMINITE, dark grey		
	Run 3	100	100		-10.0	16.0				Depth 14.9 to 17.9 m — Slotted screen, 2 mm sand
					-12.0	18.0				Depth 17.9 to 19.0 m — 2 mm sand backfill
	Run 4	100	100							Depth 19.0 to 19.9 m — Bentonite plug
					-14.0	20.0		SILTSTONE (80-95%), dark grey		
	Run 5	100	100		-16.0	22.0				Depth 19.9 to 28.1 m — 2 mm sand backfill
					-18.0	24.0				
	Run 6	100	97		-20.0	26.0				
	Run 7	100	98		-22.0	28.0				Depth 28.1 to 29.9 m — Bentonite plug
					-24.0	30.0				

BH122 Terminated at 29.90 m.

REMARKS:
GROUNDWATER MONITORING NOTES:

Final

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH143

Sheet: 1 of 4

Client: WDA
Project: WestConnex Stage 2: M5
Location: Silver Jubilee Park, Bardwell Valley

Project No: 60327128
Logged by: JCB **Checked by:** PC
Start Date: 27/01/2015 **End Date:** 4/02/2015

Driller: Macquarie Drilling Pty. Ltd. **Hole Diameter:** Varies
Drill Rig: Hydrapower Scout **Inclination:** -90° **Bearing:** N/A

Easting: 327180.8 m **RL:** 40.19 m
Northing: 6242912.2 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
HQ3	Run 1	97	97	3/02/2015	40.0	0.0		Silty SAND, fine to medium grained, brown	
	Run 2	100	92		38.0	2.0		Silty SAND, fine to medium grained, brown	
								NO CORE	
	Run 3	100	92		36.0	4.0		SANDSTONE, medium grained, light grey	
	Run 4	85	63	2/02/2015	34.0	6.0			
					32.0	8.0		SANDSTONE, fine to medium grained, light grey	
	Run 5	100	89		30.0	10.0		NO CORE	
								SANDSTONE, fine to medium grained, light grey	
	Run 6	100	90		28.0	12.0		SANDSTONE, medium grained, light brown-grey	
					26.0	14.0		SANDSTONE, fine to medium grained, light grey	
	Run 7	100	90		24.0	16.0		SANDSTONE, medium to coarse grained, light grey	
	Run 8	100	98		22.0	18.0		SANDSTONE, medium grained, light grey	
					20.0	20.0		SANDSTONE, fine grained, light grey	
	Run 9	100	100		18.0	22.0		SANDSTONE, medium grained, light grey	
	Run 10	100	100		16.0	24.0			
					14.0	26.0			
	Run 11	100	95		12.0	28.0		SANDSTONE, fine to medium grained, light grey	
					10.0	30.0		SANDSTONE, coarse grained, light	

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 85.0 mBGL
Screen Top: 82.0 mBGL
Screen/Sensor Base: 85.0 mBGL
Instrument Details: -
Installation Date: -
Development Date: 20/03/2015

Depth 0.0 to 0.2 m — Lockable Gatic cover
Depth 0.2 to 79.0 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM **Engineering Log** **Final** **PIEZOMETER No. BH143**

Sheet: 2 of 4

Client: WDA **Project No:** 60327128

Project: WestConnex Stage 2: M5 **Logged by:** JCB **Checked by:** PC

Location: Silver Jubilee Park, Bardwell Valley **Start Date:** 27/01/2015 **End Date:** 4/02/2015

Driller: Macquarie Drilling Pty. Ltd. **Hole Diameter:** Varies **Easting:** 327180.8 m **RL:** 40.19 m

Drill Rig: Hydrapower Scout **Inclination:** -90° **Northing:** 6242912.2 m **Ver. Datum:** m AHD

Bearing: N/A **Hor. Proj/Dat:** MGA94/GDA94 **Surface:** Grass

Field Data | **Rock Description** | **Piezometer Details**

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
HQ3	Run 12	100	97		10.0 / 8.0	32.0		brown-grey SANDSTONE, fine to medium grained, light grey	20 60 200 600 2000
	Run 13	100	83		6.0	34.0		SANDSTONE, medium grained, light grey *continued* SILTSTONE, dark grey	
	Run 14	100	100		4.0	36.0		SANDSTONE, medium to coarse grained, light grey	
	Run 15	100	100		2.0 / 0.0	38.0 / 40.0			
	Run 16	100	98		-2.0	42.0		SANDSTONE, fine to medium grained, light grey	
	Run 17	100	99		-4.0	44.0		SANDSTONE, medium grained, light grey SANDSTONE, medium to coarse grained, light grey	
	Run 18	100	100		-6.0 / -8.0	46.0 / 48.0		SANDSTONE, medium grained, light grey	
	Run 19	100	100		-10.0	50.0		SANDSTONE, coarse grained, light grey	
	Run 20	100	100		-12.0	52.0		SANDSTONE, fine to medium grained, light grey	
	Run 21	100	100		-14.0	54.0			
	Run 22	100	95		-16.0	56.0			
	Run 23	100	85		-18.0	58.0			
						60.0		SANDSTONE, medium grained, light brown-grey	

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 85.0 mBGL
Screen Top: 82.0 mBGL
Screen/Sensor Base: 85.0 mBGL
Instrument Details: -
Installation Date: -
Development Date: 20/03/2015

Depth 0.2 to 79.0 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH143

Sheet: 3 of 4

Client: WDA
Project: WestConnex Stage 2: M5
Location: Silver Jubilee Park, Bardwell Valley

Project No: 60327128
Logged by: JCB **Checked by:** PC
Start Date: 27/01/2015 **End Date:** 4/02/2015

Driller: Macquarie Drilling Pty. Ltd. **Hole Diameter:** Varies
Drill Rig: Hydrapower Scout **Inclination:** -90° **Bearing:** N/A

Easting: 327180.8 m **RL:** 40.19 m
Northing: 6242912.2 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
HQ3	Run 24	100	100		62.0	20.0		SANDSTONE, fine to medium grained, light brown-grey *continued*	
	Run 25	100	100		64.0	22.0		SANDSTONE, medium grained, light brown-grey	
	Run 26	100	96		66.0	24.0		SANDSTONE, fine to medium grained, light grey to light brown-grey	
	Run 27	100	100		68.0	26.0		SANDSTONE, medium grained, light grey	
	Run 28	100	100		70.0	28.0		SANDSTONE, medium grained, light grey	
	Run 29	100	100		72.0	30.0		SANDSTONE, medium grained, light grey	
	Run 30	100	100		74.0	32.0		SANDSTONE, medium grained	
	Run 31	100	100		76.0	34.0			
	Run 32	100	92		78.0	36.0			
	Run 33	94	74		80.0	38.0		SANDSTONE, medium to coarse grained, light grey	
	Run 34	100	70		82.0	40.0		SANDSTONE, fine grained, grey	
	Run 35	100	100		84.0	42.0		SANDSTONE, fine to medium grained, light brown-grey	
					86.0	44.0		NO CORE	
					88.0	46.0		SANDSTONE, fine to medium grained, light brown-grey	
					90.0	48.0		SANDSTONE, medium grained, light brown-grey	
								SANDSTONE, medium grained, light grey	

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 85.0 mBGL
Screen Top: 82.0 mBGL
Screen/Sensor Base: 85.0 mBGL
Instrument Details: -
Installation Date: -
Development Date: 20/03/2015

Depth 0.2 to 79.0 m — Cement grout
Depth 79.0 to 80.0 m — Bentonite plug
Depth 80.0 to 82.0 m — 2 mm sand backfill
Depth 82.0 to 85.0 m — Slotted screen, 2 mm sand
Depth 85.0 to 85.8 m — 2 mm sand backfill
Depth 85.8 to 86.9 m — Bentonite plug
Depth 86.9 to 93.2 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log

Final

PIEZOMETER No. BH143

Sheet: 4 of 4

Client: WDA
Project: WestConnex Stage 2: M5
Location: Silver Jubilee Park, Bardwell Valley

Project No: 60327128
Logged by: JCB **Checked by:** PC
Start Date: 27/01/2015 **End Date:** 4/02/2015

Driller: Macquarie Drilling Pty. Ltd. **Hole Diameter:** Varies
Drill Rig: Hydrapower Scout **Inclination:** -90° **Bearing:** N/A

Easting: 327180.8 m **RL:** 40.19 m
Northing: 6242912.2 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
HQ3	Run 36	100	96		50.0	92.0		SANDSTONE, medium grained, light grey *continued*	
					52.0			SANDSTONE, medium grained, brown	
					94.0	54.0		SANDSTONE, fine to medium grained, light grey	
								BH143 Terminated at 93.15 m.	
					96.0	56.0			
					98.0	58.0			
					100.0	60.0			
					102.0	62.0			
					104.0	64.0			
					106.0	66.0			
					108.0	68.0			
					110.0	70.0			
					112.0	72.0			
					114.0	74.0			
					116.0	76.0			
					118.0	78.0			
					120.0				

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 85.0 mBGL
Screen Top: 82.0 mBGL
Screen/Sensor Base: 85.0 mBGL
Instrument Details: -
Installation Date: -
Development Date: 20/03/2015

Depth 86.9 to 93.2 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH152a
Sheet: 1 of 1

