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

P1002842JR01V02 February 2013

















CIVIL



PROJECT MANAGEMENT



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



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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 subdivision 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):

- o Lot 61 DP 755971
- Part Lot 5 DP 1065111
- o Part Lot 6 DP 1065111
- o 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 andheadlands (Chapman & Murphy, 1989).

Layer	Depth Range of soil layer (m)	Description
gpl	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.

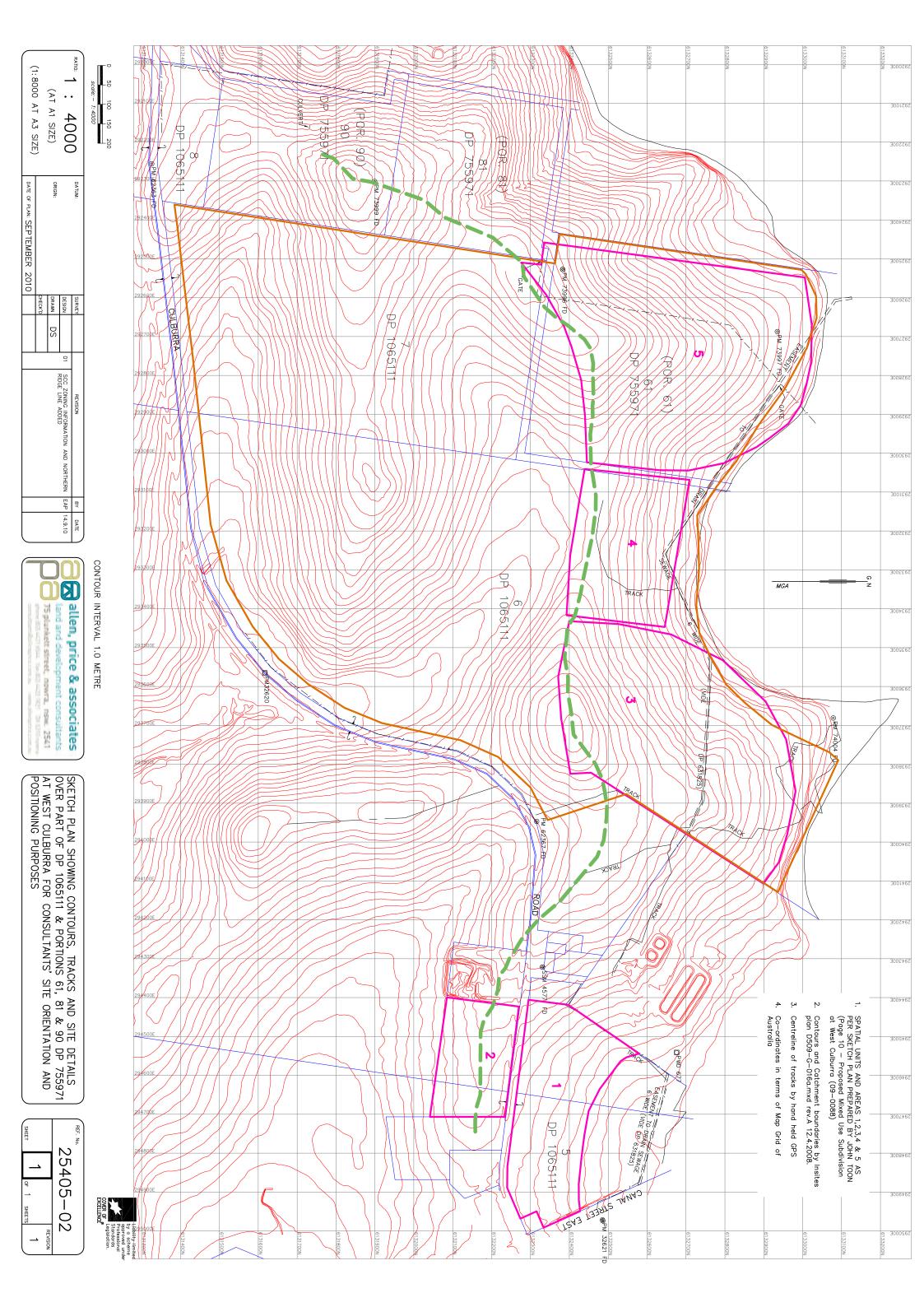
NSW DEC (2005) Contaminated Sites: Guidelines for Assessing Former Orchards and Market Gardens.



7 Attachment A – Site Plan



Preliminary (Stage One) Land Contamination Assessment: Part DP 1065111 and Lot 61 DP 755971, Culburra Road, West Culburra, NSW P1002842JR01V02 –February 2013 Page 15



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



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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.

Material Description	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

Table 2: Indicative soil and rock depth range.

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

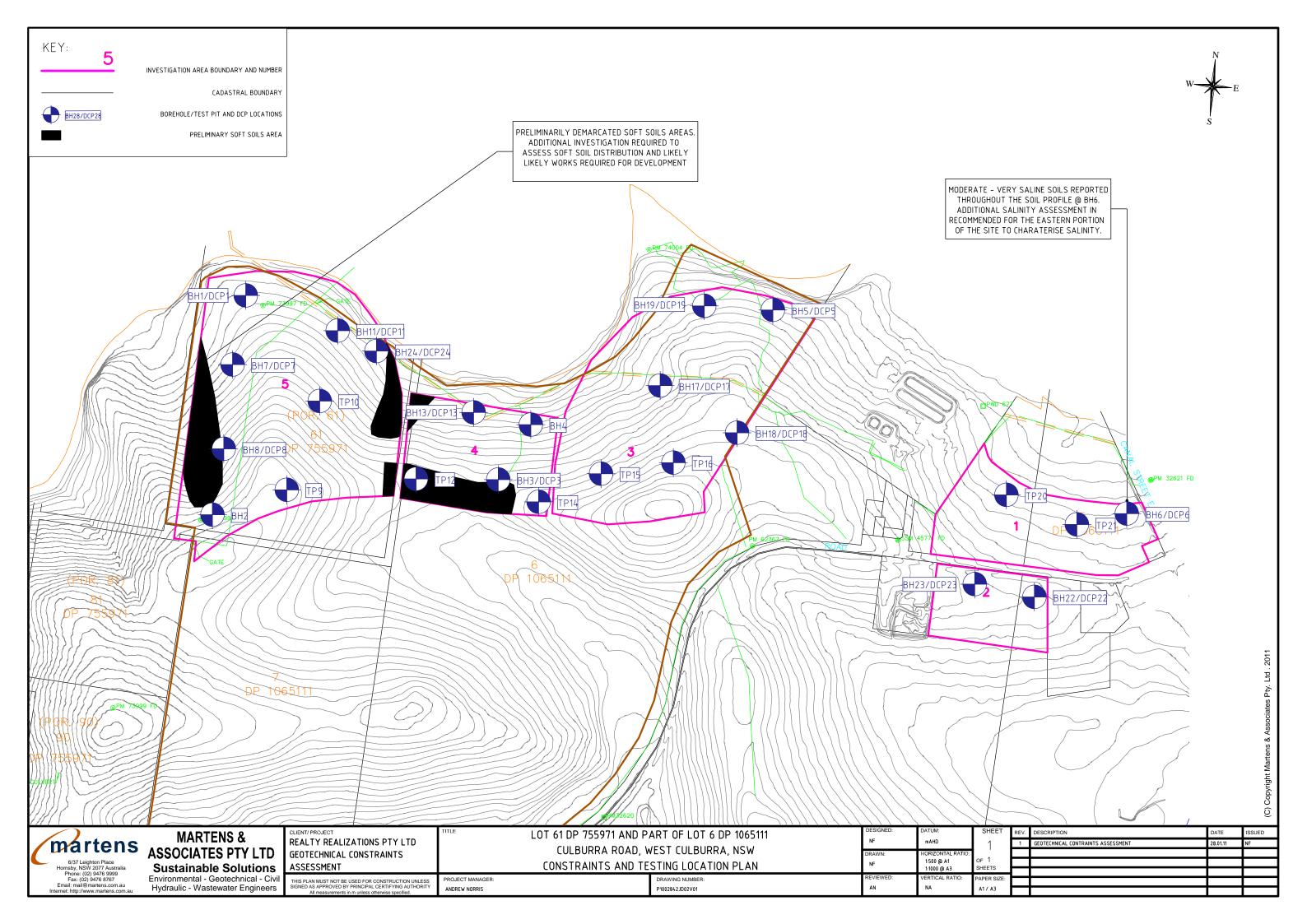
Preliminary soil strength estimates indicate soils below 0.3 m are likely to have allowable bearing capacities (ABC) ranging between 50 – 200 kPa, providing suitable bearing capacity for standard shallow foundations for residential dwellings. Areas of the site identified to contain soft soils are likely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





8 Attachment B – Borehole and Test Pit Logs



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METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	L M PENETRATION H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STF mottling, colour, pl anics, secondary pntamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	түре	DEPTH (M)	WAT		. DETAILS	
A A	Nil Nil	N N	M M	0.1			OL CL	ORGANIC SILT	Y CLAY – Da	ark grey/black.	S S		A	0.2 284	2/2/0.2+B		Concret	
			141	-		<u> </u>		SILTY CLA	Y – Brown/lig	ht brown.	F			0.2 204	2/2/0.2+D			
A	Nil	N	м	- 0.6		 	CL	CLAY – Red, moderat mottles inc	tely plastic, w creassing wit				A	0.5 284	2/2/0.5 + Att		Bentonite	Seal .
A	Nil	N	м	- <u>1.0</u> 1.1			СН	CLAY – Red, mediur	n plasticity, g	rey/brown mottles.	St		A	1.0 284	2/2/1.0	•	UPVCI	<u>Pipe.</u> 1 <u>.(</u>
A	Nil	Ν	М	1.2			СН	CLAY - Grey wit	th minor red/t	prown mottles.	VSt		A	1.2 284	2/2/1.2		- C.	
				_		=				/			А	1.5 284	2/2/ 1.5			
				- - - <u>2.0</u>									A		2/2/1.3			2 <u>.(</u>
			D										A	2.5 284	2/2/ 2.5			- - - - -
A	Nil	N	м	<u>3.0</u> - - - - - - - - - - - - - - - - - - -			CL EW	CLAY - EXTREMEL Clay to sandy gra		red gravels,	VSt							3 <u>.(</u>
				4.0 									A	4.5 284	2/2/ 4.5		Sand 1	Pack. 5 <u>.</u>
A	Nil	N	м	6.0 			CL	SILTSTONE CLAY - highly w	Brown/dark (veathered silt		St		A	6.0 284	2/2/6.0			6 <u>.</u>
A	Nil	N	w	-			CL EW	CLAY - Dark g weat	rey/brown, cl hered siltstor		VSt							
				7.0 <u>8.0</u> 				Borehole term	ninated at 7.0	m on clays.			A	7.0 284	42/2/7.0		<u>Vell</u> end pi	
N BH E HA S PT A	Na Ex Ex Ha Ha Pus	itural e kisting ckhoe cavate nd au nd sp sh tub ger	expos e exca e buck or ger ade	ure S vation S et R N	UPPORT H Shoring C Shotcrete B Rock Bol il No suppo	ts ⊻ Wat ort → Wat → Wat	e obse measu er leve er outfl er inflo	rved D Dry L Lo red M Moist M M/ I W Wet H Hi Wp Plastic limit R Re low WI Liquid limit W	ow VS oderate S gh F efusal St VSt H F	SISTENCY DENSITY Very Soft VL Very Loc Soft L Loose Firm MD Medium Stiff D Dense Very Stiff VD Very Den Hard Friable	ose A Au B Bui Dense U Un D Dis Ise M Mo Ux Tut	LING & TE ger sample k sample disturbed s turbed san isture cont be sample i	ample nple ent (x mm)	S Sta VS Va DCP D P0 FD Fie WS Wa	cket penetromel ndard penetrati ne shear lynamic cone enetrometer ld density tter sample	ter	CLASSIFICATI SYMBOLS ANI SOIL DESCRIF Y USCS N Agricultur	D NOIT?
					E	EXCAVATI	ON LO	OG TO BE READ IN CONJU			PORT NOTES	S AND AE	BREV	IATIONS				
(rte Martens & As	NS isociates Pty. L	.td . 2010		Pr mail@m	6/37 Hornsby, hone: (02) 9476	ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 87 WEB: http://www.marten	67 s.com.au		E		neeri Borel			

