

Hanson Construction Materials Pty Ltd



Land Resources Assessment: Hanson's Brandy Hill Quarry Expansion

ENVIRONMENTAL



WATER



WASTEWATER



GEOTECHNICAL



CIVIL



PROJECT
MANAGEMENT



P1303888JR05V03
May 2016

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All enquiries regarding this project are to be directed to the Project Manager.

Contents

1 OVERVIEW.....	5
1.1 Introduction	5
1.2 Scope	5
1.3 Agency Consultation	5
2 SITE DESCRIPTION	6
2.1 Subject Site	6
2.2 Proposed Development	6
3 ASSESSMENT OF SURROUNDING LAND USES	7
3.1 Surrounding Land Uses	7
3.2 Potential Impacts on Surrounding Land Uses	7
4 ASSESSMENT OF SITE SOILS	9
4.1 Field Investigations	9
4.2 Site Soils	9
4.3 Impact Assessment of Proposed Development	11
5 ASSESSMENT OF AGRICULTURAL LAND CAPABILITY	13
5.1 Potential for Agricultural Land Use	13
5.2 Agricultural Impact Assessment of Proposed Development	14
6 ASSESSMENT OF SITE LANDFORMS AND TOPOGRAPHY	16
6.1 Geology and Rock Formations	16
6.2 Site Slopes	17
6.3 Topography and Quarry Landform	17
6.4 Land Slippage	18
6.5 Impact Assessment of Proposed Development	18
7 CONCLUSIONS AND RECOMMENDATIONS	20
8 REFERENCES	21
9 ATTACHMENT A – SITE PLAN	22
10 ATTACHMENT B – MA BOREHOLE LOGS	25
11 ATTACHMENT C – LAND ZONING MAP (HANSON, 2016)	29
12 ATTACHMENT D – HANSON BOREHOLE LOGS	31
13 ATTACHMENT E – AGENCY CONSULTATION	76

1 Overview

1.1 Introduction

This land resources assessment forms part of an Environmental Impact Study (EIS) submitted to the NSW Department of Planning and Environment (DoPE) to address Secretary's Environmental Assessment Requirements (SEARs) for the proposed expansion of Hanson's Brandy Hill Quarry, 979 Clarence Town Road, Seaham, NSW (SSD-5899).

This report should be read in conjunction with Martens and Associates (MA) Surface Water Assessment of the site (P1303888JR03V09, 2016b).

1.2 Scope

This assessment has been completed in order to satisfy amended SEARs issued by NSW DoPE (November 11, 2014) and recent correspondence with DoPE, relating to preparation of a land resources assessment. It shall:

- Assess surrounding land uses and summarise potential impacts due to the proposed development.
- Assess site soils.
- Assess agricultural land capability.
- Assess site landforms and topography, including review of rock formations, steep slopes and land slippage.
- Review potential impacts on site soils, agricultural land capability, landforms and topography due to the proposed development.

1.3 Agency Consultation

Consultation with NSW Department of Agriculture was undertaken in preparation of this document. Details of correspondence are provided in Attachment E.

2 Site Description

2.1 Subject Site

The site is located at 979 Clarence Town Road, Seaham, NSW and comprises 22 individual lots owned by the Client within Port Stephens Shire Council. It has been used for extractive industry and processing of rhyodacite hard rock aggregate since 1983. The site occupies approximately 561 ha of which 18.6 ha is occupied by the quarry; 11.1 ha by the crushing plant; 5.3 ha by the aggregate stockpile area; and the remainder being bushland and cleared lands. The Client advises that the existing quarry consent is to a maximum excavation depth of 30 mAHD. The site layout and aerial is provided in Attachment A, SK001.

Further details regarding site and surrounding conditions are provided in the project Preliminary Environmental Assessment (Hanson, 2012a).

2.2 Proposed Development

Proposed final form development layout is shown overlaying recent site survey in Attachment A, SK002. The proposed expansion works include:

1. Expansion of the currently approved extraction boundary of the quarry to extend the life of operations by approximately 30 years.
2. Extraction to a maximum depth of -78 mAHD.
3. Increased annual extraction limit to 1.5 Mt per annum.
4. Relocation of existing plant infrastructure and incorporation of a new concrete batching plant with a capacity of 15,000 m³ per annum.
5. Receiving and recycling 20,000 t of concrete waste per annum.
6. New pre-coat plant and mobile pug-mill.

3 Assessment of Surrounding Land Uses

3.1 Surrounding Land Uses

A land use zoning map (produced by Hanson, 2016) based on Port Stephens LEP (2013) is provided in Attachment C. Site and surrounding land uses include:

- RU1 – Primary Production.
- RU2 – Rural Landscape.
- E2 – Environmental Conservation.
- E3 – Environmental Management.
- SP2 – Infrastructure (Cemetery).
- R5 – Large Lot Residential.

3.2 Potential Impacts on Surrounding Land Uses

Potential impacts which may arise due to the proposed development have been considered in a number of expert reports. Potential impacts and the reports in which they have been addressed include:

- Land resources impacts – addressed in this report.
- Biodiversity impacts – refer Appendix 7 of the EIS.
- Traffic and transport impacts – refer Appendix 8 of the EIS.
- Noise impacts – refer Appendix 9 of the EIS.
- Blasting impacts – refer Appendix 10 of the EIS.
- Air quality impacts – refer Appendix 11 of the EIS.
- Heritage impacts – refer Appendix 12 of the EIS.
- Water impacts – refer Appendix 13 of the EIS.
- Waste impacts – refer Appendix 14 of the EIS.
- Visual impacts – refer Appendix 15 of the EIS.
- Hazard impacts – refer Appendix 16 of the EIS.
- Socio-economic impacts – refer Appendix 17 of the EIS.

Potential impacts to sensitive receivers within each surrounding land use have been considered in these reports, as well as the acceptability of impacts and recommended mitigation measures. The main body of the EIS summarises the pertinent findings of each impact assessment report.

Duplication of these findings has not been undertaken as part of this assessment. Rather, this report addresses the following potential land resource impacts, which have not been specifically addressed in the other reports:

- Soil impacts – refer Section 4 of this report.
- Agricultural land capability impacts – refer Section 5 of this report.
- Landforms and topography impacts – refer Section 6 of this report.

4 Assessment of Site Soils

4.1 Field Investigations

A site inspection was undertaken on 29th January 2015 for a Wastewater Assessment (P1303888JR04V01, 2015b), and included:

- Walkover inspection of the site to assess existing site conditions, local topography, geology, soil characteristics, hydrology and vegetation.
- Excavation of three boreholes (BH 101, BH 102, BH 103) using a 4wd truck mounted hydraulic auger to a maximum depth of 2 m below ground level (mBGL) to allow for the characterisation of underlying soils.
- Collection of representative soils samples from boreholes for future reference.

Borehole locations are shown on the site plan in Attachment A, SK001 and detailed borehole logs are provided in Attachment B.

4.2 Site Soils

4.2.1 Soil Landscape Mapping

The Soil Landscapes of the Newcastle 1:100,000 Sheet (Soil Conservation Service of NSW, 1995) indicates that site soils are Seaham (SE) and Hungry Hill (HH) on Carboniferous volcanics and sediments. Soils are primarily shallow to moderately deep (30 – 120 cm) rapidly drained loams and well / imperfectly drained soloths, with some moderately deep (> 140 cm) imperfectly / well drained chocolate soils on colluvial benches, moderately deep (> 90 cm) poorly drained structured loams on small alluvial flats, and shallow to moderately deep (20 – 100 cm) well drained lithosols. Limitations noted include steep slopes, mass movement hazard, shallow & stony soils, seasonal waterlogging (for lower slopes/benches), high erosion hazard, localised rock outcrops, and strongly acidic soils of low fertility.

Soils at high elevation (generally > 40 mAHD) are described as being 0.3 – 1.2 m deep and soils at low elevation (generally < 40 mAHD) as being 1 – 3 m deep. Soils at low elevation are also classified as being swampy and/or drainage plains, and limitations noted include being seasonally waterlogged and/or having a permanently high water table. However, the lower lying areas to be impacted by the proposed quarry expansion are better characterised as side slopes and would more closely correspond to the description for > 40 mAHD soil profile. We

consider it likely that the water table would be 0 – 5 mBGL for the majority of low-lying swamp and rural land within the mapped Newcastle area.

4.2.2 Site Investigation

Site soil profile is summarised in Table 1 with detailed Martens and Associates (MA) borehole logs in Attachment B. A summary of site soil characteristics is provided in Table 2.

Table 1: Summary of typical soil layers for the site.

Layer	Depth (m) ¹	Agricultural Classification
Loamy sand	0.0 – 0.2	LS
Sandy clay	0.2 – 0.7	SC

Notes:

¹ Depth varies – indicative only.

Table 2: Summary of site soil characteristics.

Feature	Details	Description	Impact on Erosion
Soil permeability category	2a and 4a	Soils are moderately permeable.	Low
Coarse fragments (%)	0 - 20%	Soils have low coarse fragment content.	Low
pH (1:5) ¹	4.5	Soils are acidic.	Moderate
ECe (dS/m) ¹	<4	Soils not saline.	Low
P-sorption (mg/kg) ¹	552	Soils have a high phosphorus sorption capacity.	NA ²

Notes:

¹ Chemical properties estimated based on local experience and Soil Landscapes of the Newcastle 1:100,000 Sheet (1995).

² Not applicable.

Site specific soil testing was conducted as part of the EIS for the currently approved quarry by Hunter Valley Mining Corporation (1983). These findings were largely consistent with MA investigation findings:

- The majority of the site consists of sandy loams (< 50 cm) overlying weathering bedrock, with some gravels and kaolinite clays, as well as areas of rock outcrop.
- The soil layer thickens towards the base of the existing quarry due to colluvial deposits from upslope, and alluvial deposits are present in local drainage lines.
- Soils are acidic with pH values ranging from 4.5 – 5.5.

4.2.3 Acid Sulfate Soils

The site is mapped on the Department of Land and Water Conservation (DLWC) Acid Sulfate Soil Risk Map 1:25,000 Sheet 64 (1997) as 'no known occurrence of acid sulfate soil materials'.

The Port Stephens Council Local Environmental Plan (LEP) 2013 Acid Sulfate Soils Map Sheet ASS_004 classifies the site as Class 5, which does not typically consist of acid sulfate soils.

4.3 Impact Assessment of Proposed Development

4.3.1 Potential Impacts

Potential impacts which may arise due to the proposed development include:

- Surface soil erosion due vegetation disturbance and stormwater runoff from the proposed quarry.
- Increased sedimentation in receiving drainage lines due to site erosion.

4.3.2 Impact Assessment

Assessment of the site soils indicates that the sandy loam soils are not dispersive but have significant erosion potential. The site is not impacted by acid sulfate soils, hence adverse impacts on the ecosystem due to acidified soil and surface waters are not expected.

The proposed development will change the land use of existing vegetated areas to quarry. This will increase annual sediment loads running off of quarry faces. Site sediment erosion and control plans have been developed in order to address the risk of increased sediment loads. For more detail, refer to the MA Surface Water Assessment (P1303888JR03V09, 2016b).

Site sedimentation basins have been conservatively designed using best management practice in accordance with industry standards. These basins will ensure compliance with site Environmental Protection Licence (EPL) conditions by capturing and treating stormwater flows and, in conjunction with other sediment and control measures, ensuring there is no unacceptable increase in sediment loads from the site. Sediment and erosion control measures shall be applied during construction works stages to ensure mitigation of potential water quality impacts.

Site discharges will continue to be regulated under the site EPL #1879 conditions, and hence will ensure no unacceptable impacts on total

suspended solids (TSS) concentrations, oil and grease concentrations, and surface water pH.

4.3.3 *Mitigation Measures*

Mitigation measures have been incorporated within the quarry's design and include sediment basins and water capture, recycling and reuse systems.

These measures are considered adequate to appropriately mitigate risks.

5 Assessment of Agricultural Land Capability

5.1 Potential for Agricultural Land Use

Agricultural use is the most significant land use for the site and surrounding area based on the land zoning map (Attachment C) and has hence been assessed in greater detail as part of this assessment. We note that potential impacts to all other surrounding land uses have been assessed in other expert reports as summarised in Section 3.2.

Potential for agricultural land use is assessed based on constraints to agricultural production. NSW Agriculture Agfact AC. 25 (2002) provides guidelines on classifying the potential for agricultural land use. Classifications range from Class 1, representing land with few constraints and potential for a wide range of crops to be grown profitably, to Class 5, representing land with severe constraints which is unsuited to agriculture.

As discussed in Section 4.2, there are a number of constraints on the site which affect the agricultural potential, including:

- Shallow soils and areas of rocky outcrops.
- Rapidly drained (sandy side slopes) and poorly drained (swampy valley floors) soils.
- Steep slopes.
- Acidic soils of low fertility.

Based on these constraints and the NSW Agriculture classifications, the site has a low agricultural capability and is likely Class 4 or 5, which are defined as follows:

- Class 4: Land suitable for grazing but not for cultivation. Agriculture is based on native pastures or improved pastures established using minimum tillage techniques. Production may be seasonally high but the overall production level is low as a result of major environmental constraints.
- Class 5: Land unsuitable for agriculture, or at best suited only to light grazing. Agricultural production is very low or zero as a result of severe constraints, including economic factors which prevent land improvement.

(NSW Agriculture Agfact AC. 25, 2002)

NSW Department of Agriculture has been consulted to confirm this classification, with details of correspondence provided in Attachment E. They concur that the land is most likely Class 5 and that further detailed assessment of agricultural potential is not required.

5.2 Agricultural Impact Assessment of Proposed Development

5.2.1 Potential Agricultural Impacts

Potential impacts which may arise due to the proposed development include:

- Reduction to site agricultural use potential.
- Bore drawdown at nearby poultry farms.

5.2.2 Impact Assessment

Existing site agricultural land use potential is considered to be minimal as agreed by NSW Department of Agriculture, and hence any further reductions to the agricultural land use potential of the site due to proposed quarry expansion are considered negligible.

NSW Department of Agriculture requested in their correspondence (Attachment E) that nearby poultry farm bores are assessed for potential drawdown. Drawdown at all licenced bores in the study area has been assessed in detail within the project Hydrogeological Assessment (P1303888JR02V04, 2015a). Within the Hydrogeological Assessment refer to Sections 6.2.4 and 6.3.5 for model results discussion, Sections 8.2 and 11 for impact management discussion, and Attachment C Figure 47 for predicted offsite bore drawdown plot. The assessment concluded that one nearby licenced bore (GW078135) is modelled to be subjected to >2 m of drawdown due to the proposed development.

In accordance with the NSW Aquifer Interference Policy (2012), it was recommended that further works are undertaken to determine measures required, to the Minister's satisfaction, to ensure long-term bore viability will not be affected or to assess necessary 'make good' provisions. It is also recommended that groundwater level monitoring be undertaken at this bore prior to proposed quarrying progression below existing approved quarry floor level to provide a benchmark for impact assessment. The Applicant's statement of commitments is to include measures to monitor and, should negative impacts be identified, address any loss of bore yield.

5.2.3 Mitigation Measures

Impacts to site agricultural potential are negligible and hence works are not considered necessary to mitigate this risk.

Further works are recommended to ensure offsite bore viability and necessary 'make good' provisions, and the Applicant has committed to addressing any loss of bore yield.

These measures are considered adequate to appropriately mitigate risks.

6 Assessment of Site Landforms and Topography

6.1 Geology and Rock Formations

6.1.1 Geological Mapping

The Newcastle 1:100,000 Geological Sheet 9232 (Geological Survey of NSW, Department of Mines, 1975) identifies the site as being underlain by the Carboniferous Paterson Formation which consists of acid lava flows, crystal tuff, interbedded conglomerate and ignimbrite.

Carboniferous rocks outcrop principally on the northern side of the Hunter River and are separated from the younger Coal Measure geology to the south by a fault system, known as the Hunter Thrust. The area is highly faulted and these faults cut off geological units abruptly.

6.1.2 Site Geological Investigations

Hanson has previously conducted geological investigations at the Brandy Hill Quarry, with a total of 10 site boreholes located around the quarry expansion area drilled up to approximately 110 mBGL. 3 boreholes were drilled as part of previous investigations in 2012 (BH401A, BH401, BH400), and 7 as part of the expansion EIS in 2014 (BH1401, BH1402, BH1403, BH1404, BH1405, BH1406, BH1407). Borehole locations are shown in Attachment A, SK001 with graphic drill logs provided in Attachment D.

The boreholes comprised of sandy loams and clays overlying weathered ignimbrite, sandstone or conglomerate, and confirmed the presence of Seaham Glacial Beds comprising sandstone, mudstone and conglomerate overlying Patterson Volcanics comprising predominantly fine grained mudstone and sandstone (Hanson, 2014). At boreholes within the quarry void, ignimbrite is present at the surface due to soil overburden removal. Where rock overburden is present the sandstone, conglomerate and mudstone layers range from 10 to 58 mBGL. Isolated thin lenses of conglomerate, sandstone and granite are present within the ignimbrite rock mass. At the base of the ignimbrite, bore holes intercepted either sandstone or mudstone belonging to the Mount Johnson Formation.

Field measurements indicate the base of the ignimbrite dipping at 10 degrees to the south east. The ignimbrite is described as a hard rock, and the specific gravity has been tested at 2.67 for the ignimbrite and 2.6 for the sandstone (Hanson, 2014).

6.2 Site Slopes

The existing quarry (Attachment A, SK001) is situated on the eastern slopes of Brandy Hill (approximate elevation 35 to 100 mAHD) adjacent to the Deadman's Creek incised valley (approximate elevation 25 to 55 mAHD). Pre quarrying contours are given in the EIS for the currently approved quarry (Hunter Valley Mining Corporation, 1983) and show slopes of 10 – 30%. Slopes to the south of the site are generally consistent with pre quarrying slopes. Slopes north of the site on the opposite side of Deadman's Creek gradually increase to steeper slopes of > 50%.

Batter slopes of quarry benches range from approximately 60° to beyond 90° (over steepened), with the average batter slope being approximately 80°. The average pit slope of the quarry is approximately 25°.

6.3 Topography and Quarry Landform

The existing extraction pit collects stormwater from the disturbed portion of the site. The top bench of the existing pit represents the top of this catchment. Bunds direct stormwater runoff upslope of the pit north east to Deadmans Creek, west to an unnamed drainage path running to Barties Creek, and south east to the site western dam and through the site processing area.

The existing quarry pit is approximately 900 m long, 380 m wide and 70 m deep. The quarry has 6 benches and 2 rehabilitated former benches on the uppermost slopes which are no longer used for quarrying. Benches are typically east to south east facing and are stepped down on the mid to lower north-west slopes of Brandy Hill. Benches increase in length from upper to lower with the second last bench wrapping around the quarry to form an amphitheatre shape, with an opening to the east. The final drop cut to the currently approved extraction limit of 30 mAHD was made on 28th March 2014 and is currently being excavated.

The pit has elevations ranging from approximately 95 mAHD at the uppermost bench to 31 mAHD within the currently active base bench.

The crushing plant and stockpiling area is approximately 420 m long and 410 m wide. The plant is located on a mostly flat surface south of the quarry and haul road at approximately 33 to 37 mAHD. Aggregate stockpiles are located on three benches with elevations ranging from 32 to 45 mAHD. The plant area is separated from the quarry floor by a haul road up to 13 m above the quarry floor.

Natural ground levels at the site range from approximately 111 mAHD north-west of the quarry to approximately 32 mAHD south of the processing area.

6.4 Land Slippage

A Geotechnical Assessment previously conducted by MA (2016a) identified land slippage hazards onsite which were related to stability of pit slopes, benches and haul roads within the quarry, due to discontinuities within the rock mass. Risks of slope failure due to groundwater and seepage inflows are considered to be low (P1203463JR02V02, 2016a).

Potential hazards identified were generally confined to individual benches and included rock toppling, rock fall, rock slide and wedge failure. Complete bench failure was not observed and is not expected to be a likely failure mechanism. Further details of geotechnical investigations are provided in the site Geotechnical Assessment (P1203463JR02V02, 2016a).

Importantly, we note that land slippage hazards are localised within the quarry footprint. Any potential land slippage failure would be internalised, and there is no increased risk of land slippage in outside of the quarry footprint.

6.5 Impact Assessment of Proposed Development

6.5.1 Potential Impacts

Potential impacts which may arise due to the proposed development include:

- Slope failure within the quarry footprint extents, resulting in risk to life and commercial consequences of damage to the quarry and associated infrastructure.

6.5.2 Impact Assessment

The site has no history of major land slippage within the quarry footprint extents. Assessment of site slopes indicates that both pit slope failure risk and bench slope failure risk are generally low. The risks identified in the MA Geotechnical Assessment (P1203463JR02V02, 2016a) have been addressed and are managed through quarry operations and appropriate mitigation measures as recommended. These mitigation measures will continue during quarry expansion.

It is anticipated that internal slope stability risks are minimal and can be effectively managed through the implementation of the proposed geotechnical stability control measures.

Internal quarry slope failure and land slippage are risks inherent to the quarry operation. These risks are addressed through quarry operations and management, including regular inspection and maintenance. Quarry management recommendations provided in the past Geotechnical Assessment (P1203463JR02V02, 2016a) shall continue to be incorporated in quarry development.

6.5.3 Mitigation Measures

Land slippage controls have been incorporated within the quarry's design based on the recommendations of the MA Geotechnical Assessment (P1203463JR02V02, 2016a), and include:

- Trimming of batter slopes: Removal of hazardous blocks of rock and reduction of batter slope angles.
- Bunds: Installation at the base of the batter to control falling rocks, which are to be removed if bunds fill up.
- Positions of future bunds and material stockpiles: Located away from the edge of benches to prevent rock fall and unnecessary loading which may lead to instability.
- Cut-off drains: Suitable drains are excavated into the rock or formed by mound construction, and are used to intercept surface water run-off and reduce flows down the batter face. Sheet flow across slope surfaces is to be avoided during quarry expansion.
- Drains: Properly designed and constructed stormwater and sub-soil drainage to prevent scour, ponding and limit inflow to a slope.

These measures are further detailed in the MA Geotechnical Assessment (P1203463JR02V02, 2016a). When implemented in conjunction with regular inspection and on-going maintenance, these measures are considered adequate to control internal quarry land slippage risk.

These measures are considered adequate to appropriately mitigate risks.

Conclusions and Recommendations

This Land Resources Assessment has yielded the following findings regarding potential impacts due to the proposed development:

- Potential impacts to surrounding land uses have been assessed in a number of expert reports which also consider acceptability of impacts and recommended mitigation measures.
- Assessment of site soils indicates that the site is not impacted by acid sulfate soils.
- Increased site sediment and erosion will be effectively managed by the proposed sediment erosion control measures, such as sedimentation basins and water capture, recycling and reuse systems. The quarry will continue operating in accordance with EPL conditions, thereby ensuring no significant adverse off site sediment impacts.
- The site has a low potential (most likely Class 5 land) for agricultural land use as confirmed by NSW Department of Agriculture. Offsite impacts to nearby licenced groundwater users have been assessed, and should unacceptable impacts occur the Applicant's statement of commitments includes measures to monitor and address any loss of bore yield.
- The site has no history of major land slippage, and the assessment of site slope failure indicates that internal slope stability risks are minimal with the implementation of the proposed geotechnical stability controls.
- Any potential land slippage failure would be internalised, and there is no risk of slope slippage in the external environment.
- While risks of localised internal land slippage have been identified, they are considered acceptable as they will be managed by appropriate controls and ongoing monitoring.

The impacts of the proposed quarry extension at Hanson's Brandy Hill Quarry are considered acceptable with the proposed mitigation measures implemented. The quarry shall not impact on the soils, agricultural land capability, and landforms and topography in such a way as to have significant detrimental effects on surrounding ecological systems or land use for the duration of the proposed project and after rehabilitation.

8

References

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Martens and Associates (2016a), *Geotechnical Assessment: Brandy Hill Quarry, Seaham, NSW*, Ref: P1203463JR02V02.

Martens and Associates (2016b), *Surface Water Assessment: Hanson's Brandy Hill Quarry Expansion*, Ref: P1303888JR03V09.

NSW Agriculture (2002), *Agricultural Land Classification, Agfact AC.25*.

Port Stephens Council (2013) LEP 2013, *Acid Sulfate Soils Map Sheet ASS_004, 1:80,000*.

