

Realty Realizations Pty Ltd
C/- Allen, Price & Associates



Stage 1 Land Contamination Assessment

Part DP 1065111 and Lot 61 DP 755971
Culburra Road, West Culburra, NSW

ENVIRONMENTAL



WATER



WASTEWATER



GEOTECHNICAL



CIVIL



PROJECT
MANAGEMENT



P1002842JR01V02
February 2013

Copyright Statement

Martens & Associates Pty Ltd (Publisher) is the owner of the copyright subsisting in this publication. Other than as permitted by the Copyright Act and as outlined in the Terms of Engagement, no part of this report may be reprinted or reproduced or used in any form, copied or transmitted, by any electronic, mechanical, or by other means, now known or hereafter invented (including microcopying, photocopying, recording, recording tape or through electronic information storage and retrieval systems or otherwise), without the prior written permission of Martens & Associates Pty Ltd. Legal action will be taken against any breach of its copyright. This report is available only as book form unless specifically distributed by Martens & Associates in electronic form. No part of it is authorised to be copied, sold, distributed or offered in any other form.

The document may only be used for the purposes for which it was commissioned. Unauthorised use of this document in any form whatsoever is prohibited. Martens & Associates Pty Ltd assumes no responsibility where the document is used for purposes other than those for which it was commissioned.

Limitations Statement

The sole purpose of this report and the associated services performed by Martens & Associates Pty Ltd is to provide a preliminary assessment of land contamination risk at the subject site in accordance with the scope of services set out in the contract / quotation between Martens & Associates Pty Ltd and Realty Realizations Pty Ltd C/- Allen, Price & Associates (hereafter known as the Client). That scope of works and services were defined by the requests of the Client, by the time and budgetary constraints imposed by the Client, and by the availability of access to the site.

Martens & Associates Pty Ltd derived the data in this report primarily from a number of sources which included correspondence regarding the proposal, examination of records in the public domain, interviews with individuals with information about the site or the project, and field explorations conducted on the dates indicated. The passage of time, manifestation of latent conditions or impacts of future events may require further examination / exploration of the site and subsequent data analyses, together with a re-evaluation of the findings, observations and conclusions expressed in this report.


In preparing this report, Martens & Associates Pty Ltd may have relied upon and presumed accurate certain information (or absence thereof) relative to the site. Except as otherwise stated in the report, Martens & Associates Pty Ltd has not attempted to verify the accuracy or completeness of any such information (including for example survey data supplied by others).

The findings, observations and conclusions expressed by Martens & Associates Pty Ltd in this report are not, and should not be considered an opinion concerning the completeness and accuracy of information supplied by others. No warranty or guarantee, whether express or implied, is made with respect to the data reported or to the findings, observations and conclusions expressed in this report. Further, such data, findings and conclusions are based solely upon site conditions, information and drawings supplied by the Client etc. in existence at the time of the investigation.

This report has been prepared on behalf of and for the exclusive use of the Client, and is subject to and issued in connection with the provisions of the agreement between Martens & Associates Pty Ltd and the Client. Martens & Associates Pty Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party.

© February 2013
 Copyright Martens & Associates Pty Ltd
 All Rights Reserved

Head Office
 Unit 6/ 37 Leighton Place
 Hornsby, NSW 2077, Australia
 ACN 070 240 890 ABN 85 070 240 890
Phone: +61-2-9476-9999
 Fax: +61-2-9476-8767
 Email: mail@martens.com.au
 Web: www.martens.com.au

Document and Distribution Status							
Author(s)			Reviewer(s)		Project Manager		Signature
Mr Mark Terei			Mr Andrew Norris		Mr Andrew Norris		
Revision No.	Status	Release Date	Document Location				
			File Copy	Realty Realizations Pty Ltd	Allen, Price & Associates		
1	Draft	22.12.2010	1E, 1P, 1H	1E	1P		
2	Final	22.02.2013	1E, 1P, 1H	1E	1P		

Distribution Types: F = Fax, H = hard copy, P = PDF document, E = Other electronic format. Digits indicate number of document copies.

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

Contents

1 INTRODUCTION.....	5
1.1 Scope of Works	5
2 SITE DESCRIPTION	6
2.1 Location and Site Description	6
2.2 Physiography and Hydrology	6
2.3 Geology	6
2.4 Soil Profile	7
2.5 Groundwater	7
3 SITE HISTORY REVIEW (STAGE 1 INVESTIGATION).....	9
3.1 Overview	9
3.2 Zoning	9
3.3 NSW EPA/DECC Contaminated Land Record	9
3.4 Development Application History	9
3.5 Historical Aerial Photograph Analysis	10
3.6 Walkover Site Inspection	11
4 CONCLUSIONS AND RECOMMENDATIONS	12
5 LIMITATIONS STATEMENT	13
6 REFERENCES	14
7 ATTACHMENT A – SITE PLAN	15
8 ATTACHMENT B – EXCERPTS FROM MARTENS (2010) GEOTECHNICAL ASSESSMENT REPORT (P1002842JR02V01).....	17
9 ATTACHMENT C – HISTORICAL AERIAL PHOTOGRAPHS	48

1 Introduction

1.1 Scope of Works

Martens & Associates Pty Ltd has prepared this preliminary (Stage 1) land contamination assessment for Realty Realizations Pty Ltd C/- Allen, Price & Associates to inform a concept plan for a mixed use sub-division at West Culburra.

The purpose of the assessment is to detail the suitability of the site for the proposed development and to determine if further site assessment (Stage 2 soil sampling and testing) is required. The Stage 1 assessment was based on a historical review of site land use and does not involve soil sampling.

The assessment has been prepared in accordance with NSW OEH (2011) *Guidelines for Consultants Reporting on Contaminated Sites* and SEPP 55 – *Remediation of Land*.

2 Site Description

2.1 Location and Site Description

The study area is located on the northern side of Culburra Road, West Culburra, within the Shoalhaven City Council local government area (LGA). The study area consists of the following lots (Attachment A):

- Lot 61 DP 755971
- Part Lot 5 DP 1065111
- Part Lot 6 DP 1065111
- Part Lot 7 DP 1065111

The study area covers an area of approximately 109 ha and consists of undeveloped vegetated land and some agricultural areas in Lot 5 DP 1065111 and Lot 61 DP 755971.

2.2 Physiography and Hydrology

Majority of the site is elevated >5 mAHD above the Crookhaven River estuary. Immediate foreshore areas are moderately steep and transitional between the subject site and the estuary. Relief across the site is approximately 20 m. The landscape is gently undulating with slopes ranging between 2.5 – 6.0 %, with some areas of localised over steepening typically associated with drainage lines.

The site of the proposed subdivision lies on a ridgeline and associated northern side slopes discussed above, except for an area of Lot 5 which lies on the southern side of the ridge line.

Site drainage ranges from good to poor across the site, with poor draining areas characteristically associated with lower points of elevation within the landscape. Site drainage likely consists of both infiltration and overland flow (sheet and concentrated).

2.3 Geology

The Wollongong 1:250,000 Geological Sheet (NSW Dept. of Mines, 1966) identifies the site as being underlain predominantly by Wandrawandian Siltstone, a member of the Shoalhaven Group. Wandrawandian Siltstone is dominated by siltstone and silty sandstone lithologies, and is pebbly in parts. Immediate foreshore areas of the site, adjacent to Crookhaven River Estuary consist of Quaternary sedimentary units of gravel, sands, silts, and clays of marine to freshwater environments, and likely overlie Wandrawandian Siltstone in these areas.

On-site borehole investigations for a site geotechnical assessment (Martens & Associates report P1002842JR02V01, December 2010) encountered weathered siltstone at 0.8 – 2.3 m below ground level at 22 borehole locations across the site. Bedrock was deeper than 2.2 m bgl at 2 borehole locations.

2.4 Soil Profile

The Soil Landscapes of the Kiama 1:100,000 Sheet identifies the site as having soils of the Greenwell Point soil landscape (Table 1). Total soil depth is typically <1.0 m.

Table 1: Soil profile summary of Greenwell Point soil landscape: coastal cliffs and headlands (Chapman & Murphy, 1989).

Layer	Depth Range of soil layer (m)	Description
gp1	0.0 – 0.5	Hardsetting brownish black SILT LOAM.
gp2	0.5 – 0.9	Yellowish brown strongly pedal SANDY CLAY.

On-site borehole investigations for a site geotechnical assessment (Martens & Associates report P1002842JR02V01, December 2010) found the soil profile to typically consist of no more than 0.5 m of topsoil (silty sand and sandy silt) overlying clay subsoil grading to extremely-highly weathered siltstone. Relevant excerpts from that report are provided in Attachment B.

2.5 Groundwater

2.5.1 Bore Search

A review of the former NSW Department of Natural Resources groundwater bore database indicates that there are no licensed bores in the vicinity of the site.

2.5.2 Site Observations

Groundwater was observed during intrusive investigations at the site (November 22, 2010), and is summarised in Table 2. More detailed investigation of groundwater at the site is presented in Martens and Associates report P0902521JR02V01 (2010).

Table 2: Groundwater level measurements

GMB ID ¹	GMB Surface Level ²	23.11.2010 mAHD	24.11.2010 mAHD	25.11.2010 mAHD	26.11.2010 mAHD
1	6	5.38	5.38	5.34	5.31
1a	6	-	4.84	4.93	4.97
2	22	20.8	20.71	20.63	20.59
2a	22	-	Dry	Dry	Dry
3	15	Dry	Dry	Dry	Dry
4	8	Dry	Dry	Dry	Dry
5	8	Dry	Dry	Dry	Dry
6	5	-	-	4.87	4.86

Note:

¹ GMB – groundwater monitoring bore.

² Level approximate mAHD based on Allen, Price and Associates survey (Ref: 25405-02)

3 Site History Review (Stage 1 Investigation)

3.1 Overview

A review of the history of site use and development has been completed based on Council development consent and building plan records, NSW EPA/DECC contaminated land records, historical aerial photography and a walkover site inspection to form a preliminary assessment of the risk of land contamination resulting from past land uses.

3.2 Zoning

Zoning of the subject lots is as follows according to the Shoalhaven LEP (1985):

- Lot 61 DP 755971 – mostly residential 2(c) (Living Areas) with a 7(a) (Ecology) Environmental Protection buffer along the shoreline;
- Part Lot 5 DP 1065111 north of Culburra Road – business 3(f) (Village);
- Part Lot 5 DP 1065111 south of Culburra Road – partly residential 2(c) (Living Areas) and partly 5(a) Community Uses
- Part Lot 6 DP 1065111 – mostly residential 2(c) (Living Areas) with a 7(a) (Ecology) Environmental Protection buffer along the shoreline and portions of business 3(f) (Village) and 5(a) Community Uses near the boundary with Lot 5; and
- Part Lot 7 DP 1065111 – residential 2(c) (Living Areas).

3.3 NSW EPA/DECC Contaminated Land Record

Review of the NSW EPA/DECC contaminated land record shows that the subject site has not been regulated by the EPA in regards to contaminated land. No site within the suburb of Culburra was listed on the register.

3.4 Development Application History

Development application and building plan records kept by Shoalhaven City Council were reviewed in November 2010. Council's records date back to approximately 1960 – 1970. The records indicate that all previous development applications have been in relation to residential use (Table 3) and were approved within the last 9 months prior. Properties not listed did not have any associated recorded applications.

Table 3: Building or development applications for the site, approximately 1960 - current.

Year	DA No.	Description	Decision
Lot 6 DP 1065111			
2010	1330	New dwelling – single storey and detached shed.	Approved 30/04/2010
Lot 7 DP 1065111			
2010	1494	New dwelling – single storey and detached garage.	Approved 13/09/2010
Lot 5 DP 1065111			
2009	2675	Dwelling – single storey sustainable house	Approved 02/03/2010

3.5 Historical Aerial Photograph Analysis

Historical aerial photographs taken of the site during 1949, 1961, 1974, 1993, 2002 and 2008 were reviewed in order to investigate the history of land use on the site (Table 4). Copies of all aerial photographs are provided in Attachment B.

Photos indicate that the site has not sustained any intensive land use except for possibly grazing of pasture in cleared portions of the site.

Table 2: Historical aerial photograph observations 1949 – 2008.

Year	Description
1949	The northern portion of Lot 61 and eastern portions of Lot 5 are fully cleared with other parts of the site either mainly cleared or covered by remnant forest. A number of access tracks but no structures or intensive land use are observed. Surrounding land use has a similar pattern of use.
1961	As per 1949, the site is partly cleared with some remnant forest; surrounding land use is similar with small residential lots in present day residential areas.
1974	Site condition appears similar to 1961 except Lot 61 has been more extensively cleared along the western boundary and there is some fencing in the north-west corner of the site. Some vegetation regrowth has occurred in other areas. Residential development has become more prominent around the Culburra town centre and some clearing and possibly earthworks can be seen at the site of the current Culburra wastewater treatment plant. It appears that quarrying operation has started on the property to the west of Lot 5 DP 1065111.
1993	Significant vegetation regrowth outside of present day cleared areas has occurred. Residential development has intensified around the Culburra town centre. Culburra wastewater treatment plant is established, as is Culburra nursing home adjacent to Lot 5 DP 1065111.
2002	Land use on-site is consistent with the 1993 photo. Industrial area on STP access road has increased in size with the concrete batching plant.
2008	Land use on-site and in the surrounding area is consistent with the 2002 photo, although the quarrying operation on the southern side of Culburra Road and west of Lot 5 DP 1065111 appears to have ceased. The site is predominantly remnant and regrowth forest and there are no structures or intensive land use apparent. The western portion of Lot 61 and a portion of Lot 5 on the north side of Culburra Road remain cleared.