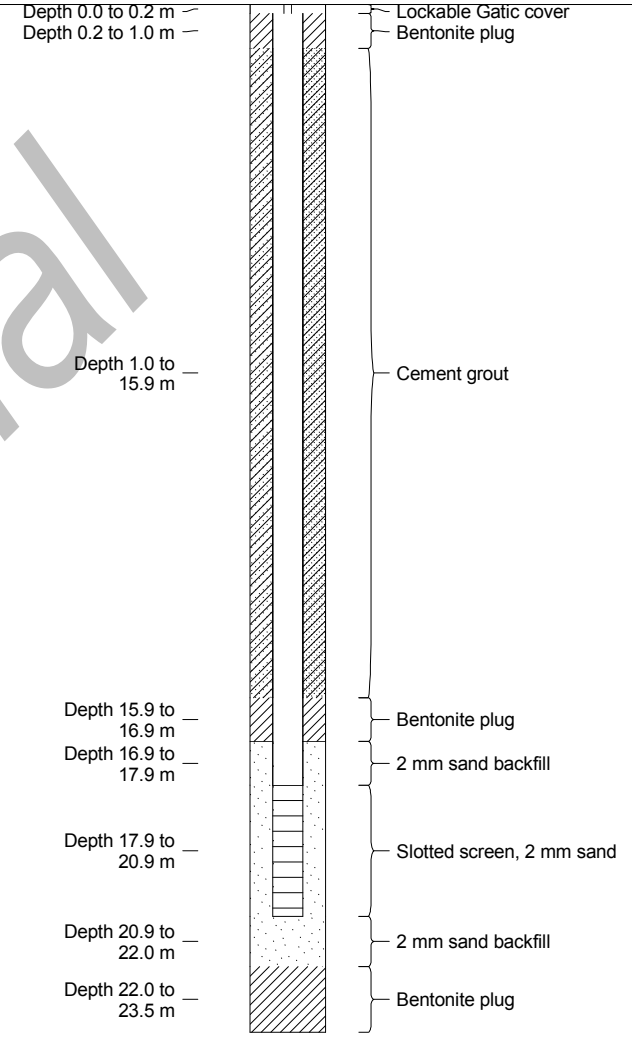
Client: WDA
Project: WestConnex Stage 2: M5
Location: Tempe Station, Tempe
Project No: 60327128
Logged by: AC **Checked by:** EC
Start Date: 6/03/2015 **End Date:** 9/03/2015

Driller: Terratest Pty. Ltd.
Drill Rig: Comacchio Geo 305
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 329588.6 m **RL:** 2.93 m
Northing: 6244818.3 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Gravel

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
RT					2.0	0.0		Sandy GRAVEL, fine to coarse grained, brown	
					0.0	2.0		Clayey GRAVEL	
					-2.0	4.0		GRAVEL & COBBLES, fine to coarse grained	
					-4.0	6.0		Sandy GRAVEL, fine to medium grained, light grey	
					-6.0	8.0		Clayey SAND, fine to medium grained	
					-8.0	10.0			
					-10.0	12.0		Sandy CLAY	
					-12.0	14.0			
					-14.0	16.0			
					-16.0	18.0		Clayey SAND, fine to medium grained, red, mottled orange-brown	
					-18.0	20.0		Clayey SAND, fine to medium grained, red, mottled grey	
					-20.0	22.0		Clayey SAND, fine to medium grained, yellow-brown	
					-22.0	24.0		Silty CLAY, brown, mottled grey	
					-24.0	26.0		SANDSTONE, fine grained, light grey	
					-26.0	28.0		*BH152a Terminated at 23.50 m.*	
						30.0			

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 20.9 mBGL
Screen Top: 17.9 mBGL
Screen/Sensor Base: 20.9 mBGL
Instrument Details: Level Troll 400
Installation Date: 20/03/2015
Development Date: 20/03/2015



Final

REMARKS:Lithology inferred from BH152
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH152

Sheet: 1 of 2

Client: WDA
Project: WestConnex Stage 2: M5
Location: Tempe Station, Tempe

Project No: 60327128
Logged by: HB **Checked by:** PC
Start Date: 16/02/2015 **End Date:** 17/03/2015

Driller: Terratest Pty. Ltd.
Drill Rig: Comacchio Geo 305

Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 329588.9 m **RL:** 2.87 m
Northing: 6244819.3 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Gravel

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 51.1 mBGL
Screen Top: 48.1 mBGL
Screen/Sensor Base: 51.1 mBGL
Instrument Details: Level Troll 400
Installation Date: 20/03/2015
Development Date: 20/03/2015

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
					2.0	0.0		Sandy GRAVEL, fine to coarse grained, brown	
					0.0	2.0		Clayey GRAVEL	
					-2.0	4.0		GRAVEL & COBBLES, fine to coarse grained	
					-4.0	6.0		Sandy GRAVEL, fine to medium grained, light grey	
					-6.0	8.0		Clayey SAND, fine to medium grained	
					-8.0	10.0			
					-10.0	12.0		Sandy CLAY	
					-12.0	14.0			
					-14.0	16.0			
					-16.0	18.0		Clayey SAND, fine to medium grained, red, mottled orange-brown	
					-18.0	20.0		Clayey SAND, fine to medium grained, red, mottled grey	
					-20.0	22.0		Clayey SAND, fine to medium grained, yellow-brown	
HQ3	Run 1	100	45		-22.0	24.0		Silty CLAY, brown, mottled grey	
HQ3	Run 2	100	84		-24.0	26.0		SANDSTONE, fine grained, light grey LAMINITE SANDSTONE, fine grained, light grey	
HQ3	Run 3	100	94		-26.0	28.0		SANDSTONE, medium to coarse grained, light grey-brown	
						30.0			

Defect Spacing (mm): 20, 60, 200, 600, 2000

Depth 0.0 to 0.2 m — Lockable Gatic cover
Depth 0.2 to 1.0 m — Bentonite plug
Depth 1.0 to 44.7 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH152

Sheet: 2 of 2

Client: WDA
Project: WestConnex Stage 2: M5
Location: Tempe Station, Tempe

Project No: 60327128
Logged by: HB **Checked by:** PC
Start Date: 16/02/2015 **End Date:** 17/03/2015

Driller: Terratest Pty. Ltd.
Drill Rig: Comacchio Geo 305

Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 329588.9 m **RL:** 2.87 m
Northing: 6244819.3 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Gravel

Field Data / Rock Description / Piezometer Details

Method	Core Run	TCR (%)	RQD (%)	Depth (m)	Reduced Level (m)	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
HQ3	Run 4	100	96	28.0	32.0	SANDSTONE, medium grained, light yellow-brown	
	Run 5	100	95	30.0	34.0	SANDSTONE, medium to coarse grained, light grey	
	Run 6	100	88	32.0	36.0	SANDSTONE, fine to medium grained, light grey	
	Run 7	100	95	34.0	38.0	SANDSTONE, medium to coarse grained, light grey *continued*	
	Run 8	100	99	36.0	40.0	SANDSTONE, medium grained, light grey	
	Run 9	100	97	38.0	42.0	SANDSTONE, medium to coarse grained, light grey	
	Run 10	100	88	40.0	44.0	SANDSTONE, medium grained, light grey	
	Run 11	76	49	42.0	46.0	SANDSTONE, medium grained, light grey	
	Run 12	100	25	44.0	48.0	SILTSTONE, dark grey	
	Run 13	100	88	46.0	50.0	SHALE BRECCIA	
	Run 14	86	86	48.0	52.0	SANDSTONE, medium grained, light grey	
	Run 15	100	93	50.0	54.0	SANDSTONE, fine to medium grained, light grey	
	Run 16	100	97	52.0	56.0	SANDSTONE, medium grained, light grey	
	Run 17	100	100	54.0	58.0	SANDSTONE, medium to coarse grained, light grey	
	Run 18	100	100	56.0	60.0	SANDSTONE, medium to coarse grained, light grey	
	Run 19	100	98			SANDSTONE, fine to medium grained, light grey	
						SHALE BRECCIA	
						SANDSTONE, fine grained, light grey	
						SANDSTONE	

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 51.1 mBGL
Screen Top: 48.1 mBGL
Screen/Sensor Base: 51.1 mBGL
Instrument Details: Level Troll 400
Installation Date: 20/03/2015
Development Date: 20/03/2015

- Depth 1.0 to 44.7 m — Cement grout
- Depth 44.7 to 45.8 m — Bentonite plug
- Depth 45.8 to 48.1 m — 2 mm sand backfill
- Depth 48.1 to 51.1 m — Slotted screen, 2 mm sand
- Depth 51.1 to 51.9 m — 2 mm sand backfill
- Depth 51.9 to 53.4 m — Bentonite plug

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH152

Client: WDA
Project: WestConnex Stage 2: M5
Location: Tempe Station, Tempe

Project No: 60327128
Logged by: HB **Checked by:** PC
Start Date: 16/02/2015 **End Date:** 17/03/2015

Driller: Terratest Pty. Ltd.
Drill Rig: Comacchio Geo 305

Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 329588.9 m **RL:** 2.87 m
Northing: 6244819.3 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Gravel

Field Data								Rock Description		Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000	**Construction details:** PVC slotted screen, 2 mm sand **Pipe diameter:** 50 mm **Pipe Top:** 0.0 mBGL **Pipe Base:** 51.1 mBGL **Screen Top:** 48.1 mBGL **Screen/Sensor Base:** 51.1 mBGL **Instrument Details:** Level Troll 400 **Installation Date:** 20/03/2015 **Development Date:** 20/03/2015
					58.0 62.0 60.0 64.0 62.0 66.0 64.0 68.0 66.0 70.0 68.0 72.0 70.0 74.0 72.0 76.0 74.0 78.0 76.0 80.0 78.0 82.0 80.0 84.0 82.0 86.0 84.0 88.0 86.0 90.0			NO CORE SANDSTONE SANDSTONE, fine to medium grained, light grey NO CORE SANDSTONE, medium grained, light grey *BH152 Terminated at 59.90 m.*		

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH153

Sheet: 1 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: IKEA car park, Tempe

Project No: 60327128
Logged by: AC **Checked by:** PC
Start Date: 2/02/2015 **End Date:** 6/02/2015

Driller: Terratest Pty Ltd
Drill Rig: Comacchio Geo305

Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 330468.3 m **RL:** 11.24 m
Northing: 6244765.9 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Asphalt

Field Data

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log
HQ3	Run 1	100	0		10.0	2.0	
					8.0	4.0	
					6.0	6.0	
					4.0	8.0	
					2.0	10.0	
					0.0	12.0	
					-2.0	14.0	
	Run 2	100	44		-4.0	16.0	
	Run 3	100	90		-6.0	18.0	
	Run 4	100	90		-8.0	20.0	
	Run 5	100	94		-10.0	22.0	
	Run 6	100	100		-12.0	24.0	
					-14.0	26.0	
	Run 7	100	99		-16.0	28.0	
					-18.0	30.0	

Rock Description

Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
ASPHALT	
GRAVEL, fine to medium grained	
Gravelly SAND, fine to medium grained	
Silty SAND, fine to medium grained	
Gravelly SAND, fine to medium grained	
GRAVEL, fine grained	
GRAVEL, fine grained, black	
Gravelly CLAY, light grey and red	
SILTSTONE	
Silty CLAY, mottled grey, orange-brown, red-brown	
SILTSTONE	
Silty CLAY, mottled grey, red-brown	
SILTSTONE	
SILTSTONE, orange-brown	
Silty CLAY, grey to dark grey	
SANDSTONE, fine to medium grained, light yellow-grey	
SANDSTONE, fine grained, grey	
LAMINITE	
SANDSTONE, fine grained, light brown-grey	
SANDSTONE, fine grained, grey	
SANDSTONE, fine to medium grained, light grey	
SANDSTONE, medium grained, light	

