ATTACHMENT A3
BOREHOLE BH HQ1 LOGS, PHOTOS AND EXPLANATION SHEETS

Pells Sullivan Meynink Pty Ltd
Engineering Consultants
Rock-Soil-Water
ABN 15 061 447 621

EXPLANATION SHEET
BOREHOLE LOG

Method

Symbol	Diameter (mm)
Auger Screwing	Variable
Auger Drilling	Variable
NMLC	51.9
BQ	36.5
NQ	47.6
HQ	63.5
PQ	85.0
Dry-Plug	N/A
Percussion	Variable
X	Excavator
BH	Backhoe

Water

Symbol	Level Type
C	Complete Water Loss
I	Water Inflow
L	Water Level
P	Partial Water Loss

Support

- Unsupported / No Support
- Supported

Testing

Symbol	Term
UCS	Unconfined Compressive Strength
TX	Triaxial Test
DS	Direct Shear Test
PS	Particle Size Distribution
BT	Brazilian Test
DT	Direct Tensile
PT	Petrographical Sample
MH	Material Hardness (undifferentiated)
SD	Slake Durability
PD	Porosity/Density
PE	Permeability Test
U50	Undisturbed Sample 50mm diameter
D	Disturbed Sample
Bs	Bulk Sample
Is50 (A)	Point Load Axially Tested
Is50 (D)	Point Load Diametrally Tested

Penetration

Code	Description
1	No resistance
2	Moderate Resistance
3	Refusal

NON-COHESIVE SOILS are described in terms of density, colour, with comments on minor constituents or special features. Density (density index) is generally based on standard penetration testing (AS1289 Test F3.1), or other forms of penetration testing. Terms used in describing density are set out below:

Term	Density Index blows/300mm	SPT "N" Values
Very Loose	Less than 15%	Less than 5
Loose	15-35%	5-10
Medium Dense	35-65%	10-30
Dense	65-85%	30-50

Soil Consistency/Density

Symbol	Term
VS	Very soft
S	Soft
F	Firm
ST	Stiff
VST	Very Stiff
H	Hard
Fb	Friable
VL	Very Loose
L	Loose
MD	Medium Dense
D	Dense
VD	Very Dense

Soil Moisture

Symbol	Term
D	Dry
M	Moist
W	Wet
Wp	Wet at plastic limit

COHESIVE SOILS are described in terms of undrained shear strength (consistency), colour and structure with comments on minor constituents or apparent special features. Consistency is measured by hand penetrometer or determined by laboratory testing or estimated from experience. Classification in terms of undrained shear strength (consistency) is as follows:

Symbol	Term	Abbreviation	Guide For Field	Shear Strength	Unconfined Compressive Strength
S0	Very Soft	VS	Easily penetrated several centimetres by fist.	less than 12 kPa	less than 25 kPa
S1	Soft	S	Easily penetrated several centimetres by thumb. Can be moulded by light finger pressure.	12-25 kPa	25-50
S2	Firm	F	Can be penetrated by thumb with moderate effort. Can be moulded by strong finger pressure.	25-50 kPa	50-100
S3	Stiff	St	Readily indented by thumb.	50-100 kPa	100-200
S4	Very Stiff	Vst	Readily indented by thumbnail.	100-200 kPa	200-400
S5	Hard	H	Indented with difficulty by thumbnail	greater than 200 kPa	greater than 400 kPa

Unified Soil Classification (USC)

Major Divisions			Group Symbols	Typical Names
Coarse-Grained Soils More than 50% coarser than 0.075mm	Gravels (more than 50% coarser than 2mm)	Clean Gravels	**GW**	Well-graded gravels and gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines.
		Gravels With Fines	**GM**	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels. gravel-sand-clay mixtures.
	Sands (more than 50% of coarse fraction finer than 2mm)	Clean Sands	**SW**	Well-graded sands and gravelly sands, little or no fines.
			SP	Poorly graded sands and gravelly sands, little or no fines.
		Sand With Fines	**SM**	Silty sands, sand-silt mixture.
			SC	Clayey sands, sand-clay mixtures.
Fine-Grained Soils 50% or more finer than 0.075mm	Silts and Clays Liquid limit 50% or less		**ML**	Inorganic silts, very fine sands, rock flour silty or clayey fine sands.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and silty clays of low plasticity.
	Silts and Clays Liquid limit greater than 50%		**MH**	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity.
Highly Organic Soils			**PT**	Peat etc.

Weathering

Symbol	Term	Description
FR	Fresh	Rock substance unaffected by weathering.
SW	Slightly Weathered	Rock substance affected by weathering to the extent that partial staining or partial discolouration of the rock substance usually by limonite has taken place. The colour and texture of the fresh rock is recognisable; strength properties are essentially those of the fresh rock substance.
MW	Moderately Weathered	Rock substance affected by weathering to the extent staining extends throughout whole of the rock substance and the original colour of the fresh rock is no longer recognisable.
HW	Highly Weathered	Rock substance affected by weathering to the extent that limonite staining or bleaching affects the whole of the rock substance and signs of chemical or physical decomposition of individual minerals are usually evident. Porosity and strength may be increased or decreased when compared to the fresh rock substance, usually as a result of the leaching or deposition of iron. The colour and strength of the original fresh rock substance is no longer recognisable.
EW	Extremely Weathered	Rock substance affected by weathering to the extent that the rock exhibits soil properties, i.e. it can be remoulded and can be classified according to the Unified Soil Classification System, but the texture of the original rock is still evident.

Graphic Log/Core loss

core recovered (hatching indicates material)

no core recovered

RQD

RQD = cumulative length of core pieces > 10cm (m) x 100%
rock mass unit length (m)

RQD Class (%)	Rock Quality Description
0 - 25	very poor
25 - 50	poor
50 - 75	fair
75 - 90	good
90 - 100	excellent

Strength

Based on AS1726-1993 'Geotechnical site investigations' and CANMET 'Pit Slope Manual' (1977).

Symbol	Description for Field Estimation	Approximate Strength Classification		
	Soil	**Consistency**	**C_u(kPa)**	**UCS (MPa)**
S0	Easily penetrated several centimetres by fist	Very soft	≤ 12	≤ 0.025
S1	Easily penetrated several centimetres by thumb. Can be moulded by light finger pressure.	Soft	12-25	0.025-0.05
S2	Can be penetrated by thumb with moderate effort. Can be moulded by strong finger pressure.	Firm	25-50	0.05-0.1
S3	Readily indented by thumb.	Stiff	50-100	0.1-0.2
S4	Readily indented by thumbnail	Very Stiff	100-200	0.2-0.4
S5	Indented with difficulty by thumbnail	Hard	200-350	0.4-0.7
	Rock	**Strength Classification**		**UCS (MPa)**
R0	Thumbnail easily scratches; gentle blow with geological pick leaves deep impression.	Extremely Low		0.7-1.5
R1	Can be peeled by a pocket knife. Crumbles under firm blows with geological pick.	Very Low		1.5-3.0
R2	Can be peeled by a pocket knife with difficulty; shallow indentation made by firm blow of geological pick.	Low		3.0-10
R3	Cannot be scraped or peeled with a pocket knife; specimen can be fractured with single firm blow of hammer end of geological pick.	Medium		10-25
R4	Specimen requires more than one blow with hammer end of geological pick to fracture.	High		25-80
R5	Specimen requires many blows of hammer end of geological pick to fracture.	Very High		>80

Defect Description

Order of description: type, inclination, shape, roughness, infill type, infill thickness, number