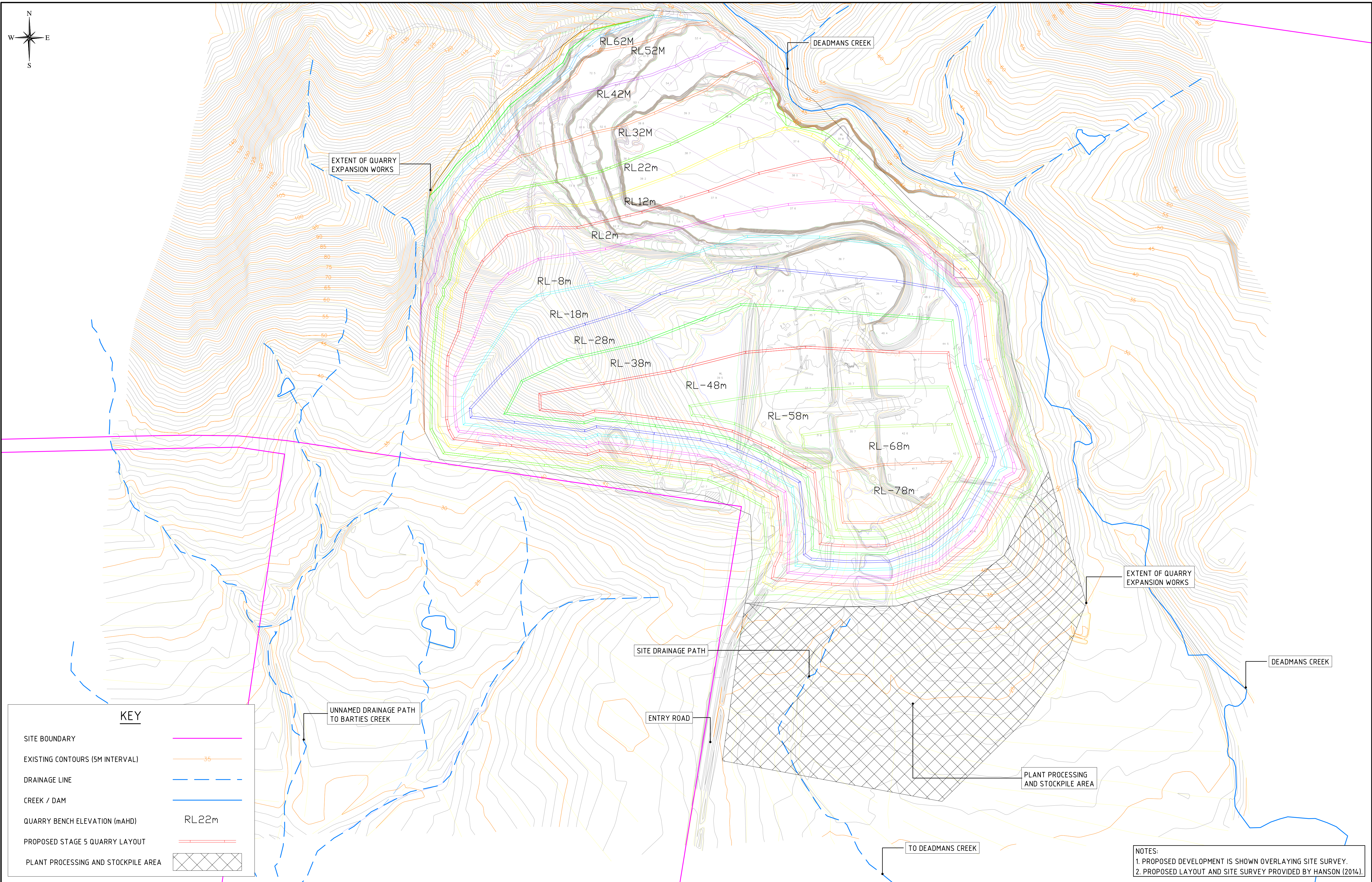
Soil Conservation Service of NSW (1995), *Newcastle Soil Landscape Series Sheet 9232, 1:100,000*.

9 **Attachment A – Site Plan**



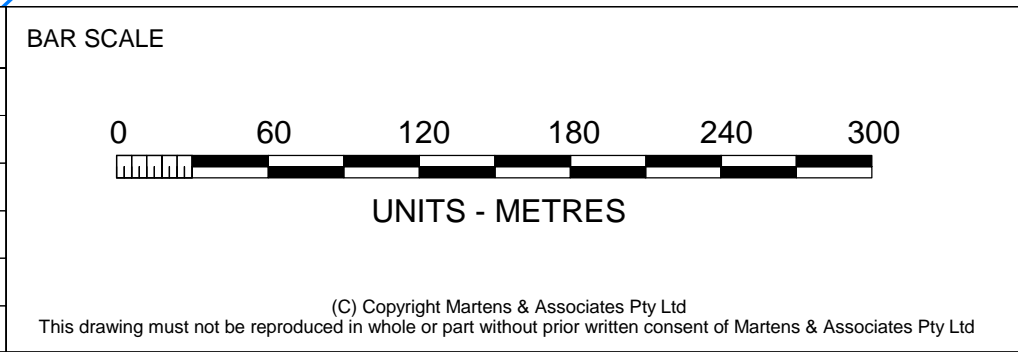
NOTES:
1. BACKGROUND AERIAL FROM SIXMAPS (2014).
2. EXISTING CONTOURS AND BOREHOLE LOCATIONS PROVIDED BY HANSON (2014).

REV.	DESCRIPTION	DATE	ISSUED	BAR SCALE	DESIGNED:	DATUM:	CLIENT / PROJECT	<div>martens & Associates Pty Ltd</div> <div>Consulting Engineers</div> <div>Environment Water Geotechnical Civil</div>	TITLE:	DRAWING ID:
A	ENVIRONMENTAL IMPACT STATEMENT	15.12.15	AN	<div>050100200250</div> <div>UNITS - METRES</div> <div>(C) Copyright Martens & Associates Pty Ltd This drawing must not be reproduced in whole or part without prior written consent of Martens & Associates Pty Ltd</div>	DD	mAHD	HANSON BRANDY HILL QUARRY EXPANSION EIS		EXISTING SITE LAYOUT, SURFACE WATER CONDITIONS AND TESTING LOCATIONS	SK001
					REVIEWED:	HORIZONTAL RATIO:	THIS PLAN MUST NOT BE USED FOR CONSTRUCTION UNLESS SIGNED AS APPROVED BY PRINCIPAL CERTIFYING AUTHORITY All measurements in mm unless otherwise specified		PROJECT MANAGER:	REVISION:
					AN	1:2500		AN		A
					PAPER SIZE:	VERTICAL RATIO:			PROJECT NO.:	FILE:
					A1	NA			P1303888	JD02V01



NOTES:
1. PROPOSED DEVELOPMENT IS SHOWN OVERLAYING SITE SURVEY.
2. PROPOSED LAYOUT AND SITE SURVEY PROVIDED BY HANSON (2014).

REV.	DESCRIPTION	DATE	ISSUED
A	ENVIRONMENTAL IMPACT STATEMENT	15.12.15	AN



DESIGNED: DD	DATUM: mAHD	CLIENT / PROJECT HANSON BRANDY HILL QUARRY EXPANSION EIS
REVIEWED: AN	HORIZONTAL RATIO: 1:3000	THIS PLAN MUST NOT BE USED FOR CONSTRUCTION UNLESS SIGNED AS APPROVED BY PRINCIPAL CERTIFYING AUTHORITY All measurements in mm unless otherwise specified
PAPER SIZE: A1	VERTICAL RATIO: NA	



Consulting Engineers
Environment
Water
Geotechnical
Civil

Suite 201, 20 George Street, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767
Email: mail@martens.com.au Internet: http://www.martens.com.au

TITLE: SITE SURVEY AND STAGE 5 QUARRY LAYOUT				DRAWING ID: SK002
PROJECT MANAGER: AN	PROJECT NO.: P1303888	FILE: JD02V01	REVISION: A	

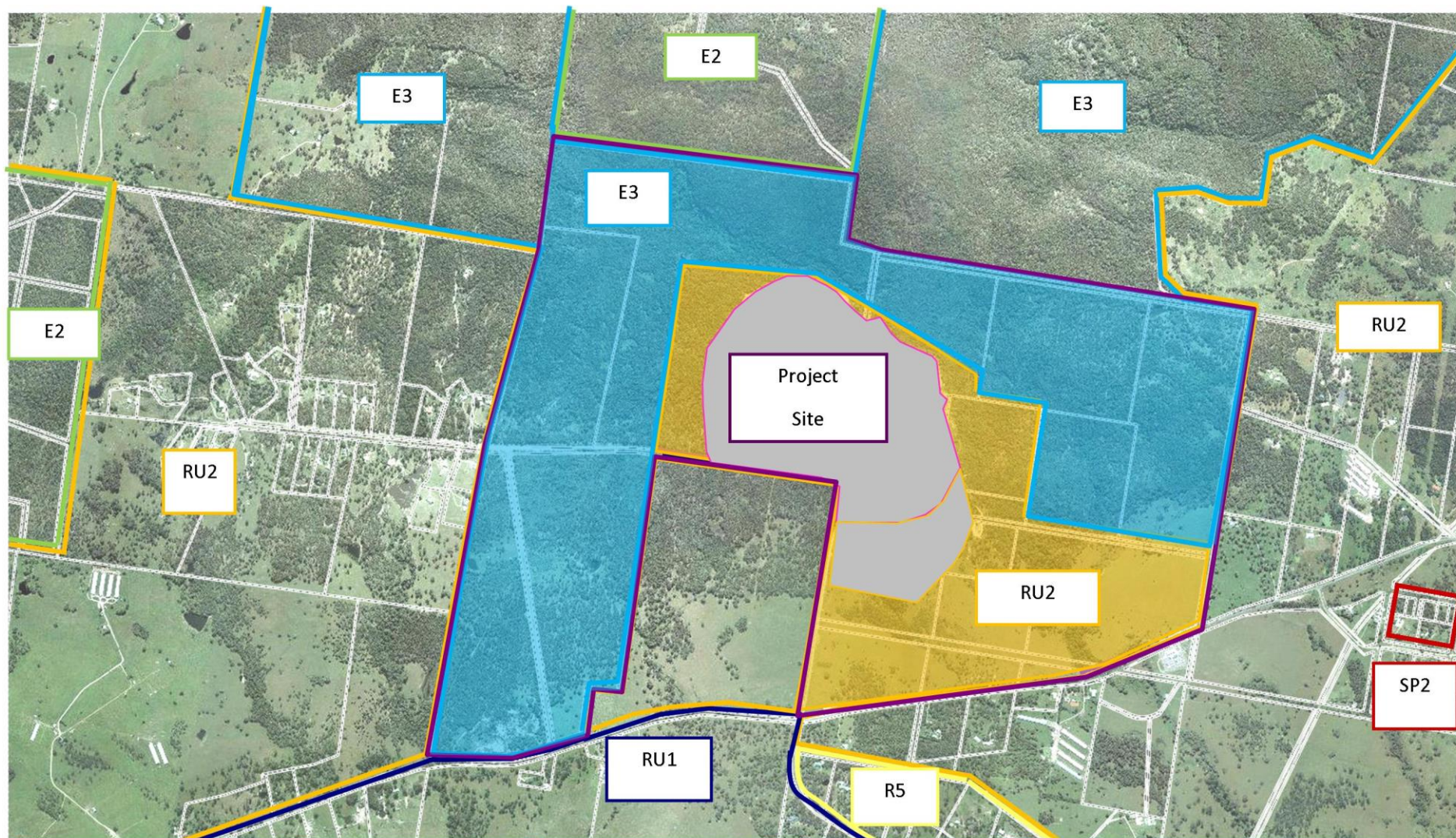
10 **Attachment B – MA Borehole Logs**

CLIENT	Hanson Construction Materials Pty Ltd	COMMENCED	29/01/15	COMPLETED	29/01/15	REF BH101									
PROJECT	Wastewater Assessment	LOGGED	AB/AT	CHECKED	ANN	Sheet 1 of 1									
SITE	Hanson Brandy Hill Quarry, NSW	GEOLOGY	Dalwood Group	VEGETATION	Bushland	PROJECT NO. P1303888									
EQUIPMENT	4WD Truck Mounted Auger		EASTING	-		RL SURFACE 41.60m AHD									
EXCAVATION DIMENSIONS	Ø95mm X 0.9m depth		NORTHING	-		ASPECT	South								
SLOPE		5-7°													
EXCAVATION DATA				MATERIAL DATA				SAMPLING & TESTING							
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	DRILLING RESISTANCE	GRAPHIC LOG	CLASSIFICATION	MATERIAL DESCRIPTION		CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS	
									SOIL NAME, plasticity or particle characteristics, colour, secondary and minor components, moisture condition, consistency/relative density, ROCK NAME, grain size, texture/fabric, colour, strength, weathering.						
V	Nil	N	M	0.1			SP	Loamy SAND - Dark brown, weakly structured.						- TOPSOIL	
V	Nil	N	M	0.25			CL	Sandy CLAY - Low plasticity, dark brown, becoming light brown with depth, moderately structured.						- RESIDUAL	
TC	Nil	N	D	0.75				SILTSTONE - Brown, distinctly weathered.				A	0.7	3888/101/ 0.7	
				0.9				TC Bit refusal at 0.9m on siltstone.						- V Bit refusal at 0.5m.	
				1.0										- ROCK	
				1.25											
				1.5											
				1.75											
				2.0											
				2.25											
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS															
martens															
MARTENS & ASSOCIATES PTY LTD Suite 201, 20 George St, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767 mail@martens.com.au WEB: http://www.martens.com.au															
Engineering Log - Borehole															

CLIENT	Hanson Construction Materials Pty Ltd			COMMENCED	29/01/15	COMPLETED	29/01/15		REF BH102						
PROJECT	Wastewater Assessment			LOGGED	AB/AT	CHECKED	ANN		Sheet 1 of 1						
SITE	Hanson Brandy Hill Quarry, NSW			GEOLOGY	Dalwood Group	VEGETATION	Bushland		PROJECT NO. P1303888						
EQUIPMENT		4WD Truck Mounted Auger			EASTING	-		RL SURFACE		38.775m AHD					
EXCAVATION DIMENSIONS		Ø95mm X 1.5m depth			NORTHING	-		ASPECT		South	SLOPE	5-7°			
EXCAVATION DATA				MATERIAL DATA				SAMPLING & TESTING							
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	DRILLING RESISTANCE	GRAPHIC LOG	CLASSIFICATION	MATERIAL DESCRIPTION		CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS	
								SOIL NAME, plasticity or particle characteristics, colour, secondary and minor components, moisture condition, consistency/relative density, ROCK NAME, grain size, texture/fabric, colour, strength, weathering.							
V	Nil	N	M	0.1			SP	Loamy SAND - Dark brown, weakly structured.						- TOPSOIL	
V	Nil	N	M	0.25			CL	Sandy CLAY - Low plasticity, dark brown, becoming light brown with depth, moderately structured.				A	0.3	3888/102/ 0.3	
				0.5											
				0.7								A	0.7	3888/102/ 0.7	
				0.75										- V Bit refusal at 0.7m.	
				1.0										- ROCK	
TC	Nil	N	D	1.25				SILTSTONE - Brown, distinctly weathered.							
				1.5											
				1.75				TC Bit refusal at 1.5m on siltstone.							
				2.0											
				2.25											
EQUIPMENT / METHOD		SUPPORT	WATER	MOISTURE	DRILLING RESISTANCE	CONSISTENCY	DENSITY	SAMPLING & TESTING		CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION					
N Natural exposure		SH Shoring	N None observed	D Dry	VS Very Soft	VL Very Loose	A Auger sample	pp Pocket penetrometer		Y USCS					
X Existing excavation		SC Shotcrete	X Not measured	M Moist	S Soft	L Loose	B Bulk sample	S Standard penetration test		N Agricultural					
BH Backhoe bucket		RB Rock Bolts	Water level	W Wet	F Firm	MD Medium Dense	U Undisturbed sample	VS Vane shear							
HA Hand auger		Nil No support	Water outflow	Wp Plastic limit	St Stiff	D Dense	D Disturbed sample	DCP Dynamic cone penetrometer							
S Spade			Water inflow	Wl Liquid limit	VSt Very Stiff	VD Very Dense	M Moisture content	FD Field density							
CC Concrete Corer					H Hard		Ux Tube sample (x mm)	WS Water sample							
V V-Bit					F Friable										
TC Tungsten Carbide Bit															
PT Push tube															
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS															
<div><div><div></div><div>(C) Copyright Martens & Associates Pty. Ltd . 2015</div></div><div>MARTENS & ASSOCIATES PTY LTD Suite 201, 20 George St, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767 mail@martens.com.au WEB: http://www.martens.com.au</div><div>Engineering Log - Borehole</div></div>															

CLIENT	Hanson Construction Materials Pty Ltd	COMMENCED	29/01/15	COMPLETED	29/01/15	REF BH103																																																																																																																																															
PROJECT	Wastewater Assessment	LOGGED	AB/AT	CHECKED	ANN	Sheet 1 of 1																																																																																																																																															
SITE	Hanson Brandy Hill Quarry, NSW	GEOLOGY	Dalwood Group	VEGETATION	Bushland	PROJECT NO. P1303888																																																																																																																																															
EQUIPMENT	4WD Truck Mounted Auger		EASTING	-		RL SURFACE 42.19m AHD																																																																																																																																															
EXCAVATION DIMENSIONS	Ø95mm X 2.0m depth		NORTHING	-		ASPECT	South																																																																																																																																														
SLOPE		5-7°																																																																																																																																																			
EXCAVATION DATA				MATERIAL DATA				SAMPLING & TESTING																																																																																																																																													
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	DRILLING RESISTANCE	GRAPHIC LOG	CLASSIFICATION	MATERIAL DESCRIPTION		CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS																																																																																																																																							
SOIL NAME, plasticity or particle characteristics, colour, secondary and minor components, moisture condition, consistency/relative density, ROCK NAME, grain size, texture/fabric, colour, strength, weathering.																																																																																																																																																					
V	Nil	N	M	0.2			SP	Loamy SAND - Dark brown, weakly structured.				A	0.2	- TOPSOIL 3888/103/ 0.2																																																																																																																																							
V	Nil	N	M	0.25			CL	Sandy CLAY - Low plasticity, dark brown, becoming light brown with depth, moderately structured.				A	0.5	- RESIDUAL 3888/103/ 0.5																																																																																																																																							
TC	Nil	N	D	0.75				SILTSTONE - Brown, distinctly weathered.						- V Bit refusal at 0.7m. - ROCK																																																																																																																																							
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				2.25																																																																																																																																																	
TC Bit refusal at 2.0m on siltstone.																																																																																																																																																					
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS																																																																																																																																																					
EQUIPMENT / METHOD N Natural exposure X Existing excavation BH Backhoe bucket HA Hand auger S Spade CC Concrete Corer V V-Bit TC Tungsten Carbide Bit PT Push tube															SUPPORT SH Shoring SC Shotcrete RB Rock Bolts Nil No support															WATER N None observed X Not measured Water level Water outflow Water inflow															MOISTURE D Dry M Moist Wp Plastic limit Wl Liquid limit															DRILLING RESISTANCE L Low M Moderate H High R Refusal															CONSISTENCY VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard F Friable															DENSITY VL Very Loose L Loose MD Medium Dense D Dense VD Very Dense															SAMPLING & TESTING A Auger sample B Bulk sample U Undisturbed sample D Disturbed sample M Moisture content Ux Tube sample (x mm)															pp Pocket penetrometer S Standard penetration test VS Vane shear DCP Dynamic cone penetrometer FD Field density WS Water sample															CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION Y USCS N Agricultural														
martens															MARTENS & ASSOCIATES PTY LTD Suite 201, 20 George St, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767 mail@martens.com.au WEB: http://www.martens.com.au															Engineering Log - Borehole																																																																																																																							

11 **Attachment C – Land Zoning Map (Hanson, 2016)**



Legend

- RU1: Primary Production
- RU2: Rural Landscape
- E2: Environmental Conservation
- E3: Environmental Management
- SP2: Infrastructure
- R5: Large Lot Residential
- Project Site

Land Use Zoning

Image Source: SIX Maps, NSW Land and Property (Base Layer).



Hanson
HEIDELBERGCEMENT Group

12 **Attachment D – Hanson Borehole Logs**

GRAPHIC DRILL LOG

HOLE: BH-400-DH


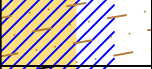

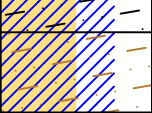

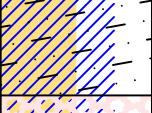
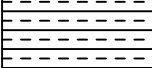

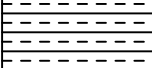

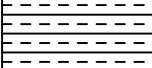
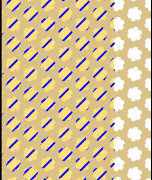
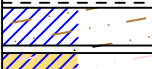
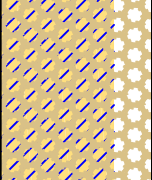

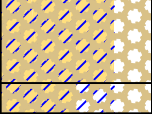
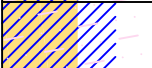
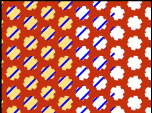

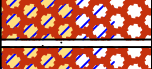
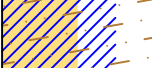
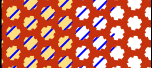
PROJECT: BRANDY HILL EXTENSION

PAGE 1 OF 5

LOCATION: 56 376668, 6385668

DRILLED:

LOGGED: P BROWNE 13/9/11

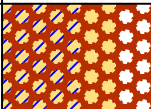
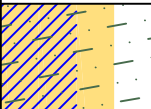
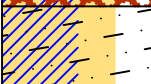
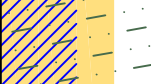
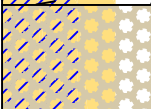
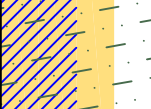
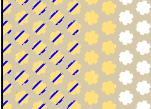
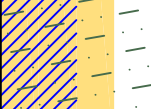
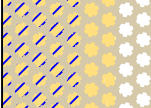
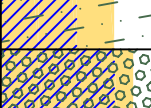
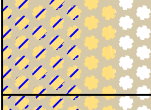
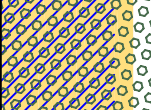
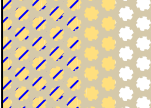
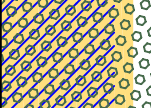
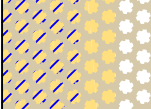
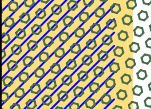



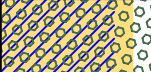

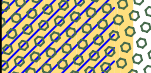

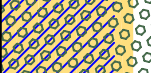
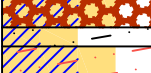
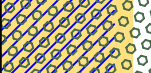
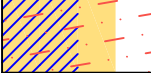
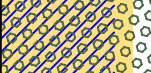
DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
1		YELLOW BROWN CLAY..	11		BROWN FINE GRAINED MEDIUM HARD SANDSTONE FRACTURES 60cm APART. 80° TO CORE AXIS
2		YELLOW BROWN CLAY..	12		VIOLET AND WHITE FINE GRAINED MEDIUM HARD SANDSTONE.
3		OFF WHITE SANDSTONE AND CLAY..	13		BROWN STAINED FINE GRAINED, MEDIUM HARD SANDSTONE
4		OFF WHITE SANDSTONE AND CLAY..	14		VIOLET AND WHITE FINE GRAINED MEDIUM HARD SANDSTONE FRACTURES 10cm APART.
5		OFF WHITE SANDSTONE AND RED BROWN CLAY..	15		LIGHT PINK TO WHITE MEDIUM TO COARSE GRAINED MEDIUM HARD CONGLOMERATE, PEBBLES MAINLY SANDSTONE ROUNDED TO 7mm FRACTURES 30cm APART.
6		OFF WHITE SANDSTONE AND CLAY..	16		LIGHT YELLOW TO WHITE MEDIUM TO COARSE GRAINED MEDIUM HARD CONGLOMERATE, PEBBLES MAINLY SANDSTONE ROUNDED TO 14mm, POORLY SORTED, FRACTURES 30cm APART.
7		BROWN MEDIUM HARD FINE GRAINED SANDSTONE..FRACTURES 20cm APART	17		LIGHT YELLOW TO WHITE MEDIUM TO COARSE GRAINED MEDIUM HARD CONGLOMERATE, PEBBLES MAINLY SANDSTONE ROUNDED TO 14mm, POORLY SORTED, FRACTURES 30cm APART.
8		BROWNE MEDIUM HARD FINE GRAINED SANDSTONE..	18		MULTICOLORED MEDIUM GRAINED MEDIUM HARD CONGLOMERATE, .
9		VIOLET AND WHITE FINE GRAINED MEDIUM HARD SANDSTONE FRACTURES 30cm APART.	19		RED BROWN MEDIUM TO COARSE GRAINED MEDIUM HARD CONGLOMERATE, PEBBLES MAINLY SANDSTONE ROUNDED TO 5mm FRACTURES 100cm APART.
10		VIOLET AND WHITE FINE GRAINED MEDIUM HARD SANDSTONE FRACTURES 100cm APART.	20		VIOLET FINE GRAINED MEDIUM HARD SANDSTONE.
		BROWN FINE GRAINED MEDIUM HARD SANDSTONE FRACTURES 60cm APART. 80° TO CORE AXIS			RED BROWN MEDIUM TO COARSE GRAINED MEDIUM HARD CONGLOMERATE, PEBBLES MAINLY SANDSTONE ROUNDED TO 4mm FRACTURES 40cm APART.