Defect Spacing (mm): 20 60 200 600 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 49.0 mBGL
Screen Top: 46.0 mBGL
Screen/Sensor Base: 49.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/02/2015
Development Date: 2/03/2015

Depth 0.0 to 0.2 m — Lockable gatic cover
Depth 0.2 to 43.0 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH153

Sheet: 2 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: IKEA car park, Tempe

Project No: 60327128
Logged by: AC **Checked by:** PC
Start Date: 2/02/2015 **End Date:** 6/02/2015

Driller: Terratest Pty Ltd
Drill Rig: Comacchio Geo305
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 330468.3 m **RL:** 11.24 m
Northing: 6244765.9 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Asphalt

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 49.0 mBGL
Screen Top: 46.0 mBGL
Screen/Sensor Base: 49.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/02/2015
Development Date: 2/03/2015

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
HQ3	Run 8	100	98		20.0	32.0		brown-grey	
								SANDSTONE, medium to coarse grained, light brown-grey	
	Run 9	100	100		22.0	34.0		SANDSTONE, medium grained, light grey	
								SANDSTONE, medium grained, light brown-grey *continued*	
	Run 10	100	100		24.0	36.0		SANDSTONE, medium to coarse grained, light grey	
	Run 11	100	96		26.0	38.0		SANDSTONE, medium to coarse grained	
	Run 12	100	100		28.0	40.0		SANDSTONE, medium to coarse grained, light grey	
					30.0	42.0		SANDSTONE, medium grained, light grey	
	Run 13	100	98		32.0	44.0		SANDSTONE, coarse grained, light grey	
								SANDSTONE, fine to medium grained, brown-grey	
	Run 14	100	99		34.0	46.0		SANDSTONE, medium to coarse grained, light brown-grey	
					36.0	48.0		SANDSTONE, medium to coarse grained, light brown-grey	
	Run 15	100	98		38.0	50.0		SANDSTONE, medium grained, brown-grey	
								SANDSTONE, medium to coarse grained, brown-grey	
	Run 16	100	100		40.0	52.0		SANDSTONE, medium grained, brown-grey	
	Run 17	100	96		42.0	54.0		LAMINITE, fine grained	
	Run 18	100	94		44.0	56.0		SANDSTONE, fine to medium grained, grey	
								SANDSTONE, coarse grained, light grey	
								SILTSTONE, green-grey	
	Run 19	100	98		46.0	58.0		SANDSTONE, medium grained, brown-grey	
								SANDSTONE, fine grained, light grey	
					48.0	60.0			

Defect Spacing (mm): 20, 60, 200, 600, 2000

Depth 0.2 to 43.0 m — Cement grout
Depth 43.0 to 44.0 m — Bentonite plug
Depth 44.0 to 46.0 m — 2 mm sand backfill
Depth 46.0 to 49.0 m — Slotted screen, 2 mm sand
Depth 49.0 to 51.0 m — 2 mm sand backfill
Depth 51.0 to 63.1 m — Bentonite plug

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

Engineering Log — Final

PIEZOMETER No. BH153

Sheet: 3 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: IKEA car park, Tempe

Project No: 60327128
Logged by: AC — **Checked by:** PC
Start Date: 2/02/2015 — **End Date:** 6/02/2015

Driller: Terratest Pty Ltd
Drill Rig: Comacchio Geo305
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 330468.3 m — **RL:** 11.24 m
Northing: 6244765.9 m — **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 — **Surface:** Asphalt

Field Data: Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Rock Description: Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
HQ3	Run 20	100	100		50.0	62.0		SANDSTONE, fine to medium grained, light grey *continued*	
	Run 21	100	100						
					52.0	64.0		*BH153 Terminated at 63.06 m.*	
					54.0	66.0			
					56.0	68.0			
					58.0	70.0			
					60.0	72.0			
					62.0	74.0			
					64.0	76.0			
					66.0	78.0			
					68.0	80.0			
					70.0	82.0			
					72.0	84.0			
					74.0	86.0			
					76.0	88.0			
					78.0	90.0			

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 49.0 mBGL
Screen Top: 46.0 mBGL
Screen/Sensor Base: 49.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 16/02/2015
Development Date: 2/03/2015

Depth 51.0 to 63.1 m — Bentonite plug

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

AECOM Engineering Log — Final

PIEZOMETER No. BH157

Sheet: 1 of 2

Client: WDA
Project: WestConnex Stage 2: M5
Location: 108 Princes Highway, St Peters

Project No: 60327128
Logged by: MB/RS **Checked by:** PC
Start Date: 20/01/2015 **End Date:** 23/01/2015

Driller: Terratest Pty Ltd
Drill Rig: Comacchio 450

Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 331518.0 m **RL:** 16.82 m
Northing: 6245765.5 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Concrete

Field Data

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log
HQ3	Run 1				16.0	0.0	
						2.0	
	Run 2	100	0		14.0	2.0	
		61				4.0	
	Run 3	100			12.0	4.0	
	Run 4	100				6.0	
	Run 5	100	55		10.0	6.0	
	Run 6	100	69		8.0	8.0	
	Run 7	100	96			8.0	
	Run 8	97	89	90%	6.0	10.0	
	Run 9	100	92	85%		12.0	
	Run 10	100	98		4.0	12.0	
	Run 11	100	97			14.0	
	Run 12	100	100		2.0	14.0	
						16.0	
					0.0	16.0	
						18.0	
					-2.0	18.0	
						20.0	
					-4.0	20.0	
						22.0	
					-6.0	22.0	
						24.0	
					-8.0	24.0	
						26.0	
					-10.0	26.0	
						28.0	
					-12.0	28.0	
						30.0	

Rock Description

Summary Geology (refer to geological log for full descriptions)

- CONCRETE
- GRAVEL, fine to coarse grained
- SAND, fine to coarse grained, dark brown
- Silty CLAY
- SANDSTONE, fine to medium grained, light grey
- NO CORE
- LAMINITE
- LAMINITE
- LAMINITE
- SILTSTONE

Defect Spacing (mm): 20 60 200 600 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 39.0 mBGL
Screen Top: 36.0 mBGL
Screen/Sensor Base: 39.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 27/01/2014
Development Date: 11/02/2015

Depth 0.0 to 0.2 m — Lockable Gatic cover
Depth 0.2 to 1.0 m — Bentonite plug
Depth 1.0 to 33.1 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH157

Sheet: 2 of 2

Client: WDA
Project: WestConnex Stage 2: M5
Location: 108 Princes Highway, St Peters

Project No: 60327128
Logged by: MB/RS **Checked by:** PC
Start Date: 20/01/2015 **End Date:** 23/01/2015

Driller: Terratest Pty Ltd
Drill Rig: Comacchio 450
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 331518.0 m **RL:** 16.82 m
Northing: 6245765.5 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Concrete

Field Data

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log
HQ3	Run 13	100	97	95%	14.0	32.0	
					16.0	34.0	
	Run 14	100	100	95%	18.0	36.0	
	Run 15	102	82	95%	20.0	38.0	
					22.0	40.0	
	Run 16	100	79	95%	24.0	42.0	
					26.0	44.0	
	Run 17	100	100	95%	28.0	46.0	
	Run 18	100	100	95%	30.0	48.0	
	Run 19	100	100	95%	32.0	50.0	
					34.0	52.0	
					36.0	54.0	
					38.0	56.0	
					40.0	58.0	
					42.0	60.0	

Rock Description

Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
SILTSTONE *continued*	
SILTSTONE	
LAMINITE	
LAMINITE	
SILTSTONE	
SILTSTONE	
BH157 Terminated at 51.00 m.	

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 39.0 mBGL
Screen Top: 36.0 mBGL
Screen/Sensor Base: 39.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 27/01/2014
Development Date: 11/02/2015

Depth 1.0 to 33.1 m	Cement grout
Depth 33.1 to 34.1 m	Bentonite plug
Depth 34.1 to 36.0 m	2 mm sand backfill
Depth 36.0 to 39.0 m	Slotted screen, 2 mm sand
Depth 39.0 to 40.0 m	2 mm sand backfill
Depth 40.0 to 42.1 m	Bentonite plug
Depth 42.1 to 51.0 m	Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH168

Sheet: 1 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Cahill Park, Wolli Creek

Project No: 60327128
Logged by: DW **Checked by:** PC
Start Date: 22/01/2015 **End Date:** 30/01/2015

Driller: Terratest Pty Ltd
Drill Rig: Comacchio Geo 305

Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 329702.2 m **RL:** 1.36 m
Northing: 6243775.2 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 51.0 mBGL
Screen Top: 48.0 mBGL
Screen/Sensor Base: 51.0 mBGL
Instrument Details: -
Installation Date: 16/02/2015
Development Date: 11/02/2015

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
					0.0	2.0		Silty SAND, fine to medium grained, brown	
					-2.0	4.0		Silty SAND, fine to coarse grained, grey-brown	
					-4.0	6.0		Clayey SAND, fine to coarse grained	
					-6.0	8.0		SAND, medium to coarse grained	
					-8.0	10.0		Clayey SAND, fine to coarse grained, dark grey	
					-10.0	12.0		Clayey SAND, fine to coarse grained, grey-brown	
					-12.0	14.0		CLAY, dark grey	
					-14.0	16.0		Clayey SAND, fine to coarse grained	
					-16.0	18.0		Sandy CLAY	
					-18.0	20.0		Clayey SAND, dark brown-grey	
					-20.0	22.0		Silty CLAY, grey-brown	
					-22.0	24.0		Clayey SAND, fine to coarse grained	
HQ3	Run 1	100	100		-24.0	26.0		SAND, fine to medium grained, light orange-brown, mottled red-brown	
HQ3	Run 2	100	18		-26.0	28.0		Sandy ORGANIC CLAY	
					-28.0	30.0		Clayey SAND, fine to coarse grained, dark grey, mottled black	
								Silty SAND, fine to coarse grained, grey, mottled black	
								SANDSTONE, medium to coarse grained, light grey	