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PR	OJE	СТ	Ε	ngineer	ing S	Serv	vices			LOGGED	GT	CHECKED	A	AN .			Sheet 1			
SIT			С	ullburra			West Cu	ıllbı	ırra	GEOLOGY	Siltstone	VEGETATI		Grasses			PROJECT	NO. P	1002842	
				SIONS	Hydra		.5m depth			EASTING	NA NA	RL SURFA		NA North			SLOPE	3-	40/	
EXC						2 X 1.	.5m deptn		M			ASPECT	Г	North	SAN		G & TE			
						ш		z				>	×				0 4 12		-	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION	RESISTANC	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, particle characteristics, or		asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)		0.78m agl		DETAILS	/er
A	Nil	N N	M M	0.1	_ ≥ ≥	Ξœ	-	OL	ORGANIC SILT	Y CLAY – Da	ark grey/black	S					<u> </u>	-		
A	Nil	Ν	М	0.2				CL		Y – Brown/lig		S					-0.25m bgl-		Bentonite	Seal
A	Nil	N	м	0.6		;		CL	CLAY – Red, modera mottles in	itely plastic, w creassing wit		F					0.47m bgl		UPVC Pi	_
А	Nil	N	м	<u>1.0</u>			 	сн	CLAY – Red, mediu	m plasticity, g	rey/brown mottles.	St							Sand Pa	
Α	Nil	Ν	M	1.2				СН	CLAY - Grey wi	th minor red/t	prown mottles.	VSt		_						
A	Nil	Ν	D M	1.5				CL EW	CLAY TO EXTREME			VSt		A	1.5 2	842/2A/1	.5 ^{1.42m} bgl	E		-
				_					Clay to sandy	clay, weathe ey/red/brown									Well end plug	
				_					Borehole termir		/									-
				<u>2.0</u>						thered siltstor										2.0
				E																_
				_																-
				-																-
				-																-
				<u>3.0</u> 																3 <u>.0</u> –
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				_																-
				_																-
				4.0																4.0
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E				THOD SU	JPPOR		WATER				SISTENCY DENSITY	SAM		& TESTIN		Docket -	notre m - 1 -			<u></u>
X	E	tural e disting ckhoe	exca	ation SC	H Shor C Shot B Rock	crete		e obsi measi er levi	ured M Moist M M	loderate S	Very Soft VL Very Loo Soft L Loose Firm MD Medium D	ВВ	uger s ulk sar Indistu		S S		penetrometer penetration		SYMBOLS AND SOIL DESCRIPT	ION
E H	Ex A Ha	cavato nd au	or ger		Nos				Wp Plastic limit R R	efusal St VSt	Stiff D Dense Very Stiff VD Very Dens	D D Se M M	isturbe loisture	ed sample e content	DCP	Dynam penetro	ic cone meter	[Y USCS	
S P	Ha T Pu	nd sp sh tub	ade				→ Wat			н	Hard Friable			mple (x mm		Field den Water sa	sity	l	N Agricultura	I
A C	Au C Co		Core	r			-													
-			~			E	XCAVATI	ON L	OG TO BE READ IN CONJI			ORT NOTE	S AN							
martens							6/37	ASSOCIATES PTY LTD Leighton Place			E	ng	ine	erin	gL	_og -				
		И	d	rte	11	5				hone: (02) 9476	NSW 2077 Australia 9999 Fax: (02) 9476 876				-		reh	-	-	
ž 🛰	- (C) Cop	yright	Martens & Ass	sociates	Pty. Lt	td . 2010		mail@m	nartens.com.au	WEB: http://www.martens	s.com.au				DU		JIE		

	IEN					sociates	Pty	Ltd	COMMENCED	23.11.10	COMPLETE		.10			REF		BH3
		СТ	+	ngineer	•				LOGGED	GT	CHECKED	AN				Sheet 1		
		NT	C	ullburra	Hydraulic	West Cu	illbu	irra	GEOLOGY	Siltstone						PROJECT	NO. P10	002842
				SIONS	-	5.5m depth			EASTING NORTHING	NA	RL SURFAC	North	1			SLOPE	2-3%	6
	EX	CA	/AT	ION DA	ТА			MA	TERIAL DA	TA				SA	MPLIN	IG & TE	STING	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	M PENETRATION	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STR nottling, colour, pla anics, secondary a ontamination, odou	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)		WATER		DETAILS Well Cover
А	Nil	N	М	- 0.15		XXXX	SM	SILTY SAND – Bro				L	A	0.2	2842/3/0	0.2		Concrete
A	Nil	N	М	- -0.35			SP	SAND – Light brown	/brown, medi -5mm, appro	um grained sands,		L						
А	Nil	N	м	 <u>0.8</u>			CL	CLAY - Yellow/br siltstone band	own/orange,	red weathered	F St		A	0.5	2842/3/ (0.6m bgl Bentonite Seal
A	Nil	N	м	<u>1.0</u> _{1.05}			CL/ HW	SANDY CLAY/HIGH	LY WEATHE	RED SILTSTONE	VSt		A	1.2	2842/3/1			
A	Nil	N	м	-1.25 - -			CL	CLAY - HIGHLY V	Orange/grey.		VSt		A	1.5	2842/3/ 1	5		
				1.6 _			HW	Grey with red/orange						1.5	2042/3/1	.5	(4 () = = 1	1.565m bgl
A	Nil	N	м				CL MW EW	CLAY - MODERATELY SILTSTONE - (TO EXTREN Grey with red	MELY WEATHERED	VSt		A	2.0	2842/3/2	2.0		Sand Pack. UPVC Screen.2.
А	Nil	N	D	- - - - - 3.0			SC EW		EXTREMELY - Grey/pink/i m grained sai	ed, fine to	VSt		A	2.5	2842/3/2	2.5		3.0
А	Nil	N	D	3.2			мw	MODERATELY V	VEATHERED range brown.	SILTSTONE -								
А	Nil	N	D	- - - - 4.0			HW/ EW	HIGHLY/EXTREMEI		RED SILTSTONE.			в	4.0	2842/3/4	0		
A	Nil	N	D	- - - - - -			MW/ SW	MODERATELY S	/SLIGHTLY V ILTSTONE.	VEATHERED						4 <u>.565</u> m <u>bg</u>		Well end plug.
A	Nil	N	D	- - - 5.5			EW/ MW	EXTREMELY/MC S	DDERATELY SILTSTONE.	WEATHERED								
	N N K E BH Ba E E HA Ha S Ha PT Pu	atural xisting ackhoe kcavat and au and sp ish tub uger	expos g exca e buck or iger oade e	ure SH vation SC æt RE Ni	JPPORT + Shoring C Shotcret B Rock Bo I No supp	lts ⊻ Wat ort √ Wat → Wat	e obse measu er leve er outl er inflo	MOISTURE PENE rved D Dry L Lo red M Moist M M i W Wet H Hit Wp Plastic limit R Re low WI Liquid limit	hered siltstor w VS oderate S gh St Ysal St H F	e. SISTENCY DENSITY Very Soft VL Very Loo Soft L Loose Firm MD Medium D Stiff D Dense Very Stiff VD Very Dens Hard Friable	se A Au B Bu Dense U U D Di se M M Ux Tu	PLING & TI uger sample disturbed sa Disturbed sa Disturbe con be sample	le sample ample atent e (x mm)	PP S DC FE W	Standard Vane sh P Dynan penetro Field de S Water s	nic cone ometer nsity	S	-
F		_	~			EXCAVATI	ON L	OG TO BE READ IN CONJU		I ACCOMPANYING REP ASSOCIATES PTY LTD	ORT NOTE	S AND A						
funda				rte Martens & Ass		Ltd . 2010			6/37 Hornsby, none: (02) 9476	Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 876 WEB: http://www.martens			E	ng		erin oreh	-	og -

	LIE							sociates	Pty	Ltd	COMMENCED	23.11.10	COMPLET		3.11.10			REF		В	H4	٦
-	RO		СТ	+	ngineer							GT	CHECKED					Sheet		1		
_			т	C	ullburra	Hydrau		West Cu	llbu	irra	GEOLOGY	Siltstone	VEGETAT RL SURFA		one A			PROJEC	TNO. P	10028	42	_
				IMEN	SIONS	-		.5m depth			NORTHING	NA	ASPECT	-	orth			SLOPE	2-:	3%		
	E	XC	:AV	/AT	ION DA					MA	TERIAL D	ATA				SA	MPLIN	IG & TE	STING	3		
COLTEM		SUPPORI	WATER	MOISTURE	DEPTH (M)			GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STR nottling, colour, pla anics, secondary a ontamination, odou	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)		WATE			AILS — Well Cover	
4	, I	VII	N	М	- 0.3			× * * * × × * *	SM	SILTY SAND – Brown	, gravels (1-1	0mm, approx 10%).		L	A	0.2	2842/4/	0.2			Concrete	-
4		lil	N	М	0.5 -				CL	CLAY - Brown/orange gravels (1-	e, mottles incl 10mm, appro		s		A	0.5	2842/4/	0.5			0.6m bgl	
4		Nil	N	М	- - 1.0 1.2				CL	CLAY - Grey/brow	n/red mottles	, minor gravels.		F	A	1.0	2842/4/	1.0	•		Bentonite Seal UPVC Pipe.	- 1 <u>.0</u> -
4	. 1	Nil	N	М	_ _ _ _ 1.8				CL HW	CLAY - HIGHLY V Grey with red/orange			VSt		A	1.5	2842/4/	1.5		- 10224	-1.26m bgl Sand Pack. UPVC Screer	- - -
					<u>2.0</u> 				CL				VSt		A	2.0	2842/4/2	2.0				2 <u>.0</u> - -
4		Nil	N	М					MW EW	CLAY - MODERATELY SILTSTONE - (Vot		A	2.5	2842/4/3	2.5				
Ļ										CLAYEY SAND/E SILTSTONE - G mediui		orange, fine to	VSt		В	4.0	2842/4/4	4.0 4 <u>.26m</u> bgj			<u>Well e</u> nd plug.	4.0
ļ	. 1	Vil	N	D	 5.0 5.5				EW/ MW	EXTREMELY/MC SILTSTONE					A	5.0	2842/4/	5.0				- - 5 <u>.0</u> - - - -
	ECULPORT SupPORT Water Monor between with the support SupPORT SupPORT Water with weathered SupPORT SupPORT Natural ages SupPORT SupPORT Natural ages SupPORT SupPORT Natural ages SupPORT SupPORT																					
┡	А	Aug	er	Core	r		F			OG TO BE READ IN CONJU				ES AN	ABBRF							_
	(rte Martens & Ass		5			Pt	MARTENS & . 6/37 Hornsby, none: (02) 9476	ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 87 WEB: http://www.martei	767				gine	erir oreh	-		g -	

