



Hunter Water Corporation

TILLEGRA DAM DESIGN - CONSULTANCY 361802

Storage Rim Stability and Seepage Potential Engineering Geotechnical Report

VOLUME III

Report No. 08–GN31A–R2 Final Report V 4.1 February 2009

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Appendix F

Engineering Geological Borehole Logs – DDH1 to DD9, DD29 and DDH30 (with core photographs)

EXPLANATION OF LOGGING TERMS FOR ENGINEERING GEOLOGY BOREHOLE LOGGING

ROCK SUBSTANCE WEATHERING CLASSIFICATION

ESTIMATED STRENGTH CLASSIFICATION

RS	Residual soil	EW	Extremely weak
EW	Extremely weathered	VW	Very weak
HW	Highly weathered	W	Weak
MW	Moderately weathered	MS	Medium strong
SW	Slightly weathered	S	Strong
F(s)	Fresh (stained defects)	VS	Very strong
F	Fresh	ES	Extremely strong

DEFECTS

Defects include all joints, bedding planes, fracture zones, seams, veins and cleavage partings.

RQD

Rock quality designation:

RQD = length of core in pieces 100mm or longer x 100% length of run

WATER

UVD Water table, with date

► Water inflow

Partial drilling water loss

Complete drilling water loss

Angles of joint inclination (and other geological features and drill holes) are angles between the feature and a horizontal plane. In core, angles of joints (and other geological structures) are angles between the structure and the plane normal to the axis of the core. In vertical holes these angles are then the true inclination (dip) of the structure.

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$\begin{array}{c} 112.777\\ 123\\ 123\\ 123\\ 123\\ 123\\ 123\\ 123\\ 123$	71.8] 22 22.77	sav vs		METH-SHALE, dark gray with occasional gray bands Hunly laminated (12		- 7.1,70 p - 7.1,87 - 7.1,87 - 7.2,.18 - 7.2,.19 - 7.2,.19	ARTING, 15° planar, rough Minor Carbonase C Town, 67° planar, rough, 1 JOINT, 50°, planar, rough, PARTING, 15°, planar, rough As above. Probable DRILLING BREMU	h, Fest, poting Est Fest	
17.85 METH - SHALE CONTINUES Story DECOMPOSITION OF A SHALE CONTINUES FRACIMENTS, 10 to 15 th , planer, rough, Fa St.	23 24,24			(Innar barral not locked					,]		8
	27,85 27,85 24 24,03	BUN TO BUNIT		META - SHALE COMFANIES	Seaf Fics)				- Numarcus PARTINGS (). FRACIMENTS , 10 to 15 th , p rough, Fa. st.	lance, 1575, 65°, 6	the
	24; 77 24: 77 Temarks:	122 80	11111111 X	ENDS AT 20,82 M B	Fas	-		25.00 M	Job / Repo	rt No. "G M Z:	

Con Con	mme	ŕće							NTAL ENGINEERING BOREHOLE LOG	BOREHOLE No).)	1
PROJECT OCATION	RIG	47 A	RA DAM BUTMENT, PROPOSED CREST	E	IDINATI ろ76月 642	70/			RL COLLAR 172.7m DATUM AHD BEARING 090°M INCLINATION 60° From horizont	al Sheet 6 of 1	- 7	
			TACK MOUNTED CONTRACTOR MC.	DERN	4.07J	D.A			COMME	NCED 9.12,07	,	-
CORE BARRE		4Q	TRIFFE DRILLER SHAC ROCK SUBSTANCE	UNI)	TAYL	or I			COMPLE ROCK MASS DEFECTS	TED /8,/2.0	7	_
DRILLING DA			NUCK SUBSTAILCE			DEF	ECT	Т				1
	La	DOJ	DESCRIPTION	RING	6 円 円	SPA (m	CING Im)		DEFECT DESCRIPTION			\$
	Method Casing, Run	GRAPHIC GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	_	ESTIMATED STRENGTH	500	288 1111	VISUAL	Inclination, planarity, roughne coatings or infillings	155,	ROD.	
767 19.72			TUFFACEOUS SAMDSTONE (From 25,00 m), frine grained, gray. META-SMALE, dkgrey, 15,19m laminated at 15°		51/5 XX				-15, 29 DRILLING BREAK			
15.19	6											
	NULEI		TUFFACEOUS SANDSTONE, continues, fine gr., gray									
15.85	CONTA								19.86 PARTING, 15, planar, 1	ough, Fest.	2.4	
26			Occassional carbonate		5/152		ļ		26.00 JOINT, 30, planar, roug	gh, Fest.	89	
16.90	12 1		VERNING GENERALLY to Inco thick (mostly infilling jours	5)	¥.(
	Run			Fis)					= 26,48 Joinst, Se, planar, very	rough, Fest.		
6.60 16.70 26.75			— 24,60 Interbadded METH-SHALE, dk						26.61 PARTING, 15, planar, 1 16.70 FOINT, 445, planar, 10	ough, Fest ush, Fest		
			Jiey, and very fine grained TUFF. Sfs., grey. Last mated as - 26.95 10 for 15", banded.	1	5	l r-			16.78] 28's PARTINGS IF, pli 16.88] (possibly dolling mo	thar, raugh tuced)		
16-95	N.S								- 27.00 BOXING BREAK			
			Fine grained, gray.		5/145				- - -			
	14				N.							
27.64	L MOD								17.64 Possible PARTING, 15, p. (may be drilling inc	anar, rough.		
34	Ric		Interbadded META-SHALE, dk gray, and very force graves	F					28.00 As above			
25			TUFFACEOUS SANDSTONE, May Laminated at 10 to 15, banda	у. Л.								
			(META -SHALE is dominant		5							
			r v (skt egps)						18.70 VAIST, 70, planae, 10 Carbonate coated.	ugls,	1.56	
			Rove corbonate versing									
29			parsists, gainerally for lunar these pass						18.96 BOXING BREAK			
*												
									14,49 Probable DUILLING B.	REAK		
14,65												
29.70	162.02			Es					14.70 PARTING, 15°, planar r. minor carbonate a	ough, Fest,		
ho emarke:	Ka	EE	7 ENDS AT 18.96 M	19					-11,15 BOXING BREAK	/Report No. GN 7-	Ц 5А	
emarks: ogged by:	.7.		YOUNG	Date	9.1	1, 0	<i>q</i> ,		Site Supervisor MARK ASHD		,	ĺ

l		3						FAL ENGINEERING BOREHOLE OREHOLE LOG	No.	Л
	mme:		êam		RDINATE		R.L	COLLAR 173,7m ///		
OCATION Å	RIGH.	T KRI	HTMENT, PROPOSED Y CREST.		765	01 2961	BE	TUM AHD ARING 090°M CLINATION 60° Arom horisonial sheet Tot	1	s
and the second se			ACK MOUNTED CONTRACTOR MC	DERM	o11 i	SRILLIA		COMMENCED 9. 17.0	07	
ORE BARRE		<u>a</u> Tr	RIPLE DRILLER ROCK SUBSTANCE	(HAU)	V 11	YLOR		COMPLETED /8.12. ROCK MASS DEFECTS	07	7 T
RILLING DA		-	NUCK SUBSTAINCE			DEFECT	Π		Τ	1
	Run	БQ	DESCRIPTION	RING	日王	SPACING (mm)	EOG	DEFECT DESCRIPTION TYPE		ŀ
	Method Casing,	GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMA	(mm) 888888	VISUAL	Inclination, planarity, roughness, coatings or infillings	a na	הענט.
52			Interbadded META-SHALE					10,12 J JOINT 50, with associated PARTINGS		
			Very time grain ad Turpheed SANDSTONE CONTINUES.	45			ΙĘ	V		
			hammated at 15.			T ⁴	世	re.44 PARTING, 15, With associated Joint, 90, planar, rough.		
			(META-SHALE dommant				1 6	20.64 Probable BRILLING BREAK		
							Ē			
34			have carbonate varing,					10,90 AS above 30,95 Boxing BREAK 31.56 HANDLING BREAK		
			1255 there tones fleed					31.10 PARTING, 15, planar, rough, East		
	Q			F. (5)	5			• •	10	Š
	TANCA							FORT, 75, planar, rough, minor Fest, carbonate coded.	$\gamma \nu$	160
	1.00						LE	Several associated for Trasto, 15, planae, rough.		
						v ,	١Ę	41,78 plande, rough.		
37.	N Z							31.97 Probable DRILLING BREAK		
er fan	Ru						Ē			
1 30	HO.		47. 375 100			L L		77.20 As above 37.20 PARTING, 10°, planar, vough, more tes		
7-39			TUFF ACEOUS SANDSTONE, Very fine grained, grey.		Sints			12.45 Possible PARTING, 15, planar, rough.		
2.69			- 32.95 m					12.55 Jan's PARTINGS, 15, planar, rough, 32.59 Jan's PARTINGS, 15, planar, rough, Fad		
7.70			META - SHALE, dk. July, worth					N-Jo DRILLIAN EREAK 14.19		T
13			Very time gracued TUFFACEDO SANDSTENSE lammations, gr	us vy.				24.92 BOXING BREAK		
**	25		Thinky tommated flammate		15			77.11 PARTING, 19, planar, rough, miner Fort.		
ゆれつ	CIN ?		17 14 				F	M. To As above. Pert.		
	Ň		TUFFACEOUS SANDSTONE, Very time grained, greap.		\$1/2		LE	-74.50 L		
4,%							X	Saveral JO11575, 60 to 76", planar, . rough, test (heavily).		
			and the first of t				1\E		1.	Ż
l efe			META - SHALE, dk. quay, with (minor) very fine grained	¢			佳	89,93] 84,01 PARTING, 16; planar, rough, Fe st.	Carlo	<i>Q</i>
			TUFFACEOUS EANDSTONE lammations, gray.						6	
			Thinky lawsinated for		\$			14.15 14.17 Hus JOINTS, Ho to To, planer, roug. 14.30 MINOT CARDonale coast any	5	
			lemmased as 15".			│ │ ┍ ┾╃╎ │		14:10 J 34:50 Joint, 45°, planar, rough, Fest.		
			Rais corbonate verning gon anally to Iman fucker	< e			1 ‡	· •		
			parsists					64.74 Probable DRILLING BREAK		
39							Ę;	HI93 BOXING BREAK		
marks:		Boy!	8 ENDS AT 372,92 M					Job / Report No. GM	L	4

			GEOTECHNICAL & ENGINEERING						BOREHOLE No.	1
PROJECT		GRI	a DAM	со-оя е <i>7</i> ј	DINATE	S	R.L. COLLAR Datum	173.7m AHD	DOH	/
LOCATION	RIGHT SPILL	- AB WAV	UTMENT, PROPOSED CREST.		•	.961	BEARING Inclination	of the horizontal	Sheet & of 12	Sheet
DRILL DEC	TA 2000	,TRAC	K MOUNTED CONTRACTOR MC.			T DR TAYLO	THLING	COMMENCED	9.12.07 18.12.07	
CORE BARRI DRILLING D	Г	. 181	ROCK SUBSTANCE		•		AND DESCRIPTION OF A DE	K MASS DEFECTS		
	Run	00 C	DESCRIPTION	ERING	GTH	DEFECT SPACING (mm)	00	DEFECT. DESCRIPTION Type		WPT
DEPTH (R.L.) Metres	<u>Method</u> Casing, Run Water	GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIM/ STREN	(mm) နွန္လန္လန္လန	VISUAL	Inclination, planarity, roughness, coatings or infillings	ROD	TESTS
34	RUN 24 CONT.		Continues as above. META-SWALE with very fine gracined TUFFACEDUS SANDSTONE lammations.				277.07 PART Ca 23.75.44 Vo IN 23.75.47 DR 11.	INC, 10; planar, rough, t. uponate coatant. 17, 50, planar, rough, m carbonate coating LINC, BREME.		
25,70 26	OH		Theney lanimated laminated at 10 to 15". Rane carbonate verning persists, Less than lime thick	F (s)	\$		- 36,12 HA	UNIC BREAK NG BREAK MALING BREAK ARTING, 15°, planar, rough	ls, Fest	70
37 37.09	Run Z		— 11.09 m THEF RECEVIS SANDSTONE, fina				= 36,62 Vo Fas	obable DRILLING BRENK INT, 67°, planar, rough, it, minor carbonate ^r coa int, To', planar, rough, mi, carbonate ^c coatet.	minor string -	8
37.28 -37.47 37.70			- 77.70m META-SHALE, dk gray, with META-SHALE, dk gray, with with very fine grained TUFFACEORIS SHADSTONE lamusations (at 15') - 37.70m		~~ <u>*/</u> 6		27 CO	st, 60°, planae, sough, mii cerbonate coate. LING BREAK 4's Portings, 15°, plana To st		-
38.10	57 ND2		TUFFACEOUS SANDSTONE, two grained ranging to ture-madicunt worth depth, gray.					T, 6°, planar, rough, Fe	7, 00J	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
38,70 39	y Iz mng				5/5		-248.58 As -		Fost.	-
89,45 34,52	9		H9,44M -META -SHALE, Skaren MAM TAMINUTED AF 16- TUFFACEDUS SANDSTONE		<u>1955</u>		39.42 3 7. 39.42 3 7. 39.52 Har	INT, 49, planar, rough, 4 x's PARTUNGS, planar, rough solung BREAK cinc BREAK		μ
- 1/10			Confinitios de abera.	F	2			lah /Dana	ort No. GN 25	 5 A
Remarks:	Jossi		ENDS AT 36.80 M	Data	1,,	. 30	Site Superviso	Job /Repo MARK ASHOVER	11 NU. 17 18 65	<u>n</u>

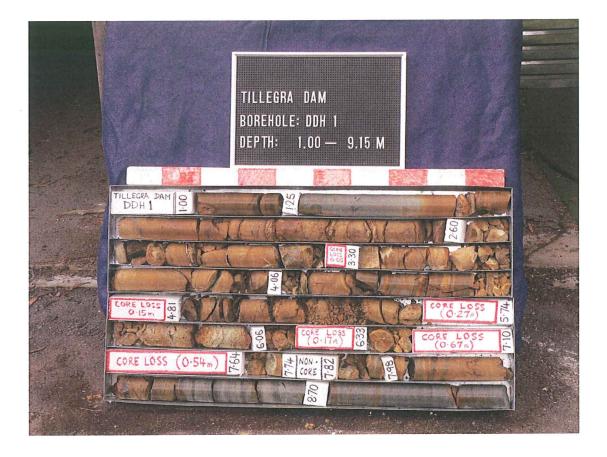
Q		7 						BOREHOLE LOG	_
PROJECT	mmer		RA DAM				<u> </u>	RL COLLAR 173.7m AD//	
			BUTMENT, PROPOSED		5765			BEARING 090 M	
	SP14	LWA	V CREST		\$4-27				Sh
)rill <i>den</i> Core Barre		·						COMMENCED 9.12.07 BYLOR COMPLETED 18.12.07	
ORILLING DA			ROCK SUBSTANCE		-			ROCK MASS DEFECTS	
		5	DESCRIPTION			DEFE(Spaci	NG	G DEFECT DESCRIPTION	
- sa	od 18, Rui	HIC LOG	ROCK TYPE	NEATHERING	ESTIMATED STRENGTH	(mm)	Inclination, planarity, roughness,	
DEPTH (R.L.) Metres	Method Casing, I	GRAPHIC	Grainsize, texture, colour, composition, structure, hardness	WEAT		2000 2000 2000	82		
40 40.09		····	TUFF. 5/5, continues as above 40,09m		5/15			= 40,09 Probable DRILLING BREAK	
			Interbadded META-SHALE, degry and fine graced TUFFALLOUS	6				40.20 Joint, 65, planar, rough, carbourte.	
			and time gracined sufficients SANDSTONE, they lappres, entral					11 E 11	
	Q		SANDSTONE, gray (apprex, equal propartions).		5			40,60 Possible PARTING, 15°, planar, rough, Carbonate coated. 40,70 BoxING BREAK	
	L'IN	1::1 1::1	Laminated to very thinky bedded at 15					40.70 BOXING BREAK	
40.94	(100)		- 40,94 m					40.97 Possible PARTING, 15, planar, rough carbonate coated.	
41 41.07	12		44,07m Includes elongate META-					larbonate coafed.	
41.20	CUM		41,16m SHALE clashs to Mann.					-44.13 Probable DRILLING BRENK.	ŀ
771 60		••••						TILD MODADUE DRILLING ERENA.	
			TUFFACEOUS SANDSTONE, Fino grained, grey.						
4.70	IЦ			F				41.70 DRILLINC BREAK	
42									
								E	
	a					╽╽╏╌╷	1	41. 51 Joint 45, planar, rough, minar	
17.70	BC							42.55 TEINT, 60, as above.	
r#.70								42.65 Jowrs, 60, as above 42.70 - 24's Jowrs, 65, planar, rough, Fest, minor carbonate coating	
-f-1									
お									ž
					\$115			47,41 DRILLING BREAK	
110 0	23	.			V			= 42,27 Joint, 60°, planar, vough, carbonate	
43,50	AUD A							47.13 HANDLING BREAK	
				E				47.72 PARTING, 15, planar, sough, minor	
				FG)					
44								44.00 Joint, 60, planas, rough, Fest.	
44.20									
								444.40 TOINT, 60°. planar, roush minor	
								44.40 TOINT, 60°, planar, rough, minor Tost, carbonate coated.	
14.70								44.7. DRILLING BREAK	$\left \right $
_	Z NI.								
4 <i>5</i> emarks:		<u>::::</u> 30 x	10 ENDS AT 40, Tom	Bar		UUU VDS	 A7	II F ИТ 44.70 м Job / Report No. GN 251	L
ogged by:		OHN OHN	YouNG		91			Site Supervisor MARK ASHOVER	-

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Co			1 −− − − − − − − − − 	~ ~ F	-01	001	ENTAL ENGIN		BOREHOLE No.	1
ROJECT	mmero TILLEC		ENGINEERING Dam	CO-OR	RDINATI	S	DATIM	Dh. Tim AUD	DOH 1	No.
OCATION -	RIGHT « PII	r AL	BUTMENT, PROPOSED Y CREST		5765 427	01 :961	BEARING 090	M from horizontal		SI
RILLDELTI	4 2000,	TRA	CR MOUNTED CONTRACTOR MC	DERM	677	DRILLI	And a second	COMMENCED	9.12.07	2
CORE BARRE		Q 74	RIPLE DRILLER SHA ROCK SUBSTANCE	AUN ,	IAYL	OK	ROCK MA	COMPLETED ISS DEFECTS	18.12.07	ŕ
			a an			DEFECT SPACING		DEFECT DESCRIPTION		
ŝ	od B, Run	IIC FOG	DESCRIPTION ROCK TYPE	WEATHERING	NGTH	(mm)		ТҮРЕ	_	
depth (r.l.) Metres	<u>Method</u> Casing, F Water	GRAPHIC	Grainsize, texture, colour, composition, structure, hardness	WEAT	ESTIM	8888 8888		lination, planarity, roughness, coatings or infillings	ROD	
47	CONTINUED		TUFFICEOUS SANDSTONE Continues, fine grained, gray.				45.54 HANDL 45,65 BOXIN 45,62 HANDS	G BREAK	25% 1	~~ ~~
46 46.57 47	MCD RUN 24			F. (6)	S/15		46.78 JOINT, CA 46.57 DR 16.61 46.70 46.70 46.70	50°, planar, rough,	Fest,	
43.70	1 RUM 30						- 47.70 FMRTIN	UG, 15°, planar, roceg	rta, Fæst. –	y 7
	Kan 30						48.43 As abo 48.65 BoxIN 48.74 JOINT,		Fe st.	77 60
49 149,93 Fo							44.20 Jourt,	70°, planar, rough, 60°, planar, rough, WG BREAK	fê st	
emarks:	 ,	вох	12 ENDS AT 48.65m	l	I	1,08	Site Supervisor	Job /Rep MARK ASHOVER	ort No. GN 25	7

		,					NTAL ENGINEERING	BOREHOLE No.
PROJECT 7	RICH	ARA T AL	ENGINEERING DAM BUTMENT, PROPASED V CREST.	CO-OF E 7	RDINATI ろフしち	S 7D]	BOREHOLE LOG R.L. COLLAR 172,7m DATUM AHD BEARING 090 M INCLINATION 600 from borgoutal	DDH
	A 200	o, TRI	WILL MOUNTED CONTRACTOR ML.	DERI	non	DRILLI	COMMENCED	9.12.07
CORE BARRE		<i>(Q</i>	TRIPLE DRILLER 3) ROCK SUBSTANCE	HAUN		YLOR	COMPLETED ROCK MASS DEFECTS	18.12.07
UNILLING DA			NOOR BODGTANCE	·	1	DEFECT		\
DEPTH (R.L.) Metres	Method Casing, Run Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED Strength	CDACINIC	DEFECT DESCRIPTION TYPE Inclination, planatity, roughness, coatings or infillings	R,Q.D,
50	20>							
Fo.70	RUN V.C. CONT		TUFFACEOUS SANDSTONE Continues, fine grained, gray. Raie carbonate verning paisists, less than limm thickness.				=50.49 Jowst, 49, planar, rough, t 50.70 DRILING BRENK	à
F1 F2	HAR RUN VI			Es)	5/15		FI.70 JOINT, 40, planar, rough, Fe: FI.70 BOXING BRENK FI.87 JOINT, 70, planar, rough (with assaciated HANDEN BREAKS).	
63 93.58 97.50 93.63 93.70			- 52.38 m Intorbadded WETH-SWALE, dk.goog, and TUFF. SS, gay, very time grained. Thinky laws instead fo TB.67 m Laws instead of 10 for 15 TUFFACEDULS SANDSTEAME,	2	× ×		52.70 JUNT, 50, planas, rough, N 52.70 JUNT, 50, planas, rough, N 52.74 JUNT, 60 53.35 44's Possible PARTINGS, J Planar, rough, Minor 53.55 673.55 DAILLING BAEAK	o to 15.
78,96 54 94:17 94:17 94:19 94:40	RUN 74		THEFFECTIONS SANDSTONE, The grained, gley, Therebuilded METR-SHALE/THEF, 55, Thinky Lane, /lant, at NG 94,17m METH-SHALE db grey, METH-SHALE db grey, THEFF SCEOUS SANDSTONE CONTINUES, form grached, grey.		5/12 vn 15 11 5/12		193.82 Jaint, 45, planar, voug 194.29 Probable DRILLING BRE 54.50 Possible Portinsci, 15, p rough, memor Fa St.	AK. B
67 Iemarks:		<u> ·:·</u> Box	13 ENDS AT 52.70m		<u> </u>		Job / Repu	ort No. GN 75A
		UUX	19 -10 - 111 7 -1011	Date	-	1.08	Site Supervisor MARK ASHOVE	

Co		erc	é								TAL ENGINEERING	BOREHOLE No.	£	
	R IG	.H	T A	2A DAM BLITMENT, PROPOSED 94 CREET,	E ?	DINATI 5761 642:	<i>1</i> 71		1	D B	AL COLLAR 173.7m NATUM AHD JEARING 040°M NCLINATION 60° From horizontal	DDH Sheet 12 of 13	LSh	1001
	7 7	000	, TR.	ACK MOUNTED CONTRACTOR MC.					212		8	9. 12. 07		
DRILLING DA		H	×).	<u>RIPLE DRILLER SHALL</u> ROCK SUBSTANCE		11/6	Γ	/ .			ROCK MASS DEFECTS	10.70.01		
DEPTH (R.L.) Metres	Method Casing Run	Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED Strength	15	DEFE(SPACI (mm 응응왕	NG	VISUAL LOG	DEFECT DESCRIPTION TYPE Inclination, planarity, roughness, coatings or infillings	LO R		TESTS W///
<i>55</i>	LONTINUED			TUFFACEOUS SANDSTONE LOWINNUES, Fine graaned, gray	Fresh	5/45					FF.40 J 24's Joints, FD"; planae, re FF.47 fest.			
F6 F6,40 F6,F6	n4 1117		Х	CORE LOSS 0.10 1 LOSS Joint hole HOLE ENDS NT 56.5014							Possible JOINT, 50°, planas, 56,10° carbonate coards (whey be d 76.17 DRILLING, BREAK 56.90 DRILLING BREAK	roughs, officing weady	-	
<i>5</i> 7														
F8														
59														
Go Remarks:		B		4 ENDS AT 56.50m + END	OF	Hor					Job / Repor	t No. GN 25	FA	
.ogged by:				N YOUNG	-	9.1				Т	Site Supervisor MARK ASHOVE			

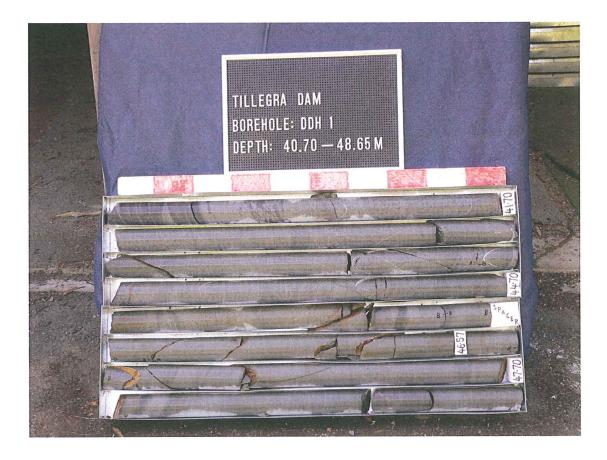














·			GEOTECHNICAL &							BOREHOLE No.
	mmerc 114Ec		engineering	CO-OR	DINATE	S		R.L. COLLAR Datum	107.2m 4HD	DDH 7
LOCATION	RIGHT	r 51	PILL WAY CHANNEL			4075	•	BEARING INCLINATION	090 M. o° from horizontal	Sheet of She
			,			° DRI YLOR		ING		24.1.08
CORE BARRE		<u>a</u> 1	T <u>RIFLE DRILLER SHA</u> ROCK SUBSTANCE	UN	11	YLUK		RO	COMPLETED CK MASS DEFECTS	27.1.40
	Method Casing, Run Water	GRAPHIC LOG	DESCRIPTION	WEATHERING	IMATED ENGTH	DEFECI SPACIN (mm)	G		DEFECT DESCRIPTION TYPE Inclination, planarity, roughness,	ROD
DEPTH (R.L.) Metres	Meth Casi Wat	GRAF	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEA	ESTI	2000			coatings or infillings	ROD
0 1 3 3 3 3			NON CORE CORMG COMMENCES NT 4.4FM							
4,37 4 4,20 4,3F	CRUN /	X	Meta-sedimentary rock fragments (gravel) in a. elayey setty saved matin Pale yellowbrown (graybrown vary stiff. Gravel angular, ranging from 24 mm to form, gen HW, ranging to MW LORE LOSS D, 15m							NA
 	kund.		As above (Probable slopewash).							14 P
Remarks:				1						port No. GN 25A
Logged by:	Joh	10	YOUNG	Date:	19.	102		Site Supervis	SOF MARK ASHOVER	

C	ommer	će	GEOTECHNICAL ENGINEERING						ENGINEERING HOLE LOG	BOREHOLE No.	\rangle
ROJECT	TILL	EG,	RA DAM PILLWAY CHANNEL	CO-OR	dinate 766			R.L. COLLA Datum Bearing	R 107.2m AHD 090m ON 60 from horizontal	DDH	-
			IN MOUNTED CONTRACTOR MO	DERM	15][Ď	R.16	INCLINATIO	ON 60 from horizontal COMMENCED	Sheet 7 of 7 : 74.1.08	She
ORE BARR	RELL /	10 74	21PLE DRILLER SHA ROCK SUBSTANCE	un 1	îny _l	0R			COMPLETED ROCK MASS DEFECTS	19.1.08	Γ
RILLING D				-		DEF	ECT		DEFECT DESCRIPTION		l <
	Bun	901 C	DESCRIPTION	MEATHERING	CTED CTED	SPA (m	CING Im)	FOG	TYPE		
DEPTH (R.L.) Metres	Method Casing, Run Water	GRAPHIC LOG	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATH	ESTIMATED STRENGTH	500	888 TTT	VISUA	Inclination, planarity, roughness, coatings or infillings	R.O.D	
•			continues as above						· · · · · · · · · · · · · · · · · · ·		
	Co107.										
	1-1										
	KuN		Matrix predominantly pale gray / graybrown, moist, stiff/v. stiff.								
817	H		moist, stiff/v. stiff.							Γ	1
	0H										
								E			
	14										
	Kaw :										
87									c		_
	6010 4										
	<i>.</i>										
narks:		Box	I ENDS AT 7.32 M					<u> †</u>		eport No. GN 25	- / - /
iged by:	Joh		Точки	Date	: 1 <i>4</i> ,	1,0	08	Site St	upervisor MARK ASHOVER		