3.6 Walkover Site Inspection

A site inspection completed 23 – 26 November 2010 made the following observations:

- Some scattered bulky waste items (including a few old cars and a wheel barrow) in various locations about the site, but otherwise no significant/widespread dumping was identified; and
- 4 stockpiles of soil containing minor building waste (e.g. wire) in the south-east corner of proposed Lot 1.

No other evidence of potential contamination such as soil staining, unnatural odours or plant stress was observed on-site.

4

Conclusions and Recommendations

The results of the site history review (preliminary site investigation) indicate that the site has possibly been used for grazing. Some bulky waste items and a few stockpiles of soil were identified by a site walkover inspection (Section 3.6) but do not represent widespread site contamination. On this basis, the site is unlikely to be contaminated other than by waste and stockpiles noted, and further site assessment (sampling and laboratory testing) is generally not necessary. Future investigation of identified stockpiles are to be undertaken and they, and any others found during site works, are to be removed from site unless classified as acceptable to remain on a residential site.

Subject to the appropriate management of the identified stockpiles, dumped vehicles and any other such areas, the site is considered suitable for residential purposes.

5 Limitations Statement

The Stage 1 contamination assessment was undertaken in line with current industry standards. No site soil sampling has been undertaken.

It is important, however, to note that no Stage 1 land contamination study can be considered to be a complete and exhaustive characterisation of a site nor can it be guaranteed that any assessment shall identify and characterise all areas of potential contamination or all past potentially contaminating land-uses. This is particularly the case on sites where extensive areas of past cleared land have revegetated. Therefore, this report should not be read as a guarantee that no contamination shall be found on the site. Should material be exposed in future which appears to be contaminated, additional testing may be required to determine the implications for the site.

Martens & Associates Pty Ltd has undertaken this assessment for the purposes of the current development proposal. No reliance on this report should be made for any other investigation or proposal. Martens & Associates accepts no responsibility, and provides no guarantee regarding the characteristics of areas of the site not specifically studied in this investigation.

6

References

Martens and Associates (2010) *Geotechnical Constraints Assessment: Lot 61 DP 755971 and Part of Lot 6 DP 106511, Culburra Road, West Culburra, NSW* (Report Ref: P1002842JR02V01).

Soil Landscapes of the Kiama 1:100 000 sheet. Soil Conservation Service of NSW, Sydney.

Shoalhaven City Council – Shoalhaven LEP (1985).

Wollongong 1:250,000 Geological Sheet; New South Wales Dept of Mines, 1970.

NSW EPA (2000) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*.

NSW DEC (2005) *Contaminated Sites: Guidelines for Assessing Former Orchards and Market Gardens*.

7 Attachment A – Site Plan

8 Attachment B – Excerpts from Martens (2010)
Geotechnical Assessment Report (P1002842JR02V01)

3 Factors Affecting Development

3.1 Geotechnical

3.1.1 Sub-surface Conditions

Subsurface investigations at the subject indicate that predominantly sandy silts or silty sands (with some organic content) typically overlie medium to high-plasticity clays derived from *in-situ* weathering of the underlying Wandrawandian Siltstone. The soil mantle typically ranges in depths from 1.3 – 1.5 m below ground level (BGL). Extremely to highly-weathered siltstone is encountered below 1.5 mBGL, with rock strength variation ranging from extremely to slightly weathered to depths of 5.5 mBGL. Significant rock outcropping was not observed on the site.

Borehole, test pit and DCP locations are shown on the site plan (Attachment A). Detailed borehole and test pit logs are presented in Attachment B.

Table 2: Indicative soil and rock depth range.

Material Description ¹	Depth ² (m)
SILTY SAND / SANDY SILT	0.0 – 0.3
CLAY	0.3 – 1.3
EW – SW SILTSTONE (weathering patterns variable down profile)	1.3 - >5.5

Notes:

¹ F = Fresh, SW=Slightly weathered, MW = Moderately weathered, HW = Highly weathered, EW = Extremely weathered. Refer to borehole logs for material description details.

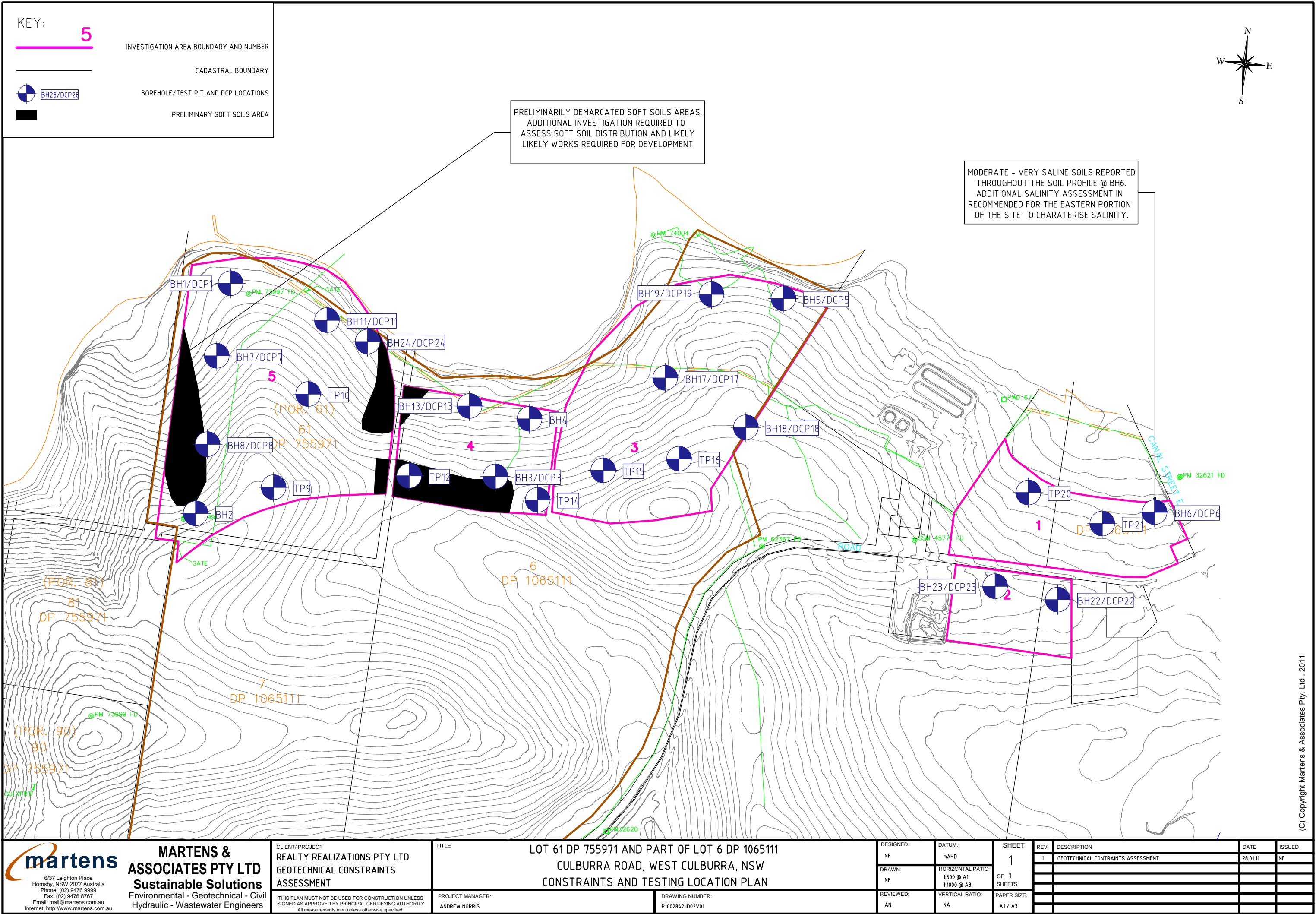
² Indicative depth range. Material depth may vary across a site depending on site and local geological conditions. Depth of fill variable across the site. Refer to borehole logs for accurate depths of soil materials at each borehole.

3.1.2 Soil Strength Properties

Preliminary soil strength estimates indicate soils below 0.3 m are likely to have allowable bearing capacities (ABC) ranging between 50 – 200 kPa, providing suitable bearing capacity for standard shallow foundations for residential dwellings. Areas of the site identified to contain soft soils are likely to have ABC <50 kPa.


Further investigation is required at detailed design stage to formally assess ABC and related soil strength properties across the site. We also recommend that additional assessment is conducted to formally identify the distribution of soft soil areas and associated ABC and related soil strength properties which may have implications for development in these areas.

7 Attachment A – Site Plan



PRELIMINARILY DEMARCATED SOFT SOILS AREAS.
ADDITIONAL INVESTIGATION REQUIRED TO
ASSESS SOFT SOIL DISTRIBUTION AND LIKELY
LIKELY WORKS REQUIRED FOR DEVELOPMENT

MODERATE - VERY SALINE SOILS REPORTED
THROUGHOUT THE SOIL PROFILE @ BH6.
ADDITIONAL SALINITY ASSESSMENT IN
RECOMMENDED FOR THE EASTERN PORTION
OF THE SITE TO CHARATERISE SALINITY.

<div><div><div>MARTENS & ASSOCIATES PTY LTD</div><div>Sustainable Solutions</div><div>Environmental - Geotechnical - Civil</div><div>Hydraulic - Wastewater Engineers</div></div><div><div>6/37 Leighton Place</div><div>Hornsby, NSW 2077 Australia</div><div>Phone: (02) 9476 9999</div><div>Fax: (02) 9476 8767</div><div>Email: mail@martens.com.au</div><div>Internet: http://www.martens.com.au</div></div></div>	CLIENT/ PROJECT		REALTY REALIZATIONS PTY LTD		TITLE		DESIGNED:		DATUM:		SHEET 1 OF 1 SHEETS	REV.	DESCRIPTION	DATE	ISSUED	
	GEOTECHNICAL CONSTRAINTS		ASSESSMENT		LOT 61 DP 755971 AND PART OF LOT 6 DP 1065111 CULBURRA ROAD, WEST CULBURRA, NSW CONSTRAINTS AND TESTING LOCATION PLAN		NF		mAHD			1	1	GEOTECHNICAL CONTRAINTS ASSESSMENT	28.01.11	NF
	THIS PLAN MUST NOT BE USED FOR CONSTRUCTION UNLESS SIGNED AS APPROVED BY PRINCIPAL CERTIFYING AUTHORITY All measurements in m unless otherwise specified.		PROJECT MANAGER:		DRAWING NUMBER:		DRAWN:		HORIZONTAL RATIO:							
			ANDREW NORRIS		P100284.2J002V01		NF		1:500 @ A1 1:1000 @ A3							
							REVIEWED:		VERTICAL RATIO:			PAPER SIZE:				
							AN		NA			A1 / A3				

8 Attachment B – Borehole and Test Pit Logs

CLIENT		Allen Price & Associates Pty Ltd		COMMENCED		23.11.10		COMPLETED		23.11.10		REF		BH1A					
PROJECT		Engineering Services		LOGGED		GT		CHECKED		AN		Sheet 1 of 1							
SITE		Cullburra Road, West Cullburra		GEOLOGY		Siltstone		VEGETATION		Grasses		PROJECT NO. P1002842							
EQUIPMENT				Hydraulic Auger				EASTING		NA		RL SURFACE				NA			
EXCAVATION DIMENSIONS				0.1mØ X 1.6m depth				NORTHING		NA		ASPECT		North		SLOPE		2-3%	
EXCAVATION DATA				MATERIAL DATA								SAMPLING & TESTING							
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.		CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	WATER WELL DETAILS					
A	Nil	N	M	0.25			SC	SILTY CLAYEY SAND – Dark brown, fine grained sands.			L								
A	Nil	N	M	0.45			SC	SILTY CLAYEY SAND – Light grey, fine grained sands, minor gravels.			L								
A	Nil	N	M	0.6			CL	SILTY CLAY - Brown/orange, gravels (1-15mm, 35%), tending to clay with gravels decreasing.		F									
A	Nil	N	M	0.9			CH	CLAY - Grey/orange/red mottled.		VSt									
A	Nil	N	M	1.0			CL	SANDY CLAY/EXTREMELY WEATHERED SILTSTONE - Light grey, yellow, cream bands, gravels (approx 5-50mm).		VSt	MD	A	1.6					2842/1A/1.6	
				1.2				Borehole terminated at 1.6m on clay/extremely weathered siltstone.											
				1.6															
				2.0															
				3.0															
				4.0															
				5.0															
				6.0															
				7.0															
				8.0															
				9.0															

EQUIPMENT / METHOD		SUPPORT		WATER		MOISTURE		PENETRATION		CONSISTENCY		DENSITY		SAMPLING & TESTING		CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION	
N	Natural exposure	SH	Shoring	N	None observed	D	Dry	L	Low	VS	Very Soft	VL	Very Loose	A	Auger sample	pp	Pocket penetrometer
X	Existing excavation	SC	Shotcrete	X	Not measured	M	Moist	M	Moderate	S	Soft	L	Loose	B	Bulk sample	S	Standard penetration test
BH	Backhoe bucket	RB	Rock Bolts		Water level	W	Wet	H	High	F	Firm	MD	Medium Dense	U	Undisturbed sample	VS	Vane shear
E	Excavator	Nil	No support			Wp	Plastic limit	R	Refusal	St	Stiff	D	Dense	D	Disturbed sample	DCP	Dynamic cone penetrometer
HA	Hand auger				Water outflow	WI	Liquid limit			VSt	Very Stiff	VD	Very Dense	M	Moisture content	FD	Field density
S	Hand spade				Water inflow					H	Hard			Ux	Tube sample (x mm)	WS	Water sample
PT	Push tube									F	Friable						
A	Auger																
CC	Concrete Corer																