Defect Spacing (mm): 20, 60, 200, 600, 2000

Depth 0.0 to 0.2 m — Lockable gatic cover
Depth 0.2 to 1.0 m — Bentonite plug
Depth 1.0 to 45.0 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

AECOM Engineering Log — Final

PIEZOMETER No. BH168

Sheet: 2 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Cahill Park, Wolli Creek
Project No: 60327128
Logged by: DW
Checked by: PC
Start Date: 22/01/2015
End Date: 30/01/2015

Driller: Terratest Pty Ltd
Drill Rig: Comacchio Geo 305
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 329702.2 m
Northing: 6243775.2 m
Hor. Proj/Dat: MGA94/GDA94
RL: 1.36 m
Ver. Datum: m AHD
Surface: Grass

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 51.0 mBGL
Screen Top: 48.0 mBGL
Screen/Sensor Base: 51.0 mBGL
Instrument Details: -
Installation Date: 16/02/2015
Development Date: 11/02/2015

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
HQ3	Run 3	100	85		30.0	32.0		SANDSTONE, medium to coarse grained, light grey *continued*	
	Run 4	100	88		32.0	34.0		SANDSTONE, medium to coarse grained, light grey	
	Run 5	100	89		34.0	36.0		SANDSTONE, fine to medium grained, light grey	
	Run 6	100	96		36.0	38.0		SANDSTONE, medium to coarse grained, light grey	
	Run 7	100	91		38.0	40.0			
	Run 8	100	100		40.0	42.0		SANDSTONE, fine to medium grained, light grey	
	Run 9	100	93		42.0	44.0		SANDSTONE, medium grained, light grey	
	Run 10	96	77		44.0	46.0		SANDSTONE, medium grained, light grey	
	Run 11	100	91		46.0	48.0		SANDSTONE, medium to coarse grained, light brown-grey	
	Run 12	100	100		48.0	50.0		SANDSTONE, medium grained, light grey	
	Run 13	100	100		50.0	52.0		SANDSTONE, medium grained, light grey	
	Run 14	100	62		52.0	54.0		SANDSTONE, medium grained, light grey	
	Run 15	100	100		54.0	56.0		SANDSTONE, fine to medium grained, grey	
	Run 16	92	65		56.0	58.0		SANDSTONE, medium grained, light grey	
					58.0	60.0		SANDSTONE, medium to coarse grained, light grey	

Defect Spacing (mm): 20, 60, 200, 600, 2000

Depth 1.0 to 45.0 m — Cement grout
Depth 45.0 to 46.0 m — Bentonite plug
Depth 46.0 to 48.0 m — 2 mm sand backfill
Depth 48.0 to 51.0 m — Slotted screen, 2 mm sand
Depth 51.0 to 52.0 m — 2 mm sand backfill
Depth 52.0 to 53.0 m — Bentonite plug
Depth 53.0 to 65.0 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM **Engineering Log** **Final** **PIEZOMETER No. BH168**

Sheet: 3 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Cahill Park, Wolli Creek
Project No: 60327128
Logged by: DW **Checked by:** PC
Start Date: 22/01/2015 **End Date:** 30/01/2015

Driller: Terratest Pty Ltd
Drill Rig: Comacchio Geo 305
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 329702.2 m **RL:** 1.36 m
Northing: 6243775.2 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
HQ3	Run 17	100	100			60.0 62.0		SANDSTONE, medium to coarse grained, light grey *continued*	
	Run 18	100	98			62.0 64.0			
						64.0 66.0		*BH168 Terminated at 65.00 m.*	
						66.0 68.0			
						68.0 70.0			
						70.0 72.0			
						72.0 74.0			
						74.0 76.0			
						76.0 78.0			
						78.0 80.0			
						80.0 82.0			
						82.0 84.0			
						84.0 86.0			
						86.0 88.0			
						88.0 90.0			

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 51.0 mBGL
Screen Top: 48.0 mBGL
Screen/Sensor Base: 51.0 mBGL
Instrument Details: -
Installation Date: 16/02/2015
Development Date: 11/02/2015

Depth 53.0 to 65.0 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

AECOM **Engineering Log** **Final** **PIEZOMETER No. BH201a**

Sheet: 1 of 1

Client: WDA **Project No:** 60327128

Project: WestConnex Stage 2: M5 **Logged by:** DC **Checked by:** PC

Location: 9-11 Colson Crescent, Monterey **Start Date:** 24/02/2015 **End Date:** 25/02/2015

Driller: Terratest Pty Ltd **Hole Diameter:** 100 mm **Easting:** 328744.4 m **RL:** 2.42 m

Drill Rig: Comacchio Geo305 **Inclination:** -90° **Northing:** 6239918.5 m **Ver. Datum:** m AHD

Bearing: N/A **Hor. Proj/Dat:** MGA94/GDA94 **Surface:** Grass

Field Data | **Rock Description** | **Piezometer Details**

Method: AD, RT | Core Run | TCR (%) | RQD (%) | Ground Water: 24/02/2015 ▽ | Reduced Level (m) | Depth (m) | Graphic Log

Depth (m)	Reduced Level (m)	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
0.0	2.0	SAND, fine to medium grained, brown-grey and grey	
8.0	-6.0	SAND, fine to medium grained, light brown-grey	
10.0	-8.0	Clayey SAND, fine to medium grained, dark grey	
12.0	-10.0	SAND, fine to medium grained, light grey	
16.0	-14.0	SAND, fine to medium grained, brown-grey	
18.0	-16.0	Clayey SAND, fine to medium grained, dark grey	
22.0	-20.0	Clayey SAND, fine to medium grained, light grey	
		BH201a Terminated at 22.00 m.	

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 21.0 mBGL
Screen Top: 18.0 mBGL
Screen/Sensor Base: 21.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 4/03/2015
Development Date: 2/03/2015

Depth 0.0 to 0.2 m — Lockable Gatic cover
Depth 0.2 to 15.1 m — Cement grout
Depth 15.1 to 17.4 m — Bentonite plug
Depth 17.4 to 18.0 m — 2 mm sand backfill
Depth 18.0 to 21.0 m — Slotted screen, 2 mm sand
Depth 21.0 to 21.5 m — 2 mm sand backfill
Depth 21.5 to 22.0 m — Bentonite plug

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

AECOM **Engineering Log** **Final** **PIEZOMETER No. BH202**

Sheet: 1 of 2

Client: WDA
Project: WestConnex Stage 2: M5
Location: President Ave. Brighton-Le-Sands
Project No: 60327128
Logged by: DW **Checked by:** PC
Start Date: 6/01/2015 **End Date:** 8/01/2015

Driller: Terratest Pty. Ltd.
Drill Rig: Boart Longyear DB-8
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 328078.0 m **RL:** 12.91 m
Northing: 6240175.0 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Asphalt

Field Data

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log
HQ3	Run 1	73			12.0	2.0	
	Run 2	100	26		10.0	4.0	
					8.0	6.0	
	Run 3	100	97		6.0	8.0	
	Run 4	100	60		4.0	10.0	
					2.0	12.0	
	Run 5	100	97		0.0	14.0	
	Run 6	100	100		-2.0	16.0	
					-4.0	18.0	
	Run 7	100	95		-6.0	20.0	
	Run 8	100	100		-8.0	22.0	
					-10.0	24.0	
	Run 9	100	81		-12.0	26.0	
	Run 10	100	100		-14.0	28.0	
	Run 11	100	82				
	Run 12	100	70		-16.0	30.0	

Rock Description

Summary Geology (refer to geological log for full descriptions)

Defect Spacing (mm) 20 60 200 600 2000

- ASPHALT
- Clayey SAND, fine to coarse grained, dark brown-grey
- Sandy CLAY
- NO CORE
- Sandy CLAY
- SANDSTONE, medium to coarse grained, red-brown to light brown-grey
- SANDSTONE, medium grained, grey
- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, medium grained, light brown-grey
- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, medium to coarse grained, light grey
- SILTSTONE, dark grey
- SANDSTONE, fine grained, grey

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 38.5 mBGL
Screen Top: 35.5 mBGL
Screen/Sensor Base: 38.5 mBGL
Instrument Details: Level Troll 400
Installation Date: 2/02/2015
Development Date: 23/01/2015

Depth 0.0 to 0.2 m — Lockable Gatic cover
Depth 0.2 to 34.0 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH202

Sheet: 2 of 2

Client:	WDA	**Project No:**	60327128
Project:	WestConnex Stage 2: M5	**Logged by:**	DW
Location:	President Ave. Brighton-Le-Sands	**Start Date:**	6/01/2015
Checked by:	PC	**End Date:**	8/01/2015

Driller:	Terratest Pty. Ltd.	**Hole Diameter:**	Varies	**Easting:**	328078.0 m
Drill Rig:	Boart Longyear DB-8	**Inclination:**	-90°	**Northing:**	6240175.0 m
		Bearing:	N/A	**Hor. Proj/Dat:**	MGA94/GDA94
				RL:	12.91 m
				Ver. Datum:	m AHD
				Surface:	Asphalt

Field Data

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log
HQ3	Run 13	100	99		18.0	32.0	
		100	99				
	Run 14	100	100		20.0	34.0	
					22.0	36.0	
	Run 15	100	100		24.0	38.0	
					26.0	40.0	
	Run 16	100	100		28.0	42.0	
	Run 17	100	96		30.0	44.0	
					32.0	46.0	
	Run 18	100	95		34.0	48.0	
	Run 19	100	100		36.0	50.0	
					38.0	52.0	
					40.0	54.0	
					42.0	56.0	
					44.0	58.0	
					46.0	60.0	

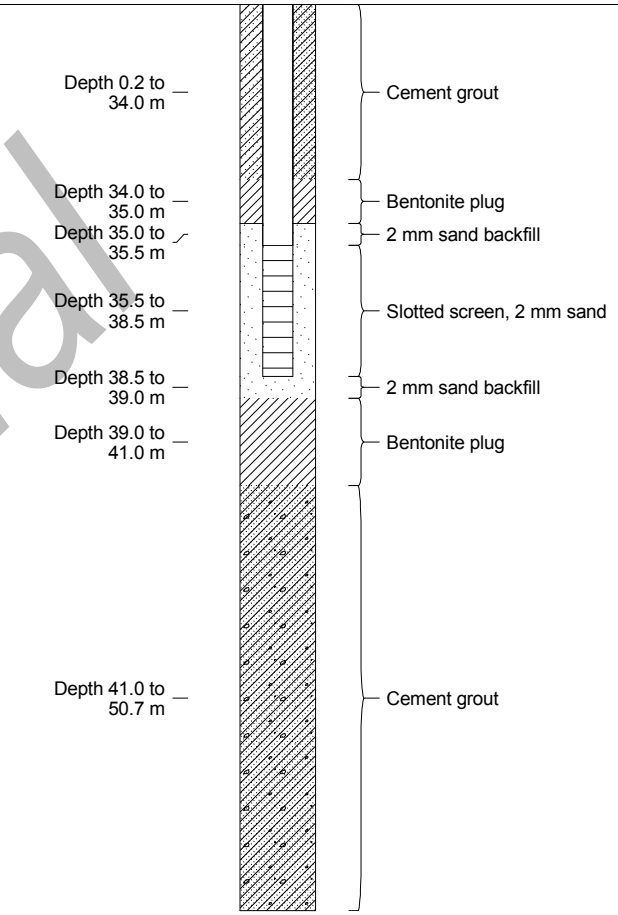
Rock Description

Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
SANDSTONE, medium to coarse grained, light grey *continued*	
SANDSTONE, fine grained, grey	
SANDSTONE, medium grained, light grey	
SANDSTONE, medium grained, light grey	
SANDSTONE, medium to coarse grained, light grey	
SANDSTONE, medium to coarse grained, light grey	
SANDSTONE, medium grained, light grey	
SANDSTONE, medium to coarse grained, light brown-grey	
BH202 Terminated at 50.72 m.	