Co	Minerc	e e	GEOTECHNICAL ENGINEERING							BOREHOLE No.	
PROJECT	TILL	ECI	RA DAM Spillway channel	CO-OF E	716	a.1.	R.L. COLLAR Datum Bearing	AHD		DDH/ Sheet 3 of 7	
ORILL DECT	7 7.000	, TRI	CK MOUNTED CONTRACTOR MCD.	ERMC	ŚĨŢ	DRICL	-INC		COMMENCED	24.1.08	31
ORE BARRE	1	<u>) </u>	ROCK SUBSTANCE		ч <u>у</u> г.(· <i>K</i>		ROCK MASS DEF	COMPLETED ECTS	67.1.00	T
depth (RL) Metres	Method Casing, Run Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	NEATHERING	STIMATED TRENGTH	DEFECT SPACING (mm) 응응응당 문자	sual log	Inclination,	DESCRIPTION TYPE planarity, roughness,	R O D	
	203	5	confinues as above	<u> </u>	<u>ы о</u>			COATIN	ys or infillings		5
, ,	Q										
	ALLE.										
//	1000									VN	N AS
	6										
	RUN										
11.87 12											1
11.40	S .	-									
	И		Sitty clay with gravel, dark gray, most, stilf.								
			Cravel fraction Supangula	1							
13)	10		angular, meta sadımalıfaiğ Ganorally Hus, tarely fo 25 mm domension	-							
3,20	REAM		13-30							V/V	NA
			Mata-sadsmantary grave	2							
			Mata-sadimentary gravel in clay solly sand f silly clayer sand math	īv,						-	
4			gemerally pale group, with organizations streaks, moist stiff.								
			Gravel fraction angular								
			to subvounded; Hu to MW, Panging from Several Jonn's to Fomm								
			SENERAL CAISTES TO TUIMM Len cassion -								
4,87 4	12										1
emarks: ogged by:			ENDS AT 11.40 m	Data	15	1, 18	Site Supe	ervisor MA k		ort No. GN 25	7 k

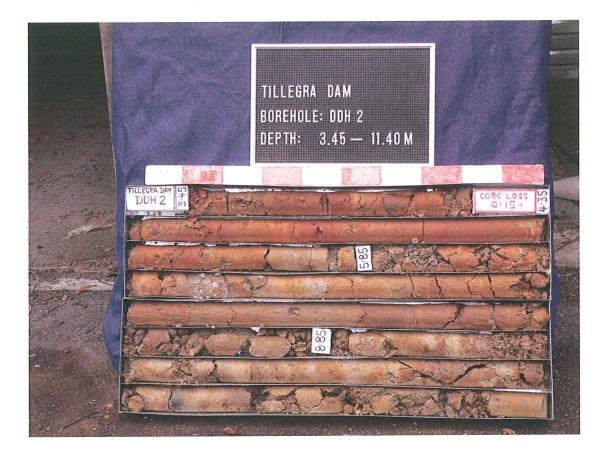
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				GEOTECHNICAL 8							BOREHOLE No.
	Til			ENGINEERING	CO-07	DINATE	S	Y	R.L. COLLAR Datum	OLE LOG 107.2 m AHD	DBH ?
LOCATION	Ri	IG h	17	SPILLWAY CHANNEL				7	BEARING Inclination	090°m 60° from horizontal	Sheet 44 of 7 Sheet
		700		CALL MAUNTED CONTRACTOR MC. Q TAIPLE DRILLER SHAL	DER	MO]	TD	R II	LL ING	COMMENCED	24.1.08 29.1.08
CORE BARR				ROCK SUBSTANCE	. <i>Ę F</i> #	<i>y y</i>	L-OK		- R	COMPLETED	29.11-00
DEPTH (R.L.) METRES		<u>Casing, Kun</u> Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED Strength	DEFEC SPACI (mm	NG	Visual log	DEFECT DESCRIPTION TYPE Inclination, planarity, roughness, coatings or infillings	R.O.D. Treve M.A.
16				Continues as above — 15.40m Well rounded gravel in a sandy clayf Clayey sand matrix, generally pale greyf pale greybrown, with narrow orangebrown		•					
<i>l</i> 6		Kun I continues b		with narrow or engebicion yones. Gravel fightion ranges from saveral mm's to (say) form dea, mostly tresh rock.	8				· · · · · · · · · · · · · · · · · · ·		UN .
17 17,10 17,87		KUN D									- ME
13 13-70 18.80		k and	111	METM-SHALE, brown/ METM-SHALE, brown/ graybroson, thronly Vlaminated / laminated at 10 to 15		wi/10%			16,70 ×	- PARTING FUNGIMELTS (FREQUERY), planer, vot	gravel -
19 19,08 19,28 19,28		1 0/0		CERELOSS 0.3.8M META-SHALES continue as above.	MW EW	E			19.0% ·	Pecovery), planar, vol Fe st, gen, eley coefes (where visible). Numerous PARTINGS, with associated Volum planas, rough, Fo st commonly clay co.	10 to 15,
19.5% 19.58	1.1	KAN II KAN		CORE LOSS 0.05m METH-SHALE, dk. grey with pale brown laminations (banded). Thinky laminated laminated at 10 fo 15		1115			= 19.67 JE = 14.77 Pi	, 124 PATTINGS, 15, planas, n DINT, 30, planas, rough, Fo obable DRILLING BEERS NINT, 50, planas, rough, fo	rugh, Fest st.
70									T 19, 98.	/// Job / Repo	ort No. GN 25A

Con	hmer		GEOTECHNICAL & ENGINEERING				ENTAL ENGINEERING BOREHOLE LOG	LE No.	
ROJECT	Tiu	EGI	RA DAM SPILLWAY CHANNEL	E 7	1 dinate 5766 642		R.L. COLLAR 107.2m DATUM AHD BEARING 090°M INCLINATION 60° From horizontal Sheet 5	4 /	∽ Sh
RILL DELT						DRILL	INSCO COMMENCED 24.1.		
CORE BARREL		<u>(@</u>		ILIN	I AY	LOR	COMPLETED 229.1 ROCK MASS DEFECTS	<u>, 0%</u>	Г
Drilling da'		50 LOG	DESCRIPTION	SNIF) ED L	DEFECT SPACING (mm)	DEFECT DESCRIPTION		
depth (r.l.) Metres	Method Casing, I Water	GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMAT STRENG	(mm) දිසිදිසි	Inclination, planarity, roughness, coatings or infillings	R.O.D.	
20	RUK IN CONST.		METH-SHALE contruues as aberre	Sasfinal	M S		10.00 Several TOINTS, To to 49, planar, TO.17 Several TOINTS, To to 49, planar, TO.17 TOUGH, Feftmast. To.49 PARTINK, 16, planar, vough, Fess To.49 Probable BRILLING BREAK TO.77 TOINT, 50, planar, rough, Fess	Jodd	1. 10 mm
10,87 10,40 11 11,13 11,13	Ha Ha		- 10.90m TUFFACEDUS SANDSTONE, time grained, graybrown META-SHALE, dkgrayf graybrown, thinly faminates at 10 to 15 - 21.48 m	記載 Staffes) 新			10.397 As above 21.11 As above 21.11 As above 21.14 4x's PARTINES, 10+015, planae, 11.49 21.49 21.49 21.49 21.52 JOINT, 60, planae, rough, Fe st same		
1,65 1,90 1,90 12 2,04	ELUNI 12		TUFFACEOUS SANDSTONE, madrum granned, grey greybrown - 21.85 m Includes METR- SHALE lammatron af 18 - 12,04m META-SHALE, de grey grey- brown, thinky faminated at - 12.04m	ersfam Fe	76 WS		11.52 JONNT, 60, planar, rough, Fast, sand H. 52 JONNT, 60, planar, rough, Fast, sand PARTING, 10 Planar, rough, Fast 11.85 JonnT, 60, planar, rough, Fast. 12.06 JONNT, 60, planar, rough, Fast. 12.18 Saveral intersecting Jours, 30, 12.19 Saveral intersecting Jours, 30, 12.19 Janar, rough, Falms st.		2 N N N N
12-72- 12,86 13	RUN 1 3		TUFFACEOUS SANDSTONE, fune gracmad, gray — TL.86m Includes META- SHALE lammation at 15.	Fis	2/62		12.44. HANDLING BREBK 12.47. PRILLING BREAK 12.86 PARTING, 15°, planar, rough, Fest 13.40 DRILLING BREAK	7,00	• • · · · · · · · · · · · · · · · · · ·
13,85 13,99 14.07 14.16	tob ter			* <u>-</u> - 	~		23, 85 DRILLING BREAK 24:16 PAATTING, 10°, planar, rowgh, Fost. 24:25 BoxING BAEAK	1 1.63	101 fs 1
45 14:80 15			- 24.70m META-SHALE laminda et 10° META-SHALE, d.k. grey META-SHALE, d.k. grey L4,9800	<u> </u>	ms		24.92 Numerous Vours, 20 to 60", plane rough, Fest. Clay costing at 2 24.92 NATING at 24.48m, 10', planar, 19	ugi.	
emarks:	<u> </u>	OX 5	ENDS AT 23,40m				Job / Report No. 🦚	N 29	F/

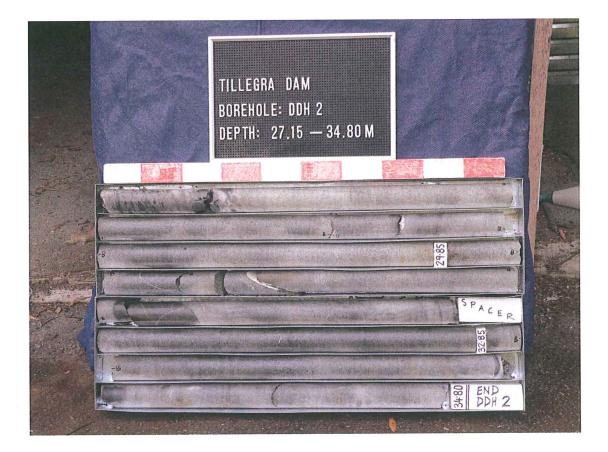
2	erce	ENGINEERING	GE	OL	OGY	NTAL ENGINEERING BOREHOLE NO),	$\Big)$
		- SPHIMAN (HANDLES	CO-ORI E 3 N (766		RL COLLAR 107.2 in DATUM A4D BEARING 070 m INCLINATION 60° from 40011301114 Sheet 6 of 3	7 SI	he
		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			DRILL. YLOR	COMMENCED 24:1.08 COMPLETED 2.1.1.08	•	
RE BARRELL	<u>40</u>	TAIPLE DRILLER SHI ROCK SUBSTANCE		1 8 8	1 LON	ROCK MASS DEFECTS		
	Casing, nun Water GRAPHIC LOG	DESCRIPTION	WEATHERING	ESTIMATED Strength		DEFECT DESCRIPTION TYPE Inclination, planarity, roughness, coatings or infillings	R.Q.D.	10
5 20 5 5 20 5 7 5 20 5 7 5 6 5 20 5 20 5 20 6 5 20 6 5 20 6 5 20 6 7 5 7 5 6		TUFFICEOUS SANDSTONE, fine grained, greep. - UF, SOM Includes METM - SHALE laminations ac Shown at - UF, SOM 10 to 15 - UF, SO -	Fail SW	5/45		15.13 J Probable DRILLAR BREAKS 25.20 BOXING BREAK 15.30 BOXING BREAK 14.157 JOINT, 60', with associated PARTINSC, 15, planar, rough.		
1.14 6.75 9.35 7.00 1.15		META-SHALE, darb grey lammated ad 10" (poorly defined) The FACEOUS SANDSTONES medium grained, grey. META-SHALE, dark grey, META-SHALE, dark grey, 21. Fim lam, at 10	(6) 	[素] 5/W5 m5/2		26.20 Several Jourts, 20 to Jo", planar, rough, Fest. 16.67 IL.89 Soveral DAILLING BREAUS Around 26.89 21.18 Soveral parallel Jours, Jo" planar, rough, millior tarbornate coasting. 27.15 DRILLING BREAK.		
3				2112		18.00 BoxMAC BREAK 28.57 HANDLING BUEAK 28.72 Jomst, 50°, planar, rough, carbonate coated 29.00 BOXING BREAK	1,001	
1.27 narks: 19ged by:	Box	6 ENDS AT 27, 15 M HN YOUNG		1.2.		29. 85 DRILLING BREAK Job / Report No. GN 2 Site Supervisor MARK ASHOVER	H 19,	Ĥ

	mmer		GEOTECHNICAL 8 ENGINEERING	GI	EOL	OGY	BOF	REHOLE LOG	BOREHOLE No.	$\overline{)}$
PROJECT Ocation	TILLI RIG	EG K H T	2.n DAM SPILLWAY CHANNEL		766 642		R.L. CO Datun Bearin Inclin	stata.	Sheet 7 of 7 s	/ She
)rill <i>Decti</i> Core Barre	9 Loox	s TRA	RCK MOUNTED CONTRACTOR MG. TRIPLE DRILLER SHAL	DER	mor	T DRI	IL LA AS	COMMENCED COMPLETED	24.1.02 29.1.08	
DRILLING DA			ROCK SUBSTANCE			L, C. I.		ROCK MASS DEFECTS		
_ %	od B, Run	HC TOG	DESCRIPTION ROCK TYPE	WEATHERING	IATED NGTH	DEFECT SPACING (mm) SSSSS	907 TV	DEFECT DESCRIPTION TYPE		110
depth (r.l.) Metres	<u>Method</u> Casing, Rur Water	GRAPHIC	Grainsize, texture, colour, composition, structure, hardness	WEAT	ESTIN	88888 8888		Inclination, planarity, roughness, coatings or infillings	ROD	
30			Turfaceous SANDSTONE Continues, fine grained, grey.				N F	199 Possible Venet, Fo, planar, rou 41 As above, 30°. 147 Jours, 65°, planar, roug carbonate full to Linus	11	
3] }1.29	U 16 CONTINUED						1 L	03 BOXINC BREAK 10 Probable PAHLING BREA. 	y. 001	
912, 11	HQ HU		Meduum graun cel, peorly defined bedding et '10" Includes seebanguelas -fillise clasts to 3mm dimensión	F	5/12			92 DRILLING BREAK	• •	
n, 87 33								67 DRILLING BREAK 93 BONING BREAK		
Jef	Earry ES							IO DRILLING BREAK	7,00/	
4:30 T			HOLE ENDS AT 24,80 M				- 34	M Joint, 20°, planar, vough, carbonate coefed. 1.20 DRILLING BREAK		
marks:	₿ох		NDS AT 31.03m Box B N Yocinsci			AT 34 .,08		Supervisor MARK ASHOL	bort No. GN 251	A









ļ							ENTAL ENGINEERING BOREHOLE LOG	BOREHOLE No.	
PROJECT	RIGH F	EGR. T. Ari L. Ari	A DAM BUTMENT INTERSECTION ND DIVERSION TUNNED	CO-OF E	101NATE 3769 642	S 194 3242	R.L. COLLAR 118,7m DATUM AHD BEARING 070°m INCLINATION 60° From horizoudaO	DH 5 Sheet 1 of 7 St) She
ORILL PEL	TA 20	60, TA	RACK MOLINTED CONTRACTOR	ICDER. HALIN	mottj	DR1	LLING COMMENCED	23,1,08	
CORE BARREL		<u>(a 1</u>	RIPLE DRILLER S. ROCK SUBSTANCE	11 12 30 1 3		sy Log	ROCK MASS DEFECTS		
depth (R.L.) Metres	<u>Method</u> Casing, Run Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED Strength	DEFECT SPACING (mm) 응용응용	DEFECT DESCRIPTION TYPE Inclination, planarity, roughness, coatings or infillings		TO WDT
Ø			NON CORE						
0,70 1	Kun I		CORINSC COMMENCES Nº 0. META-SHALE, brown (greybrown / dark greeg, banded, Thinly lamma to laminated at 10 to 15	ted (Sy)			1.00 1.00	emar, , plamar,	•
1.70 24.02 2.12 2.12 2.20 2.45	TWH RUNS RUNZ	雨季寒、阳阳中中中中中	TUFF. \$15 Very time graine gray, with METRY SHALL lamsnations at 10 to 15" META-SHALE, graybrown grey dark gray, banded. Thinly laminated to laminated at 10"	/	m\$/\$		1:70: Vower, 60°, planar, rough, Fe 1.86 DAILLING BREAK 2.07 Several PARTINGS, 10°, pl 2.17 Probable DRILLING BREAK 2.32 Probable DRILLING BREAK 2.44 J. 2.x's PARTINGS, 10°, planar, 2.47 PARTING, 10°, planar, rough, b	anar, , rough, St. X	
2.75 1.83 }	aut 5 HQ		TuffALEOUS SANDSTONE very fine gramed, gray		5/W		2.83 DRILLING BREAK 3.25 JOINT, 69, planar, rough 3.30 BOXING BREAK 3.51 HANDLING BREAK	s, Fest	
4.84 4 4,33	zun 6 R						4.10 HANDLING BREAK	-001	
4, <i>84</i> 5			Brown/greybrown	MW	4	│ ^{┡┿┿} ┨ _┩	4,85 PARTING, 10, planar, rough, Fa		Ĺ
emarks:	Box .	I EN	105 AT 4,23 m				Job / Report Site Supervisor MARK ASHOVER	rt No. GN 155 A	A.

Con	mmer	če	GEOTECHNICAL ENGINEERING					L ENGINEERING REHOLE LOG	BOREHOLE No.	
ROJECT	TILL	É G K	IA DAM UTNIENT, INTERSECTION DIVERSION TUNNEL	CO-OF E 7	764		R.L. CO Datum Bearin Inclin/	AHD	DDH Sheet ² of 7	Sh
ORILL BELT	7 7,000	, TRA	(L MOUNTED CONTRACTOR MCD.	ERIME	M.	DRILL.		COMMENCED	17.1.08	
CORE BARRE		a 72.	IPLE DRILLER SHAUN ROCK SUBSTANCE	1 / 17	LOK			ROCK MASS DEFECTS	23,1,08	Γ
		00 C	DESCRIPTION	NEATHERING	ATED GTH	DEFECT SPACING (mm)	901	DEFECT DESCRIPTION TYPE		1107
depth (R.L.) Metres	<u>Method</u> Casing, Rui Water	GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATH	ESTIM	(mm) දිපිදිසි	VISUA	Inclination, planarity, roughness, coatings or infillings	ROD	
5	RUNG CONT.		TUFFACEOUS SANDSTONE CONTENUES, Very fune grame brown graybrown.	nd, MW	5			2. PNATING, 80°, planar, rough As above 13 Voint, 45°, planar, rough, Fe 19 - Munnarows PARTINGS, 19 planar, rough, Feftin	st.	1 2 M 1 2 M
7	©H		5.92m Greef,	F(s)	\$/45		6.8 6.9 6.9 6.7 7.7.7	PARTINC, 10°, planan, rough, PARTINC, 10°, planan, rough, p. rough, Folinin 4. 1 Tourt, 50°, planar, rough, Fos Tourt, 69°, planar, rough, Fos o Tourt, 45°, planar, rough, fos o Tourt, 45°, planar, rough, fos o Tourt, 45°, planar, rough, fos	lanar, A.	<i>21.</i> / 5.
7.43	1 Zu							3 As above		4
в. 8,144	. Kan				· · · · ·			15 In 24's Jourse, 69', planar 16 In Instance BREPK 16 Boxing BREPK 16 Boxing BREPK 10 Toint, 65', planar, rough,	/ (oo)	1 mm
8.70 8.83 8.92 9					<u> </u>		8,8	TEINIT, FO', planar, rough, , Several PARTINUS, 10', 4 5 J4F', planar, rough, Fe Si 5 DRILLING BREAK		
	Rum ?		TUPFACEOUS SANDSTONE continues, very fine grained, grey	F.(s)	2/02			15 Box110c, BREAK. F JOINT, 60°, planar, rough, M	unor fest.	
10			•					·		Ţ
Remarks:	Bo	x 2	ENDS AT 8.26m					Job /R Supervisor MARK ASHOVER	eport No. GN 25	R

Contraction of the second seco	mmer	će							BOREHOLE LOG	Vo.)
ROJECT			A A DAM UTMENT, INTERSECTION DIVERSION TUNNEL		RDINATI 376 5		4.	I	R.L. COLLAR 118.7m DATUM AHB BEARING 075°M NCLINATION 60° Frame horizonthal Sheet 7 of	2)
RILL DELT	4 <u>4</u> 74 100	4,77	PRCK MOUNTED CONTRACTOR MCL	N ERN	1075	D	RILL	. 11	COMMENCED /2.,/, 08		Sn
			RIPLE DRILLER SHAW	v 7	AYL	O J	Z		COMPLETED 23.1.08		Т
DRILLING DA			ROCK SUBSTANCE	1	1		EFECT	Π	ROCK MASS DEFECTS	Т	$\frac{1}{2}$
	5	ß	DESCRIPTION	NG	ΘŦ	SP	ACING	10G	DEFECT DESCRIPTION		
depth (r.l.) Metres	<u>Method</u> Casing, Run Water	<u></u>	ROCK TYPE Graincize texture colour composition	NEATHERING	ESTIMATED	0			TYPE Inclination, planarity, roughness,	q	
	Metho Casing Water	GRA	Grainsize, texture, colour, composition, structure, hardness	<u>R</u>	SI ES	ន្ត្រី	8888 TTTT	VISU	coatings or infillings 10.05 Probable DRILLWG BREAK	ROI	╀
10	NUED		TUFFACEOUS SANDSTONE Continues, very fine grained grey. Includes occasionel carbonate veins, gamerally less than fimm						10.09 Probable DRILLOG BREAR 10.72 HANDLING BREAR 10.73 Boxing BREAR 10.45 Possible Joint 60°, planas, rough, Marbonale Coaffed 10.61 As above 10.70 J 2x'S PARTINGS, 15°, planar, rough, 10.73 J 2x'S PARTINGS, 15°, planar, rough, 10.75 J 2x'S PARTINGS, 15°, planar, rough,		
(/	RUN 9 CONT.			F _(S)	5/18				11.12 Possible Joint, bo, planar, rough, carbonado coated 11.28 PRILLING BREAK 11.95 DRILLING BREAK	100 11	1 mar 6 8
11.83 12	HQ 1								- 11.83 DRILLING BREAK 12.11 HANDLING BREAK 12.12 Probable Joust, 50, planal, rough. miner Fest, carbonade coasted		-
/3			·						12.64 Voinst, 60°, planar, rough, minor Fest., editonate coated. 12.73 Possible Joinst, 60°, planar, rough, 12.88° Possible Joinst, 45°, as above. 13.10 Probable DRILLING BREAK 12.28 Voinst, 45°, curved, rough, Fast	16.31	17.14
18,40 18 <i>,81</i> 13.70	SUN 10		17.48 METR-SUBLE laurinations 17.51 m of Franci lo TUFF. S/s continues, medium — 12.70 m grained						13.45 PARTINS, 5, planas, rough, Fest 13.53 As above, minor Fest 13.70 Possible PARTINS, 15, planas rough, carbonste coated (may be drilling induced) 13.87 Possible Joinst, to, planar, rough, carbonate, coasted.		
	11 11		Very time grames, grey					AH-	14.13 14.13 14.37 14.37 14.30 DRILLING BREAK	1.001	I to the for
14.73	1111								14.94 - See over	ſ	
15			FULLY AT to AD.					Ν_	Job / Report No. G N	<u> </u> 2	
Remarks: .ogged by:			ENDS AT 12.22 m Yourse	D-4-	: 73,	6	60		Site Supervisor MARK ASHOVER		<u>· *</u>

Co	miner of	će	GEOTECHNICAL ENGINEERING				BOREHOLE LOG	0.	$\mathbf{)}$
HOVEOI			2A DAM			s 94	R.L. COLLAR 118.7m DATUM AHD . DDH	2	No No
OCATION 0	RIGHT F &	' A <i>Bu</i> AND	TMENT, INTERSECTION DIVERSION TUNNEL	N l	542	3242	BEARING 070 M INCLINATION 60 from horizontal. Sheet 4 of	<u>1</u> s	Sh
RILL <i>Delt.</i> :Ore barre	71 200	o, TRIK	K MOUNTED CONTRACTOR ME	DERIN IN T	ott	DR.ILL	COMMENCED /2./.08 COMPLETED 23.1.08		
ORE BARKE			ROCK SUBSTANCE				ROCK MASS DEFECTS		
		67	DESCRIPTION			DEFECT SPACING	DEFECT DESCRIPTION		ļ
depth (r.l.) Metres	<u>Method</u> <u>Casing, Run</u> Water	GRAPHIC LOG	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED STRENGTH	(mm)	COLINE TYPE Inclination, planarity, roughness, coatings or infillings	R.Q.D.	
15			TUFFACEOUS SANDSTONE Continues, very fine grames	1.			Several parallel. Joints, 15, pland, rough, heavy Fe/Mn st.		
	O.M.		grey.				=15.28 -		
5,47	al live		15.47 m				15.47 Fourt 45, planar, rough, Fe st 15.52 PARTING, 5, planar, V. rough, Fe st		
,	T CONT		Medium grained				15.52 PARTING, 5, planat, V. rough, Past 15.60 J flobable DRILLING BRENKS 15.70 J		
5.72	ZINNZ		15,72 m	F ₍₅₎	NX.		15.70 - 15.21 Joint, 69, planar, rough, Felmn st.		
16			,	(6)	2		15.96 BOXING BREAK		
fla			Very fine grained.						
								2/2	
							16.40 TOINT, 65, planar, rough, Fest.	10	
							16,76 DRILLING BREAK		
6.70					s/sw	 	16.70 Numerous PARTINGS, 10, planar, Fest.		
16-88	0	==	-16-88 M Jaminated at 10		W	┟╷┝┼┿┥			
17			TUFFACEOUS SANDSTONE, VERY	1					
17.30			fine grained to fine-medius grained with depth, gray.		2				_
,,,,,					5/115		EVT. 47. JOINT, 60, planar, rough, Fest.		
1.60			- 17.6am				17.63 PRATING, 10, planar, rough, minor Fest		
7.73			META-SHALE, dark gracy, with TUFF. Sts. laminations at 10	5. P 7	M			Η	
_			time grained, gray.		s/s/	│ │ │ _╋ ╇╤┿	17.92 2 2x's PARTINUS, 9, planar, rough, minor Fo St.		
18.03 18.03	2			cel,	5/85		6°	1.36	
8,20	Kan I			,			- 18.21 Probable DRILLING BREAK		
	×		META-SHALE, grey/dk. grey, banded. Thinty laminated at 5 to 10"		ms/s		-18.41 HANDLING BREAK. 18.50 PARTINU, 15, planar, rough, Fe St.	Ц	
8,50 18.51			TUFF. 5/m V. fine Ifine gr.		5/15		ביב שיני דשיטון השתישון פי דו ואווו סדורי		
18.69			META-SHALE, dk gray, thinly		ms/s				
18.78 18.15			- 18. 78 m		5/15		- 18-93 PARTING, 10°, as above		
9,05	421 N		- 19, 78m 10, 10, 20, 10, 20, 20, 20, 10, 10, 20, 10, 20, 20, 20, 20, 20, 20, 20, 20, 20, 2	est.	<u>ms/s</u> \$/vs				
9.17	RUM		- 19. The METR-SHAZE, Anay / de grey, kans Thinky landerated at 540 0° - 19. 200	dal	mrs/s		- 19.76 As above.		
9,331			- 19-37m TUFFALEOLIS SANDSTONE,		<u> </u>		PIANAR, FOLMA, JOINT, 70°, and PARTING, F, planar, rough, Fe st		
			time grained, grey.		12				
					5/22		- 19.78 BONING BREAK		
Co							19. 94 PARTING, 10, Inequilar, rough, Fe St.		
emarks:	 	and the	ENDS AT 15.96M	Roy	5 EN	AL AT	19,78 m Job / Report No. C.M.	15	2

		GEOTECHNICAL 8					IOLE No.	
PROJECT TI OCATION RIG. OF Q DRILL PELTA P	COMMETCE ENGINEERING OJECT TILLECIRA DAMI CATION RIGHT A BUTMENT, INTERSECTION OF & AND DIVERSION TUNNEL ILL PELTA 2000, TRACK MOUNTED CONTRACTOR MUDI DRE BARRELL HQ TRIPLE DRILLER SHALLA					BEARING 070 M INCLINATION 65° from horizontal shoet		
DRILLING DATA		ROCK SUBSTANCE		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		ROCK MASS DEFECTS		Γ
DEPTH (R.L.) METRES Method	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED Strength	DEFECT SPACING (mm)	DEFECT DESCRIPTION TYPE Inclination, planarity, roughness, coatings or infillings	RÓD	N.U.
70 70,70		TUFFACEDUS SANDSTONE Continues, very fime fime grained, grey.	F (3)	51/12		- 20.43 PARTING, 15", planar, rough, Fe ag - 20.73 PRILLING EREAK	7,007	SI 1001
21 71,33						21.34 Probable DRILLASS BREAK 21.30 Numerous Joinsts Jonst FRAGMENTS, 60 to 70°, plan rough, Fe St. (sheared).	as,	
22 12,359 14,559 14,759			MW	1115			151	1 200 V.
13. 14.20 23.37		Grey. (very fine/fine gracuad)	F (s)	\$/12		24.84 Jours, 60', planar, rough, Fest 12.03 As above 14.27 DRILLING BREAK	1.001 1.1	0 /0 1 100 13
13,80	ound fail by why					24.11 BOXING BREAK 24.20 DRILLING, BREAK 14.97 JOINT, 60, planor, rough, Fest. 24.00 DRILLING BREAK 24.14 FOINT, 60, planor, rough, Fest 24.55 JOINT, 65, planor, rough, Fest. 24.55 JOINT, 65, planor, rough, Fest.	10, 10, 10, 10, 10, 10, 10, 10, 10, 10,	01 1/201 1.00/
247 Remarks:	Rox	6 ENDS AT 23.71m				- - Job / Report No.	GN.	25