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

(C) Copyright Martens & Associates Pty. Ltd . 2010

MARTENS & ASSOCIATES PTY LTD
6/37 Leighton Place
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

Quality Sheet No. 4

CLIENT		Allen Price & Associates Pty Ltd		COMMENCED		23.11.10		COMPLETED		23.11.10		REF		BH2A			
PROJECT		Engineering Services		LOGGED		GT		CHECKED		AN		Sheet 1 of 1					
SITE		Cullburra Road, West Cullburra		GEOLOGY		Siltstone		VEGETATION		Grasses		PROJECT NO. P1002842					
EQUIPMENT		Hydraulic Auger		EASTING		NA		RL SURFACE		NA							
EXCAVATION DIMENSIONS		0.1mØ X 1.5m depth		NORTHING		NA		ASPECT		North		SLOPE		3-4%			
EXCAVATION DATA				MATERIAL DATA				SAMPLING & TESTING									
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.		CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	WATER WELL DETAILS			
A	Nil	N	M	0.1			OL	ORGANIC SILTY CLAY – Dark grey/black.		S							
A	Nil	N	M	0.2			CL	SILTY CLAY – Brown/light brown.		S							
A	Nil	N	M	0.6			CL	CLAY – Red, moderately plastic, with light brown/grey mottles increasing with depth.		F							
A	Nil	N	M	1.0			CH	CLAY – Red, medium plasticity, grey/brown mottles.		St							
A	Nil	N	M	1.1			CH	CLAY - Grey with minor red/brown mottles.		VSt							
A	Nil	N	M	1.2			CL	CLAY TO EXTREMELY WEATHERED SILTSTONE - Clay to sandy clay, weathered gravels, grey/red/brown.		VSt							
A	Nil	N	D	1.5			EW	Borehole terminated at 1.5m on extremely weathered siltstone.				A	1.5	2842/2A/ 1.5			
				2.0										2.0			
				3.0										3.0			
				4.0										4.0			
				5.0										5.0			
				6.0										6.0			
				7.0										7.0			
				8.0										8.0			
				9.0										9.0			
EQUIPMENT / METHOD		SUPPORT		WATER		MOISTURE		PENETRATION		CONSISTENCY		DENSITY		SAMPLING & TESTING		CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION	
N Natural exposure		SH Shoring		N None observed		D Dry		L Low		VS Very Soft		VL Very Loose		A Auger sample		pp Pocket penetrometer	
X Existing excavation		SC Shotcrete		X Not measured		M Moist		M Moderate		S Soft		L Loose		B Bulk sample		S Standard penetration test	
BH Backhoe bucket		RB Rock Bolts		Water level		W Wet		H High		F Firm		MD Medium Dense		U Undisturbed sample		VS Vane shear	
E Excavator		Nil No support		Water outflow		Wp Plastic limit		R Refusal		St Stiff		D Dense		D Disturbed sample		DCP Dynamic cone	
HA Hand auger				Water inflow		WL Liquid limit				VSt Very Stiff		VD Very Dense		M Moisture content		penetrometer	
S Hand spade										H Hard				Ux Tube sample (x mm)		FD Field density	
PT Push tube										F Friable						WS Water sample	
A Auger																	
CC Concrete Corer																	
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS																	
<div><div></div><div>MARTENS & ASSOCIATES PTY LTD 6/37 Leighton Place 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		Allen Price & Associates Pty Ltd		COMMENCED		23.11.10		COMPLETED		23.11.10		REF		BH3			
PROJECT		Engineering Services		LOGGED		GT		CHECKED		AN		Sheet 1 of 1					
SITE		Cullburra Road, West Cullburra		GEOLOGY		Siltstone		VEGETATION		None		PROJECT NO. P1002842					
EQUIPMENT		Hydraulic Auger		EASTING		NA		RL SURFACE		NA							
EXCAVATION DIMENSIONS		0.1mØ X 5.5m depth		NORTHING		NA		ASPECT		North		SLOPE		2-3%			
EXCAVATION DATA						MATERIAL DATA						SAMPLING & TESTING					
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.		CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	WATER WELL DETAILS			
A	Nil	N	M	-0.15			SM	SILTY SAND – Brown/dark brown, minor gravels.			L	A	0.2	2842/3/ 0.2			
A	Nil	N	M	-0.35			SP	SAND – Light brown/brown, medium grained sands, gravels (1-5mm, approx 10%).			L	A	0.5	2842/3/ 0.5			
A	Nil	N	M	0.8			CL	CLAY - Yellow/brown/orange, red weathered siltstone bands increasing with depth.		F St		A	1.0	2842/3/ 1.0			
A	Nil	N	M	1.05			CL/ HW	SANDY CLAY/HIGHLY WEATHERED SILTSTONE - Orange/grey.		VSt		A	1.2	2842/3/ 1.2			
A	Nil	N	M	1.6			CL HW	CLAY - HIGHLY WEATHERED SILTSTONE - Grey with red/orange mottles, siltstone bands/gravels.		VSt		A	1.5	2842/3/ 1.5			
A	Nil	N	M	2.0			CL MW EW	CLAY - MODERATELY TO EXTREMELY WEATHERED SILTSTONE - Grey with red/pink mottles.		VSt		A	2.0	2842/3/ 2.0			
A	Nil	N	D	3.0			SC EW	CLAYEY SAND/EXTREMELY WEATHERED SILTSTONE - Grey/pink/red, fine to medium grained sands.		VSt		A	2.5	2842/3/ 2.5			
A	Nil	N	D	3.2			MW	MODERATELY WEATHERED SILTSTONE - Orange brown.									
A	Nil	N	D	4.0			HW/ EW	HIGHLY/EXTREMELY WEATHERED SILTSTONE.				B	4.0	2842/3/ 4.0			
A	Nil	N	D	5.0			MW/ SW	MODERATELY/SLIGHTLY WEATHERED SILTSTONE.									
A	Nil	N	D	5.5			EW/ MW	EXTREMELY/MODERATELY WEATHERED SILTSTONE.									
				6.0				Borehole terminated at 5.5m on moderately weathered siltstone.									
				7.0													
				8.0													
				9.0													
EQUIPMENT / METHOD		SUPPORT	WATER	MOISTURE	PENETRATION	CONSISTENCY	DENSITY	SAMPLING & TESTING		CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION							
N Natural exposure		SH Shoring	N None observed	D Dry	L Low	VS Very Soft	VL Very Loose	A Auger sample		pp Pocket penetrometer							
X Existing excavation		SC Shotcrete	X Not measured	M Moist	M Moderate	S Soft	L Loose	B Bulk sample		S Standard penetration test							
BH Backhoe bucket		RB Rock Bolts	Water level	W Wet	H High	F Firm	MD Medium Dense	U Undisturbed sample		VS Vane shear							
E Excavator		Nil No support	Water outflow	Wp Plastic limit	R Refusal	St Stiff	D Dense	D Disturbed sample		DCP Dynamic cone penetrometer							
HA Hand auger			Water inflow	WI Liquid limit		VSt Very Stiff	VD Very Dense	M Moisture content		FD Field density							
S Hand spade						H Hard		Ux Tube sample (x mm)		WS Water sample							
PT Push tube						F Friable											
A Auger																	
CC Concrete Corer																	
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS																	
martens		MARTENS & ASSOCIATES PTY LTD 6/37 Leighton Place 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		Allen Price & Associates Pty Ltd		COMMENCED		23.11.10		COMPLETED		23.11.10		REF		BH4	
PROJECT		Engineering Services		LOGGED		GT		CHECKED		AN		Sheet 1 of 1			
SITE		Cullburra Road, West Cullburra		GEOLOGY		Siltstone		VEGETATION		None		PROJECT NO.		P1002842	
EQUIPMENT		Hydraulic Auger		EASTING		NA		RL SURFACE		NA					
EXCAVATION DIMENSIONS		0.1mØ X 5.5m depth		NORTHING		NA		ASPECT		North		SLOPE		2-3%	
EXCAVATION DATA				MATERIAL DATA				SAMPLING & TESTING							
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	WATER WELL DETAILS		
A	Nil	N	M	0.3			SM	SILTY SAND – Brown, gravels (1-10mm, approx 10%).		L	A	0.2	2842/4/ 0.2		
A	Nil	N	M	0.5			CL	CLAY - Brown/orange, mottles increasing with depth, gravels (1-10mm, approx 10%).	S		A	0.5	2842/4/ 0.5		
A	Nil	N	M	1.0			CL	CLAY - Grey/brown/red mottles, minor gravels.		F	A	1.0	2842/4/ 1.0		
A	Nil	N	M	1.2			CL HW	CLAY - HIGHLY WEATHERED SILTSTONE - Grey with red/orange mottles, siltstone bands/gravels.	VSt		A	1.5	2842/4/ 1.5		
A	Nil	N	M	1.8			CL MW EW	CLAY - MODERATELY TO EXTREMELY WEATHERED SILTSTONE - Grey with red/pink mottles.	VSt		A	2.0	2842/4/ 2.0		
A	Nil	N	M	2.0							A	2.5	2842/4/ 2.5		
A	Nil	N	M	3.0											
A	Nil	N	D	4.0			SC EW	CLAYEY SAND/EXTREMELY WEATHERED SILTSTONE - Grey/pink/red/orange, fine to medium grained sands.	VSt		B	4.0	2842/4/ 4.0		
A	Nil	N	D	4.5											
A	Nil	N	D	5.0			EW/ MW	EXTREMELY/MODERATELY WEATHERED SILTSTONE - Grey/red/pink/orange.			A	5.0	2842/4/ 5.0		
A	Nil	N	D	5.5											
				6.0				Borehole terminated at 5.5m on extremely/moderately weathered siltstone.							
				7.0											
				8.0											
				9.0											