Defect type

Symbol	Description
CL	Clay Seam
FL	Fault - fracture along which displacement is recognisable.
SR	Shear - a fracture along which movement has taken place but no displacement is recognisable. Evidence for movement may be slickensides, polishing and/or clay gouge.
SH	Sheared Zone - zone of multiple closely spaced fracture planes with roughly parallel planar boundaries usually forming blocks of lenticular or wedge shaped intact material. Fractures are typically smooth, polished or slickensided; and curved.
BG	Bedding parting - arrangement in layers of mineral grains or crystals parallel to surface of deposition along which a continuous observable parting occurs.
BSH	Bedding plane shear - a shear formed along a bedding plane
JN	Joint - a single fracture across which rock has little or no tensile strength and is not obviously related to rock fabric.
CN	Contact - surface between two lithologies.
SC	Schistosity - plane formed by the preferred orientation of the constituent minerals in a parallel arrangement in a coarse grained rock which has undergone regional metamorphism (schist).
CV	Cleavage - plane of mechanical fracture in a rock normally sufficiently closely spaced to form parallel-sided slices.
FO	Foliation
CZ	Crushed Zone - zone with roughly parallel, planar boundaries (commonly slickensided) containing disoriented usually angular rock fragments of variable size often in a soil matrix.
VN	Vein - fracture in which a tabular or sheet-like body of minerals have been intruded.
DK	Dyke - Igneous intrusion - often weathered and altered to a clay like substance.
DZ	Decomposed Zone - zone of any shape but commonly with parallel planar boundaries containing moderately to gradational boundaries into fresher rock.
FR	Fracture
FZ	Fractured Zone - a zone of closely spaced defects (mainly joints, bedding, cleavage and/or schistosity) comprised of core lengths in the order of 50mm or less.
DI	Drilling Induced Fracture - Fracture caused by drilling. Usually smooth (if core has spun) or irregular/serrated (if rock has broken in tension).

Inclination

For specific defects, the orientation of each individual defect is noted in degrees from the core axis. If the orientation cannot be measured, a dash (-) is used.

Shape

Symbol		Description
PL	Planar	Forms a continuous plane without variation in orientation.
CU	Curved	Has a gradual change in orientation.
UN	Undulating	Has a wavy surface shape.
ST	Stepped	Has one or more well defined steps
IR	Irregular	Many changes of orientation.
SE	Serrated	Saw-tooth like appearance

Roughness

Symbol		Description
Ro1	Slickensided or polished	Very smooth, reflects light.
Ro2	Smooth	Roughness not detected with finger.
Ro3	Defined ridges	Sandpaper feel (fine to medium sandpaper).
Ro4	Small steps	Sandpaper feel (medium to coarse sandpaper).
Ro5	Very rough	Very well defined ridges and/or steps.

Infill Type

Symbol	Description
KL	Clean
CA	Calcite
CB	Carbonaceous material
CH	Chlorite
CT	Carbonate
FE	Iron oxide
LM	Limonite
QZ	Quartz
MG	Manganese
SU	Sulphides
SE	Sericite
RF	Rock fragments
PY	Pyrite
g	gravelly -
s	sandy -
z	silty -
c	clayey -
G	Gravel
S	Sand
Z	Silt
CL	Clay
HE	Haematite

Note: Lower case letters are used as prefixes

Infill Thickness

Where infilling is present, the thickness of infill is recorded using the following convention:

ST Iron oxide staining of less than 1mm
VN Veneer coating of less than 1mm

If the infilling is greater than 1mm, the actual thickness of infill is recorded in millimeters.

If infill is not present, a dash (-) is recorded

Number

Number of defects with similar characteristics.

Standard Lithological Symbols


Fill


No Core


Gravel


Sand


Silt


Clay


Topsoil


Peat


Coal


Conglomerate


Breccia


Sandstone


Shale


Mudstone


Laminite


Coarse Grained Igneous Rock


Fine Grained Igneous Rock


Coarse Grained Metamorphic Rock


Fine Grained Metamorphic Rock

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A.C.N. 061447621

Borehole Log
Hole No: HQ1

job no: PSM1059
client: Hornsby Shire Council
project: Hornsby Quarry
drilling subcontractor: McDermott
date hole commenced: 14/11/06
date hole complete: 18/11/06

drill information:
core diameter: 61
datum: AMG
borehole location: 322916.2E 6269635.9N
inclination/azimuth: -60° / 127°
surface R.L.: 105.4 m

Sheet 1 of 19
Logged by: RS/PC

Method	Testing	Water	RL (m)	Depth (m)	Graphic Log	Material Description (ROCK TYPE: Colour, grain size, major and minor components)	Weathering (EW HW MW SW FR)	Estimated Strength (S0 S1 S2 S3 S4 S5 R0 R1 R2 R3 R4 R5)	Point Load Is (50) MPa	RQD % (20 40 60 80)	Defect Description / Comments (Type, inclination, shape, roughness, infill type, infill thickness, number.)
Auger			105.0	0.5		FILL: Compacted gravel and silty sand; well graded road base					
Tri cone			104.5	1.0		VOLCANIC BRECCIA: Brown-orange					
			104.0	1.5							
			103.5	2.0							
			103.0	2.5							
			102.5	3.0							
HQ3			102.0	3.5		VOLCANIC BRECCIA: Brown-orange with grey clay seams, fine grained matrix with clasts of 1 to 3 mm, highly fractured.					FZ, , RC, 240mm JN, 85°, PL, Ro2, CL, 13mm JN, 80°, PL, Ro2, CL, 3mm JN, 36°, PL, Ro2, CL, 2mm JN, 51°, ST, Ro2, CL, 10mm JN, 37°, PL, Ro2, CL, 10mm JN, 41°, PL, Ro2, CL, 10mm CL, 55°, PL, Ro2, CL, 8mm CZ, 54°, PL, Ro2, RC, 50mm JN, 50°, PL, Ro2, RC, 3mm JN, 36°, PL, Ro2, CL, 1mm JN, 55°, PL, Ro2, CL, VN CL, 68°, PL, Ro2, CL, 10mm CL, 66°, PL, Ro2, CL, 17mm CZ, 56°, PL, Ro2, RC, 80mm CL, 65°, PL, Ro2, CL, 15mm CL, 65°, PL, Ro2, CL, 10mm CL, 65°, PL, Ro2, CL, 11mm JN, 70°, PL, Ro2, CL, VN
			101.5	4.5							

CIVIL BOREHOLE HQ CORE LOG.GPJ PSMLIB JAN04.GDT 17/1/07

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HQ3			101.0			VOLCANIC BRECCIA: Brown-orange with grey clay seams, fine grained matrix with clasts of 1 to 3 mm, highly fractured.					CZ, 70°, PL, Ro2, RC, 160mm JN, 66°, PL, Ro3, RC, 4mm JN, 56°, PL, Ro2, KL JN, 64°, PL, Ro2, KL JN, 71°, PL, Ro2, RC, VN JN, 57°, PL, Ro2, RC, VN
				5.5		450mm NO CORE					
			100.5			VOLCANIC BRECCIA: Brown-orange with grey clay seams, fine grained matrix with clasts of 1 to 3 mm, highly fractured.					JN, 56°, PL, Ro3, RC, 5mm JN, 55°, PL, Ro3, RC, 5mm JN, 46°, PL, Ro3, RC, 1mm CZ, 51°, PL, Ro3, RC, 150mm
				6.0							
			100.0								JN, 51°, PL, Ro3, RC, 3mm JN, 59°, PL, Ro3, RC, 20mm CL, 49°, PL, Ro2, RC, 80mm
				6.5							JN, 64°, PL, Ro2, CL, 1mm CL, 61°, PL, Ro2, CL, 18mm CL, 60°, PL, Ro2, CL, 4mm CL, 66°, PL, Ro2, CL, 1mm JN, 70°, PL, Ro2, KL CZ, 52°, PL, Ro2, RC, 150mm
			99.5			640mm NO CORE					
				7.0							
			99.0								
				7.5		VOLCANIC BRECCIA: Brown-orange with grey clay seams, fine grained matrix with clasts of 1 to 3 mm. Core damaged by handling.					
			98.5	8.0							
				8.5							
			98.0								JN, 45°, PL, Ro3, RC, 2mm
				9.0							
			97.5								
				9.5							CL, 80°, PL, Ro2, RC, 100mm
			97.0			VOLCANIC BRECCIA: Dark purple-grey and white with orange limonite staining, fine grained matrix with subangular clasts upto 4 mm.					JN, 70°, IR, Ro3, KL