ļ			GEOTECHNICAL 8						BOREHOLE No.	
PROJECT		ĒGR	ENGINEERING DAM BUTMENT, INTERSECTION DIVERSION TUNNEL	со-ог е ?	DINATE 5764	s 194	R.L. COLLAR Datum Bearing	OLE LOG 118.7m AHB 070°M 60°From horizoutal	DDH - Sheet 6 of 9))
DRILL DEL	10 200	20, TR.	WE MOUNTED CONTRACTOR ME	DER	mo	T DRI		COMMENCED	12.1.08	
CORE BARRE		Q 7.		N :	TAYI	loR		COMPLETED	13.1.08	Т
DRILLING DA			DESCRIPTION	67		DEFECT Spacing		DEFECT DESCRIPTION		100
depth (r.l.) Metres	<u>Method</u> Casing, Run Water	GRAPHIC LOG	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED	(mm) 88888		TYPE Inclination, planarity, roughness, coatings or infillings	ROD	
25 17,10	У		TUFFACEOLIS SANDSTONE Continues, very fine fine grained, grey.				19.35	3 DRULLING BREAKS JOINT, 65°, planar, rough, As above	Fe st	
14	HQ RUN TO			FG	5//vs		26.46	2 2 x x Tourrs, 70°, planar fe st	rough,	
26,80 <i>16,90</i> 27	RUN I.V			- -				BRILLING BREAK		
28								RILLING BREAK PARTING, 15 [°] , planar, sou	glo, Fe st.	V. 181
29 19.06 19.33 29.44	823				1/5 MU 2/8			Toust FF, plands, sough, F Desiling BREAK Concert BREAK Cong be deviling and a Gour PARTING FRACIMEN POLOVERY, pland, rough, (partly hand Ing instice	at rough, ced) NT≤ (gravel Fest d).	2.05
14.172 19.83 30	8.24 R 73		METH-SHALE, dark group. Thinky lansmatch (Taminate at 10. Includes decestomal THEF. SIS LEMINATIONS, Very fin a. gr.		2/3000 -		H H H H H 19.78	Numerous PARTINECA, 10 associated JOINT, 80°, p rough, te st. J. I.X's PARTINECS, 10°, planan Fo s	, rough,	V.0
Remarks:	_	Bo	x] ENDS AT 27,24M					Job / Repo visor MARK ASHOVET	the second s	71

LOCATION RIG OF DRILL DELTTA 2	LEC1 HT A 4 At 2000, TH H@ T		CO-OF E 77 N C DERI CHAU	1764 764 942 1970 1971	S 94 7242 DEFECT	COMMENCED 12.1.08 COMPLETED 23.1.08 ROCK MASS DEFECTS DEFECT DESCRIPTION
DRILL DELTTA 2 CORE BARRELL DRILLING DATA URITING DATA	2.640, T) H@ TI	Angle Mousted Contractor Ma <u>AIPLE DRILLER</u> ROCK SUBSTANCE DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness METH - SHALE continues as above	MEATHERING	m 6M W ·	DEFECT SPACING	BEARING 070°M INCLINATION 60° From horizontal sheet 7 of 4 CLINIC- COMMENCED 12.1.08 COMPLETED 23.1.08 ROCK MASS DEFECTS DEFECT DESCRIPTION
CORE BARRELL CORE BARRELL DRILLING DATA UIUNG DATA	2.640, T) H@ TI	Angle Mousted Contractor Ma <u>AIPLE DRILLER</u> ROCK SUBSTANCE DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness METH - SHALE continues as above	MEATHERING	m 6M W ·	DEFECT SPACING	COMPLETED 23.1.02 ROCK MASS DEFECTS DEFECT DESCRIPTION
CRITTING DATA DEPTH RLIN RLIN RETRES Method Method Run RLIN RLIN RLIN RLIN RLIN RLIN RLIN RLIN		ROCK SUBSTANCE DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness METH - SHALE continues as above.	WEATHERING		DEFECT	ROCK MASS DEFECTS
A DEPTH RELL RELL RELL RELL RELL RELL RELL REL		DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness METH - SHRILE continues as above		ESTIMATED Strength	SPACING	en l
20,00 KUN 14 COUL	Water Water 1	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness METH - SHALE confirmes as above		ESTIMATED Strength	SPACING (mm) 竁훓竁윤목	en l
RUNTS RUN 24 CONT	Itit Itit <th< th=""><th>Grainsize, texture, colour, composition, structure, hardness METH - SHALE continues as above.</th><th></th><th>ESTIMA</th><th>88888 4</th><th>Inclination, planarity, roughness, coatings or infillings</th></th<>	Grainsize, texture, colour, composition, structure, hardness METH - SHALE continues as above.		ESTIMA	88888 4	Inclination, planarity, roughness, coatings or infillings
3.0. 66 KUN 14 WORL		as above.			* ¶	
51,00		ч				Numerous PARTINGS, Eto 10, with associated JOINTE, 4840 60, planar
41,00		Includes very fine grained Tuff. 5/5 laminations (1+ 5+010)				rough, Fest.
51,00		(15 5 10 10)		115/5		Clay bell 10 mm thouk in parting
		· ·				
						no.75 PHETING, 10, planar, rough; minor Fast.
51.77 DH						21.00 As above
SH SH		-31.00m TUFF, Sf5., Very fine graines grey. -31.72m	"A	SIVS		
ЪH		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				-31.23 hr above
Ľ,		Advertised of the second s				21.50 Planar, rough, Fo st.
		METH-SHALE dark grey, with very fine grained TUFFACEOUS SANDSTONE				
		TUFFACEOUS SANDSTONE laminations, gray,				X 31 70 Includes crushed 2000 from 31.72 to 31.76 m
47F		banded.				
		Thinky laminated !	F (5)			72.07 72.07 11umarous PARTINES to, planer, rough, minor Fest. Crushad jone 10mm
172.30		laminated at 5 to 15"	12/	m 5/5		72.14 Thick # 32.07 10. 32.25 Voist, 60, planar, rough.
						- 32.39 Probable DRILLING BREAKS -32.48
32.83						22.75 PAATING, 5, planar, rough, Fe st. #2.83 DAILLING BAEAK
37						
13.15						- 39.03 Possible PARTIDG, F, planar, rough, miner Fost. 19.13 Probable DRILLIAG BREAK
Z	Ş	TUFFICEOUS SANDSTONE, Very fore graces of, gray.		sn/s		
3.42 Nrs		- 33.42 m		<u> </u>		TOINT, Bo, with numerous
						Associated PARTIESUS, planar, rough, Fast.
		META-SHALE, de quey, with very fine grained TUFF.				Fount carbonate conted.
314		TENDS ONE COMMENDED		15	╽┟┼┥	373.95
		Interbeds, gray. Thinky laminated to very		1×11		
		thinly bedded at Stals"				34.77 Probable DRILLING BREAK
					4	24.43 PARTING, No, planar, rough, Fe St. 34.47 PARTING, 5, as above
74:60					4	14.64 Bus FARTINGS 15, planar, 14.14 rough, Fe st.
:		TUFFACEOUS SANDSTONE, fine-medium to medium		145		- JAT I rough, rost.
25		grained, grey.		V		
emarks: ogged by: VA						Job / Report No. GM 7

ADDED THE CALL AND DAME TO THE PARTY DETERMENT OF CONTROL AND ADDED TO THE CALL OF THE PARTY DETERMENT OF OF THE PARTY DETERME	e Maria	mmer	4 76	GEOTECHNICAL 8 ENGINEERING					ENGINEERING HOLE LOG	BOREHOLE No.	
BL. ACL DATA Sono, Fance Montres Contractors Male Rations Delighted Status Tryles Contractors Contractors J. 1.03 ORE BURGED 1/6.1.03 ORE BURGED 1/6.1.03 DEFECT DESCRIPTION BURGED 1/6.1.03 DEFECT DESCRIPTION DEFECT DESCRIPTION BURGED 1/6.1.03 DEFECT DESCRIPTION BURGED 1/6.1.03 DEFECT DESCRIPTION BURGED 1/6.1.03 DEFECT DESCRIPTION DEFECT	project 7	ĪLLE	GR	A DAM	со-ог е ⁻⁷³	RDINATE 76チ	S 94-	R.L. COLLA Datum Bearing	В 1195.7m Анб 070 М	L'AN L) Sh
BILLING DATA ROCK SUBSTANCE ROCK MASS DEFECTS BILLING DATA OCK MASS DEFECTS BILLING DATA DESCRIPTION BILLING DA	DRILL DELT	71 200×	, TAP	CR MOUNTED CONTRACTOR MCD	ERN.	101	DRIL		COMMENCED	12.1.08	
Name Note and the properties Description Bardellow Signature Signature Signature Bardellow Signature Signature Signature Signature Signature Signature Signature Signatur			@ 14 		UM	"[Ay	LOR			73.1.08	
B B B B B B TYPE B	VAILLING VA		5		(7)		SPACING				101
 TURPACEOUS SAMPSTENE. Conformers, from mathing for mathematic from mathematic for mathematical diff. TURPACEOUS SAMPSTENE. Conformers, from mathematic for mathematical diff. TURPACEOUS SAMPSTENE. Conformers, from mathematical diff. TURPACEOUS SAMPSTENE. for for for mathematical diff. TURPACEOUS SAMPSTENE. for for for for for for for for for for	DEPTH R.L.) Metres	<u>Method</u> Casing, Rur Water		BOCK TYPE	WEATHERIN	ESTIMATED	(mm) နွန္မန္လန္လန	VISUAL LOC	Inclination, planarity, roughness,	ROD	
19783 19783 19783 19707, 50; 10th number over 19807, 50; 10th number o	- <u></u>	V 27 1826		TUFFACEOUS SANDSTONSE. continues, fine - meducing to medicing grained,	•			- 34, 64 - 345, 12 - 349, 22	BRILLING BREAK PARTING, 5°, planar, rough,	Fe sf.	
10.42 10	27,83 34 34.02	1 811							PORTLEING BREAK	-	
9 9 9 9 9 9 9 9 9 9 9 9 9 9	36,42	0H		-		s/sw			associated PARTINYS, F racyh, Fe St.	3 planar,	
1 1 1 1 1 1 1 1 1 1 1 1 1 1	27 ·	RUN 28		fine - medium to medium	1 1			-36.85	Vo 1157, 60°, planar, rough,	Fe st.	
12,03 12,05 12	14					5/13		27.70	BRILLING BREAK	14 22	11 11
8.83 1 29.03 Very fine grained 1 1 29.03 1 29.03 1 29.03 1 29.03 1 29.03 1 29.03 1 29.03 1 29.03 1 29.03 1 29.03 1 29.05 1 20.05 1 20.0	38,42	162		carbonate veins, generally less than Insus				- - - - - - - - - - - - - - - - - - -	DRILLING BREAK	1 200	1 700
Very fine grained Very fine grained H.M H.M H.M H.M H.M H.M H.M H.M	18.83 1 297.03	Ruh						38.8	I DRILLING BREAK	-	
	8	RUN 30		· · · · · ·					Planar, rough, offin c coa Possible PARTING, 5°, pla rough, carbonatt coa Tourst PARTING ERACA	arbonale ut.ed. mar, ut.ed. acourc	
	a emarks:		<u>Bo</u>	x 9 ENDS AT 35.05m	B	OX I	D ENDS			COLUMN TWO IS NOT THE OWNER.	Ĩ A

LOCATION RI OF G DRILL DELTA TO CORE BARRELL DRILLING DATA HLANG DATA HLANG DATA 40 40 40 41.357 42	UN 70 CONTINCIES Casing, Run Water Water ON Water ON Water	2.A DAM BUTMENT, INTERSECTION BIVERSION TUMMEL KNOWNTED CONTRACTOR / TAIPLE DRILLER SH ROCK SUBSTANCE DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness TUFF. RCEOUS SAND STONE CONTINUES, very Franc Grained, grey. 40.63 m Medium - coarse graine TUFF. SJS. Condences	Inad -	MEATHERING	077	94 320 Ør Q DEF	2 <i>114</i> ECT	5.115C- 9001 TRINIT FOR	G ATION 60 ROCK N IT 03 Possib 05 Proba	ble BRILL le PARTIN 19 ¹⁶ , Carbo 2 INIG BRI	rizontal COMMENCE COMPLETED COMPLETED CRIPTION ity, roughness, infillings TMCa, 55, p. INSC BRE MCC, 10, p. INSC BRE	13.1.08 12.1.08 12.1.08 12.1.08 10.1.09 10.1.09 10.1.09	R.Q.D.
CORE BARRELL DRILLING DATA	un 70 Contractes Casing, Run Water GRAPHIC LOG	TRIPLE DRILLER SH ROCK SUBSTANCE DESCRIPTION BESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness TUFFFACEOUS SAND STONE Contrates, very frac. Jrained, grey. House Sand Stone Ontrates, states	ined -	WEATHERING	ESTIMATED ESTIMATED 07/A	DEF	ECT	40. 440.2 440.2 440.2 440.2	li 03 Posse 04 Proba 14 Posseb 14 Posseb 14 Posseb 14 Posseb	DEFECT DESC TYPE Inclination, planar coatings or i alla PART, ble BRILL la PARTM 19 th , carbo	COMPLETED CRIPTION inty, roughness, infillings TANG, 57, p. INSG BRE MG, 10, p. INSG BRE	13.1.08 12.1.08 12.1.08 12.1.08 10.1.09 10.1.09 10.1.09	/00//
40 40 40 40 41.06 41.041	un 70 Contracts Casing, Fundament	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness TUFFRCEOUS SANDSTONE continues, very frac. grained, grey. 40.63m Maduum-coarce, grace 41.11m METR-SHALE lamination at lo	ined .	_		SPA	ING	TVNSIA 40.	li 03 Posse 04 Proba 14 Posseb 14 Posseb 14 Posseb 14 Posseb	DEFECT DESC TYPE Inclination, planar coatings or i alla PART, ble BRILL la PARTM 19 th , carbo	ity, roughness, infillings TMCa, 57, p INSC BRE USC, 10, pt nate full EPE	EAK. lanar, lo Lunn	/00//
40 40.68 41.24 41.24 41.25 42	un 70 contractes	TUFFACEOUS SANDSTONE contraves, very fine. grained, grey. — 40.63m Maducm - coarec grac — 41.21m META - SHALE lamination at 10-	ined .					- 440.2 - 440.2 - 440.2 - 441.2	015 Proba 1015 Possib 1010 1010 1011	ble BRILL le PARTIN 19 ¹⁶ , Carbo 2 INIG BRI	INIC BRE NG. 10, pl nate full ENE	EAK. lanar, lo Lunn	100%.
42								- 49.0 - 41.0 - 41.0	57 DRILL 51 As ab 61 As ab 64 As ab	MC BRE ove ove	DLING B	¥	
43		END OF HOLE		•								· ·	
44													
45 Remarks: Logged by: V	11 1	ILENDS AT 41.85 mm	END	ÓF	Ho	LE			Supervisor	MARK		eport No. GN	11 25A













			GEOTECHNICAL							BOREHOLE No.
PROJECT Location Drill <i>Del</i>	RIGA Ul: TH LO	EGR HT S B B B B B B B B B B B B B B B B B B	TRIPLE DRILLER SHA	G GE CO-OR E 37 N 6 Mo DE DUN	DINATE 630 723 RAI	S 7 179 177	DRN	R.L. COLLAR DATUM BEARING INCLINATION	122.4m AHD 025°M 60°from horizentel. COMMENCED COMPLETED	DDH <u>sheet / of 9 s</u> 8.1.02 11.1.08
DRILLING DA	Method Casing, Run Water	GRAPHIC LOG	ROCK SUBSTANCE DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED Strength	DEFEI SPACI (mm	NG .		IOCK MASS DEFECTS DEFECT DESCRIPTION TYPE Inclination, planarity, roughness, coatings or infillings	RQD.
0			NON CORE CORING COMMENCES AT 0.9				1 *	0,90		
1.75	Ruhl		TUFFRCEOUS SANDSTONE, fine granned, greybrouch Includes angular littic claris to tomm dimensio lightly coloured, creating a specklad appointmente	1811	ШŚ				- Jourt / PARTING FRACM PARTINGS, 10to 15, plana Fe/Mm St. Rave sandy coatents Joints, 70 to 80, plana Fe/Min St. Dicasionic clacy coatengs.	r, rough, 0 class
1- 2,10 2,31 2,51	KUN & RUN	X	-1.10m Guybreen/brown. CONE LOSS 8.20 ~ noncore casing reseated.	` MW				7.31	- Numerous VoiNTS 45	0 20 24 655 .
2.70 3. 4.86 2.35	Run 4 Ha		TUPFACEDUS SANDSTONE CONTINUES OS REOVO.	1111/214	M5			E .	planar, rough, Fe/Mn Toust, 30°, planar, rough, t	st. Se/Mm set.
5.35 7.40 7.45 7.60 8.88	RUM F		— Includes METP - SHALE — Tam watsons at to fol 71,49m — 71,76 METP - SHALE Janundste — 71,78 METR - SHALE Janundstel — 71,78 METR - SHALE Janundsteins af — 71,76 METR - SHALE Janundsteins af — 71,6 fo 17		4			3,50 3,60 3,68 Bc 3,78 P.A,	1977, 40°, planar, rough, fe/m Forw, 20°, costin associates 15°, planar, rough, fe/mn 24 5%, 146 BREAK Coated, r. RTING, 15°, planar, rough, fo 1987, 60°, planar unual Fo	et PARTINUS, elay optiets. st.
4.05 f. Io	Ruth lo		- 4.19 METH-SUALE lanundien at 10° LUFFACEBUS SANDSTONE LOCATON USS.	МW	INK			4.12 PA	SINT, 60°, planas, rough, Fo RTIN4, 15°, planas, rough, Fo Volast / Phatinsc, Fanchi 454 60° and 15° respects Planas, rough, Fo/Ma	ENTS.
4.87 F,50		\mathbf{X}	CORE LOSS O. IFM					+:85 J	Job / Repo	

							ENTAL ENGINEERING BOREHOLE LOG	BOREHOLE No.	
PROJECT OCATION	RIGH) U/S N 7010,	GRI DIX TRICK		CO-OF E 3 N 6	1630 7630 423	09 179 r <i>DRIL</i>	R.L. COLLAR 122.4 m DATUM AHD BEARING OEFM INCLINATION 6° from boursental CLINIC COMMENCE	D \$,/,0%	Sh
CORE BARREI DRILLING DA		TRI	ROCK SUBSTANCE	- IP	3 L D K		COMPLETE ROCK MASS DEFECTS	11, 1, 08	Γ
	Method Casing, Run Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED Strength	DEFECT SPACING (mm)		R,QD,	
47 17:72 19			TUPPACEOLIS SANDSTONE continues, Ario grouned with angular clasts rarely to 3 mm dumension, greybrown. (speckled appearance).	MM/Sau	ms		1,00 1,00 1,00 1,00 1,39 5,50 1		
5. 6Þ	HQ KUN 7		_ 6,ерля Цгец .	Fis)	5/15		6.11 PARTING, 10, planar, roug 6.11 PARTING, 10, planar, roug 6.10 As above 6.63 Rowing BREAK 6.15 Town, 20, planar, rough, Fer 6.15 J Tx's PARTINGS, 10', planar, Fo 4,	f. Vorugh, Fest.	
3,57	Run 8		- Boom META-SHALE lamination at 16°			the second secon	7.70 7.25 7.25 7.25 7.75 7.75 7.75 Jown, 20, planar, cough, & 8.00 PARTING, 10, planar, cough	* e 11	
9			TUFFACEDUS SANDSTONE Continues as above			ر ا	2.22 As above 8.74 As above. 8.74 Stonst, 55, planar, rough 2.92 - 3x's Partinus, 10 to A rough, Fest.		
9.57 1.67 1.80	Rulv 10 129						9,35 9.44 Voikit, Lo, places, rol 9.67 Numerous Parrinkis, l associated Voists, u plamar, roligh, FelM	5° with Flobe. nst.	20 · · · · · · · · · · · · · · · · · · ·
emarks:		Be	XZ ENDS AT 8.54m				JOD /	Report No. GN 29	: <i>K</i>

							ENTAL ENGINEERING BOREHOLE NO	
PROJECT	RIGH US	EGRI, T A DIV	ENGINEERING DAM BUTMENT, ERSION PORTML	CO-OF E 3 N 6	PDINATE 76ろ チンン	s 09 317 <i>9</i>	BOREHOLE LOG R.L. COLLAR 122., 4 m DATUM AHD BEARING 025 M INCLINATION 60 From hor 13 outal Sheet 3 of 9 COMMENCED 8-1.08	//
RILL <i>Del</i> : Ore Barre							COMMENCED %-1.08 COMPLETED 11.1.08	
RILLING DA			ROCK SUBSTANCE				ROCK MASS DEFECTS	_
depth (R.L.) Metres	Method Casing, Run Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED Strength	DEFECT SPACING (mm)	Coatings or infillings	R.Q.D.
(0, °%, 0 (0, °%, 0 (0, %)	Raw II RIO		TUFFACEOUS SANDSTONE contenues, fine graened, grey, angular little clasts persist generally fo timm almonsion (speckled).		- SN/S metr		10.02 & The above . 10.20 DRILLING EREAK 10.30 BOXING BREAK 10.42 JOINT, 55°, planar, rough, Felmnst. 10.86° Probable DRILLING BREAK	
o,84	ЮH		10.81 M METH-SHALE, de group, 10.86 M laminated at 10 TUFFACEOUS SANDSTONE Continues	F(s)		.	- 11.09 PARTING, 10°, planar, rough, Felminst. - 11.72# Joint, 78°, planar, rough, Felminst.	5%.
12					51/5		N.80 Joint, 115, planar, rough, Fe st. 11.94 Numerous Vointz, 45, planar, rough, Fol Min st.	
12,80 13,60 13,82 13,82 13,70			13,ee — METH - SHALE lanninadion 13.ez. at lo			6 -9	-12.79 VOWT, Bo to 90°, with associated PARTINGS, 15°, and other Intersections VOWSTS, 45 to 60°, planar, rough, Fel Min St.	
14 7	ZI NNY		TUFFACEOUS SANDSTONE confrances				12.94 Joint, 60°, planar, rough, Fa/Min st. 14.17 - Voint, 70°, planar, rough, Fa/Min st. 14.47 - 14.56 PARTINC, 5°, planar, rough, Fe st.	
97 emarks:		20%	3 ENDS AT 12.27				Job / Report No. GN 1	L.J.,
ogged by:	Vo F		Young	Date	: 11.	1,08	Site Supervisor MARK ASHOVER	

DOLTION ALCAT D BUTMESUT N 64720179 MUNION OPF 14 MIL BELLON FARMENCE N 64720179 MUNION OPF 14 MIL BELLON FARMENCE COMMENCE 0.1.0 COMMENCE 0.1.0 COMMENCE 0.1.0 MIL BELLON FARMENCE DBELLIN SALENCE COMMENCE 0.1.0 COMMENCE 0.1.0 MIL BELLON FARMENCE DBELLIN SALENCE COMMENCE 0.1.0 COMMENCE 0.1.0 MIL BELLON MORE BUBLING DBELLIN SALENCE DBELLIN COMMENCE 0.1.0 MIL BELLON MORE BUBLING DBELLIN SALENCE DBELLIN COMMENCE 0.1.0 MIL BELLON MORE BUBLING DBELLIN DBELLIN SALENCE DBELLIN MIL BELLON MORE BUBLING DBELLIN DBELLIN DBELLIN DBELLIN MIL BELLIN MORE BUBLING DBELLIN DBELLIN DBELLIN DBELLIN MIL BELLIN DBELLIN DBELLIN DBELLIN DBELLIN DBELLIN MIL BELLIN DBELLIN DBELLIN DBELLIN DBELLIN DBELLIN MIL BELLIN DBELLIN DBELLIN DBELLIN DBELLIN DBELLIN MIL BELLIN DBELIN DBELIN DBELIN DBELIN DBE								ENTAL ENGINEERING	BOREHOLE No.
ORE RUBELL HO TRITLE DRILL Statut DATA COMPLETE J. J. S. B. RULING DATA ROCK SUBSTANCE ROCK SUBSTANCE ROCK MASS DEPECTS ROCK MASS DEPECTS Bigging and B	PROJECT .ocation	TILLI RIGH UK	EGR T A	A BAM BUTMENT, VERSION PORTAL DOCK MOUNTED CONTRACTOR MCC	CO-OR E 3 N 6	107 107	5 309 3179 <i>DR144</i>	R.L. COLLAR 122.4m DATUM AHD BEARING 085 M INCLINATION 60° from horizontel	
Minute Data Intervention Big and Big	CORE BARRE	<u>u H</u>		RIPLE DRILLER SHAU	es TA	YLO,	Q	COMPLETED	11. 1. 08
$ \begin{bmatrix} 1 \\ 16 \\ 17 \\ 18 \\ 18 \\ 18 \\ 18 \\ 18 \\ 18 \\ 18$			GRAPHIC LOG	DESCRIPTION	WEATHERING	ESTIMATED Strength	SPACING	DEFECT DESCRIPTION	
 17 18.80m 19.80m 19.80m 19.70 19.80m 19.70 19.80m 19.70 19.70 19.80m 19.70 19.71 19.71 19.71 19.71 19.71 19.71 19.71 19.71 19.72 19.72 19.73 19.74 19.74 19.75 19.74 19.75 19.75 19.76 19.76 19.77 19.76 19.77 19.77 19.76 19.77 19.77 19.76 19.76 19.77 19.77 19.77 19.76 19.76 19.76 19.77 19.77 19.76 19.76 19.77 19.78 19.78 19.78 19.79 19.79 19.79 19.79 19.70 19.70 19.70 19.70 19.71 19.71<td>19:80</td><td></td><td>0</td><td>TUFFICEOUS SANDSTONE continues, free gracmed, greef, includes angular lithic clasts generally in the size range to 2mm (lightly coloured,</td><td></td><td></td><td></td><td>15.25 ORILLINSC, BRENK.</td><td></td>	19:80		0	TUFFICEOUS SANDSTONE continues, free gracmed, greef, includes angular lithic clasts generally in the size range to 2mm (lightly coloured,				15.25 ORILLINSC, BRENK.	
8.86 8.86 9.96 9.96 9.96 9.96 18. 86 m 18. 86 m 19.19 South BREAK 19.19 Desting Continued of 115 19.20 19.20 19.25	6 16,20	HQ RUN,			F(s)	2/12		= 16,13 DE1141NG BREAK	
8.86 9.94 9.10 18.86 m IS.86 m IS.86 m IS.86 m IS.96 m IS.96 m IS.94 META-SWALE, de group, 19.05 Jack possible PARTINGS, IE, planar, 19.10 rough, miner fest I may be continues. 19.10 rough, miner fest I may be 19.10 rough, miner fest I may be 19.10 rough, fest (miner) 19.10 rough, fest (miner) 19.54 Probable DRILLING BREPH (parsists to approx. IDm) 19.77 Jourt FARLMENTS, 45 to bo, planar, rough, fest bo, planar, rough, fest bo,	17	Ruh 15						17.15 17.18 PORTINSC., 10, planar, roug 17.49 Sount, 65, planar, roug	igh, Fast
8.86 anyt 9.20 19.40 Intersecting Joints, 45 and 60, planar, rough, Fe st (inimor) 19.54 19.54 19.54 19.54 19.55 19.5	18							18.18 BOXING BREAK	78
	18,86 19,94 19,20 19,39	RUN I4		META-SHALE, de gray, thuniy lamin acd as 13 16-994 TUFFACEOUS SANDSTONE CONTINUES- 19.35m Angular /ithuc clasis range fo 4 mm dimension.				19.40 Intersecting Jowrs 45 planar, rough, Fest 19.54 Probable DRILLING	und 66°, miner] BREAM
highs, boy fields in ferrors	<i>ko</i> emarks:		:::: 	Pox 4 ENDS AT 16.18 m		<u> </u>			and the second

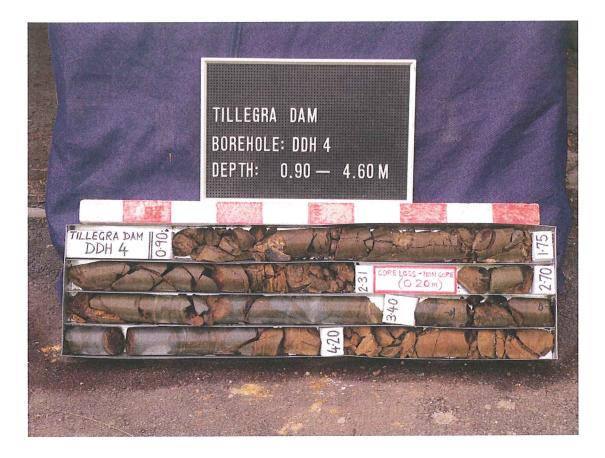
Commerc	će							NTAL ENGINEERING BOREHOLE LOG	BOREHOLE No.
DIC	EGRA HT AB DIVER	DAM CITMENT', ISION PORTAL	E	3	DINATE 763 チン	09	2000	R.L.COLLAR 122.4m DATUM AHD BEARING 087 M INCLINATION 60 from horizontal	DDH A
DRILL DELTA Zoc	o, TRACK N	MOUNTED CONTRACTOR M	LDER	M07.	T D.	RILLI	N	COMMENCED	8.1.08
	iq Trifle	DRILLER SHI ROCK SUBSTANCE	AUN	70)	үлок	,		COMPLETED ROCK MASS DEFECTS	//,/.08
DEFITH DEFITH MEIL METRES METRES Casing Mutter Watter	907 0	DESCRIPTION		NEATHERING	ATED IGTH	DEFECT SPACIN (mm)	GL	DEFECT DESCRIPTION	
DEPTH METRES METRES Method Casing, Water	GRAPHIC G	ROCK TYPE rainsize, texture, colour, composition, structure, hardness		WEATH	ESTIM	(mm) දිසිදි ස	20	Inclination, planarity, roughness,	R.O.D.
23 23 24 24 24 24 24 24 24 24 24 24 24 24 24	Tuf cos grc	FACEOUS SANDSTONE when uss, fore greed ey. Lynthy coloure gular little clasts nerally to line mension, rerely	e art, A, Linni		\$/12			10.05 BOXING BREAK 10.05 BOXING BREAK 10.18 Probable DAULING BR 10.24 DRILLING BREAK 20.71 BUJA, Fa. 51. 20.71 Sough, Fa. 51. 20.85 JOUGH, Fa. 51. 20.95 Sougrad HANDLING B. 20.95 Sougrad HANDLING B. 21.06 PLUS BOXING BREAK MINOR Fa. 51. Carbonate Full MINOR Fa. 51. Carbonate Full MINOR Fa. 51. Carbonate Full MINOR Fa. 51. Carbonate Full 10.05 DAULING BREAK	», plænar, REAKS at II, obm :: W
24 24 24	fan	, 44m NETA-SHALE MINATION AT 15° FFRCEOLIS SANDSTON CONTINUES	<i>] [</i>					14.88 PARTING, 10°, planar, 10	15, and h, Fest.