EQUIPMENT / METHOD

N Natural exposure

X Existing excavation

BH Backhoe bucket

E Excavator

HA Hand auger

S Hand spade

PT Push tube

A Auger

CC Concrete Corer

SUPPORT

SH Shoring

SC Shotcrete

RB Rock Bolts

Nil No support

WATER

N None observed

D Dry

M Moist

W Wet

Wp Plastic limit

WI Liquid limit

Water outflow

Water inflow

MOISTURE

D Dry

M Moist

Wp Plastic limit

WI Liquid limit

PENETRATION

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

EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

martens

(C) Copyright Martens & Associates Pty. Ltd . 2010

MARTENS & ASSOCIATES PTY LTD

6/37 Leighton Place

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		Allen Price & Associates Pty Ltd		COMMENCED		23.11.10		COMPLETED		23.11.10		REF		BH6	
PROJECT		Engineering Services		LOGGED		GT		CHECKED		AN		Sheet 1 of 1			
SITE		Cullburra Road, West Cullburra		GEOLOGY		Siltstone		VEGETATION		None		PROJECT NO. P1002842			
EQUIPMENT		Hydraulic Auger		EASTING		NA		RL SURFACE		NA					
EXCAVATION DIMENSIONS		0.1mØ X 5.5m depth		NORTHING		NA		ASPECT		North		SLOPE		1-2%	
EXCAVATION DATA				MATERIAL DATA				SAMPLING & TESTING							
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.		CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	WATER WELL DETAILS	
A	Nil	N	M	0.1			CL	SILTY SANDY CLAY – Dark grey/brown.		S			0.2	2842/6/ 0.2	
A	Nil	N	M	0.45			CL	SILTY SAND CLAY – Brown/light brown.		S		A	0.5	2842/6/ 0.5	
A	Nil	N	M	0.7			CL	CLAY - Red/orange with light brown mottles increasing with depth, minor gravels (1-10mm, approx 5%).		St					
A	Nil	N	M	1.0			CH	CLAY - Grey/cream with red/brown mottles, moderately plastic, gravels (1-5mm, approx 20%).		St		A	1.0	2842/6/ 1.0	
A	Nil	N	M	1.3											
A	Nil	N	M	2.0			CL HW	CLAY - HIGHLY WEATHERED SILTSTONE - Light grey with red mottles, siltstone gravels bands increasing with depth.		VSt		A	1.5	2842/6/ 1.5	
A	Nil	N	M	2.8								A	2.0	2842/6/ 2.0	
A	Nil	N	M	3.0			CL MW	SANDY CLAY - MODERATELY WEATHERED SILTSTONE - Light brown, gravels (1-50mm, approx 15%).		VSt		B	3.0	2842/6/ 3.0	
A	Nil	N	D	3.3			CL/ HW	CLAY/HIGHLY WEATHERED SILTSTONE - Light grey.		VSt					
A	Nil	N	W	4.0								A	3.5	2842/6/ 3.5	
A	Nil	N	W	5.0			CL EW	CLAY - EXTREMELY WEATHERED SILTSTONE - Dark brown/dark grey with bands of grey clay.		VSt		B	4.5	2842/6/ 4.5	
A	Nil	N	W	5.5								A	5.5	2842/6/ 5.5	
				6.0				Borehole terminated at 5.5m on extremely weathered siltstone.							
				7.0											
				8.0											
				9.0											
EQUIPMENT / METHOD		SUPPORT	WATER	MOISTURE	PENETRATION	CONSISTENCY	DENSITY	SAMPLING & TESTING						CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION	
N Natural exposure		SH Shoring	N None observed	D Dry	L Low	VS Very Soft	VL Very Loose	A Auger sample		pp Pocket penetrometer		Y		USCS	
X Existing excavation		SC Shotcrete	X Not measured	M Moist	M Moderate	S Soft	L Loose	B Bulk sample		S Standard penetration test		N		Agricultural	
BH Backhoe bucket		RB Rock Bolts	Water level	W Wet	H High	F Firm	MD Medium Dense	U Undisturbed sample		VS Vane shear					
E Excavator		Nil No support	Water outflow	Wp Plastic limit	R Refusal	St Stiff	D Dense	D Disturbed sample		DCP Dynamic cone penetrometer					
HA Hand auger			Water inflow	WI Liquid limit		VSt Very Stiff	VD Very Dense	M Moisture content		FD Field density					
S Hand spade						H Hard		Ux Tube sample (x mm)		WS Water sample					
PT Push tube						F Friable									
A Auger															
CC Concrete Corer															
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS															
martens		MARTENS & ASSOCIATES PTY LTD 6/37 Leighton Place 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		Allen Price & Associates Pty Ltd		COMMENCED		24.11.10		COMPLETED		24.11.10		REF		TP9			
PROJECT		Engineering Services		LOGGED		GT		CHECKED		AN		Sheet 1 of 1					
SITE		Cullburra Road, West Cullburra		GEOLOGY		Siltstone		VEGETATION		None		PROJECT NO. P1002842					
EQUIPMENT				Backhoe		EASTING		NA		RL SURFACE		NA					
EXCAVATION DIMENSIONS				0.4m X 2.0m X 2.5m depth		NORTHING		NA		ASPECT		Sourth		SLOPE 2-3%			
EXCAVATION DATA						MATERIAL DATA						SAMPLING & TESTING					
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.		CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS			
BH	Nil	N	M	0.1			SM	ORGANIC SILTY SAND – Dark grey/brown.			L						
BH	Nil	N	M	0.35			SM	SILTY SAND – Light grey/grey, gravels (1-5mm, 10%).			L	B	0.2	2842/9/0.2			
BH	Nil	N	M	0.6			CL	CLAY - Orange/brown mottled, moderately plastic.		F St		B	0.5	2842/9/0.5			
BH	Nil	N	M	0.9			CL	CLAY - Grey/red/orange mottled, moderately plastic.		VSt		B	1.0	2842/9/1.0			
BH	Nil	N	M	1.0			CL	CLAY - Grey/red/orange mottled, moderately plastic.		VSt		B	1.0	2842/9/1.0			
BH	Nil	N	M	1.4			CL	CLAY - Grey/red/orange mottled, moderately plastic.		VSt		B	1.5	2842/9/1.5			
BH	Nil	N	M	2.0			CL/HW	CLAY/HIGHLY WEATHERED SILTSTONE - Grey/pink/red/orange, siltstone gravels bands, tending to extremely weathered siltstone at 1.8m.		VSt		B	1.5	2842/9/1.5			
BH	Nil	N	M	2.5			MW	MODERATELY WEATHERED SILTSTONE - With grey/orange/red mottling.		VSt		B	2.0	2842/9/2.0			
				2.5				Test pit terminated at 2.5m on moderately weathered siltstone.									
				3.0													
				4.0													
				5.0													
				6.0													
				7.0													
				8.0													
				9.0													
EQUIPMENT / METHOD		SUPPORT		WATER		MOISTURE		PENETRATION		CONSISTENCY		DENSITY		SAMPLING & TESTING		CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION	
N Natural exposure		SH Shoring		N None observed		D Dry		L Low		VS Very Soft		VL Very Loose		A Auger sample		pp Pocket penetrometer	
X Existing excavation		SC Shotcrete		X Not measured		M Moist		M Moderate		S Soft		L Loose		B Bulk sample		S Standard penetration test	
BH Backhoe bucket		RB Rock Bolts		Water level		W Wet		H High		F Firm		MD Medium Dense		U Undisturbed sample		VS Vane shear	
E Excavator		Nil No support		Water outflow		Wp Plastic limit		R Refusal		St Stiff		D Dense		D Disturbed sample		DCP Dynamic cone	
HA Hand auger				Water inflow		WL Liquid limit				VSt Very Stiff		VD Very Dense		M Moisture content		penetrometer	
S Hand spade										H Hard				FD Field density		WS Water sample	
PT Push tube										F Friable				Ux Tube sample (x mm)			
A Auger																	
CC Concrete Corer																	
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS																	
<div><div><div><div>Martens</div><div>(C) Copyright Martens & Associates Pty. Ltd . 2010</div></div></div><div><div>MARTENS & ASSOCIATES PTY LTD</div><div>6/37 Leighton Place</div><div>Hornsby, NSW 2077 Australia</div><div>Phone: (02) 9476 9999 Fax: (02) 9476 8767</div><div>mail@martens.com.au WEB: http://www.martens.com.au</div></div><div><div>Engineering Log -</div><div>Excavation</div></div></div>																	

CLIENT		Allen Price & Associates Pty Ltd		COMMENCED		24.11.10		COMPLETED		24.11.10		REF		TP10			
PROJECT		Engineering Services		LOGGED		GT		CHECKED		AN		Sheet 1 of 1					
SITE		Cullburra Road, West Cullburra		GEOLOGY		Siltstone		VEGETATION		None		PROJECT NO. P1002842					
EQUIPMENT				Backhoe		EASTING		NA		RL SURFACE		NA					
EXCAVATION DIMENSIONS				0.4m X 2.0m X 2.0m depth		NORTHING		NA		ASPECT		North West		SLOPE 2-3%			
EXCAVATION DATA				MATERIAL DATA						SAMPLING & TESTING							
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.		CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS			
BH	Nil	N	M	0.1			SM	ORGANIC SILTY SAND – Dark grey/brown.			L						
BH	Nil	N	M	0.3			SM	SILTY SAND – Light grey/grey, gravels (1-5mm, 10%).			L	B	0.2	2842/10/ 0.2			
BH	Nil	N	M	0.5			CL	CLAY - Orange/brown mottled, moderately plastic.		F St		B	0.5	2842/10/ 0.5			
BH	Nil	N	M	1.0			CL	CLAY - Grey/red/orange mottled, moderately plastic.		VSt		B	1.0	2842/10/ 1.0			
BH	Nil	N	M	1.3			CL										
BH	Nil	N	M	2.0			CL/ EW	CLAY/EXTREMELY WEATHERED SILTSTONE - Grey minor mottles, moderately weathered siltstone bands, tending to moderately weathered siltstone.		VSt		B	1.5	2842/10/ 1.5			
				2.0								B	2.0	2842/10/ 2.0			
				3.0				Test pit terminated at 2.0m on moderately/slightly weathered siltstone.									
				4.0													
				5.0													
				6.0													
				7.0													
				8.0													
				9.0													
EQUIPMENT / METHOD		SUPPORT		WATER		MOISTURE		PENETRATION		CONSISTENCY		DENSITY		SAMPLING & TESTING		CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION	
N Natural exposure		SH Shoring		N None observed		D Dry		L Low		VS Very Soft		VL Very Loose		A Auger sample		pp Pocket penetrometer	
X Existing excavation		SC Shotcrete		X Not measured		M Moist		M Moderate		S Soft		L Loose		B Bulk sample		S Standard penetration test	
BH Backhoe bucket		RB Rock Bolts		Water level		W Wet		H High		F Firm		MD Medium Dense		U Undisturbed sample		VS Vane shear	
E Excavator		Nil No support		Water outflow		Wp Plastic limit		R Refusal		St Stiff		D Dense		D Disturbed sample		DCP Dynamic cone penetrometer	
HA Hand auger				Water inflow		WL Liquid limit				VSt Very Stiff		VD Very Dense		M Moisture content		FD Field density	
PT Push tube										H Hard				Ux Tube sample (x mm)		WS Water sample	
A Auger										F Friable							
CC Concrete Corer																	
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS																	
<div><div><div></div><div><div>martens</div><div>(C) Copyright Martens & Associates Pty. Ltd . 2010</div></div></div><div><div>MARTENS & ASSOCIATES PTY LTD</div><div>6/37 Leighton Place</div><div>Hornsby, NSW 2077 Australia</div><div>Phone: (02) 9476 9999 Fax: (02) 9476 8767</div><div>mail@martens.com.au WEB: http://www.martens.com.au</div></div><div><div>Engineering Log -</div><div>Excavation</div></div></div>																	


CLIENT		Allen Price & Associates Pty Ltd		COMMENCED		24.11.10		COMPLETED		24.11.10		REF		TP12			
PROJECT		Engineering Services		LOGGED		GT		CHECKED		AN		Sheet 1 of 1					
SITE		Cullburra Road, West Cullburra		GEOLOGY		Siltstone		VEGETATION		None		PROJECT NO. P1002842					
EQUIPMENT				Backhoe		EASTING		NA		RL SURFACE		NA					
EXCAVATION DIMENSIONS				0.4m X 2.0m X 2.2m depth		NORTHING		NA		ASPECT		North		SLOPE 2-3%			
EXCAVATION DATA				MATERIAL DATA						SAMPLING & TESTING							
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.		CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS			
BH	Nil	N	M	0.1			SM	ORGANIC SILTY SAND – Dark grey/brown.			L						
BH	Nil	N	M	0.3			SM	SILTY SAND – Light grey/grey, gravels (1-5mm, 10%).			L	B	0.2	2842/12/ 0.2			
BH	Nil	N	M	0.5			CL	CLAY - Orange/brown mottled, moderately plastic.		F		B	0.5	2842/12/ 0.5			
BH	Nil	N	M	1.0			CL	CLAY - Grey/red/orange mottled, moderately plastic.		VS		B	1.0	2842/12/ 1.0			
BH	Nil	N	M	2.0			CL/ EW	CLAY/EXTREMELY WEATHERED SILTSTONE - Grey minor mottles, moderately weathered siltstone bands, tending to moderately weathered siltstone.		VS		B	1.5	2842/12/ 1.5			
				3.0				Test pit terminated at 2.2m on moderately weathered siltstone.									
				4.0													
				5.0													
				6.0													
				7.0													
				8.0													
				9.0													
EQUIPMENT / METHOD		SUPPORT		WATER		MOISTURE		PENETRATION		CONSISTENCY		DENSITY		SAMPLING & TESTING		CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION	
N Natural exposure		SH Shoring		N None observed		D Dry		L Low		VS Very Soft		VL Very Loose		A Auger sample		pp Pocket penetrometer	
X Existing excavation		SC Shotcrete		X Not measured		M Moist		M Moderate		S Soft		L Loose		B Bulk sample		S Standard penetration test	
BH Backhoe bucket		RB Rock Bolts		Water level		W Wet		H High		F Firm		MD Medium Dense		U Undisturbed sample		VS Vane shear	
E Excavator		Nil No support		Water outflow		Wp Plastic limit		R Refusal		St Stiff		D Dense		D Disturbed sample		DCP Dynamic cone	
HA Hand auger				Water inflow		WL Liquid limit				VS		VD Very Dense		M Moisture content		penetrometer	
S Hand spade										H Hard				FD Field density		penetrometer	
PT Push tube										F Friable				Ux Tube sample (x mm)		WS Water sample	
A Auger																	
CC Concrete Corer																	
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS																	
<div><div><div></div><div><div>martens</div><div>(C) Copyright Martens & Associates Pty. Ltd . 2010</div></div></div><div><div>MARTENS & ASSOCIATES PTY LTD</div><div>6/37 Leighton Place</div><div>Hornsby, NSW 2077 Australia</div><div>Phone: (02) 9476 9999 Fax: (02) 9476 8767</div><div>mail@martens.com.au WEB: http://www.martens.com.au</div></div><div><div>Engineering Log -</div><div>Excavation</div></div></div>																	

CLIENT		Allen Price & Associates Pty Ltd				COMMENCED		24.11.10		COMPLETED		24.11.10		REF		TP14			
PROJECT		Engineering Services				LOGGED		GT		CHECKED		AN		Sheet 1 of 1					
SITE		Cullburra Road, West Cullburra				GEOLOGY		Siltstone		VEGETATION		None		PROJECT NO. P1002842					
EQUIPMENT				Backhoe				EASTING		NA		RL SURFACE		NA					
EXCAVATION DIMENSIONS				0.4m X 2.0m X 1.5m depth				NORTHING		NA		ASPECT		North		SLOPE		2-3%	
EXCAVATION DATA						MATERIAL DATA						SAMPLING & TESTING							
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.				CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS			
BH	Nil	N	M	0.1			SM	ORGANIC SILTY SAND – Dark grey/brown.					L						
BH	Nil	N	M	0.25			SM	SILTY SAND – Light grey/grey, gravels (1-5mm, 10%).					L	B	0.2	2842/14/ 0.2			
BH	Nil	N	M	0.5			CL	CLAY - Orange/brown mottled, moderately plastic.				F St		B	0.5	2842/14/ 0.5			
BH	Nil	N	M	0.8			CL	CLAY - Light grey/grey with brown/orange mottled.				VSt							
BH	Nil	N	M	1.0			EW	EXTREMELY WEATHERED SILTSTONE BANDS.				VSt		B	1.0	2842/14/ 1.0			
BH	Nil	N	M	1.5			MW	MODERATELY WEATHERED SILTSTONE - Grey, minor mottles.				VSt		B	1.2	2842/14/ 1.2			
				1.5				Test pit terminated at 1.5m on moderately weathered siltstone.						B	1.5	2842/14/ 1.5			
				2.0												2.0			
				3.0												3.0			
				4.0												4.0			
				5.0												5.0			
				6.0												6.0			
				7.0												7.0			
				8.0												8.0			
				9.0												9.0			
EQUIPMENT / METHOD		SUPPORT		WATER		MOISTURE		PENETRATION		CONSISTENCY		DENSITY		SAMPLING & TESTING		CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION			
N Natural exposure		SH Shoring		N None observed		D Dry		L Low		VS Very Soft		VL Very Loose		A Auger sample		pp Pocket penetrometer			
X Existing excavation		SC Shotcrete		X Not measured		M Moist		M Moderate		S Soft		L Loose		B Bulk sample		S Standard penetration test			
BH Backhoe bucket		RB Rock Bolts		Water level		W Wet		H High		F Firm		MD Medium Dense		U Undisturbed sample		VS Vane shear			
E Excavator		Nil No support		Water outflow		Wp Plastic limit		R Refusal		St Stiff		D Dense		D Disturbed sample		DCP Dynamic cone			
HA Hand auger				Water inflow		WL Liquid limit				VSt Very Stiff		VD Very Dense		M Moisture content		penetrometer			
PT Push tube										H Hard				Ux Tube sample (x mm)		FD Field density			
A Auger										F Friable						WS Water sample			
CC Concrete Corer																			
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS																			
<div><div><div></div><div><div>MARTENS & ASSOCIATES PTY LTD</div><div>6/37 Leighton Place</div><div>Hornsby, NSW 2077 Australia</div><div>Phone: (02) 9476 9999 Fax: (02) 9476 8767</div><div>mail@martens.com.au WEB: http://www.martens.com.au</div></div></div><div><div>Engineering Log -</div><div>Excavation</div></div></div>																			