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project: Hornsby Quarry
drilling subcontractor: McDermott
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Sheet 3 of 19
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Method	Testing	Water	RL (m)	Depth (m)	Graphic Log	Material Description (ROCK TYPE: Colour, grain size, major and minor components)	Weathering (EW HW MW SW FR)	Estimated Strength (S0 S1 S2 S3 S4 S5 R0 R1 R2 R3 R4 R5)	Point Load Is (50) MPa	RQD % (20 40 60 80)	Defect Description / Comments (Type, inclination, shape, roughness, infill type, infill thickness, number.)
HQ3			96.5	10.5		VOLCANIC BRECCIA: Dark purple-grey and white with orange limonite staining, fine grained matrix with subangular clasts upto 4 mm.					JN, 20°, IR, Ro3, KL JN, 55°, PL, Ro2, KL JN, 31°, IR, Ro2, KL
						Matrix altered to clay					CL, 76°, IR, Ro2, RC, 18mm
			96.0	11.0		VOLCANIC BRECCIA: dark grey, fine grained with orange limonite altered subangular clasts up to 22 mm.					CL, , RC
			95.5	11.5		100mm zone where matrix is altered to clay					JN, 36°, IR, Ro2, KL CZ, , PL, Ro2, RC, 100mm JN, 54°, PL, Ro2, KL JN, 38°, PL, Ro2, KL
			95.0	12.0							JN, 25°, IR, Ro2, KL
				12.5		870mm NO CORE					
			94.5	13.0							
			94.0								
				13.5		SANDSTONE: Light yellow-grey, medium grained, with occasional dark grey shale laminations					JN, 64°, PL, Ro3, KL JN, 64°, PL, Ro3, KL JN, 63°, IR, Ro3, KL
			93.5	14.0		Matrix altered to clay					JN, 44°, IR, Ro3, RC, VN JN, 50°, IR, Ro2, RC, VN JN, 24°, IR, Ro2, RC, VN
			93.0	14.5		SANDSTONE BRECCIA: Light yellow-grey medium to coarsed grained sandstone clasts up to 50mm in a fine grained matrix. Limonite staining throughout.					
			92.5			200mm zone where matrix is altered					

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HQ3			92.0	15.5		to clay SANDSTONE BRECCIA: Light yellow-grey medium to coarsed grained sandstone clasts up to 50mm in a fine grained matrix. Limonite staining throughout.					JN, 61°, PL, Ro3, KL
			91.5	16.0		SANDSTONE: Light orange-grey, fine to medium grained with numerous randomly orientated limonite altered brown veins throughout; occasional shale wisps and laminations throughout. Unit has a thermal metamorphic overprint.					JN, 74°, PL, Ro3, KL
				16.5							JN, 31°, PL, Ro3, CA, 10mm
			91.0								JN, 37°, IR, Ro3, CA, VN
				17.0							JN, 54°, PL, Ro3, CA, VN
						100mm highly fractured shale band					
			90.5								JN, 51°, IR, Ro3, CB, VN
						50mm highly fractured shale band					JN, 54°, ST, Ro3, CB, VN JN, 54°, IR, Ro3, CB, VN
				17.5		20mm shale band					JN, 65°, IR, Ro2, CB, VN
						10mm shale band					JN, 36°, PL, Ro3, KL JN, 53°, PL, Ro3, KL
			90.0								
				18.0							
			89.5								
				18.5							JN, 69°, PL, Ro3, KL JN, 54°, PL, Ro3, KL
			89.0								
				19.0							JN, 74°, IR, Ro3, KL
											JN, 58°, IR, Ro3, KL
											JN, 74°, PL, Ro3, KL
			88.5	19.5							JN, 84°, PL, Ro3, KL

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HQ3			88.0			SANDSTONE: Light orange-grey, fine to medium grained with numerous randomly orientated limonite altered brown veins throughout; occasional shale wisps and laminations throughout. Unit has a thermal metamorphic overprint.					JN, 68°, IR, Ro3, CB, 4mm JN, 55°, PL, Ro3, KL JN, 25°, IR, Ro3, CB, 4mm
				20.5							JN, 40°, PL, Ro3, KL JN, 35°, PL, Ro3, KL JN, 60°, IR, Ro3, CB, 1mm JN, 40°, PL, Ro3, KL JN, 28°, PL, Ro3, CA, 1mm JN, 49°, IR, Ro3, CL, 1mm CZ, , IR, Ro3, RF, 80mm
			87.5								
				21.0		200mm highly fractured zone					JN, 24°, IR, Ro2, RF, 4mm JN, 33°, IR, Ro3, RF, 3mm
			87.0								JN, , PL, Ro2, KL
				21.5							JN, 36°, PL, Ro3, KL JN, 34°, PL, Ro3, KL
			86.5								
				22.0							JN, 37°, PL, Ro2, RF, 3mm
			86.0								
				22.5							JN, 37°, PL, Ro2, RF, 3mm
			85.5	23.0							
				23.5							JN, 60°, IR, Ro2, KL
			85.0								
				24.0							JN, 58°, IR, Ro2, KL
			84.5								JN, 74°, PL, Ro2, KL
				24.5		500mm zone of INTERBEDDED SANDSTONE and SHALE					JN, 66°, PL, Ro2, RF JN, 63°, IR, Ro2, RF, 4mm CZ, , IR, Ro2, RF, 30mm JN, 63°, IR, Ro2, RF, 10mm FZ, , PL, Ro2, RF, 100mm
			84.0								JN, 61°, IR, Ro2, KL