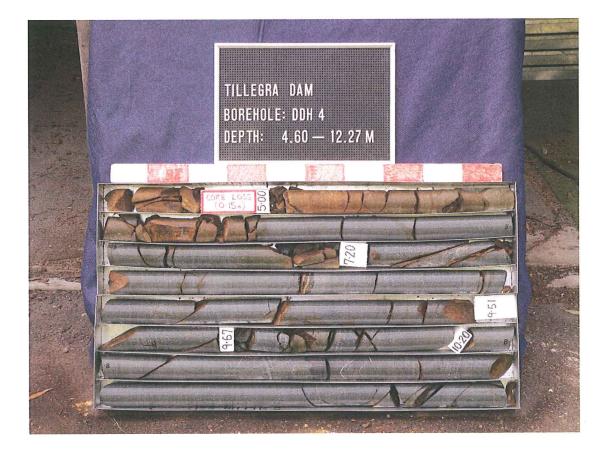
1		,	GEOTECHNICAL 8							BOREHOLE No).	
Co Co	mmer		ENGINEERING			14 M 10	<u>S</u> Y		1.4		/	and the second
ROJECT			RA BAM	CO-OF				R.L. COLI Datum	AHD	DDH 1	4	
DCATION	Q16 415	47 A Dh	BLITMENT, VERSION PORTAL	n é		-		BEARING Inclina	TION 60° from horizontal	Sheet 6 of 1	7 <u>Sh</u>	1
RILL DELT.	A 1.00	o, Thi	ALK MOUASTED CONTRACTOR MCL				2121	ling	COMMENCE			
ORE BARRE		a <i>î k</i>	ROCK SUBSTANCE	u Th	160	<u> </u>			COMPLETED ROCK MASS DEFECTS	11.1.08		
DRILLING DA			RUCK SUBSTANCE	T		DEF	ECT					2-5-
	un	100 100	DESCRIPTION	DND	ຨຬ	SPA	CING	90	DEFECT DESCRIPTION		1.1	8016
depth (R.L.) Metres	Method Casing, F	GRAPHIC	ROCK TYPE Grainsize texture colour composition.	NEATHERING	ESTIMATED STRENGTH	88	888	SUAL 1	TYPE Inclination, planarity, roughness,		R.Q.D.	
	Cas	8	Grainsize, texture, colour, composition, structure, hardness	ME	SIS				coatings or infillings		œ́	-
247	RIF		TUFFACEOUS SANDSTONE						09 BOXING BREAK LO BRILLING BREAK			
15.20			continues as above					IE T				
								27.4	3 HANDLING BREAK			
								ΙĘ				
								E				
lle, co			76,00 m						, DD BOXING BREAK			
			Littuc clast less & 1 mm, less obvious.						KO BRILLING BRENK			
	10		Less Obylous.					Eq. 1	v Joint, 60°, planar, rough,	Fact		
	Carn								10 VOINI, 00, priser, 1		.00	
										· .		
								Ē				
	0H							- 7.6.9	19 BOXING BREAK			
17				F	NS.							
				(5)	1			Ē				
¥7.8Z			-17,82m META-SHALE					27.0	19] HANDLING BREAKS			
			lamination at 10'					E 27.5	98 BOXING BREAD			
Zg .			TUFFACEOUS SANDSTONE						14 DRILLING BREAK			
8,70			continues, very formal fears grachad, gray.								П	~
		•••	Severes Aread					E 7.2.3	57 Probable DKILLING BRE	AK		
s	RUN							L 19.1	15 As above (corbonate coat	ed)		
18.76								- 28.	15 As above (carbonata coati 20 Passible Instruct, 10°, plan 28 Bex.1146 BREAK	an rawyle, 15.		
19			laminations, de gray, at 10"						17 DRILLING BREAK		a fa	
4.04			TUFF. 5/5. , Very fine / fine								6-9	
4.20			- Jraenad, gray. — M.M. METR-SHALE (unrinabase				L.	24,2	A JAS possible PARTINGS, 1	and 15		
19,47			TUFF. SIS nº Talland.			-	Ц	19.4	planar, rough (ma	ybe drived).		
			META-SHALE, group, laminates META-SHALE, group, laminates at 10	1	11%/5			E.	Wurmarous PARTINSES, 54 mforsacting Joint, 45, pi Fo 44,	en, write lunar, rough,		
19.67			TUFF. 5/5., fime grained, avery		\$/44 44/5			-21	75 PARTING, 10, planar, rous	th, Fest.		
19.82			META-SHALE, groupdt, group NETA-SHALE, groupdt, group, Inminated at 10 to 15		\$ \$/\$4		Ц	- 34. - 14.4	B2 > HANDLING BOXING BREAK	<i>≸</i>		
3 ø emarks:		1==	Box 7 ENDS AT 17.981	 V2			<u> </u>		a person at a set	Report No. GN 2	.FA	1000
gged by:	Tou	. Va.		1	: 12.	1.0	Q	Site	Supervisor MARK ASHOVEN			•

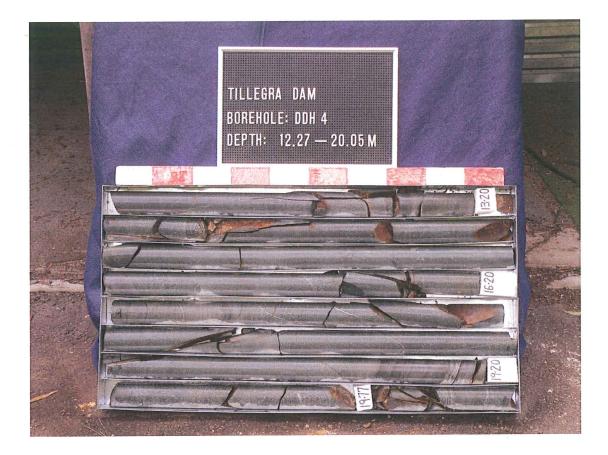
C NST	himer		GEOTECHNICAL ENGINEERING				INTAL ENGINEERING	BOREHOLE No.	6
PROJECT	TILLE DIGN	CIRA	DAM BUTMENT, VERSION PORTAL	CO-OF E <i>킹</i>	101NATE 57631 5423	S 09	R.L. COLLAR 122. 4-117 DATUM 14D BEARING 085 11 INCLINATION 60 From horizontal	Sheet 7 of 9	Sh
DRILL DELTA			MOUNTED CONTRACTOR Mel					8,1,08	
CORE BARREL	<u>. /</u>	a Tr	IILE DRILLER SHAU	W TRY	11.0R			11.1.03	т-
DRILLING DA	TA	ļ	ROCK SUBSTANCE		<u> </u>		ROCK MASS DEFECTS		$\frac{1}{2}$
	E	БG	DESCRIPTION	9		DEFECT SPACING	DEFECT DESCRIPTION		
	ng Ru	1 1	ROCK TYPE	NEATHERING	NGTH	(mm) (TYPE Inclination, planarity, roughness,		
depth (r.L.) Metres	<u>Method</u> <u>Casing,</u> Water	GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEAT	ESTIN	(mm) 888888	coatings or infillings	ROD	11.4.5.
30 50.20	1 CONT.		META-SHALE continues, - 20.20 m TUFFACEOUS SANDSTONE,		\$/5411		Numerous PARTINGS, 15, Reveral associated Foinst planar, rough, Fe/Mn S; Includes carponate vein thuck at 20.24m	5,30660, t	
16.91	I RUN I		fino-grames, grey. Ocoasional carbonate. Verning, generally & Imm			6	245 JOINTS, 60, with associ PARTINGS, 10, planae, ro	ated ugh,bast.	
51.01 131.18 51.20	9 Run 16		- 31.01m Very free grached. - 31.13m Fine grached.	Fis)	\$1/5		- 81.10 PARTING, 15, planar, vough, Fe NI.10 DRILLING BREAK - 81.34 PARTING, 15, planar, rough, h		Ør
	Run I		•				- 31.60 Joint, 95, planar, rough, fost.		
1,69 1,96 72	H		— 31,85m HETR-SHALE, dk group, laminated a — 31.4cm — 32.16m	ġ.	<u>ms/s</u>		31.25 Probable DRILLING BREAK - 41.91 PARTINC, 25°, Stapped, rough, - 422.14 JUNT, 45°, planar, rough, Fe St.	il.	17 14
12,50			Interbadded METR-SHALE,				22.29 Several JOINTS, 45456, w associated PARTIMAS, 10°, p. 10496, Fest.	rotu tamar,	-
			Hypey, and TUFFACEOUS SANDSTONE, grey. Thinky laminated to very Thinky bedded at 10to 14.		-	-	77.50 } PARTINGS, 10, planer, rough, 71.50 72.60 73.78 87.78 DRILLING BREAKS 72.60		
*	1 7.8						74.41 Probable DRILLING BREAK 74.12 DRILLING BREAK 74.12 DRILLING BREAK 14.12 Numerous probable PAR planar, rough.	TINNES, 115°,	
ň,60	. 2UM		- 38.60m TUFFACEOUS SANDSTONE,	ويبر			33,45 33:52 33:52 34:60 78:65 Probable DRILLING BREAKS 58:65 Probable DRILLING BREAM	207 100	100
4700			fine-medium grained, gray 				74,00 As abova		
¥:20					\$1/13		-74.70 DRILLING BREAK -74.79 BOKINS4 BREAK		╉
4.59	RUNT	1	- H.S. M. DIET-SHALE lam Ination of IE				24.57 MANDLING BREAK 24.75 AS Above. 24.85 Numerous prohable PART	MASCA . 16.	
5			META SHALE, da gray, with Turk SS Interbers . laminated to year Munit bedded at 18. banded.		5		24.82 Humerous probable PART planar, rough	1000	
/		1	BOX 8 ENDS AT 31.60 M			الم التي المساحد العا		ort No. GN 29	: A

		mer	of	GEOTECHNICAL ENGINEERING										BOREHOLE N	lo.
PROJECT	71	LL	EG,	QA DAM	CO-	-ORC	DINATE	ES			R.L. COLLAR DATUM BEARING	122.4m AHD 08F M		DAH	4
				ABUTMENT, <u>VERSION PORTAL</u> ACK MOUNTED CONTRACTOR MA	N C DER				79 0111		INCLINATION	60° Arom ho	rnoutal COMMENCED	Sheet 3 of	9 Sheets
CORE BARR					UN T				1755				COMPLETED	11.1.08	
DRILLING D	ATA			ROCK SUBSTANCE						Т	R	OCK MASS DEFEC	S		H.
		un	50	DESCRIPTION	Q		ΘŦ	I SI	EFECT PACING	3	501	DEFECT DE			MPT
DEPTH (R.L.) Metres	Method	Casing, F Water	2	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	MEATUEDING		STIMATE Trengt	8	(mm) සුදූප	87	SUAL L		narity, roughness,		R.O.D. Tests
865 - 26	ž	3 ≊		continues as above.	3		<u></u>			Π	<u>></u>	coatings	or infillings		
Ē											-35.17 PR) -125.25 HA	ILLING BREAL NDLINK, BREAL XING BREAL			
- 799,78											- 75,30 BO	XING EREAL			
												NANDLING	BREAKS		
				TUFFACEOUS SANDSTONE,							<i>■39,87</i> →				N
- 3% - -				meducin grained, grey, motiled appearance.							-34.08 P	Probable DRN	LING BREAD	Ķ	46
				momen my paceter ses .							-34,122 Be	oxing BREAM HANDLING B	: REAKS		
		121											LING BREN	K	
Ē		RUN											•		111
					F		N,				- - 34.78 0,	RILLING BRI	Enk.		
-37					1		<1 VS				E.				
Ē							4.						·		
- 317,20 E	HO			•								HLING BRE	RK.		Π
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- 2%		-													
E		CAN 22		· ·							-732.19 E	loxing BAE	214		
F		Ru									Ē				
F F											• 				100
F															
-348,899 = 348,994				178, CAIN							e e				
-32.94 M				Includes METH-SHMLE 28.9400 / AMINATIONS At 10											
E											-39,20 B	oxing Bren) Ka		
39.40				39.40 m								6 6	4187. · · · · · · · · · · · · · · · · · · ·	,	
				Very fine grained								rough,	ATING, 10, p	lanan,	
39.65															
				Fine-medicim grained							Ē				
- <i>4</i> 60 Remarks:		Bo	<u>* 9</u> % 9	ENDS AT 25.30M B	lox 10) E	NS	<u>п</u> 2	AT	3	9.20m		Job / Repo	rt No. GN ;	25 A
Logged by:		To	HAS	YOUNG	Dat	te:	12.1	1. 1	18		Site Supervi	isor MAI	RE ASHOVER		

C	Minerce												BOREHOLE	Vo.
PROJECT	TILLE	CIRA .				RDINATI 576 :		9		R.L. COLLAR DATUM	122,4n And 085 M	7	DDH 1	4
ĥ	<u>4/5 DI</u>	T. A BUT VERSION TRACE MOU	<u>O POR</u>	TAL		54Z	31	79			60° Acm	hormontal COMMENCED	Sheet 9 of 8,1,0	
CORE BARRI		TRIPLE		DRILLER SHA	UN							COMPLETED	11, 1. 0	
DRILLING D	ATA		ROCK SU	BSTANCE			DE	EFECT	r T		ROCK MASS DE			Πŀ
depth (R.L.) Metres	Method Casing, Run Water	907 Difference Grain	DESCR ROCK nsize, texture, o structure		WEATHERING	ESTIMATED STRENGTH	I SP.	ACIN	GI		Inclination	「DESCRIPTION TYPE , planarity, roughness, ngs or infillings	·	ROD. TECTC ///P
- 40	207	TUP	ALEOUS	SANDSTONE KS above	F	5/12				Ł	DRILLING A			
- 40.20		•••		AT 40.20M					┼╋	70,20	DRIFFING	<u>KENA</u>		$\frac{1}{1}$
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-41														
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Remarks: .ogged by:	Е Лонм	Box II El Youn		40.20 m		17.			<u></u>	Site Super	3 & ~	Job/Repo RK ASHOVE		25 A













CORE BARRELL HQ TRIPLE DRILLER SHAUM ThyLOTR COM DRILLING DATA ROCK SUBSTANCE ROCK MASS DEFECTS	MENCED 4-, 17 (PLETED 2. /7 N hness,	07 07	Iest:
LOCATION LOWER LEFT A BUTMENT E 376387 BEARING 0857 M LOCATION LOWER LEFT A BUTMENT N 6423509 INCLINATION 60 from horizonth DRILL DELTA DOGO, TRACK MOUNTED CONTRACTOR ML DERMOTT DRILL ING COM CORE BARRELL HQ TRIPLE DRILLER SHAUM TAYLOR COM DRILLING DATA ROCK SUBSTANCE ROCK MASS DEFECTS DEFECT DEFECT DRIDUATION DEFECT DEFECT DEFECT DEFECT DEFECT DEFECT	MENCED 4-, 17 (PLETED 2. /7 N hness,	07 07	
CORE BARRELL HQ TRIPLE DRILLER SHAUM TAYLOR COM DRILLING DATA ROCK SUBSTANCE ROCK MASS DEFECTS DEFECT DEFECT DEFECT DEFECT	MENCED 4-, 17 (PLETED 2. /7 N hness,	07 07	
DRILLING DATA ROCK SUBSTANCE ROCK MASS DEFECTS	V Jhness,		
DEFECT DESCRIPTION	jhness,		
Image: Section of the section of t		R.Q.D.	TESTS
NON CORE I			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	oth Associated anar, rough, Fast, contrag.	1.08 7.04 7. mm 7.95	LFUL NO TEST
Remarks: Date: 18.12.07 Site Supervisor MARK ASHO	Job / Report No GI	V [5]	9

× ~ Ni		ed .	GEOTECHNICAL ENGINEERING				ENTAL ENG		BOREHOLE	No.	
PROJECT		EGR	LINGINELLING A DAM EFT ABLOTMENT	СО-ОІ Е 3	rdinati 76 3 s	is 57	R.L. COLLAR DATUM BEARING	97.7m AHD 085 M	DBH,	5	
	(6	1851	REAM TOE)			FO9 DRILLI		from hoursounder	Sheet 2 of 4.12.07		hee
CORE BARRE	LL HG		IPLE DRILLER	SHA	UN .	AYLOR		COMPLETED	8.12.0	7	
DRILLING DA			ROCK SUBSTANCE			DEFECT				П	7
	Run	C 10G	DESCRIPTION	NEATHERING	E HS	SPACING (mm)	90 0	DEFECT DESCRIPTION TYPE			10/17
DEPTH (R.L.) Metres	Method Casing, Run Water	GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness		ESTIM/ STREN	(mm) 888888	VISUAL	Inclination, planarity, roughness, coatings or infillings		<u>R.Q.D.</u>	TECTC
5	Iwos .		META-SHALE continues dark gray, laminated as The lo	e			- F. 7.0 Pox/M	C BREAK		244	
5.75	RUN S							NT 60, With associated planar, rough, Fe st		*	
6 6,30	E CANA 4			E	15/2/5.			-1116, 10°, planas, rough, ural Voints, 30°, with a erings, 10 to 15°, planar, st.		1429	
6.82	. Run lo			Fis)			-6.72 -	S PARTINGS, 10, Planas, 1 Fost.	•	1.08	
/6.97 7 7.10	HQ 1.811		-6.97m TUFFACEOUS SANDSTONE				1.18	WT, TO, With associats ATENICS, 15, planae, 1 FofMn 53.	aa rough,	70	,
	TI .		ture grained , Jacy.		. 1		ŀĒ	le DRILLING BREAK. 7, 20°, planar, rough, N	Fe st	Ju-L	
.8	K.U.N.		•		S/KS		Ē	7, 60°, planar, rought, Fe.)) 's Tern13, 657, planar, 1		X	5
8,39 8,75	6. 6401 1 F						- 3.39 - 2.60 PHATI	fest. NG, 15, planar, rough, 1	Fest.	//	•
9	41 NM 1		9.17 T				2.95	's Tomsts, 65°, planar, Fe st.	, rough,		
1.17 1.20 1.52			-9.52m				154 J-21	(= PARTINGS, 10°, plam Fe	ar, rough	7.01	
1.73	CUM 15		META - SHALE, die grey folac Iaminated at Vito 10 1.97 TURPACEOUS SIS, fine gr.	che _y	× 1945		- 4.73 DRI 4.80 BOX	FE ILLING BREAK ING BREAK PLING BREAK	G. J.		
Remarks:	. BI	0X / 1		Box 2	ENI	S AT	8.85M	Job / Rep MARK ASHOVER	ort No. GN	125.	A

		,					ENTAL ENGINEERING	BOREHOLE	No.	-
ROJECT 7	LOWE	GRA FR L UPS	DAM DAM EFT ABUT MENT TREAM TOE) KK MOUNTED CONTRACTOR MU	СО-ОГ Е Э N 6	10 INATE 763:	s 37 3509		untal Shiet 3 of COMMENCED 4, 17.		She
CORE BARRE				UN TI				COMPLETED 8,12.	· ·	
DRILLING DA			ROCK SUBSTANCE		1		ROCK MASS DEFECTS		, T	$\frac{1}{2}$
depth (r.l.) Metres	<u>Method</u> Casing, Run Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED Strength	DEFECT SPACING (mm) දිසිදිසි	DEFECT DESCRII OCI TYPE Inclination, planarity coatings or infi	, roughness,	R.O.D.	111 0-2
10 10,43 10,53 ,10.80	Run 15 CONT.		TUFFACEOUS SANDSTONE CONTINUES, FINE Jr., Jrey -10.43 Elongate META-SHALE Class to Tomm -10.53m Inferbedded META-SHALE TUFFACEDUS SANDSTONE,		\$1/5		10.54 PARTING, 5, plan 10.64 J-3x's PARTINGS, 10.60 DRILLING BREAK	ar, rough, íminor fes, as above	1 82%	57 /s
60,833 Y 11,FF 11,FF 11,7F	Run le F		Jrey / dk grey, banded. Laminated to thinky badded at 10°,	E.)	m5/5		-11,75 Probable DRILLIN -11,75 Probable DRILLIN -11,75 PARTING, F, pland -11,75 PA above with ca -11,75 BRILLING BREME		7,00/	5 area 5 a
12 (2.58 (3.65	Kaw i I	. (1	- 12.65 META- SHALE	F	5/113		12.60 rough	, rough 011175, 65, planar,		
(z			78 11/ 1/2119 Leven Lev 51	<i>4</i> ,			12.78 Joint 80, pla minor, car 13.75 Jutersecting Ju planas, roleyh,	nar, roczątu, bonate coatung 14875, 70 aud 60°, minor carbonate Coatung.	124	57 Ki
14 4- 03-	KUN IB						- 14.27 FOINT, 60, planar, re 13.29 1 22 PARTINGS, , 14.02 Carbonate coas 14.40 JOINT, 60, planar, 14.40 JOINT, 60, planar,	10", planas, rough tact to fill Fran thick Howsh, Minor andonale, coating	- -	1622 / 2.
4.75 5	K Pd 1						- 14,717 DRILL-ING BREAK			
emarks:	Box	BEI	105 AT 12.78 m					Job / Report No. GA	74	7 A

Cà		ierc	é	GEOTECHNICAL ENGINEERING							ITAL ENGINEERING	BOR	EHOLE No.		
PROJECT Location		ow,	ER ,	RA DAM LEFT ABLITMENT REAM TOE)	E N	37 6		387 35	09	[[]	R.L.COLLAR 97.7m DATUM AHD BEARING OBF [®] M NCLINATION 60 [®] from horizo	rstal Shoot	H _) s	hee
DRILL <i>Pelo</i> Core Barri			·		L DE HAU								12.07		
DRILLING D		_		ROCK SUBSTANCE				Ĺ			ROCK MASS DEFECTS		T		
		(nu	БQ	DESCRIPTION	DIN		Ô٣	SP/	FECT ACING mm)	DO	DEFECT DESCRIPTIO)N			WPT
depth (r.l.) Metres	Method	Casing, Kun Water	GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness		WCAINE	ESTIMAT STRENG	2000	mm) 3888	VISUAL 1	TYPE Inclination, planarity, roi coatings or infilling			K.U.U.	TESTS
N7-				TUFFACEOUS SAMDSTOME Continues, fine grained, gray							15,76 15,42 15,42 15,47 15,70 15,70 15,20 15	r	mar, long. IS		
16	213	A CONTINCES		2	F		SAV/S				Carbonate con 16,10 16,49 Possible Joinst, 50, p 16.79 Joinst, 445, planar 16,29 Joinst, 45, planar 16,25 Joinst, 60, carbo	lanar, rougi		3.Z.C.	711 1111
17 17.35	Ha with	Kan								/	17.18 JoINT; 30, plands, 10	ugh, miner estonate coa	ling		
17.75 18											17.75 DRILLING BREAK. 17.94 Possible PARTINE, 10 Carbonate Coate 18.10 Foinst, 45, planar, rou 18.70 Probable PARTINE, 19,	gh Carbonas coase blanne, roug	12 1- 14_3		17 11
19	10000	OT NON		• •							18.43 Jourt, 60°, planar, rou 18.45 PRILLING BRERK 18.66 VOUNT, 90°, plana rough , carbom			7.41	
14,10	1111120	VI WAX								and the second sec		·		0%	
<i>10</i> Remarks:			Box;	FENDS AT 16.79 m						11	FY	Job / Report No.	GN2	5	ţ
ogged by:	1	Jø.	YN S	YOUNG	Da	ite:	18,	12	.07		Site Supervisor MARK ASA	VOVER			