Quality Sheet No. 4

CLIENT		Allen Price & Associates Pty Ltd		COMMENCED		24.11.10		COMPLETED		24.11.10		REF		TP16			
PROJECT		Engineering Services		LOGGED		GT		CHECKED		AN		Sheet 1 of 1					
SITE		Cullburra Road, West Cullburra		GEOLOGY		Siltstone		VEGETATION		None		PROJECT NO. P1002842					
EQUIPMENT				Backhoe		EASTING		NA		RL SURFACE		NA					
EXCAVATION DIMENSIONS				0.4m X 2.0m X 2.4m depth		NORTHING		NA		ASPECT		North		SLOPE 2-3%			
EXCAVATION DATA				MATERIAL DATA						SAMPLING & TESTING							
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.		CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS			
BH	Nil	N	M	0.1			SM	ORGANIC SILTY SAND – Dark grey/brown.			L						
BH	Nil	N	M	0.4			SM	SILTY SAND – Light grey/grey, gravels (1-5mm, 10%).			L	B	0.2	2842/16/ 0.2			
BH	Nil	N	M	0.6			CL	CLAY - Light brown/grey mottles, moderately plastic.		F		B	0.5	2842/16/ 0.5			
BH	Nil	N	M	0.9			CL	CLAY - Grey with minor red/orange mottles, minor gravels, moderately plastic, mottles increasing with depth.		St		B	1.0	2842/16/ 1.0			
BH	Nil	N	M	1.0			CL			VSt		B	1.0	1.0			
BH	Nil	N	M	1.2			CL					B	1.5	2842/16/ 1.5			
BH	Nil	N	M	2.0			CL HW	CLAY - HIGHLY WEATHERED SILTSTONE - Grey with minor red/orange mottles, minor gravels, moderately plastic, mottles increasing with depth, siltstone bands/gravels (1-10mm, approx 20%), tending to extremely weathered siltstone.		VSt		B	2.0	2842/16/ 2.0			
BH	Nil	N	M	2.4			CL HW					B	2.4	2842/16/ 2.4			
				3.0				Test pit terminated at 2.4m on extremely weathered siltstone.						3.0			
				4.0										4.0			
				5.0										5.0			
				6.0										6.0			
				7.0										7.0			
				8.0										8.0			
				9.0										9.0			
EQUIPMENT / METHOD		SUPPORT		WATER		MOISTURE		PENETRATION		CONSISTENCY		DENSITY		SAMPLING & TESTING		CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION	
N Natural exposure		SH Shoring		N None observed		D Dry		L Low		VS Very Soft		VL Very Loose		A Auger sample		pp Pocket penetrometer	
X Existing excavation		SC Shotcrete		X Not measured		M Moist		M Moderate		S Soft		L Loose		B Bulk sample		S Standard penetration test	
BH Backhoe bucket		RB Rock Bolts		Water level		W Wet		H High		F Firm		MD Medium Dense		U Undisturbed sample		VS Vane shear	
E Excavator		Nil No support		Water outflow		Wp Plastic limit		R Refusal		St Stiff		D Dense		D Disturbed sample		DCP Dynamic cone	
HA Hand auger				Water inflow		WL Liquid limit				VSt Very Stiff		VD Very Dense		M Moisture content		penetrometer	
S Hand spade										H Hard				FD Field density		FD Field density	
PT Push tube										F Friable				Ux Tube sample (x mm)		WS Water sample	
A Auger																	
CC Concrete Corer																	
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS																	
martens		MARTENS & ASSOCIATES PTY LTD 6/37 Leighton Place Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767 mail@martens.com.au WEB: http://www.martens.com.au										Engineering Log - Excavation					

Quality Sheet No. 4


CLIENT		Allen Price & Associates Pty Ltd		COMMENCED		24.11.10		COMPLETED		24.11.10		REF		TP20			
PROJECT		Engineering Services		LOGGED		GT		CHECKED		AN		Sheet 1 of 1					
SITE		Cullburra Road, West Cullburra		GEOLOGY		Siltstone		VEGETATION		None		PROJECT NO. P1002842					
EQUIPMENT				Backhoe		EASTING		NA		RL SURFACE		NA					
EXCAVATION DIMENSIONS				0.4m X 2.0m X 2.2m depth		NORTHING		NA		ASPECT		North West		SLOPE 1-2%			
EXCAVATION DATA				MATERIAL DATA						SAMPLING & TESTING							
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.		CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS			
BH	Nil	N	M	0.2			SM	SILTY SAND – Dark grey/grey.			L	B	0.2	2842/20/ 0.2			
BH	Nil	Y	W	-0.35			SM	SILTY CLAYEY SAND – Brown/light brown.			L						
BH	Nil	Y	W	-0.55	0.45		CL	CLAY - Orange/brown, minor gravels, moderately plastic.		F St		B	0.5	2842/20/ 0.5			
BH	Nil	N	M	1.0			CH	CLAY - Red/grey, minor gravels, orange mottled, moderately to highly plastic.		VSt		B	1.0	2842/20/ 1.0			
				1.5								B	1.5	2842/20/ 1.5			
				2.0								B	2.0	2842/20/ 2.0			
				2.2				Test pit terminated at 2.2m on clays.									
				3.0													
				4.0													
				5.0													
				6.0													
				7.0													
				8.0													
				9.0													
EQUIPMENT / METHOD		SUPPORT		WATER		MOISTURE		PENETRATION		CONSISTENCY		DENSITY		SAMPLING & TESTING		CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION	
N Natural exposure		SH Shoring		N None observed		D Dry		L Low		VS Very Soft		VL Very Loose		A Auger sample		pp Pocket penetrometer	
X Existing excavation		SC Shotcrete		X Not measured		M Moist		M Moderate		S Soft		L Loose		B Bulk sample		S Standard penetration test	
BH Backhoe bucket		RB Rock Bolts		Water level		W Wet		H High		F Firm		MD Medium Dense		U Undisturbed sample		VS Vane shear	
E Excavator		Nil No support		Water outflow		Wp Plastic limit		R Refusal		St Stiff		D Dense		D Disturbed sample		DCP Dynamic cone penetrometer	
HA Hand auger				Water inflow		WL Liquid limit				VSt Very Stiff		VD Very Dense		M Moisture content		FD Field density	
PT Push tube										H Hard				Ux Tube sample (x mm)		WS Water sample	
A Auger										F Friable							
CC Concrete Corer																	
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS																	
<div><div><div><div>Martens</div><div>(C) Copyright Martens & Associates Pty. Ltd . 2010</div></div></div><div><div>MARTENS & ASSOCIATES PTY LTD</div><div>6/37 Leighton Place</div><div>Hornsby, NSW 2077 Australia</div><div>Phone: (02) 9476 9999 Fax: (02) 9476 8767</div><div>mail@martens.com.au WEB: http://www.martens.com.au</div></div><div><div>Engineering Log -</div><div>Excavation</div></div></div>																	


CLIENT		Allen Price & Associates Pty Ltd		COMMENCED	24.11.10	COMPLETED	24.11.10	REF		TP21			
PROJECT		Engineering Services		LOGGED	GT	CHECKED	AN	Sheet		1 of 1			
SITE		Cullburra Road, West Cullburra		GEOLOGY	Siltstone	VEGETATION	None	PROJECT NO.		P1002842			
EQUIPMENT		Backhoe		EASTING	NA	RL SURFACE	NA						
EXCAVATION DIMENSIONS		0.4m X 2.0m X 2.6m depth		NORTHING	NA	ASPECT	North West	SLOPE	1-2%				
EXCAVATION DATA				MATERIAL DATA				SAMPLING & TESTING					
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.													
BH	Nil	N	M	0.12			CL	SILTY SANDY CLAY – Dark grey/brown.	S				
BH	Nil	N	M	0.5			CL	SILTY SAND CLAY – Brown/light brown.	S		B	0.2	2842/20/ 0.2
BH	Nil	N	M	0.8			CL	CLAY - Red/orange with light brown mottles increasing with depth, minor gravels (1-10mm, approx 5%).	St				
BH	Nil	N	M	1.0			CH	CLAY - Grey/cream with red/brown mottles, moderately plastic, gravels (1-5mm, approx 20%).	St		B	1.0	2842/20/ 1.0
BH	Nil	N	M	1.6							B	1.5	2842/20/ 1.5
BH	Nil	N	M	2.0			CL HW	CLAY - HIGHLY WEATHERED SILTSTONE - Light grey with red mottles, siltstone gravels bands increasing with depth.	VSt		B	2.0	2842/20/ 2.0
BH	Nil	N	M	2.6							B	2.6	2842/20/ 2.6
				3.0				Test pit terminated at 2.6m on moderately weathered siltstone.					
				4.0									
				5.0									
				6.0									
				7.0									
				8.0									
				9.0									
EQUIPMENT / METHOD		SUPPORT	WATER	MOISTURE	PENETRATION	CONSISTENCY	DENSITY	SAMPLING & TESTING		CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION			
N Natural exposure		SH Shoring	N None observed	D Dry	L Low	VS Very Soft	VL Very Loose	A Auger sample	pp Pocket penetrometer	Y USCS			
X Existing excavation		SC Shotcrete	X Not measured	M Moist	M Moderate	S Soft	L Loose	B Bulk sample	S Standard penetration test	N Agricultural			
BH Backhoe bucket		RB Rock Bolts	Water level	W Wet	H High	F Firm	MD Medium Dense	U Undisturbed sample	VS Vane shear				
E Excavator		Nil No support	Water outflow	Wp Plastic limit	R Refusal	St Stiff	D Dense	D Disturbed sample	DCP Dynamic cone penetrometer				
HA Hand auger			Water inflow	WI Liquid limit		VSt Very Stiff	VD Very Dense	M Moisture content	FD Field density				
S Hand spade						H Hard		Ux Tube sample (x mm)	WS Water sample				
PT Push tube						F Friable							
A Auger													
CC Concrete Corer													
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS													
martens		MARTENS & ASSOCIATES PTY LTD 6/37 Leighton Place Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767 mail@martens.com.au WEB: http://www.martens.com.au						Engineering Log - Excavation					


CLIENT		Allen Price & Associates Pty Ltd		COMMENCED		24.11.10		COMPLETED		24.11.10		REF		BH5			
PROJECT		Engineering Services		LOGGED		JSF		CHECKED		GT		Sheet 1 of 1					
SITE		Cullburra Road, West Cullburra		GEOLOGY		Siltstone		VEGETATION		Eucalypts		PROJECT NO. P1002842					
EQUIPMENT		Hydraulic Auger		EASTING		NA		RL SURFACE		NA							
EXCAVATION DIMENSIONS		0.95mØ X 5.5m depth		NORTHING		NA		ASPECT		North		SLOPE		5%			
EXCAVATION DATA				MATERIAL DATA						SAMPLING & TESTING							
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.		CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	WATER WELL DETAILS			
A	Nil	N	M	0.3			OL	ORGANIC SANDY SILT – Dark brown.		S		A	0.2	2842/5/ 0.2			
A	Nil	N	M	1.0			CL	CLAY - Orange/brown mottles, firm grading stiff, tending grey with minor brown and red mottles at depth.		F- St		A	0.5	2842/5/ 0.5			
A	Nil	N	M	1.3								A	1.0	2842/5/ 1.0			
A	Nil	N	D	1.7			EW	EXTREMELY WEATHERED SILTSTONE - Orange/grey mottled, dry.				A	1.5	2842/5/ 1.5			
A	Nil	N	D	2.0			MW	MODERATELY WEATHERED SILTSTONE - Orange/grey mottled, dry.				A	2.5	2842/5/ 2.5			
A	Nil	N	D	3.0													
A	Nil	N	D	4.0			EW	EXTREMELY WEATHERED SILTSTONE - Orange/grey mottled, dry.									
A	Nil	N	D	4.3			SW	SLIGHTLY WEATHERED SILTSTONE.									
A	Nil	N	D	5.0			MW	MODERATELY WEATHERED WITH EXTREMELY WEATHERED SILTSTONE BANDS.									
				5.5								B	5.5	2842/5/ 5.5			
				6.0				Borehole terminated at 5.5m on moderately weathered siltstone.									
				7.0													
				8.0													
				9.0													
EQUIPMENT / METHOD		SUPPORT		WATER		MOISTURE		PENETRATION		CONSISTENCY		DENSITY		SAMPLING & TESTING		CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION	
N Natural exposure		SH Shoring		N None observed		D Dry		L Low		VS Very Soft		VL Very Loose		A Auger sample		pp Pocket penetrometer	
X Existing excavation		SC Shotcrete		X Not measured		M Moist		S Soft		S Soft		L Loose		B Bulk sample		S Standard penetration test	
BH Backhoe bucket		RB Rock Bolts		Water level		W Wet		H High		F Firm		MD Medium Dense		U Undisturbed sample		VS Vane shear	
E Excavator		Nil No support		Water outflow		Wp Plastic limit		R Refusal		St Stiff		D Dense		D Disturbed sample		DCP Dynamic cone penetrometer	
HA Hand auger				Water inflow		WL Liquid limit				VSt Very Stiff		VD Very Dense		M Moisture content		FD Field density	
S Hand spade										H Hard				Ux Tube sample (x mm)		WS Water sample	
PT Push tube										F Friable							
CC Concrete Corer																	
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS																	
<div><div><div></div><div>martens</div><div>(C) Copyright Martens & Associates Pty. Ltd . 2010</div></div><div><div>MARTENS & ASSOCIATES PTY LTD</div><div>6/37 Leighton Place</div><div>Hornsby, NSW 2077 Australia</div><div>Phone: (02) 9476 9999 Fax: (02) 9476 8767</div><div>mail@martens.com.au WEB: http://www.martens.com.au</div></div><div><div>Engineering Log -</div><div>Borehole</div></div></div>																	