CL	IEN	Г	A	llen Prie	ce & As	sociates	; Pty	Ltd	COMMENCED	23.11.10	COMPLET	ED 23.11.	10			REF		BH6	
-	OJE	СТ	-	ngineer					LOGGED	GT	CHECKED	AN		_		Sheet 1	of 1	-	
SI			C	ullburra	-	West Cu	ıllbı	irra	GEOLOGY	Siltstone	VEGETAT					PROJECT	NO. P1	002842	
	IPMEI			ISIONS	Hydraulic 0.1mØ X	5.5m depth			EASTING NORTHING	NA	RL SURFA	CE NA North				SLOPE	1-29	%	
	EX	CA\	/AT	ION DA				MA	TERIAL D	ТА				SA	MPLIN	G & TES	STING		
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	M PENETRATION	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org		asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	түре	DEPTH (M)		WATER		DETAILS	Cover
A	Nil	N	М	0.1	<u></u>		CL	SILTY SANDY	CLAY – Dark	grey/brown.	S		A	0.2	2842/6/0	.2		Concr	<u>ste</u> –
А	Nil	N	м	- 			CL	SILTY SAND C	LAY – Browr	n/light brown.	S		A	0.5	2842/6/0				-
А	Nil	N	м	- 0.7			CL	CLAY - Red/orange w with depth, minor g	ith light brow	n mottles increasing	St			0.0	2012/0/0	.0			-
A	Nil	N	м	- <u>1.0</u> - 1.3			СН	CLAY - Grey/cream wi plastic, gravel	th red/brown	mottles, moderately	St		A	1.0	2842/6/1	.0			 2 Pipe. 1 <u>.0</u>
													A	1.5	2842/6/1	.5			
A	Nil	N	м	_ <u>2.0</u> _			CL HW	CLAY - HIGHLY V Light grey with red r increa		one gravels bands	VSt		A	2.0	2842/6/2	.0		Sand	Pack. – 2 <u>.0</u> - ogl –
				_ _ _ 2.8									A	2.5	2842/6/2	.5		UPVC	 Screen
А	Nil								ODERATEL	WEATHERED	VSt		В	3.0	2842/6/3	.0			3 <u>.0</u>
A	Nil	N	D	3.3			CL/ HW		nm, approx 1		VSt								-
A	Nil N D 3.1 CL/ CL/							CLAY - EXTREMEL Dark brown/dark	Y WEATHER	ED SILTSTONE -	VSt		A B	3.54.55.5	2842/6/3 2842/6/4 2842/6/5	.5 <u>5.33</u> mbgl		Wellend	
				-					erminated at weathered si					5.5	2042/0/3				
N X	Na Ex	atural (kisting	expos exca	ure SH vation SC	JPPORT + Shoring C Shotcrete		e obse measu	rved D Dry L Lo red M Moist M M	ow VS oderate S	SISTENCY DENSITY Very Soft VL Very Loo Soft L Loose	se A A B B	PLING & TEP	•	pp S	Standard	enetrometer penetration	S	LASSIFICAT YMBOLS AN OIL DESCR	ID
E F F A	Ex A Ha Ha T Pu	ckhoe cavat ind au ind sp sh tub iger ncrete	or ger ade e	Ni	B Rock Bo I No supp	oort ≚ -		Wp Plastic limit R Re Iow WI Liquid limit w	efusal St VSt H F	Firm MD Medium D Stiff D Dense Very Stiff VD Very Dens Hard Friable	D E se M M Ux T	Indisturbed sar Disturbed sar loisture cont ube sample	nple ent (x mm)	D0 FC W	S Vane she CP Dynam penetro O Field der S Water sa	nic cone ometer nsity	-	Y USCS	ıral
				rte Martens & As:	ns		ON L		MARTENS & 6/37 Hornsby, none: (02) 9476	ACCOMPANYING REP ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 876 WEB: http://www.martens	67	S AND A			jine	erin oreh	-	og -	

	IEN					sociates	Pty	Ltd	COMMENCED	24.11.10	COMPLET		24.11.10			REF	TP9	
	OJE	СТ	+	ngineer	•				LOGGED	GT	CHECKED	-	AN			Sheet 1 of		
SIT		лт	C	ullburra	Backhoe	West Cu	illbu	irra	GEOLOGY	Siltstone	VEGETAT RL SURFA		None NA			PROJECT NO.	P1002842	
			DIMEN	ISIONS)m X 2.5m de	pth		NORTHING	NA	ASPECT		Sourth			SLOPE	2-3%	
	EX	CAV	/AT	ION DA	ГА			MA	TERIAL D	ATA				SA	MPLIN	G & TESTIN	IG	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	L M PENETRATION R R R R R R R R	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STR nottling, colour, pl anics, secondary a ontamination, odou	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)	A	RESULT DDITIONAL OI	S AND BSERVATIONS	
BH	Nil	Ν		0.1		× * × × * ×	SM	ORGANIC SILTY	′ SAND – Da	rk grey/brown.		L	B	0.2	2842/9/0	2		
вн	Nil	N	м	-0.35		x x x	SM	SILTY SAND – Light g	grey/grey, gra	vels (1-5mm, 10%).		L						
вн	Nil	N	м	0.6		 	CL	CLAY - Orange/brov	vn mottled, m	oderately plastic.	F St		В	0.5	2842/9/0			
вн	Nil	N	м	<u>1.0</u> - 1.4		 	CL	CLAY - Grey/red/orar	nge mottled, i	noderately plastic.	VSt		В	1.0	2842/9/1			1 <u>.0</u> - -
вн	Nil	N	м				CL/ HW	CLAY/HIGHLY W Grey/pink/red/orange, to extremely we	siltstone gra	vels bands, tending	VSt		В	2.0				
вн	Nil	N	м	 2.5		 	мw				VSt			2.0				
With grey/orange/red mottling.																		
N X B E H S P A	Na E: H Ba Ex A Ha Ha T Pu	itural e kisting ckhoe cavate nd au ind sp sh tub ger	expos exca buck or ger ade e	ure SH vation SC et RE Nil	PPORT Shoring Shotcrete Rock Bol No suppo	lts <u>▼</u> Wat	e obse measu er leve er outf	rrved D Dry L Lo red M Moist M M. I W Wet H Hig Wp Plastic limit R Re Iow WI Liquid limit	w VS oderate S gh F ifusal St VSt H	SISTENCY DENSITY Very Soft VL Very Loo Soft L Loose Firm MD Medium D Stiff D Dense Very Stiff VD Very Dens Hard Friable	ise A A B E Dense U U D E se M M	Auger s Bulk sar Jndistu Disturb Ioistur	& TESTING ample mple irbed sample ed sample e content ample (x mm	PF S D	 Pocket pr Standard S Vane shi CP Dynam penetro D Field der S Water sa 	ic cone meter isity	CLASSIFICATION SYMBOLS AND SOIL DESCRIPTI Y USCS N Agricultural	ION
Ľ		2.010	2010			EXCAVATI	ON LO	OG TO BE READ IN CONJU		ACCOMPANYING REP	ORT NOTE	S AN	ID ABBRE	VIATI	ONS			
(rte Martens & Ass		.td . 2010			6/37 Hornsby, none: (02) 9476	ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 876 WEB: http://www.martens			E	-		ering avatio	_	

CL	IEN	Г	A	llen Pric	ce & As	sociates	. Pty	Ltd	COMMENCED	24.11.10	COMPLET	ED	24.11.10			REF	TP10
PR	OJE	СТ	E	ngineer	ing Se	rvices			LOGGED	GT	CHECKED)	AN			Sheet 1 of	-
SIT			C	ullburra	1	West Cu	ıllbı	ırra	GEOLOGY	Siltstone	VEGETAT		None			PROJECT NO.	P1002842
				SIONS	Backhoe	.0m X 2.0m de	nth		EASTING NORTHING	NA NA	RL SURFA	ACE	NA North Wes			SLOPE	2-3%
EAC						.011 × 2.011 de	pun	MA			ASPECT		North Wes			G & TESTI	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)		GRAPHIC LOG	CLASSIFICATION	DESCRI Soil type, texture, structure, r particle characteristics, org	PTION OF STR	ATA asticity, rocks, oxidation, and minor components,	CONSISTENCY			(RESUL	
BH	Nil	N	М	0.1		× * * *	SM	ORGANIC SILT	Y SAND – Da	rk grey/brown.			L B	0.2	2842/10/	0.2	
вн	Nil	N	М	0.3		× × ×	SM	SILTY SAND – Light g	grey/grey, gra	vels (1-5mm, 10%).				0.2	2042/10/		
вн	Nil	N	м	0.5 0.8			CL	CLAY - Orange/brov	wn mottled, m	oderately plastic.	F St		B	0.5	2842/10/	0.5	-
вн	Nil	N	м	<u>1.0</u> - 1.3			CL	CLAY - Grey/red/ora	nge mottled,	moderately plastic.	VSt		B	1.0	2842/10/	1.0	1 <u>.0</u> - -
вн	Nil	N	м	-			CL/ EW	CLAY/EXTREMELY Grey minor mott siltstone banc	tles, moderate Is, tending to	ely weathered moderately	VSt		B	1.5	2842/10/	1.5	
			-	2.0				weat	hered siltstor	16.			в	2.0	2842/10/	2.0	2.0
N X B E H S	ECULIPMENT /METHOD 3.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5						MOISTURE PENE pred D Dry L Lo red M Moist M M W Wet H Hi W Plastic limit R Re low WI Liquid limit	TRATION CON www.vs oderate S gh F fusal St VSt H H F	SISTENCY DENSITY Very Soft VL Very Loo Soft L Loose Firm MD Medium E Stiff D Dense Very Stiff VD Very Dens Hradle	ise A B I Dense U D Se M I Ux	Auger Bulk s Undist Disturl Moistu Tube s	G & TESTI sample ample urbed samp bed sample re content iample (x m	p S N D M) F V	Standard S Vane she CP Dynam penetro D Field der /S Water sa	ic cone meter isity	3.0 3.0 3.0 4.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5	
						EXCAVATI	ON L	OG TO BE READ IN CONJL			ORT NOT	ES A	ND ABBR	EVIAT	ONS		
(rte Martens & Ass		Ltd . 2010			6/37 Hornsby, 10ne: (02) 9476	ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 876 WEB: http://www.martens			E	Eng	-	ering avatio	•