CEREMERTO: ENCINCELEMING GEOLOGY EXPENDICE LOG DECEMINENT LEFT ABLIT MELETING GEOLOGY EXPENDICE LOG THELE CAR D D M M DIFFET DESCRIPTION COMPARED DATA TAKE COMMENTED DATA TAKE DIFFET DESCRIPTION LL DROX THAT EXPENDENCE MELESATION DEFET DESCRIPTION DESCRIPT	Currer on trans				DONEHUL	E LOG	
CALLON CALL Contraction No. 697-2607 NO. 1007 Contraction Description Description <thdescription< th=""></thdescription<>	IAUCH ITSTADISTAD	F 2		87	DATUM	AHD	DDH
RE BARRELL // C TRUCC DRLLE SAMAN TAYLON COMMETED -//L.07 RUNG MAR ROCK MASS DEFECTS ROCK MASS DEFECTS RUNG MAR ROCK MASS DEFECTS RUNG MAR ROCK MASS DEFECTS RUNG MAR DESCRIPTION RUNG MARS	(UPSTREAM TOE)	N (INCLINATION 60		
Bill MURA NOCK SUBSTANCE NOCK MUSS DEFECTS ILING DATA DESCRIPTION DESCRIPTION Big Bill Bill Bill Bill Bill Bill Bill B		1.1.0			æ		
B S DESCRIPTION B DESCRIPTION DESCRIPTION B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B B <th></th> <th></th> <th></th> <th></th> <th>ROCK N</th> <th></th> <th></th>					ROCK N		
1.00 1		THERING	.	SPACING	<u>JAL LOG</u>	TYPE	.0
1. 10 PARTICLE LASSENCE 1. 10 PARTICLE LASSEN				ୢଌୄଌୢୄୠଌ୕ଋ ୣୄୄୄୄୄ			RO
1 1 1 1 1 1 1 1 1 1 1 1 1 1	TUFFACEDUS SAN Continues, fine. gray	IBSTONE grained,			- To. 18 PARTI	NG, 15°, planae, rough urbonata (Sa	24
2. 2. 14 2. 14 2. 14 3. 18 3. 19 3. 19	Run an		SM,		11,70 JOINT, 11,74 As abo 21,40 DE(11), 21.75 Jo 1417,	55°, planar, rough, cap ove	bouate bated
12.78 7 16 METR-SHRIE, dark gray, leminated est 51-10° 10.73 10.75	11 25 HG RUN 24					T FRACIOSINTS, No je B , generalig vorte m Maja contrag	o', planar, ister
time gracmed, grey. 13,61 DRULING BREAK. 14.19 DRULING BREAK. 14.19 Jourt, 46, planar, rough, miner Locking 14.19 Jourt, 46, planar, rough, 14.19 Jourt, 46, planar, rough, 14.19 Jourt, 46, planar, rough, 14.19 Jourt, 46, planar, 14.19 Jourt, 47.19 Jo	1.98 HETA-SHALE da In minated at 5		5/ sm				121
	timo grained, g		5M/5		JOINT, 13,61 13,61 13,61 13,61 14,19 JOINT, 14,79 JOINT, 14,70 BOXIM 74,70 BOXIM 74,70 BOXIM	NG BREAK He, planer, rough, Mi lorbohate (co. 750°, as above G BREAK	ner at ing

c,		r Laf	GEOTECHNICA ENGINEERIN						NGINEERING OLE LOG	BOREHOLE No		
PROJECT	Low	EG IER	RA DAM LEFT ABUTMENT REAM TOE)		CO-OF E न्द्र	DINATE	S	R.L. COLLAR DATUM BEARING INCLINATION	97.7m AHD 085°M	Sheet 6 of 2	5 She	eet
	TA 2000	, ÎRA	CONTRACTOR	Mel	OER,	m07	T DRI	LING	COMMENCED	4.12.07		
CORE BARR		<u>a 7</u> 	RIPLE DRILLER ROCK SUBSTANCE	54	AU	M T	AYLOR		COMPLETED OCK MASS DEFECTS	8.12.0;	$\overline{+}$	
·····	Run	901 0	DESCRIPTION		FRING	图表	DEFECT SPACING (mm)		DEFECT DESCRIPTION		1.107	I d W
depth (r.l.) Metres	Method Casing, Water	GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness		WEATHERING	ESTIMA	(mm) දිසිදිසි	VISUAL	Inclination, planarity, roughness, coatings or infillings	4	<u>R.O.D.</u>	TESTS
14		9	TUFFACEOUS SANDSTONE eDittuies, fine grained grey.		>		2	= 25,07; 1 19,30 Bc	HANDLING BREAK			
Zo	N 27 CONTINUED							I France D	our, 60°, plamar, rough, aarbonale co oxuxce BRE44 our, 60°, plamar, rough, c	W.7	1 1	
26-75 27	HQ . RUN				F	13		- 14.75 DJ 12.55 J 12.75 J	Robable DAILLING /HANDLIN RILLING BREAK 2x's Joinsts, Fo, planar, r Mor cabbo nate e VINT, Jo, planar, rough, with carbonate cooter Succ BREAK	paraghe Conficing.		
73	Kun 18							27. 40 Pro	bable BAILLING BRENK ssible PARTING, F, planar, foint, To, planar, carboude ssible MATING, F, planar Probable DRILLING (HANDLING &	h, mines cecting rough	12	
B.78									Intersections Tours, Hoar planar, vough			
29	EUM IS				•			19.13 19.51 19.51	Jowt, 45, planar, vough, con Jowt, 95, planar (undula rough, Carbonate coas Histociated Parties as p vough, carbonate costal to thick of 29-51 Ix's Partings, planar, rough, corrough	fing); tall s ² plansi fill buno	· / alt	
21.75	23.0							$\left[E^{\mu \eta, \mu p} \right]$	5151-110% BUEPE	Ň		
<i>گرہ</i> Remarks:	1	1	ENDS AT 28.30M			ļ		N REAL	His Volate Do fo the Plance		15A	-
Logged by:		<u>x i</u> ohn	YOUNG		Date:	18.1	12.07	Site Supervi	SON MARK ASHOVER			

CATION LOUTER LEFT ADJUTTION E 371-392 BRANN PBY'N CHATTERIAM TAPES N 64235-07 BRANN bother bergenhald and the second bergenhald berg								ENTAL ENGINEERING	BOREHOLE No.
ALLACED TO DEPRECIDE HOBERHON DALLER SHARE TO SUMMER DE 1, 1, 57 RE BARREL HOA TRAFTS DURLER DURLER SHARE TAYLOR COMMERCE 1, 1, 57 RE BARREL HOA TRAFTS DURLER DURLER SHARE TAYLOR COMMERCE 1, 1, 57 RE BARREL HOA TRAFTS DURLER DURLER DURLER COMMERCE 1, 1, 57 RE BARREL HOA TRAFTS DURLER DURLER DURLER COMMERCE 1, 1, 57 RE BARREL HOA TRAFTS DURLER DESCRIPTION BE BE BE BERRER DEFECT RE BERRER BOCK TYPE DESCRIPTION BE BE BE BERRER DEFECT DESCRIPTION BE BE BE BE BERRER DESCRIPTION BE BE BE BERRER DEFECT DESCRIPTION BE BE BE BE BERRER DEFECT DESCRIPTION DEFECT DESCRIPTION BOCK TYPE SUBJECT SCHLOOTS SALE OF SUBJECT SCHLOOTS DEFECT DESCRIPTION DEFECT DESCRIPTION BE BE BE BERRER BERRER BERRER DEFECT DESCRIPTION DEFECT DESCRIPTION BOCK TYPE SUBJECT SCHLOOTS SALE OF SUBJECT SCHLOOTS TARTAFTS TART SCHLOOTS SALE OF SUBJECT SCHLOOTS DEFECT DESCRIPTION BE B	PROJECT	TILLE	GR	n Dam	со-ог е ²	NDINATE	s 87	R.L. COLLAR 97.7m DATUM AHD BEARING 087 M	sheet 7 of # She
BLING DATA ROCK SUBSTACE BLING DATA ROCK MASS DEFICIS BLING DATA DESCRIPTION BLING DATA <tr< th=""><th>RILL<i>ÞELTA</i></th><th>1000</th><th>Unck</th><th>NOUNTED CONTRACTOR</th><th></th><th></th><th>•</th><th>LINCI COMMENCE</th><th>11.2.7</th></tr<>	RILL <i>ÞELTA</i>	1000	Unck	NOUNTED CONTRACTOR			•	LINCI COMMENCE	11.2.7
Bit			1a 7		SHAU	N 7,	1YLOR		<u> B.12.07</u>
Image: Solution of the second seco	DRILLING DA			ROCK SUBSTANCE			DEFECT	RUCK MASS DEFECTS	
1.10 1.10	depth (R.L.) Metres			ROCK TYPE	WEATHERING	ESTIMATED STRENGTH	SPACING	TYPE Inclination, planarity, roughness,	11
12.75 70,65 70,80 70.85 70.80 70	31 31.10 31.65 37	© [111] 3.4. [1411] 7.4 [1111] 7.0		continues, fine gracuad,	F	5/112		JOINT FRIMMENTS, 70 4 Tough, MIMOR Carbonatt Jo. 47 Jo. 47 Jo. 47 Jonst, 60; planar, rough (possibly drilling indice 31.10 JOINT, 67, planar, rough, JI. 10 JOINT, 67, planar, rough, ALLERSCO & REAL TI. 16 BOXING BREAM TI. 16 JOINT, 67, planar, rough, carbo. 34,17 JIX'S JOINT, 67, planar, rough, carbo. 34,17 JIX'S JOINT, 67, planar, rough, carbo.	d) carboucte coefect. g
	32.75 33 好.03 71 43 新期	134 Run 33 11 14		Interboolded fine gr. Tupp: 5/5 and METTA-SHALE, gray/ dk gray, banded, han incher to v. threaty badded at 104514 - 20.43 TUFFICEOUS SANDSTERIE, fine to mechum grained (with depth), gray. Includes paeta - Smale laminations as shear	- 20""			-74.16 VOINT, FD', as above -74.157 -72.80	lanar, lanar, coasted.
	Ŧ	0		ENDS AT 31.76m					port No. GN 25A

PROJECT / LOCATION DRILL <i>DELTR</i> CORE BARRE DRILLING DA	L. 611 L. 611 Taco L. H. TA	EC/K VER PST R TRACK,	LEFT A BUTMENT LEFT A BUTMENT EA M TOE) MOUNTED CONTRACTOR M	C E I	COMMERCEENGINEERINGGEOLOGYBOREHOLELOGPROJECTTILLEGRADAMCO-ORDINATESR.L. COLLAR97.7mLOCATIONLOWNERLEFTA BOTTMENTE3763937DATUMAHDLOCATIONLOWNERLEFTA BOTTMENTN6423509BEARING0857mINCLINATION 60 from horizoutalShoet 3 of											
DRILLING DA	TA	LOCATION LIPSTREAM TOE N 6423509 INCLINATION 60° from horizontal DRILL DETA Too TRACK MOUNTED CONTRACTOR McDERMOTT DRILLING COMMENCED CORE BARRELL H@ TRIPLE DRILLER SHTAUM TAYLOR COMPLETED DRILLING DATA ROCK SUBSTANCE ROCK MASS DEFECTS ROCK MASS DEFECTS														
				HA	1UN	1 11	φy Γ	607	7		4.12.08 8.12.01	<u>8 -</u> T				
	Method Casing, Run Weter	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness		WEATHERING	ESTIMATED Strength	l SF	EFECT ACIN((mm) 글음(응	۱L.	DEFECT DESCRIPTION	400	T.C.L.				
	RUN 34 COUST.		TUFFACEOUS SANDSTONE COMMUNES, MODULIN GRAM, GULY.		F	511/5				39.10 JOINT FRILIMENTS, Joto 60", J 39.24, Jough, Carbonate Coaton 4 mm then 39.27 1.x's Joints, Jo and 45", plan MINDOR Carbonate Coaton 39.15 39.15 25.15 DRILLINK, BREPK	N N	11				
245.75° 346 389			HOLE ENDS AT 35.75 m.													
3-9 40						065					nt No. GN2					











Commerce				NTAL ENGINEERING BOREHOLE LOG	BOREHOLE No.
	GRIA VINIA - LEET ARCOTATION	CO-ORDINATES E <i>3576 44</i> N 6423	F6	R.L. COLLAR 127.6m DATUM AHD BEARING 090°M INCLINATION 60° from hos coordiale	Sheet 1 of 9 She
DRILL DELTA 1000, CORE BARRELL HG	TRACEMOUNTED CONTRACTOR MCDE TRUPLE DRILLER SHALL		RILLIM	COMMENCED COMPLETED	16.11.07 3.17.07
DEITIH RELIT RELIT RELIT Method Water Vater Casing, Run Casing, Run Casing, Run	ROCK SUBSTANCE DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING Estimated Strength	DEFECT SPACING (mm) 000 IVI 000 IVI 000 000 000 000 000 000 000 000 000	ROCK MASS DEFECTS DEFECT DESCRIPTION TYPE Inclination, planarity, roughness, coatings or infillings	RQD
0	NON CORE				
1.50 I 2.75	CORING COMMENCES AT 1.701 TUFFACEDOUS SANDSTONE, flue grathed, brownf orangebrowers.	HW / WW		1.40 1.49 DALLING PREMES 1.44 PARTING 15°, planar, rough, 1.90 JOINT 60°, planar, rough, 1.91 PARTING, 15°, planar, rough 2.49 JOINT, 60°, planar, rough 2.49 JOINT, 60°, planar, rough	gh, Fest
4 (1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	lale brown guardero www.	WW MS		3.10 Joint, 35, planar, rough 3.18 Boxing BREME 3.76 Probable Shillines B.H. 7.65 Joint, 60, planar, rough clay coates 3.90 - Toint, Jo, planar, rough sandy clay full to 3.00	e, Fest E Q4 1, Fest 4.
F. TF. I I I I I I I I I I I I I I I I I I I				4.18 4.24 Probable DEISLINGE BREA 4.57 28's TOINTS 60°, waterse 4.72 plander, rough, Ec st 4.30 FRINT, 60°, planer, roug 4.96 As above.	chasse of a

DOCTION METADLE LEFT & BARTNERSTER BARTNER - B	Co	minero	že	GEOTECHNICAL 8 ENGINEERING			ONM OGY	ENTAL ENGINEERING BOREHOLE LOG	BOREHOLE No.
International Anticipation State St					E	3764	-56	DATUM AHD BEARING OGD [®] M	DOH 6
ORE BARRELL INC. TRAVE COMPLETED 3, 12, 12, 12 RUNDO DATA ROCK SUBSTANCE ROCK MASS DEPECTS ROCK MASS DEPECTS BUDDO TYPE DESCRIPTION BERGEN DESCRIPTION BUDDO TYPE DESCRIPTION BERGEN BERGEN BUDDO TYPE DESCRIPTION BERGEN BERGEN </th <th></th> <th></th> <th>and the second se</th> <th></th> <th></th> <th></th> <th></th> <th><u>k</u></th> <th>/</th>			and the second se					<u>k</u>	/
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		'			-			R COMPLETED	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	DRILLING DA			ROCK SUBSTANCE	1	1	DEFEAT	ROCK MASS DEFECTS	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	depth (RL) Metres	<u>Method</u> Casing, Run Water	GRAPHIC LOG	ROCK TYPE	WEATHERING	ESTIMATED	SPACING	ien.	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	5	RUN'S CONT		continues pale brocconf			-	5.20 To INT, 65, planas, rough, 5.35 Inforsacting Joins, 45 a Deplanar, rough, minor	nd 60°, Fe st.
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	5.71 5.95 5.10				<i>č</i>	-		9.95 PARTING, 5, planar, ver 6-10 PARTING, 5, planar, ver sandy vay feut to 7-min	y voregh ugh,
7.10 Image: Construct, gravelly laws Image: The Destruction of the	6.80	40		TUPPACEBUS SANDSTONG Funa-meduum gracmed, graybeoicen (Stu) to gray	\$ <i>IV</i>	5		6.46 Probable Preting 15 very rough, partly suit	planar, s
$\begin{bmatrix} 1, 60 \\ 1,$	1 7.10 1.75 7.75	Run			SW			7.10 DRILLING BREME. 7.25. JOINT, 65, planar, rough Milhor clay coust.	~
A 15 METR - SWALE LANDARION, 16 METR - SWALE LANDARION, 16 METR - SWALE LANDARION, 17 METR - SWALE LANDARIONE, 18 METR - SWALE LANDSTONE, 18 METR - SWALE LANDSTONE, 18 METR - SWALE LANDSTONE, 18 METR - SWALE LANDSTONE, 19 METR - SWALE LANDSTONE, 10 METR - SWALE LANDSTONE,	7, 60 ð							7.79 DRILLING BREAK	
1.5- 1.5- 1.70 80 1.6- 1.70 1.		S NN E		— META-SHALE lawswatton			1	2.45 As above 2.51 TO 197, 45°, planas, roce 2.67 PARTING, 5° planas, roce 2.67 Probable plituing BREM	gle, FC/Minst cgla FLS1 k.
1.56 1.70	8;15 1.15	1 - 1		time grained, grey 1					To, planar, E
15 11 11 11 11 11 11 11 11 11 11 11 11 1	1, 52 1, 70 1,80	LNDA						- VOINT, 70, plamer, rocy	-
	o emarks:	Box	EAL	SAT 5.20m ROX2 EA	105 1	173	. 65 m	Job /Re	port No. GN 2571

e		rd .	GEOTECHNICAL 8 ENGINEERING				ENTAL ENGINEERING BOREHOLE LOG	BOREHOLE No.	
PROJECT		ECI,	RA DAM EFT A BUTMENT	CO-OF	ndinate 576 4	S	R.L. COLLAR 127.6m DATUM AHD BEARING 090°M INCLINATION 60° from horizoutal	Sheet ²⁵ of 9 s)
DRILL BELTI	1000,		TRELINE) R MOUNTED CONTRACTOR MC.				ILLINCA COMMENCE		Sne
CORE BARRE		Q 11		IN T	ĨAYL	R	COMPLETED ROCK MASS DEFECTS) 7.12.07	Γ
DRILLING DA			ROCK SUBSTANCE	1		DEFECT	KULK MASS DEFECTS		
	ų	20 LO	DESCRIPTION	NG	e z	SPACING	DEFECT DESCRIPTION		11107
depth (r.l.) Metres	Method Casing, R Water		ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATE	(mm) နွန္ဗန္ရအနာ	TYPE Inclination, planarity, roughness, coatings or infillings	<u>R.Q.D.</u>	
10	K2		TUPPACEOUS SANDSTONE continues, fine grained,	Fa)	5	H	TOINT, 30, planas, 10, 10,18 10,29 PARTING, 15, planas, 10		
10.24 10,66 11 11,14 11,14 11,14	fa Run 8		Interbedded META-SHALE and fine grained TUFFACEOUS SANDSTONE. brown / greepbrocon, bunded. Laminated to vary think bedded at 5 to 10°	R	stulled in stallor in sec.		10.61 Probable DRILLING BASAS 10.61 Probable DRILLING BASAS 10.61 Grande, roug 10.71 Janut, 45; planae, roug 10.95 24's Jointe, planae, r 10.95 - 24's Jointe, planae, r 11.03 Falling Stance, r 11.03 Falling Stance, r 11.04 PARTING FRAGMENTE 11.14 PARTING FRAGMENTE	6, Fest, e 20 min ugh Horce ough, FO;	
11.#7 11.74 12	Kan 10 - Kan 9		11.74m Urcy/daveJrcy, banded		nof mi		11.4 Foint VARTING FA GF and F, planar, Folimm SF, prince dary (may be handling 11.80 11.80 11.80 11.94 Fough, Fo St.,	A GMENTS, voligh, Lell fo Zama snet weed) . "Fiftin st. "an er,	- M. &
17. F1 12. 84 13. 60 13. 15 12. 15	<i>a</i>		TUFFACEOUS (ANDSTONE, fine grace of gray/ greybrown/brown Includes META - SHALE interbads (45 shown) donk grey/ greybrown, laminated at 5 to 10		5		12.18 PARTING, 10, planas, ro 12.17 - 24's JOINTS, 40, planas, ro 12.51 PARTING, 5°, planas, rough 12.51 PARTING, 5°, planas, rough 12.51 PARTING, 5°, planas, rough 14.81 PARTING, 5°, planas, ro 13.02 22x's PARTING, 5°, planas, ro 13.75 Probable DRILLING BA	es, rough Me st. S , Min st. ough, Faf Me Maner, rough, t.	500 F 100 F
(3.15 13.28 13.78 13.56 13.60	Runst			HW/WH	V tal / tot		13.44 VOINT 60, planar, rough, Fo 13.50 PARTING, F, planar, rough 13.65 Voint, FRACEMENTS, bot rough, Fo St.	Mn 4. , Ec]Mn 4.	
14,10 14,10 14,29 (4,92 14,68				SW Faj			14. 10 14.77. Probable DE MLMC BA 14.77. PARTING, 10, planer, 10 14.60 As above 14.68 As above 14.68 As above	regh, 100 st.	
15		····	and a second				- 14. 97 DRILLING BREAK	Report No. GN 251	
emarks:	Bog	K31	ENDS AT 12.51m		7.1		Site Supervisor MARK ASNOVE	and the second design of the s	ri

15778-04-900 H H H H H H H H H H H H H H H H H H	mmer		GEOTECHNICAL & ENGINEERING	GE		OGY BOF	REHOLE LOG	BOREHOLE No.	
LOCATION	M100	LE CEN) DAM LEFT ABUTMENT TRELINE)	е 7. N 6	,764 542	456 DATUM BEARIN 3606 INCLIN	AHD IG 090°M ATION <i>Go" from horrzonkal</i>	Sheet 4 of 9	Shi
DRILL <i>Dela</i> Core Barre						TE DRILLING TAYLOR	COMMENC	P # 11.07	
DRILLING DA			ROCK SUBSTANCE				ROCK MASS DEFECTS		Ţ
depth (R.L.) Metres	<u>Method</u> Casing, Run Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	estimated Strength	DEFECT SPACING (mm) 01 WISIA	DEFECT DESCRIPTION TYPE Inclination, planarity, roughness coatings or infillings	NOD.	<u>n.u.</u>
15,10 15,10 16,20	i cont		Fine gr. TUFFACEOUS SE CONTINUE META-SHALE, dark grayf greybrown / brown, banded Laminated at	es Frsj MW	5 115		13 Numerous PARTINUS, planar, generally Felmn St.	17 to 10; rocupte,	
15.UL 15.71	12 - RUNS		5 to 10"	Fw)	MIS MS		71 JOINT / PARTING FRAG 21 60 and 5°, planar, ro 91 4x's PARTINGS, 57% 10 199 4x's PARTINGS, 57% 10 100096, Falmin st.	MENTS negli, Fo/My st.	Z / 2
la 16.17 16.15	1 RUN		TUPFACEOUS SANDSTONE, fune grained, greef.	Fig	5		17 Joint, 60, planar, rough		
16.68 17	HQ RUNI 12			MW	W		10 Jourt PARTING FROMM 940 10 - planar, rough 10 Clay coasted to sandy		
(7.26 7.35			- 17.25 - gracued		1115 W		10 I chay constant to senar 26 37 J As above (partly to by circulary pr 44 Joint, 60, planar, rough Fr Joint, 49, planar, rough	regnicisted	600 Sec 1.
17.86 18 18,08 18,41			- 17.86m Greybrown	FG)	5	17.5	86 901117, 70, planas, rough 08 J. Probable PARTIANE FR 11 J. Crushed, Fast.	, Fafirin st.	
8.44		X	- 19.11 Gray CORE LOSS 0.27 MM	E)	5/145		, ++ Fourt, 65°, planer, roo		
18,80 19,25	RUN 14		TUFFACEDUS SANDSTONE Continues, very finef fine gracuad, grey.	Faj	5/VK		67 No above 71 No above 13 - 2x's Partings, 10°, pla 16 - 2x's Partings, 10°, pla 14 BRILLING BREME	enas, rough Mn st.	1 7 2 1
20	RUM 15						.76 TomT, To", planar, rough .27 TomT, 60°, 45 above	, carbonate coated.	
	L L L		NDS AT 16.47m	I	J		Inh	Report No. GNZ	15

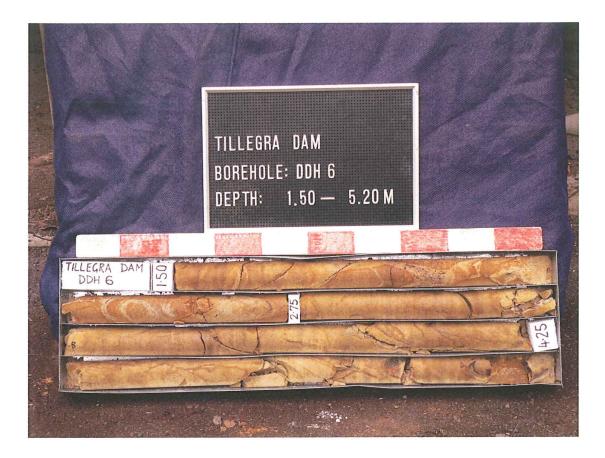
OCATION MUDDES' LEFT Afform MARTIN E 37.164763 DRUM Ogo M MILL ACCID 2000 SAME MARTING MARTING DATALANC OCAMING DATA MILL ACCID 2000 SAME MARTING DOURACTOR MARTING DATALANC COMMENCE TO . M. 97 MILL ACCID 2000 SAME MARTING DATA DOURACTOR MARTING DATA COMMENCE TO . M. 97 MILL ACCID 2000 SAME MARTING DATA DOURACTOR MARTING DATA COMMENCE TO . M. 97 MILLING DATA DOUR SUBSTANCE DESCRIPTION DESCRIPTION DESCRIPTION MILLING DATA DOUR SUBSTANCE DESCRIPTION DESCRIPTION DESCRIPTION MILL STATUS, FOR THE . SAME STATUS, SAME SUBSTANCE DESCRIPTION DESCRIPTION DESCRIPTION MILL STATUS, FOR THE . SAME STATUS, SAME SUBSTANCE DESCRIPTION DESCRIPTION DESCRIPTION MILL STATUS, FOR THE . SAME STATUS,	C		erc	e		INICAL &						ITAL EN			-	BOREHOLE	Vo.	<u> </u>
DELLING DATA ROCK SUBSTANCE DOCK MASS DEPECTS Image: Second Sec	LOCATION Drill Deci	M 4 (W 2c	000 <u>C</u> 6 100,	E ENTRE TRE	LEFT ABUTMEN ZELIWE) MCC MOUNTAD CONTRA	ACTOR MODE	e 3 <u>n (</u> <i>Rhm</i>	767 942 017	456 760 DR	06 114	D B II	DATUM Bearing Nclination	AHD	90°M 1 horizo <i>u</i> COMM	ENCED	<u>Sheet 5 of</u> Z6.11.0	7	
Bit				(, <u>, , , , , , , , , , , , , , , , , , </u>				RO	CK MASS DEF	ECTS		Anna anna anna anna anna anna anna anna	T	
10.99 11440-addig META-MALE and Dary Method Method META-MALE and Dary Method Method Method Methods (Methods) and G THERMOND, INTERPRETE and Dary Methods (Methods) and G THERMOND, META-MALE and Dary Methods (Methods) and G THERMOND, META-MALE THERMOND, META-MALE THERMOND, META-MALE AND THE META-META-MALE THERMOND, META-MALE THERMOND, META-	depth (R.L.) Metres		Water	GRAPHIC LOG	ROCK TYPE	omposition, SS	WEATHERING	ESTIMATED Strength	SPA	CING	VISUAL LOG		Inclination,	TYPE planarity, rough	ness,		R.Q.D.	TESTS M/P7
	70.05 70.05 70.24 70.24 70.24 70 70 70 70 70 70 70 70 70 70 70 70 70	RUN 16 RUN 17 PUN 16 RUN 16 COM			TUFF. 615 CONF., v. f Interbadead METH and kary time gt.: SAMPSTONE, Le pi banded, lamman TUFFACEOUS SAM verythue frue. gr grey. Includes carbon healact jocuts fo itesch, 60 fo 30	Ino gr. - 5 HALE WIFFACEOUS ey giey, ey at y = 5570NF, a.cn.cd, actec Incom	F(4)	SAVS				20, 10 PAL 20, 10 PAL 10, 20, 73 VO 20, 73 VO 21, 10 DR 21, 10 DR	ATTING, F ROBADIE L TING dore TING dore TING dore INT, FO, J ILLINIG MT, 60°, Pla NT, 60°, Pla NT, 60°, Pla NT, 60°, Pla NT, 61°, Pla NT, 60°, P RTING, F TOUGH, R TOUGH, R SUNT, TO°, PLA NT, 60°,	ALLING Planar, Planar, ro Planar, ro P	BREA.	E (w/th arbonate coated E St. Contate ated. Contate contate contate contate contate contate contate contate contate contate contate contate contate	200/ 1/co/ 200/ 1/co/	
	15 Remarks:			5	ENAS AT TA TZ	e last	EN		III AT	24	ka .	<u>}</u>		.	ob / Reno	ort No. GA	12	L 7 A

					& ENVIRONMENTAL ENGINEERING G GEOLOGY BOREHOLE LOG					
PROJECT TILLECIRA DAM LOCATION MIDDLE LEFT ABUTMENT (CENTRELINE)			CO-ORDINATES E 376456 N 6423606 RL COLLAR 127.6m DATUM AHD BEARING 090°M INCLINATION 60° from horizontal					- DOH C		
RILL DEL	(TA 10	CENT 30 TRI	RELIME J BCK MOUNTED CONTRACTOR MC	DERM	DTF	OR ILL.	INCLINATION (30)	COMMENCED	Sheet 6 of 9 26, 11, 07	
ORE BARRI			5-1	TAULA	TAY	OR		COMPLETED	3,12.0	
RILLING D			ROCK SUBSTANCE				ROCK M/	ASS DEFECTS		┨.
	ŋ	90T	DESCRIPTION	SING	岛王	DEFECT SPACING (mm)		DEFECT DESCRIPTION		104
depth (r.l.) Metres	Method Casing, I	GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMAT	(mm) క్షక్రిప్రకర్		TYPE lination, planarity, roughness, coatings or infillings	L L L L L L L L L L L L L L L L L L L	
14 14.117	I K 15		TUFFACEOUS SANDSTONE continues, very fine, fine-grained, gray.		· · ·		- UF, OF BOXIN - UF, UF DRILL			
							-16.19 Box 1M	S PAERIC		
-7	Ruh Vo		· · ·	Fis)	5/1/5		- 17,10 BOXING	EREAL	7.008	2000 64
1.50 17.71 17.88			Includes -17.50 META - SEALE lannuatio at Tr TUFFE Nils charge of Strikter Includes Nils clarite for Strikter META-SHALE, dark group, lannum ated at 5 fb 10	11			27.67 - Possibi	6, 7, Slightly eurved, Fe St. 2, PARTING, 5, planer 1, 7, planar, rough.	, rough minor Fa. sd.	
7.96 \$ 8.75 18.75	1 618 1.81		META-SHALE, dark grey, lammated at 5 to 10" 		5/5/10 -		-18,15 PAKIN	1 PARTING FRAGMET Nande, rough, prime a drilling induced BREAK 4 5, plenar, rough, Fa NG BREAK KI, 5, curved, rough		1920/1
8.70	NIDA .		to coarse - grace of with deptin, gray. 2870 m METR-SHALL, dark gray, Jammated at 4°.		5/5 /205		16,66 June	25°, planer, rough, PARTING FARGESENT planer, rough, res some planes.	s boand	3] Like
29,99 9 7.00 9.20	Run ig 1		74,00 m TUFFREECUS Sfs, madicungi Jerg METM - SHALE With TUFF, Sfs Inforbads, eth grey [grey] Date brown, have	- 3	2/2 1/2 WE		29.03 J 29.20 29.32 JHS a	r		-
1.70 0	X		Laminated to V. thinky belded at 10 74.70 TUFF RECOLES SANDSTONE medium feasise gr, groff.		'suu 511/5		19.64 Probable.	NULING PREAK , 10°, planar, rough , . BREAK	Fest.	746
	1 1 1		ENDS AT 28.04m			and the second second	7		ort No. GAS 24	£