COMMENTS:

GRAPHIC DRILL LOG

HOLE: BHQ-400-DH
PROJECT: BRANDY HILL EXTENSION
PAGE 2 OF 5

LOCATION: 56 376668, 6385668
DRILLED:
LOGGED: P BROWNE 13/9/11

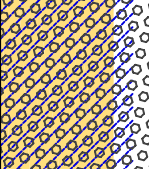
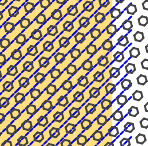
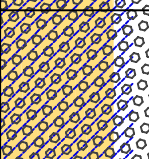
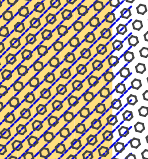
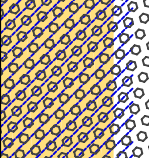

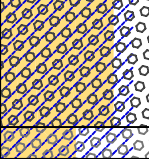
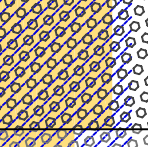
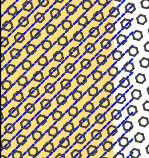
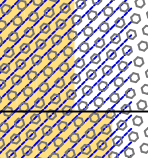
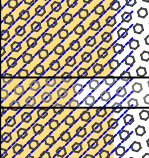
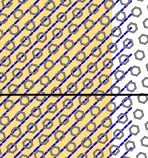
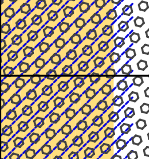
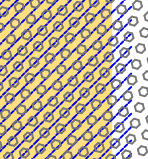
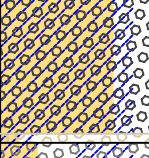
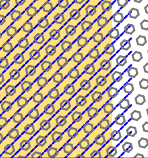
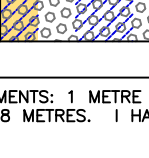
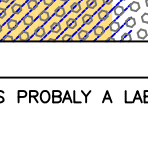


DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
		RED BROWN MEDIUM TO COARSE GRAINED MEDIUM HARD CONGLOMERATE, PEBBLES MAINLY SANDSTONE ROUNDED TO 4mm FRACTURES 40cm APART.			OFF WHITE TO LIGHT GREEN VERY FINE GRAINED SANDSTONE HARD, FRACTURES 100cm APART. CALCITE VEINS 80° T CORE AXIS.
21		WHITE FINE TO COARSE GRAINED MEDIUM HARD SANDSTONE, FRACTURES 40cm APART.	31		
22		MULTI COLOURED MEDIUM TO COARSE GRAINED MEDIUM HARD CONGLOMERATE, PEBBLES MAINLY SANDSTONE ROUNDED TO 20mm, SOME SHALES INCLUDED, FRACTURES 30 TO 60cm APART.	32		
23			33		
24			34		GREY GREEN FINE GRAINED IGIMBRITE, FRESH, VERY HARD, EVEN TEXTURED, FELDSPAR PHENOCRYSTS TO 5mm. FRACTURES 20 TO 70 cm APART
25		LIGHT BROWN TO WHITE MEDIUM GRAINED HARD CONGLOMERATE, PEBBLES MAINLY SANDSTONE ROUNDED TO 7mm, FRACTURES 30 TO 60cm APART. MINOR CROSS BEDDING.	35		
26			36		
27		RED BROWN MEDIUM GRAINED HARD CONGLOMERATE, PEBBLES MAINLY SANDSTONE ROUNDED TO 5mm,	37		GREY GREEN FINE GRAINED IGIMBRITE, FRESH, VERY HARD, EVEN TEXTURED, FELDSPAR PHENOCRYSTS TO 5mm. FRACTURES 20 TO 70 cm APART
28		LIGHT GREEN FINE GRAINED HARD SANDSTONE, PEBBLES MAINLY SANDSTONE	38		
		LIGHT RED FINE GRAINED HARD SANDSTONE, FRACTURES 30cm APART. MINOR CROSS BEDDING.			
		RED FINE GRAINED HARD SANDSTONE			
29		PINK FINE GRAINED HARD SANDSTONE,	39		
		LIGHT RED FINE GRAINED SANDSTONE FRESH HARD			GREY GREEN FINE GRAINED IGIMBRITE, FRESH, VERY HARD, EVEN TEXTURED, FELDSPAR PHENOCRYSTS TO 5mm. FRACTURES 20 TO 70 cm APART
30			40		

COMMENTS:

GRAPHIC DRILL LOG

HOLE: BH-400-PC
PROJECT: BRANDY HILL EXTENSION
PAGE 3 OF 5

LOCATION: 56 376668, 6385668
DRILLED:
LOGGED: P BROWNE 13/9/11

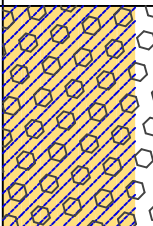
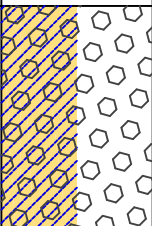
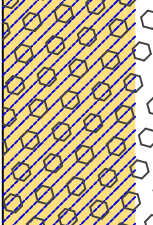
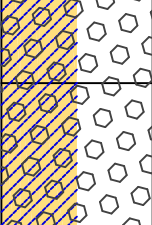
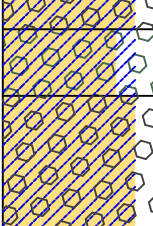
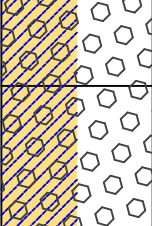
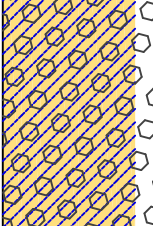
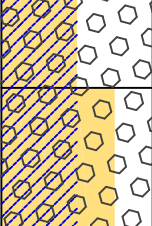
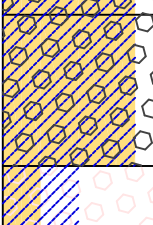
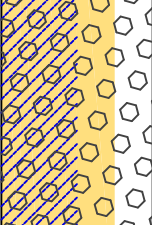
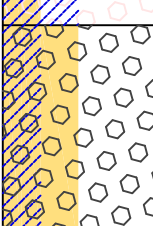
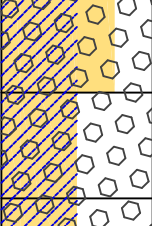
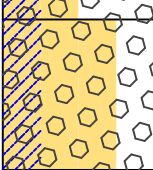
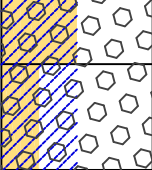




DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
41		DARK GREY, FINE GRAINED IGNIMBRITE, VERY SLIGHTLY WEATHERED, VERY HARD, EVEN TEXTURED, FRACTURES 40cm APART..	51		DARK GREY, FINE GRAINED IGNIMBRITE, VERY SLIGHTLY WEATHERED, VERY HARD, EVEN TEXTURED, FRACTURES 50cm APART, MINOR CALCITE PRESENT..
42			52		DARK GREY, FINE GRAINED IGNIMBRITE, VERY SLIGHTLY WEATHERED, VERY HARD, EVEN TEXTURED, FRACTURES 25cm APART, MINOR CALCITE PRESENT..
43		DARK GREY, FINE GRAINED IGNIMBRITE, VERY SLIGHTLY WEATHERED, VERY HARD, EVEN TEXTURED, FRACTURES 40cm APART..	53		
44			54		
45		GREY, AND PINK FINE GRAINED IGNIMBRITE, SLIGHTLY WEATHERED, MEDIUM HARD, EVEN TEXTURED, FRACTURES 45° TO CORE AXIS..	55		DARK GREY, FINE GRAINED IGNIMBRITE, VERY SLIGHTLY WEATHERED, VERY HARD, EVEN TEXTURED..
46		DARK GREY, FINE GRAINED IGNIMBRITE, VERY SLIGHTLY WEATHERED, VERY HARD, EVEN TEXTURED, FRACTURES 30cm APART.. CALCITE VEINS 45° TO CORE AXIS	56		GREY, GREEN FINE GRAINED IGNIMBRITE, SLIGHTLY WEATHERED, HARD, EVEN TEXTURED, FRACTURES 25cm APART, MINOR CALCITE PRESENT., BROWN CLAYS ON FRACTURES.
47		GREY, FINE GRAINED IGNIMBRITE, VERY SLIGHTLY WEATHERED, VERY HARD, EVEN TEXTURED..	57		GREY, MINOR RED WEATHERING, FINE GRAINED IGNIMBRITE, VERY SLIGHTLY WEATHERED, VERY HARD, EVEN TEXTURED, FRACTURES 30cm APART, MINOR CALCITE PRESENT..
48		GREY, FINE GRAINED IGNIMBRITE, VERY SLIGHTLY WEATHERED, VERY HARD, EVEN TEXTURED, FRACTURES 40cm APART SOME 45° TO CORE AXIS..	58		GREY, FINE GRAINED IGNIMBRITE, VERY SLIGHTLY WEATHERED, VERY HARD, EVEN TEXTURED, FRACTURES 25cm APART 45 TO 90° TO CORE AXIS, MINOR CALCITE PRESENT..
49		DARK GREY, FINE GRAINED IGNIMBRITE, VERY SLIGHTLY WEATHERED, VERY HARD, EVEN TEXTURED, FRACTURES 40cm APART..	59		
50		LIGHT BROWN WEATHERED IGNIMBRITE FRACTURED.. GREY GREEN, FINE GRAINED IGNIMBRITE, VERY SLIGHTLY WEATHERED, VERY HARD, EVEN TEXTURED, FRACTURES 60cm APART..	60		GREY, FINE GRAINED IGNIMBRITE, VERY SLIGHTLY WEATHERED, VERY HARD, EVEN TEXTURED, FRACTURES 25cm APART 45 TO 90° TO CORE AXIS, MINOR CALCITE PRESENT..

COMMENTS: 1 METRE INTERVAL MISSING IN 51 TO 54 METRE INTERVAL. THIS IS PROBABLY A LABELLING ERROR WITH THE HOLE FINISHING AT 98 METRES. I HAVE KEPT THE INTERVALS AS PER THE MARKING

GRAPHIC DRILL LOG

HOLE: BH-400-PC
 PROJECT: BRANDY HILL EXTENSION
 PAGE 4 OF 5

LOCATION: 56 376668, 6385668
 DRILLED:
 LOGGED: P BROWNE 13/9/11

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
61		GREYI GNIMBRITE, EQUANT HARD FRESH TO SLIGHTLY WEATHERED, FELDSPAR WHITE ALTERED TO 5mm, FRACTURES 20cm APART AT 10 TO 45° TO CORE AXIS, CALCITE VEINS 10° TO CORE AXIS. BROWN CLAY ON FRACTURES.	71		GREYI GNIMBRITE, HARD, SLIGHTLY WEATHERED, FELDSPAR WHITE ALTERED TO 5mm, FRACTURES 15cm APART, ALSO A VERTICAL FRACTURE IN THIS INTERVAL.
62			72		
63		GREY GREEN IGIMBRITE, HARD FRESH TO SLIGHTLY WEATHERED, FELDSPAR WHITE ALTERED TO 5mm, FRACTURES 20cm APART AT 10° TO CORE AXIS, CALCITE VEINS 10° TO CORE AXIS. BROWN CLAY ON FRACTURES.	73		GREYI GNIMBRITE, HARD, SLIGHTLY WEATHERED, FELDSPAR WHITE ALTERED TO 5mm, FRACTURES 15cm APART, BROWN CLAY ON FRACTURES
64			74		GREYI GNIMBRITE, HARD, VERY SLIGHTLY WEATHERED, FELDSPAR WHITE ALTERED TO 5mm, FRACTURES 15 TO 30cm APART, RED CLAY ON FRACTURES
65		GREYI GNIMBRITE, EQUANT HARD FRESH TO SLIGHTLY WEATHERED, FELDSPAR WHITE ALTERED TO 5mm, FRACTURES 20cm APART AT 10 TO 45° TO CORE AXIS, CALCITE VEINS 10° TO CORE AXIS. BROWN CLAY ON FRACTURES.	75		
66			76		
67		GREYI GNIMBRITE, EQUANT HARD FRESH TO SLIGHTLY WEATHERED, FELDSPAR WHITE ALTERED TO 5mm, FRACTURES 20cm APART AT 10 TO 45° TO CORE AXIS, CALCITE VEINS 10° TO CORE AXIS. BROWN CLAY ON FRACTURES.	77		GREYI GNIMBRITE, HARD, VERY SLIGHTLY WEATHERED, FELDSPAR WHITE ALTERED TO 5mm, FRACTURES 15 TO 30cm APART, RED CLAY ON FRACTURES
		PINK, BROWN AND GREYI WELDED GNIMBRITE, HARD WEATHERED, FELDSPAR WHITE ALTERED TO 5mm.			
68		GREY GREEN IGIMBRITE, HARD FRESH TO SLIGHTLY WEATHERED, FELDSPAR WHITE ALTERED TO 5mm, FRACTURES 20cm APART AT 45° TO CORE AXIS. BROWN CLAY ON FRACTURES.	78		GREY IGIMBRITE, HARD, MEDIUM WEATHERED, FELDSPAR WHITE ALTERED TO 5mm, FRACTURES 15 TO 30cm APART, RED CLAY ON FRACTURES
69		GREYI GNIMBRITE, HARD, FRESH TO SLIGHTLY WEATHERED, FELDSPAR WHITE ALTERED TO 5mm, FRACTURES 20cm APART, CALCITE VEIN PARALLEL TO CORE AXIS ALTERED. BROWN CLAY ON FRACTURES.	79		GREYI GNIMBRITE, HARD, VERY SLIGHTLY WEATHERED, FELDSPAR WHITE ALTERED TO 5mm, FRACTURES 15 TO 30cm APART, RED CLAY ON FRACTURES
70			80		GREY IGIMBRITE, HARD, MEDIUM WEATHERED, FELDSPAR WHITE ALTERED TO 5mm, FRACTURES 15 TO 30cm APART, RED CLAY ON FRACTURES

GRAPHIC DRILL LOG

HOLE: BH-400-PC
PROJECT: BRANDY HILL EXTN
PAGE 5 OF 5

LOCATION: 56 376668, 6385668
DRILLED:
LOGGED: P BROWNE 13/9/11

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
81		GREY GREEN, FINE GRAINED IGIMBRITE EQUANT QUARTZ ANGULAR 3mm, FELDSPAR WHITE HIGHLY WEATHERED 2mm FRACTURES 80cm APART 45° TO CORE AXIS.	91		GREY GREEN MINOR PINK AND GREEN FINE GRAINED HARD IGIMBRITE, FRACTURES 40cm APART. CALCITE FILLED VEINS 45° TO 80° TO CORE AXIS
82		GREY GREEN, FINE GRAINED IGIMBRITE EQUANT FELDSPAR WHITE HIGHLY WEATHERED 5mm FRACTURES 20cm APART 80° TO CORE AXIS. CALCITE VEINS 10° TO CORE AXIS, LARGER VEIN AT 82.0m	92		
83			93		PINK FINE GRAINED HARD IGIMBRITE.
84		BROWN AND GREY GREEN, FINE GRAINED MEDIUM HARD SLIGHTLY WEATHERED IGIMBRITE EQUANT FRACTURES 20cm APART 80° TO CORE AXIS. CALCITE VEINS 10° TO CORE AXIS, NOW BROWN CLAYS	94		RED TO PINK AND MINOR GREEN FINE GRAINED MEDIUM HARD TUFFACEOUS MUDSTONE
85		GREY GREEN, WITH MINOR RED ALTERATION IN PLACES, FINE GRAINED IGIMBRITE. SLIGHTLY WEATHERED FRACTURES 30cm APART 80° TO CORE AXIS. CALCITE VEINS 10 TO 45° TO CORE AXIS, LARGER VEIN AT 85.0m, VERTICAL VEIN AT 86m	75		GREY GREEN FINE GRAINED MEDIUM HARD TUFFACEOUS MUDSTONE
86					RED FINE GRAINED MEDIUM HARD TUFFACEOUS MUDSTONE
87		GREY GREEN, FINE GRAINED IGIMBRITE. SLIGHTLY WEATHERED FRACTURES 10cm APART 10° TO CORE AXIS CALCITE FILLED AND WITH BROWN RED ALTERATION	96		PINK, MINOR GREEN, VERY FINE GRAINED MUDSTONE, CALCITE FRACTURE 45° TO CORE AXIS
88					RED FINE GRAINED MEDIUM HARD MUDSTONE CROSS BEDDED
89		GREY GREEN, WITH MINOR RED ALTERATION IN PLACES, MEDIUM GRAINED SLIGHTED WEATHERED IGIMBRITE. FELDSPAR WHITE SLIGHTLY WEATHERED. FRACTURES 30cm APART 80° TO CORE AXIS. CALCITE VEINS 10 TO 45° TO CORE AXIS,	97		GREEN FINE GRAINED FRACTURED MUDSTONE PINK VERY FINE GRAINED MUDSTONE, CALCITE FRACTURE 45° TO CORE AXIS GREEN AND VIOTEL MYLOTISED MUDSTONE.
90					PINK VERY FINE GRAINED MUDSTONE, FRACTURE 20cm APART
			98		RED, VIOLET AND GREEN MYLOTISED MUDSTONE
			99		LIGHT GREY GREEN VERY FINE GRAINED MEDIUM HARD MUDSTONE CALCITE VEINS 90° TO CORE AXIS FRACTURES 60cm APART
			100		

GRAPHIC DRILL LOG

HOLE: BH-401-DH

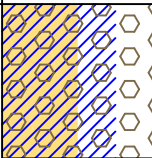
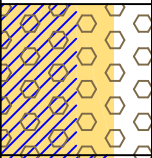
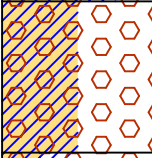
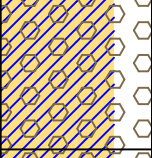
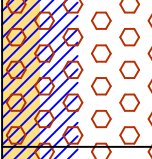
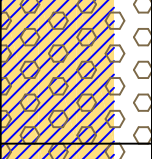
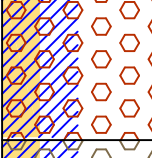
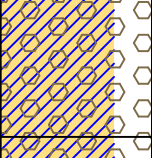
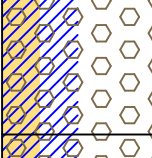
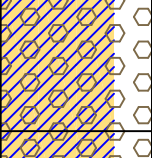
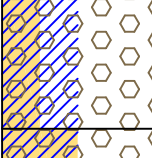
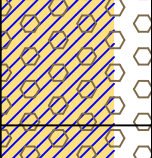
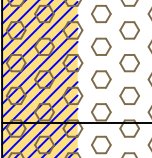
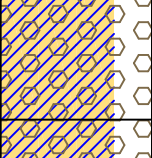
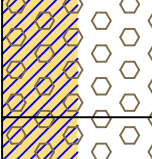
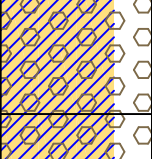
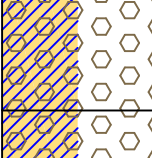
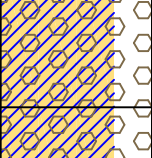
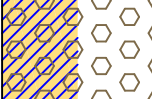
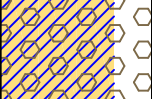
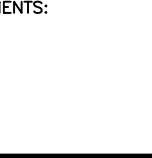

PROJECT: BRANDY HILL EXTENSION

PAGE 1 OF 3

LOCATION: 56 377298, 6385847

DRILLED:

LOGGED: P BROWNE 13/9/11

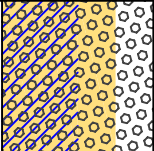
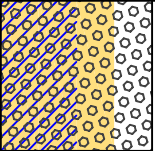
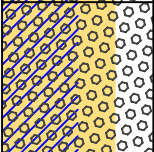
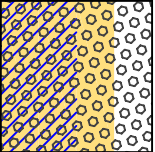
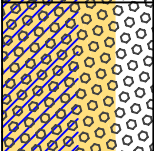
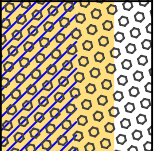
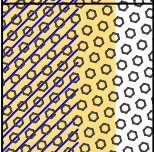
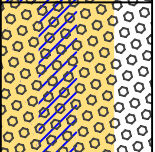
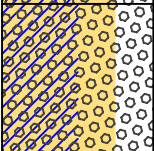
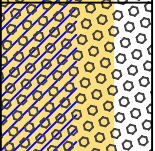
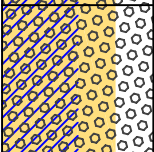
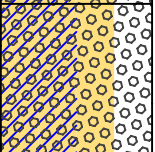
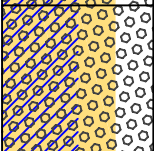
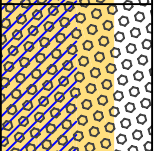
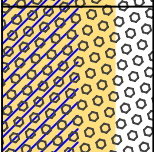
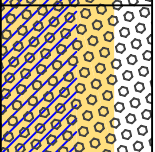
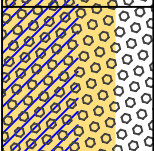
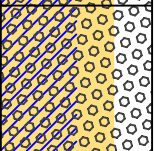
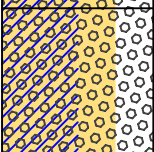
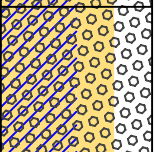
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1		RED BROWN MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..	11		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..
2		RED BROWN MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..	12		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..
3		RED BROWN MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..	13		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..
4		RED BROWN MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..	14		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..
5		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..	15		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..
6		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..	16		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..
7		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..	17		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..
8		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..	18		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..
9		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..	19		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..
10		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..	20		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..

COMMENTS:

GRAPHIC DRILL LOG

HOLE: BHQ-401-DH
PROJECT: BRANDY HILL PIT
PAGE 2 OF 3

LOCATION: 473475, 7696862 GDA
DRILLED:
LOGGED: P BROWNE 13/9/11

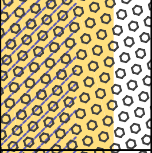

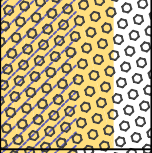

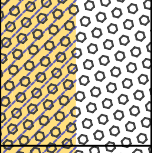
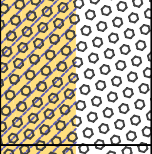
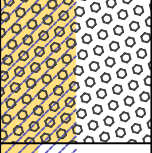
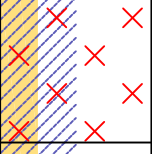
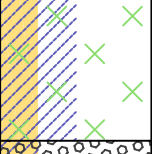

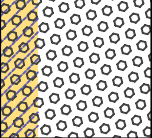
DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
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22		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.	32		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.
23		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.	33		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.
24		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.	34		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.
25		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.	35		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.
26		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.	36		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.
27		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.	37		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.
28		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.	38		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.
29		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.	39		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.
30		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.	40		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.

COMMENTS:

GRAPHIC DRILL LOG

HOLE: BH-401-PC
PROJECT: BRANDY HILL PIT
PAGE 3 OF 3

LOCATION: 56 377298, 6385847
DRILLED:
LOGGED: P BROWNE 13/9/11

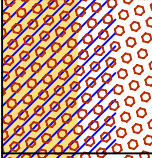
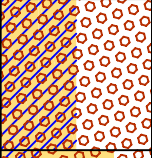
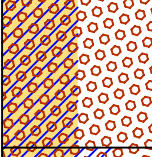
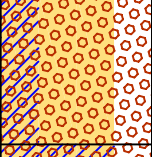
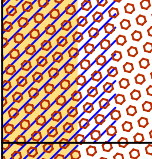
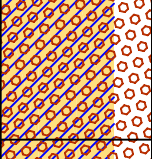
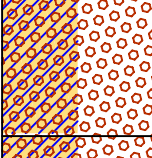
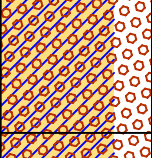
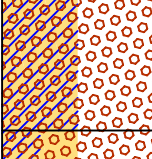
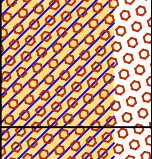
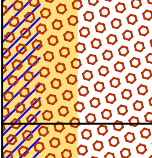
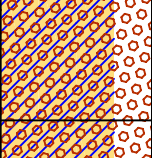
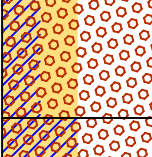
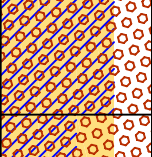
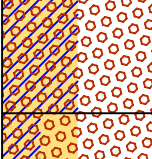
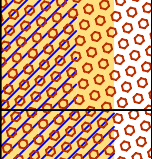
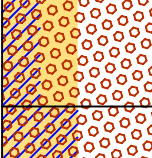
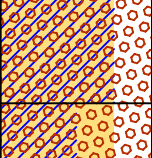
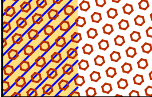
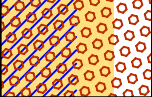
DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
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42		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.	52		
43		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.	53		
44		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.	54		
45		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.	55		
46		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.	56		
47		RED GRANITE	57		
48		GREY NAD GREEN GRANITE	58		
49		DARK GREY FINE GRAINED ALTERED IGNIMBRITE.	59		
50		DARK GREY FINE GRAINED ALTERED IGNIMBRITE.	60		

COMMENTS:

GRAPHIC DRILL LOG

HOLE: BH-400A-DH
PROJECT: BRANDY HILL PIT
PAGE 1 OF 3

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LOGGED: P BROWNE 13/9/11

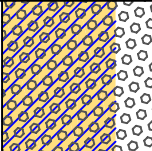
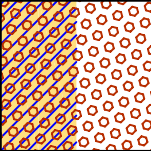
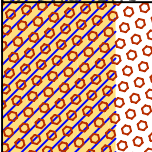
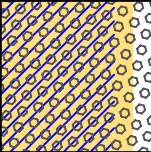
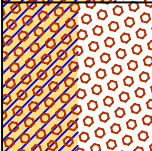
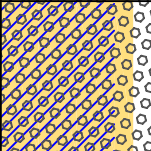
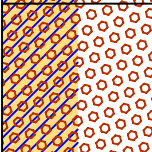
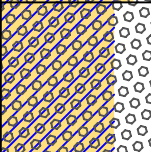
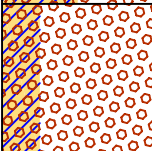
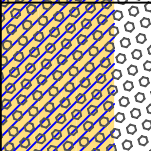
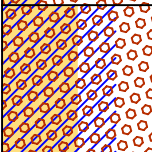
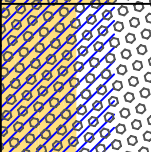
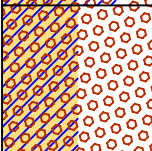
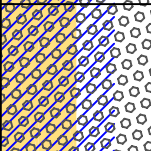
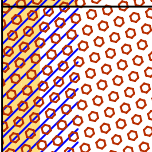
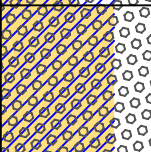
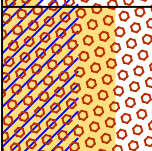
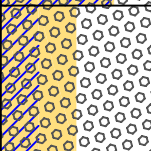
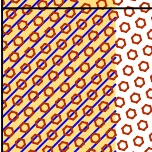
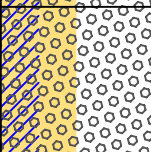
DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
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2		RED BROWN MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..	12		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..
3		RED BROWN MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..	13		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..
4		RED BROWN MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..	14		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..
5		RED BROWN MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..	15		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..
6		RED BROWN MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..	16		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..
7		RED BROWN MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..	17		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..
8		RED BROWN MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..	18		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..
9		RED BROWN MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..	19		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..
10		RED BROWN AND GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..	20		RED BROWN AND MINOR GREY MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE..