CLIENT	Allen Price & Associates Pty Ltd			COMMENCED	24.11.10	COMPLETED	24.11.10		REF BH7				
PROJECT	Engineering Services			LOGGED	JSF	CHECKED	GT		Sheet 1 of 1				
SITE	Cullburra Road, West Cullburra			GEOLOGY	Siltstone	VEGETATION	Grass		PROJECT NO. P1002842				
EQUIPMENT		Hydraulic Auger			EASTING	NA		RL SURFACE		NA			
EXCAVATION DIMENSIONS		0.95mØ X 2.5m depth			NORTHING	NA		ASPECT	North West				
SLOPE							4%						
EXCAVATION DATA					MATERIAL DATA				SAMPLING & TESTING				
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.													
A	Nil	N	M	0.1		x x x x	OL	ORGANIC SANDY SILT – Dark brown.	S				
A	Nil	N	M	0.3		x x x x	SC	CLAYEY SAND - Brown, moist (almost wet), loose.		L	A	0.2	2842/7/0.2
A	Nil	N	M	1.0			CL	CLAY - Orange/brown mottles, firm grading stiff, tending grey with minor brown and red mottles at depth.	F		A	0.5	2842/7/0.5
A	Nil	N	M	1.2							A	1.0	2842/7/1.0
A	Nil	N	D	1.6			EW	EXTREMELY WEATHERED SILTSTONE - Grey, clay like properties.			A	1.5	2842/7/1.5
A	Nil	N	D	2.0			MW	MODERATELY WEATHERED WITH EXTREMELY WEATHERED SILTSTONE BANDS.					
				2.5									Borehole left open and checked 2 hours after drillinh and found dry.
				3.0				Borehole terminated at 2.5m on moderately weathered siltstone.					
				4.0									
				5.0									
				6.0									
				7.0									
				8.0									
				9.0									
EQUIPMENT / METHOD													
SUPPORT													
WATER													
MOISTURE													
PENETRATION													
CONSISTENCY													
DENSITY													
SAMPLING & TESTING													
CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION													
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS													
MARTENS & ASSOCIATES PTY LTD													
6/37 Leighton Place													
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	Allen Price & Associates Pty Ltd			COMMENCED	24.11.10	COMPLETED	24.11.10		REF BH8				
PROJECT	Engineering Services			LOGGED	JSF	CHECKED	GT		Sheet 1 of 1				
SITE	Cullburra Road, West Cullburra			GEOLOGY	Siltstone	VEGETATION	Grass		PROJECT NO. P1002842				
EQUIPMENT		Hydraulic Auger			EASTING	NA		RL SURFACE		NA			
EXCAVATION DIMENSIONS		0.95mØ X 2.5m depth			NORTHING	NA		ASPECT		North West			
								SLOPE		5%			
EXCAVATION DATA				MATERIAL DATA				SAMPLING & TESTING					
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.													
A	Nil	N	M	0.1			OL	ORGANIC SANDY SILT – Dark brown.	S				
A	Nil	N	M	0.3			SC	CLAYEY SAND - Brown, moist (almost wet), loose.		L	A	0.2	2842/7/0.2
A	Nil	N	M	1.0			CL	CLAY - Orange/brown mottles, firm grading stiff, tending grey with minor brown and red mottles at depth.	F		A	0.5	2842/7/0.5
A	Nil	N	M	1.3							A	1.0	2842/7/1.0
A	Nil	N	D	1.6			EW	EXTREMELY WEATHERED SILTSTONE - Grey, red mottles, clay like properties.			A	1.5	2842/7/1.5
A	Nil	N	D	1.9			EW	EXTREMELY WEATHERED SILTSTONE - Orange, clay like properties.					
A	Nil	N	D	2.0			MW	MODERATELY WEATHERED SILTSTONE - Grey.			A	2.0	2842/7/2.0
				2.5				Borehole terminated at 2.5m on moderately weathered siltstone.					Borehole dry after 2 hours.
				3.0									
				4.0									
				5.0									
				6.0									
				7.0									
				8.0									
				9.0									
EQUIPMENT / METHOD N Natural exposure X Existing excavation BH Backhoe bucket E Excavator HA Hand auger S Hand spade PT Push tube A Auger CC Concrete Corer													
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													
PENETRATION 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													
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS													
MARTENS & ASSOCIATES PTY LTD 6/37 Leighton Place 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	Allen Price & Associates Pty Ltd			COMMENCED	24.11.10	COMPLETED	24.11.10		REF BH11																										
PROJECT	Engineering Services			LOGGED	JSF	CHECKED	GT		Sheet 1 of 1																										
SITE	Cullburra Road, West Cullburra			GEOLOGY	Siltstone	VEGETATION	Eucalypts		PROJECT NO. P1002842																										
EQUIPMENT	Hydraulic Auger			EASTING	NA	RL SURFACE	NA																												
EXCAVATION DIMENSIONS	0.95mØ X 2.0m depth			NORTHING	NA	ASPECT	North East		SLOPE	4%																									
EXCAVATION DATA				MATERIAL DATA				SAMPLING & TESTING																											
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS																						
Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.																																			
A	Nil	N	M	0.2		x x x x	OL	ORGANIC SANDY SILT – Dark brown.	S		A	0.2	2842/11/ 0.2																						
A	Nil	N	M	1.0			CL	CLAY - Orange/brown mottles, firm grading stiff, tending grey with minor brown and red mottles at depth.	F-St		A	0.5	2842/11/ 0.5																						
A	Nil	N	D	1.3			EW	EXTREMELY WEATHERED SILTSTONE - Grey with mottled.			A	1.0	2842/11/ 1.0																						
A	Nil	N	D	1.8			MW	MODERATELY WEATHERED SILTSTONE - Grey with mottled.			A	1.5	2842/11/ 1.5																						
A	Nil	N	D	2.0				Borehole terminated at 2.0m on moderately weathered siltstone.																											
				3.0																															
				4.0																															
				5.0																															
				6.0																															
				7.0																															
				8.0																															
				9.0																															
EQUIPMENT / METHOD N Natural exposure X Existing excavation BH Backhoe bucket E Excavator HA Hand auger S Hand spade PT Push tube A Auger CC Concrete Corer														SUPPORT SH Shoring SC Shotcrete X Not measured Nil No support				WATER N None observed X Not measured Water level Water outflow Water inflow		MOISTURE D Dry M Moist W Wet Wp Plastic limit WI Liquid limit		PENETRATION 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			
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS																																			
 martens (C) Copyright Martens & Associates Pty. Ltd . 2010													MARTENS & ASSOCIATES PTY LTD 6/37 Leighton Place 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		Allen Price & Associates Pty Ltd		COMMENCED		24.11.10		COMPLETED		24.11.10		REF		BH13					
PROJECT		Engineering Services		LOGGED		JSF		CHECKED		GT		Sheet 1 of 1							
SITE		Cullburra Road, West Cullburra		GEOLOGY		Siltstone		VEGETATION		Eucalypts		PROJECT NO. P1002842							
EQUIPMENT				Hydraulic Auger				EASTING		NA		RL SURFACE		NA					
EXCAVATION DIMENSIONS				0.95mØ X 2.5m depth				NORTHING		NA		ASPECT		North		SLOPE		6%	
EXCAVATION DATA						MATERIAL DATA						SAMPLING & TESTING							
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.		CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS					
A	Nil	N	M	0.25			ML	ORGANIC SILTY/CLAYEY SAND - Dark brown, moist.		S		A	0.2	2842/13/ 0.2					
A	Nil	0.4	M	0.4			CL	SANDY CLAY - Light brown, moist.		F									
A	Nil	N	W	0.7			CL	GRAVELLY CLAY - Brown, wet (perched), gravels (5- 10mm, 10-40%), minor sand.		S-F		A	0.5	2842/13/ 0.5					
A	Nil	N	M	1.0			CL	CLAY - Brown and orange mottled, firm to stiff, moist.		F-St		A	1.0	2842/13/ 1.0					
A	Nil	N	M	1.3															
A	Nil	N	M	1.7			EW	EXTREMELY WEATHERED SILTSTONE - Brown/grey mottled, dry side of moist.				A	1.5	2842/13/ 1.5					
A	Nil	N	M	2.0			MW	MODERATELY WEATHERED SILTSTONE - Light grey.				A	2.0	2842/13/ 2.0					
				2.5				Borehole terminated at 2.5m on moderately weathered siltstone.											
				3.0															
				4.0															
				5.0															
				6.0															
				7.0															
				8.0															
				9.0															
EQUIPMENT / METHOD		SUPPORT		WATER		MOISTURE		PENETRATION		CONSISTENCY		DENSITY		SAMPLING & TESTING		CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION			
N Natural exposure		SH Shoring		N None observed		D Dry		L Low		VS Very Soft		VL Very Loose		A Auger sample		pp Pocket penetrometer			
X Existing excavation		SC Shotcrete		X Not measured		M Moist		M Moderate		S Soft		L Loose		B Bulk sample		S Standard penetration test			
BH Backhoe bucket		RB Rock Bolts		Water level		W Wet		H High		F Firm		MD Medium Dense		U Undisturbed sample		VS Vane shear			
E Excavator		Nil No support		Water outflow		Wp Plastic limit		R Refusal		St Stiff		D Dense		D Disturbed sample		DCP Dynamic cone penetrometer			
HA Hand auger				Water inflow		WL Liquid limit				VSt Very Stiff		VD Very Dense		M Moisture content		FD Field density			
PT Push tube										H Hard				Ux Tube sample (x mm)		WS Water sample			
A Auger										F Friable									
CC Concrete Corer																			
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS																			
<div><div><div><div>Martens</div><div>(C) Copyright Martens & Associates Pty. Ltd . 2010</div></div></div><div><div>MARTENS & ASSOCIATES PTY LTD</div><div>6/37 Leighton Place</div><div>Hornsby, NSW 2077 Australia</div><div>Phone: (02) 9476 9999 Fax: (02) 9476 8767</div><div>mail@martens.com.au WEB: http://www.martens.com.au</div></div><div><div>Engineering Log -</div><div>Borehole</div></div></div>																			

CLIENT		Allen Price & Associates Pty Ltd		COMMENCED		24.11.10		COMPLETED		24.11.10		REF		BH17			
PROJECT		Engineering Services		LOGGED		JSF		CHECKED		GT		Sheet 1 of 1					
SITE		Cullburra Road, West Cullburra		GEOLOGY		Siltstone		VEGETATION		Eucalypts		PROJECT NO. P1002842					
EQUIPMENT				Hydraulic Auger		EASTING		NA		RL SURFACE		NA					
EXCAVATION DIMENSIONS				0.95mØ X 2.5m depth		NORTHING		NA		ASPECT		North West		SLOPE		5%	
EXCAVATION DATA						MATERIAL DATA						SAMPLING & TESTING					
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.		CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS			
A	Nil	N	M	0.3			ML	ORGANIC SILTY/CLAYEY SAND - Dark brown, moist.			L	A	0.2	2842/17/ 0.2			
A	Nil	N	M	1.0			CL	CLAY - Orange/brown mottles, firm grading stiff, tending grey with minor brown and red mottles at depth.		F		A	0.5	2842/17/ 0.5			
A	Nil	N	M	1.4			CL					A	1.0	2842/17/ 1.0			
A	Nil	N	M	2.0			CL	CLAY - Grey with minor red mottled, firm to stiff, moist, sand in profile from 1.8m, grades to SANDY CLAY - Grey, with red mottles, moist, stiff.		St		A	1.5	2842/17/ 1.5			
A	Nil	N	M	2.5			CL					A	2.0	2842/17/ 2.0			
				2.5								A	2.5	2842/17/ 2.5			
				3.0				Borehole terminated at 2.5m on sandy clay.									
				4.0													
				5.0													
				6.0													
				7.0													
				8.0													
				9.0													
EQUIPMENT / METHOD		SUPPORT		WATER		MOISTURE		PENETRATION		CONSISTENCY		DENSITY		SAMPLING & TESTING		CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION	
N Natural exposure		SH Shoring		N None observed		D Dry		L Low		VS Very Soft		VL Very Loose		A Auger sample		pp Pocket penetrometer	
X Existing excavation		SC Shotcrete		X Not measured		M Moist		M Moderate		S Soft		L Loose		B Bulk sample		S Standard penetration test	
BH Backhoe bucket		RB Rock Bolts		Water level		W Wet		H High		F Firm		MD Medium Dense		U Undisturbed sample		VS Vane shear	
E Excavator		Nil No support		Water outflow		Wp Plastic limit		R Refusal		St Stiff		D Dense		D Disturbed sample		DCP Dynamic cone penetrometer	
HA Hand auger				Water inflow		WL Liquid limit				VSt Very Stiff		VD Very Dense		M Moisture content		FD Field density	
PT Push tube										H Hard				Ux Tube sample (x mm)		WS Water sample	
A Auger										F Friable							
CC Concrete Corer																	
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS																	
<div><div><div>martens</div><div>(C) Copyright Martens & Associates Pty. Ltd . 2010</div></div><div><div>MARTENS & ASSOCIATES PTY LTD</div><div>6/37 Leighton Place</div><div>Hornsby, NSW 2077 Australia</div><div>Phone: (02) 9476 9999 Fax: (02) 9476 8767</div><div>mail@martens.com.au WEB: http://www.martens.com.au</div></div><div><div>Engineering Log -</div><div>Borehole</div></div></div>																	