KR I I			GEOTECHNICAL ENGINEERING	GI GI	EOL	OG		ENTAL ENGINEERING BOREHOLE LOG				
	9 DATH EFT ABUTMENT	ЕŻ	CO-ORDINATES R.L. COLLAR 127.6m E 376456 DATUM HHD BEARING D90°M N 6423606 INCLINATION 60° From horizontal					DDH 6				
DRILL <i>Del</i> t				ERMO	TT D	2166			COMMENCED	Sheet 7 of 9 26. 11. 67		
CORE BARRE		1 7 <u>81</u>	PLE DRILLER SHA ROCK SUBSTANCE	UN	IAYL	ØR		B	COMPLETED	3.12.0	<u>)7</u> T	
DRILLING DA			NUCK SUBSTANCE		[DEFI	CT				- ŀ	
	Bun	90 F0	DESCRIPTION	RING	B €	SPAC (mr	:ING n)	907	DEFECT DESCRIPTION TYPE		1.10	
	Method Casing, Run Water	GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED STRENGTH		388 TT	VISUAL	Inclination, planarity, roughness, coatings or infillings		<u>и.ч.</u>	
7,0			<i>Tusetheeoels</i> SANDSTONE cont. medium/coarso grained, grey		5M/S			- 40,17 PA	RTING, 5°, planar, smooth Fo stacury	, MINOF 7 -		
10.257	UED		howing META-SHALE, dk. grog, laminased at 15 howen		m5.7			ļĒ	Ť			
40.4C	NI IN		houtem						RTINIC, 15°, planar, rough Fe shace	ung.		
	00		TUFFACEOUS SANDSTONE,									
31	N 15		medium (coarse grained, gray.					Enire	OXING BREAK			
51	Ka		¥ .	Fis)	/W				INT. 65°, planer, rough, Fo	25f.		
N.29 51 <i>-34</i>					M			31.25 D	RILLING BREAK		+	
31.42	02		Fine-gracesad									
	N/P											
			Medium (coaree gr.	-								
32						ŗ		31:95	oxinc BREAK ount, 50°, planas, rough, Fe	st:		
	NS I											
											ľ,	
32.75								ļĘ		0	2	
		1	TUFFACEOUS SANDSTONE Very fine grached, wold HETA-SHALE lannations,						BOXING BREAK HANDLING BREAK			
\$3. ·			META-Stonce laminations, dk yey gray, banded at 10 to 15								1	
32,27									Possible PARTINK, 20, pr 10 cgh, miner fe sta	tanar, coorg		
			TUFFACEOUS SANDSTONE, medum/coarse grained,						÷			
			gray.					IE				
<i>7</i> 4.77			- 47.17m Includes META-SHALE Iammahou et 15						the second of the second second			
34-									BOXING BREAK.			
2.11.1000			- 34 TTL, RAPPIE - 111-11- 1	· .				= 24: 72 A	RULING BREAK			
34:25				97					• • • • • •			
84.71	12 N	·.·.			- 				ARTING, 18, plands, vough, ANDLING BREAK	Fest		
39	Ru				2/544			1 24.90 B	ering BREME RTING 10° planer. rough mim	or he st.		
1		1	ENDS AT 31.9100		-l	للله المست	- Ila	1 1 1 20 1 10		port No. GN 23	Tel	

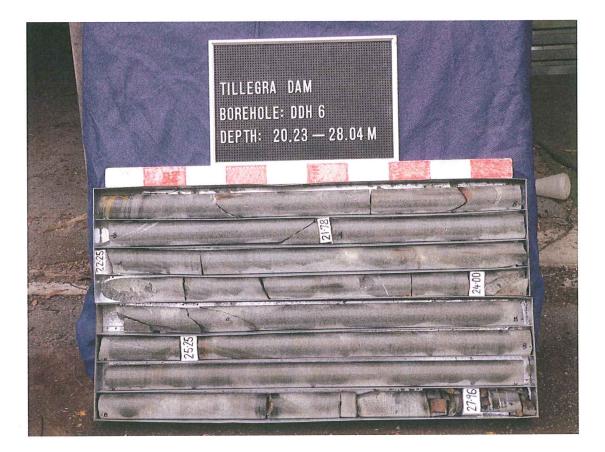
Commerce PROJECT TILLEGARA				CHNICAL & ENVIRONMENTAL ENGINEERING					
			DAM LEET ARGENTA		CO-ORDINATES E 376456		R.L. COLLAR 12-7.6m DATUM AHD BEARING 090°M	DDH 6)
	6	CEN.	TRELINE)			3606 DRILLI		Sheet ³ of 9 Sh D 76. 11. D7	ihee
CORE BARREI		,	out the out of the other	acini			COMPLETED		7
DRILLING DA			ROCK SUBSTANCE	1		DEFECT	ROCK MASS DEFECTS		١
depth (r.l.) Metres	Method Casing, Run Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED Strength	DEFECT SPACING (mm) 응응응고유	DEFECT DESCRIPTION TYPE Inclination, planarity, roughness, coatings or infillings		TECTE WDT
35 35	LONT.		TUFFACEOUS (ANOSTONE, fine. to madsum grained, gray. - 39.52m Includes META-SHALE lamination at 10.		5/45		35.19 - Probable DRILLING BA	'EAZS	
35.22 36	12,0002		META-SHALE, dark group, META-SHALE, dark group, Icommatan at 10 to 19				745,76 TOINT, 60°, planar, rough 45,82 BOUNG BRENK 75.92 PARTING, 5°, voite asso FOINT, 60°, Planar, roug	curred to, Fest	
36.34 36.90 36.55 36.63			Includes than Turfnesous \$15 interheds as shown.				36.48 PORTING, 5°, planar, crush Jone From 36.48 Probable DRILLING BRE 36.81 TOINT, 50°, planar, rough	<i>AK</i>	Ľ
37 37,13	×			Es)	1544	A	27.03 JOINT PARTING FROMME 37.13 JO, planer, rough, some (some bracks may be drill 27.25 Probable DRILLING BREAK	esps, bo [°] and planes fost. ing inducedj	
37-48	77 77				>/w	L.	27.99 As above 27.74 Possible Joint, 45, plan carbonate coat 287.94 Joint, 45, planai, rough, 1	11	
3\$ 3\$.//	. MNU				a		24.11 PARTING FRAGMENTS	2 10 203	
39 17.07			METH-SHULE, dark gaor, Temernated at 1050 15"		1115/2		38.37 Intersecting To 11.75, beth B. Ba.47 Hours, Lo, Frequency lies Pough, Fe st. 38.97 Numcrous Partings, Planae, rough, Memor Fr	gh, FE St.	
89.92	GUMD &				\$145		14,14 PORTINE, FRAGMERSTS, 149,17 20 00, clayay from 19.1 (shearad). 199,41 199,41 199,41 199,41 199,41 199,40 190,400,400,400,400,400,400,400,400,400,4	211151756 4 to 79,19m. 10 to 15, 2020 20 1	-
19.85 to			META-LUALE dark giey, Varminated at 10-		1115		1 29.95 & See over	1	L
emarks:	Box			10 E	ักฏร์	\$7 7	HI. 73 M Job /F Site Supervisor MARK ASHOV.	leport No. GM 25,	• /

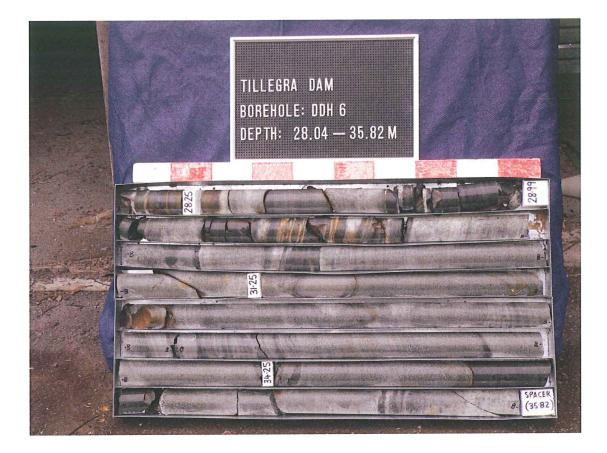
м. 	mme	J of	GEOTECHNICAL 8 ENGINEERING						BOREHOLE No.	,
PROJECT	TIL	LEG DLE	RA DANI LEFT ABUTMENT VTRELINE)	CO-OF	ndinati 5764		R.L. COLLAR Datum Bearing	127.6m AHP 090°M 60° from horizontal.	DDH C)
	TA 70	00, TRI	DER MOUNTED CONTRACTOR MC	0ERI	MOT		LING	COMMENCED	26. 4.07	
CORE BARRE		<u>(G /</u>	RIPLE DRILLER 2 ROCK SUBSTANCE	AT FIC.	ę ,~.,	TryLe		COMPLETED OCK MASS DEFECTS	3.12.07	
depth (R.L.) Metres	Method Casing, Run	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED Strength	DEFECT SPACING (mm) දිසිදිසිසි	VISUAL LOG	DEFECT DESCRIPTION TYPE Inclination, planarity, roughness, coatings or infillings		TESTS UPT
40 40,13	102 July 202		META-SHALE continues, dart gray, lansinated at 10	Es)			40.53	JOINT FRAGMENTS, 50 to associated FRATINGS, rough, Fast, minor Loaten]a°, with 10°, planav, 2104 10°, planav, 2104 10°, 10°, 10°, 10°, 10°, 10°, 10°, 10°,	
40.67 41							40.67 40.87 40.87 40.97 40.97 441.07 441.14	- Numerous PARTINES, rough, occasional.can coaten	115°, planar konate 1	•
41,54	N.		- 441, 12900 TUFFICEOUS SANDSTONE, Anna graconed, giley. 		5/8/2			OXING BREEK WADLING BREEK		11
42.00			Interbaddad META-SHALE (TUFFACEOUS SIS guylda glay, baudad, lam, to v. Thinly beddad 	F	5		44,70 H	ANDLING BREAK	1.92	
42.30	Va		- 43.20 MEIN-SHALE lanination of 15 Maduum grained - 42.63	*	s/ws		-43,67 A	oxink, brenk		
42.94 43 43.20			Fine grained META-SHALE, de gray / gray, banded, saminated at 15° COARE LOSS 0.05 m. Latt down hola		12/2		43.20	22's intersecting Joints, planar, rough, manner c	50 and 78, arbonate oatmeg.	
4%, 20 45, 25 44			HOLE ENDS AT 43.15m							
	Box .	12 EA	UDS AT 43.25MAEND OF	NOL	Ē			Job / Repo	ort No. GN 25A	4
gged by:	Contraction of the second		louise :	-		12.07	Site Supervi	SOF MARK ASHOVER		













Comme	rce	. 0	GEOTECHNICAL							3	BOREHOLE N	lo.).
	PER 1	LEFT A	BUTMENT		7650 427	06 3774	•	R.L. COLLAR DATUM BEARING INCLINATION	14-7, Бт Анр всо°м 60° from hor		DDH Sheet 1 of		[
CORE BARRELL	~	RINE	DRILLER	SHAU.					CK MASS DEFECTS	COMMENCED COMPLETED	ЪЪ.И. 26.И.	•	
DEPTH REPTH RELL Method Casing, Run Casing, Run	Water GRAPHIC LOG		ROCK SUBSTANCE DESCRIPTION ROCK TYPE texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED Strength	DEFECT SPACIN (mm) କ୍ଷିତ୍ତିକ୍ଷିତ୍ତି	G		DEFECT DESCI TYPE Inclination, planari coatings or in	ty, roughness,		I R.Q.D.	The Inter
1		NøN	CORE										
2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2	իկելելելելելելելելելելելելելելելելելելել		OMMENCES AT 1. HALE, brown fda banded , Taminah 10*		m5			1.427 PAR 1.42 A5 a 2.03 1.42 A5 a 1.42 A5 a	PARTING FRAG en, rough, fili to clay fili to clay fili to clay fili to clay for the lanar, rough lay coaring to To S PARTINGS, est, clay coa	; rough, Fa. crussing MT FRAG , Fe.st, M ; F (bea	st, clay constact mENTS, y 11107 (deng)	1.31 3/422	
5 823 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	111111111111111111111111111111111111111		·	1714	M/ms Sm/M				PARTING /TO Nanar, roci clay coats to Th ncludes clay to h. Thm (8	9, 10 31, d, 510/0° (Bedding)	1 %0 1 %0 1	4
4.24 4.76 4.80		fine gri Include subang classe	eous Sandstone, amadz pale brou « elongate, ula» meth-SHALL "Stanm HALE, brown/dark actor faminated at follo		M5			- 4,9% As	VT, 70°, plande et 1009, 57°, pl above. above. mt, 70°, pland	anar, vocy or, fragmer it, rough, fo	ela, MINOT Fefinn St. Jæfeon J cast ed. I Ma st.	ントルチ	
emarks:	YAS Y	lousc		Data	6 1	7 07		Site Supervis	or MARE	Job /Repo ASHOVEA	ort No. GN	64	A

Co Co	himero	é	GEOTECHNICAL 8 ENGINEERING				ENTAL ENG		BOREHOLE No.		
	PPER	LEI	A DAM ET NBUTMENT	E Z	IDINATE	706	DATUM BEARING	147.5m AHD 060°M	DDH f	ļ	
BILL DECT			ODLE) CARCK ASOCIATEDCONTRACTOR MCL			3774 DRN		from horizoutal	Sheet Z of 7 72. 11. 07	Sł	<u>.1</u>
ORE BARREL						TRYLOR		COMPLETED	25. 1.07	1	
RILLING DA			ROCK SUBSTANCE				ROCK	MASS DEFECTS		1	
	d , Run	C 10G	DESCRIPTION	WEATHERING	(TED GTH	DEFECT SPACING (mm)	90 1	DEFECT DESCRIPTION TYPE			1011
DEPTH (R.L.) Metres	Method Casing, Water	GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATH	ESTIM STREN	(mm) 888888	VISUA	Inclination, planarity, roughness, coatings or infillings	u u u	יאיני	
5 5.22 5.35	M Renuce		META-SHALE continues, brown/derk gray, banded. Lammated at 5 to 10°	MW 	MS	6	FRI FRI	mierocus PARTINICS I ACHIENTS, planat, I IMA St., occassion. Clay coarted.	Congle, congle, ally	2	
	60			Mw/Sust			5.77 25.77 5.74 5.74 7.04 7.04 7.04	ur, so, with associ thics, F, planar, r	ated Eggh Efmàst.	6	
7,82 7,88 6,02	Run		TUFFALEOUS SMADSTONE,	EW MM SU	EW		1-17.19 200 245.19 12. 10.20	Veral TOWTS, 49 to b. occasted PERTINGS, Mar, rough, Fellin Lassonally clay coa	Sei.	Ling	
7.94			time grained, pale	ทฟ	тs		6.40 JOINT 6.49 PRATING 6.54 JOINT,	45 planar, rough, fes 30, as above. 57 planar, rough, Felm 45 planar, rough, Fe	in st. ist, elege		
67 15 6.80	Gan I		META-SHALE dask yey minor becow bandeng.	HW	-71/-		6.90 - Jo	RTINGS ID, Planer, 1996 St. 1997 FARTING FRAGME to To (JONTS) and Side	9175.	142	•
30	H.		Laminated at 10 Includes occasional fune, grained TurFriceous			\$ 	主 pla	assonal clay coate.	ist.	-	
ಪ್ರ	an Io		SANDSTENE lanibafrom		M5			40°, planae, rough, ka minor Sclay	/ N	1 F Le	
\$ 8./6							Part Part	veret Seinis, 90 (pu a dria), with asso ATTANSS, Folo 10, ph ugh, Folmin St, as ional clay coord	te se te to j	Ze 1	
.13	RUNS		CORE LOSS 0.100				E 8.42	TING 10, WITE JOUNT, 6.	8.	2	
1			time grained, pale brews. graybrown				8.90 Jonst, 100 -	", bo", with associated a ar, rough, minor clay 40", planas, rough, Fo 60", conta associated [Min statured	PARTING, 10 watmg.	· /. Lanta	
49	LI MAU	V1	olongate META-SHALE clasts and laminations at 10 to 15	1.	MS		1.20 JOINT, 9.30 J Sec 9.49 J	4 0', planar, rough, h veral Jons 75 , 60', pl ocgh, Felma 4.	Ē.S.		
.80	Run IS	Ч.		hin			IE .	Ke BHEAR 45, planar, rough, Fe 144, 5°, planar, roug	4		
0			SAT 5.07.M Box 7 El	ALTO	 8-90 G	En ins		Job / Rep		$\frac{1}{c}$	
marks: 🦼	50X /	ENL	15 AT 5.02M Box 7 El Toccase		5.1		Site Supervisor	MARK ASHOVER		7	

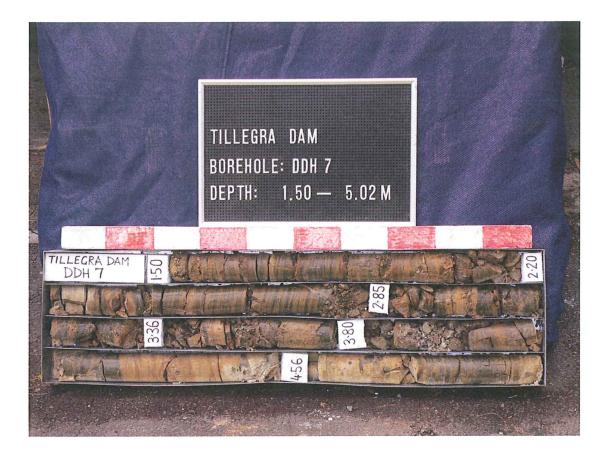
q									NTAL ENGINEERING BOREHOLE N	lo.	
	mmer Tille		ENGINEERING	CO-01	DINATI	ES	<u>,</u>		R.L. COLLAR 14-7. Fm DATUM AHD DDH	Ţ	
OCATION	UPP.	ER L SAL	EFT ABUTMENT DOLE)	-	5422		-		BEARING 060 M INCLINATION 60° from horizontal sheet 3 of	7 s	ihe
		o, TRA	TCK MOUNTED CONTRACTOR M.	CDERN HACIN					COMMENCED ZZ. H.	•	
CORE BARRE			ROCK SUBSTANCE	17 11 10 10			LON	i.	COMPLETED 25. U.		
			DEGADIOTICI				EFECT ACING		DEFECT DESCRIPTION		07
8	ng Bun	DOL DO	DESCRIPTION ROCK TYPE	WEATHERING	ATED	or ((mm)		TYPE		110
DEPTH (R.L.) Metres	Metho Casing	GRAPHIC	Grainsize, texture, colour, composition, structure, hardness		ESTIMATED	2000	3888		Inclination, planarity, roughness, coatings or infillings	R.Q.D	
10 .	210		TURFFACEOUS SANDSTONE COM fund gr., palebrownfgraybrow	N 200				4	10.19 7- Someral TOINTS. 30 to to planar.		
10.18 10.35	Reals		METH-SHALE, dask grey greybrown, lamba aled at 10 to 16	W.(+10	ШŞ			11	10.19 Several DOINTS, 30 to 50, planar, 10.20 Trough, Folma st.	Н	
la.46			* 10 to 19	W			$\left + 4 \right $	h	10,46 PARTING, 20, planar, rough, Fe/Min		
			e.						-10.73 DRILLING BREAK		
			INFFACEOUS SANDSTONE fine grained, pale gieg								
1	41		time grained, pale gray with greybrown bands								
	Ruth			Fis							
						!			- 11.36 PARTING, 15, planar, rough, Fest 11.49 BOXING BREAK		
					115		H		11.57 TOINT, 60°, planar, rough, To st.		,
	0H				M						
11.80									N.95 PARTING, 15, planar, rough, TelMinst.	2	
12				SU						100	
12,40									-12.43 BOXING BREAK		
						۲ ⁴		ŀ	Vary rough, Fe st.		
13											
3.30									13,30 DRILLING BREAK	H	~~
				Fis)					- 13.42 BOXING BREAK		
									12-60 BUILDENE DELET		
14											
	411										
	KUK								-14.42 BOXING BREAK		
14.94									- 14.86 Probable DRILLING BREAR		
15		::::		SW	-					75	-
emarks: ogged by:			ENDS AT 12.4-3111	Data	6.,	10	A-7		Job / Report No. GN Site Supervisor MARK ASHOVER	47.	1

NE		£_	GEOTECHNICAL & ENGINEERING				IENTAL ENGINEERING	BOREHOLE No.
ROJECT	•	EGŔ	TA DAM	со-ог е ² /	ndinate 765	S	R.L. COLLAR 14-7.5m DATUM AHD BEARING DGO°M	DDH f
			CK MOUNTED CONTRACTOR MCL	DERM	107	DRILL	LIANG	22.11.07
CORE BARREL		TRI	<u>PLE DRILLER SHA</u> ROCK SUBSTANCE	UN	14	LOK	COMPLETED ROCK MASS DEFECTS	29, H. 07
-	Run	00T 0	DESCRIPTION	NEATHERING	(TED	DEFECT SPACING (mm)	DEFECT DESCRIPTION	
depth (R.L.) Metres	Method Casing, Water	GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATH	ESTIMU	(mm) နွန္လန္လန္လန	nclination, planarity, roughness,	R.O.D.
15 15,50 16	RUN 15 CONT.		TUFFICEOUS SAMDSTONE Continues, fine grained, pale grey write graybrown bands (SM) Carbonate verning in part up to Imm thill (heated joints).		5/122		15.60 Probable PARTING, 5, pla NUMOR RESEL 14.70 VOINT, 60, planar, rough 15.60 Probable DRILLING BREAL	de de
16,30 16,50	HØ			F(z)			16.15 VOINT, 60°, planar, rough 16.30 BRILLING BRENE 16.43 PARTING, F, planar, r	ough, Fest.
16:96 17 17,30	RUN K		META-SHALE, graybrown, laminated at 15 Includes laminated (vary thein TUFFACEOUS SANDSTONE inferbeds, vuy fine grached	SW	 m5		Numerous Joinsts, 40 witz PARTINCIS, 15; generally rough,	tobt, planas, Fellin st.
17.70 18 18-10			TUFFACEOUS SANDSTONE, Very fine / fine gracued, guerprocess (Slo) with pale gracy bands.				-B.co Probable BRILLING BR	ENL
18.75 16,80 19	6 an U	1	Includes vare elongate META-SHALE classe de Homm dimension	, F(s)			-18.77 BOXING BREAK	Ť II
9.30	Ruw (8			SW			19.10 JoINT, To, planar, roug 19.30 DRILLING BREAK 19.57 Several JOINTS, 60 en 19.57 Planar, rough, Forman 19.75 Joint, 60, planar, rough,	ad 30°,
20					<u> </u>			port No. GN 251
emarks:		ох 4 Гонн	ENDS AT 16.70 m.	ا م ا	. /	12:07	Site Supervisor MARK ASHOV	

~	omme	3		GEOTECHNICAL ENGINEERING						NTAL ENGINEERING BOREHOLE LOG	BOREHOLE No.	, measure , management , m
PROJECT	TILL	ĒĞ		A DAM EFT ABUTMENT	CO)-OR	DINATE	S		R.L. COLLAR 147.5m DATUM AHD BEARING 060°M	DDH f	Allanue I
OCATION			(5,	ADDLE)	N			3774	-	INCLINATION bo from horizontal	Sheet F of 7 S	
orill <i>del</i> Core Barr								VII I VLOK	M.	COMMENCED COMPLETED	22.11.07. 25.11.07	
DRILLING D				ROCK SUBSTANCE						ROCK MASS DEFECTS		
depth (R.L.) Metres	Method Casing, Run	Water		DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness		NEATHERING	STIMATED Strength	DEFECT SPACING (mm)	VISUAL LOG	Indination planavity roughness	ROD	
70	L.	≤ č 	::			5	Ξ					ſ
	3 CONI		ł	TUFFACEOUS SAND STONE. continues fine grained	,				N	10.14 No INT PRAYMENTS, Co to planar, rough, FofMn St.	č°,	
10,49	RA		ę	contruces fine grained praybroion (SW) / pale gray.					N			ļ
~177				Includes occasional	5	ŚW				20,50-		
				carbonate traalect joints up to Imm Anick	ы				Į	TO INT, TO to go, plane rough, to st.	25,	
2-1				up to Imm Mick."						Tollan, Te W.	14	
~;	e.										20) Z	
21.15	111				~				Ì			
21.48	80							╽╎┢┼┤┙		7.1,45	-	
,,,,=					1	F (s)					e ale	
						• • •	5				 QD	
/1/.98 12	2				-					21.92 PARTING, 5, planas, ve rough, Falmas,	ery	
	NHÓ					<i></i>				F 22-17 V		
12.30	È				5	ŚW			H	- JOINT FRAGMENTS, 30 plamar, rough, Fe/M.	o fo fo, in st.	ľ
22.58	Q					-				12.78		
44.75	4											
											Y.	Ş
23								Ч		107.07. PARTING, 5, planar, rough		
								$ _{H}$		27.20 JOINT, 45, planas, rough	, Fest.	
Ch, fe	C 2		-	- 77. tom		F (5)	51/2			- 22, 49 PARTING, 10, planar, You	ale.	
12.9]	RUN		-	Very fine grained - 19,57 m			×			Felmn	st.	
24,00				•						23,90 As above.	Ц	
, wes	22			Medium grained						24.00 VOINT, 45° 24.10 BOXING BREAK		
	RUN			¥.						F	Y	
74,50			-	- 24.50 m							, <i>Oe</i> /	
									-	24.68 PARTING, 10, planar, v. rough, Fest.	ery .	
				Fine gracmad.							·	
147 Iemarks:			e -	FENDS AT TO.7.4 M	<u> </u>		lan			5 AT 7-4-10 m Job / Repo	ort No. GM 25	
ogged by:	17.			TENDS RI LO.NAM		Date:	6,11		SE A	Site Supervisor MAR & RS HOVER	and the second	-

Co.	miner	, čće	GEOTECHNICAL 8 ENGINEERING				BOREHOLE LOG	BOREHOLE No.	
			a Dam		idinati 576 <i>4</i>		R.L. COLLAR 14-7. Fim DATUM AHD	DDH f	6
LOCATION	UPF	ER (LEFT ABUTMENT SAPOLE)			3774	BEARING 060°N INCLINATION 60' from horizoutal	Sheet 6 of 7 St	Sh
						T DR. TAYL	COMMENCED	22, U.07 25. U.07	
CORE BARRE DRILLING DA			ROCK SUBSTANCE			1.10	ROCK MASS DEFECTS		r
	E	DOL	DESCRIPTION	U		DEFECT Spacing	DEFECT DESCRIPTION		ł
depth (r.l.) Metres	Method Casing, Ru	1	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	STRENGTH	(mm) နွန္မန္လ	Solution TYPE Inclination, planarity, roughness, coatings or infillings		
147	172		TUFFACEOUS SANDSTONE				75.10 BOXING BREAK		
15.20			continues, fine grained, gamerally pale gray,	Fig			/ 14, 27 HANDLING BREAK 75, 30 DRILLING BREAK		
			"with graybrocon (sco)						
75.55			tort Ervala. 19.99 m						
			Meducin grained,	5W			25.77. VOINT, 45, planar, rough, 1 25.80 7 25'S JOINTS Fin and has al	est.	
17:95			Medium grainat, Includes sub angular clasts generally to 2mm				29.80] ZX'S VOINTS, To and 60, pl 29.97] rough, Fe st	second j	
			demension, rarely 5 mm.				26.10 PARTING, 15, planas, roug	th, Fest	
			1				- 26.99 As above	1.0	
	17							6	٩.
	NIN.			F.(5)	8				
	×.			- (5)	1		2617 Probable DRILLING BREA.	«	
5	0					│ │ <mark>⋫┼╶</mark> ┪╕	26.94 PARTING, 20, planae, re	cigh, Fost,	
	A.					┥┥	27.13 JOINT, 60", planar; rough, F	ē str	
-							= 29.24 27.21 DRILLING BREAKS		
7.65							77. 55 PARTING, 20, planos, roug	th, Fest.	
7 12	¥						17.18 17.90 HANDLING BREAKS		
27.90 28	Z MITZ		Finagrained					425	ļ
28.10	RL		- 18.10 m				18.07 JowT, 60, planae, rough,	fe fittin sf.	
18,30							18,30 DRILLIAKS BREAK	┝┽	-
			Fine-medum grained.				-28.50 DRILLING BREAK		
							18,88 Just Perrill IE when	when prevale	
-7 29.07							12,92 745 PARTINGS, 15, plan 20,92 Fast Carbonale coa 19,02 at 18	Stang Jos, Benjan	
29.17	11			511			VOINT FRAGMENTS 45 10 29.27 planar, rough, Falma	65, 00	
-1144	NDS						-11.41 VOINT, 70, planer, roug		
			. · ·	F			=29.54 As above.		
				FG)					
,							Barlille BO-14		
emarks:		Box l	, ENDS AT 28,07 m .	<u> </u>	<u> </u>		Job / Rep	ort No. GN 25A	-
gged by:			GUNG	Date:	6,1	2.07	Site Supervisor MARK ASHOVE		1