COMMENTS:

GRAPHIC DRILL LOG

HOLE: BHQ-401A-DH
PROJECT: BRANDY HILL PIT
PAGE 2 OF 3

LOCATION: 56 377937, 6385796
DRILLED:
LOGGED: P BROWNE 13/9/11

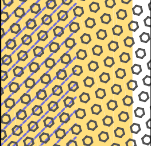
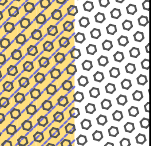
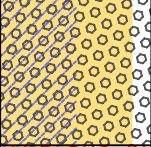
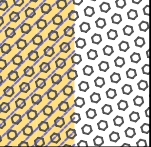
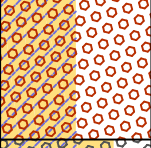
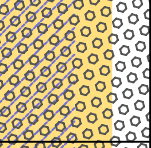
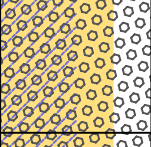
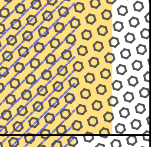
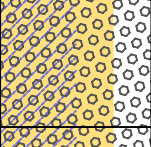

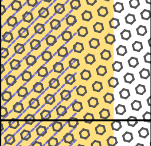
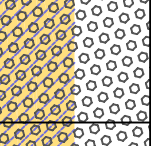
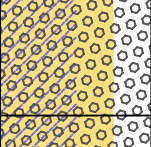
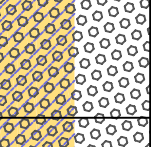
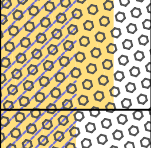
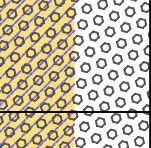
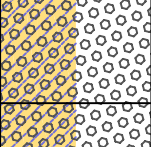


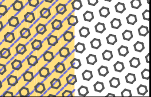
DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
21		DARK GREY FINE GRAINED MEDIUM HARD FRESH IGNIMBRITE.	31		RED BROWN FINE GRAINED MEDIUM HARD WEATHERED IGNIMBRITE.
22		RED BROWN FINE GRAINED MEDIUM HARD WEATHERED IGNIMBRITE.	32		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.
23		RED BROWN FINE GRAINED MEDIUM HARD WEATHERED IGNIMBRITE.	33		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.
24		RED BROWN FINE GRAINED MEDIUM HARD WEATHERED IGNIMBRITE.	34		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.
25		RED BROWN FINE GRAINED MEDIUM HARD WEATHERED IGNIMBRITE.	35		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.
26		RED BROWN FINE GRAINED MEDIUM HARD WEATHERED IGNIMBRITE.	36		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.
27		RED BROWN FINE GRAINED MEDIUM HARD WEATHERED IGNIMBRITE.	37		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.
28		RED BROWN FINE GRAINED MEDIUM HARD WEATHERED IGNIMBRITE.	38		DARK GREY AND RED BROWN FINE GRAINED MEDIUM HARD WEATHERED IGNIMBRITE.
29		RED BROWN FINE GRAINED MEDIUM HARD WEATHERED IGNIMBRITE.	39		DARK GREY AND RED BROWN FINE GRAINED MEDIUM HARD WEATHERED IGNIMBRITE.
30		RED BROWN FINE GRAINED MEDIUM HARD WEATHERED IGNIMBRITE.	40		DARK GREY AND RED BROWN FINE GRAINED MEDIUM HARD WEATHERED IGNIMBRITE.

COMMENTS:

GRAPHIC DRILL LOG

HOLE: BH-401A-PC
PROJECT: BRANDY HILL PIT
PAGE 3 OF 3

LOCATION: 56 377937, 6385796
DRILLED:
LOGGED: P BROWNE 13/9/11

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
41		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.	51		DARK GREY FINE GRAINED MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE.
42		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.	52		DARK GREY FINE GRAINED MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE.
43		RED BROWN FINE GRAINED MEDIUM HARD WEATHERED IGNIMBRITE.	53		DARK GREY FINE GRAINED MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE.
44		DARK GREY FINE GRAINED MEDIUM HARD IGNIMBRITE.	54		DARK GREY FINE GRAINED MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE.
45		DARK GREY FINE GRAINED MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE.	55		DARK GREY FINE GRAINED MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE.
46		DARK GREY FINE GRAINED MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE.	56		DARK GREY FINE GRAINED MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE.
47		DARK GREY FINE GRAINED MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE.	57		DARK GREY FINE GRAINED MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE.
48		DARK GREY FINE GRAINED MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE.	58		DARK GREY FINE GRAINED MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE.
49		DARK GREY FINE GRAINED MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE.	59		DARK GREY FINE GRAINED MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE.
50		DARK GREY FINE GRAINED MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE.	60		DARK GREY FINE GRAINED MEDIUM HARD SLIGHTLY WEATHERED IGNIMBRITE.

COMMENTS:

GRAPHIC DRILL LOG

HOLE: BH-1401-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 1 OF 4

LOCATION: 377467, 6385110 GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
1		NO CORE	11		A/A VERTICAL FRACTURE BROWN CLAY LINED
2			12		GREY CONGLOMERATE GRAINS TO 20mm SANDSTONE, SOME OXIDISED, FRACTURES 20cm APART, FRACTURES
3		NO CORE	13		GREY & BROWN CONGLOMERATE GRAINS TO 30mm SANDSTONE & QUARTZ EQUANT ROUNDED, FRACTURES 20cm
4		NO CORE	14		GREY QUARTZ SANDSTONE, FRACTURES 45° TO CORE AXIS
5		BROWN SANDSTONE VERY FINE GRAINED NO CORE BROWN SANDSTONE VERY FINE GRAINED, FRACTURES 9cm APART GREY BROWN FINE GRAINED SANDSTONE, FRACTURES BROWN CLAY FILLED IRON STAINING	15		BROWN GREEN CONGLOMERATE GRAINS TO 30mm SANDSTONE AND SILTSTONE VIOLET GREY VERY FINE GRAINED SANDSTONE VIOLET VERY FINE GRAINED SANDSTONE BANDED
6		GREY MEDIUM SANDSTONE, MANY FRACTURES AT ALL ANGLES BROWN CLAY LINED BROWN SANDSTONE FINE GRAINED NO CORE	16		BROWN GREY CONGLOMERATE GRAINS TO 50mm SANDSTONE GREY FINE GRAINED SANDSTONE F 0.05cm BROWN CLAY ON FRACTURES GREY CONGLOMERATE GRAINS TO 14mm
7		BROWN GREY SANDSTONE MEDIUM GRAINED BROWN, FRACTURES 20cm APART BROWN CLAY LINED GREY CONGLOMERATE GRAINS TO 40mm ROUNDED EQUANT QUARTZ & SANDSTONE. VERTICAL FRACTURE BROWN CLAY VERTICAL FRACTURE BROWN CLAY LINED	17		PINK GREY MEDIUM SANDSTONE, FRACTURES 30cm APART
8		GREY SANDSTONE	18		BROWN SANDSTONE HIGHLY FRACTURED
9		GREY CONGLOMERATE GRAINS TO 30mm ANGULAR EQUANT VERTICAL FRACTURE GREY GREEN CONGLOMERATE GRAINS TO 50mm SANDSTONE EQUANT ANGULAR	19		VIOLET GREY MEDIUM GRAINED SANDSTONE, FRACTURES .2cm APART BROWN CLAY ON FRACTURES BROWN FINE GRAINED SANDSTONE, FRACTURES 25cm APART
10		GREY GREEN CONGLOMERATE GRAINS TO 50cm ROUNDED, EQUANT QUARTZ & SANDSTONE, FRACTURES 23cm APART, FRACTURES	20		PINK & GREY SANDSTONE VERY FINE GRAINED SMALL LENS COARSE SANDSTONE, FRACTURES 50cm APART

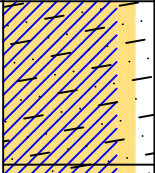
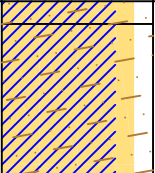
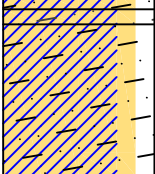
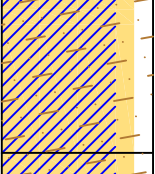
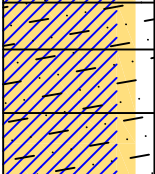
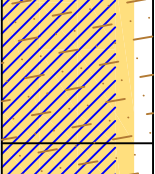
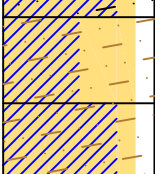
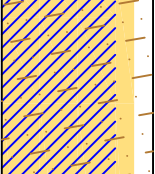
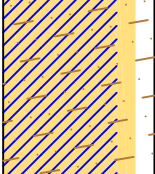
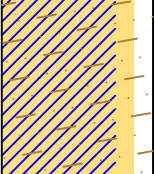
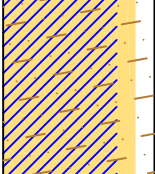
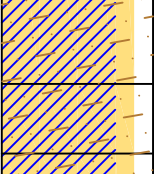
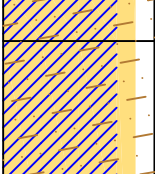
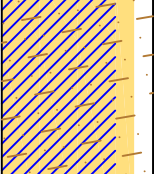
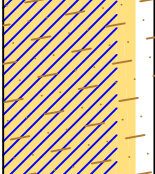
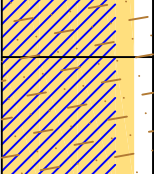
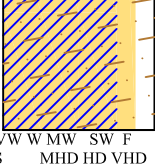
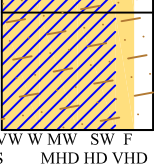
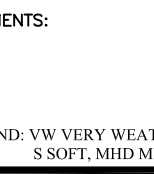
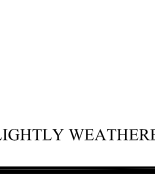
COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD

GRAPHIC DRILL LOG

HOLE: BH-1401-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 2 OF 4

LOCATION: 377467, 6385110 GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
21		A/A DARK GREY SANDSTONE, FRACTURES 45° TO CORE AXIS PINK & GREY SANDSTONE VERY FINE GRAINED SMALL LENS COARSE SANDSTONE, FRACTURES 20cm APART	31		BROWN MEDIUM GRAINED SANDSTONE WITH BANDS VERY FINE GRAINED SANDSTONE AND CLAY CLASTS
22		PINK & GREY SANDSTONE HIGHLY FRACTURED BROWN CLAY ON FRACTURES	32		BROWN MEDIUM GRAINED SANDSTONE WITH BANDS VERY FINE GRAINED SANDSTONE AND CLAY CLASTS, FRACTURES 10cm APART
23		PINK & GREY SANDSTONE VERY FINE GRAINED SMALL LENS COARSE SANDSTONE	33		BROWN MEDIUM GRAINED SANDSTONE WITH BANDS VERY FINE GRAINED SANDSTONE AND CLAY CLASTS
24		PINK & GREY SANDSTONE MEDIUM GRAINED SMALL LENS COARSE SANDSTONE	34		BROWN MEDIUM GRAINED SANDSTONE WITH BANDS VERY FINE GRAINED SANDSTONE AND CLAY CLASTS
25		BROWN SANDSTONE VERY FINE GRAINED WITH GREY CLASTS	35		BROWN MEDIUM GRAINED SANDSTONE WITH BANDS VERY FINE GRAINED SANDSTONE AND CLAY CLASTS
26		BROWN MEDIUM GRAINED SANDSTONE WITH BANDS VERY FINE GRAINED SANDSTONE AND CLAY CLASTS	36		BROWN MEDIUM GRAINED SANDSTONE WITH BANDS VERY FINE GRAINED SANDSTONE AND CLAY CLASTS
27		BROWN MEDIUM GRAINED SANDSTONE WITH BANDS VERY FINE GRAINED SANDSTONE AND CLAY CLASTS, FRACTURES 10 TO 100cm APART	37		BROWN FINE GRAINED SANDSTONE WITH BANDS VERY FINE GRAINED AND CC SANDSTONE AND CLAY CLASTS
28			38		BROWN FINE GRAINED SANDSTONE WITH BANDS VERY FINE GRAINED AND CC SANDSTONE AND CLAY CLASTS
29			39		BROWN MEDIUM GRAINED SANDSTONE WITH BANDS VERY FINE GRAINED SANDSTONE AND CLAY CLASTS
30			40		

COMMENTS:

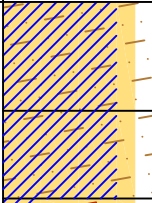
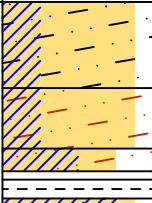
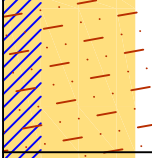
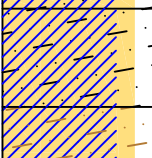
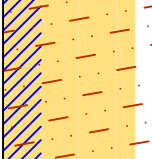
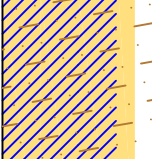
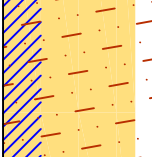
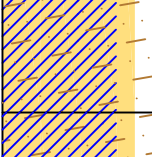
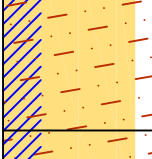
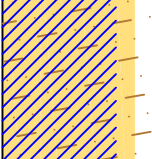
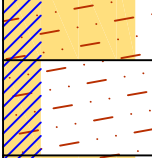
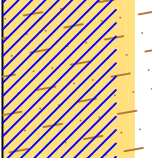
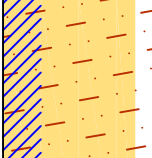
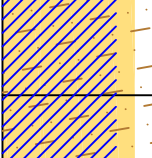
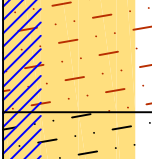
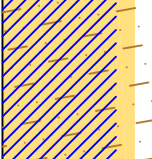
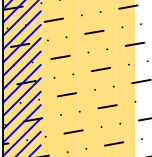
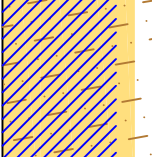

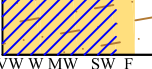
LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1401-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 3 OF 4

LOCATION: 377467, 6385110 GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
41		BROWN & GREEN MEDIUM GRAINED SANDSTONE WITH BANDS VERY FINE GRAINED SANDSTONE AND CLAY CLASTS	51		ALTERNATING MAINLY RED BROWN AND GREEN LAYERED VERY FINE GRAINED SANDSTONE, FRACTURES 40cm APART
42		ALTERNATING RED BROWN AND GREEN LAYERED VERY FINE GRAINED SANDSTONE	52		ALTERNATING MAINLY RED BROWN AND GREEN LAYERED VERY FINE GRAINED SANDSTONE, FRACTURES 5cm APART
43		ALTERNATING MAINLY RED BROWN AND GREEN LAYERED VERY FINE GRAINED SANDSTONE, FRACTURES 40cm APART	53		CLAYS
44			54		LAYERED SANDSTONE
45			55		RED MEDIUM GRAINED SANDSTONE
46		ALTERNATING MAINLY RED BROWN AND GREEN LAYERED VERY FINE GRAINED SANDSTONE, FRACTURES 40cm APART	56		
47		HIGHLY FRACTURED ALTERNATING MAINLY RED BROWN AND GREEN LAYERED VERY FINE GRAINED SANDSTONE	57		BROWN MEDIUM GRAINED SANDSTONE
48		ALTERNATING MAINLY RED BROWN AND GREEN LAYERED VERY FINE GRAINED SANDSTONE	58		
49		ALTERNATING MAINLY GREEN AND RED BROWN LAYERED VERY FINE GRAINED SANDSTONE, FRACTURES 40cm APART	59		BROWN MEDIUM GRAINED SANDSTONE MINOR VERY FINE GRAINED LAYERS, FRACTURES 100cm APART
50			60		BROWN MEDIUM GRAINED SANDSTONE MINOR VERY FINE GRAINED LAYERS, FRACTURES 100cm APART

COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1401-DH
PROJECT BRANDY HILL, ZONE 56
PAGE 4 OF 4

LOCATION: 377467, 6385110 GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
61		BROWN MEDIUM GRAINED SANDSTONE MINOR VERY FINE GRAINED AND COARSE SANDSTONE LAYERS PERPENDICULAR TO CORE AXIS	71		RED BROWN VERY FINE GRAINED SANDSTONE COARSE SANDSTONE LAYER RED BROWN VERY FINE GRAINED SANDSTONE COARSE SANDSTONE LAYER GREEN AND RED BROWN FINE GRAINED SANDSTONE LIGHT & CHOCOLATE BROWN MEDIUM GRAINED SANDSTONE MOTTLED VIOLET ALTERATION FRACTURES 100cm
62			72		
63			73		LIGHT & CHOCOLATE BROWN MEDIUM GRAINED SANDSTONE MOTTLED VIOLET ALTERATION FRACTURES 30 TO 100cm
64		BROWN MEDIUM GRAINED SANDSTONE MINOR VERY FINE GRAINED LAYERS, FRACTURES 100cm APART	74		
65		GREEN VERY FINE GRAINED SILTSTONE LAYERS 50° TO CORE AXIS BROWN MEDIUM GRAINED SANDSTONE MINOR VERY FINE GRAINED LAYERS, FRACTURES 100cm APART	75		
66			76		
67		BROWN MEDIUM GRAINED SANDSTONE MINOR VERY FINE GRAINED LAYERS, FRACTURES 100cm APART	77		
68		GREEN GREY MEDIUM GRAINED SANDSTONE POORLY SORTED SOME SILTSTONE LAYERS COARSE SANDSTONE LAYER BROWN MEDIUM GRAINED SANDSTONE MINOR VERY FINE GRAINED LAYERS	78		
69			79		
70		BROWN MEDIUM GRAINED SANDSTONE POORLY SORTED AND MINOR VERY FINE GRAINED LAYERS, FRACTURES 100cm APART DARK BROWN MEDIUM GRAINED SANDSTONE MOTTLED VIOLET ALTERATION GREY MEDIUM GRAINED SANDSTONE MOTTLED VIOLET ALTERATION	80		
	VW W MW SW F S MHD HD VHD			VW W MW SW F S MHD HD VHD	

COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1402-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 1 OF 4

LOCATION: 377445, 6385345GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
1	NO CORE		11		PINK VERY FINE GRAINED SANDSTONE
2			12		BROWN VERY FINE GRAINED SANDSTONE MINOR LIMONITE
3			13		LIGHT BROWN VERY FINE GRAINED SANDSTONE WITH CHOCOLATE BROWN LAYERS 80° TO CORE AXIS
4			14		LIGHT BROWN VERY FINE GRAINED SANDSTONE WITH CHOCOLATE BROWN LAYERS 80° TO CORE AXIS, FRACTURES 50cm AND ONE 10° TO CORE AXIS LIMONITE FILLED. ONION WEATHERING
5			15		PINK VERY FINE GRAINED SANDSTONE
6			16		LIGHT BROWN VERY FINE GRAINED SANDSTONE HIGHLY FRACTURED
7			17		LIGHT BROWN VERY FINE GRAINED SANDSTONE HIGHLY FRACTURED AND ONE 10° TO CORE AXIS LIMONITE FILLED
8			18		LIGHT BROWN VERY FINE GRAINED SANDSTONE WITH CHOCOLATE BROWN LAYERS PERPENDICULAR TO CORE AXIS, FRACTURES 16cm APART FRACTURED AND ONE 10° TO CORE AXIS LIMONITE FILLED
9			19		LIGHT BROWN VERY FINE GRAINED SANDSTONE
10			20		BROWN MEDIUM COARSE SANDSTONE GRAINS TO 5mm CLASTIC & QUARTZ FRAGMENTS

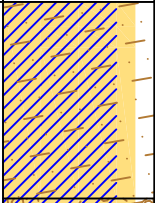
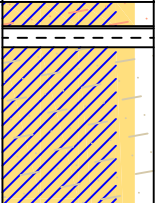
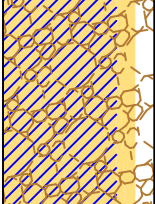
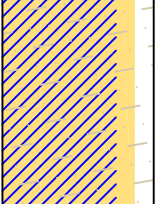
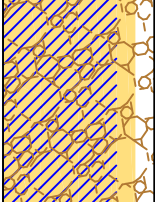
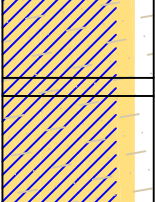
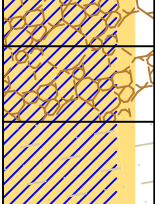
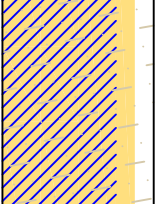
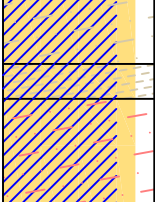
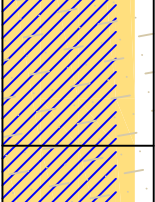
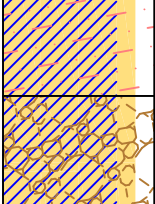
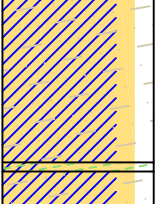
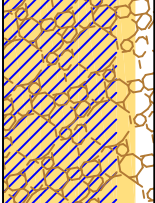
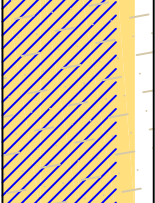
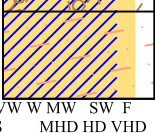
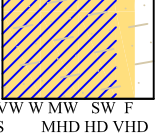
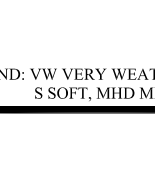

COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD

GRAPHIC DRILL LOG

HOLE: BH-1402-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 2 OF 4

LOCATION: 377445, 6385345GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
21		BROWN MEDIUM COARSE CONGLOMERATE GRAINS TO 14mm CLASTIC & QUARTZ FRAGMENTS POORLY SORTED WITH NO BEDDING	31		CORE LOSS PINK AND LIGHT BROWN FINE GRAINED SANDSTONE, FRACTURES 30cm APART MEDIUM
22		BROWN MEDIUM COARSE CONGLOMERATE GRAINS TO 14mm CLASTIC & QUARTZ FRAGMENTS POORLY SORTED WITH NO BEDDING	32		
23		BROWN MEDIUM COARSE CONGLOMERATE GRAINS TO 14mm CLASTIC & QUARTZ FRAGMENTS POORLY SORTED WITH NO BEDDING	33		
24		BROWN MEDIUM COARSE CONGLOMERATE GRAINS TO 14mm CLASTIC & QUARTZ FRAGMENTS POORLY SORTED WITH NO BEDDING	34		PINK AND LIGHT BROWN FINE GRAINED SANDSTONE FRACTURED MEDIUM PINK AND LIGHT BROWN FINE GRAINED SANDSTONE, FRACTURES 30cm APART MEDIUM
25		LIGHT BROWN VERY FINE GRAINED SANDSTONE NO BEDDING	35		
26		LIGHT BROWN MUDSTONE BEDDING 80° TO CORE AXIS	36		
27		PINK MEDIUM GRAINED SANDSTONE WEAK BEDDING	37		LIGHT BROWN COARSE GRAINED SANDSTONE POORLY SORTED MINOR LIGHT PINK LAYERS, FRACTURES 10 TO 100cm APART MEDIUM
28		BROWN MEDIUM COARSE CONGLOMERATE GRAINS TO 14mm CLASTIC & QUARTZ FRAGMENTS POORLY SORTED WITH NO BEDDING	38		LIGHT GREEN GREY MUDSTONE LIGHT BROWN FINE GRAINED SANDSTONE POORLY SORTED MINOR LIGHT PINK LAYERS AND RARE LARGE PEBBLES, FRACTURES 30cm APART MEDIUM
29		LIGHT PINK MEDIUM GRAINED SANDSTONE SOME COARSE SANDSTONE LAYERS	39		
30			40		