	IEN					sociates	Pty	Ltd	COMMENCED		COMPLET		24.11.10			REF	TP12	
		СТ	-	-	ing Ser					GT	CHECKED		AN			Sheet 1		
SIT		лт	C	ullburra	Backhoe	West Cu	illbu	irra	GEOLOGY	Siltstone NA	VEGETAT RL SURFA		None NA			PROJECT NO	O. P1002842	
-			IMEN	SIONS)m X 2.2m de	pth		NORTHING	NA	ASPECT		North			SLOPE	2-3%	
	EX	CAV	/AT	ION DA	ТА			MA	TERIAL D	ATA				SA	MPLIN	G & TEST	TING	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	L M PENETRATION R R R R SISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STF nottling, colour, p anics, secondary ontamination, odo	lasticity, rocks, oxidation, and minor components,	CONSISTENCY		TYPE	DEPTH (M)	A	RESU DDITIONAL	ILTS AND OBSERVATIONS	
BH	Nil	N	М	0.1	**	× * *	SM	ORGANIC SILTY	′ SAND – Da	ark grey/brown.			- В	0.2	2842/12/	0.2		_
вн	Nil	N	м	0.3		× × × ×	SM	SILTY SAND – Light g	grey/grey, gra	avels (1-5mm, 10%).				0.2				
вн	Nil	N	м	0.5 0.7		 	CL	CLAY - Orange/brov	vn mottled, n	noderately plastic.	F St		В	0.5	2842/12/	0.5		-
вн	Nil	N	м	1.0 - 1.3		 	CL	CLAY - Grey/red/orar	nge mottled,	moderately plastic.	VSt		В	1.0	2842/12/	1.0	1	.0
вн	Nil	N	М	- - - 2.0 2.2			CL/ EW	CLAY/EXTREMELY Grey minor mott siltstone band weat	les, moderat	ely weathered moderately	VSt		В	1.5	2842/12/	1.5	2	2.0
				-				Test pit termina weat	ted at 2.2m of hered siltstor									
				<u>3.0</u> -													3	<u>3.0</u>
				-														-
				- <u>4.0</u> -													4	1.0
				-														-
																	5	5.0
				-														-
				_														-
				<u>6.0</u> 													Ę	<u>ة.0</u>
				-														-
				<u>7.0</u>													7	7.0
				_														-
																		-
				_														_
				80													ß	-
				_														-
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				-														_
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E	QUIPN	/ENT	/ ME		JPPORT	WATER		MOISTURE PENE	TRATION CON	SISTENCY DENSITY	SAN	IPLIN(G & TESTIN	G				9. <u>0</u>
N X BI E H, S P A	E> H Ba Ex A Ha Ha	ckhoe cavate nd aug nd sp sh tub	exca buck or ger ade	vation SC et RE	H Shoring C Shotcrete B Rock Bol I No suppo	ts 👽 Wat	measu ter leve ter outf	red M Moist M Mo W Wet H Hig Wp Plastic limit R Re Iow WI Liquid limit	oderate S gh F efusal St VSt H	Very Soft VL Very Loc Soft L Loose Firm MD Medium Stiff D Dense Very Stiff VD Very Den Hard Friable	B I Dense U D Ise M I	Bulk sa Undist Disturb Moistu	sample ample urbed sample bed sample re content ample (x mm	8 9 V D	 Pocket po Standard S Vane sho CP Dynam penetro D Field der /S Water sa 	ic cone meter isity	SYMBOLS AND SOIL DESCRIPTION Y USCS N Agricultural	I
C	C Cor		Core	r		ΞΧϹΑ\/ΔΤι		OG TO BE READ IN CONJU				ES AI			ONS			-
⊢		/								ASSOCIATES PTY LTD					_	• ···		-
(rte	NS sociates Pty. L	.td . 2010		Pł mail@m	Hornsby, 10ne: (02) 9476	' Leighton Place NSW 2077 Australia 5 9999 Fax: (02) 9476 87 WEB: http://www.marten	67 is.com.au		E		-	ering avati	y Log - ion	

CL	IEN	Г	A	llen Pric	:e &	As	sociates	s Pty	Ltd	COMMENCED	24.11.10	COMPLET	ED	24.11.10			REF	TP14
	OJE	СТ	-	ngineer	-					LOGGED	GT	CHECKED		AN			1	of 1
SIT			C	ullburra			West Cu	ıllbı	ırra	GEOLOGY	Siltstone	VEGETAT		None			PROJECT NO	. P1002842
				ISIONS	Back)m X 1.5m de	onth		EASTING NORTHING	NA	RL SURFA		NA North			SLOPE	2-3%
				ION DA		1 X 2.0		pui	MA			ASILOI		North	SA	MPLIN	G & TEST	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	PENETRATION	RESISTANCE	GRAPHIC LOG	CLASSIFICATION	DESCRI Soil type, texture, structure, r particle characteristics, org	PTION OF STR	ATA asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)		RESUL	TS AND DBSERVATIONS
BH	Nil	N	М	0.1	≥ ⊙4	Ξœ		SM	ORGANIC SILT	SAND – Da	rk arev/brown	-	L					
BH	Nil	N	М	-0.25			× × ×	SM	SILTY SAND – Light g				L	. В	0.2	2842/14/	0.2	
BH	Nil	Ν	м	- 0. <u>35</u> - 0. <u>35</u> 0.5		3		CL	CLAY - Orange/brov			F St		В	0.5	2842/14/	0.5	
вн	Nil	N	м					CL	CLAY - Light grey/g	rey with brow	n/orange mottled.	VSt						-
вн	Nil	N	м	0.8				EW	EXTREMELY WEAT	HEREDSI	ISTONE BANDS	VSt						
				1.0 				-				VOL		В.	1.0	2842/14/ 2842/14/		<u>1.0</u> –
вн	Nil	N	М	-				мw	MODERATELY V Grev	VEATHERED , minor mottle		VSt						-
				1.5						, minor mota				В	1.5	2842/14/	1.5	
				_					Test pit termina									-
				-					weat	hered siltstor	e.							-
				2.0														2 <u>.0</u>
				_														-
				_														-
				_														_
																		-
				<u>3.0</u>														3 <u>.0</u>
				_														-
																		-
																		-
																		-
				<u>4.0</u>														4 <u>.0</u>
				_														-
				_														-
				-														-
				-														-
				<u>5.0</u>														5 <u>.0</u>
				_														-
				E														-
				-														-
				_														-
				<u>6.0</u>														6 <u>.0</u>
				_														_
																		-
				_														-
				L														-
				<u>7.0</u>														7 <u>.0</u>
				-														-
				F														-
				-														-
				-														-
				<u>8.0</u> 														8 <u>.0</u>
				_														-
				L														-
				-														-
				- 9.0														- 9.0
				THOD SU	JPPO		WATER				SISTENCY DENSITY			G & TESTING		D		CLASSIFICATION
	E	atural (kisting .ckhoe	exca	vation SC	H Sho	otcrete		measu	red M Moist M M	oderate S	Very Soft VL Very Loo Soft L Loose Firm MD Medium [BE	Bulk sa		S	Standard	enetrometer I penetration test	SYMBOLS AND SOIL DESCRIPTION
E	Ex	cknoe cavat ind au	or		B Roo No			ter leve	Wp Plastic limit R Re	fusal St	Stiff D Dense	D	Disturb	urbed sample ed sample re content		S Vane sh CP Dynam penetro	iic cone	Y USCS
s	Ha	ind sp sh tub	ade				→ Wat			Н	Very Stiff VD Very Dens Hard Friable			ample (x mm)		D Field der S Water sa	nsity	N Agricultural
A		iger		r			V vval								~ ~ ~			
						E	EXCAVATI	ON L	OG TO BE READ IN CONJU	INCTION WITH	ACCOMPANYING REP	ORT NOT	ES AN	ND ABBRE	VIATI	ONS		
)								ASSOCIATES PTY LTD		Γ	F	'n	ning	orina	Log -
6/37 Leighton Place Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 947											NSW 2077 Australia	77		L	_	-	-	-
				Martens & Ass			_td . 2010				9999 Fax: (02) 9476 876 WEB: http://www.martens					Exc	avati	on

CL						sociates	Pty	Ltd	COMMENCED		COMPLET		4.11.10			REF	TP15	٦
PR		СТ	-	ngineer	-				LOGGED	GT	CHECKED		N			Sheet 1		
SIT EQU		лт	C	ullburra	Backhoe	West Cu	illbu	rra	GEOLOGY	Siltstone	VEGETATI RL SURFA		A			PROJECT N	IO. P1002842	_
			DIMEN	ISIONS		0m X 2.7m de	pth		NORTHING	NA	ASPECT		lorth			SLOPE	1-2%	-
	EX	CA	/AT	ION DA				MA	TERIAL D	ATA				SA	MPLIN	G & TES	TING	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	L M FENETRATION R R R R SISTANCE		CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STF nottling, colour, pl anics, secondary intamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)	Δ		JLTS AND OBSERVATIONS	
BH BH	Nil Nil	N N	M	0.1 0.2		× × × ×	SM SM	ORGANIC SILTY				L	В	0.2	2842/15/	0.2		-
вн	Nil	N	м	- <u>0.6</u> - <u>0.6</u> - <u>0.9</u> <u>1.0</u>			CL	SILTY SAND – Light c			F St		В	0.5	2842/15/ 2842/15/			- - - 1
вн	Nil	N	м	- - - 1.7			CL	CLAY - Grey/red/orar	nge mottled,	moderately plastic.	VSt		В	1.5	2842/15/	1.5		
вн	Nil	N	м	_ _ _ _ _ _ _ _ _ _ _ _ _ 2 7			CL/ HW	CLAY/HIGHLY W Grey/pink/red, silt to extremely wea	stone gravels	s bands, tending	VSt		B B B	2.0 2.5 2.6	2842/15/ 2842/15/ 2842/15/	2.5	2	- 2.0 - - - -
	H H Grey/pin 								ated at 2.7m hered siltstor	on extremely ne.								
N BI E H S P A	Na E: H Ba Ex A Ha Ha T Pu Au C Co	atural e kisting ckhoe cavate nd au ind sp sh tub iger ncrete	expos expos e buck or ger eade e e Core	ure SI vation S(et RI Ni		olts ⊻ Wat ort √ Wat → Wat	e obse measu er leve er outf er inflo	rved D Dry L Lo red M Moist M M WWet H Hig WP Plastic limit R Re low WI Liquid limit W	w VS defate S fusal St VSt H NCTION WITH MARTENS & 6/37 Hornsby,	SISTENCY DENSITY Very Soft VL Very Loo Soft L Loose Firm MD Medium E Very Stiff D Dense Very Stiff VD Very Dens Hard Friable HACCOMPANYING REP ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 876	se A A B B Dense U U E M M Se M M Ux T	uger sa ulk sam ndisturt isturbeo oisture ube sar	iple bed sample d sample content mple (x mm) D ABBRE		Standarc S Vane sh CP Dynam penetro D Field der S Water sa ONS	ic cone ometer isity imple	CLASSIFICATION SYMBOLS AND SI SOIL DESCRIPTION Y USCS N Agricultural	