DOLTON OFFER LEFT AGUTALONT NORMAN AGUTALONT N	C	Mine	íće		-			MENTAL ENGINEERING BOREHOLE No. Y BOREHOLE LOG	-
RULDETT Deco, Function (Fig. Contraction of the Difference of the Contraction of the Cont	LOCATION	UPPE	FR [] [S]	EFT ABUTMANT ADDLE)	E	3764	706	DATUM AHD DUDT	
NLING DATA ROCK SUBSTANCE ROCK MASS DEFCIS BETERT SS DESCRIPTION SS DESCRIPTION SS SS THEFFALEBORY SY DESCRIPTION SS DESCRIPTION SS THEFFALEBORY SY DESCRIPTION SS DESCRIPTION SS SS THEFFALEBORY SY DESCRIPTION SS DESCRIPTION SS SS THEFFALEBORY SY DESCRIPTION SS DESCRIPTION SS SS THEFFALEBORY SY DESCRIPTION SS DESCRIPTION DESCRIPTION SS THEFFALEBORY SY DESCRIPTION THEFFALEBORY SY DESCRIPTION DESCRIPTION SS THEFFALEBORY SY DESCRIPTION THEFFALEBORY SY DESCRIPTION DESCRIPTION SS THEFFALEBORY SY DESCRIPTION THEFFALEB					ØER.	M OT	DR	COMMENCED ZZ. 11. 0	•
B B B DESCRITION B SPACE DESCRITION B B B B B SPACE DESCRITION B B B B SPACE SPACE DESCRITION B B SPACE			707		1162 10		6~14		
 Tellef Alebold's (MUSTONIE Condensities (Second Processing), Test Condensities (Second	depth (R.L.) Metres	Method Casing, Run	GRAPHIC LOG	ROCK TYPE	WEATHERING	ESTIMATED Strength	SPACING	G DEFECT DESCRIPTION	K.U.D.
1 1 1 1 1 1 1 1 1 1 1 1 1 1	70 70,70 70,78	RTH CONT		TUFFACEOUS SANDSTONE continues, grog. Fine-medicum quained. Includes subrounded				30.10 JOINT, 60°, planar, rough, miner best Carbonate costes no.14 Joint, 30°, planar, rough, Fest.	/ / · · ·
2 21.75 Possible PARTING. 10; planar; Freugh, minor fo.54, 21.90 BORING BREAK 21.90 BORING BREAK 21.90 BORING BREAK 21.90 BORING BREAK 21.90 BORING BREAK 21.90 PARTING, 10; planar, rough, fo.54, 21.90 BORING BREAK 21.90 PARTING FOR SALE 21.90 PARTING BREAK 21.90 PARTING BRE	31,750 741,747	RUN 76			F. (s)	5/145		THING HANDLING BREAK	1.001
12.70 - 72.70 - 72.70 - 72.70 - 72.70 - 72.70 - 72.74 - 75, planar, rough, fest - 27.74 - 76, planar, rough, fest - 27.77 - 77, planar, rough, fest - 27.77 - 77, planar, rough, fest - 27.77 - 77, planar, rough, fest - 27.77 - 78.77 - 78.	h.	HQ Run 21		Fine grained				71,90 BOXING BREAK 72.60 PARTING, 10°, planar, rough, Fest	
4.14 Hole ENDS AT 24.2011	32 <i>.7</i> 59			Medium grained.			·	237.46 TOINT, 60°, planar, rough, fest, Carbonate coaled.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
4.20 HOLE ENDS NT 244.20 M	3 3 3			Claste to 2 mm duncission Occasion carbonate healed jounts (partings					
	4,94 4 4.30			Fine grained					
	er.			26-5455 Extended From 148 1997, 1990 197					
marks: BOX & ENDS AT 31.90m BOX 9 ENDS AT 34.30 M-END OF HOLE Job /Report No. GN 24 A. gged by: VORMS VOLLAGE Date: 6.12.01 Site Supervisor MARK ASHOVER	<u>7</u> emarks:	Box	<u>8</u> E	WBS AT 31.90M Box 9 EA	VDS A	173	4.30 m		T A.











								BOREHOLE LOG	•
PROJECT 7		GRA	DAM	со-ог е 3	DINATE	s 17		RL COLLAR 165.6 m DATUM AHD BEARING 060 M	8
			BUTMENT, PROPOSED AY CREST			3872		INCLINATION 60 from hornordal sheet 1 of 1. LING COMMENCED 15, 11, 0	
DRILL D		MOU	WEB CONTRACT			-	C I bri	COMPLETED 77. H. O	
DRILLING DA			ROCK SUBSTANCE	,				ROCK MASS DEFECTS	<u> </u>
depth (R.L.) Metres	Method Casing, Run Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED STRENGTH	DEFEC SPACIN (mm)	GI.	DEFECT DESCRIPTION TYPE Inclination, planarity, roughness, coatings or infillings	TESTS WPT
			NON CORE CORING COMMENCES (150A						
1.50		111 11	CORING COMMENCES 1900 METR-SWALE, Very fine gr. Lark gray greybrown.	MW	ms			-1.40 - PARTING, JOINT FRAGMENTS.	2
-1.169 -1.747	121	Ň	CORE 6035 0,10m					FI. 167 Planar generally rough, Felmin stached, 17 (bedding) to 70	-
	N		As above (laminated) thinky bedded at 197)	ЙШ	111 \$			As above, clay fill in parting at 2.00m, 15mm thick	
2,00	141)	5	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	+		┿┿┽┥	╬╋	2.00	6
-2.25	×	\square	CORE LOSS 0, 197 m					2,15	
- Z.43	KX.	1111	Ry above					As above.	<u>b</u>)`
	-45				m s			Uayay fill from 2. 2010 2.193 and again from 2.30 to	
1,68		111			1170			+E 1.8hm (30mm 741ck).	TEST -
- 3 00		111						H Defects commonly clay H coafed.	1/0
12-99	3	-	TURFACEOUS SANDSTONE, time grained, palebrown.	MW	M	Г		- 2.99	
Ē	R		time grained, palebrown.		1115/			- Numerous PARTINES TOINTS,	Ö,
7.74		: 11					-	H planar, smeeth to rough, fellia	
-7.47	 +		META-SHALE very fine gr, dark grey/greybrown, laminated to very flumly		Mş			Splined, generally elarg coated. Mostly 15 (bedding) 10 10	
Ë	ANG.	4111	laminated to very fumly bedded at 15			Г	┛╎╎╴	- 1.67 -	×!
7.80	Ret.							73.78 PARTING, 17, plande, rough, Fe St. 23.88 Joint, 50, plander, rough, Felmost.	
4.05			TUFFACEOUS SANDSTONE forme grained, generally			ĻĻ	T	H. OF PARTING, 15, planar, rough, minor, 4.05 TOINT / PARTING FRAGMENTS	
E4.70			fine grached, generally pale brown indistruct badding at 15 to 20		<u>*15/4</u>	-		14,10 15 to Jo, planar, rough, Fe st.	
F			pring avairing the set of the set					Ę	hut
- 4,42 - 4-53	87			M#1 514	5				
E F	KUN			paul		4		4.68 PARTING, 15, planas, rough, FolMn st.	2 2 2
			META-SHALE Interhed from	MW	115/5			4.79 Jourt, 45, planas, rough Fe St. 4.94 Jourt Partings, 15, Clay coasted 5.80 planar rough, Fe & charg coasted.	
F // Remarks:		× 1 5	4.96 to 5.00 m NDS AT F. 60 m	<u> </u>		1/1		Job / Report No. GN 2	 FA
Logged by:		1	VOUNG	Date:	1.7	11.07	1	Site Supervisor MARK ASHOVER	

							ENTAL ENGINEERING	.E No.	
Cos Project 7	mmer MLE			CO-0F	EOL RDINATI	S	BOREHOLE LOG RL COLLAR 165.6m DATUM AHD DDF		
OCATION 4	LEFT SP111	- ABC WAY	TMENT, PROPOSED CREST			3872	BEARING 060 M INCLINATION 60 from horizontal sheet 2	of 10	Sh
RILL DE	LTR -	2.0001 MC	TRACK CONTRACTOR MC				COMMENCED 15.11 COMPLETED 77.1	• •	1
ORE BARRE		<u>a 7</u>	RIPLE DRILLER SHALLA ROCK SUBSTANCE	9 /	AYLC		COMPLETED 22.1 ROCK MASS DEFECTS	<u> </u>	Γ
						DEFECT Spacing	DEFECT DESCRIPTION		
DEPTH (R.L.) METRES	<u>Method</u> Casing, Run Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, F, co	WEATHERING	ESTIMATED	(mm)	TYPE Inclination, planarity, roughness, coatings or infillings	R.Q.D.	-
-10 17	82		7.60 META-SHAFE Waterbook TUPFS SIS, Force gr., polebrush META SHALE WATErbook, 20*	, MW	ms 		5.00 F.10 4x's PARTINUS, 15 to Lo, plassar generally rough, Following Stacked minor clay coafing.	;	
5,35			TUFFACEOUS SANDSTONE, fune grained, generally				5.74 Joint bo, planar, rough, Fefn		
			fine grained, generally graybrows, Poorly defined bestding at 20				57., MINON day conjung 57.72 5.80 5.90 5.95 BOXING BREAK	ž	
2	RUM 9						6.08 JOINT, FD, planar, rough, Fc/Mn 6.10 PARTING, 10, planar, rough, Fc/M	54. 14	
5.41	-			NIM 15m	m\$/5		6.47 Jourt FRACMENTS, 60, plana 6.41 Jough, Falmin St., minor clan coatthing.	*, -	
	011			Ś	4		6.61 DRILLING BREAK Associated with FOINT, 70" 6.20 TOINT, 45, planer, rough, To St.	1.19	1
7	1941						6.94 JOINT, 50, planar, rough, Fe/Mn 7.17, DRILLING BREAK		
1,724 1,50	1						7.24 JOINT, 50, plande, rough, Telinn	<i>ils</i>	
1,65	N 11			HW	w		JOINT FRAGMENTS. 3x's parallel JOINTS at 20° with opposing Joinsts at 50° planar, rough, Fo st, withd carbonate fell (sheer some	11.61	
3 8.10 8.13 8.18	140	N	CARE LOSS 0, ORM						
	N 12				1		- 2.71 Jowr, 45", planar, rough, Folma - 4.47 - Numerous Jowrs, 60, plane rough, Felma stained.		2
	1414		TUFFACEOUS SANDSTONE continues. Includes subangulas				2.34	·] * 14/4	1
./8			clasts to 2mm Annersian	15W	:/s		Feimn stamet		
54	Run 13			MM	Sall		Inertistis fronts, 20 to 50°, planar, rough, Felmost, minor carbonate coating.	6	
×	431.141						9.91 PARTING, 30°, planar, 10 cugh, MA	852	
ð marke: <i>Ø</i>			AT 5.00 M. BOX ZENAS		- ĝ	62 m	Job / Report No. G		. 7,
narks: 🎉 gged by:			ALTION. WALLARD			11.07	Site Supervisor MARK ASHOVER		

			GEOTECHNICAL & ENGINEERING						BOREHOLE No.	
PROJECT 77	EFT	IRF AE	DAM BUTMENT, PROPOSED Y CREST	со-ог е <i>7</i> n <i>Е</i>	DINATE 766 542	s 97 3872	R.L. COLLAR Datum Bearing Inclination	169.6m AHD 060 M 60° from horizoutat	DDH O) Sheet
DRILL <i>Delt</i> Core Barrell			MOUNTED	-		DESE VLOR	LING	COMMENCED COMPLETED	15. 11. 07 22. 11. 07	
DRILLING DATA			ROCK SUBSTANCE				1	ROCK MASS DEFECTS		
DEPTH (R.L.) METRES Method	Casing, Run Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	STIMATED Strength	DEFECT SPACING (mm)	ISUAL LOG	DEFECT DESCRIPTION TYPE Inclination, planarity, roughness, contings or infillings		TERTS MIPT
10 10 10 10 10 10 10 10 12 12 12 12 12 12 12 12 12 12	un 19 Rum 18 17 Run 16 19 Rum 16 Rum 15 Rum 19 W		TUPFACEOUS SANDSTONE continues, generally fine gracies with fine gr. subangular clears Holme dumonsion, graybrown dumonsion, graybrown histopeds, graybrown forown lammated to very thinky badded at 10 to 15.		1115/5 W/WS 185/5 Generally 1995 8015 1805 5		10,07 10,27 10,344 10,344 10,45 10,64 11,02 11,50 11,50 11,50 12,23 14,15 13,25 14,15	Coatings or intillings FOINT, 60°, Planar, roug. DRILLING BREAK 22x's VOINTS, 65°, planar Falmin'stained PARTING, 70°, planar, ro Falmin'stained 2x's PARTINGS, as above oscinic BREERE VOINT, 45°, irregular (sta rough, Eafmin'stained PRETING, 10°, planar, ro Falmin'stained PRETING, 10°, planar, ro Falmin'stained 2x's PARTING FANCING PRETING, 10°, planar, ro Falmin'stained Sevenal Joints, 45°, planar, Falmin'stained Sevenal Joints, 45°, planar, Falmin'stained FARTINGS, 15°, planar, Falmin'stained Sevenal Joints, 45°, planar, Falmin'stained Farming, 50°, mith oppos Parting, 45°, as above VOINT, 80°, mith oppos Parting, 70 mith oppos	h, Mn st. er, rough ough, pped) ough, entry, rough, ind, i	1. Fui
Remarks:	Rox	3	ENDS AT 12,30 m	·			1 = 14.98		rt No. GN 251	A
	ĨOHN		surrey	Date:	27.	11.07	Site Superv	isor MARK ASHOVER	1	

			GEOTECHNICAL 8						E No.	
Co:	W Department mmer	će	ENGINEERING			OGY		COLLAR 165,6m	Ć	
ROJECT 7	TILLE	EGR	A DAM		rdinate 3766		DAT	UM AND DDH	C	180
OCATION	LEFT	T AB	BUTMENT PROPOSED		•	-17 7872		RING 060 M LINATION 60 from horizontal sheet 4-	of los	Sh
RILL DE			TRACK CONTRACTOR MCL	DERN	1011	DRIL		COMMENCED 15. 11	07	
ORE BARRE	LL H	<u>a 71</u>	ROCK SUBSTANCE	XN	AYL	OR		COMPLETED 22.1 ROCK MASS DEFECTS	1. 07	
			· · · · · · · · · · · · · · · · · · ·			DEFECT SPACING		DEFECT DESCRIPTION	·	10
S	nn Run	IC FOG	DESCRIPTION ROCK TYPE	WEATHERING	ATED VGTH	(mm)	1 F0G	TYPE		011
depth (R.L.) Metres	Method Casing, Water	GRAPHIC	Grainsize, texture, colour, composition, structure, hardness	WEATI	ESTIM	(mm)	VISUA	Inclination, planarity, roughness, coatings or infillings	R.O.D	
15			TUFFACEOUS SANDSTONE continues, free ground.	M				5.04 PHETING, 10, planar, rough, Fest. 15.06 Juint, 45, irrequiar, rough, Fest		
	CONT.		V	MW/SW	ws/s	Π		5-20 JOINT, 45; planer, rough Fest		İ.
9.40 19.45	10		_ META-SHALE interback, 10	-		1 ⁴	下	5.44 - 2x's PARTINUS, 10to 15, planar, 5.44 - rough, Fe stached		,
IF AF	KUN I		TUFFACEOUS SANDSTONE,					- Treat da Marguna conste	1.30	1
19.74	X		madum gracsed.	SW	5		ILE	- Jorast, 90, wavening, rough, Fo stand.		
16.00			Includes subungular, elongate class to 25 mm				I E	5.10		
16.23			demansion.			╽┝┿┩│		16.13 JoINT, 65, planar, rough, Fe sham	ed H	ſ
				Seu	15					
				nam / Seu	5/5IN			0.67 Probable DRILLINK BREAK.		
6,70 16,72		111	METH-SHALE interbed, 10"	<			II F	. 85 VOMIT, 45, planar, rough, Festain	- 1	
16,90 17			TUFFACEOUS SANDSTONE,	******		n		107 Volar, 177, Francer, Israyer, Ista Jun		
- /			medrum graineet. Tricludes subangular					÷		
	~		claute to 3 mm domensio.	ţe				1.25 Joint, 40, planar, rough, Fe stem	ed	
	HC							1.60 Former, 65, planor, rough, Fe staine	ا م	7
							ΗF		4 9	ĺ
17,94	6			$(F_{(S)})$				6.82 BOXING BREAK		
18	N. 57		TUFFACEOUS SANDSTONE, Interheddad fraalmarium	5						
	Ru		Interbedded friia friedium Coarse grained	1	511/			8.79 PARTING, 10, planar, rough.		
	-		Very thinly to thinky bedded at 15		N			Fastained.		
18.63								6 The standard to read to		
								8,77 HANDLING BREAK 19,84 Boxing BREAK		
19 19,10										
19,10 19.23			Grader into medium grained around 19.104	F(s)			E⁄	1.20 DRILLING BREAK	Н	
			grained around 14.104							
	1-1								2	
	KITN							19.63 HANDLING BREAK.	0.07	
20							ΙNF/	19.34 BOXING BREAK 19.46 Toint, 55, planar, rough, Fost.		Ĺ
emarks:	Bo	× 4	ENDS AT 15.90 BO	× 4 ,	ENDS	AT	19.83	Job / Report No. GI	V 24,	A

Contraction of Contraction				NTAL ENGINEERING BOREHOLE LOG	BOREHOLE No.
PROJECT TILLEGR	a DAm	CO-ORDIN		R.L. COLLAR 165.6m DATUM 1410	DAH O
LOCATION LEFT ABO	UTMENT, PROPOSED CREST.	E 376	5697 423872	BEARING 060 M INCLINATION 60° from horrzortal	Sheet 5 of a Sheets
DRILL DELTA ZOOO,	TRACK MOUNTEDCONTRACTOR MUS	OERM	OTT DRIL		15. 11.07
CORE BARRELL HOR TR	WLE DRILLER SHAUN	v TAJ	LOR	COMPLETED ROCK MASS DEFECTS	22.11.07
DRILLING DATA	ROCK SUBSTANCE		DEFECT		
LOG Run	DESCRIPTION	ED	SPACING .	DEFECT DESCRIPTION	MP
DEPTH (RL.) METRES Method Casing, Run Water Casing, Run SRAPHIC LOG	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	NEATHERING	STRENGTH 2000 2000 2000 2000 2000 2000 2000 20	Inclination, planarity, roughness, coatings or infillings	<u>R.O.D.</u> Tests
	TUFFACEOUS SANDSTONE CONFINIES, MEDILIA	× ü			
	grained.			-10,17 Jowr Jo, plana, rough carbonate coated, with	botest.
	Includes rare subangular classes to 5mm dunkension	ġ.			
				TO. 83 BOXING BREAK	
Cow				- - 11.40 DRILLING BREAK	101
		$F_{(3)}$	a to		
Kun	•				
772 9					0
= 77.73	:			= 14.24 DRILLING BREAK	
	• •				
				- 11-19 BOXING BREAK	
73					
Run	· · ·				1.05
				123.75 BOXING BREAK	
24					
				14.76 PARTING, 15. planar, volig minor te staining	ika,
-74	•			T29.00 DRILLING BREAK	<u> </u>
Remarks: Box 6 Logged by: VOHN	ENDS AT 23.75m Yourc	Date: 2	1.11.07	Site Supervisor MARK ASHONER	rt No. GN 25A

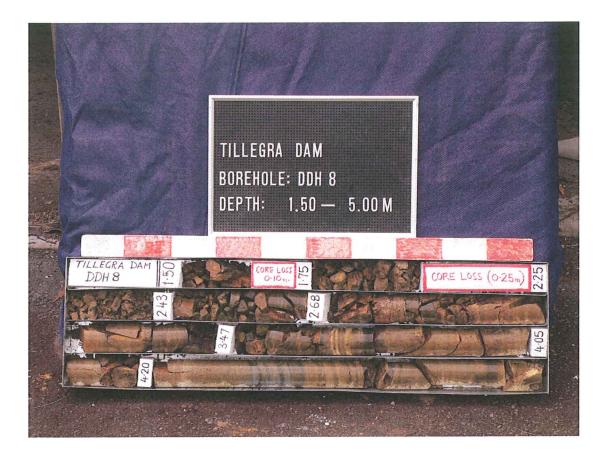
COMMERCE DIRECT TALLEGRA DAM E 276-677 SERVICE OF TALLEGRA SERVICE TALLEGRA DAM E 276-677 SERVICE OF TALLEGRA SERVICE TALLEGRA SER	NST C	W Department	of	GEOTECHNICAL & ENGINEERING		NVII E ol			ENTAL ENGINEERING BOREHOLE LOG	E No.	
DUNION LEFT A BATT MENT, PRO POSED N 6423872 NOLMAN COLLING LARGE AND STATE NLIPE CONTRACTOR MICHARM AND									R.L. COLLAR 167.6m		
BLACKET Jook COMMENTS C						-		·	BEARING OGO M	×.	
ONE BARREL //O TAILING DIRLEM SMALLAN TAYLOR DOWNETED TA11. AT RUNG DATA ROCK SUBSTANCE ROCK MASS DEFECTS ROCK MASS DEFECTS ROCK MASS DEFECTS ROCK MASS DEFECTS RUNG DATA ROCK SUBSTANCE DESCRIPTION SPECT ROCK MASS DEFECTS DESCRIPTION READ Status SPECT DESCRIPTION SPECT DESCRIPTION READ Status SPECT DEPCT DESCRIPTION TOP READ SPECT SPECT SPECT SPECT READ SPECT SPECT SPECT SPECT READ SPECT SPECT SPECT SPECT READ SPECT SPECT SPECT SP	SPI	<u>LLW</u>	AV	CREST.							
BLING DAA ROCK SUBSTANCE ROCK MASS DEPCTS BLING DAA 000 K SUBSTANCE BEER SUBSTANCE BEER SUBSTANCE BLING DAA 000 K YPE position, and the position and the posit position and the position and t	•		,								
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $									ROCK MASS DEFECTS		
B B <td></td> <td></td> <td>g</td> <td>DESCRIPTION</td> <td>9</td> <td></td> <td>SP/</td> <td>CING</td> <td></td> <td></td> <td></td>			g	DESCRIPTION	9		SP/	CING			
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 TUPFINCEOUS SANDSTONE TUPFINCE CERTS SANDSTONE TUPFINCE CERTS SANDSTONE TUPFINCE CERTS SANDSTONE Continues, incidian gr. Tupe CERTS SANDSTONE Classing of the softward Tupe CERTS SAND		Meth Casi	GRAF	Grainsize, texture, colour, composition, structure, hardness	WEA	EST	88	888 111		B.0	╈
 25.32 - Conferences, madricen grational 25.52 Prestinite, 20', 41ghtly magular, 10', 10, 10, 10', 10', 10', 10', 10',	UIJ ,	222		TUFFACEOUS SANDSTONE							
10-06 10	15,13	17			đ						T
10-06 10									25.52 PARTING 10 Allahtly magubas		
10 10.05					ĺ				rough, Fe st.		
15.06 Forme gracured, very thinty badked at 15 ⁻ (Includes MSTA-SHALE Institutes at 150 % to 50 26.50 (Includes MSTA-SHALE Institutes at 150 % to 50 26.50 14.92									25,80 BOXING BREAK		
15.06 Forme gracured, very thinty badked at 15 ⁻ (Includes MSTA-SHALE Institutes at 150 % to 50 26.50 (Includes MSTA-SHALE Institutes at 150 % to 50 26.50 14.92	16										
 C. Loo C. Lo	76.06	0		Fino and und your think	w.				-76.10		
6.60 (Includes METR - SINLE Interindences at 16.50 m 24.72 m 25.12 DRULING BREAK 26.92 m 27.10 m 27.10 m 28.92 m 29.10 m 29.62 Dexine BREAK 29.64 Boxing BREAK		He		bedded at 15					- 4x5 PARTINGS, 15, planar,		
6.co 10.71.00 10.72.00				(Includes META-SHALE	Fa	2			I T Mar Mar 1	1	
17.70 TUPFREDUS SAMDSTONE Confirmulos, maduum gr. 17.70 TOURT: 60°, plamar, rough, Folom Stannad. Tool: WATER 10%, 19.72 19.72 19.72 19.74 19.75	6,60			Tamination at 26.50 fo 26.52m).	13			T		32	5
17.70 TUPFREDUS SAMDSTONE Confirmulos, maduum gr. 17.70 TOURT: 60°, plamar, rough, Folom Stannad. Tool: WATER 10%, 19.72 19.72 19.72 19.74 19.75		123							- 16.80 BOXING BREAK		
2770 2770 28.07 28.07 29.00 29.07 29.00 20.07 20.0	а-13	2410		THEERING LANDSTONE							
PB PB.772 Pa.772 Pa.772 Pa.772 Pa.772 Pa.772 Pa.772 Pa.782 Pa.772 Pa.782 Pa.772 Pa.782 Pa.772 Pa	-1	utato									
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PB PB.772 Pa.772 Pa.772 Pa.772 Pa.772 Pa.772 Pa.772 Pa.782 Pa.772 Pa.782 Pa.772 Pa.782 Pa.772 Pa	7.70								17.70 VOINT, 60, planer, rough. Fall Stained, 100%, WRITER 10%.	AM F	
18.07 Fine grached Fine grac		32								1	
18,73 9.40 Cyroden to unedium gr. 29 TUFFRCEOUS SANDSTONE Continues, michillingr. Includes rare subangular Class's to 4 mm dinkingion. 29 29 29 29 29 29 29 29 29 29	1:8 28.07	NY								S.	5
29 TUFFACEOUS SANDSTONE continues, middium gr. Includes rase subangular clasts to 4 mm dimension. 29.64 BoxING BREAK 29.64 BoxING BREAK 29.64 BoxING BREAK 29.64 BoxING BREAK 29.64 BoxING BREAK 29.64 BoxING BREAK	28,72			Fine grained					Fre DRILLING BREDK	-	╉╴
29 TUFFACEOUS SANDSTONE continues, middium gr. Includes rase subangular clasts to 4 mm dimension. 29.64 BoxING BREAK 29.64 BoxING BREAK 29.64 BoxING BREAK 29.64 BoxING BREAK 29.64 BoxING BREAK 29.64 BoxING BREAK	\$.40			- Grodes to medium gr.					28.45 PARTING, 15. planar, rough,		
19 TUFFACEOUS SANDSTONE LONATION Les, MEdition gr. Includes rase subangular Classis to timm dinations con. 19.64 Box/ANG BREAK 19.84 - 2x's Towns, 45, planar, rough, Fe stained.				• •					FR. 53 BOY MIG BEFOR	#	
Continues, meditum gr. Includes rare subangular clasts to 4 mm dimension. 29.64 Boulds BREAK 29.64 Boulds BREAK 29.64 Boulds BREAK 29.64 Boulds BREAK 29.64 Boulds BREAK											
Continues, meditum gr. Includes rare subangular clasts to 4 mm dimension. 29.64 Boulds BREAK 29.64 Boulds BREAK 29.64 Boulds BREAK 29.64 Boulds BREAK 29.64 Boulds BREAK				Transformer 1							
10 Lincludes rave subangular classis is 4 mm dimension. 24.64 Boxinsis BREAK 24.84 Boxinsis BREAK 24.84 Joints, 45, planar, rough, 74.94 - 2x's Toints, 45, planar, rough,	29	SUN				• .				2	*
10 19.64 BOXING BREAK 19.84 - 2x's Towrs, 45, planar, rough, 19.99 - 2x's Towrs, 45, planar, rough, 19.99 - 2x's Towrs, 45, planar, rough, 19.99 - 2x's Towrs, 45, planar, rough,		× -		Includes rare subangular						101	
29,89 - 2x's Towns, 45, planar, rough, 19,99 - 2x's Towns, 45, planar, rough, 19,99				64662799 9 4 6 5 813111 VISTORIE 95 41 6							
29,89 - 2x's Towns, 45, planar, rough, 19,99 - 2x's Towns, 45, planar, rough, 19,99					****				The left and annual		
				·.							
	ĺà						4		14,89 - 2×'s FOINTS, 45, planar, vought,		
		LLL Bby	7 EN	05 AT 27.70M			LL			N 2	9

		of.	GEOTECHNICAL &						ITAL ENGINEERING	BOREHOLE No.	
PROJECT . 7		EGK	A DAM BUTMENT, PROPOSED	со-ог е 2	DINAT	es 97	,	F	RL COLLAR 165.6m DATUM 1440 BEARING 060°M	DDH (3
\$	PILL	WAY	CREST	N					NCLINATION 60 from horizontal	Sheet 7 of 10	
			RACK MOUNTED CONTRACTOR MCD					////	COMMENCED	17.11.07 22.11.07	
CORE BARREL		141	<u>PLE DRILLER SHAC</u> ROCK SUBSTANCE	<u> </u>	12 1 1		•		ROCK MASS DEFECTS		Ī
	Run	901 J	DESCRIPTION	NEATHERING	ATED VGTH	SP.	FECT ACING mm)	<u>r 106</u>	DEFECT DESCRIPTION TYPE		10L
DEPTH (R.L.) METRES	<u>Method</u> Casing, Water	GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATH	ESTIMATED STRENGTH	2000	8888	VISUA	Inclination, planarity, roughness, coatings or infillings	UU	1.4.U.
3,0 30,07	Mrt -		Turraceus smostone Cont, , medium grame Fine gramed	d F(s)	s/V5				-30,30 DRILLING BREAK 30,31 TOWT, 60°, Planar, rough	Fe st.	14 1
30.71 30.76	6220	Ň	Gredes write med unn gr. around he. tom CORE 1055, 0.05m						20,53 DRILLING BREAK 30.60 FOINT, 60°, planar, rough 40.71 (fragmonted), 70.76 Joint, 87°, planar, rough		
3] 31-13 8].13	R 76		TUFFACEOUS SANDSTONE, meduum grained.		•				31.23 DRILLING BRENK.	/1990	V. ant
31.57 32	RUNIZ		Fine grained Modium feature grained	Fa)	51/5				-AI.63. BOXING BREAK		
31.82 33.00			Includes subangular elongale classes to Forman driven 2000						72.40 Рантись, 15, ріанаг, г 92.60 Вохимсь ВКЕРК 82.62 Тонят, 60°, ріанаг, госуф.		1 day
33,65			Loditse grained TUFFRIEDUS SANDSTOND Continues Fine graced.						33.10 PHATING, 19, planar, roe 313.40 PHATING, 20°, planar, POU 33.65 PHATING, 18°, planar, rou	igte.	
34	61. NM		Fine-meduum grained.						24.65 PARTING, IF, planar, roug VATI JOINT, 45, planar, roug 24.95 DRILLING, BREAK 24.10 JOINT, 45, planar, rough	1.04	1/00
34.23 54.40	1 52	5 C	Includes Subangular, clongate class to 25 mm dimension. Fine-meducin grained.						24.10 JOINT, 45, planar, rough carbonate full Immu fie 24.23 TOMT, 45, planar, rough 30.40 PRILLING BREAK 34.60 BORING BREAK	, Fa st.	
35.85 35	RUM .		Fine grained, laminated to very thinty badded at 10"				, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		24.88 34.5 PARTINGS, 10, Planes	port No. GN 25	
27			ENDS AT 31.62 m						· · · · ·		