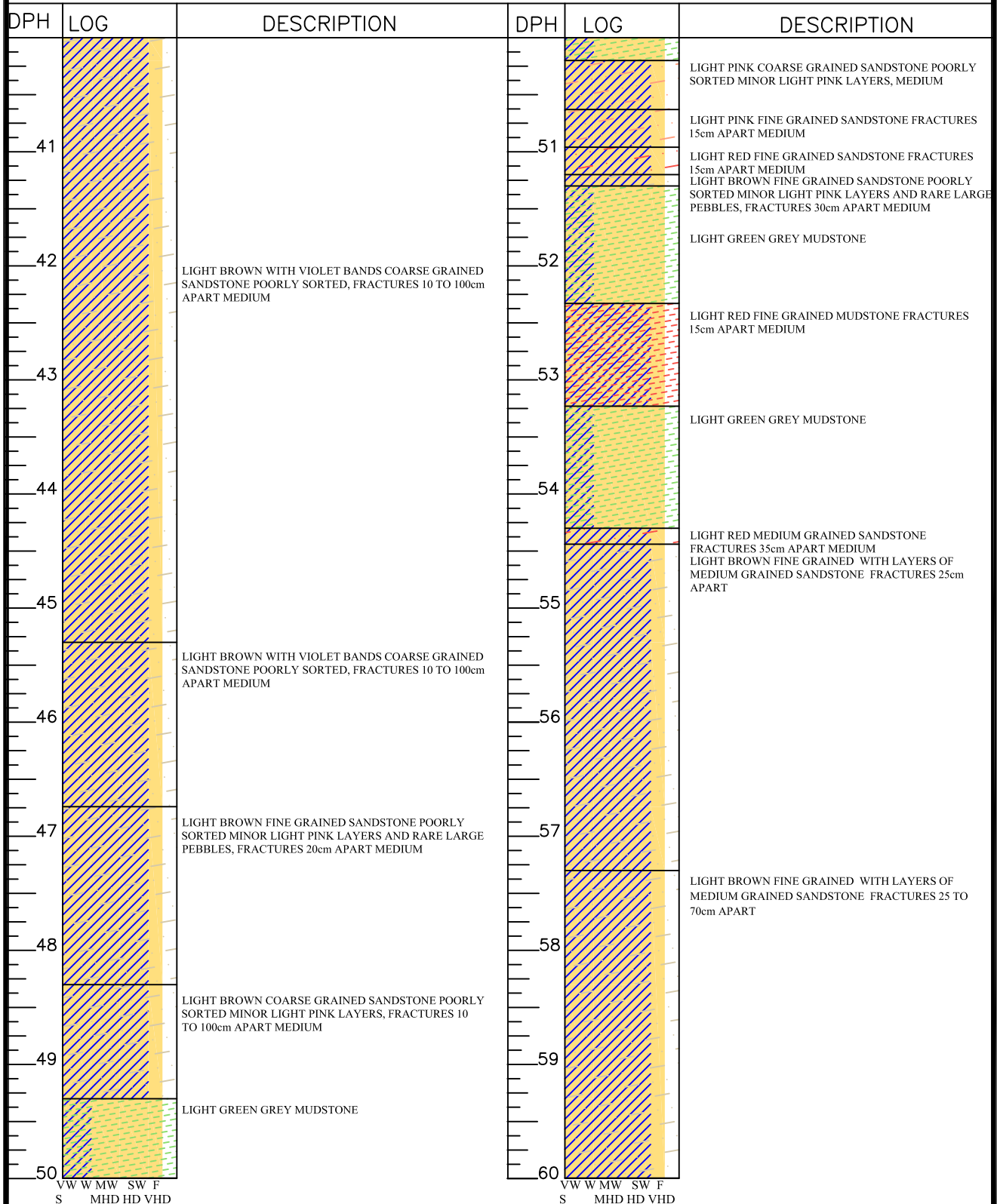
COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD

GRAPHIC DRILL LOG

HOLE: BH-1402-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 3 OF 4

LOCATION: 377445, 6385345GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14



COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1402-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 4 OF 4

LOCATION: 377445, 6385345GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
61		LIGHT BROWN FINE GRAINED WITH LAYERS OF MEDIUM GRAINED SANDSTONE APART	71		
62			72		
63			73		
64		LIGHT BROWN FINE GRAINED WITH LAYERS OF MEDIUM GRAINED SANDSTONE APART	74		
65			75		
66			76		
67			77		
68			78		
69			79		
70			80		
VW W MW SW F S MHD HD VHD			VW W MW SW F S MHD HD VHD		

COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1403-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 1 OF 7

LOCATION: 377250, 6385303GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
1		NO CORE	11		LIGHT PINK MUDSTONE WITH CHOCOLATE BROWN LENS
2			12		LIGHT BROWN CONGLOMERATE GRAINS TO 20mm POORLY SORTED
3		BROWN VERY FINE GRAINED SANDSTONE FRACTURED ZONE	13		LIGHT PINK MUDSTONE WITH LIMONITE 45° TO CORE AXIS AND PERPENDICULAR TO CORE AXIS
4		LIGHT GREY MINOR BROWN VERY FINE GRAINED SANDSTONE LAYERED WITH BLACK CLAY CLASTS, FRACTURES 30cm APART	14		LIGHT PINK MUDSTONE MINOR COARSE SANDSTONE CLASTS
5		GREY VERY FINE GRAINED SANDSTONE BLACK LAYERED CLASTS RED BROWN VERY FINE GRAINED SANDSTONE LAYERED FRACTURED	15		LIGHT RED MUDSTONE WITH CHOCOLATE BROWN LIMONITE BANDS
6		GREY VERY FINE GRAINED SANDSTONE BLACK LAYERED CLASTS RED BROWN VERY FINE GRAINED SANDSTONE LAYERED FRACTURED	16		LIGHT PINK MUDSTONE
7		GREY VERY FINE GRAINED SANDSTONE BLACK LAYERED CLASTS RED BROWN VERY FINE GRAINED SANDSTONE LAYERED FRACTURED	17		LIGHT PINK MUDSTONE MINOR, FRACTURES 45° TO CORE AXIS
8		GREY COARSE GRAINED SANDSTONE POORLY SORTED FELDSPAR & CLASTS TO 5mm, FRACTURES 20cm APART	18		
9		LIGHT BROWN VERY FINE GRAINED SANDSTONE POOR BEDDING, FRACTURES 5cm APART	19		LIGHT RED MUDSTONE, FRACTURES 30cm APART
10		OFF WHITE WITH DARK CHOCOLATE BROWN MUDSTONE LAYERS PERPENDICULAR TO CORE AXIS, FRACTURES 15cm APART	20		
		LIGHT GREY COARSE GRAINED SANDSTONE POORLY SORTED			
		FRACTURED ZONE LIGHT GREY COARSE GRAINED SANDSTONE POORLY SORTED FELDSPAR & CLASTS LIGHT GREY VERY FINE GRAINED MUDSTONE BLACK LAYERS			
		GREY CONGLOMERATE GRAINS TO 30mm MAINLY FELDSPAR & SANDSTONE GREY MUDSTONE LAYERS 80° TO CORE AXIS GREY VERY COARSE GRAINED SANDSTONE POORLY SORTED GREY MUDSTONE GREY VERY COARSE GRAINED SANDSTONE POORLY SORTED			

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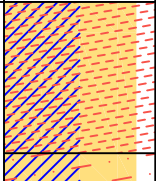
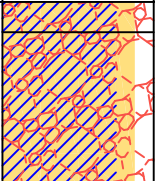
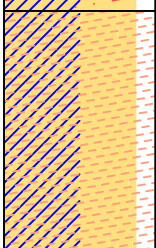
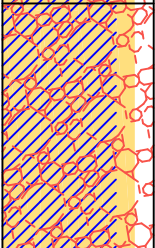
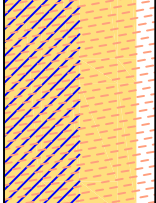
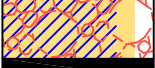
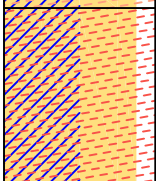
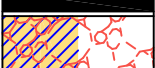
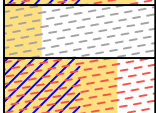
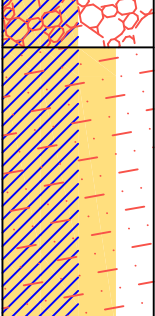
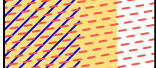
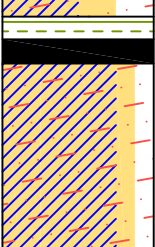
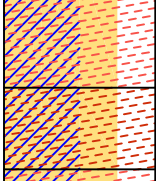
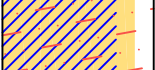
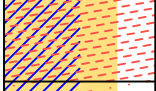
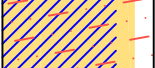
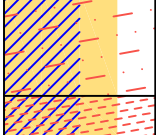
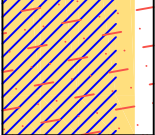
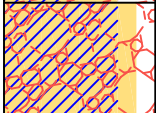
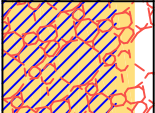
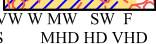
LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1403-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 2 OF 7

LOCATION: 377250, 6385303GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
21		LIGHT RED VERY FINE TO COARSE GRAINED SANDSTONE POORLY SORTED	31		LIGHT RED CONGLOMERATE WITH FRAGMENTS TO 14mm MAINLY FELDSPAR & MINOR QUARTZ
22		RED AND LIGHT PINK MUDSTONE LAYERED 80° TO CORE AXIS FR 100cm APART	32		LIGHT RED CONGLOMERATE WITH FRAGMENTS TO 14mm MAINLY FELDSPAR & MINOR QUARTZ
23		LIGHT RED MUDSTONE SOME DARK RED CLASTS	33		NO CORE
24		LIGHT RED MUDSTONE SOME DARK RED CLASTS	34		OLIVE CLAY
25		LIGHT RED MUDSTONE SOME DARK RED CLASTS	35		LIGHT RED MEDIUM GRAINED CONGLOMERATE, FRACTURES 20cm
26		LIGHT GREY MUDSTONE FRACTURED	36		LIGHT RED VERY FINE GRAINED SANDSTONE MINOR DARK RED BANDS 80° TO CORE AXIS
27		LIGHT RED MUDSTONE WITH DARK RED LAYERS 80° TO CORE AXIS, FRACTURES 30cm APART	37		OLIVE CLAY
28		RED MUDSTONE WITH DARK RED LAYERS 70° TO CORE AXIS	38		NO CORE
29		LIGHT RED & LIGHT GREEN MUDSTONE LAYERS 80° TO CORE AXIS	39		LIGHT RED COARSE GRAINED SANDSTONE POORLY SORTED SANDSTONE FRAGMENTS, FRACTURES 50cm
30		LIGHT RED VERY FINE GRAINED SANDSTONE POORLY SORTED	40		LIGHT RED CONGLOMERATE FRAGMENTS TO 60mm WITH ROCK FRAGMENTS FELDSPAR & AND MINOR QUARTZ AND VOLCANIC, FRACTURES 30 TO 100cm
		MAINLY LIGHT RED MINOR LIGHT GREEN MUDSTONE			

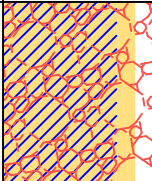
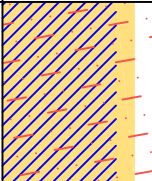
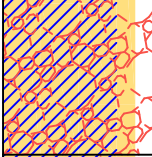
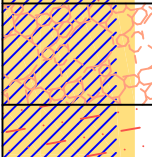
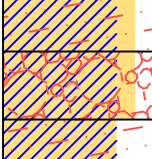
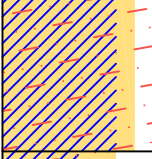
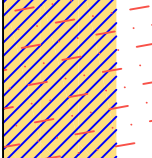
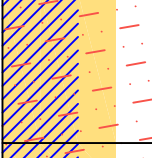
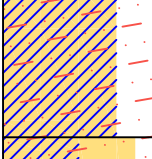
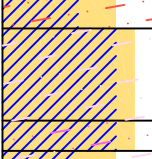
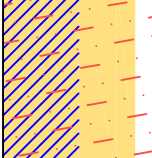
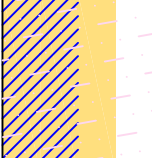
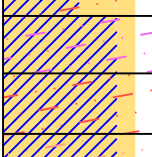
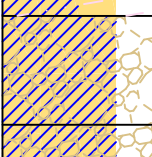
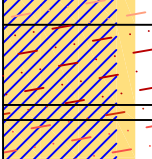
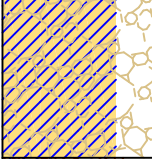
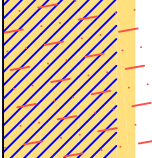
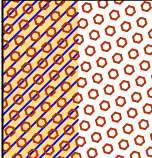
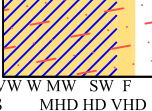
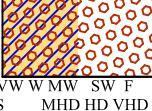
COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD

GRAPHIC DRILL LOG

HOLE: BH-1403-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 3 OF 7

LOCATION: 377250, 6385303GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
41			51		
42		LIGHT RED COARSE GRAINED SANDSTONE POORLY SORTED FELDSPAR FRAGMENTS	52		LIGHT PINK CONGLOMERATE FRAGMENTS 40mm MAINLY FELDSPAR
43		LIGHT RED CONGLOMERATE FRAGMENTS TO 30mm MAINLY SANDSTONE SOME VOLCANIC	53		LIGHT RED VERY COARSE GRAINED SANDSTONE POORLY SORTED LITHIC FRAGMENTS TO 10mm FELDSPAR
44		LIGHT RED AND PINK COARSE GRAINED SANDSTONE POORLY SORTED	54		LIGHT RED MEDIUM GRAINED SANDSTONE VERTICAL FRACTURE
45			55		LIGHT RED MEDIUM GRAINED SANDSTONE VERTICAL FRACTURE
46		LIGHT RED MEDIUM GRAINED SANDSTONE POORLY SORTED SOME LAMINAE INCLINED	56		LIGHT VIOLET MEDIUM GRAINED SANDSTONE SOME LARGER FRAGMENTS ROUNDED
47		VIOLET & RED MEDIUM GRAINED SANDSTONE LAMINAE PERPENDICULAR TO CORE AXIS	57		VIOLET FINE GRAINED SANDSTONE
48		LIGHT RED MEDIUM TO COARSE GRAINED SANDSTONE POORLY SORTED	58		VIOLET LIGHT RED VERY FINE GRAINED SANDSTONE LAMINAE PERPENDICULAR TO CORE AXIS, FRACTURES 25cm
49		LIGHT PINK FINE GRAINED SANDSTONE NO BEDDING	59		LIGHT YELLOW BROWN CONGLOMERATE FRAGMENTS 14mm FELDSPAR POORLY SORTED
50		DARK RED MEDIUM GRAINED SANDSTONE LAMINAE PERPENDICULAR TO CORE AXIS	60		LIGHT YELLOW BROWN CONGLOMERATE FRAGMENTS 14mm FELDSPAR POORLY SORTED
		RED MEDIUM GRAINED SANDSTONE			RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 35cm APART SOME CALCITE ON FRACTURES
		LIGHT RED MEDIUM GRAINED SOME COARSE GRAINED SANDSTONE MINOR X BEDDING POORLY SORTED, FRACTURES 60cm			

COMMENTS:

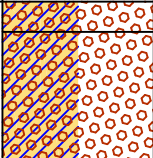
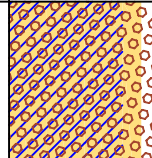
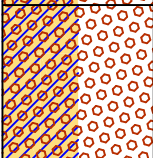
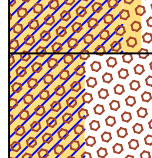
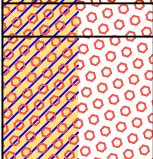
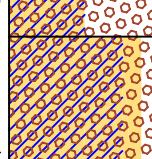
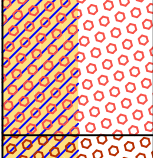
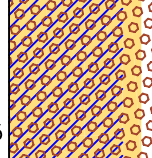
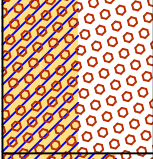
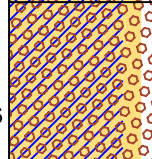
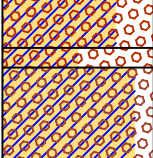
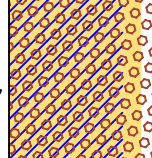
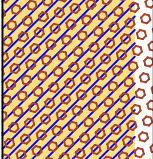
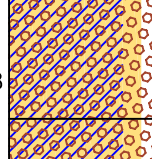
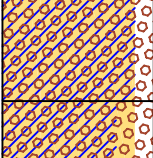
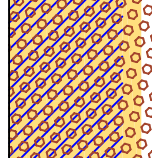
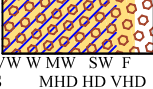
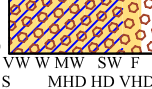
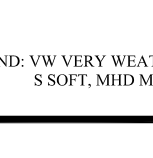

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1403-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 4 OF 7

LOCATION: 377250, 6385303GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
61		RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 35cm APART SOME CALCITE ON FRACTURES	71		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm HIGHLY FRACTURED CALCITE VEINS ALL ANGLES
62		RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 35cm APART AND 15° TO CORE AXIS SOME CALCITE ON FRACTURES	72		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm
63		LIGHT RED FINE GRAINED IGIMBRITE FELDSPAR 2mm SOME CALCITE ON FRACTURES	73		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm
64		LIGHT RED FINE GRAINED IGIMBRITE FELDSPAR 2mm SOME CALCITE ON FRACTURES	74		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm
65		RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 35cm SOME CALCITE ON FRACTURES	75		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm
66		RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm	76		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm
67		RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 35cm CALCITE ON FRACTURES	77		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm
68		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm CALCITE LINED	78		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm
69		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 35cm SOME CALCITE ON FRACTURES ALSO VERTICAL FRACTURE	79		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm
70		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 35cm SOME CALCITE ON FRACTURES ALSO VERTICAL FRACTURE	80		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm

COMMENTS:

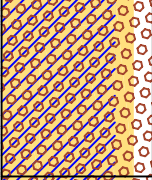
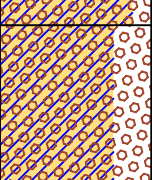
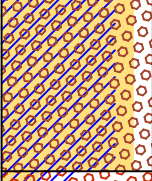
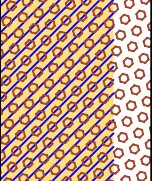
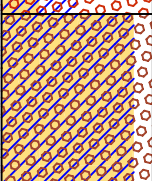
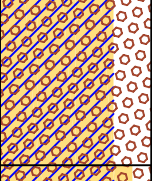
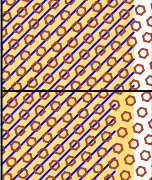
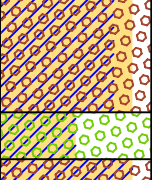
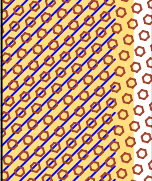
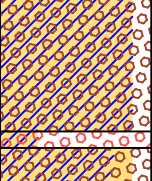
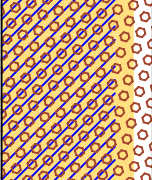
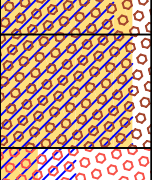
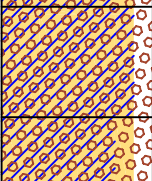
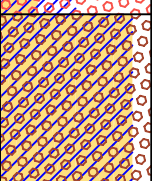
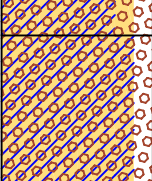
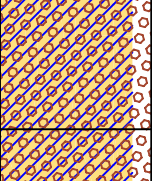
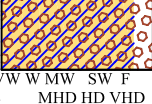
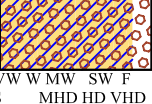
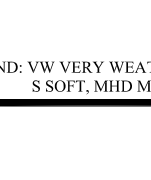

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1403-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 5 OF 7

LOCATION: 377250, 6385303GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
81			91		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm CALCITE FILLED
82		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm	92		
83		RED FINE GRAINED IGIMBRITE DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm	93		
84		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm VEIN @ 86.2m	94		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm CALCITE FILLED
85			95		LIGHT RED GREEN FINE GRAINED IGIMBRITE FELDSPAR 2mm FRACTURED CALCITE FILLED
86			96		LIGHT RED VERY FINE GRAINED IGIMBRITE CALCITE VEIN DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm
87		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm	97		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 30cm
88		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm VERTICAL FRACTURE	98		LIGHT RED DARK FINE GRAINED IGIMBRITE CALCITE PRESENT DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm CALCITE FILLED
89		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm APART	99		
90			100		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm CALCITE VEIN @ 100

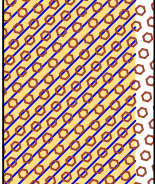
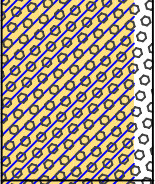
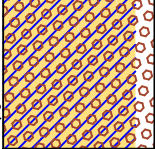
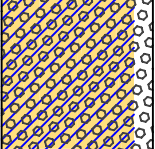
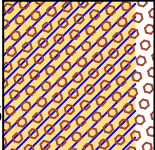
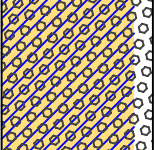
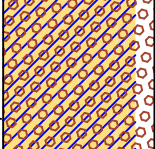
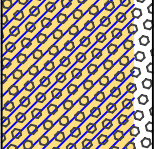
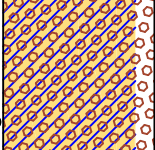
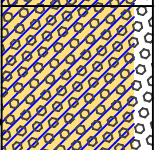
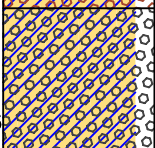
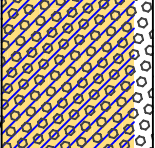
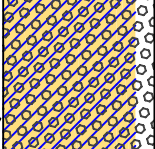
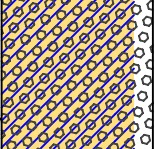
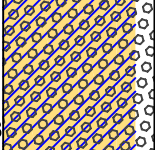
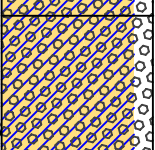
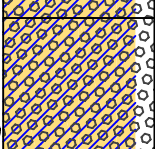
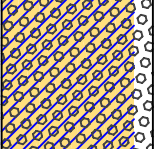
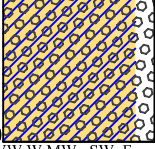
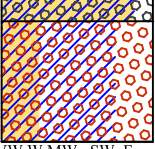
COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD

GRAPHIC DRILL LOG

HOLE: BH-1403-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 6 OF 7

LOCATION: 377250, 6385303GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
101			111		
102			112		DARK GREY FINE GRAINED IGIMBRITE FELDSPAR 3mm, FRACTURES 40cm
103		DARK RED BROWN FINE GRAINED IGIMBRITE FELDSPAR 2mm, FRACTURES 40cm	113		
104			114		
105			115		DARK GREY FINE GRAINED IGIMBRITE FELDSPAR 3mm, FRACTURES 40cm
106		DARK GREY FINE GRAINED IGIMBRITE FELDSPAR 3mm, FRACTURES 40 TO 80cm	116		
107			117		
108			118		DARK GREY FINE GRAINED IGIMBRITE FELDSPAR 3mm, FRACTURES 40cm
109		DARK GREY FINE GRAINED IGIMBRITE FELDSPAR 4mm, FRACTURES 30cm SOME 45° TO CORE AXIS	119		
110			120		RED FINE GRAINED IGIMBRITE GROUNDMASS LIGHT
VW W MW SW F S MHD HD VHD			VW W MW SW F S MHD HD VHD		

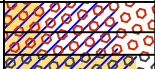
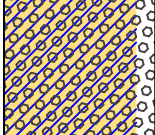
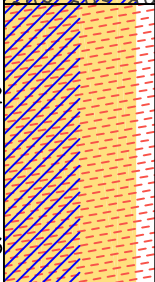
COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD

GRAPHIC DRILL LOG

HOLE: BH-1403-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 7 OF 7

LOCATION: 377250, 6385303GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
121		RED FINE GRAINED IGNIMBRITE GROUNDMASS LIGHT	131		
		DARK GREY FINE GRAINED IGNIMBRITE FELDSPAR 3mm, FRACTURES 40cm			
122		LIGHT RED MUDSTONE	132		
123			133		
124			134		
125			135		
126			136		
127			137		
128			138		
129			139		
130			140		

COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1404-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 1 OF 5

LOCATION: 376295, 6386194GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
1		NO CORE	11		GREY VERY FINE GRAINED SANDSTONE, FRACTURES 10cm APART LINED WITH RED CLAY
2			12		LIGHT BROWN VERY FINE GRAINED SANDSTONE HIGHLY FRACTURED
3		LIGHT RED BROWN SANDSTONE	13		GREY VERY FINE GRAINED SANDSTONE VERTICAL FRACTURE RED CLAY LINED
		YELLOW BROWN CLAY			GREY MUDSTONE WITH DARK GREY LAMINAE, FRACTURES 30cm
4		BROWN VERY FINE GRAINED SANDSTONE	14		
		BROWN VERY FRACTURED SANDSTONE	15		GREY MUDSTONE WITH DARK GREY LAMINAE, FRACTURES 30cm
5			16		GREY MUDSTONE, FRACTURES 30cm AND ONE 45° TO CORE AXIS
6		BROWN & VIOLET VERY FRACTURED SANDSTONE	17		GREY FINE GRAINED SANDSTONE WITH WHITE AND DARK GREY LITHIC FRAGMENTS, FRACTURES 30cm
		NO CORE			FRACTURED ZONE
7			18		GREY FINE GRAINED SANDSTONE WITH WHITE AND DARK GREY LITHIC FRAGMENTS, FRACTURES 30cm
8		BROWN RED VERY FINE GRAINED SANDSTONE HIGHLY FRACTURED	19		GREY FINE GRAINED SANDSTONE WITH WHITE AND DARK GREY LITHIC FRAGMENTS, FRACTURES 30cm
		NO CORE			
9			20		GREY FINE GRAINED SANDSTONE WITH WHITE LITHIC FRAGMENTS, FRACTURES 30cm
		BROWN SANDSTONE VERY FRACTURED			
10					