-	IEN [®]					sociates	Pty	Ltd			COMPLET		24.11.10			REF	TP16	6
		СТ	-	ngineer	-					GT	CHECKED		AN None			Sheet 1		
		NT	10	uliburra	Backhoe	West Cu	ומווו	irra	GEOLOGY	NA	VEGETAT		NA			PROJECT	IO. P1002842	
EXC	ΑνΑτ		DIMEN	SIONS	0.4m X 2.0)m X 2.4m de	pth		NORTHING	NA	ASPECT		North			SLOPE	2-3%	
	EX	CA	/AT	ION DA				MA	ATERIAL D	ΑΤΑ				SA	MPLIN	G & TES	TING	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	L M PENETRATION R R R R SISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STF nottling, colour, p anics, secondary ontamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)	A		JLTS AND _ OBSERVATIO	NS
BH	Nil	Ν	М	0.1		× × ×	SM	ORGANIC SILTY	′ SAND – Da	irk grey/brown.		L	В	0.2	2842/16/	0.2		
BH	Nil	Ν	М	0.4		× * * • × * *	SM	SILTY SAND – Light g	grey/grey, gra	avels (1-5mm, 10%).		L						_
вн	Nil	N	м	0.6		 	CL	CLAY - Light brown/g	grey mottles,	moderately plastic.	F St		В	0.5	2842/16/	0.5		-
вн	Nil	N	м	<u>1.0</u> 1.2			CL	CLAY - Grey with minor gravels, moder	n minor red/c rately plastic, with depth.	range mottles, mottles increasing	VSt		В	1.0	2842/16/	1.0		1 <u>.0</u> _
вн	Nil	N	м	 			CL HW	CLAY - HIGHLY WEAT minor red/orange mo plastic, mottles inc bands/gravels tending to extre	THERED SIL ttles, minor g creasing with s (1-10mm, a	ravels, moderately depth, siltstone pprox 20%),	VSt		В	1.5 2.0	2842/16/ 2842/16/	2.0		 2 <u>.0</u>
				2.4				T					В	2.4	2842/16/	2.4		
								Test pit termina weat	ated at 2.4m hered siltstor									3.0
N Natural exposure SH Shoring N None observed D Dry L Low VS Very Soft VL Very Loose A Auger sample pp Pocket penetrometer SYM														Y USCS N Agricul	ND RIPTION Itural			

	IEN					sociates	Pty	Ltd	COMMENCED	24.11.10	COMPLET		10			REF	TP20	
PR SI	OJE	СТ	-	ngineer	•				LOGGED	GT Siltstone	CHECKED					Sheet 1 o	of 1	
		νт		unpurra	Backhoe	West Cu	unou	irra	EASTING	NA	RL SURFA					FROJECT NO	. 11002042	
EXC				ISIONS)m X 2.2m de	pth		NORTHING	NA	ASPECT	North	West			SLOPE	1-2%	
	EX	CA\	/AT	ION DA				MA	TERIAL D	ATA				SA	MPLIN	G & TEST	ING	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	L M PENETRATION H R R R R R	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STR nottling, colour, pl anics, secondary a ontamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)	А		TS AND DBSERVATION	S
BH	Nil	Ν	М	0.2		× × × ×	SM		ND – Dark gr			L	В	0.2	2842/20/	0.2		
BH BH	Nil Nil	Y Y	w w	-0.35 - 0 <u>.45</u> -0.55		<u>***</u> *	SM CL	SILTY CLAYEY CLAY - Orange/brown,			F St	L	в	0.5	2842/20/	0.5		
вн	Nil	N	м	- - - - - - - - - - - - - - - - - - -			СН	CLAY - Red/grey, r		, orange mottled,	VSt		В	1.0 1.5 2.0	2842/20/ 2842/20/ 2842/20/	1.5		
									ated at 2.2m	on clays.								3.0 4.0
																		5.0
	Na E: H Ba Ex A Ha Ha T Pu Au C Co	tural e kisting ckhoe cavat nd au nd sp sh tub ger ncrete	expos exca buck or ger ade e Core	ure SH vation SC et RE Nil		lts ⊻ Wat ort → Wat → Wat	e obse measu er leve er outf er inflo	nrved D Dry L Lo red M Moist M Mu I W Wet H Hig Wp Plastic limit R Re low WI Liquid limit	w VS oderate S gh F fusal St VSt H F INCTION WITH MARTENS &	ASSOCIATES PTY LTD	ose A A B E Dense U U D I se M N Ux T	PLING & TE Auger sample 3ulk sample Jndisturbed sa Abisture con Cube sample	sample nple rent (x mm)	pp S Do FE W	Standard S Vane she CP Dynam penetro O Field der S Water sa	ic cone ometer isity imple	CLASSIFICATI SYMBOLS AN SOIL DESCRIF USCS N Agricultu	D PTION
				rte Martens & Ass		_td . 2010			Hornsby, none: (02) 9476	Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 876 WEB: http://www.marten:			L	-		avati	-	

-	IEN					sociates	s Pty	/ Ltd	COMMENCED		COMPLET		10			REF	TP21	
		СТ	-	ngineer	-				LOGGED	GT	CHECKED						of 1	
SIT		лт	C	ullburra	Backhoe	West Cu	ullbu	urra	GEOLOGY	Siltstone	VEGETAT					PROJECT NO). P1002842	
<u> </u>			DIMEN	SIONS		0m X 2.6m de	epth		NORTHING	NA	ASPECT	North	West			SLOPE	1-2%	
	EX	CA\	/AT	ION DA	ТА			MA	TERIAL D	ATA				SA	MPLIN	G & TEST	ING	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	L M FENETRATION R R R R R	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STF nottling, colour, pl anics, secondary ontamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	түре	DEPTH (M)	А		LTS AND OBSERVATION	IS
BH	Nil	Ν	м	_0.12	22 22		CL	SILTY SANDY	CLAY – Darl	k grey/brown.	S		В	0.2	2842/20/	0.2		_
вн	Nil	Ν	м	0.5			CL	SILTY SAND C	LAY – Brown	n/light brown.	S		В	0.5	2842/20/			-
вн	Nil	N	м	0.8			CL	CLAY - Red/orange with depth, minor g	ith light brow pravels (1-10	n mottles increasing mm, approx 5%).	St							-
вн	Nil	N	м	<u>1.0</u> 			СН	CLAY - Grey/cream wi plastic, gravel			St		В	1.0	2842/20/ 2842/20/			1 <u>.0</u> - -
				1.6			_						В	1.5	2042/20/	1.5		
вн	Nil	N	м	- 2.0 - - -			CL HW	CLAY - HIGHLY V Light grey with red r increa		one gravels bands	VSt		В	2.0	2842/20/			- 2 <u>.0</u> - - -
				2.6 -				Toot pit torminot	ad at 2 6m ar	modorotoly			В	2.6	2842/20/	2.6		
								Test pit terminate weath	ad at 2.6m or ered siltstone									
N X B E H S P A	Na E: H Ba Ex A Ha Ha T Pu Au	itural o kisting ckhoe cavat nd au ind sp sh tub ger	ger ade	ıre S⊦ ∕ation SC at RE Nil	JPPORT I Shotcret Shotcret Rock Bo No supp	lts 👽 Wa	ie obsi measi ter levi ter out	erved D Dry L Lo ured M Moist M M el W Wet H Hi Wp Plastic limit R Re flow WI Liquid limit	w VS oderate S gh F efusal St VSt H	ISISTENCY DENSITY Very Soft VL Very Loose Firm MD Medium I Stiff D Dense Very Stiff VD Very Dens Hard Friable	ose A B Dense U D se M	IPLING & TE Auger sample Bulk sample Undisturbed sa Disturbed sar Moisture cont Tube sample	e sample mple tent	PF S VS D(FI	 Pocket pr Standard Vane shat CP Dynampenetro Field der S Water sat 	ic cone meter isity	CLASSIFICAT SYMBOLS AN SOIL DESCRI Y USCS N Agricultu	ion Id Ption
				rte Martens & Ass	ns		ON L		MARTENS & 6/37 Hornsby, none: (02) 9476	H ACCOMPANYING REP ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 99999 Fax: (02) 9476 870 WEB: http://www.marten	67			ng	jine	ering avati	ı Log - on	

С	LIEN	IT	1	Allen Pri	ce & A	ssociates	Pty	Ltd	COMMENCED	24.11.10	COMPLET	ED	24.11.10			REF		BH	5	
	ROJ	ЕСТ	-	Inginee					LOGGED	JSF	CHECKED		GT			Sheet 1				
				Cullburr	A Road	d, West Cu	illbu	irra	GEOLOGY	Siltstone	VEGETATI		Eucalypts NA			PROJECT N	0. P1	002842		
-			DIME	NSIONS	-	X 5.5m depth			NORTHING	NA	ASPECT		North			SLOPE	5%			
	E	(CA	VA.				1	MA	ATERIAL D	ATA				S		IG & TES	ΓING			
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	L PENETRATION H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STR nottling, colour, pl anics, secondary ontamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	TYPF	DEPTH (M)		0.54m agl			L S Well Cover	
А	Ni	N	м				OL	ORGANIC SA	NDY SILT -	Dark brown.	s		4	0.2	2842/5/0	.2			Concrete	-
				0.3			-						A	0.5	2842/5/0	0.5		Ве	entonite Seal	
A	Nil	N	м	- <u>1.0</u> - 1.3			CL	CLAY - Orange/bro tending grey with mino			F- St		A	1.0	2842/5/1	.0			.0 <u>m bgl</u> UPVC Pipe.	- 1 <u>.0</u> -
А	Ni	I N	I D	_			EW	EXTREMELY W Orange	EATHERED				Α	1.5	2842/5/1	.5		2 2 <u>1.</u>	<u>68</u> m bgl	-
A	Nil	N	D				MW	MODERATELY V Orange	VEATHEREE /grey mottlec				A	2.5	2842/5/2	2.5			Sand Pack.	2.0
A Nil N D E EXTREMELY WEATHERED SILTSTONE - Orange/grey mottled, dry. Image: Constraint of the second sec											4.0									
A	Ni	N	D	- 4.3			sw	SLIGHTLY WE	EATHERED	SILTSTONE.										-
A	A Nii N D 4.3											5.0								
	N N BH E E E HA F S F PT P	Natural Existin Excava Iand a Iand s ush tu	l expo ng exc ator uger pade be	sure S avation S ket R N	UPPORT H Shorin C Shoter B Rock E ii No su;	ng N Non rete X Not Bolts ∏ Wat	e obse measu er leve er out	MOISTURE PENE rved D Dry L Lo red M Moist M M Wet H Hi Wp Plastic limit R Re low Wi Liquid limit	ow VS oderate S gh F efusal St VSt H		se A A B B Dense U L D D Se M M	luger s Julk sa Indistu Disturb Ioistur	S & TESTI sample mple e d sample e content ample (x m	ole im)	pp Pocket p S Standar VS Vane sh OCP Dynam penetric D Field del WS Water si	nic cone ometer nsity	st S		SCRIPTIC	6.0
	(rte It Martens & As		6			MARTENS & 6/37 Hornsby, none: (02) 9476	ACCOMPANYING REP ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 876 WEB: http://www.marten:	67	SAN			gine	ering oreho	-	og	-	