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Logged by: RS/PC

Method	Testing	Water	RL (m)	Depth (m)	Graphic Log	Material Description (ROCK TYPE: Colour, grain size, major and minor components)	Weathering (EW HW MW SW FR)	Estimated Strength (S0 S1 S2 S3 S4 S5 R0 R1 R2 R3 R4 R5)	Point Load Is (50) MPa	RQD % (20 40 60 80)	Defect Description / Comments (Type, inclination, shape, roughness, infill type, infill thickness, number.)
HQ3			83.5	25.5		SANDSTONE: Light orange-grey, fine to medium grained with numerous randomly orientated limonite altered brown veins throughout; occasional shale wisps and laminations throughout. Unit has a thermal metamorphic overprint.					JN, 36°, PL, Ro2, KL JN, 79°, PL, Ro2, KL JN, 50°, PL, Ro2, KL JN, 50°, PL, Ro2, KL
			83.0	26.0		Start of gradational change from sandstone with numerous veins to sandstone breccia					JN, 56°, PL, Ro2, KL JN, 45°, IR, Ro2, KL JN, 45°, PL, Ro2, KL JN, 45°, PL, Ro2, KL JN, 45°, PL, Ro2, KL
			82.5	26.5		250mm zone of INTERBEDDED SANDSTONE and SHALE					JN, 73°, PL, Ro2, KL JN, 49°, IR, Ro2, RF, VN
			82.0	27.0		SANDSTONE BRECCIA: Light yellow-grey medium to coarsed grained sandstone clasts up to 50mm in a fine grained matrix. Limonite staining and veins throughout. Unit has a thermal metamorphic overprint.					JN, 41°, PL, Ro2, KL JN, 64°, PL, Ro2, KL
			81.5	27.5							JN, 83°, PL, Ro2, CL, 1mm JN, 59°, PL, Ro2, KL JN, 47°, PL, Ro2, KL
			81.0	28.0							JN, 65°, PL, Ro2, KL JN, 64°, IR, Ro2, KL
			80.5	28.5							JN, 74°, PL, Ro2, KL
						40mm fractured shale band at 70° to core axis					
			80.0	29.0		SANDSTONE: Light orange-grey, fine to medium grained with numerous randomly orientated limonite altered brown veins throughout; occasional shale wisps and laminations throughout. Unit has a thermal metamorphic overprint.					JN, 82°, PL, Ro2, KL JN, 75°, IR, KL JN, 70°, IR, Ro2, KL
			79.5	29.5		10mm shale band at 80° to core axis					JN, 65°, IR, Ro2, KL JN, 64°, IR, Ro2, KL

CIVIL BOREHOLE HQ CORE LOG.GPJ PSMLIB JAN04.GDT 17/1/07

Refer to Explanation Sheets Attached for Classification Systems

Pells Sullivan Meynink Pty Ltd

Engineering Consultants
Rock-Soil-Water

A.C.N. 061447621

Borehole Log
Hole No: HQ1

job no: PSM1059
client: Hornsby Shire Council
project: Hornsby Quarry
drilling subcontractor: McDermott
date hole commenced: 14/11/06
date hole complete: 18/11/06

drill information:
core diameter: 61
datum: AMG
borehole location: 322916.2E 6269635.9N
inclination/azimuth: -60° / 127°
surface R.L.: 105.4 m

Sheet 7 of 19
Logged by: RS/PC

Method	Testing	Water	RL (m)	Depth (m)	Graphic Log	Material Description (ROCK TYPE: Colour, grain size, major and minor components)	Weathering (EW HW MW SW FR)	Estimated Strength (S0 S1 S2 S3 S4 S5 R0 R1 R2 R3 R4 R5)	Point Load Is (50) MPa	RQD % (20 40 60 80)	Defect Description / Comments (Type, inclination, shape, roughness, infill type, infill thickness, number.)
HQ3			79.0	30.5		SANDSTONE BRECCIA: Light yellow-grey medium to coarsed grained sandstone clasts up to 200mm in a fine grained matrix. Limonite staining and veins throughout. Unit has a thermal metamorphic overprint.					JN, 81°, PL, Ro2, KL
											JN, 68°, IR, Ro2, KL
											JN, 64°, IR, Ro2, KL
			78.5	31.0							
				31.5		40mm shale band at 30° to core axis 25mm charcoal lump					JN, 68°, PL, Ro2, KL
			78.0								
						150mm highly fractured shale band					JN, 29°, IR, Ro1, CB, 3mm
				32.0							
			77.5								JN, 45°, IR, Ro1, CB, 5mm
						70mm highly fractured shale band at 50° to the core axis					CZ, 85°, IR, Ro2, RF, 18mm
				32.5							
			77.0								
				33.0		15mm shale band at 70° to core axis					JN, 63°, IR, Ro2, KL JN, 67°, IR, Ro2, KL
											JN, 86°, PL, Ro2, CL, 1mm JN, 66°, IR, Ro2, KL JN, 60°, IR, Ro2, KL JN, 60°, PL, Ro2, KL JN, 60°, PL, Ro2, KL JN, 78°, IR, KL CL, 85°, PL, Ro2, CL, 10mm
			76.5								
				33.5							
			76.0								JN, 70°, IR, Ro2, CL, VN JN, 66°, IR, Ro2, KL
				34.0							JN, 60°, IR, Ro2, CL, VN JN, 64°, PL, Ro2, CL, VN JN, 63°, PL, Ro2, KL JN, 66°, PL, Ro2, KL
			75.5	34.5							JN, 66°, PL, Ro2, KL JN, 66°, IR, Ro2, KL

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Engineering Consultants
Rock-Soil-Water

A.C.N. 061447621

Borehole Log
Hole No: HQ1

job no: PSM1059
client: Hornsby Shire Council
project: Hornsby Quarry
drilling subcontractor: McDermott
date hole commenced: 14/11/06
date hole complete: 18/11/06

drill information:
core diameter: 61
datum: AMG
borehole location: 322916.2E 6269635.9N
inclination/azimuth: -60° / 127°
surface R.L.: 105.4 m

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Logged by: RS/PC

Method	Testing	Water	RL (m)	Depth (m)	Graphic Log	Material Description (ROCK TYPE: Colour, grain size, major and minor components)	Weathering (EW HW MW SW FR)	Estimated Strength (S0 S1 S2 S3 S4 S5 R0 R1 R2 R3 R4 R5)	Point Load Is (50) MPa	RQD % (20 40 60 80)	Defect Description / Comments (Type, inclination, shape, roughness, infill type, infill thickness, number.)
HQ3			75.0			SANDSTONE BRECCIA: Light yellow-grey medium to coarsed grained sandstone clasts up to 200mm in a fine grained grey (ash?) matrix. Unit has a thermal metamorphic overprint.					JN, 65°, IR, Ro2, KL JN, 70°, IR, Ro2, KL JN, 70°, IR, Ro2, KL JN, 65°, IR, Ro2, KL JN, 60°, IR, Ro2, KL
				35.5							JN, 72°, IR, Ro2, KL
			74.5			SANDSTONE and VOLCANIC BRECCIA: Light and dark grey clasts of sandstone (up to 100mm; ~60%) and volcanic breccia (up to 20mm; ~15%) in a grey (ash?) fine grained matrix (~25%). Unit has a thermal metamorphic overprint.					
				36.0							JN, 49°, IR, Ro2, KL
			74.0								
				36.5							JN, 55°, IR, Ro2, KL
			73.5								
				37.0							
			73.0								
				37.5		Volcanic clasts becoming more common					JN, 74°, IR, Ro2, KL
						VOLCANIC BRECCIA: dark grey and cream, coarse grained grains typically about 4mm with occasional cobble sized cream subangular sandstone clasts.					
			72.5	38.0							JN, 68°, IR, Ro2, KL JN, 70°, IR, Ro1, CL, 5mm CN, 55°, IR, RF CZ, 86°, IR, Ro3, RF, 160mm
				38.5		Colour change to cream dominating dark grey; cobble sized clasts more common					
			72.0								
				39.0							
			71.5								
				39.5							
			71.0			Cobble sized clasts becoming rare.					