COMMENTS:

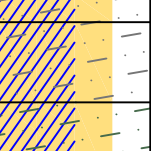
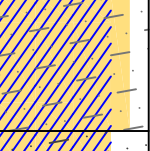
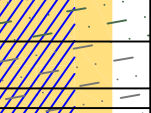
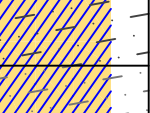
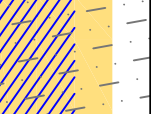
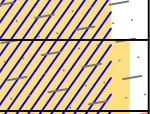
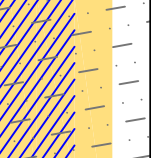
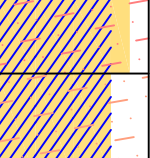
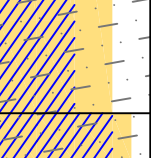
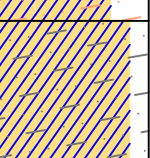
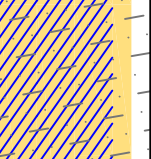
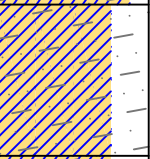
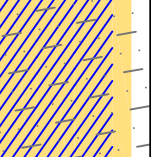
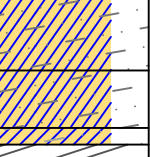
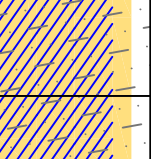
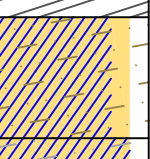
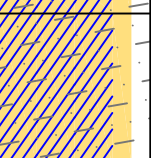
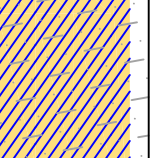
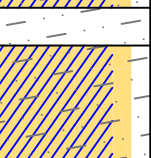
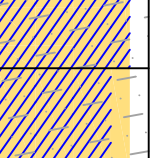
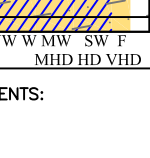
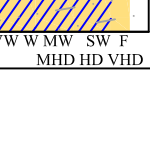
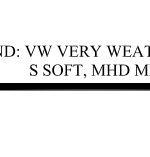



LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1404-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 2 OF 5

LOCATION: 376295, 6386194GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
21		GREY FINE GRAINED SANDSTONE WITH, FRACTURES 30cm 45° TO CORE AXIS	31		GREY FINE GRAINED SANDSTONE MINOR BLACK LAMINAE
		GREY GREEN VERY FINE GRAINED SANDSTONE, FRACTURES 30cm APART			DARK GREY FINE GRAINED SANDSTONE FELDSPAR CLASTS POORLY SORTED
		GREY VERY FINE GRAINED SANDSTONE, FRACTURES 30cm	32		GREY & BROWN COARSE GRAINED SANDSTONE WITH LARGE FELDSPAR CLASTS
22		GREY VERY FINE GRAINED SANDSTONE BLACK LAMINAE GREY VERY FINE GRAINED SANDSTONE, FRACTURES 30cm			GREY VERY FINE GRAINED SANDSTONE WITH BLACK LAMINAE PERPENDICULAR TO CORE AXIS
23			33		PINK VERY FINE GRAINED SANDSTONE
24					LIGHT PINK VERY FINE GRAINED SANDSTONE, FRACTURES 40cm
		GREY VERY FINE GRAINED SANDSTONE, FRACTURES 30cm	34		GREY MINOR BROWN FINE GRAINED SANDSTONE MINOR FELDSPAR CLASTS
25			35		GREY FINE GRAINED SANDSTONE, FRACTURES 20cm
26					GREY RED BROWN VERY FINE GRAINED SANDSTONE MINOR CALCITE VEIN
		GREY VERY FINE GRAINED SANDSTONE, FRACTURES 30cm	36		GREY RED BROWN VERY FINE GRAINED SANDSTONE MINOR
27		GREY VERY FINE GRAINED SANDSTONE FRACTURED			LIGHT GREY VERY FINE GRAINED SANDSTONE BLACK SHALE LAMINAE
28		FRACTURED ZONE	37		CHOCOLATE BROWN MEDIUM GRAINED SANDSTONE POORLY SORTED
		GREY VERY FINE GRAINED SANDSTONE, FRACTURES 30cm	38		LIGHT GREY VERY FINE GRAINED SANDSTONE
29			39		
30			40		LIGHT GREY PINK FINE GRAINED SANDSTONE LAYERS

COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD

GRAPHIC DRILL LOG

HOLE: BH-1404-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 3 OF 5

LOCATION: 376295, 6386194GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
41			51		
42			52		GREY VERY FINE GRAINED SANDSTONE MINOR LAMINAE BLACK AND BROWN MINOR CALCITE VEIN
43		GREY VERY FINE GRAINED SANDSTONE MINOR LAMINAE BLACK AND BROWN MINOR CALCITE VEIN	53		
44			54		LIGHT PINK VERY FINE GRAINED SANDSTONE
45			55		LIGHT PINK VERY FINE GRAINED SANDSTONE MINOR BLACK LAMINAE
46		GREY VERY FINE GRAINED SANDSTONE MINOR LAMINAE BLACK AND BROWN MINOR CALCITE VEIN	56		BLACK SHALE LIGHT GREY AND LIGHT PINK VERY FINE GRAINED SANDSTONE, FRACTURES 25cm APART
47			57		
48			58		LIGHT GREY VERY FINE GRAINED SANDSTONE, FRACTURES 30 TO 100cm APART
49			59		
50			60		

COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1404-DH
PROJECT BRANDY HILL, ZONE 56
PAGE 4 OF 5

LOCATION: 376295, 6386194GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
61		GREY MEDIUM GRAINED SANDSTONE POORLY SORTED	71		
		BLACK SHALE			
		GREY MEDIUM GRAINED SANDSTONE POORLY SORTED			
		PINK VERY FINE GRAINED SANDSTONE POORLY SORTED			
		BLACK SHALE			
62		WHITE VERY FINE GRAINED SANDSTONE	72		LIGHT GREY MINOR BROWN FINE GRAINED SANDSTONE
		CHOCOLATE RED BROWN FINE GRAINED SANDSTONE			
		VIOLET VERY FINE GRAINED SANDSTONE & MUDSTONE LAYERS 80° TO CORE AXIS			
		BLACK SHALE			
		RED BROWN VERY FINE GRAINED SANDSTONE			
63		CHOCOLATE BROWN FINE GRAINED SANDSTONE FELDSPAR CLASTS POORLY SORTED	73		
		BROWN & VIOLET VERY FINE GRAINED SANDSTONE			
64			74		BROWN VERY FINE GRAINED SANDSTONE LAYERED PERPENDICULAR TO CORE AXIS
65		LIGHT GREY MEDIUM GRAINED SANDSTONE FELDSPAR GRAINS, FRACTURES 10 TO 60cm APART	75		BROWN VERY FINE GRAINED SANDSTONE ;LAYERED PERPENDICULAR TO CORE AXIS
66		GREY MEDIUM GRAINED SANDSTONE FELDSPAR GRAINS, FRACTURES 20 TO 150cm APART	76		BROWN GREEN & WHITE FINE GRAINED SANDSTONE LAYERED
67			77		OFF WHITE VERY FINE GRAINED SANDSTONE MINOR BROWN LAMINAE
68			78		OLIVE GREEN MEDIUM GRAINED SANDSTONE, FRACTURES 40° TO CORE AXIS 20cm APART
					OLIVE GREEN MEDIUM GRAINED SANDSTONE, FRACTURES 40° TO CORE AXIS 20cm APART
69		GREY FINE GRAINED SANDSTONE FELDSPAR GRAINS SHALE LAMINAE 80° TO CORE AXIS FRACTURES 20 TO 150cm APART	79		BROWN MEDIUM GRAINED SANDSTONE
70			80		GREY FINE GRAINED SANDSTONE WITH BLACK LAMINAE 80° TO CORE AXIS

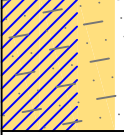
COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD

GRAPHIC DRILL LOG

HOLE: BH-1404-DH
 PROJECT: BRANDY HILL, ZONE 56
 PAGE 5 OF 5

LOCATION: 376295, 6386194GDA
 DRILLED: MACQUARIE DRILLING
 LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
81		GREY FINE GRAINED SANDSTONE WITH BLACK LAMINAE 80° TO CORE AXIS	91		
82			92		
83			93		
84			94		
85			95		
86			96		
87			97		
88			98		
89			99		
90			100		

COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
 S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1405-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 1 OF 6

LOCATION: 376384, 6385562GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
1		NO CORE	11		
2			12		
3			13		DARK GREY VERY FINE GRAINED IGIMBRITE FELDSPAR QUARTZ 3mm
4		GREY BROWN CONGLOMERATE FRAGMENTS TO 90mm QUARTZ AND SANDSTONE	14		GREY FINE GRAINED IGIMBRITE HIGHLY FRACTURED BROWN CLAY ON FRACTURES
5			15		LIGHT BROWN FINE GRAINED IGIMBRITE BROWN CLAY
6		BROWN GREY FINE GRAINED SANDSTONE POORLY SORTED, FRACTURES 25cm	16		DARK GREY FINE GRAINED IGIMBRITE, FRACTURES 10cm APART BROWN CLAY LINED
7		GREY FINE GRAINED SANDSTONE FINE GRAINED BROWN WEATHERED ON FRACTURES HIGHLY FRACTURED	17		LIGHT GREY FINE GRAINED IGIMBRITE VERY FRACTURED ALSO VERTICAL F
8			18		CORE LOSS LIGHT BROWN VERY FINE IGIMBRITE VERY FRACTURED
9			19		GREY FINE GRAINED IGIMBRITE, FRACTURES 20cm APART AND VERTICAL BROWN CLAY LINED
10		GREY FINE GRAINED SANDSTONE FINE GRAINED BROWN WEATHERED ON FRACTURES HIGHLY FRACTURED	20		DARK GREY FINE GRAINED IGIMBRITE LIGHT GREY VERY FINE GRAINED SANDSTONE LIGHT GREY VERY FINE GRAINED SANDSTONE LIGHT GREY VERY FINE GRAINED SANDSTONE VERY FRACTURED BROWN CLAY LINED
		LIGHT GREY FINE GRAINED IGIMBRITE HIGHLY FRACTURED BROWN CLAY ON FRACTURES AND VERTICAL FRACTURED			LIGHT GREY VERY FINE GRAINED SANDSTONE MINOR BLACK CLASTS, FRACTURES 20cm APART BROWN CLAY LINED
	VW W MW SW F S MHD HD VHD			VW W MW SW F S MHD HD VHD	LIGHT BROWN VERY FINE GRAINED SANDSTONE, FRACTURES 10cm APART

COMMENTS:

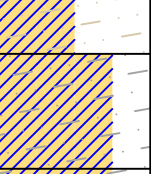
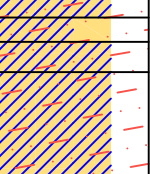
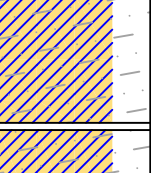
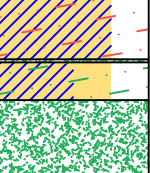
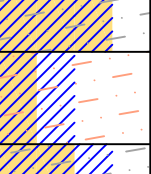
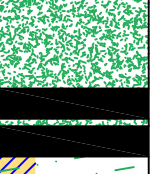
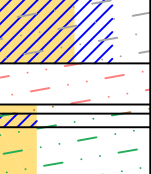
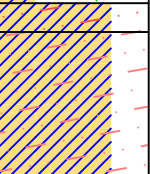
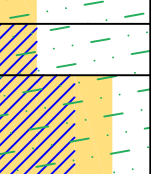
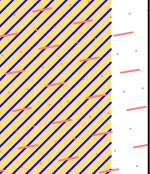
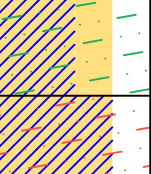
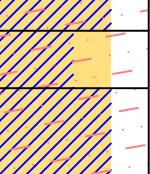
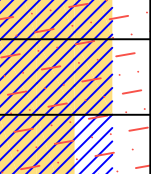
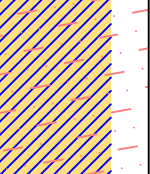
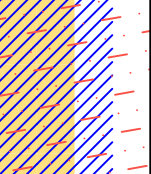
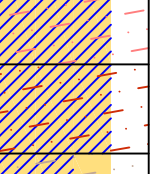
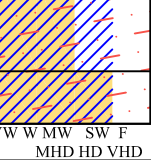
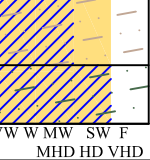
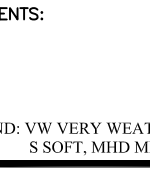
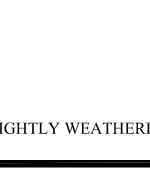
LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1405-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 2 OF 6

LOCATION: 376384, 6385562GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
21		LIGHT GREY VERY FINE GRAINED SANDSTONE, FRACTURES 10cm APART MICROFRACTURE AND CALCITE IN GROUNDMASS	31		LIGHT RED MEDIUM GRAINED SANDSTONE LIGHT RED MEDIUM GRAINED SANDSTONE QUARTZ RICH, FRACTURES 45° TO CORE AXIS LIGHT RED MEDIUM GRAINED SANDSTONE FELDSPAR FRAGMENTS, FRACTURES 30cm APART
22		LIGHT GREY VERY FINE GRAINED SANDSTONE, FRACTURES 10cm APART MICROFRACTURE AND CALCITE IN GROUNDMASS	32		GREEN AND RED FRACTURED ZONE GREEN MEDIUM GRAINED SANDSTONE FELDSPAR FRAGMENTS, FRACTURES 10cm APART
23		WEATHERED ZONE LIGHT GREY VERY FINE GRAINED SANDSTONE, FRACTURES 10cm APART MICROFRACTURE AND CALCITE IN GROUNDMASS	33		HIGHLY FRACTURED ZONE CORE LOSS
24		LIGHT PINK VERY FINE GRAINED SANDSTONE, FRACTURES 10cm APART LAYERS	34		HIGHLY FRACTURED ZONE CORE LOSS GREEN MEDIUM GRAINED SANDSTONE LIGHT RED MEDIUM GRAINED SANDSTONE QUARTZ RICH VERY FRACTURED
25		BROWN VERY FINE GRAINED SANDSTONE GREEN MEDIUM GRAINED SANDSTONE POORLY SORTED GREEN AND PINK LIGHT LAYERS GREEN WEATHERED SOFT PINK	35		PINK VERY FINE GRAINED SANDSTONE MINOR CALCITE IN GROUNDMASS MINOR BLACK CLASTS, FRACTURES 40cm
26		GREEN MEDIUM GRAINED SANDSTONE POORLY SORTED	36		PINK AN BLACK VERY FINE GRAINED SANDSTONE CALCITE IN VEINS
27		LIGHT RED MEDIUM GRAINED SANDSTONE QUARTZ RICH, FRACTURES 10cm APART	37		PINK VERY FINE GRAINED SANDSTONE MINOR CALCITE IN GROUNDMASS MINOR BLACK CLASTS
28		GREEN AND LIGHT RED COARSE GRAINED SANDSTONE, FRACTURES 10 TO 30cm APART CALCITE VEIN VERTICAL FRACTURED	38		RED VERY FINE GRAINED SANDSTONE WITH QUARTZ VEINS FAULTING ZONE
29		LIGHT RED MEDIUM GRAINED SANDSTONE, FRACTURES 10cm APART	39		VIOLET GREEN GREY VERY FINE GRAINED SANDSTONE CALCITE IN GROUNDMASS
30		LIGHT RED MEDIUM GRAINED SANDSTONE, FRACTURES 10cm APART	40		GREEN GREY MINOR VIOLET VERY FINE GRAINED SANDSTONE, FRACTURES 45° TO CORE AXIS

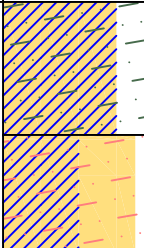
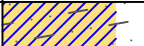
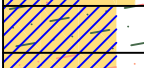

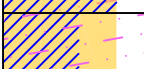
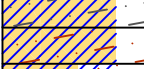
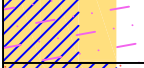
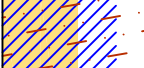
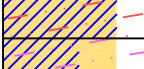
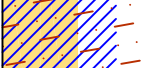
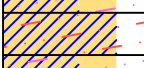
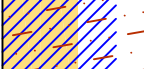

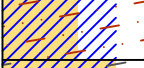
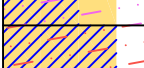
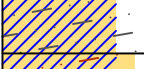
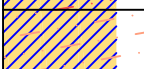
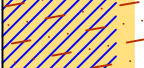
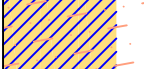
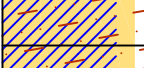
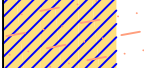
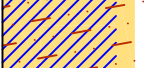
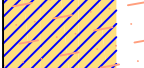
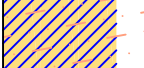
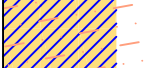
COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD

GRAPHIC DRILL LOG

HOLE: BH-1405-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 3 OF 6

LOCATION: 376384, 6385562GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
41		PINK VERY FINE GRAINED SANDSTONE MINOR CALCITE VEINS	51		BLACK VERY FINE GRAINED SANDSTONE WITH CALCITE VEINS
42		GREY GREEN VERY FINE GRAINED SANDSTONE LAYERED 45° TO CORE AXIS	52		FRACTURED ZONE BLACK VERY FINE GRAINED SANDSTONE WITH CALCITE VEINS
43		LIGHT PINK VERY FINE GRAINED SANDSTONE	53		RED BROWN MEDIUM GRAINED SANDSTONE LAMINAE 70° TO CORE AXIS
44		VIOLET & GREEN VERY FINE GRAINED SANDSTONE WITH SHALE LENS 45° TO CORE AXIS	54		RED BROWN MEDIUM GRAINED SANDSTONE LAMINAE 70° TO CORE AXIS
45		LIGHT RED VERY FINE GRAINED SANDSTONE QUARTZ RICH	55		BLACK VERY FINE GRAINED SANDSTONE WITH CALCITE VEINS
46		VIOLET & GREEN VERY FINE GRAINED SANDSTONE WITH SHALE LENS 45° TO CORE AXIS	56		RED BROWN MEDIUM GRAINED SANDSTONE LAMINAE 70° TO CORE AXIS
47		LIGHT RED MEDIUM GRAINED SANDSTONE QUARTZ RICH, FRACTURES 45° TO CORE AXIS	57		RED BROWN MEDIUM GRAINED SANDSTONE LAMINAE 70° TO CORE AXIS
48		VIOLET & GREEN VERY FINE GRAINED SANDSTONE WITH SHALE LENS 45° TO CORE AXIS	58		RED BROWN MEDIUM GRAINED SANDSTONE LAMINAE 70° TO CORE AXIS
49		LIGHT RED MEDIUM GRAINED SANDSTONE QUARTZ RICH, FRACTURES 45° TO CORE AXIS	59		RED BROWN MEDIUM GRAINED SANDSTONE LAMINAE 70° TO CORE AXIS CALCITE VEINS IN GROUNDMASS SHALE LAMINAE
50		LIGHT PINK VERY FINE GRAINED SANDSTONE SHALE CLASTS	60		RED BROWN MEDIUM GRAINED SANDSTONE LAMINAE 70° TO CORE AXIS, FRACTURES 20 TO 100cm
		BLACK AND RED BROWN VERY FINE GRAINED SANDSTONE SHALE LAMINAE FRACTURE 10cm APART			GREEN AND RED BROWN MEDIUM GRAINED SANDSTONE LAYERED, FRACTURES 10cm APART
		RED BROWN MEDIUM GRAINED SANDSTONE POORLY SORTED FELDSPAR MINOR RED SHALE			
		BLACK COARSE GRAINED SANDSTONE POORLY SORTED SOME FINE GRAINED FELDSPAR			
		FRACTURED ZONE			

COMMENTS:

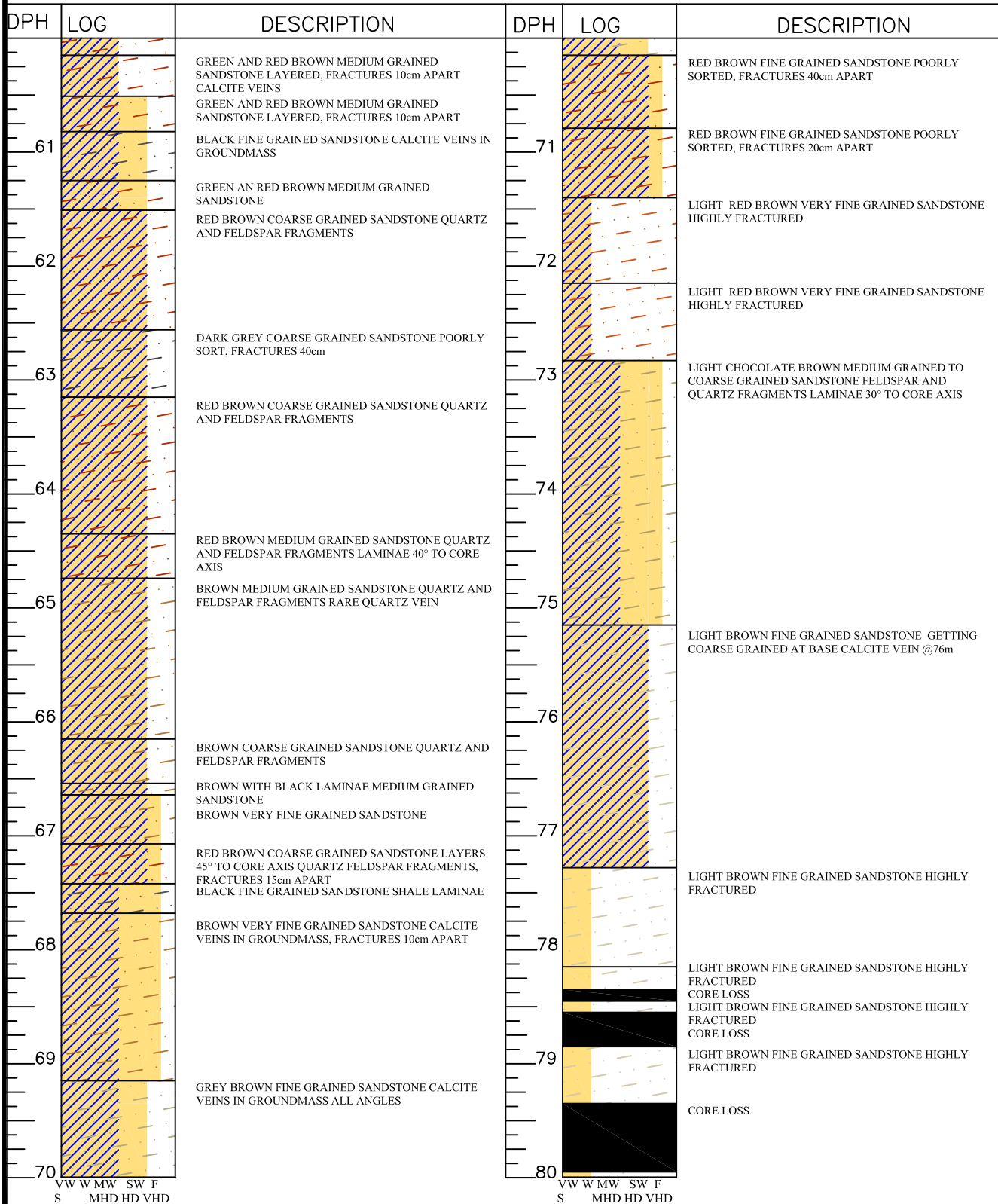
LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1405-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 4 OF 6

LOCATION: 376384, 6385562GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14



COMMENTS:

















































LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1405-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 5 OF 6

LOCATION: 376384, 6385562GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
		LIGHT BROWN FINE GRAINED SANDSTONE HIGHLY FRACTURED			GREEN BROWN FINE GRAINED SANDSTONE LAMINAE 70° TO CORE AXIS
		CORE LOSS			BROWN COARSE GRAINED SANDSTONE QUARTZ FELDSPAR LAMINAE AND BEDDING 45° TO CORE AXIS, FRACTURES 30cm APART
81		LIGHT BROWN FINE GRAINED SANDSTONE HIGHLY FRACTURED	91		
		CORE LOSS			
82		LIGHT BROWN FINE GRAINED SANDSTONE HIGHLY FRACTURED	92		
					