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details:	PVC slotted screen, 2 mm sand
Pipe diameter:	50 mm
Pipe Top:	0.0 mBGL
Pipe Base:	38.5 mBGL
Screen Top:	35.5 mBGL
Screen/Sensor Base:	38.5 mBGL
Instrument Details:	Level Troll 400
Installation Date:	2/02/2015
Development Date:	23/01/2015



Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH204

Sheet: 1 of 3

Client:	WDA	**Project No:**	60327128
Project:	WestConnex Stage 2: M5	**Logged by:** DW/AC	**Checked by:** PC
Location:	Rockdale Wetlands, Rockdale	**Start Date:** 12/02/2015	**End Date:** 20/02/2015

Driller:	Terratest Pty Ltd	**Hole Diameter:**	Varies	**Easting:** 328849.9 m	**RL:** 4.15 m
Drill Rig:	Comacchio Geo 305	**Inclination:**	-90°	**Northing:** 6240324.9 m	**Ver. Datum:** m AHD
		Bearing:	N/A	**Hor. Proj/Dat:** MGA94/GDA94	**Surface:** Grass

Field Data | **Rock Description** | **Piezometer Details**

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
					4.0	2.0		Silty SAND, fine to medium grained, dark grey-brown	
					2.0	4.0		SAND, medium grained, light brown	
					0.0	6.0		SAND, fine to medium grained, dark grey	
					-2.0	8.0		SAND, fine to medium grained, grey	
					-4.0	10.0			
					-6.0	12.0		Silty SAND, fine to medium grained, grey to dark grey	
					-8.0	14.0		SAND, fine to medium grained, grey	
					-10.0	16.0			
					-12.0	18.0			
					-14.0	20.0		Silty SAND, fine to medium grained, dark grey	
					-16.0			Silty CLAY, grey, mottled brown	
HQ3	Run 1	100	59		-18.0	22.0		SANDSTONE, medium to coarse grained, light grey	
	Run 2	100	97		-20.0	24.0		SANDSTONE, coarse grained, light grey	
	Run 3	100	80		-22.0	26.0		SANDSTONE, coarse grained, red-brown, mottled orange-brown	
					-24.0	28.0		SANDSTONE, medium to coarse grained, light brown, mottled brown	
	Run 4	100	54			30.0		SANDSTONE, medium to coarse grained, light yellow-brown	
								SANDSTONE, medium to coarse grained,	

Piezometer Details

Construction details:	PVC slotted screen, 2 mm sand
Pipe diameter:	50 mm
Pipe Top:	0.0 mBGL
Pipe Base:	55.3 mBGL
Screen Top:	52.3 mBGL
Screen/Sensor Base:	55.3 mBGL
Instrument Details:	Level Troll 400
Installation Date:	4/03/2015
Development Date:	2/03/2015

Depth 0.0 to 0.2 m — Lockable gatic cover

Depth 0.2 to 48.6 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM **Engineering Log** **Final** **PIEZOMETER No. BH204**

Sheet: 2 of 3

Client: WDA **Project No:** 60327128

Project: WestConnex Stage 2: M5 **Logged by:** DW/AC **Checked by:** PC

Location: Rockdale Wetlands, Rockdale **Start Date:** 12/02/2015 **End Date:** 20/02/2015

Driller: Terratest Pty Ltd **Hole Diameter:** Varies **Easting:** 328849.9 m **RL:** 4.15 m

Drill Rig: Comacchio Geo 305 **Inclination:** -90° **Northing:** 6240324.9 m **Ver. Datum:** m AHD

Bearing: N/A **Hor. Proj/Dat:** MGA94/GDA94 **Surface:** Grass

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
HQ3	Run 5	97	85		32.0	26.0		light yellow-brown, mottled orange-brown and red-brown	
					28.0			SANDSTONE, medium to coarse grained, light yellow-brown *continued*	
	Run 6	100	93		34.0			NO CORE	
					30.0			SANDSTONE, medium to coarse grained, light brown-grey	
	Run 7	99	96		36.0			SANDSTONE, medium grained, light brown-grey	
				50%	32.0				
					38.0			SILTSTONE (90%), dark grey	
	Run 8	100	75		34.0			SANDSTONE, fine to medium grained, light grey	
					40.0				
	Run 9	100	91		36.0			SANDSTONE, medium grained, light grey	
					42.0				
					38.0			SILTSTONE	
					44.0				
	Run 10	100	95		40.0			SANDSTONE, brown-grey	
					46.0			SANDSTONE, medium grained, brown-grey	
	Run 11	100	75		42.0				
					48.0				
					44.0				
					50.0			SANDSTONE, medium grained, brown-grey	
	Run 12	71	29		46.0				
					52.0			BRECCIA, light grey to dark grey	
					48.0				
	Run 13	68	30		54.0			NO CORE	
					50.0			SANDSTONE, medium grained, light brown-grey	
	Run 14	100	41		56.0				
					52.0			SILTSTONE, dark grey	
	Run 15	100	97		58.0			SANDSTONE, fine to medium grained, light grey	
					54.0				
					60.0			SILTSTONE, dark grey	

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 55.3 mBGL
Screen Top: 52.3 mBGL
Screen/Sensor Base: 55.3 mBGL
Instrument Details: Level Troll 400
Installation Date: 4/03/2015
Development Date: 2/03/2015

Depth 0.2 to 48.6 m — Cement grout
Depth 48.6 to 49.6 m — Bentonite plug
Depth 49.6 to 52.3 m — 2 mm sand backfill
Depth 52.3 to 55.3 m — Slotted screen, 2 mm sand
Depth 55.3 to 56.1 m — 2 mm sand backfill
Depth 56.1 to 57.0 m — Bentonite plug
Depth 57.0 to 67.0 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM **Engineering Log** **Final** **PIEZOMETER No. BH204**

Sheet: 3 of 3

Client: WDA **Project No:** 60327128

Project: WestConnex Stage 2: M5 **Logged by:** DW/AC **Checked by:** PC

Location: Rockdale Wetlands, Rockdale **Start Date:** 12/02/2015 **End Date:** 20/02/2015

Driller: Terratest Pty Ltd **Hole Diameter:** Varies **Easting:** 328849.9 m **RL:** 4.15 m

Drill Rig: Comacchio Geo 305 **Inclination:** -90° **Northing:** 6240324.9 m **Ver. Datum:** m AHD

Bearing: N/A **Hor. Proj/Dat:** MGA94/GDA94 **Surface:** Grass

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	
HQ3	Run 16	100	94		56.0	62.0		SANDSTONE, medium grained, light brown-grey	**Construction details:** PVC slotted screen, 2 mm sand **Pipe diameter:** 50 mm **Pipe Top:** 0.0 mBGL **Pipe Base:** 55.3 mBGL **Screen Top:** 52.3 mBGL **Screen/Sensor Base:** 55.3 mBGL **Instrument Details:** Level Troll 400 **Installation Date:** 4/03/2015 **Development Date:** 2/03/2015
					58.0			SHALE BRECCIA *continued*	
	Run 17	100	73		60.0	64.0		SANDSTONE, medium to coarse grained, light grey	Depth 57.0 to 67.0 m — Cement grout
					62.0			SANDSTONE, medium grained, grey	
	Run 18	100	100		64.0	66.0		SANDSTONE, medium to coarse grained, light brown-grey	
					66.0	68.0		SANDSTONE, medium grained, brown-grey	
					68.0	70.0		SANDSTONE, medium grained, brown-grey	
					70.0	72.0		*BH204 Terminated at 67.00 m.*	
					72.0	74.0			
					74.0	76.0			
					76.0	78.0			
					78.0	80.0			
					80.0	82.0			
					82.0	84.0			
					84.0	86.0			
					86.0	88.0			
					88.0	90.0			

Defect Spacing (mm): 20, 60, 200, 600, 2000

Final

REMARKS:

GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM **Engineering Log** **Final** **PIEZOMETER No. BH206**

Sheet: 1 of 1

Client: WDA
Project: WestConnex Stage 2: M5
Location: Beach Street, Kogarah
Project No: 60327128
Logged by: DC **Checked by:** PC
Start Date: 3/02/2015 **End Date:** 5/02/2015

Driller: Terratest Pty Ltd
Drill Rig: Comacchio Geo305
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 328398.9 m **RL:** 2.39 m
Northing: 6240659.0 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Asphalt