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project: Hornsby Quarry
drilling subcontractor: McDermott
date hole commenced: 14/11/06
date hole complete: 18/11/06

drill information:
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datum: AMG
borehole location: 322916.2E 6269635.9N
inclination/azimuth: -60° / 127°
surface R.L.: 105.4 m

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Logged by: RS/PC

Method	Testing	Water	RL (m)	Depth (m)	Graphic Log	Material Description (ROCK TYPE: Colour, grain size, major and minor components)	Weathering (EW HW MW SW FR)	Estimated Strength (S0 S1 S2 S3 S4 S5 R0 R1 R2 R3 R4 R5)	Point Load Is (50) MPa	RQD % (20 40 60 80)	Defect Description / Comments (Type, inclination, shape, roughness, infill type, infill thickness, number.)
HQ3			70.5	40.5		VOLCANIC BRECCIA: dark grey and cream, coarse grained grains typically about 4mm with occasional cobble sized cream subangular sandstone clasts. 400mm highly fractured zone.					JN, 50°, PL, Ro2, RF, 20mm JN, 66°, PL, Ro2, KL JN, 60°, PL, Ro2, KL CZ, 55°, RF, 300mm
			70.0	41.0							JN, 70°, PL, Ro2, KL JN, 45°, IR, Ro2, RC, 2mm
			69.5	41.5		Clasts becoming typically about 10-20mm.					JN, 65°, IR, Ro2, KL JN, 63°, IR, Ro2, KL JN, 66°, IR, Ro2, KL JN, 73°, Ro2, RC, 1mm JN, 73°, PL, Ro2, RF, 2mm JN, 74°, PL, Ro2, KL FZ, 76°, IR, Ro2, CL, 30mm JN, 60°, PL, Ro2, KL
											JN, 38°, IR, Ro2, KL
			69.0	42.0		SANDSTONE BRECCIA: Light brown-grey to grey, medium to coarse grained sandstone clasts up to 200mm in a fine grained matrix. Unit has a thermal metamorphic overprint.					JN, 71°, PL, Ro2, KL JN, 70°, PL, Ro2, KL JN, 50°, PL, Ro2, KL
			68.5	42.5							JN, 50°, IR, Ro2, KL JN, 60°, IR, Ro2, KL
			68.0	43.0							JN, 50°, IR, Ro2, KL
			67.5	43.5							JN, 55°, IR, Ro2, KL JN, 64°, PL, Ro2, KL CZ, 60°, PL, Ro2, RF, 150mm
			67.0	44.0							JN, 64°, PL, Ro2, KL
			66.5	44.5							JN, 64°, PL, Ro2, CL, 1mm JN, 70°, PL, Ro2, KL JN, 74°, IR, Ro2, KL

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Rock-Soil-Water

A.C.N. 061447621

Borehole Log
Hole No: HQ1

job no: PSM1059
client: Hornsby Shire Council
project: Hornsby Quarry
drilling subcontractor: McDermott
date hole commenced: 14/11/06
date hole complete: 18/11/06

drill information:
core diameter: 61
datum: AMG
borehole location: 322916.2E 6269635.9N
inclination/azimuth: -60° / 127°
surface R.L.: 105.4 m

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Logged by: RS/PC

Method	Testing	Water	RL (m)	Depth (m)	Graphic Log	Material Description (ROCK TYPE: Colour, grain size, major and minor components)	Weathering (EW HW MW SW FR)	Estimated Strength (S0 S1 S2 S3 S4 S5 R0 R1 R2 R3 R4 R5)	Point Load Is (50) MPa	RQD % (20 40 60 80)	Defect Description / Comments (Type, inclination, shape, roughness, infill type, infill thickness, number.)
HQ3			66.0	45.5		METASANDSTONE: Light grey, coarse grained, with many sand grains recrystalised into quartz grains; remnant shale laminations or crossbeds throughout.					JN, 46°, IR, Ro2, KL JN, 44°, IR, Ro2, CL, 1mm JN, 54°, PL, Ro2, KL JN, 54°, PL, Ro2, QZ, 1mm JN, 20°, IR, Ro2, KL JN, 73°, PL, Ro2, CB, 1mm JN, 60°, PL, Ro2, 1mm JN, 36°, IR, Ro2, KL JN, 40°, IR, Ro2, CB, 1mm JN, 56°, IR, Ro2, KL
			65.5	46.0							
			65.0	46.5							JN, 70°, PL, Ro2, CB, 1mm
			64.5	47.0							JN, 50°, PL, Ro2, RF, 9mm JN, 64°, PL, Ro2, CL, 1mm JN, 60°, IR, Ro2, CL, 1mm JN, 55°, PL, Ro2, RF, 6mm JN, 60°, IR, Ro2, RC, VN BG, 68°, IR, Ro2, CB, 1mm JN, 66°, PL, Ro2, KL JN, 45°, PL, Ro2, KL JN, 76°, PL, Ro2, KL JN, 65°, PL, Ro2, KL JN, 40°, IR, Ro2, KL JN, 20°, IR, Ro2, KL
			64.0	47.5							
			63.5	48.0							BG, 68°, PL, Ro2, CB, 1mm
			63.0	48.5		Remnant shale laminations or crossbeds becoming less pronounced					JN, 22°, IR, Ro2, KL
			62.5	49.0							JN, 65°, IR, Ro3, KL JN, 60°, IR, Ro3, KL JN, 65°, IR, Ro3, KL JN, 65°, IR, Ro3, KL JN, 60°, IR, Ro3, KL
				49.5							JN, 60°, IR, Ro3, KL

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Rock-Soil-Water

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Borehole Log
Hole No: HQ1

job no: PSM1059
client: Hornsby Shire Council
project: Hornsby Quarry
drilling subcontractor: McDermott
date hole commenced: 14/11/06
date hole complete: 18/11/06

drill information:
core diameter: 61
datum: AMG
borehole location: 322916.2E 6269635.9N
inclination/azimuth: -60° / 127°
surface R.L.: 105.4 m

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Logged by: RS/PC

Method	Testing	Water	RL (m)	Depth (m)	Graphic Log	Material Description (ROCK TYPE: Colour, grain size, major and minor components)	Weathering (EW HW MW SW FR)	Estimated Strength (S0 S1 S2 S3 S4 S5 R0 R1 R2 R3 R4 R5)	Point Load Is (50) MPa	RQD % (20 40 60 80)	Defect Description / Comments (Type, inclination, shape, roughness, infill type, infill thickness, number.)
HQ3			62.0			METASANDSTONE: Light grey, coarse grained, with many sand grains recrystalised into quartz grains; remnant shale laminations or crossbeds throughout.					
				50.5		100mm conglomerate band					JN, 61°, IR, CB, 3mm
			61.5			Thermal metamorphic overprint becoming less pronounced					
				51.0							JN, 62°, PL, Ro3, CB, VN
			61.0								JN, 50°, IR, Ro4, KL
											JN, 64°, IR, Ro4, KL
				51.5							
			60.5								
				52.0							
											JN, 15°, IR, Ro4, KL
			60.0	52.5							JN, 25°, IR, Ro4, KL
											JN, 55°, IR, Ro3, CB, VN
			59.5	53.0							JN, 55°, PL, Ro3, CB, VN
											JN, 26°, IR, Ro3, KL
				53.5							
			59.0								JN, 59°, PL, Ro3, KL
											JN, 59°, IR, Ro3, KL
				54.0							
			58.5								
											BG, 50°, PL, Ro3, KL
				54.5		SANDSTONE: Predominantly light grey with zones of dark grey, medium to coarse grained, black laminations or crossbeds and occasional zones of laminate and conglomerate throughout					
			58.0								

CIVIL BOREHOLE HQ CORE LOG.GPJ PSMLIB JAN04.GDT 17/1/07

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A.C.N. 061447621

Borehole Log
Hole No: HQ1

job no: PSM1059
client: Hornsby Shire Council
project: Hornsby Quarry
drilling subcontractor: McDermott
date hole commenced: 14/11/06
date hole complete: 18/11/06

drill information:
core diameter: 61
datum: AMG
borehole location: 322916.2E 6269635.9N
inclination/azimuth: -60° / 127°
surface R.L.: 105.4 m