CLIENT		Allen Price & Associates Pty Ltd		COMMENCED		24.11.10		COMPLETED		24.11.10		REF		BH18					
PROJECT		Engineering Services		LOGGED		JSF		CHECKED		GT		Sheet 1 of 1							
SITE		Cullburra Road, West Cullburra		GEOLOGY		Siltstone		VEGETATION		Eucalypts		PROJECT NO. P1002842							
EQUIPMENT				Hydraulic Auger				EASTING		NA		RL SURFACE		NA					
EXCAVATION DIMENSIONS				0.95mØ X 2.5m depth				NORTHING		NA		ASPECT		North		SLOPE		1-2%	
EXCAVATION DATA						MATERIAL DATA						SAMPLING & TESTING							
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.		CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS					
A	Nil	N	M	0.3			OL	ORGANIC SANDY SILT – Dark brown.		S		A	0.2	2842/18/ 0.2					
A	Nil	N	M	1.0			CL	CLAY - Orange/brown mottles, firm grading stiff, tending grey with minor brown and red mottles at depth.		F-St		A	0.5	2842/18/ 0.5					
A	Nil	N	M	1.5								A	1.0	2842/18/ 1.0					
A	Nil	N	M	2.0								A	1.5	2842/18/ 1.5					
A	Nil	N	D	2.0			EW	EXTREMELY WEATHERED SILTSTONE - Clay like properties, grey with red mottles, stiff to very stiff.		St-VSt		A	2.0	2842/18/ 2.0					
A	Nil	N	D	2.5			MW	MODERATELY WEATHERED SILTSTONE - Grey.				A	2.5	2842/18/ 2.5					
				3.0				Borehole terminated at 2.5m on moderately weathered siltstone.											
				4.0															
				5.0															
				6.0															
				7.0															
				8.0															
				9.0															
EQUIPMENT / METHOD		SUPPORT		WATER		MOISTURE		PENETRATION		CONSISTENCY		DENSITY		SAMPLING & TESTING		CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION			
N Natural exposure		SH Shoring		N None observed		D Dry		L Low		VS Very Soft		VL Very Loose		A Auger sample		pp Pocket penetrometer			
X Existing excavation		SC Shotcrete		X Not measured		M Moist		M Moderate		S Soft		L Loose		B Bulk sample		S Standard penetration test			
BH Backhoe bucket		RB Rock Bolts		Water level		W Wet		H High		F Firm		MD Medium Dense		U Undisturbed sample		VS Vane shear			
E Excavator		Nil No support		Water outflow		Wp Plastic limit		R Refusal		St Stiff		D Dense		D Disturbed sample		DCP Dynamic cone penetrometer			
HA Hand auger				Water inflow		WL Liquid limit				VSt Very Stiff		VD Very Dense		M Moisture content		FD Field density			
S Hand spade										H Hard				Ux Tube sample (x mm)		WS Water sample			
PT Push tube										F Friable									
A Auger																			
CC Concrete Corer																			
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS																			
<div><div><div></div><div><div>MARTENS & ASSOCIATES PTY LTD</div><div>6/37 Leighton Place</div><div>Hornsby, NSW 2077 Australia</div><div>Phone: (02) 9476 9999 Fax: (02) 9476 8767</div><div>mail@martens.com.au WEB: http://www.martens.com.au</div></div></div><div><div>Engineering Log -</div><div>Borehole</div></div></div>																			

CLIENT	Allen Price & Associates Pty Ltd			COMMENCED	24.11.10		COMPLETED	24.11.10		REF BH19			
PROJECT	Engineering Services			LOGGED	JSF		CHECKED	GT		Sheet 1 of 1			
SITE	Cullburra Road, West Cullburra			GEOLOGY	Siltstone		VEGETATION	Eucalypts		PROJECT NO. P1002842			
EQUIPMENT	Hydraulic Auger			EASTING	NA		RL SURFACE	NA					
EXCAVATION DIMENSIONS	0.95mØ X 2.5m depth			NORTHING	NA		ASPECT	North		SLOPE	2-3%		
EXCAVATION DATA				MATERIAL DATA				SAMPLING & TESTING					
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS
Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.													
A	Nil	N	M	0.1		x x x	OL	ORGANIC SANDY SILT – Dark brown.	S		A	0.2	2842/19/ 0.2
A	Nil	N	M	1.0			CL	CLAY - Orange/brown mottles, firm grading stiff, tending grey with minor brown and red mottles at depth.	F-St		A	0.5	2842/19/ 0.5
A	Nil	N	M	1.6							A	1.0	2842/19/ 1.0
A	Nil	N	M	1.6							A	1.5	2842/19/ 1.5
A	Nil	N	D	2.0			EW	EXTREMELY WEATHERED SILTSTONE - Red and grey mottles, clay like properties, highly weathered layers from 2.0m.			A	2.0	2842/19/ 2.0
A	Nil	N	D	2.5							A	2.5	2842/19/ 2.5
Borehole terminated at 2.5m on moderately weathered siltstone.													
3.0													
4.0													
5.0													
6.0													
7.0													
8.0													
9.0													
EQUIPMENT / METHOD													
SUPPORT													
WATER													
MOISTURE													
PENETRATION													
CONSISTENCY													
DENSITY													
SAMPLING & TESTING													
CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION													
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS													
MARTENS & ASSOCIATES PTY LTD													
Engineering Log - Borehole													

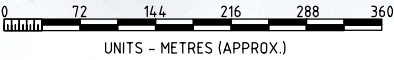
CLIENT		Allen Price & Associates Pty Ltd		COMMENCED		24.11.10		COMPLETED		24.11.10		REF		BH22			
PROJECT		Engineering Services		LOGGED		BR		CHECKED		GT		Sheet 1 of 1					
SITE		Cullburra Road, West Cullburra		GEOLOGY		Siltstone		VEGETATION		Grass		PROJECT NO. P1002842					
EQUIPMENT				Hydraulic Auger		EASTING		NA		RL SURFACE		NA					
EXCAVATION DIMENSIONS				0.95mØ X 2.5m depth		NORTHING		NA		ASPECT		North East		SLOPE 1-2%			
EXCAVATION DATA				MATERIAL DATA						SAMPLING & TESTING							
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.		CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS			
A	Nil	N	M	0.3			OL	ORGANIC SILT – Dark brown, gravels (5-10mm, 30%).		S		A	0.2	2842/22/ 0.2			
A	Nil	N	M	0.8			CL	CLAY - Variable colours (grey, red, yellow, brown).		F		A	0.5	2842/22/ 0.5			
A	Nil	N	D	1.0			EW	EXTREMELY WEATHERED FINE GRAINED SILTSTONE - Reddish brown.				A	1.0	2842/22/ 1.0			
A	Nil	N	D	1.9			EW	EXTREMELY WEATHERED FINE GRAINED SILTSTONE - Grey.				A	1.5	2842/22/ 1.5			
A	Nil	N	D	2.0			EW	EXTREMELY WEATHERED FINE GRAINED SILTSTONE - Grey, strength decreasing.				A	2.0	2842/22/ 2.0			
				2.5				Borehole terminated at 2.5m on extremely weathered siltstone.				A	2.5	2842/22/ 2.5			
				3.0													
				4.0													
				5.0													
				6.0													
				7.0													
				8.0													
				9.0													
EQUIPMENT / METHOD		SUPPORT		WATER		MOISTURE		PENETRATION		CONSISTENCY		DENSITY		SAMPLING & TESTING		CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION	
N Natural exposure		SH Shoring		N None observed		D Dry		L Low		VS Very Soft		VL Very Loose		A Auger sample		pp Pocket penetrometer	
X Existing excavation		SC Shotcrete		X Not measured		M Moist		M Moderate		S Soft		L Loose		B Bulk sample		S Standard penetration test	
BH Backhoe bucket		RB Rock Bolts		Water level		W Wet		H High		F Firm		MD Medium Dense		U Undisturbed sample		VS Vane shear	
E Excavator		Nil No support		Water outflow		Wp Plastic limit		R Refusal		St Stiff		D Dense		D Disturbed sample		DCP Dynamic cone	
HA Hand auger				Water inflow		WI Liquid limit				VSt Very Stiff		VD Very Dense		M Moisture content		penetrometer	
S Hand spade										H Hard				Ux Tube sample (x mm)		FD Field density	
PT Push tube										F Friable						WS Water sample	
A Auger																	
CC Concrete Corer																	
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS																	
<div><div><div><div>MARTENS & ASSOCIATES PTY LTD</div><div>6/37 Leighton Place</div><div>Hornsby, NSW 2077 Australia</div><div>Phone: (02) 9476 9999 Fax: (02) 9476 8767</div><div>mail@martens.com.au WEB: http://www.martens.com.au</div></div></div><div><div>Engineering Log -</div><div>Borehole</div></div></div>																	

CLIENT	Allen Price & Associates Pty Ltd			COMMENCED	24.11.10	COMPLETED	24.11.10	REF BH23											
PROJECT	Engineering Services			LOGGED	BR	CHECKED	GT	Sheet 1 of 1											
SITE	Cullburra Road, West Cullburra			GEOLOGY	Siltstone	VEGETATION	Grass	PROJECT NO. P1002842											
EQUIPMENT	Hydraulic Auger			EASTING	NA	RL SURFACE	NA												
EXCAVATION DIMENSIONS	0.95mØ X 1.0m depth			NORTHING	NA	ASPECT	North East	SLOPE	1-2%										
EXCAVATION DATA				MATERIAL DATA				SAMPLING & TESTING											
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA <small>Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.</small>	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS						
A	Nil	N	M	0.2			OL	ORGANIC SILT – Dark brown, gravels (5-10mm, 30%).	S		A	0.2	2842/23/ 0.2						
A	Nil	N	M	0.3			CL	CLAY - Grey.	S										
A	Nil	N	M				CL	CLAY - Variable colours (grey, red, yellow, brown).	S		A	0.5	2842/23/ 0.5						
A	Nil	N	D	0.9			EW	EXTREMELY WEATHERED FINE GRAINED SILTSTONE - Reddish brown.			A	1.0	2842/23/ 1.0						
				1.0				Borehole terminated at 1.0m on extremely weathered siltstone.											
				2.0															
				3.0															
				4.0															
				5.0															
				6.0															
				7.0															
				8.0															
				9.0															
EQUIPMENT / METHOD				SUPPORT		WATER		MOISTURE		PENETRATION		CONSISTENCY		DENSITY		SAMPLING & TESTING		CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION	
N Natural exposure				SH Shoring		N None observed		D Dry		L Low		VS Very Soft		VL Very Loose		A Auger sample		pp Pocket penetrometer	
X Existing excavation				SC Shotcrete		X Not measured		M Moist		M Moderate		S Soft		L Loose		B Bulk sample		S Standard penetration test	
BH Backhoe bucket				RB Rock Bolts		Water level		W Wet		H High		F Firm		MD Medium Dense		U Undisturbed sample		VS Vane shear	
E Excavator				Nil No support		Water outflow		Wp Plastic limit		R Refusal		St Stiff		D Dense		D Disturbed sample		DCP Dynamic cone penetrometer	
HA Hand auger						Water inflow		WI Liquid limit				VSt Very Stiff		VD Very Dense		M Moisture content		FD Field density	
S Hand spade												H Hard				Ux Tube sample (x mm)		WS Water sample	
PT Push tube												F Friable							
A Auger																			
CC Concrete Corer																			
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS																			
<div><div>Martens</div></div>										<div>MARTENS & ASSOCIATES PTY LTD</div> <div>6/37 Leighton Place</div> <div>Hornsby, NSW 2077 Australia</div> <div>Phone: (02) 9476 9999 Fax: (02) 9476 8767</div> <div>mail@martens.com.au WEB: http://www.martens.com.au</div>									
										<div>Engineering Log -</div> <div>Borehole</div>									