Field Data								Rock Description		Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000	**Construction details:** PVC slotted screen, 2 mm sand **Pipe diameter:** 50 mm **Pipe Top:** 0.0 mBGL **Pipe Base:** 22.0 mBGL **Screen Top:** 19.0 mBGL **Screen/Sensor Base:** 22.0 mBGL **Instrument Details:** Level Troll 400 **Installation Date:** 16/02/2015 **Development Date:** 11/02/2015
					2.0	0.0		ASPHALT		Depth 0.0 to 0.2 m — Lockable Gatic cover
					0.0	2.0		Gravelly SAND, fine to coarse grained, dark grey		
					-2.0	4.0		Sandy GRAVEL, fine to coarse grained, dark grey		
HQ3	Run 1	100	96		-4.0	6.0		Silty CLAY, dark grey		
					-6.0	8.0		SAND, fine to medium grained, light grey		
	Run 2	100	87		-8.0	10.0		SANDSTONE, medium grained, light grey		Depth 0.2 to 16.8 m — Cement grout
	Run 3	100	87		-10.0	12.0		SANDSTONE, medium to coarse grained		
	Run 4	100	93		-12.0	14.0		SANDSTONE, medium grained, light grey		
	Run 5	100	92		-14.0	16.0		SANDSTONE, coarse grained		
	Run 6	100	100		-16.0	18.0		SANDSTONE, medium to coarse grained, light grey		
	Run 7	100	93		-18.0	20.0		SANDSTONE, medium grained, light grey		Depth 16.8 to 17.8 m — Bentonite plug Depth 17.8 to 19.0 m — 2 mm sand backfill
	Run 8	100	52		-20.0	22.0		SANDSTONE, medium to coarse grained, light grey		Depth 19.0 to 22.0 m — Slotted screen, 2 mm sand
	Run 9	100	90		-22.0	24.0		SANDSTONE, coarse grained, light grey		Depth 22.0 to 22.9 m — 2 mm sand backfill Depth 22.9 to 23.8 m — Bentonite plug
	Run 10	100	100		-24.0	26.0		SANDSTONE, medium to coarse grained, light grey		
	Run 11	100	100		-26.0	28.0		SILTSTONE, dark grey		
					-28.0	30.0		SANDSTONE, medium to coarse grained, light grey		Depth 23.8 to 30.0 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

AECOM **Engineering Log** **Final** **PIEZOMETER No. BH206**

Sheet: 2 of 1

Client: WDA
Project: WestConnex Stage 2: M5
Location: Beach Street, Kogarah
Project No: 60327128
Logged by: DC **Checked by:** PC
Start Date: 3/02/2015 **End Date:** 5/02/2015

Driller: Terratest Pty Ltd
Drill Rig: Comacchio Geo305
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 328398.9 m **RL:** 2.39 m
Northing: 6240659.0 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Asphalt

Field Data								Rock Description		Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000	**Construction details:** PVC slotted screen, 2 mm sand **Pipe diameter:** 50 mm **Pipe Top:** 0.0 mBGL **Pipe Base:** 22.0 mBGL **Screen Top:** 19.0 mBGL **Screen/Sensor Base:** 22.0 mBGL **Instrument Details:** Level Troll 400 **Installation Date:** 16/02/2015 **Development Date:** 11/02/2015
					-28.0 -30.0 -32.0 -34.0 -36.0 -38.0 -40.0 -42.0 -44.0 -46.0 -48.0 -50.0 -52.0 -54.0 -56.0 -58.0 -60.0	32.0 34.0 36.0 38.0 40.0 42.0 44.0 46.0 48.0 50.0 52.0 54.0 56.0 58.0 60.0		*BH206 Terminated at 30.00 m.*		

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH208

Sheet: 1 of 2

Client: WDA
Project: WestConnex Stage 2: M5
Location: Leighton Holdings Brighton Le-Sands

Project No: 60327128
Logged by: NJ **Checked by:** PC
Start Date: 6/01/2015 **End Date:** 13/01/2015

Driller: Macquarie Drilling Pty Ltd
Drill Rig: Hydrapower Scout
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 328973.4 m **RL:** 2.42 m
Northing: 6240823.0 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Gravel

Field Data / Rock Description

Depth (m)	Reduced Level (m)	Summary Geology (refer to geological log for full descriptions)
0.0	2.0	Silty SAND, fine grained, grey-brown
2.0	0.0	SAND, fine grained, dark grey-brown
4.0	-2.0	SAND, fine to medium grained, dark grey-brown
6.0	-4.0	SAND, fine to medium grained, light grey
8.0	-6.0	CLAY, grey
10.0	-8.0	SAND, fine to medium grained, light yellow-brown
12.0	-10.0	
14.0	-12.0	
16.0	-14.0	
18.0	-16.0	Silty CLAY, dark grey
20.0	-18.0	
22.0	-20.0	SAND, fine to medium grained, grey
24.0	-22.0	SAND, fine to medium grained, light yellow-brown
26.0	-24.0	
28.0	-26.0	Sandy CLAY, grey
30.0		

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details: PVC slotted screen, 3 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 52.9 mBGL
Screen Top: 49.9 mBGL
Screen/Sensor Base: 52.9 mBGL
Instrument Details: Level Troll 400
Installation Date: 23/01/2015
Development Date: 23/01/2015

Depth 0.0 to 0.2 m — Lockable Gatic cover
Depth 0.2 to 1.0 m — Bentonite plug
Depth 1.0 to 47.8 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM **Engineering Log** **Final** **PIEZOMETER No. BH208**

Sheet: 2 of 2

Client: WDA
Project: WestConnex Stage 2: M5
Location: Leighton Holdings Brighton Le-Sands
Project No: 60327128
Logged by: NJ **Checked by:** PC
Start Date: 6/01/2015 **End Date:** 13/01/2015

Driller: Macquarie Drilling Pty Ltd **Hole Diameter:** Varies
Drill Rig: Hydrapower Scout **Inclination:** -90° **Bearing:** N/A
Easting: 328973.4 m **RL:** 2.42 m
Northing: 6240823.0 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Gravel

Piezometer Details

Construction details: PVC slotted screen, 3 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 52.9 mBGL
Screen Top: 49.9 mBGL
Screen/Sensor Base: 52.9 mBGL
Instrument Details: Level Troll 400
Installation Date: 23/01/2015
Development Date: 23/01/2015

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
HQ3					28.0	32.0		Organic CLAY, black *continued*	
					30.0	34.0		SAND, fine to medium grained, brown-grey	
					32.0	36.0		SAND, fine to coarse grained, brown-grey	
					34.0	38.0		SANDSTONE	
	Run 1	80	22		36.0	40.0		NO CORE	
					38.0	42.0		SANDSTONE	
	Run 2	92	50		40.0	44.0		SANDSTONE, medium to coarse grained, light grey and yellow-brown	
					42.0	46.0		NO CORE	
	Run 3	100	100		44.0	48.0		SANDSTONE, medium to coarse grained, light grey	
	Run 4	100	100	85%	46.0	50.0		LAMINITE	
	Run 5	88	60	5%	48.0	52.0		SILTSTONE, dark grey	
					50.0	54.0		SANDSTONE, medium to coarse grained, light yellow-brown	
	Run 6	60	13		52.0	56.0		NO CORE	
					50.0	54.0		SANDSTONE, medium to coarse grained, light yellow-brown	
	Run 7	100	50		52.0	56.0		SANDSTONE, medium grained, light grey	
					54.0	58.0		SANDSTONE, medium to coarse grained, light brown-grey	
	Run 8	100	100		56.0	60.0		SANDSTONE, fine to medium grained, light grey	

Defect Spacing (mm): 20 60 200 600 2000

Depth 1.0 to 47.8 m — Cement grout
Depth 47.8 to 48.8 m — Bentonite plug
Depth 48.8 to 49.9 m — 3 mm sand backfill
Depth 49.9 to 52.9 m — Slotted screen, 3 mm sand
Depth 52.9 to 54.0 m — 3 mm sand backfill
Depth 54.0 to 55.0 m — Bentonite plug
Depth 55.0 to 56.4 m — 3 mm sand backfill

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH208

Sheet: 3 of 2

Client: WDA
Project: WestConnex Stage 2: M5
Location: Leighton Holdings Brighton Le-Sands

Project No: 60327128
Logged by: NJ **Checked by:** PC
Start Date: 6/01/2015 **End Date:** 13/01/2015

Driller: Macquarie Drilling Pty Ltd
Drill Rig: Hydrapower Scout
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 328973.4 m **RL:** 2.42 m
Northing: 6240823.0 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Gravel

Field Data								Rock Description		Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000	**Construction details:** PVC slotted screen, 3 mm sand **Pipe diameter:** 50 mm **Pipe Top:** 0.0 mBGL **Pipe Base:** 52.9 mBGL **Screen Top:** 49.9 mBGL **Screen/Sensor Base:** 52.9 mBGL **Instrument Details:** Level Troll 400 **Installation Date:** 23/01/2015 **Development Date:** 23/01/2015
					58.0 62.0 60.0 64.0 62.0 66.0 64.0 68.0 66.0 70.0 68.0 72.0 70.0 74.0 72.0 76.0 74.0 78.0 76.0 80.0 78.0 82.0 80.0 84.0 82.0 86.0 84.0 88.0 86.0 90.0			SANDSTONE, fine to medium grained, brown-grey SILTSTONE, (90%), dark grey SANDSTONE, fine grained, grey *BH208 Terminated at 60.00 m.*		

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH211

Sheet: 1 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Redmond Field, Brighton-Le-Sands

Project No: 60327128
Logged by: SBS — **Checked by:** PC
Start Date: 10/02/2015 — **End Date:** 12/02/2015

Driller: Macquarie Drilling Pty. Ltd. — **Hole Diameter:** Varies
Drill Rig: Hydrapower Scout — **Inclination:** -90° — **Bearing:** N/A

Easting: 329116.9 m — **RL:** 2.05 m
Northing: 6241213.8 m — **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 — **Surface:** Grass

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
					2.0	0.0		Silty SAND, fine grained, dark grey and brown	
					0.0	2.0		SAND, fine grained, brown-grey	
					-2.0	4.0		SAND, fine grained, brown-grey	
					-4.0	6.0		Silty SAND, fine grained, dark brown	
					-6.0	8.0		SAND, fine grained, brown-grey	
					-8.0	10.0		Silty SAND, fine grained, grey to dark grey	
					-10.0	12.0		SAND, fine grained, brown-grey to grey	
					-12.0	14.0		Silty CLAY, grey, mottled red-brown	
					-14.0	16.0		Sandy CLAY	
					-16.0	18.0		SAND, fine grained, light grey	
					-18.0	20.0		Silty CLAY, grey, mottled yellow-brown	
					-20.0	22.0		Silty SAND, fine grained, dark grey	
					-22.0	24.0		Clayey SAND, fine grained	
					-24.0	26.0		SAND, fine grained, light grey and orange-brown	
					-26.0	28.0		Clayey SAND, fine grained	
					-28.0	30.0		Clayey SAND, fine to medium grained, grey, mottled red-brown	
								Sandy CLAY	
								Clayey SAND, fine to medium grained	
HQ3	Run 1	100	90					Silty SAND, fine grained, red-brown to brown, mottled yellow-brown	
	Run 2	100	96					SANDSTONE, fine grained, light grey	