Sheet 12 of 19
Logged by: RS/PC

Method	Testing	Water	RL (m)	Depth (m)	Graphic Log	Material Description (ROCK TYPE: Colour, grain size, major and minor components)	Weathering (EW HW MW SW FR)	Estimated Strength (S0 S1 S2 S3 S4 S5 R0 R1 R2 R3 R4 R5)	Point Load Is (50) MPa	RQD % (20 40 60 80)	Defect Description / Comments (Type, inclination, shape, roughness, infill type, infill thickness, number.)
HQ3			57.5	55.5		SANDSTONE: Predominantly light grey with zones of dark grey, medium to coarse grained, black laminations or crossbeds and occasional zones of laminate and conglomerate throughout					
			57.0	56.0							BG, 75°, PL, Ro3, KL
											BG, 75°, PL, Ro3, KL
											JN, 45°, IR, Ro3, CB
			56.5	56.5							
											JN, 40°, IR, Ro3, CB, VN
				57.0							JN, 34°, IR, Ro3, CB, VN
			56.0								JN, 20°, IR, KL
				57.5							
			55.5								JN, 60°, PL, Ro3, KL
						50mm breccia band of quartz and shale					JN, 75°, IR, Ro3, CB, VN
				58.0		150mm laminated unit					BG, 50°, IR, Ro3, CB, VN
			55.0								
				58.5		400mm zone with numerous conglomerate and shale beds throughout					
			54.5								
				59.0		750mm zone with numerous faults showing displacement on bedding (core still intact).					JN, 25°, IR, Ro3, CB, VN
			54.0								
				59.5							JN, 46°, PL, Ro3, KL
			53.5								

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project: Hornsby Quarry
drilling subcontractor: McDermott
date hole commenced: 14/11/06
date hole complete: 18/11/06

drill information:
core diameter: 61
datum: AMG
borehole location: 322916.2E 6269635.9N
inclination/azimuth: -60° / 127°
surface R.L.: 105.4 m

Sheet 13 of 19
Logged by: RS/PC

Method	Testing	Water	RL (m)	Depth (m)	Graphic Log	Material Description (ROCK TYPE: Colour, grain size, major and minor components)	Weathering (EW HW MW SW FR)	Estimated Strength (S0 S1 S2 S3 S4 S5 R0 R1 R2 R3 R4 R5)	Point Load Is (50) MPa	RQD % (20 40 60 80)	Defect Description / Comments (Type, inclination, shape, roughness, infill type, infill thickness, number.)
HQ3			53.0	60.5		SANDSTONE: Predominantly light grey with zones of dark grey, medium to coarse grained, black laminations or crossbeds and occasional zones of laminate and conglomerate throughout					BG, 65°, PL, Ro3, CB, VN JN, 24°, IR, Ro4, CB, VN
			52.5	61.0		400mm zone with numerous conglomerate and shale beds throughout; beddng at 45°-60° to core axis					BG, 46°, PL, Ro3, CB, VN
			52.0	61.5		90mm black charcoal seam					JN, 34°, IR, Ro3, KL
			51.5	62.0							JN, 30°, IR, Ro4, CB, VN
			51.0	62.5							BG, 45°, PL, Ro3, CB, VN FZ, 55°, CB, 70mm
			50.5	63.0		50mm black charcoal seam					JN, 70°, UN, Ro3, CB, VN
			50.0	63.5							JN, 89°, UN, Ro3, CL, 1mm
			49.5	64.0		Numerous coarse grained (1-4mm) bands and medium grained bands 10mm thick spaced 30mm; planar to undulating bedding dips 50° to core axis					JN, 30°, UN, Ro4, CL, VN
				64.5							

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Hole No: HQ1

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date hole commenced: 14/11/06
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drill information:
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datum: AMG
borehole location: 322916.2E 6269635.9N
inclination/azimuth: -60° / 127°
surface R.L.: 105.4 m

Sheet 14 of 19
Logged by: RS/PC

Method	Testing	Water	RL (m)	Depth (m)	Graphic Log	Material Description (ROCK TYPE: Colour, grain size, major and minor components)	Weathering (EW HW MW SW FR)	Estimated Strength (S0 S1 S2 S3 S4 S5 R0 R1 R2 R3 R4 R5)	Point Load Is (50) MPa	RQD % (20 40 60 80)	Defect Description / Comments (Type, inclination, shape, roughness, infill type, infill thickness, number.)
HQ3			49.0	65.5		SANDSTONE: Predominantly light grey with zones of dark grey, medium to coarse grained, black laminations or crossbeds and occasional zones of laminate and conglomerate throughout					JN, 43°, UN, Ro4, KL
			48.5	66.0		Becoming medium grained.					JN, 24°, UN, Ro4, KL
			48.0	66.5							JN, 60°, UN, Ro4, KL
			47.5	67.0							
			47.0	67.5		160mm laminate zone Occasional coarse quartz grains (3mm)					BG, 66°, ST, Ro3, CB, VN
			46.5	68.0							
			46.0	68.5							
			45.5	69.0							
			45.0	69.5		25mm shale band at about 80° to the core axis					CN, 70°, UN, CB, 24mm

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Sheet 15 of 19
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Method	Testing	Water	RL (m)	Depth (m)	Graphic Log	Material Description (ROCK TYPE: Colour, grain size, major and minor components)	Weathering (EW HW MW SW FR)	Estimated Strength (S0 S1 S2 S3 S4 S5 R0 R1 R2 R3 R4 R5)	Point Load Is (50) MPa	RQD % (20 40 60 80)	Defect Description / Comments (Type, inclination, shape, roughness, infill type, infill thickness, number.)
HQ3			44.5	70.5		SANDSTONE: Predominantly light grey with zones of dark grey, medium to coarse grained, black laminations or crossbeds and occasional zones of laminate and conglomerate throughout 100mm thick laminate band, then fine grained, coarsening downwards					JN, 70°, IR, Ro2, CB, VN FL, 30°, IR, RF, 20mm BG, 69°, IR, Ro3, CB, VN BG, 60°, UN, Ro3, CB, VN
			44.0	71.0							BG, 65°, IR, Ro3, KL BG, 65°, PL, Ro2, CB, VN
			43.5	71.5		CONGLOMERATE: white and black quartz and shale pebbles in a medium to coarse sand matrix; shale pebbles have pyritic alteration.					
						SANDSTONE: Predominantly light grey with zones of dark grey, fine to coarse grained, black laminations or crossbeds and occasional zones of laminate and conglomerate throughout					JN, 46°, UN, Ro3, CL, VN
			43.0	72.0							JN, 45°, CU, Ro4, KL
			42.5	72.5		bedding dips about 50° to the core axis					JN, 44°, IR, Ro4, KL
			42.0	73.0							
			41.5	73.5		Bedding more developed and at about 60°-70° to the core axis; pyrite crystals throughout.					JN, 30°, IR, Ro4, CL, VN BG, 61°, UN, Ro3, CL, VN BG, 69°, PL, Ro3, KL
			41.0	74.0							CL, 63°, IR, Ro2, RF, 20mm BG, 61°, UN, Ro3, CL, VN
			40.5	74.5							

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core diameter: 61
datum: AMG
borehole location: 322916.2E 6269635.9N
inclination/azimuth: -60° / 127°
surface R.L.: 105.4 m