CLIENT	Allen Price & Associates Pty Ltd			COMMENCED	24.11.10	COMPLETED	24.11.10		REF BH24																						
PROJECT	Engineering Services			LOGGED	JSF	CHECKED	GT		Sheet 1 of 1																						
SITE	Cullburra Road, West Cullburra			GEOLOGY	Siltstone	VEGETATION	Eucalypts		PROJECT NO. P1002842																						
EQUIPMENT	Hydraulic Auger			EASTING	NA	RL SURFACE	NA																								
EXCAVATION DIMENSIONS	0.95mØ X 2.6m depth			NORTHING	NA	ASPECT	North East		SLOPE	5%																					
EXCAVATION DATA				MATERIAL DATA				SAMPLING & TESTING																							
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRIPTION OF STRATA	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	RESULTS AND ADDITIONAL OBSERVATIONS																		
Soil type, texture, structure, mottling, colour, plasticity, rocks, oxidation, particle characteristics, organics, secondary and minor components, fill, contamination, odour.																															
A	Nil	N	M	0.2		x x x x	OL	ORGANIC SANDY SILT – Dark brown.	S		A	0.2	2842/24/ 0.2																		
A	Nil	N	M	1.0			CL	CLAY - Orange/brown mottles, firm grading stiff, tending grey with minor brown and red mottles at depth.	St-VSt		A	0.5	2842/24/ 0.5																		
				A							1.0	2842/24/ 1.0																			
				A							1.5	2842/24/ 1.5																			
				A							2.0	2842/24/ 2.0																			
A	Nil	N	D	2.6			EW	EXTREMELY WEATHERED SILTSTONE - Grey with red mottles, clay like properties.			A	2.5	2842/24/ 2.5																		
				3.0				Borehole terminated at 2.6m on extremely weathered siltstone.																							
				4.0																											
				5.0																											
				6.0																											
				7.0																											
				8.0																											
				9.0																											
EQUIPMENT / METHOD N Natural exposure X Existing excavation BH Backhoe bucket E Excavator HA Hand auger S Hand spade PT Push tube A Auger CC Concrete Corer														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		PENETRATION 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	
EXCAVATION LOG TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS																															
MARTENS & ASSOCIATES PTY LTD 6/37 Leighton Place 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																	



(C) Copyright Martens & Associates Pty. Ltd. 2010



SITE BOUNDARIES ARE INDICATIVE ONLY



Unit 6/ 37 Leighton Place
Hornsby, NSW 2077 Australia
Phone: (02) 9476 9999
Fax: (02) 9476 8767
Email: mail@martens.com.au
Internet: <http://www.martens.com.au>

**MARTENS &
ASSOCIATES PTY LTD**
Sustainable Solutions
Environmental - Geotechnical - Civil
Hydraulic - Wastewater Engineers

CLIENT/ PROJECT
REALTY REALISATION PTY LTD
C/- ALLEN PRICE & ASSOCIATES

THIS PLAN MUST NOT BE USED FOR CONSTRUCTION UNLESS
SIGNED AS APPROVED BY PRINCIPAL CERTIFYING AUTHORITY
All measurements in m unless otherwise specified.

TITLE
1993 AERIAL PHOTO: PART DP 1065111 AND LOT 61 DP 755971,
CULBURRA ROAD, WEST CULBURRA


PROJECT MANAGER:
MR ANDREW NORRIS

DRAWING NUMBER:
P1002842JD01V01_SHEET 4

DESIGNED:	DATUM:	SHEET	REV.	DESCRIPTION	DATE	ISSUED
MT	AHD	4	1.0	STAGE ONE CONTAMINATION ASSESSMENT	18.11.2010	MT
DRAWN:	HORIZONTAL RATIO:	OF 6				
MT	1:7200 @A3 APPROX.	SHEETS				
REVIEWED:	VERTICAL RATIO:	PAPER SIZE:				
AN	1:7200 @A3 APPROX.	A1 / A3				



(C) Copyright Martens & Associates Pty. Ltd. 2010

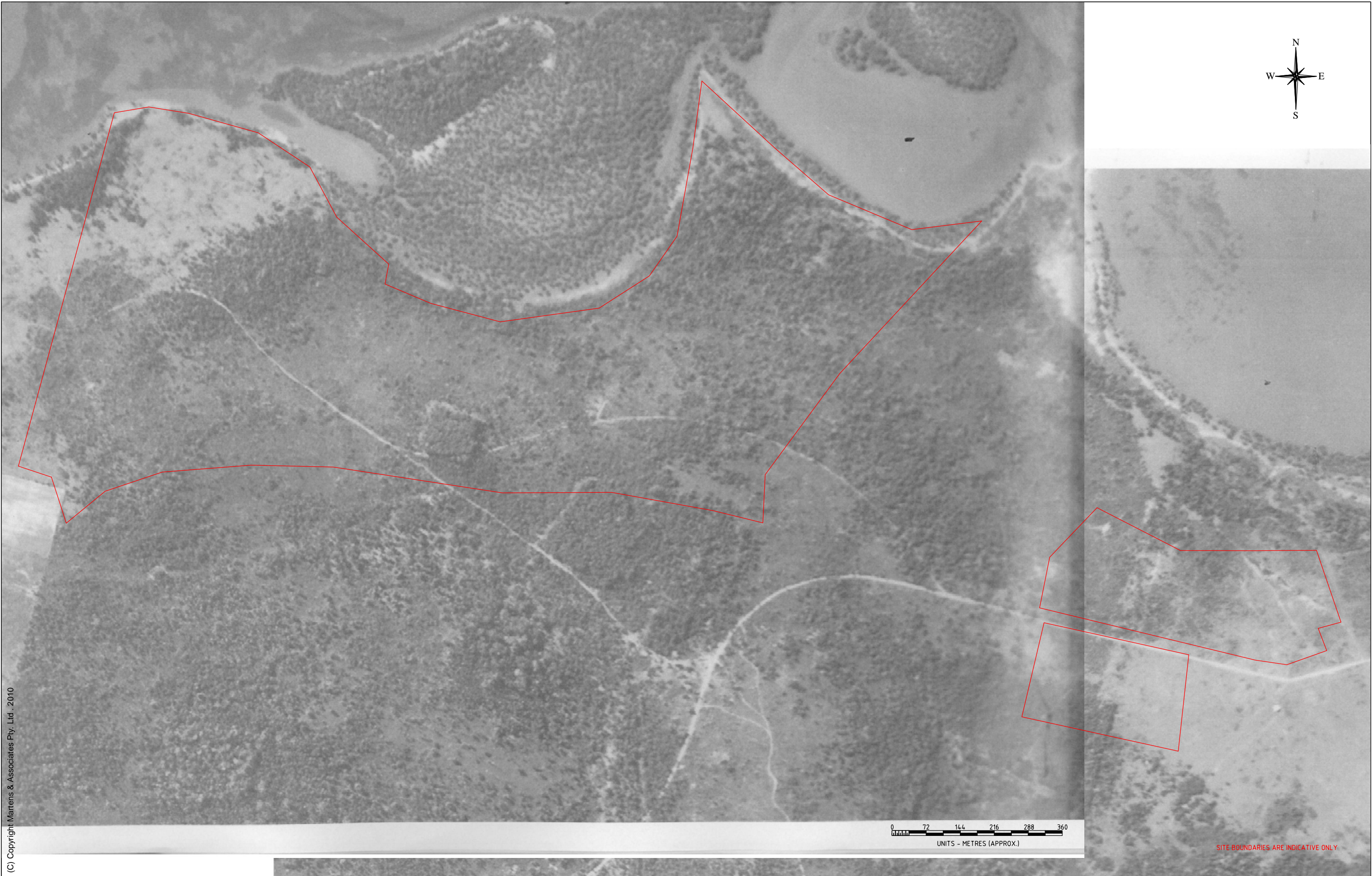
 <div><div>MARTENS & ASSOCIATES PTY LTD</div><div>Sustainable Solutions</div><div>Environmental - Geotechnical - Civil</div><div>Hydraulic - Wastewater Engineers</div></div> <div><div>Unit 6/ 37 Leighton Place</div><div>Hornsby, NSW 2077 Australia</div><div>Phone: (02) 9476 9999</div><div>Fax: (02) 9476 8767</div><div>Email: mail@martens.com.au</div><div>Internet: http://www.martens.com.au</div></div>	CLIENT/ PROJECT		TITLE		DESIGNED:	DATUM:	SHEET 3 OF 6 SHEETS PAPER SIZE: A1 / A3	REV.	DESCRIPTION	DATE	ISSUED		
	REALTY REALISATION PTY LTD		1974 AERIAL PHOTO: PART DP 1065111 AND LOT 61 DP 755971,		MT	AHD		1.0	STAGE ONE CONTAMINATION ASSESSMENT	18.11.2010	MT		
	C/- ALLEN PRICE & ASSOCIATES		CULBURRA ROAD, WEST CULBURRA		DRAWN:	HORIZONTAL RATIO:							
					MT	1:7200 @A3							
	THIS PLAN MUST NOT BE USED FOR CONSTRUCTION UNLESS SIGNED AS APPROVED BY PRINCIPAL CERTIFYING AUTHORITY All measurements in m unless otherwise specified.		PROJECT MANAGER: MR ANDREW NORRIS			APPROX.							
					DRAWING NUMBER:					VERTICAL RATIO:			
P1002842JD01V01_SHEET 3					1:7200 @A3								
					APPROX.								



(C) Copyright Martens & Associates Pty. Ltd. 2010

<div><div><div><div></div></div><div><div></div></div></div><div><div><div>martens</div><div>Unit 6/ 37 Leighton Place Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767 Email: mail@martens.com.au Internet: http://www.martens.com.au</div></div><div><div><div>MARTENS & ASSOCIATES PTY LTD</div><div>Sustainable Solutions</div><div>Environmental - Geotechnical - Civil Hydraulic - Wastewater Engineers</div></div></div></div></div>	CLIENT/ PROJECT		TITLE		DESIGNED:	DATUM:	SHEET 2 OF 6 SHEETS PAPER SIZE: A1 / A3	REV.	DESCRIPTION	DATE	ISSUED
	REALTY REALISATION PTY LTD C/- ALLEN PRICE & ASSOCIATES		1961 AERIAL PHOTO: PART DP 1065111 AND LOT 61 DP 755971, CULBURRA ROAD, WEST CULBURRA		MT	AHD		1.0	STAGE ONE CONTAMINATION ASSESSMENT	18.11.2010	MT
	THIS PLAN MUST NOT BE USED FOR CONSTRUCTION UNLESS SIGNED AS APPROVED BY PRINCIPAL CERTIFYING AUTHORITY All measurements in m unless otherwise specified.		PROJECT MANAGER: MR ANDREW NORRIS		DRAWN: MT	HORIZONTAL RATIO: 1:7200 @A3 APPROX.					
			DRAWING NUMBER: P100284.2JD01V01_SHEET 2		REVIEWED: AN	VERTICAL RATIO: 1:7200 @A3 APPROX.					


9 **Attachment C – Historical Aerial Photographs**

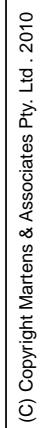


martens

Unit 6/ 37 Leighton Place
Hornsby, NSW 2077 Australia
Phone: (02) 9476 9999
Fax: (02) 9476 8767
Email: mail@martens.com.au
Internet: <http://www.martens.com.au>

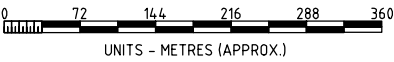
**MARTENS &
ASSOCIATES PTY LTD**
Sustainable Solutions
Environmental - Geotechnical - Civil
Hydraulic - Wastewater Engineers

 <p>MARTENS & ASSOCIATES PTY LTD Sustainable Solutions Environmental - Geotechnical - Civil Hydraulic - Wastewater Engineers</p> <p>Unit 6/ 37 Leighton Place Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767 Email: mail@martens.com.au Internet: http://www.martens.com.au</p>	CLIENT/ PROJECT	TITLE		DESIGNED:	DATUM:	SHEET 1 OF 6 SHEETS	REV.	DESCRIPTION	DATE	ISSUED
	REALTY REALISATION PTY LTD C/- ALLEN PRICE & ASSOCIATES	1949 AERIAL PHOTO: PART DP 1065111 AND LOT 61 DP 755971, CULBURRA ROAD, WEST CULBURRA		MT	AHD		1.0	STAGE ONE CONTAMINATION ASSESSMENT	18.11.2010	MT
	THIS PLAN MUST NOT BE USED FOR CONSTRUCTION UNLESS SIGNED AS APPROVED BY PRINCIPAL CERTIFYING AUTHORITY All measurements in m unless otherwise specified.	PROJECT MANAGER:	DRAWING NUMBER:	REVIEWED:	HORIZONTAL RATIO:	PAPER SIZE: A1 / A3				
		MR ANDREW NORRIS	P100284.2J01V01_SHEET 1	AN	1:7200 @A3 APPROX.					
					VERTICAL RATIO: 1:7200 @A3 APPROX.					





(C) Copyright Martens & Associates Pty. Ltd. - 2010



SITE BOUNDARIES ARE INDICATIVE ONLY



Unit 6/ 37 Leighton Place
Hornsby, NSW 2077 Australia
Phone: (02) 9476 9999
Fax: (02) 9476 8767
Email: mail@martens.com.au
Internet: <http://www.martens.com.au>

**MARTENS &
ASSOCIATES PTY LTD**
Sustainable Solutions
Environmental - Geotechnical - Civil
Hydraulic - Wastewater Engineers

CLIENT/ PROJECT
REALTY REALISATION PTY LTD
C/- ALLEN PRICE & ASSOCIATES

THIS PLAN MUST NOT BE USED FOR CONSTRUCTION UNLESS
SIGNED AS APPROVED BY PRINCIPAL CERTIFYING AUTHORITY
All measurements in m unless otherwise specified.

TITLE
2008 AERIAL PHOTO: PART DP 1065111 AND LOT 61 DP 755971,
CULBURRA ROAD, WEST CULBURRA

PROJECT MANAGER:
MR ANDREW NORRIS

DRAWING NUMBER:
P100284.2JD01V01_SHEET 6

DESIGNED:	DATUM:	SHEET	REV.	DESCRIPTION	DATE	ISSUED
MT	AHD	6	1.0	STAGE ONE CONTAMINATION ASSESSMENT	18.11.2010	MT
DRAWN:	HORIZONTAL RATIO:	OF 6				
MT	1:7200 @A3 APPROX.	SHEETS				
REVIEWED:	VERTICAL RATIO:	PAPER SIZE:				
AN	1:7200 @A3 APPROX.	A1 / A3				