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 51.0 mBGL
Screen Top: 48.0 mBGL
Screen/Sensor Base: 51.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 4/03/2015
Development Date: 2/03/2015

Depth 0.0 to 0.2 m — Lockable Gatic cover
Depth 0.2 to 1.0 m — Bentonite plug
Depth 1.0 to 43.9 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log — Final

PIEZOMETER No. BH211

Sheet: 2 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Redmond Field, Brighton-Le-Sands

Project No: 60327128
Logged by: SBS **Checked by:** PC
Start Date: 10/02/2015 **End Date:** 12/02/2015

Driller: Macquarie Drilling Pty. Ltd. **Hole Diameter:** Varies
Drill Rig: Hydrapower Scout **Inclination:** -90° **Bearing:** N/A

Easting: 329116.9 m **RL:** 2.05 m
Northing: 6241213.8 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Field Data

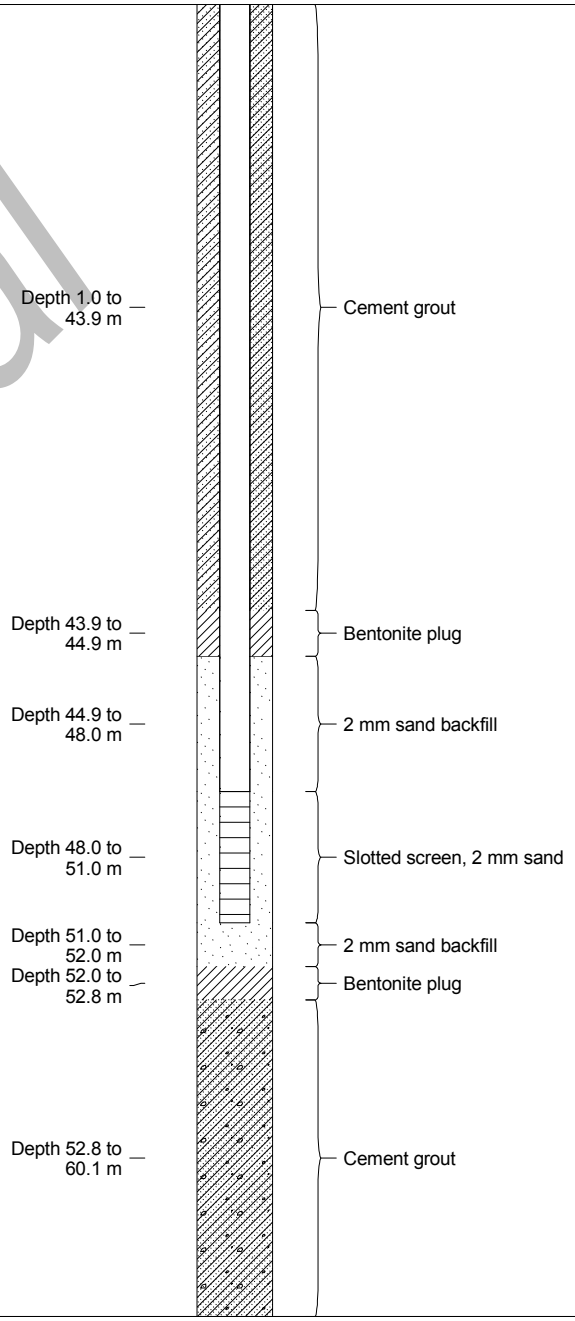
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log
HQ3	Run 3	100	90		32.0 to 30.0	28.0 to 32.0	
	Run 4	100	100		34.0 to 32.0	32.0 to 36.0	
	Run 5	96	83		36.0 to 34.0	36.0 to 38.0	
	Run 6	100	88		40.0 to 38.0	38.0 to 40.0	
	Run 7	100	77		42.0 to 40.0	40.0 to 42.0	
	Run 8	100	79		46.0 to 44.0	44.0 to 46.0	
	Run 9	100	42		48.0 to 46.0	46.0 to 48.0	
	Run 10	100	37		50.0 to 48.0	48.0 to 50.0	
	Run 11	100	5		52.0 to 50.0	50.0 to 52.0	
	Run 12	100	82		56.0 to 54.0	54.0 to 56.0	

Rock Description

Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
SANDSTONE, light grey	20 60 200 600 2000
SANDSTONE, fine grained, light grey *continued*	
SANDSTONE, fine grained, light grey	
SANDSTONE, medium to coarse grained, light grey	
NO CORE	
SANDSTONE, medium to coarse grained, light red-brown and yellow-brown	
SANDSTONE, medium to coarse grained, light grey	
SANDSTONE, medium grained, light grey	
SANDSTONE, medium grained, brown-grey	
SANDSTONE, medium grained, light grey	
SANDSTONE, medium grained, light grey	
BRECCIA, light grey	
SANDSTONE, medium grained, brown-grey	
BRECCIA, light grey	
SANDSTONE, medium grained, brown-grey	
LAMINITE	
SANDSTONE, fine grained, light grey	
BRECCIA, light grey	
LAMINITE	
BRECCIA, light grey and dark grey	
LAMINITE	

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 51.0 mBGL
Screen Top: 48.0 mBGL
Screen/Sensor Base: 51.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 4/03/2015
Development Date: 2/03/2015



Final

REMARKS:
GROUNDWATER MONITORING NOTES:

AECOM Engineering Log — Final

PIEZOMETER No. BH211

Sheet: 3 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Redmond Field, Brighton-Le-Sands

Project No: 60327128
Logged by: SBS **Checked by:** PC
Start Date: 10/02/2015 **End Date:** 12/02/2015

Driller: Macquarie Drilling Pty. Ltd.
Drill Rig: Hydrapower Scout
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 329116.9 m **RL:** 2.05 m
Northing: 6241213.8 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 51.0 mBGL
Screen Top: 48.0 mBGL
Screen/Sensor Base: 51.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 4/03/2015
Development Date: 2/03/2015

58.0 / 62.0 / 60.0 / 64.0 / 62.0 / 66.0 / 64.0 / 68.0 / 66.0 / 70.0 / 68.0 / 72.0 / 70.0 / 74.0 / 72.0 / 76.0 / 74.0 / 78.0 / 76.0 / 80.0 / 78.0 / 82.0 / 80.0 / 84.0 / 82.0 / 86.0 / 84.0 / 88.0 / 86.0 / 90.0

SANDSTONE, medium grained, brown-grey

SHALE BRECCIA

SANDSTONE, medium grained, brown-grey
continued

BH211 Terminated at 60.14 m.

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM **Engineering Log** **Final** **PIEZOMETER No. BH213**

Sheet: 1 of 2

Client: WDA
Project: WestConnex Stage 2: M5
Location: 68 Lennox St, Rockdale
Project No: 60327128
Logged by: SBS **Checked by:** PC
Start Date: 16/02/2015 **End Date:** 19/02/2015

Driller: Macquarie Drilling Pty Ltd **Hole Diameter:** Varies
Drill Rig: Hydrapower Scout **Inclination:** -90° **Bearing:** N/A
Easting: 328709.9 m **RL:** 10.84 m
Northing: 6241679.7 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Asphalt

Field Data								Rock Description		Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000	**Construction details:** PVC slotted screen, 2 mm sand **Pipe diameter:** 50 mm **Pipe Top:** 0.0 mBGL **Pipe Base:** 32.0 mBGL **Screen Top:** 29.0 mBGL **Screen/Sensor Base:** 32.0 mBGL **Instrument Details:** Level Troll 400 **Installation Date:** 4/03/2015 **Development Date:** 2/03/2015
					10.0	0.0		ASPHALT		Depth 0.0 to 0.2 m — Lockable Gatic cover Depth 0.2 to 1.0 m — Bentonite plug
					8.0	2.0		Sandy GRAVEL, fine to medium grained, dark brown-grey		
HQ3	Run 1	100	79					Silty SAND, fine grained, dark brown-grey		
	Run 2	100	78		6.0	4.0		Clayey SAND, fine to medium grained, yellow-brown		
	Run 3	100	79	19/02/2015	4.0	6.0		Silty SAND, fine to medium grained		
	Run 4	100	98		2.0	8.0		SANDSTONE, medium to coarse grained, light grey		
	Run 5	100	98		0.0	10.0		SANDSTONE, medium grained, red-brown		
	Run 6	100	78		-2.0	12.0		SANDSTONE, medium to coarse grained, brown-grey		
	Run 7	100	78		-4.0	14.0		SANDSTONE, medium to coarse grained, light grey		
	Run 8	100	88		-6.0	16.0		SANDSTONE, medium to coarse grained, light grey		Depth 1.0 to 26.0 m — Cement grout
	Run 9	100	73		-8.0	18.0		SANDSTONE, coarse grained, grey		
	Run 10	100	78		-10.0	20.0		SANDSTONE, medium to coarse grained, brown-grey		
					-12.0	22.0		SANDSTONE, medium grained, brown-grey		
					-14.0	24.0		SANDSTONE, medium grained, brown-grey		
					-16.0	26.0		SHALE BRECCIA, medium grained		
					-18.0	28.0		LAMINITE		
						30.0		SANDSTONE, medium grained, brown-grey		Depth 26.0 to 26.9 m — Bentonite plug Depth 26.9 to 29.0 m — 2 mm sand backfill Depth 29.0 to 32.0 m — Slotted screen, 2 mm sand
								SILTSTONE, dark grey		
								SANDSTONE, fine grained, light grey		
								SANDSTONE, medium to coarse grained, brown-grey		
								SANDSTONE, medium grained, brown-grey		