Sheet 16 of 19
Logged by: RS/PC

Method	Testing	Water	RL (m)	Depth (m)	Graphic Log	Material Description (ROCK TYPE: Colour, grain size, major and minor components)	Weathering (EW HW MW SW FR)	Estimated Strength (S0 S1 S2 S3 S4 S5 R0 R1 R2 R3 R4 R5)	Point Load Is (50) MPa	RQD % (20 40 60 80)	Defect Description / Comments (Type, inclination, shape, roughness, infill type, infill thickness, number.)
HQ3			40.0	75.5		SANDSTONE: Predominantly light grey with zones of dark grey, fine to coarse grained, black laminations or crossbeds and occasional zones of laminate and conglomerate throughout 500mm zone with some micro faulting (healed) with reverse displacement of about 20mm					JN, 65°, CU, Ro3, KL
				76.0		100mm coarse grained band; bedding at about 80°-85° to the core axis					
			39.5	76.5							
			39.0	77.0							CL, 46°, IR, CL, 20mm
			38.5	77.5							JN, 54°, IR, Ro3, KL
			38.0	78.0		Well developed crossbedding 10-50mm apart at about 85°-90° to the core axis; numerous healed microfaults at about 30° to the core axis					JN, 45°, CU, Ro3, CL, VN
			37.5	78.5							
			37.0	79.0							BG, 25°, ST, Ro3, CL, VN
			36.5	79.5							

CIVIL BOREHOLE HQ CORE LOG.GPJ PSMLIB JAN04.GDT 17/1/07

Refer to Explanation Sheets Attached for Classification Systems

Pells Sullivan Meynink Pty Ltd

Engineering Consultants
Rock-Soil-Water

A.C.N. 061447621

Borehole Log
Hole No: HQ1

job no: PSM1059
client: Hornsby Shire Council
project: Hornsby Quarry
drilling subcontractor: McDermott
date hole commenced: 14/11/06
date hole complete: 18/11/06

drill information:
core diameter: 61
datum: AMG
borehole location: 322916.2E 6269635.9N
inclination/azimuth: -60° / 127°
surface R.L.: 105.4 m

Sheet 17 of 19
Logged by: RS/PC

Method	Testing	Water	RL (m)	Depth (m)	Graphic Log	Material Description (ROCK TYPE: Colour, grain size, major and minor components)	Weathering (EW HW MW SW FR)	Estimated Strength (S0 S1 S2 S3 S4 S5 R0 R1 R2 R3 R4 R5)	Point Load Is (50) MPa	RQD % (20 40 60 80)	Defect Description / Comments (Type, inclination, shape, roughness, infill type, infill thickness, number.)
HQ3			36.0	80.5		SANDSTONE: Predominantly light grey with zones of dark grey, fine to coarse grained, black laminations or crossbeds and occasional zones of laminate and conglomerate throughout bedding becoming poorly developed					BG, 58°, Ro3, CL, VN
			35.5	81.0							JN, , IR, Ro3, KL
			35.0								BG, , IR, Ro3, CL JN, , IR, Ro2, CL
				81.5		Bedding more developed at about 70° to the core axis					JN, 35°, UN, Ro3, CL JN, 40°, Ro3, CL, VN
			34.5	82.0							
			34.0	82.5							JN, 47°, CU, Ro4, KL
			33.5	83.0							BG, 73°, IR, Ro4, RC, 4mm
											BG, 63°, CU, Ro4, CL, VN BG, 60°, IR, Ro4, CL, VN JN, 70°, CU, Ro4, CL, VN
			33.0	83.5							
				84.0							
			32.5								
				84.5							JN, 25°, IR, Ro4, CL, VN
			32.0								JN, 76°, IR, Ro3, KL

CIVIL BOREHOLE HQ CORE LOG.GPJ PSMLIB JAN04.GDT 17/1/07

Refer to Explanation Sheets Attached for Classification Systems

Pells Sullivan Meynink Pty Ltd

Engineering Consultants
Rock-Soil-Water

A.C.N. 061447621

Borehole Log
Hole No: HQ1

job no: PSM1059
client: Hornsby Shire Council
project: Hornsby Quarry
drilling subcontractor: McDermott
date hole commenced: 14/11/06
date hole complete: 18/11/06

drill information:
core diameter: 61
datum: AMG
borehole location: 322916.2E 6269635.9N
inclination/azimuth: -60° / 127°
surface R.L.: 105.4 m

Sheet 18 of 19
Logged by: RS/PC

Method	Testing	Water	RL (m)	Depth (m)	Graphic Log	Material Description (ROCK TYPE: Colour, grain size, major and minor components)	Weathering (EW HW MW SW FR)	Estimated Strength (S0 S1 S2 S3 S4 S5 R0 R1 R2 R3 R4 R5)	Point Load Is (50) MPa	RQD % (20 40 60 80)	Defect Description / Comments (Type, inclination, shape, roughness, infill type, infill thickness, number.)
HQ3			31.5	85.5		SANDSTONE: Predominantly light grey with zones of dark grey, fine to coarse grained, black laminations or crossbeds and occasional zones of laminate and conglomerate throughout					JN, 75°, IR, Ro3, KL
			31.0	86.0		400mm massive fine to medium grained bed					BG, 60°, UN, Ro3, KL JN, 80°, IR, Ro3, KL JN, 20°, UN, Ro3, KL JN, 60°, UN, Ro3, KL
			30.5	86.5		well developed bedding at about 40°-50° to the core axis 10mm conclomerate band					JN, 55°, UN, Ro3, KL JN, 60°, CU, Ro3, KL
			30.0	87.0							JN, 51°, IR, Ro3, CL, VN JN, 60°, IR, Ro3, CL, VN
			29.5	87.5							BG, 42°, Ro3
			29.0	88.0							
			28.5	88.5							CL, 60°, IR, Ro3, CL, 4mm
				89.0		numerous coarse grained bands with poorly developed bedding					JN, 60°, IR, Ro3, KL
			28.0	89.5							
			27.5			Medium to fine grained well developed crossbedding dipping at about 70°-80° to the core axis					BG, 64°, IR, Ro3, CB, VN JN, 79°, PL, Ro3, KL

CIVIL BOREHOLE HQ CORE LOG.GPJ PSMLIB JAN04.GDT 17/1/07

Refer to Explanation Sheets Attached for Classification Systems

Pells Sullivan Meynink Pty Ltd

Engineering Consultants
Rock-Soil-Water

A.C.N. 061447621

Borehole Log
Hole No: HQ1

job no: PSM1059
client: Hornsby Shire Council
project: Hornsby Quarry
drilling subcontractor: McDermott
date hole commenced: 14/11/06
date hole complete: 18/11/06

drill information:
core diameter: 61
datum: AMG
borehole location: 322916.2E 6269635.9N
inclination/azimuth: -60° / 127°
surface R.L.: 105.4 m

Sheet 19 of 19
Logged by: RS/PC

Method	Testing	Water	RL (m)	Depth (m)	Graphic Log	Material Description (ROCK TYPE: Colour, grain size, major and minor components)	Weathering (EW HW MW SW FR)	Estimated Strength (S0 S1 S2 S3 S4 S5 R0 R1 R2 R3 R4 R5)	Point Load Is (50) MPa	RQD % (20 40 60 80)	Defect Description / Comments (Type, inclination, shape, roughness, infill type, infill thickness, number.)
HQ3			27.0	90.5		SANDSTONE: Predominantly light grey with zones of dark grey, fine to coarse grained, black laminations or crossbeds and occasional zones of laminate and conglomerate throughout					JN, 80°, IR, Ro2, CB, 30mm BG, 70°, UN, Ro3, CL, 1mm
						End of Hole at 90.65m.					
			26.5	91.0							
				91.5							
			26.0								
				92.0							
			25.5								
				92.5							
			25.0								
				93.0							
			24.5								
				93.5							
			24.0	94.0							
				94.5							
			23.5								