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SIT		UT.	C	ullburra	Hydraulic	West Cu	ıllbı	irra	GEOLOGY	Siltstone NA	VEGETA RL SURF		6			PROJECT NO). P1002842	
			DIMEN	SIONS		2.5m depth			NORTHING	NA	ASPECT		West			SLOPE	4%	
				ION DA				MA	TERIAL D					SA		G & TEST		
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	M PENETRATION H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STF nottling, colour, pl anics, secondary ontamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	түре	DEPTH (M)		RESU	LTS AND OBSERVATIO	NS
A	Nil	N	M	0.1		× × × ×	OL	ORGANIC SA	NDY SILT –	Dark brown.	S		A	0.2	2842/7/0	2		
A	Nil	N	М	0.3		× × × ×	SC	CLAYEY SAND - Br	own, moist (a	almost wet), loose.	/	L						
A	Nil	N	м	- - - <u>1.0</u> <u>1.2</u>			CL	CLAY - Orange/bro tending grey with mino	r brown and	red mottles at depth.	F		A	0.5	2842/7/0			- - - 1 <u>.0</u> -
А	Nil	N	D	_			EW	EXTREMELY W	EATHERED lay like prope				A	1.5	2842/7/1.	5		-
A	Nil	N	D	1.6 			MW	MODERATELY WEATHERE	ATHERED W	/ITH EXTREMELY NE BANDS.							nd checked 2 hour nd found dry.	s _
									erminated at									400 400 500 400 400 400 400 400 400 400
N X B E H S P A	EQUIPMENT / METHOD SUPPORT WATER MOISTURE PNETRATION CONSISTENCY DENSITY SAMPLING & TESTING CLASSIFICATION SYMBOLS AND N Natural exposure SH Shoring N Nore observed D Dry L Low VS Very Soft VL Very Loose A Auger sample S Pp Pocket penetration test SYMBOLS AND K Existing excavation SC Shotrate X Not measured M Moist M Moderate S Soft L Loses B Bulk sample S Standard penetration test SOILD EECCRIPTION BH Backhoe bucket RB Rock Bolts W Water with R Refusal St Stiff D Dense D Disturbed sample VS VS Vane shear E Excavator Nil No support W Vater outflow WI Liquid limit VS VS Very Dense M Moisture content DCP Dynamic cone Penetrometer Y USCS S Hand spade Water inflow F Friable F Friable VS Vane sample NS Water sample N Agricultural A Auger																	
				rte			ON L		MARTENS & 6/37 Hornsby, none: (02) 9476	ACCOMPANYING RE ASSOCIATES PTY LTI Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 8 WEB: http://www.marte	767	ES AND A			gine	ering reho	ı Log · le	-

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	I E JIPME	NT	C	ullburra	Hydrau		Nest Cu	illbu	irra	GEOLOGY	Siltstone	VEGETAT RL SURFA		rass			PROJECT NO	D. P1002842	
			DIMEN	SIONS	-		2.5m depth			NORTHING	NA	ASPECT		orth West			SLOPE	5%	
	ΕX	CA\	/AT	ION DA					MA	TERIAL DA	ATA	•			SA	MPLIN	IG & TEST	ING	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)			GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, n particle characteristics, orga	PTION OF STR mottling, colour, pla anics, secondary a ontamination, odou	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)	A		ILTS AND OBSERVATI	IONS
A	Nil Nil	N N	M M	0.1		Ħ	× × × × × × × × ×	OL SC	ORGANIC SA	NDY SILT – I	Dark brown.	S	L	A	0.2	2842/7/0	0.2		
Ĥ		IN	IVI	0.3		\square	<u> </u>	30	CLAYEY SAND - Br	own, moist (a	lmost wet), loose.	\vdash		A	0.5	2842/7/0			
A	Nil	N	м	- - - <u>1.0</u> - 1.3				CL	CLAY - Orange/bro tending grey with mino			F		A	1.0	2842/7/1			- - - 1.0 - -
А	Nil	N	D	E				EW	EXTREMELY W					А	1.5	2842/7/1	.5		
A	Nil	N	D	1.6				EW	Grey, red mot EXTREMELY W	-									
A	INII	IN		1.9 2.0					Orange,	clay like prop	erties.			A	20	2842/7/2	.0		2.0
	N.U			-					MODERATELY V	VEATHERE	SILTSTONE -				2.0	2012/1/2			
A	Nil	N	D	_				MW		Grey.							Borehole dry	after 2 hours.	-
				2.5 						erminated at 3									
N X B B F S F A	I Na H Ba E> IA Ha Ha T Pu	atural e xisting ickhoe cavate and au and sp sh tub iger	expos g excav e buck or iger oade e	sure SI vation S(æt RI Ni	UPPORT H Shori C Shotr B Rock iii No su	ring crete k Bolts	s 🐺 Wat	e obse measu er leve er outf	erved D Dry L Lo Ired M Moist M Mo al W Wet H Hig Wp Plastic limit R Re Now WI Liquid limit	ow VS oderate S gh F efusal St VSt H	SISTENCY DENSITY Very Soft VL Very Loc Soft L Loose Firm MD Medium I Stiff D Dense Very Stiff VD Very Den Hard Friable	ose A A B E Dense U U D I se M M	Auger sa Bulk sam Jndisturt Disturbeo Noisture	iple bed sample d sample	PF S V: D		nic cone ometer nsity	Y USC	S AND CRIPTION
				rte Martens & As		5		<u>ON LO</u>		MARTENS & 6/37 6/37 Hornsby, none: (02) 9476	ACCOMPANYING REF ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 87 WEB: http://www.marten	67				gine	ering oreho	g Log Je	_

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	OJE	СТ	-	ngineer	-				LOGGED	JSF	CHECKED		GT			Sheet 1		
SIT			C	ullburra	Hydraulic	West Cu	ıllbı	ırra	GEOLOGY	Siltstone	VEGETAT		Eucalypts NA			PROJECT N	IO. P1002842	
			IMEN	SIONS		2.0m depth			EASTING NORTHING	NA	RL SURFA	-	North East			SLOPE	4%	
				ION DA				MA	TERIAL D					SA	MPLIN	G & TES		
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	M PENETRATION H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STF nottling, colour, p anics, secondary ontamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)	A		ULTS AND OBSERVATIONS	
А	Nil	Ν	М	0.2		* * * *	OL	ORGANIC SA	NDY SILT –	Dark brown.	S		А	0.2	2842/11/	0.2		_
				_		·							A	0.5	2842/11/	0.5		1 1
A	Nil	Ν	м	- - 1.0 -			CL	CLAY - Orange/bro tending grey with mino	own mottles, or brown and	firm grading stiff, red mottles at depth.	F- St		A	1.0	2842/11/	1.0		- - 1 <u>.0</u> -
А	Nil	N	D	1.3 		<u></u>	EW	EXTREMELY W Gre	EATHERED				A	1.5	2842/11/	1.5		
А	Nil	N	D	1.8 2.0			мw	MODERATELY	VEATHERE									2.0
				- - - - - - <u>3.0</u>				Borehole t	erminated at v weathered s	2.0m on								- - - - - - - - - - - - - - - - - - -
				- - - - -														
				<u>4.0</u> 														4 <u>.0</u>
																		5.0
				 														- 10 6. 1 1 1 1
				 														7 <u>.0</u> -
																		8.0
N X B E H S P A	Na Ex Ex A Ha Ha T Put	tural e disting ckhoe cavato nd aug nd spa sh tube ger	exposi excav bucke or ger ade e	ure SH vation SC et RE Nil	JPPORT Shoring Shotcrete Rock Boot No suppo	lts 👽 Wat	e obs meas er lev er out	erved D Dry L Lo Ired M Moist M M al W Wet H Hi Wp Plastic limit R Re Ilow WI Liquid limit	w VS oderate S gh F efusal St VSt H	ISISTENCY DENSITY Very Soft VL Very Loc Soft L Loose Firm MD Medium I Stiff D Dense Very Stiff VD Very Den Hard Friable	ose A A B B Dense U L D D Se M M	luger s Julk sar Indistu Disturb Ioistur	& TESTING ample mple trbed sample ed sample e content ample (x mm	PF S D	 Pocket p Standarc S Vane sh CP Dynam penetro D Field der /S Water sa 	ic cone meter isity	CLASSIFICATION SYMBOLS AND SOIL DESCRIPTION Y USCS N Agricultural	
	C Coi		Core	ſ	I	EXCAVATI	ON L	OG TO BE READ IN CONJU	MARTENS &	ASSOCIATES PTY LTD	PORT NOTE	S AN			_			
				rte Martens & Ass		Ltd . 2010			6/37 Hornsby, hone: (02) 9476	Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 87 WEB: http://www.marten			E	ng		erin erehc	g Log - ole	

	IEN		-	llen Prie				Pty	Ltd	COMMENCED	24.11.10		LETED	24.11.1	0			REF		BH13	
		СТ	-	ngineer	<u> </u>						JSF Siltstone	CHEC		GT	oto			Sheet 1			I
		NT	C	ullburra	Hydraul			llbu	rra	GEOLOGY	NA		RFACE	Eucalyp	DIS			PROJECT	NO. P1	002842	
_			DIMEN	ISIONS	-		im depth			NORTHING	NA	ASPE		North				SLOPE	6%		
	ΕX	CA\	/AT	ION DA	ТА				MA	TERIAL D	ATA					SA	MPLIN	G & TES	STING		
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	L M PENETRATION H RESISTANCE	×	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, n particle characteristics, orga	PTION OF STR nottling, colour, pl anics, secondary intamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY		DENSITY INDEX	түре	DEPTH (M)	A		SULTS A	AND ERVATION	S
А	Nil	N	м	_ _0.25			×X	ML	ORGANIC SILTY/CLA		,	i. s			А	0.2	2842/13/	0.2			
A	Nil Nil	$\frac{0.4}{\overline{N}}$	M W	0.4 - 0.7				CL CL	SANDY CLA GRAVELLY CLA gravels (5- 10m	AY - Brown, w	vet (perched),	F S- F			A	0.5	2842/13/	0.5			
A	Nil	N	м	<u>1.0</u> - 1.3		-		CL	CLAY - Brown and or	ange mottlec	l, firm to stiff, moist	- F- St			A	1.0	2842/13/	1.0			- 1 <u>.0</u> -
A	Nil	N	м	- - 1.7				EW	EXTREMELY W Brown/grey m						A	1.5	2842/13/	1.5			
А	Nil	N	м	- 2.0 - - 2.5			·	мw	MODERATELY W	/EATHERED Light grey.	SILTSTONE -				A	2.0	2842/13/	2.0			- 2.0 - - -
										erminated at weathered s											
				<u>3.0</u> 																	3 <u>.0</u> - -
				-																	
				<u>4.0</u> 																	4 <u>.0</u>
				-																	-
				<u>5.0</u> 																	5 <u>.0</u> - -
				- - -																	-
				<u>6.</u> 0 																	6 <u>.0</u> - -
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				7.0 																	7 <u>.0</u> - -
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				<u>8.0</u> 																	8 <u>.0</u> - -
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N X B E H S P A	H Ba E> A Ha Ha T Pu Au	atural	expos excave bucke or ger ade e	ure SH vation S(et RI Ni	JPPORT H Shorin C Shotcr B Rock I I No su	ng rete Bolts		e obse neasu er leve er outf	rved D Dry L Lo red M Moist M Mu I W Wet H Hig Wp Plastic limit R Re low WI Liquid limit	w VS oderate S gh F fusal St VSt H	Soft L Loos	Loose / e I um Dense I e I Dense I	A Auge B Bulks J Undis D Distu M Moist	NG & TES r sample sample sturbed sam rbed sam ure conte sample (;	ample iple ent	pp S VS DC FD		nic cone ometer nsity	test S	LASSIFICATI YMBOLS ANI OIL DESCRIF YUSCS NAgricultur	d PTION
		'n	a	rte Martens & As:		;		ON LO		MARTENS & 6/37 Hornsby, ione: (02) 9476	ACCOMPANYING R ASSOCIATES PTY LT Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 WEB: http://www.mar	FD 8767		AND AB			jine	erin oreh	-	og -	