		CALCITE VEIN			
		LIGHT BROWN VERY FINE GRAINED SANDSTONE, FRACTURES 15cm APART			
83		LIGHT BROWN COARSE GRAINED SANDSTONE QUARTZ FELDSPAR LAMINAE AND BEDDING 45° TO CORE AXIS	93		BROWN MEDIUM GRAINED SANDSTONE QUARTZ FELDSPAR, FRACTURES 15cm APART
		LIGHT BROWN VERY FINE GRAINED SANDSTONE, FRACTURES 10cm APART			GREY MINOR BROWN COARSE GRAINED SANDSTONE POORLY SORTED, FRACTURES 40cm APART
84		CORE LOSS	94		
					BLACK SHALE HIGHLY FRACTURED
85			95		BROWN MEDIUM GRAINED SANDSTONE MINOR FINE GRAINED FELDSPAR & FRAGMENTS POORLY SORTED PINK CALCITE VEINS
					GREY GREEN FINE GRAINED SANDSTONE LAMINAE 80° TO CORE AXIS
86		BROWN MEDIUM GRAINED SANDSTONE FELDSPAR & QUARTZ FRAGMENTS POORLY SORTED	96		BROWN FINE GRAINED SANDSTONE LAMINAE 80° TO CORE AXIS
					GREY GREEN FINE GRAINED SANDSTONE LAMINAE 70° TO CORE AXIS
87		BLACK VERY FINE GRAINED SANDSTONE AND SHALE, FRACTURES 7cm APART	97		BROWN VERY FINE GRAINED SANDSTONE
		BROWN FINE GRAINED SANDSTONE LAMINAE 80° TO CORE AXIS, FRACTURES 40cm APART			FRACTURED ZONE
88			98		BROWN VERY FINE GRAINED SANDSTONE
					
89		BROWN FINE GRAINED SANDSTONE LAMINAE 80° TO CORE AXIS, FRACTURES 40cm APART	99		
		GREEN BROWN FINE GRAINED SANDSTONE LAMINAE 70° TO CORE AXIS			BROWN VERY FINE GRAINED SANDSTONE
90		CALCITE VEINS	100		
					

COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD

GRAPHIC DRILL LOG

HOLE: BH-1405-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 6 OF 6

LOCATION: 376384, 6385562GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
					GREY FINE GRAINED SANDSTONE RED BROWN MEDIUM GRAINED SANDSTONE COME LARGE FELDSPAR FRAGMENTS, CALCITE VEINS IN GROUNDMASS
		FRACTURED ZONE BROWN VERY FINE GRAINED SANDSTONE			
101		PINK CALCITE VEIN AND FRACTURED ZONE BROWN VERY FINE GRAINED SANDSTONE, FRACTURES 30cm APART	11		
					RED BROWN VERY FINE GRAINED SANDSTONE WITH CALCITE VEINS 50° TO CORE AXIS, FRACTURES 15cm APART
102		CALCITE VEIN BROWN VERY FINE GRAINED SANDSTONE SOME MOTTLED	12		
		LIGHT GREY VERY FINE GRAINED SANDSTONE			
		BLACK SHALE LAMINAE			
		GREY MEDIUM GRAINED SANDSTONE			
103		PINK VERY FINE GRAINED SANDSTONE	13		
		GREY VERY FINE GRAINED SANDSTONE CALCITE VEINS IN GROUNDMASS			
		RED BROWN VERY FINE GRAINED SANDSTONE			
104		PINK VERY FINE GRAINED SANDSTONE LAMINAE 60° TO CORE AXIS, FRACTURES 15cm APART	14		
		CALCITE VEIN AND FRACTURED ZONE			
105			15		
		BROWN AND BLACK VERY FINE GRAINED SANDSTONE BLACK SHALE BROKEN UP			
		BROWN FINE GRAINED SANDSTONE POORLY SORTED			
106			16		
		FRACTURED ZONE			
107		BROWN FINE GRAINED COARSE GRAINED AT BASE SANDSTONE, FRACTURES 30cm APART	17		
		BLACK SANDSTONE FRACTURED ZONE			
108		OFF WHITE FINE GRAINED SANDSTONE	18		
		OFF WHITE FINE GRAINED SANDSTONE			
109			19		
		RED BROWN WHITE FINE GRAINED SANDSTONE			
		OFF WHITE FINE GRAINED SANDSTONE			
110			20		
	VW W MW SW F S MHD HD VHD			VW W MW SW F S MHD HD VHD	

COMMENTS:

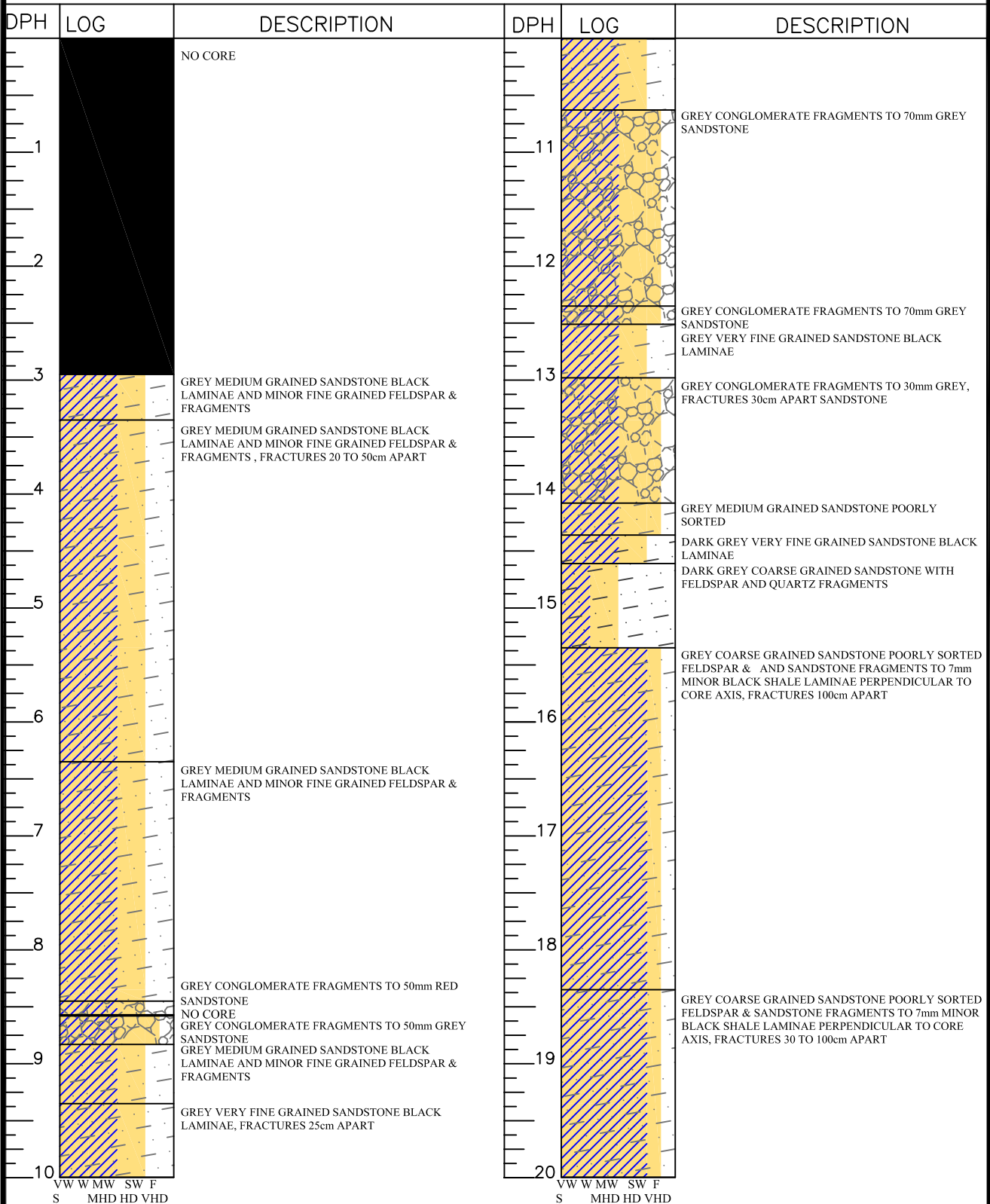
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S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1406-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 1 OF 6

LOCATION: 376633, 6385412GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14



COMMENTS:

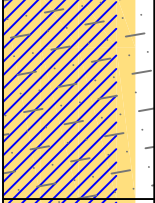
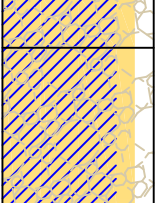
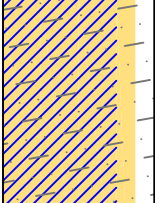
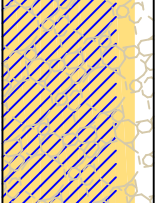
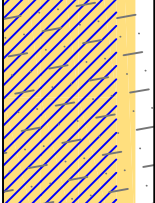
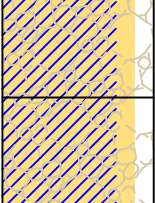
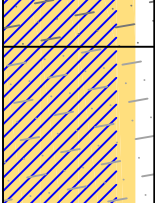
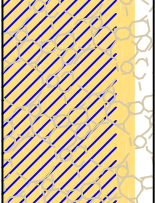
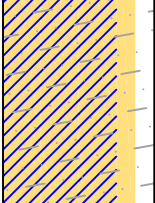
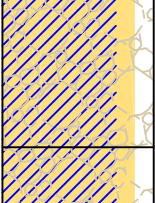
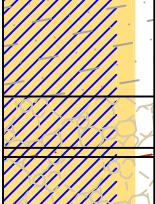
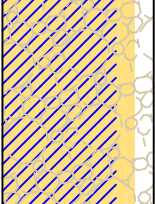
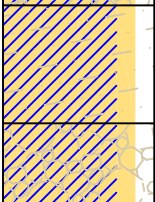
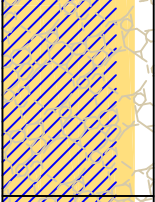
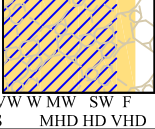
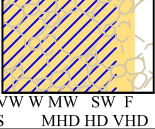




LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1406-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 2 OF 6

LOCATION: 376633, 6385412GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
21			31		LIGHT BROWN CONGLOMERATE POORLY SORTED FELDSPAR & SANDSTONE FRAGMENTS TO 40mm, FRACTURES 30 TO 100cm APART
22		GREY COARSE GRAINED SANDSTONE POORLY SORTED FELDSPAR & SANDSTONE FRAGMENTS TO 7mm, FRACTURES 50cm APART	32		
23			33		
24			34		LIGHT BROWN CONGLOMERATE POORLY SORTED FELDSPAR & SANDSTONE FRAGMENTS TO 40mm, FRACTURES 60 TO 100cm APART
25		LIGHT GREY AND PINK COARSE GRAINED SANDSTONE POORLY SORTED FELDSPAR & SANDSTONE FRAGMENTS TO 7mm MINOR BLACK SHALE LAMINAE PERPENDICULAR TO CORE AXIS, FRACTURES 40cm APART	35		
26			36		
27			37		LIGHT BROWN CONGLOMERATE POORLY SORTED FELDSPAR & SANDSTONE FRAGMENTS TO 40mm, RED FINE GRAINED SANDSTONE @ 37.35m, FRACTURES 30 TO 100cm APART
28		LIGHT BROWN COARSE GRAINED CONGLOMERATE POORLY SORTED FELDSPAR & SANDSTONE FRAGMENTS TO 14mm, FRACTURES 15cm APART RED BROWN FINE GRAINED SANDSTONE MINOR LARGE FRAGMENTS LIGHT BROWN CONGLOMERATE POORLY SORTED FELDSPAR & SANDSTONE FRAGMENTS TO 40mm LIGHT BROWN COARSE GRAINED SANDSTONE POORLY SORTED FELDSPAR & SANDSTONE FRAGMENTS TO 7mm	38		
29		LIGHT BROWN CONGLOMERATE POORLY SORTED FELDSPAR & SANDSTONE FRAGMENTS TO 40mm	39		
30			40		LIGHT BROWN CONGLOMERATE POORLY SORTED FELDSPAR & SANDSTONE FRAGMENTS TO 14mm, FRACTURES 30 TO 100cm APART

COMMENTS:

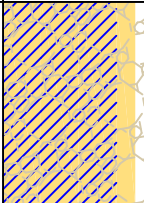
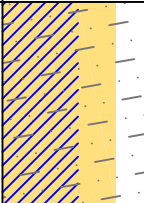
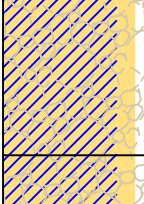
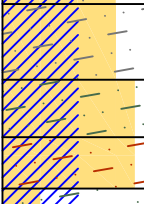
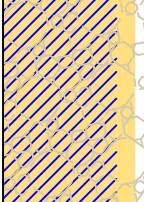
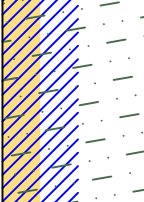
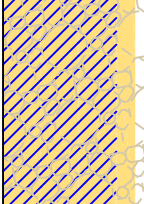
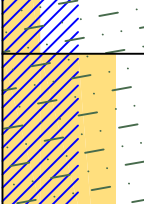
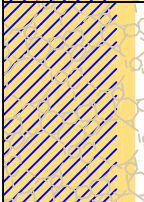
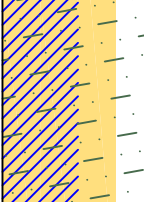
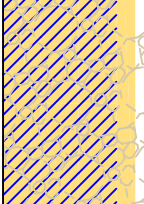
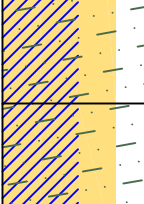
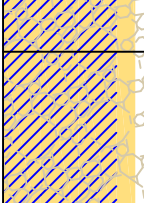
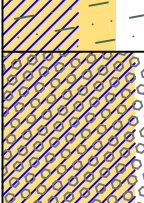
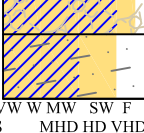
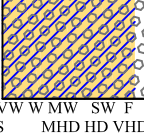
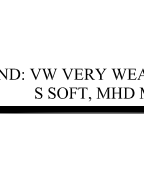

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1406-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 3 OF 6

LOCATION: 376633, 6385412GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
41			51		
42			52		GREY FINE TO COARSE GRAINED SANDSTONE POORLY SORTED WITH SHALE AND SANDSTONE FRAGMENTS, FRACTURES 30cm APART
43		LIGHT BROWN CONGLOMERATE POORLY SORTED FELDSPAR & SANDSTONE FRAGMENTS TO 7mm, FRACTURES 30 TO 100cm APART	53		GREY GREEN MEDIUM TO COARSE GRAINED SANDSTONE SHALE FRAGMENTS TO 4mm
44			54		RED BROWN MEDIUM TO COARSE GRAINED SANDSTONE SHALE FRAGMENTS TO 4mm
45			55		GREY GREEN FINE GRAINED SANDSTONE WITH SHALE FRAGMENTS, BLACK LAMINAE AN CALCITE VEINS IN GROUNDMASS
46		LIGHT BROWN CONGLOMERATE POORLY SORTED FELDSPAR & SANDSTONE FRAGMENTS TO 7mm, FRACTURES 30 TO 100cm APART	56		
47			57		GREY GREEN FINE GRAINED SANDSTONE WITH SHALE FRAGMENTS, BLACK LAMINAE AN CALCITE VEINS IN GROUNDMASS, FRACTURES 30 TO 100cm APART
48			58		GREY GREEN FINE GRAINED SANDSTONE WITH SHALE FRAGMENTS, BLACK LAMINAE AN CALCITE VEINS IN GROUNDMASS, FRACTURES 30 TO 100cm APART
49		LIGHT BROWN CONGLOMERATE POORLY SORTED FELDSPAR & SANDSTONE FRAGMENTS TO 20mm, FRACTURES 30 TO 100cm APART	59		GREY VERY FINE GRAINED IGIMBRITE FELDSPAR TO 4mm, FRACTURES 25cm APART, FRACTURES
50		GREY F TO COARSE GRAINED SANDSTONE POORLY SORTED WITH SHALE AND SANDSTONE FRAGMENTS, FRACTURES 30cm APART	60		

COMMENTS:

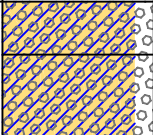
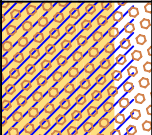

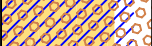
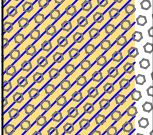
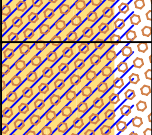
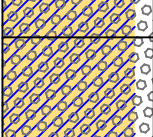
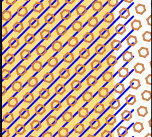
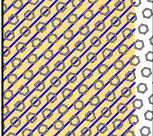
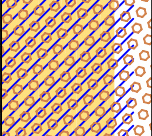
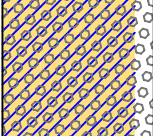
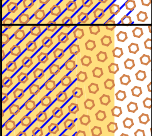
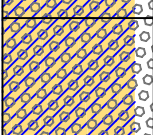
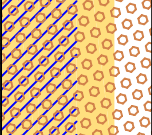
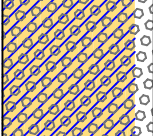
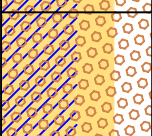
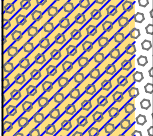
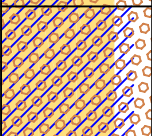
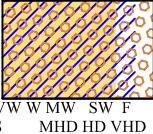
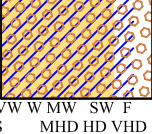
LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1406-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 4 OF 6

LOCATION: 376633, 6385412GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
61		GREY VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 15cm APART CALCITE VEINS 10° TO CORE AXIS, FRACTURES	71		
62		FRACTURED ZONE	72		
63		GREY VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 15cm APART CALCITE VEINS 80° TO CORE AXIS, FRACTURES	73		GREY RED VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 15cm APART MANY CALCITE VEINS 60° TO CORE AXIS
64		GREY VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 15cm APART CALCITE VEINS 80° TO CORE AXIS AND IN GROUNDMASS, FRACTURES	74		
65			75		
66			76		GREY RED VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 15cm APART CALCITE VEINS 80° TO CORE AXIS
67		GREY VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 15cm APART CALCITE VEINS 80° TO CORE AXIS, FRACTURES	77		
68			78		GREY RED VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 15cm APART CALCITE VEIN LARGE 10° TO CORE AXIS
69			79		GREY RED VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 15cm APART PINK CALCITE VEINS 80° TO CORE AXIS
70		GREY RED VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 15cm APART CALCITE VEINS 45° TO CORE AXIS	80		
	VW W MW SW F S MHD HD VHD			VW W MW SW F S MHD HD VHD	

COMMENTS:

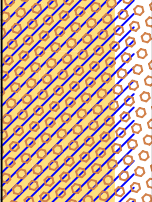

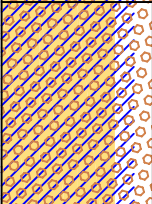
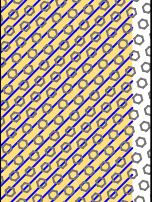
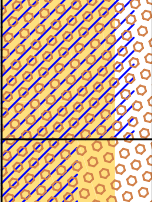
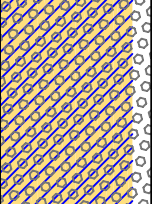
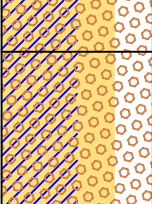
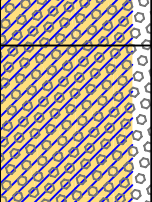
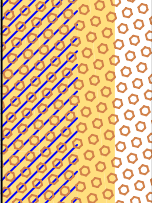
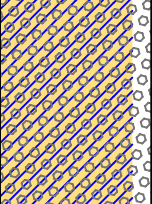
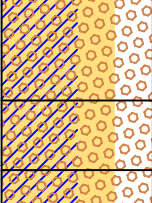
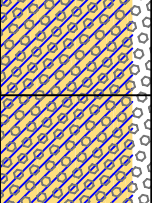
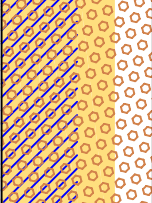
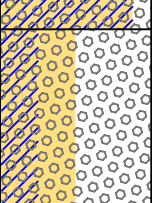
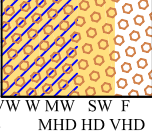
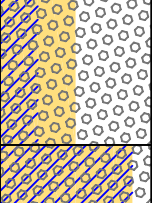
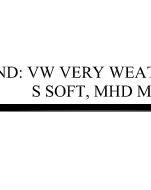
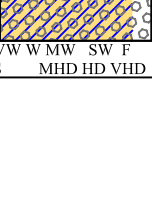
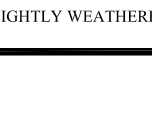
LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1406-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 5 OF 6

LOCATION: 376633, 6385412GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
81		GREY RED VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 15cm APART PINK CALCITE VEINS 45° TO CORE AXIS	91		GREY VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 45cm APART PINK CALCITE VEIN 75° TO CORE AXIS
82		GREY RED VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 15cm APART PINK CALCITE VEINS 45° TO CORE AXIS	92		GREY VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 45cm APART PINK CALCITE VEIN 75° TO CORE AXIS
83		GREY RED VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 15cm APART PINK CALCITE VEINS 45° TO CORE AXIS	93		GREY VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 45cm APART PINK CALCITE VEIN 75° TO CORE AXIS
84		GREY RED VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 15cm APART PINK CALCITE VEINS 45° TO CORE AXIS	94		GREY VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 45cm APART PINK CALCITE VEIN 75° TO CORE AXIS
85		GREY RED VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 15cm APART PINK CALCITE VEINS 45° TO CORE AXIS	95		GREY VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 45cm APART PINK CALCITE VEIN 75° TO CORE AXIS
86		GREY RED VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 15cm APART PINK CALCITE VEINS 45° TO CORE AXIS	96		GREY VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 45cm APART PINK CALCITE VEIN 75° TO CORE AXIS
87		GREY RED VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 15cm APART PINK CALCITE VEINS 45° TO CORE AXIS	97		GREY VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 45cm APART PINK CALCITE VEIN 75° TO CORE AXIS
88		GREY RED VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 15cm APART PINK CALCITE VEINS 45° TO CORE AXIS	98		GREY VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 45cm APART PINK CALCITE VEIN 75° TO CORE AXIS
89		GREY RED VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 15cm APART PINK CALCITE VEINS 45° TO CORE AXIS	99		GREY VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 45cm APART PINK CALCITE VEIN 75° TO CORE AXIS
90		GREY RED VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 15cm APART PINK CALCITE VEINS 45° TO CORE AXIS	100		GREY VERY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ TO 4mm, FRACTURES 45cm APART PINK CALCITE VEIN 75° TO CORE AXIS

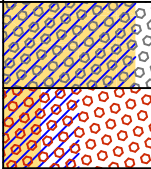
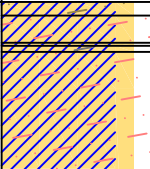
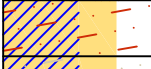
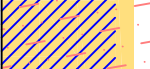
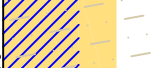
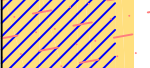
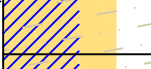
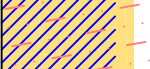
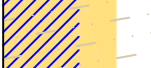
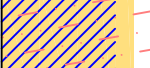
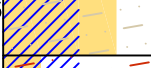
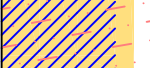
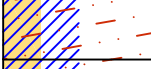

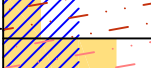

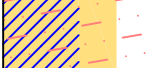

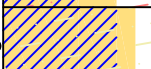

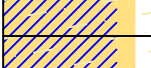

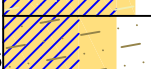

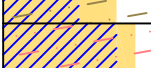

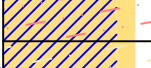

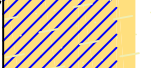

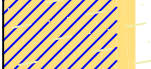

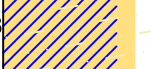

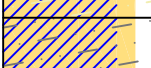

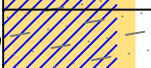

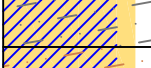

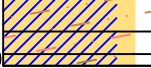

COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD

GRAPHIC DRILL LOG

HOLE: BH-1406-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 6 OF 6

LOCATION: 376633, 6385412GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
101		RED VERY FINE GRAINED IGIMBRITE, FRACTURES 45cm APART PINK CALCITE VEIN 75° TO CORE AXIS	111		PINK MEDIUM GRAINED SANDSTONE POORLY SORTED
		RED MEDIUM GRAINED SANDSTONE POORLY SORTED			RED LIMONITE
		LIGHT BROWN MEDIUM GRAINED SANDSTONE POORLY SORTED			GREY MEDIUM GRAINED SANDSTONE POORLY SORTED
102		LIGHT BROWN MEDIUM GRAINED SANDSTONE POORLY SORTED	112		PINK MEDIUM GRAINED SANDSTONE POORLY SORTED
		LIGHT BROWN MEDIUM GRAINED SANDSTONE POORLY SORTED			PINK MEDIUM GRAINED SANDSTONE POORLY SORTED
103		RED VERY FINE GRAINED SANDSTONE	113		PINK MEDIUM GRAINED SANDSTONE POORLY SORTED
		BROWN RED VERY FINE GRAINED SANDSTONE CHOCOLATE BROWN LAMINAE PERPENDICULAR TO CORE AXIS			PINK MEDIUM GRAINED SANDSTONE POORLY SORTED
104		PINK VERY FINE GRAINED SANDSTONE BLACK LAMINAE 80° TO CORE AXIS	114		PINK MEDIUM GRAINED SANDSTONE POORLY SORTED
		CREAM VERY FINE GRAINED SANDSTONE			PINK MEDIUM GRAINED SANDSTONE POORLY SORTED
105		CREAM VERY FINE GRAINED SANDSTONE	115		PINK MEDIUM GRAINED SANDSTONE POORLY SORTED
		CREAM VERY FINE GRAINED SANDSTONE			PINK MEDIUM GRAINED SANDSTONE POORLY SORTED
106		CHOCOLATE BROWN VERY FINE GRAINED SANDSTONE LAYERS PERPENDICULAR TO CORE AXIS	116		PINK MEDIUM GRAINED SANDSTONE POORLY SORTED
		PINK VERY FINE GRAINED SANDSTONE			PINK MEDIUM GRAINED SANDSTONE POORLY SORTED
107		CREAM VERY FINE GRAINED SANDSTONE RARE BLACK LAMINAE	117		PINK MEDIUM GRAINED SANDSTONE POORLY SORTED
		CREAM VERY FINE GRAINED SANDSTONE RARE BLACK LAMINAE			PINK MEDIUM GRAINED SANDSTONE POORLY SORTED
108		GREY VERY FINE GRAINED SANDSTONE	118		PINK MEDIUM GRAINED SANDSTONE POORLY SORTED
		GREY VERY FINE GRAINED SANDSTONE			PINK MEDIUM GRAINED SANDSTONE POORLY SORTED
109		GREY MEDIUM GRAINED SANDSTONE POORLY SORTED RARE BLACK LAMINAE	119		PINK MEDIUM GRAINED SANDSTONE POORLY SORTED
		RED GREY MEDIUM GRAINED SANDSTONE POORLY SORTED RARE BLACK LAMINAE			PINK MEDIUM GRAINED SANDSTONE POORLY SORTED
110		PINK MEDIUM GRAINED SANDSTONE POORLY SORTED	120		PINK MEDIUM GRAINED SANDSTONE POORLY SORTED
		CHOCOLATE BROWN MEDIUM GRAINED SANDSTONE POORLY SORTED			PINK MEDIUM GRAINED SANDSTONE POORLY SORTED

COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD

GRAPHIC DRILL LOG

HOLE: BH-1407-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 1 OF 5

LOCATION: 377590, 6385578GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
1		NO CORE	11		VIOLET CONGLOMERATE FRAGMENTS 30mm VIOLET MEDIUM GRAINED SANDSTONE VIOLET POORLY SORTED LAMINAE 45° TO CORE AXIS
2			12		WEATHERED ZONE VIOLET CONGLOMERATE FRAGMENTS 30mm VIOLET MEDIUM GRAINED SANDSTONE VIOLET POORLY SORTED LAMINAE 80° TO CORE AXIS CREAM FINE GRAINED SANDSTONE POORLY SORTED
3			13		RED SANDSTONE VIOLET MEDIUM GRAINED SANDSTONE VIOLET POORLY SORTED LAMINAE 80° TO CORE AXIS PINK MEDIUM GRAINED SANDSTONE POORLY SORTED SANDSTONE FRAGMENTS VIOLET FINE GRAINED SANDSTONE LAMINAE 70° TO CORE AXIS PINK MEDIUM GRAINED SANDSTONE POORLY SORTED SANDSTONE FRAGMENTS VIOLET FINE GRAINED SANDSTONE LAMINAE 70° TO CORE AXIS
4			14		PINK MEDIUM GRAINED SANDSTONE POORLY SORTED SANDSTONE FRAGMENTS
5			15		PINK MEDIUM GRAINED SANDSTONE VIOLET MOTTLED PATCHES PINK MEDIUM GRAINED SANDSTONE VIOLET MOTTLED PATCHES
6		VIOLET MEDIUM GRAINED SANDSTONE HIGH FRACTURED	16		LIGHT BROWN CONGLOMERATE FRAGMENTS TO 50mm SANDSTONE AND IGNIMBRITE POORLY SORTED
7		PINK MEDIUM GRAINED SANDSTONE VIOLET MOTTLED PATCHES AND BROWN LIGHT ON FRACTURES, FRACTURES 15cm APART	17		LIGHT BROWN VERY FINE GRAINED SANDSTONE HIGHLY FRACTURED
8		PINK MEDIUM GRAINED SANDSTONE VIOLET MOTTLED PATCHES AND BROWN LIGHT ON FRACTURES, FRACTURES 15cm APART	18		LIGHT BROWN TO BROWN FINE GRAINED SANDSTONE POORLY SORTED
9			19		LIGHT BROWN CONGLOMERATE FRAGMENTS TO 30mm SANDSTONE AND POORLY SORTED VIOLET VERY FINE GRAINED MUDSTONE CROSS BEDDING AT ALL ANGLES AND SOME LARGE FELDSPAR FRAGMENTS INCLUDED
10		PINK MEDIUM GRAINED SANDSTONE VIOLET MOTTLED PATCHES	20		

COMMENTS:

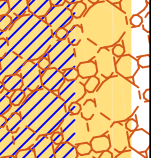
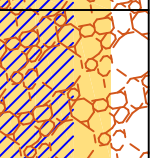
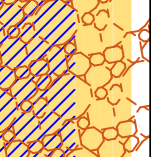
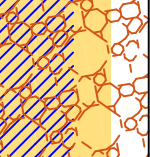
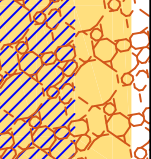
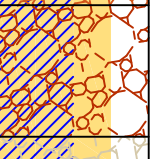
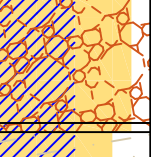
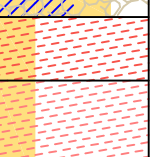
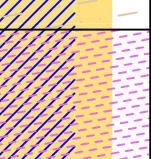
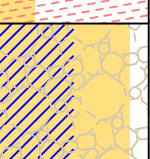
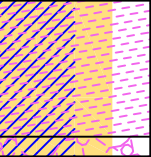
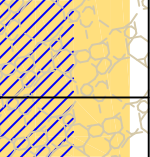
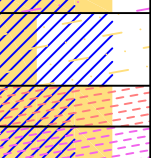
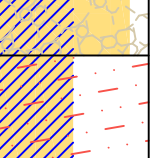
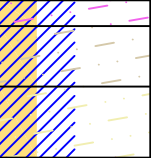
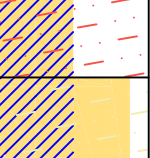
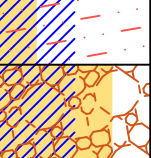
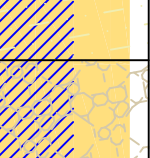
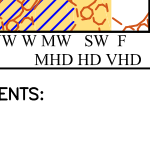
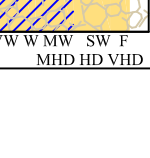
LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1407-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 2 OF 5

LOCATION: 377590, 6385578GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
21		LIGHT BROWN RED CONGLOMERATE FRAGMENTS TO 30mm SANDSTONE AND POORLY SORTED	31		LIGHT RED BROWN CONGLOMERATE FRAGMENTS TO 30mm SANDSTONE & QUARTZ, FRACTURES 20cm APART
22		LIGHT BROWN RED CONGLOMERATE FRAGMENTS TO 50mm SANDSTONE AND POORLY SORTED RES SHALE LAMINAE 45° TO CORE AXIS	32		RED BROWN CONGLOMERATE FRAGMENTS TO 30mm SANDSTONE & QUARTZ, FRACTURES 20cm APART
23		LIGHT BROWN RED CONGLOMERATE FRAGMENTS TO 20mm SANDSTONE AND POORLY SORTED	33		LIGHT BROWN CONGLOMERATE FRAGMENTS TO 30mm SANDSTONE & QUARTZ, FRACTURES 20cm APART
24		LIGHT BROWN RED CONGLOMERATE FRAGMENTS TO 20mm SANDSTONE AND POORLY SORTED	34		LIGHT RED VERY FINE GRAINED MUDSTONE, FRACTURES 7cm APART
25		LIGHT BROWN FINE GRAINED SANDSTONE POORLY SORTED RARE LARGE FRAGMENTS	35		PINK VERY FINE GRAINED MUDSTONE, FRACTURES 7cm APART
26		VIOLET TO PINK VERY FINE GRAINED MUDSTONE LAMINAE ALL ANGLES, FRACTURES 25cm APART	36		LIGHT BROWN CONGLOMERATE FRAGMENTS SANDSTONE SHALE AND QUARTZ
27		VIOLET TO PINK VERY FINE GRAINED MUDSTONE LAMINAE ALL ANGLES, FRACTURES 25cm APART VERTICAL CALCITE VEIN	37		LIGHT BROWN CONGLOMERATE FRAGMENTS SANDSTONE SHALE AND QUARTZ
28		VIOLET CONGLOMERATE FRAGMENTS TO 10mm	38		LIGHT RED TO LIGHT BROWN COARSE GRAINED SANDSTONE RARE SHALE CLASTS
29		VIOLET VERY FINE GRAINED SANDSTONE	39		CREAM MEDIUM GRAINED SANDSTONE POORLY SORTED
30		ORANGE VERY FINE GRAINED SANDSTONE	40		LIGHT BROWN CONGLOMERATE FRAGMENTS SANDSTONE SHALE AND QUARTZ TO 30mm, FRACTURES 30 TO 100cm

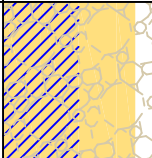
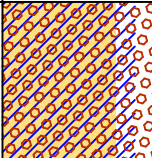

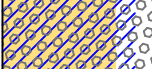
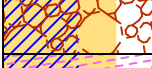
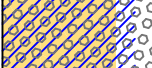
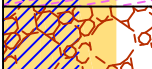
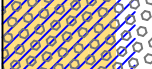
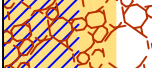
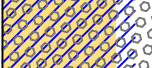
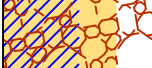
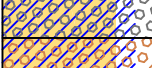
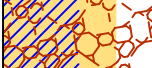
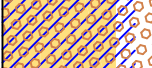
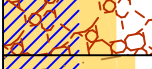
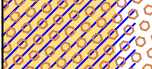
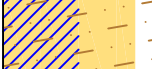
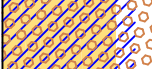
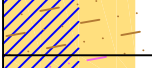
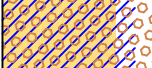
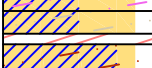
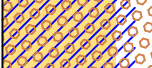
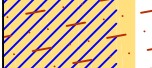
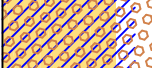
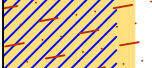
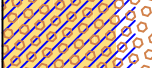
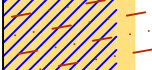
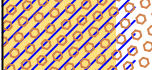
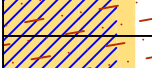
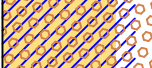
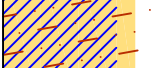
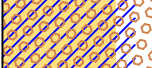
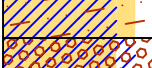
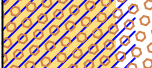
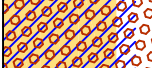
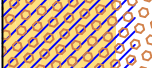
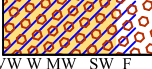
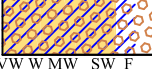
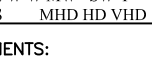
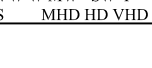
COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD

GRAPHIC DRILL LOG

HOLE: BH-1407-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 3 OF 5

LOCATION: 377590, 6385578GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
41			51		
42		LIGHT BROWN COARSE GRAINED SANDSTONE RARE SHALE CLASTS	52		GREY FINE GRAINED IGIMBRITE FELDSPAR & QUARTZ PHENOCRYSTLS, FRACTURES 50cm APART
43		RED BROWN CONGLOMERATE FRAGMENTS TO 40mm SANDSTONE & QUARTZ, FRACTURES 20cm APART	53		
44		VIOLET VERY FINE GRAINED MUDSTONE LAMINAE 70° TO CORE AXIS FRACTURED	54		
45		RED BROWN CONGLOMERATE FRAGMENTS TO 40mm SANDSTONE & QUARTZ, FRACTURES 20cm APART	55		RED GREY FINE GRAINED IGIMBRITE FELDSPAR & QUARTZ PHENOCRYSTLS, FRACTURES 50cm APART
46		BROWN FINE GRAINED SANDSTONE MINOR COARSE GRAINED BANDS PERPENDICULAR TO CORE AXIS	56		
47		VIOLET FINE GRAINED SANDSTONE MINOR COARSE GRAINED BANDS PERPENDICULAR TO CORE AXIS	57		
48		LIGHT BROWN FINE GRAINED SANDSTONE MINOR COARSE GRAINED BANDS PERPENDICULAR TO CORE AXIS	58		
49		PINK SHALE LAMINAE PERPENDICULAR TO CORE AXIS	59		
50		RED BROWN FINE GRAINED SANDSTONE FELDSPAR FRAGMENTS MINOR LAMINAE	60		
		RED BROWN FINE GRAINED SANDSTONE FELDSPAR FRAGMENTS MINOR LAMINAE			
		RED BROWN FINE GRAINED IGIMBRITE FELDSPAR & QUARTZ PHENOCRYSTLS, FRACTURES 45° TO CORE AXIS RED CALCITE LINED			
					
					
					
					
					
					
					
					

COMMENTS:

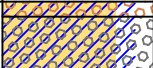
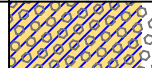
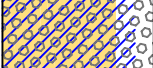
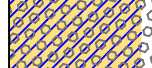
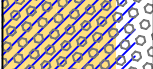
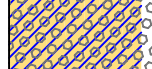
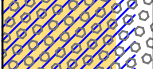
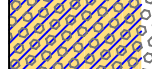
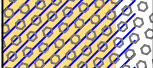
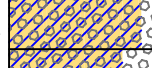
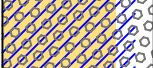
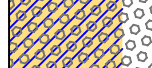
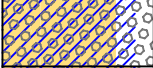
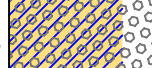
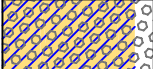
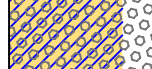
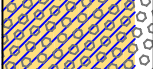
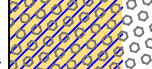
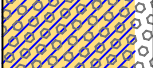
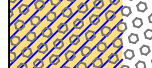
LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1407-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 4 OF 5

LOCATION: 377590, 6385578GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
61		GREY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ PHENOCRYSTS, FRACTURES 50cm APART CALCITE IN GROUNDMASS	71		
62			72		GREY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ PHENOCRYSTS, FRACTURES 50cm APART SIGNIFICANT CALCITE VEINS IN GROUNDMASS
63			73		
64		GREY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ PHENOCRYSTS, FRACTURES 50cm APART	74		
65			75		GREY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ PHENOCRYSTS, FRACTURES 50cm APART SIGNIFICANT CALCITE VEINS IN GROUNDMASS
66			76		
67		GREY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ PHENOCRYSTS, FRACTURES 50cm APART	77		
68			78		
69		GREY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ PHENOCRYSTS, FRACTURES 50cm APART CALCITE VEINS IN GROUNDMASS	79		GREY FINE GRAINED IGNIMBRITE FELDSPAR & QUARTZ PHENOCRYSTS, FRACTURES 50cm APART SIGNIFICANT RED CALCITE VEINS IN GROUNDMASS
70			80		

COMMENTS:

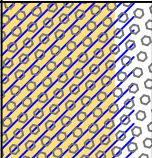
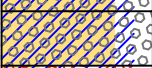
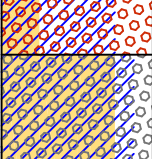
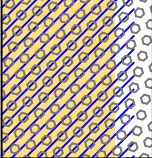
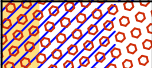
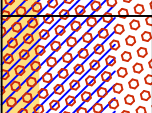

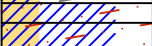
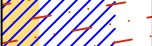
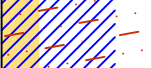
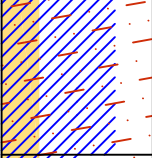
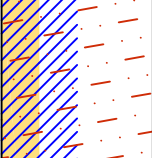
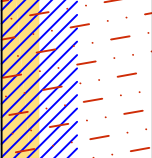
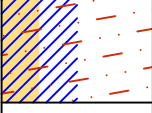
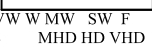
LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD



GRAPHIC DRILL LOG

HOLE: BH-1407-DH
PROJECT: BRANDY HILL, ZONE 56
PAGE 5 OF 5

LOCATION: 377590, 6385578GDA
DRILLED: MACQUARIE DRILLING
LOGGED: P BROWNE 22/5/14

DPH	LOG	DESCRIPTION	DPH	LOG	DESCRIPTION
81		GREY FINE GRAINED IGIMBRITE FELDSPAR & QUARTZ PHENOCRYSTS SIGNIFICANT CALCITE VEINS IN GROUNDMASS	91		
		RED FINE GRAINED IGIMBRITE			
82		GREY FINE GRAINED IGIMBRITE FELDSPAR & QUARTZ PHENOCRYSTS SIGNIFICANT CALCITE VEINS IN GROUNDMASS	92		
83		RED FINE GRAINED IGIMBRITE	93		
		RED FINE GRAINED IGIMBRITE			
84		RED FINE GRAINED IGIMBRITE	94		
		PINK VERY FINE GRAINED SANDSTONE			
85		GREY FINE GRAINED SANDSTONE	95		
		RED FINE GRAINED SANDSTONE LIGHT FRACTURED HIGH			
		RED FINE GRAINED SANDSTONE, FRACTURES 40cm APART			
86		RED FINE GRAINED SANDSTONE, FRACTURES 20cm APART	96		
87		RED FINE GRAINED SANDSTONE, FRACTURES 20cm APART	97		
88			98		
89			99		
90			100		

COMMENTS:

LEGEND: VW VERY WEATHERED, W WEATHERED, MW MODERATELY WEATHERED, SW SLIGHTLY WEATHERED, F FRESH
S SOFT, MHD MEDIUM HARD, HD HARD, VHD VERY HARD

13 **Attachment E – Agency Consultation**

Daniel Dhiacou

From: Andrew Docking <andrew.docking@dpi.nsw.gov.au>
Sent: Wednesday, 10 December 2014 12:07 PM
To: Daniel Dhiacou
Cc: Andrew Norris; Driver, Andrew (Parramatta) AU (Andrew.Driver@hanson.com.au)
Subject: Re: P1303888 Brandy Hill Quarry Expansion - Preliminary Agricultural Land Capacity Assessment
Attachments: OUT14 40206 Brandy Hill Quarry Expansion - Preliminary Agricultural Land Capacity Assessment.pdf

Daniel

A letter for your records.

Regards

Andrew Docking | Resource Management Officer | Agriculture NSW
Post: NSW Department of Primary Industries | Locked Bag 21 | ORANGE | NSW 2800
T: 02 8843 1122 | M: 0437 896 305
E: andrew.docking@dpi.nsw.gov.au | W: www.industry.nsw.gov.au

Land use planning information and guidelines are available at:
<http://www.dpi.nsw.gov.au/agriculture/resources/lup>
<http://www.dpi.nsw.gov.au/agriculture/resources/lup/analysis-census-data>

Building thriving, sustainable Agriculture for tomorrow's communities

On 4 December 2014 at 12:19, Daniel Dhiacou <DDhiacou@martens.com.au> wrote:

Hi Andrew,

Thank you for your response.

As discussed, could you send through the response on letter head agreeing that the land is Class 5 and that formal assessment of agricultural potential is not required. This will enable us to add it as an addendum to a report.

Regards,

Daniel Dhiacou

Civil & Environmental Engineer



Martens & Associates Pty Ltd

Suite 201, 20 George St

Hornsby, NSW 2077

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F + [61 2 9476 8767](tel:61294768767)

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From: Andrew Docking [mailto:andrew.docking@dpi.nsw.gov.au]

Sent: Wednesday, 3 December 2014 4:13 PM

To: Daniel Dhiacou

Cc: Andrew Norris; Driver, Andrew (Parramatta) AU (Andrew.Driver@hanson.com.au)

Subject: Re: P1303888 Brandy Hill Quarry Expansion - Preliminary Agricultural Land Capacity Assessment

Daniel

Agree - no need for specific agriculture impact statement and detailed assessment regarding agriculture potential -- however when you look at the location there is poultry nearby and so EA should include a discussion on any potential farm bore drawdown.

Regards

Andrew Docking | Resource Management Officer | Agriculture NSW

Post: NSW Department of Primary Industries | Locked Bag 21 | ORANGE | NSW 2800

T: 02 8843 1122 | M: 0437 896 305

E: andrew.docking@dpi.nsw.gov.au | W: www.industry.nsw.gov.au

Land use planning information and guidelines are available at:

<http://www.dpi.nsw.gov.au/agriculture/resources/lup>

<http://www.dpi.nsw.gov.au/agriculture/resources/lup/analysis-census-data>

Building thriving, sustainable Agriculture for tomorrow's communities

On 3 December 2014 at 08:31, Daniel Dhiacou <DDhiacou@martens.com.au> wrote:

Hi Andrew,

As per your discussion with Andrew Norris, please find attached the preliminary agricultural land capacity assessment for the Brandy Hill Quarry expansion.

Could you please review and provide any comments at your earliest convenience.

Regards,

Daniel Dhiacou

Civil & Environmental Engineer

BEng (Hons1), DipEngPrac



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TRIM: OUT14/40206

Daniel Dhiacou
Civil & Environmental Engineer
Martens & Associates Pty Ltd
Suite 201, 20 George St
Hornsby, NSW 2077

ddhiacou@martens.com.au

Dear Mr Dhiacou

P1303888 Brandy Hill Quarry Expansion - Preliminary Agricultural Land Capacity Assessment

Thank you for your correspondence of the 3 December 2014, NSW Primary Industries – Agriculture NSW has reviewed the soil assessment report for the proposed expansion and provides the following advice.

Agricultures NSW would concur that the land within the project area is of poor agricultural suitability, most likely agricultural land class 5, unsuitable for cultivation and minimal grazing

http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0004/189697/ag-land-classification.pdf and therefore there is no need for further detailed assessment regarding agriculture potential.

However there are poultry farms nearby and so the Environmental Assessment should include a discussion on any potential impacts to these operations.

For your information there is an issue for agriculture guideline.

http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0005/367763/Agriculture-issues-for-extractive-industry-development.pdf

Thank you for providing the opportunity to comment on the agricultural suitability of the project site.

Yours sincerely

Andrew Docking
Resource Management Officer
Department of Primary Industries
Agriculture NSW
10 December 2014

December 3, 2014

NSW Department of Agriculture
Attn: Andrew Docking

Dear Andrew,

RE: BRANDY HILL QUARRY: PRELIMINARY AGRICULTURAL LAND CAPACITY ASSESMENT FOR QUARRY EXPANSION EIS

Martens and Associates have undertaken a review of available land and soil data at Hanson's Brandy Hill Quarry to allow assessment of the agricultural land capacity in the proposed expansion area. Refer to Attachment A for a site aerial and proposed final quarry form.

The quarry is situated on the eastern slopes of Brandy Hill (approximate elevation 35 to 100 mAH) adjacent to the Deadman's Creek incised valley (approximate elevation 25 to 55 mAH). Slopes are typically 10 – 35% with the area either operating quarry or native vegetation (forest).

The Newcastle 1:100 000 soil landscape sheet (DLWC, 1995) indicates that site soils are Seaham (SE) and Hungry Hill (HH) on Carboniferous volcanics and sediments. Soils are primarily shallow to moderately deep (30 – 120 cm) rapidly drained loams and well / imperfectly drained soloths, with some moderately deep (> 140 cm) imperfectly / well drained chocolate soils on colluvial benches, moderately deep (> 90 cm) poorly drained structured loams on small alluvial flats, and shallow to moderately deep (20 – 100 cm) well drained lithosols. Limitations noted include steep slopes, mass movement hazard, shallow & stony soils, seasonal waterlogging (for lower slopes/benches), high erosion hazard, localised rock outcrops, and strongly acidic soils of low fertility.

Site specific soil testing was conducted as part of the EIS for the currently approved quarry by Hunter Valley Mining Corporation (1983). The majority of the site consists of shallow (< 50 cm) sandy loams overlying weathering bedrock, with some gravels and kaolinite clays, as well as areas of rock outcrop. The soil layer thickens towards the base of the existing quarry due to colluvial deposits from upslope, and alluvial deposits are present in surrounding drainage lines. Soils are acidic with pH values ranging from 4.5 – 5.5.

Based on the available information we believe the proposed quarry expansion land has a low agricultural capability and is likely Class 4 or 5 based on NSW Agriculture Agfact AC. 25 (2002). We would appreciate your comments and advice as to whether further detailed assessment is required.

If you require any further information, please do not hesitate to contact the writer.

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www.martens.com.au
MARTENS & ASSOCIATES P/L
ABN 85 070 240 890 ACN 070 240 890

**For and on behalf of
MARTENS & ASSOCIATES PTY LTD**



DANIEL DHIACOU

BEng (Hons1), DipEngPrac

Civil & Environmental Engineer



ANDREW NORRIS

BSc (Hons), MEngSc, MAWA

Director/Project Manager

ATTACHMENT A – SITE AERIAL AND PROPOSED LAYOUT



BACKGROUND AERIAL FROM SIXMAPS (2014).
PROPOSED QUARRY CONTOURS FROM HANSON (2014).

REV.	DESCRIPTION	DATE	ISSUED	<div>BAR SCALE</div> <div><div><div>0</div><div>50</div><div>100</div><div>150</div><div>200</div><div>250</div></div><div>UNITS - METRES</div></div> <div>(C) Copyright Martens & Associates Pty Ltd</div> <div>This drawing must not be reproduced in whole or part without prior written consent of Martens & Associates Pty Ltd</div>	DESIGNED:	DATUM:	CLIENT / 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