CIVIL BOREHOLE HQ CORE LOG.GPJ PSMLIB JAN04.GDT 17/1/07

Refer to Explanation Sheets Attached for Classification Systems

Photo A2-1: BH HQ1 – 3m to 7m

Photo A2-2: BH HQ1 – 7m to 11m

Photo A2-3: BH HQ1 – 11m to 15m

Photo A2-4: BH HQ1 – 15m to 19m

Photo A2-5: BH HQ1 – 19m to 23m

Photo A2-6: BH HQ1 – 23m to 27m

Photo A2-7: BH HQ1 – 27m to 28.4m

Photo A2-8: BH HQ1 – 28m to 32m

Photo A2-9: BH HQ1 – 32m to 36m

Photo A2-10: BH HQ1 – 36m to 40m

Photo A2-11: BH HQ1 – 40m to 44m

Photo A2-12: BH HQ1 – 44m to 48m

Photo A2-13: BH HQ1 – 48m to 52m

Photo A2-14: BH HQ1 – 52m to 56m

Photo A2-15: BH HQ1 – 56m to 60m

Photo A2-16: BH HQ1 – 60m to 64m

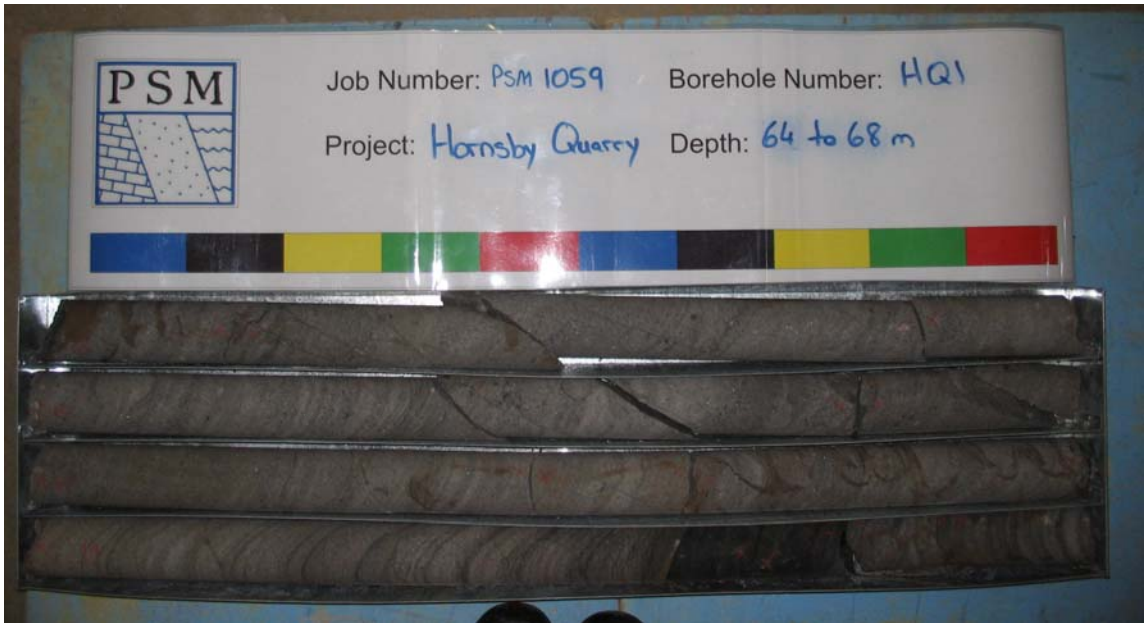


Photo A2-17: BH HQ1 – 64m to 68m

Photo A2-18: BH HQ1 – 68m to 72m

Photo A2-19: BH HQ1 – 72m to 76m

Photo A2-20: BH HQ1 – 76m to 80m

Photo A2-21: BH HQ1 – 80m to 84m

Photo A2-22: BH HQ1 – 84m to 88m

Photo A2-23: BH HQ1 – 88m to 90.65m

Pells Sullivan Meynink Pty Ltd

Engineering Consultants
Rock - Soil - Water

JOB: PSM1059
PROJECT: **HORNSBY QUARRY**

PIEZOMETER CONSTRUCTION RECORD

HOLE NUMBER: BH HQ1
PIEZOMETER: Vibrating Wire Piezometer Model 1200/700
COLLAR EASTING: 322916.2
COLLAR NORTHING: 6269635.9
COLLAR RL(m): 105.4
DATUM: AHD

DRILLING CONTRACTOR: McDermotts
RIG: -
DEPTH OF HOLE (m): 90.65m
BOREHOLE INCLINATION: 60°
PIEZO INSTALLATION DATE: 17-18/11/06
SUPERVISED BY: RS/BC

Tick boxes

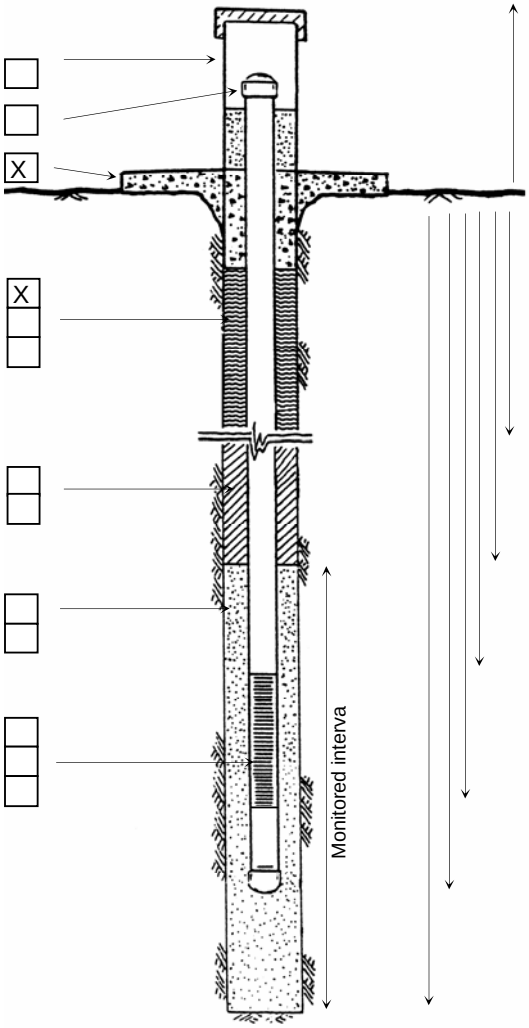
Steel protective well cover [ ]
PVC cap [ ]
Concrete colar [X]

Back fill type:
Cement bentonite [X]
Soil [ ]
None [ ]

Seal:
Bentonite pellets [ ]
Other [ ]

Gravel type:
2-5mm gravel [ ]
Other [ ]

Perforation type:
Drill holes [ ]
Hack saw cuts [ ]
40um machine slots [ ]



Complete dimensions if appropriate

Height of stickup (m): 0
Diameter of PVC (mm): -
Depth to top of seal: N/A
Depth to top of gravel pack: N/A
Depth to top of screen: N/A
Depth to base of screen: N/A
Depth to base of piezo: 90.0m RL 27.45m
Depth to base of gravel:

COMMENTS: Vibrating wire piezometer fully erased in bentonite-cement grout and buried below gravel road. Wires run to edge of road, in a trench, approximately 100mm-150mm below surface and are then hidden in long grass in labeled waterproof container (see attached photos).

Location of Piezometer BH HQ1