-						ssociates	Pty	Ltd		24.11.10	COMPLET		.10			REF	BH17	
PR SIT		СТ	-	ngineer					LOGGED	JSF Siltstone	CHECKED		inte			Sheet 1 or PROJECT NO.		
		T		uliburra	Hydraulic	West Cu		Irra	EASTING	NA	RL SURFA		ypis			PROJECT NO.	F 1002042	
			DIMEN	ISIONS		K 2.5m depth			NORTHING	NA	ASPECT	North	West			SLOPE	5%	
	EX	CA\	/AT	ION DA	ГА			MA	TERIAL D	ATA				SA	MPLIN	G & TESTI	NG	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	M M FENETRATION F RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STR nottling, colour, pl anics, secondary ontamination, odor	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)	A		TS AND BBSERVATION	8
A	Nil	N	м	0.3		× * * *	ML	ORGANIC SILTY/CLA	YEY SAND -	Dark brown, moist.		L	A	0.2	2842/17/	0.2		
A	Nil	N	м	- - - - - - - - - - - - - - - - - - -			- CL	CLAY - Orange/bro tending grey with mino			F		A	0.5	2842/17/ 2842/17/ 2842/17/	1.0		- - - 1 <u>.0</u> - -
A	Nil	N	м	- - - - - - 2.5			- CL	CLAY - Grey with r moist, sand in p SANDY CLAY - Gre	orofile from 1.	8m, grades to	St		A	2.0	2842/17/	2.0		- - - 2 <u>.0</u> - - - - -
					/PPORT	WATER		Borehole termina		on sandy clay.		IPLING & TE			2842/17/	2.5	CLASSIFICATI	
N X B E H S P A C	E) H Ba Ex A Ha Ha T Put Au	kisting ckhoe cavat nd au nd sp sh tub ger	e bucke or iger ade	vation SC et RE Nil	 Shoring Shotcrei Rock Bo No supp 	te X Not olts ∏ Wat	measu ter leve ter outf	rred M Moist M M al W Wet H Hi Wp Plastic limit R Re Iow WI Liquid limit	oderate S gh F efusal St VSt H	Very Soft VL Very Loc Soft L Loose Firm MD Medium I Stiff D Dense Very Stiff VD Very Den Hard Friable	B I Dense U D se M M	Auger sample Bulk sample Undisturbed sa Disturbed sa Moisture con Tube sample	sample mple tent	S VS DO		nic cone ometer nsity	SYMBOLS AN SOIL DESCRIF Y USCS N Agricultu	PTION
				rte Martens & Ass	ns				MARTENS & 6/37 Hornsby, none: (02) 9476	ACCOMPANYING REF ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 870 WEB: http://www.marten	67	ES AND AI			jine	ering prehol	Log - e	

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SI		лт	C	ullburra	Hydraulic	, West Cu	ıllbı	irra	GEOLOGY	Siltstone	VEGETAT		/pts			PROJECT NO	. P1002842	
			DIMEN	SIONS		X 2.5m depth			NORTHING	NA	ASPECT	North				SLOPE	1-2%	
	ΕX	CA	/AT	ION DA				MA	TERIAL D	ATA				SA	MPLIN	G & TEST	ING	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)		GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STF nottling, colour, pl anics, secondary ontamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	түре	DEPTH (M)	А		TS AND DBSERVATION	s
А	Nil	N	м	- 0.3		× × × × × × × × × × × × × × × × × × ×	OL	ORGANIC SA	NDY SILT -	Dark brown.	s		A	0.2	2842/18/	0.2		
А	Nil	N	м	- - - - - - - - - - - - - - - - - - -			CL	CLAY - Orange/bro tending grey with mino	own mottles, i or brown and	firm grading stiff, red mottles at depth.	F- St		A	0.5	2842/18/ 2842/18/ 2842/18/	1.0		- - - - - - - - - - - - - -
А	Nil	N	D				EW	EXTREMELY WEAT properties, grey wit			St- VSt		А	20	2842/18/	2.0		
А	Nil	N	D	2.0 			мw	MODERATELY WE	ATHERED S	ILTSTONE - Grey.								2.0
	QUIPI		/ ME		//PPORT 1	WATER		MOISTURE PENE				IPLING & TE			2842/18/	2.5	CLASSIFICAT SYMBOLS AN	
E F P A	H Ba Ex A Ha Ha T Pu	ckhoe cavat ind au ind sp sh tub iger	e buck or ger ade e	et RE Nil	C Shotcre B Rock Be No supp	olts 🐺 Wat		W Wet H Hi Wp Plastic limit R Re Now WI Liquid limit	efusal St VSt H	Soft L Loose Firm MD Medium Stiff D Dense Very Stiff VD Very Der Hard Friable	Dense U D nse M	Bulk sample Undisturbed sa Disturbed sa Moisture con Tube sample	mple tent	VS DC FC	Standard S Vane sh CP Dynam penetro O Field der S Water sa	ic cone meter isity	SOIL DESCRI	
		'n	a	rte Martens & Ass			ON L		MARTENS & 6/37 Hornsby, none: (02) 9476	H ACCOMPANYING REF ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 87 WEB: http://www.marter	67	ES AND A			gine	ering oreho	Log - le	

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SI	Γ Ε JIPME	NT	C	ullburra	Hydraulic	, West Cu	ıllbı	irra	GEOLOGY	Siltstone	VEGETATIC RL SURFAC		ucalypts			PROJECT NO	D. P1002842	
			DIMEN	SIONS		X 2.5m depth			NORTHING	NA	ASPECT		orth			SLOPE	2-3%	
	ΕX	CA\	/AT	ION DA				MA	TERIAL D	ATA	1			SA	MPLIN	G & TEST	ING	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)		GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STF nottling, colour, pl anics, secondary ntamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	TYPE	DEPTH (M)	A		LTS AND OBSERVATION	IS
A	Nil	N	М	0.1		× × :	OL	ORGANIC SA	NDY SILT -	Dark brown.	S		A	0.2	2842/19/	0.2		
A	Nil	N	м	- - - - - - - - - - - - - - - - - - -			CL	CLAY - Orange/bro tending grey with mino			F- St		A	0.5	2842/19/ 2842/19/ 2842/19/	0.5		- - - - - - - - - - - - - - - - - - -
A	Nil	N	D	 2.5			EW	EXTREMELY WE/ and grey mot highly weath	tles, clay like	properties,			A	2.0	2842/19/ 2842/19/			2 <u>.0</u>
				_					erminated at									-
								moderately	v weathered a	sitstone.								- 3.0 - - - - - - - - - - - - - - - - - - -
				- - 5.0 - -														- - 5 <u>.0</u> - -
				- - - - - - 6.0 - -														
				- - - - 7.0														- - - 7 <u>.0</u>
				- - - - - 8.0														
N E E F A	I Na H Ba E> IA Ha Ha T Pu	atural (xisting ackhoe acavate and au and sp ish tub uger	expos e exca e buck or ger ade e	THOD SI ure SI vation So et RI Ni	UPPORT H Shoring C Shotcre B Rock B I No sup	ete X Not olts ∏ Wat	e obse measu er leve er out	erved D Dry L Lo ired M Moist M Mu al W Wet H Hig Wp Plastic limit R Re Now WI Liquid limit	w VS oderate S gh F ifusal St VSt H	SISTENCY DENSITY Very Soft VL Very Loc Soft L Loose Firm MD Medium I Stiff D Dense Very Stiff VD Very Dens Hard Friable	ose A Au B Bu Dense U Ur D Di se M Mo	iger sa ilk sam idisturb sturbeo bisture		pr S V: D		nic cone ometer hsity	CLASSIFICAT SYMBOLS AN SOIL DESCRI Y USCS N Agricult	ID IPTION
		'n	a	rte Martens & As			ON L		MARTENS & 6/37 Hornsby, none: (02) 9476	ACCOMPANYING REP ASSOCIATES PTY LTD Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 876 WEB: http://www.marten	67				gine	ering oreho	ı Log - le	

CL	IEN	Г	A	llen Pric	e & .	Ass	ociates	Pty	Ltd	COMMENCED	24.11.10	COMPLE	TED 24.11	.10			REF	BH22	
PR	OJE	СТ	E	ngineer	ing S	Serv	vices			LOGGED	BR	CHECKE	D GT				Sheet 1 of		
SI			C	ullburra			West Cu	illbu	rra	GEOLOGY	Siltstone	VEGETA		3			PROJECT NO.	P1002842	
				SIONS	Hydra		uger 2.5m depth			EASTING NORTHING	NA	RL SURF ASPECT	ACE NA	Fact			SLOPE	1-2%	
-				ION DA		0 / 2			MA			ASI LOT	North	Lasi	SA		G & TESTI		
МЕТНОD	SUPPORT	WATER	MOISTURE	DEPTH (M)			GRAPHIC LOG	CLASSIFICATION	DESCRI Soil type, texture, structure, r particle characteristics, org	PTION OF STR	ATA asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)		RESUL		
A	Nil	N	М	- 0.3			× × × × × × × ×	OL	ORGANIC SILT – Dari	k brown, grav	vels (5-10mm, 30%).	s		A	0.2	2842/22/	0.2		_
А	Nil	N	м	- - - 0.8				CL	CLAY - Variable colo	ours (grey, re	d, yellow, brown).	F		A	0.5	2842/22/	0.5		
A	Nil	N	D	<u>1.0</u> 1.2				EW	EXTREMELY WE SILTSTO	EATHERED I NE - Reddish				A	1.0	2842/22/	1.0		1 <u>.0</u> -
A	Nil	N	D	_ _ _ _ 1.9				EW	EXTREMELY WE SILT	EATHERED I STONE - Gro				A	1.5	2842/22/	1.5		
A	Nil	N	D	<u>2.0</u> 				EW	EXTREMELY WE SILTSTONE - (A	2.0	2842/22/			2 <u>.0</u> _ _
		atural	exposi		JPPOR	ing	WATER	e obse	MOISTURE PENE rved D Dry L Lo		SISTENCY DENSITY Very Soft VL Very L	oose A	MPLING & TT Auger sample		3 pp		enetrometer	CLASSIFICATIC SYMBOLS AND	
E F S F	H Ba Ex IA Ha Ha T Pu	ckhoe cavat ind au ind sp sh tub iger	e bucke or ger ade e	et RE Nil	C Shot 3 Rock 1 No s	k Bolt	s 👽 Wat		W Wet H Hig Wp Plastic limit R Re low WI Liquid limit	gh F ifusal St VSt H	Soft L Loose Firm MD Mediur Stiff D Dense Very Stiff VD Very De Hard Friable	n Dense U D ense M	Bulk sample Undisturbed Disturbed sa Moisture con Tube sample	mple itent	VS DC FC	S Vane she CP Dynam penetro Field der S Water sa	ic cone meter isity	SOIL DESCRIPT	
		'n	a	rte Martens & Ass		5		ON LO		MARTENS & 6/37 Hornsby, none: (02) 9476	HACCOMPANYING RE ASSOCIATES PTY LTI Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 8 WEB: http://www.marte	D 1767	ES AND A			jine	ering orehol	Log - e	