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

Engineering Log — Final — PIEZOMETER No. BH213

Sheet: 2 of 2

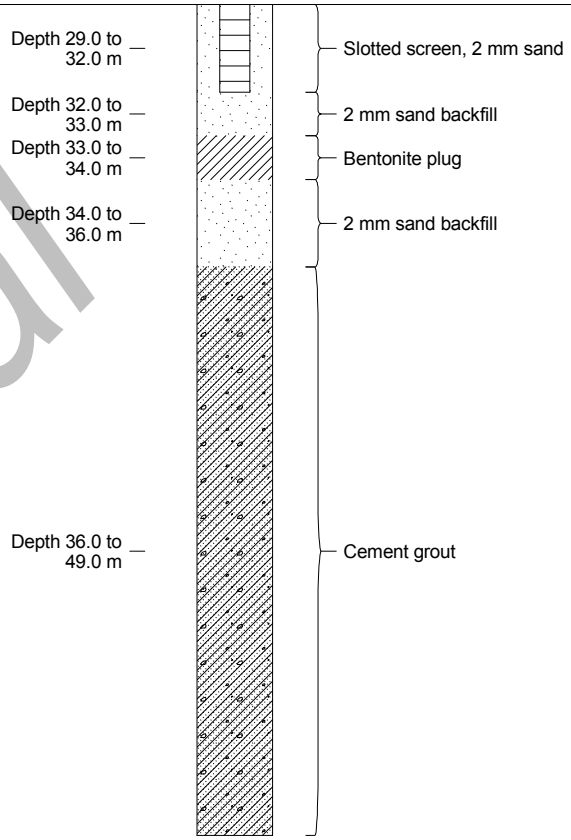
Client: WDA
Project: WestConnex Stage 2: M5
Location: 68 Lennox St, Rockdale
Project No: 60327128
Logged by: SBS
Checked by: PC
Start Date: 16/02/2015
End Date: 19/02/2015

Driller: Macquarie Drilling Pty Ltd
Drill Rig: Hydrapower Scout
Hole Diameter: Varies
Inclination: -90°
Bearing: N/A
Easting: 328709.9 m
Northing: 6241679.7 m
Hor. Proj/Dat: MGA94/GDA94
RL: 10.84 m
Ver. Datum: m AHD
Surface: Asphalt

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm)
HQ3	Run 11	100	74		20.0	32.0		SANDSTONE, medium to coarse grained, brown-grey	
	Run 12	100	97		22.0	34.0		SANDSTONE, medium grained, grey-brown	
	Run 13	100	95		24.0	36.0		SANDSTONE, medium to coarse grained, brown-grey	
	Run 14	100	100						
	Run 15	100	97		26.0	38.0		LAMINITE	
	Run 16	100	88		28.0	40.0		SILTSTONE, dark grey	
	Run 17	100	95		30.0	42.0		SANDSTONE, medium grained, brown-grey	
								SANDSTONE, medium grained, light grey	
	Run 18	100	100		32.0	44.0		SANDSTONE, medium to coarse grained, light grey	
								SANDSTONE, medium grained, light grey	
	Run 19	100	87		34.0	46.0		SANDSTONE, medium to coarse grained, brown-grey	
					36.0	48.0		SANDSTONE, medium grained	
	Run 20	100	100					SANDSTONE, medium grained, brown-grey	
					38.0	50.0		SANDSTONE, medium grained, brown-grey	
								BH213 Terminated at 49.00 m.	
					40.0	52.0			
					42.0	54.0			
					44.0	56.0			
					46.0	58.0			
					48.0	60.0			

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 32.0 mBGL
Screen Top: 29.0 mBGL
Screen/Sensor Base: 32.0 mBGL
Instrument Details: Level Troll 400
Installation Date: 4/03/2015
Development Date: 2/03/2015



Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM **Engineering Log** **Final** **PIEZOMETER No. BH214**

Sheet: 1 of 3

Client: WDA **Project No:** 60327128

Project: WestConnex Stage 2: M5 **Logged by:** DW **Checked by:** PC

Location: Bestic St, Soccer field, Banksia **Start Date:** 6/02/2015 **End Date:** 10/02/2015

Driller: Terratest Pty Ltd **Hole Diameter:** Varies **Easting:** 329228.0 m **RL:** 4.44 m

Drill Rig: Comacchio Geo305 **Inclination:** -90° **Northing:** 6241854.2 m **Ver. Datum:** m AHD

Bearing: N/A **Hor. Proj/Dat:** MGA94/GDA94 **Surface:** Grass

Field Data

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log
HQ3	Run 1	52	50		4.0	0.0	
					2.0	2.0	
					0.0	4.0	
					-2.0	6.0	
					-4.0	8.0	
					-6.0	10.0	
	Run 2	100	100		-8.0	12.0	
					-10.0	14.0	
	Run 3	100	94		-12.0	16.0	
					-14.0	18.0	
	Run 4	100	96		-16.0	20.0	
	Run 5	100	54		-18.0	22.0	
	Run 6	100	97		-20.0	24.0	
	Run 7	100	93		-22.0	26.0	
	Run 8	100	79		-24.0	28.0	
						30.0	

Rock Description

Summary Geology (refer to geological log for full descriptions)

Defect Spacing (mm): 20 60 200 600 2000

- Silty SAND, fine to coarse grained, dark brown
- Silty SAND, fine to coarse grained, dark grey-brown
- COBBLES, and BOULDERS
- Silty SAND, fine to coarse grained, black
- Clayey SAND, fine to coarse grained, black
- Clayey SAND, fine to coarse grained
- Clayey SAND, fine to coarse grained
- SANDSTONE
- NO CORE
- SANDSTONE, medium to coarse grained, light grey and yellow-orange
- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, medium grained, light grey
- SILTSTONE, (70-80%), dark grey
- SILTSTONE, (90%), dark grey
- SANDSTONE, medium grained, light grey

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 34.5 mBGL
Screen Top: 31.5 mBGL
Screen/Sensor Base: 34.5 mBGL
Instrument Details: Level Troll 400
Installation Date: 4/03/2015
Development Date: 2/03/2015

Depth 0.0 to 0.2 m — Lockable gatic cover

Depth 0.2 to 28.5 m — Cement grout

Depth 28.5 to 29.5 m — Bentonite plug

2 mm sand backfill

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

AECOM Engineering Log — Final

PIEZOMETER No. BH214

Sheet: 2 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Bestic St, Soccer field, Banksia

Project No: 60327128
Logged by: DW **Checked by:** PC
Start Date: 6/02/2015 **End Date:** 10/02/2015

Driller: Terratest Pty Ltd
Drill Rig: Comacchio Geo305

Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 329228.0 m **RL:** 4.44 m
Northing: 6241854.2 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Field Data

Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log
HQ3	Run 9	100	100		26.0	32.0	
	Run 10	100	90		28.0	34.0	
	Run 11	100	91		30.0	36.0	
	Run 12	100	93		32.0	38.0	
	Run 13	100	99		34.0	40.0	
	Run 14	100	99		36.0	42.0	
	Run 15	100	100		38.0	44.0	
	Run 16	100	100		40.0	46.0	
	Run 17	100	100		42.0	48.0	
	Run 18	100	95		44.0	50.0	
					46.0	52.0	
					48.0	54.0	
					50.0	56.0	
					52.0	58.0	
					54.0	60.0	

Rock Description

Summary Geology (refer to geological log for full descriptions)

- SANDSTONE, fine to medium grained, grey
- SANDSTONE, medium to coarse grained, light grey *continued*
- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, medium grained, light grey
- SILTSTONE, dark grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, fine to medium grained, light grey
- SANDSTONE, medium to coarse grained, light grey
- SANDSTONE, fine to medium grained, light grey
- SANDSTONE, medium grained, light grey
- SANDSTONE, medium grained, brown-grey
- SANDSTONE, medium grained, light brown-grey
- SANDSTONE, fine to medium grained, light grey

Defect Spacing (mm): 20, 60, 200, 600, 2000

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 34.5 mBGL
Screen Top: 31.5 mBGL
Screen/Sensor Base: 34.5 mBGL
Instrument Details: Level Troll 400
Installation Date: 4/03/2015
Development Date: 2/03/2015

- Depth 29.5 to 31.5 m — 2 mm sand backfill
- Depth 31.5 to 34.5 m — Slotted screen, 2 mm sand
- Depth 34.5 to 35.5 m — 2 mm sand backfill
- Depth 35.5 to 37.0 m — Bentonite plug
- Depth 37.0 to 65.0 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015

AECOM Engineering Log

Final

PIEZOMETER No. BH214

Sheet: 3 of 3

Client: WDA
Project: WestConnex Stage 2: M5
Location: Bestic St, Soccer field, Banksia

Project No: 60327128
Logged by: DW **Checked by:** PC
Start Date: 6/02/2015 **End Date:** 10/02/2015

Driller: Terratest Pty Ltd
Drill Rig: Comacchio Geo305

Hole Diameter: Varies
Inclination: -90°
Bearing: N/A

Easting: 329228.0 m **RL:** 4.44 m
Northing: 6241854.2 m **Ver. Datum:** m AHD
Hor. Proj/Dat: MGA94/GDA94 **Surface:** Grass

Field Data								Rock Description	Piezometer Details
Method	Core Run	TCR (%)	RQD (%)	Ground Water	Reduced Level (m)	Depth (m)	Graphic Log	Summary Geology (refer to geological log for full descriptions)	Defect Spacing (mm) 20 60 200 600 2000
HQ3	Run 19	100	100		62.0	56.0		SANDSTONE, medium grained, light grey	
	Run 20	100	100		58.0	60.0			
					64.0	64.0		*BH214 Terminated at 64.00 m.*	
					60.0	66.0			
					62.0	68.0			
					64.0	70.0			
					66.0	72.0			
					68.0	74.0			
					70.0	76.0			
					72.0	78.0			
					74.0	80.0			
					76.0	82.0			
					78.0	84.0			
					80.0	86.0			
					82.0	88.0			
					84.0	90.0			

Piezometer Details

Construction details: PVC slotted screen, 2 mm sand
Pipe diameter: 50 mm
Pipe Top: 0.0 mBGL
Pipe Base: 34.5 mBGL
Screen Top: 31.5 mBGL
Screen/Sensor Base: 34.5 mBGL
Instrument Details: Level Troll 400
Installation Date: 4/03/2015
Development Date: 2/03/2015

Depth 37.0 to 65.0 m — Cement grout

Final

REMARKS:
GROUNDWATER MONITORING NOTES:

ANZ_PIEZO_WCX2 60327128_WCX2_TA_MASTER_DO NOT USE UPDATING IN PROGRESS.GPJ AECOM_2-01-AA.GDT AECOM_2-01-AA_VER40.GLB 26.3.2015