	LIEN					sociates	Pty	Ltd	COMMENCED	24.11.10	COMPLET		0		REF	BH23
		ЕСТ	-	ngineeri	-				LOGGED	BR	CHECKED				Sheet 1 of	
		NT	C		Hydraulic	West Cu	illbi	irra	GEOLOGY EASTING	Siltstone	VEGETAT RL SURFA				PROJECT NO.	P1002842
			DIMEN		-	(1.0m depth			NORTHING	NA	ASPECT	North E	East		SLOPE	1-2%
	EX	CA\	/AT	ION DA				MA	TERIAL D	ATA				SAMPLIN	IG & TESTI	NG
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	M PENETRATION H RESISTANCE	GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, n particle characteristics, orga	PTION OF STR nottling, colour, pl anics, secondary ntamination, odor	asticity, rocks, oxidation, and minor components,	CONSISTENCY	DENSITY INDEX	ТҮРЕ	DEPTH (M)		TS AND BSERVATIONS
A		N N	M	0.2 0.3		× × × ×	OL CL	ORGANIC SILT – Darl	k brown, grav LAY - Grey.	vels (5-10mm, 30%).	S S		A	0.2 2842/23		
A	Nil	N	м	_ _ _ 0.9			CL	CLAY - Variable colo	ours (grey, re	d, yellow, brown).	S					
A	Nil	N	D	1.0 			EW	EXTREMELY WE SILTSTO	ATHERED I NE - Reddish				A	1.0 2842/23	/ 1.0	<u> </u>
	Х Е	atural (xisting	exposi excav	ure SH vation SC	IPPORT 9 Shoring 5 Shotcret		e obse measu	MOISTURE PENET	w VS oderate S	SISTENCY DENSITY Very Soft VL Very L Soft L Loose	bose A A B B	PLING & TES Auger sample		pp Pocket p S Standar	venetrometer denetration test	CLLASSIFICATION SYMBOLS AND SOIL DESCRIPTION
	BH Ba E E: HA Ha S Ha PT Pu	ackhoe xcavat and au and sp ush tub uger	e bucke or ger ade e	ət RE Nil	Rock Bo No supp	olts 👽 Wat	er leve er out	W Wet H Hig Wp Plastic limit R Re Now WI Liquid limit	gh F fusal St VSt H	Firm MD Mediun Stiff D Dense Very Stiff VD Very De Hard Friable	n Dense U U D E ense M M	Judisturbed sa Disturbed sam Aoisture conte Tube sample (:	nple ent	VS Vane sh DCP Dynar	near nic cone ometer nsity	Y USCS N Agricultural
F						EXCAVATI	ON L	OG TO BE READ IN CONJU	INCTION WITH	ACCOMPANYING RE		ES AND AB	BRE	/IATIONS		
				rte Martens & Ass		Ltd . 2010			6/37 Hornsby, ione: (02) 9476	ASSOCIATES PTY LTI Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 8 WEB: http://www.marte	767		E	-	ering prehol	Log - e

	IEN					ssociate	s Pty	' Ltd	COMMENCED	24.11.10	COMPLET		24.11.10			REF	BH24	
		СТ	-	ngineer						JSF Siltstone	CHECKEI		GT			Sheet 1 o PROJECT NO.		
SI		NT	C	uliburra	Hydrauli	I, West C	ulibi	Irra	GEOLOGY	NA	VEGETAT RL SURF		Eucalypts NA			PROJECT NO.	P 1002642	
			DIMEN	SIONS		X 2.6m depth			NORTHING	NA	ASPECT		North East			SLOPE	5%	
	EX	CA\	/AT	ION DA				MA	TERIAL D	ATA				S	AMPLIN	IG & TESTI	NG	
METHOD	SUPPORT	WATER	MOISTURE	DEPTH (M)	L M PENETRATION H RESISTANCE	R GRAPHIC LOG	CLASSIFICATION	Soil type, texture, structure, r particle characteristics, org	PTION OF STR nottling, colour, pl anics, secondary ntamination, odo	asticity, rocks, oxidation, and minor components,	CONSISTENCY			DEPTH (M)	A		TS AND DESERVATIONS	
A	Nil	N	М	0.2		× × × ×	× OL	ORGANIC SA	NDY SILT -	Dark brown.	S		А	0.2	2842/24/	0.2		_
А	Nil	N	М	- - - - - - - - - - - - - - - - - - -			CL	CLAY - Orange/bro tending grey with mino			St- VSt		а а а а	1.0	2842/24/ 2842/24/	1.0		
A	Nil	N	D	2.3 -			EW	EXTREMELY WEA					A	2.5	2842/24	2.5		
	Nil		D				EW	with red mott Borehole to		properties. 2.6m on				2.5	2842/24,	2.5		
	BH Ba E Ex HA Ha B Ha PT Pu A Au	Excavator Nil No support Y Wp Plastic limit R Refusal St Stiff D Dense D Disturbed sample DCP Dynamic cone Y USCS A Hand auger Hand spade Water outflow WI Liquid limit VSI Very Stiff VD Very Dense M Moisture content penetrometer Pield density N Agricultural T Push tube F Friable Friable WS Water sample WS Water sample N Agricultural C Concrete Corer Concrete																
				rte Martens & Ass		j	ION L	OG TO BE READ IN CONJU Pr mail@m	MARTENS & 6/37 Hornsby, none: (02) 9476	HACCOMPANYING RE ASSOCIATES PTY LTE Leighton Place NSW 2077 Australia 9999 Fax: (02) 9476 8 WEB: http://www.marte	767	ES AI			gine	ering prehol	Log - le	



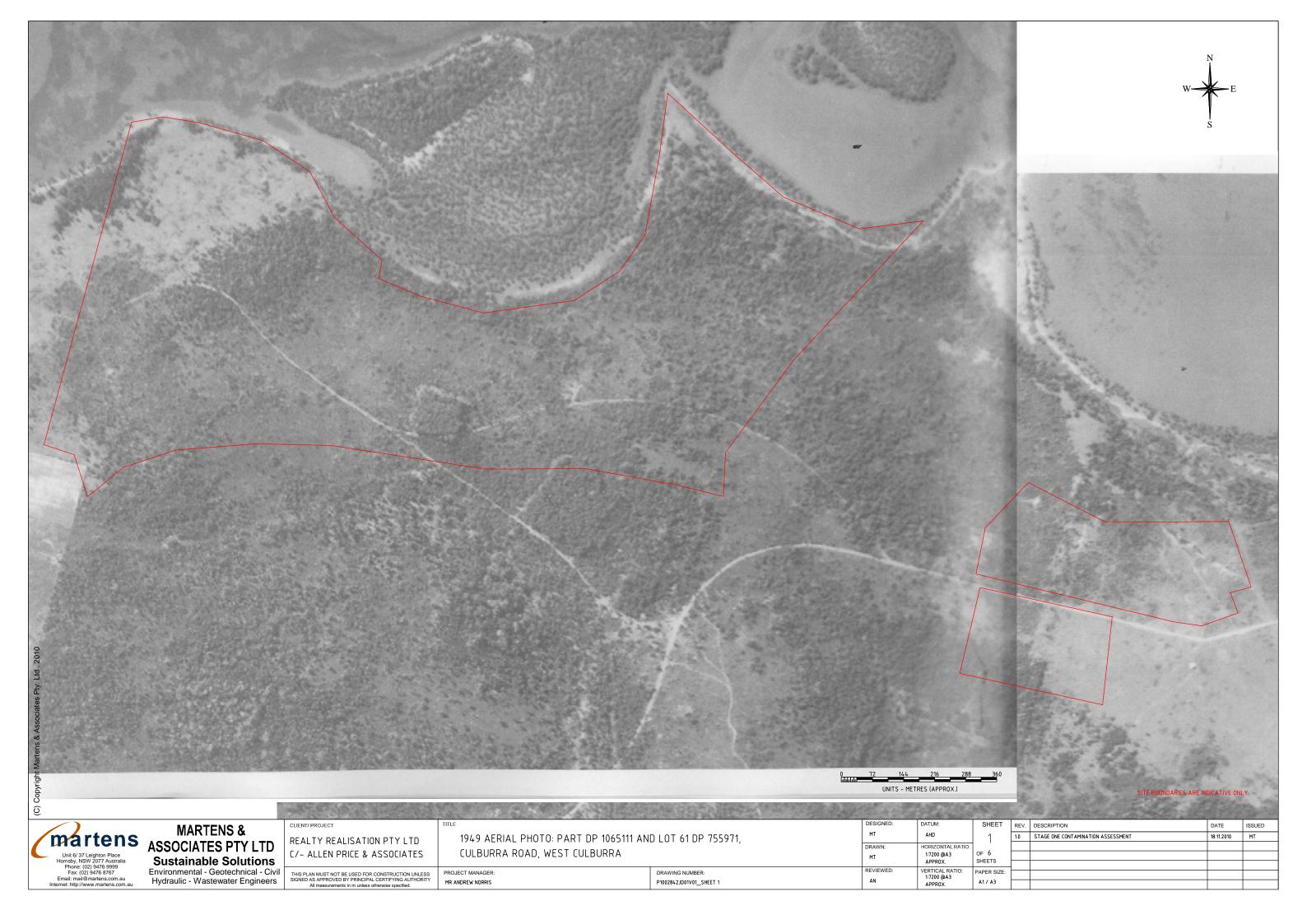




9 Attachment C – Historical Aerial Photographs



Preliminary (Stage One) Land Contamination Assessment: Part DP 1065111 and Lot 61 DP 755971, Culburra Road, West Culburra, NSW P1002842JR01V02 –February 2013 Page 48







72	144	216	288	360
	UNITS - MET	RES (APPRO)X.)	



DATUM

AHD

HORIZONTAL RAT 1:7200 @A3 APPR0X.

VERTICAL RATIO: 1:7200 @A3 APPROX.

DESIGNED

MT

DRAWN

MT

AN

REVIEWED:

Unit 6/ 37 Leighton Place Hornsby, NSW 2077 Australia Phone: (20) 9476 8767 Email: mail@martens.com.au Internet: http://www.martens.com.au

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.

CLIENT/ PROJECT

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

MR ANDREW NORRIS

TITLE

DRAWING NUMBER: P1002842JD01V01_SHEET 6

SITE BOUNDARIES ARE INDICATIVE ONLY

SHEET REV. DESCRIPTION DATE ISSUED 1.0 STAGE ONE CONTAMINATION ASSESSMENT MT 6 18.11.2010 OF 6 SHEETS PAPER SIZE A1/A3