CUMMERCE RURET TALLEGLAN DAMA RURET TALLEG	ļ							ENTAL ENGINEERING	0.	
BLACKER Dame, Tence Housing DOTTINGTOR Medicipation of the Distance of	ROJECT 7	UEC.	,RA		CO-OR	idinate 376 (s ,97	R.L. COLLAR 165.6m DATUM AHD DDH(BEARING 0605M	Ş	
Description Description Description Big and an analysis Big and analysis Big and analysis Big analysis Big and analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analysis Big analy										She
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$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	RILLING DA	TA		ROCK SUBSTANCE			DECENT	ROCK MASS DEFECTS	Н	1
No. 100 International product of the first sector of the first	depth (r.l.) Metres	<u>Method</u> Casing, Run Water		ROCK TYPE	WEATHERING	ESTIMATED Strength	SPACING		R.Q.D.	
14. 14.73 14.74 14.75 14.74 14.75 14.75 14.75 14.75 14.75 14.75 14.75 14.75 14.75 14.75 14.75 15.75 16.75 17.17 17.1	96 19.10 19.25 19.32 19.40	RZ9 CONT		Fine - medicin Avalued	Faj	s//s		279,117 48 5 Joints, 50 to 60°, planar 10 ugh, Fa st. 79,40 79,40		
4.97 4.97					F(s)	sn/s		-35.92 JOINT, 44, planae, rough, Fast. 26.05: As above 76.15 DRILLING BREAK 24.123 - PARTING FRAGMENTS, 15, planae	1 60%	
1.20 1.30 1.40	6,111 71.06	04 MM			-			24's Jainsts, bo to 70° with infersections PARTINGS 20°. Au plander, rough, Fe'st.	7.52	1
1.2 The grained, grained 1.2 Meto-shale luminihers of 16 1.2 Met	9.12 7.73 7.73 7.73	1 1 K		Turfales Gaveral Turfactions - Sis Luminatrais. Turfaceous Samosjone fine grained, Poory defined bedding at		W Ms	╺ <u>╞</u> ┍┻ ┏╌╼	27.28 planar, vough, Fo shi (mmorshoan zone ainoccated isti (podeng). 21.45 JOINT, 44, planar, vough, Fo st.		
1.2 METO-SHALE leminchion at lo	₿, 6 ≉	Ke		Grader to fina- madricen gracued.	F ₍₃₎			78.49 No.14 PARTIAL, 10° planar, rough, Minor Fest, No.45 No.11, 20 to 90°, planar to curued, rough, Fest.		
to the states above	1 1.05			with depths.	J			24,16 Joint, 40, Plener, rough, Fest. 24.05 HANDLING BREAK 24.26 BOXING BREAK	1.13	22
marks: Box 9 ENDS AT 35. FAM BOX 18 ENDS AT 39.36M - Job/Report No. GN 29.	7,8 to emarks:							- 40.00 As above		

q			GEOTECHNICAL &						BOREHOLE No.	
PROJECT	_	EGR	ENGINEERING	CO01	EOL RDINATE 7669	S	R.L. COLLAR DATUM BEARING	OLE LOG 165.6m 1740 060°M	DDH (
OCATION 4	LE FT S PI	- AH [L.W.	UTMENT, PROPOSED AT CREST.			3872	INCLINATION	A		Sh
			offere file and page contraction			n Tay	RIFLING VIER	COMMENCED	15. 11. 07 22.11.07	7
CORE BARRE DRILLING DA			ROCK SUBSTANCE	<i>124</i>	8 28 08	··· ////		ROCK MASS DEFECTS	LV . 11 . 01	Γ
	Run	90 T	DESCRIPTION	RING	日日	DEFECT SPACING (mm)	FOG	DEFECT DESCRIPTION TYPE		11 01
DEPTH (R.L.) Metres	Method Casing, Water	GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMAT	(mm) දූසිදිසිසි	VISUAL	Inclination, planarity, roughness, coatings or infillings	ROD.	
40.73	1831		Interbodded fine grained TUFF NCEOLIS SANDSTONE WITH META - SMALE.			-	l F	PARTINC, 15, P. 16400, rough DR.ILLING PARENCE 72×5 PARTINCS, 10, Plan rough, Fost.		
-			Lammaked to very third badded at 15	8	. 5/SM			Numerous Pratings, planar, rough, Fast.	15,	
40,81 41	T& MD.		TUFFACEOUS SANDSIONE,. fine grained.	FG)				Jowr, 60°, planar, rough	00	
41.56					51/13		+++++++++++++++++++++++++++++++++++++++	ымт, 50°, planar, rough , > 7x's Partinus, 10 to 15°, p rough, Fest: Partinus, 15°, planar, roug	vlanar,	
41.73 41.91 42 42.08			Interhedded NETA-SHALE With very fone grain ed TUFFACFOUS SANDSTONE. Lawranted do year Hando	HW	1.4		41.83 / 441.91	PHATING FRAGMENTS (crushed from 41.99 to and 42.70 to 42.15m).	5, 10°. 42.0400	
,42.40 42.44	9.9 HQ		Lammatrd to very Annely bedded at 10 to 15" TUFFACEOUS SANDS JOANE,		w/w		1 42.40 472.47 V	Pough, Fa st, , chayer Cruiched zones (chose associated with pade Tourt, 40, planas, rough, Fa	They of	
42,75 43	Km8		tine grained	Fis	SN/S				5. 1947 -	
43:23			Interbeddad META-SHALE with very the grand				- 43.73	DRILLING BREAK.		
13:73			TUFFACEOUS SANDSTONE, dask group grest Laminated at 10% 15. TUFFACEOUS SANDSTONE,				43.60 - 43.72 -	PARTING, 19, planar, vo minor Fe Several VOINTR, 70-10		۱
13,97 14 14,14			fine grained Includes clongete classe to 50 mm.					- Several VOINT, 70 to planan, vough, Fest, Boxum BREAK	14 19	, <u>,</u>
	RUN RY		Fine-grained.					Tomr, 60°, plande, rocy 2 st, carbonale fiel 1m.	gho _s m ^{-threech}	
45,			· · · · · · · · · · · · · · · · · · ·				44.17	y See over	4 No 10 18 18 18 19	
emarks:			11 ENDS AT 43.23	Dete	11	11.07	Site Super		ort No. GN 25	1

LUCATION LEFT RESUMMENT: PLOYOSED N 6423872 INCLINATION Lefter horizontal Sheet Perf 1986 DRIL DEUTR ZORD, TERCE Monification RACTOR MCDERMINIT DRILLING COMMENCE IF. II. 67 CORE BARRELL HO TRATE DRILLE SHALM COMMENCE IF. II. 67 CORE BARRELL HO TRATE DRILLE SHALM COMMENCE IF. II. 67 DEFECT DRILL DEUTR COMPLETED TAI NOT DRILL MACK COMMENCE DILLING DATA ROCK SUBSTANCE ROCK MASS DEFECTS COMMENCE IF. II. 67 DILLING DATA ROCK SUBSTANCE ROCK MASS DEFECTS DEFECT DESCRIPTION BEEDER OD DEFECT DESCRIPTION SPACING SPACE TYPE INCLUSS CONTRACTOR ROCK MASS DEFECTS DEFECT DESCRIPTION TYPE INTERPOLICIES SAMUSTIONES<	Co	mmen TILL	 GEOTECHNICAL & ENGINEERING	Gl	E OL RDINATI	.O Es	GY		OLE LOG	BOREHOLE No.	S
COMPLETED COMPLETED 23. //. 07 COMPLETED DELLAR DELLAR NOTA COMPLETED 23. //. 07 DELLAR DELLAR DESCRIPTION DESCRIPTION DESCRIPTION DESCRIPTION End Big				N	642	23	872	INCLINATION			Osh
DRILING DATA ROCK SUBSTANCE ROCK MASS DEFECTS DRILING DATA DESCRIPTION			1 3×0***		moi	1	DR.	ILL WC		•	,
B B DESCRIPTION B B B B B DESCRIPTION B B B B B B B B B B B B B B <th< th=""><th></th><th></th><th></th><th></th><th>1</th><th></th><th></th><th>R</th><th>OCK MASS DEFECTS</th><th></th><th></th></th<>					1			R	OCK MASS DEFECTS		
17 Instructions, functional, functio		od 8, Run		HERING	ATED VGTH	I SI	PACING	907 T	ТҮРЕ		
4572 46739 47749 477749 477749 477749 477749 47777777777		Metho Casin	Grainsize, texture, colour, composition, structure, hardness	WEATI	ESTIM	2000	8888 88	VISUA	coatings or infillings		ירירי דירי
16.75 16	45.22 45.33	1834		, Es	s//s	•		45.38 -	- Several Intersecting To and Totobo, p rough, tost.	Jours, anar,	
16.73 16.75 16	45.76	14 W.	METH-SHALE, dask graf lanswated at 10 to 15°	с. Я	-			45.76	Probable PARTING, 10"	olando,	2
 K. 89 H. 72 FUETRICED US SAMUSTONE, vary H. 73 H. 74 H. 75 H. 74 H. 75 H. 74 H. 75 H. 74 H. 75 H. 75 H. 76 H. 72 Saveral: Homer carbon of parts, too too too too too too too too too to		- 1 Ku		F	ws/s			45.10 H 45.13 B -46.23	MNDLING BREAK AXING BREAK Probable BRILLING BRI	FAL	4
47.257 47.43 47.43 47.43 47.44 47.43 47.44 47.44 47.44 47.44 47.44 47.44 47.44 47.44 47.44 47.44 47.44 47.44 47.44 47.44 47.44 47.44 47.44 47.45 4	1	HQ RUN TH			A				- Seiveral Jointh Entr	20"	
17.29 17.99 18.00 18.00 18	47.43		META- SHALE, dark grey.					47.30 rocy	· .	planar, ochug	
49 1.18 1.	7;17 48.09		META-SHAFE, lam, at losols		- MS/B				Possible Post indi, 10, pi ough, miner, carbonats As above	anar . aastring	
9.18 1.7.9	.La		Tammated at 10 \$ 15". Includes occasional very fune - gramed TUFFACEOUS		ms/s			44.67] Intersecting Joints, 60 rough, carbouata coa	, plander, fed	100
	1.18			<u>.</u>				149,04	arbouate coat co	<i>,</i>	
	To										















A MEN	partment of					ENTAL ENGINEERING BOREHOLE LOG	
	merce ULEC,I	RA DAM	CO-OR	DINATE		R.L. COLLAR 167, 4711 DDH)]
dcation G	WARRY	Y AREA B		-		BEARING INCLINATION VERTICAL Sheet 1 of 12	Sh
		ACK MOUNTED CONTRACTOR MC	DERIN	1017	DAILLI	161C1 COMMENCED 7, D. 1. 88	
	HQ	TRIPLE DRILLER SHAU ROCK SUBSTANCE	W TH	iy2c	nh	COMPLETED 13.2.09 ROCK MASS DEFECTS	Г
RILLING DATA		KULK SUBSTANLE			DEFECT		1
DEPTH (B.L.) METRES Method	<mark>Casing, Run</mark> Water GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED Strength	SPACING (mm)	DEFECT DESCRIPTION TYPE Inclination, planarity, roughness, coatings or infillings	
P -		NON CORE					
40		CORING COMMENCES AT 1. YOU	2				10.0k
-972	king 1-	TUFFACEOUS SANDSTONE, Func grained, greybrown.				"PARTING FRAGMENSTS, IF, with Joinots, 445", planar, rough, Fafinin St. 1.10 DRILLING BREAM	÷,
.67 . 55 O	Butt &		120 / 2011	\$	p3	2.477 Several Toms, Foto JE, with associated PARTINGS, 15, planar, rocigh, Fast, clay coated to fill 2 ment finck. 7.76 DAILLING BREAK 2.20 VOINT, 60°, planar, rough, Fest. 2.20 As above.	5 C) 6
76 76		7.57.00 META-SHALE, brownfgrey- brown, laminated at 104 -3.76 m	MW			1.46 As above. 3.46 Soveral VOINTE, 65 to 70, with associated PARTINCS, 15, planae, racego, Fe St. Clay Fill in 70 Jower for from	
- 45 245	RUN F	- 4.34 m Gray from 4.25m	mol/sm	4		4.15 4.35 Joint, 50°, planar, rough, Folmer st.	
648 65 117 -	BUN 6	4984997000 4,2500 - 4.67m - 4.75m Fine-madiumges, grey	Faj	5/25		-4.48 DRILLING BREAK 4.67 HANDLING BREAK 4.66 BOYING BREAK	
marks:		BOX I ENDS AT 4.86m		L		Job / Report No. GN 24	51

Co	mmer	ce	GEOTECHNICAL ENGINEERIN						BOREHOLE I	Vo.
PROJECT			ta Dam		RDINATI •756		R.L. COLLAR DATUM BEARING	163.4m AHD	DDH	9
OCATION	QU.	ARR	Y AREA B	Né	5422	067	INCLINATION	VERTICAL	Sheet ⁷ of	/Z Sh
			RACK MOUNTEDCONTRACTOR M				LING	COMMENCE	4.00	
CORE BARRE		<u>a 7</u> 2	IPLE DRILLER SHA ROCK SUBSTANCE	AUN TI	9 <u>7</u> [0	R	RO	COMPLETED CK MASS DEFECTS	17: 2:00	<u>~</u>
UNILLING UP			NUCR JUBSTANCE			DEFECT				T
	Run	DOL	DESCRIPTION	RING	B ≥	SPACING (mm)	00	DEFECT DESCRIPTION TYPE		
depth (R.L.) Metres	Method Casing, Run Water	GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING		(mm) క్షజిక్షజిక	VISUAL	Inclination, planarity, roughness, coatings or infillings		R.Q.D.
9,05			TUFF. 5/5. continues as about	e .£4	5115			L' PADTINGS 10° . Alden	Re resuela	
	ED		METH-SHALE, preybroion, laminated at 10 to 15	ŚW	тş		- <i>19,18</i> - <i>1</i>	s's PARTINCIS, 10°, plana Felmin st.	a, a way in	
5,40	771/2/2									1.00
	107							CLING BRENK		$\left[\right]$
	N 6		TUFFACEOUS SANDSTONS fine to medium gracue					LEING DREAM		
	Ru		free to machine graces. psile dapth, gray.					SING BREAK		
6.00				Fis	\$/1/5		-6,00 DA	ALLING BREAK		П
	W.			(4						
	6 2									
	Ru,						Ē			
6,80					 \$	╽╏┺╾╼┓╴	E6.80 VOIA	ut, ba; planar, rough,	Falttin sti	
,6.97 7			- 6.9700			l l _i	1.00	Jourt MELLE / POATAS	c. balatte	
			META-SHALE, graybrown, thinly law mater flamma at 10	ted MW	M5		Η [voust, 44 h 65 Partus FROCUMENTS, plamao, faltmo st.	rough,	
7.31			ar 10 — 7.3/11			H-1	1.30 -			N
					5		1,45 }7	N's PARTINGS, 10°, with A planas, sough, Fest.	own, 45	28
7.99			TUFFACEOUS SAMDSTONE,		· ·		-1.66 Jon	T, 20, planae, rough , t	a st.	
7.81			fine grained, grey	·	-			TUG, 15, planer, vough		
				ŚW				ILLING BREAK		
8.07								promos promo		
						┟╻	- 8.31 PA	RTING, 15; planar, rough,	. Fa set.	
							E	a start for the start of the st		
				F ₍₃₎	510/					
					M^		-8.70 Box	1104 BREAK		
_										
9,00	H		- 9,50 m				JE 7.00 75	everal Joints, 60 to 80°,	pléner,	Π
4 -			Grey gray brown					rough, Falma st.	, -	
9,70	8		- 9.20 M Grey.			┃	9.35			X
1.50	NIN				-		F9.60 VAIN	T, 50, planar, rough, Fe	1111 st.	35
			Graybrown	Mad f Ead			= 9.71 BOXI	WY BREAK		
2 x			-	Mari				Numeraus Towers, 50', rough, Falma St.	planar,	
a emarks:		Por	2 ENDS AT 8.70m	I	<u> </u>		NT 10.000		eport No. <i>GN</i>	19,
gged by:	JOHN		UNG	Date	15,7	., 0B	Site Supervis			

C	miner	če	GEOTECHNICAL ENGINEERIN						OLE LOG	BOREHOLE No.
			A DAM AREA B	E	ろ	INATE 17560	64	R.L. COLLAR Datum Bearing	163.4 AHD	DDH -
				N	6	+22	067	INCLINATION	VERTICAL	Sheet 7 of 12 SI 70, 1. 08
orill <i>del</i> : Core Barre	18 1.00 31 - H	o, TRA Q TA	CLE DRILLER							13.2.08
DRILLING D			ROCK SUBSTANCE					R	OCK MASS DEFECTS	
		90 T	DESCRIPTION		2 Mile	ЭE	DEFECT SPACING (mm)	90	DEFECT DESCRIPTION TYPE	
DEPTH (R.L.) Metres	Method Casing, Run Water	GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	1.660		STRENG	(mm)		Inclination, planarity, roughness, coatings or infillings	ROD.
10.03 [0.08	8		-10,03m Greybrown to 10.03m TUFFACEOUS SANDSTODE Continues, time gracused, gr	ey	s)				ORILLING BREAK	
10,70			10.70 112					= 10, 58	01NT, 55, plande, rough, Fell Box 100 BREAK 3x'= VOINT3, 50 to to , plan	
10 <i>-11</i> 11	6 M		Чгецьгоюл — 10.95т	1 adertic rel	- Mater	5/12		10.94	3x's VOWT3, Fofobo', plan 10ugh, Fe st.	87
	n de la comencia de l		Grey.	Ę	5)			- 11,50 i	болыт, 4°, р!амая, гощую, К эклась ВКЕАК	af Minist .
11, 80 17. org	H.		[1, 80 **	[Sections -				Town, 50°, planar, roug	
1 1- , 6 1	10 IO		Graybrown / brown	M	(11	\$			- Numerous Jewits, boto planar, rough, Fef Mir	50°, \$1.
12.95 13				-				<u></u>		-
								13.45 J	RTINSC, 157, planas, rough, Fa	fMn st.
14	RUN II		Fine grained Tuffnceous SANDSTONE continues. (10 19.10m)					- 13.87 - 13.87	3x's Jours, 50, planau, ro Jourt FRELMEDTS, 30, planar, rough, Faftan s	34.
					· · · · · · · · · · · · · · · · · · ·				Tow, 60°, planes, rough, 1	E/Men St.
15,00								- 14,74	hu's Joints, Fololo, pla rough, Folma st.	
emarks:		Be	Y 3 ENDS AT 12.50 m						Job / Re	port No. GN 251

			GEOTECHNICAL						BOREHOLE No.
PROJECT Location	QU. 17 20	EC, ARR		CO-OR E ? N (OERM	DINATE 3756 5422	S 664 3067 DRIL	R.L. COLLAR Datum Bearing Inclination	OLE LOG 1623.4m AND VERTICAL COMMENCED	<u>Sheet</u> 4 of 12 sh 70, 1, 08
CORE BARRE		10	TRIPLE DRILLER SHALL ROCK SUBSTANCE	148 7,	1410	R	R	COMPLETED	13.1.08
Drilling da Drilling da Uriti Meturs	Method Casing, Run Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED Strength	DEFECT SPACING (mm) දිලිදිලිසි		DEFECT DESCRIPTION TYPE Inclination, planarity, roughness, coatings or infillings	RQD.
15, 40 16, 40 15,]o			TUPFACEOUS SANDSTONE Continues, medium (coarse grained from 15.0000, grey Wery course band - 15.70m (badding to") Func grained, grey.	F3)	stas		15,47. 0) 16,547 Ju 15,64 Ju 15,63 J	oxinic EREAL RILLING BREAL OMT, 60°, planat, rough, h AATING, 10°, planat, rough, -2x's Tousts, 50°, planat, 1	Fe st. rough, Fe st.
14 . 44 16 . 68 17 17. 45 - 17. 54	kun IZ.		- 19.7500 Codrat band - 16.6800 Frine to fine - medicun gr. conta depta giey. 17.4800 Coarse band - 12.5400				- 16.32 . To 17.10 J2 17.20 R	Several Jows, 704070, rough, Fajimn st. ust, 65, planar, rough, f owt, 95, as above s above PRTING, 10, planar, rough,	te/illin est
13 , 50 , 18,40 14,45 16,70	/3		Fine to fine - medium gracued usite depths, gray. 14. tom No. 45 Medium - coor. 46 18. 50 m METH-SHALE lamination at 10				18.31 7	Jourt, 65°, with Pratin planar, sough, Folm enst, 45°, planas, rough PARTINSG, 10°, planar, reu	, Fefmnst,
18.88 19,00 19,10 19,10 19,53	Raw		Fine grained, gray — 18.88 Greistrown from 19,08 — 19.00 a. NETA - SHALE lammator — 19.10 m at 19 Frinc grained, gray — 19.42 META - SHALE, gray brown, lammated et State - 19.53 m TUFF, S/S, fine grained, gray.	a w			14,83 A 14,83 A 14,00 - 19,10 -	S above Jower, be, worth PARTIN planae, rough, Falm Numerous Jowsts, FO to Associated Partinics planar, rough, Falmn	165, with
19,84 19,94 70 Remarks:		Box ;	- 19.8*m METH-SHALE lam, at 19 - 19.93m Strey. Graybrown/brown 4 ENDS AT 16.32M	., MW	M5			V Job / Re	port No. GN 25 A

	mmer TIU		GEOTECHNICA ENGINEERIN	NG	GE		OGY	BOREH	OLE LOG 163.4-m	.	BOREHOLE No.)
OCATION			I AREA B			5756		DATUM Bearing	HHD			/.
							7067 - <i>ban</i>		VERTICAL	COMMENCED	Sheet 7 of 12 30.1.08	- Sh
ORE BARRE		<i>.</i>	RIPLE DRILLER S.	HAQI						COMPLETED	13.2.08	Т
RILLING DA			ROCK SUBSTANCE			1	DEFECT	R	OCK MASS DEFECTS			-
	ŋ	100 LOG	DESCRIPTION		DNG	⊕∓	SPACING	90	DEFECT DESC	RIPTION		
depth (r.l.) Metres	<u>Method</u> Casing, F Water	<u></u>	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	4	MEATHERING	TIMATE	(mm) 8888888	SUAL L	TYPE Inclination, planari			<u>K.U.</u>
822 10,07	203	5			M	នួទ			coatings or i	ntillings	<u>م</u>	╧
			TURFACEOUS SANDSTONE, fime gracuad, brown.		MØ				hs above			
0,76			70, 26 100		100 m			10.39				
	*								•			Z
	V NINO		METH - SHALE, brown/					Frie J	Humerous Jon and PRATING rough, Felm	0%,60°(1C1	oss bedding)	
	Ř		greybrown/grey, ban Thurly laminated/ laminated at 10 for	ded.				<i>[</i>]	rough, Fe/Min	st.		
1.08	H		laminated at 1040	5'	ESM.			₹			 	-
	N				MUS / SEA		│ │ <mark>┢┼┼</mark> ┛│					ž
	11/17										tolo	12
	×					M5		F	As above			
1.60			721.72 100				r-	-21.65			ſ	
21.7%	Ŕ		TUFFACEOUS SANDSTONE	P			╽╷╺┖┲	21.80				
17-			fine-medium grained, brown.		MW			₹			(• •	1
22.13	116		- 17, 13,00					Х. Х		×.		
	RUN								· As above			
			META-SHALE, brown/ graybrown/gray, ban	dect,				1	* 4 ¹	, · · ·		
17,63			graybrown/gray, band Thinky laminated (laminated at 10 to 15					1				1
	112	E	to the second	*				ΣĒ			1	
12,	Run		:		NS			茶			ĥ	3
4,14					went Sym			13,15			F	\dashv
	81 MM2				×	· ·		T 23.26	As above			
	KU.							127.46				
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13.98 4								P=			ŀ	┥
			· ·					Ħ	As above			
			Includes occasional very of TUFFACEOUS SANDSTONE					<u>王</u>			11 61	17.71
	6 10		Interbeds, fine gracues	1.								
	Eu.											
3.84								佐			-	_
19	20	E	E Frid APP Bra - a	0					1	Joh /D	ort No. GN 2	
marks: gged by:			FENDS AT 10,0,7 m: OUNCI	нох			AT 23 7.08	Site Superv	isor MAAK I	Job /Rep 15HOVER	uri no. <i>ISN 1</i>	1

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R. BARREL HQ TRUPLE DALLE SHAM TAYLOC DOMETED J2.2.09 ILLING MAR NOC RUSSAMCE NOC RUSSAWCE NOC RUSSAWCE NOC RUSSAWCE NOC RUSSAWCE NOC RUSSAWCE NOC RUSSAWCE NOC RUSSAWCE <td< th=""><th></th><th></th><th>,</th><th>•</th><th></th><th></th><th></th><th></th><th></th><th></th><th>ihe</th></td<>			,	•							ihe
NUMBER DATA ROCK SUBSTANCE ROCK MASS DEFECTS ILLING DATA BESCHTTON BESCHTTON BESCHTTON ILLING DATA BESCHTON BESCHTTON BESCHTTON <										COMPLETED 13.7.08	
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Roy METR-SURLE contained in the stand of the	TH .) IRES	thod sing, Run ter	VPHIC LOG	BOCK TYPE	ATHERING		rimated Rength	l Si	PACING		
Rof Alexandres and alexand and alexandres and alexand	時記号	N Cas	풍	structure, hardness	<u> </u>		ESI ST	1 R		Coatings or infillings → ♪	_
 TUFFRCE our SAUDSTONE, fine gracued, greef. R. M. Ruths Poetilis, Po	147					*	ШS				
9.00 9.00 9.00 9.00 9.00 9.00 9.00 10.75 10	19.64]b	NTINUED									
8. 8. 8. 8. 8. 8. 9.60 18.60m METR-SHALE, 19.70 VAINT, To, planae, rough, MINOR CARBONALE CONTRACT BREAK 18.60 Roboth Daniel MARGAE 18.60 Roboth Daniel MARGAE 18.60 Roboth Daniel MARGAE 19.70 VOLNT, To, planae, rough, minor Carbonate Containing. 19.32 Boxiss BREAK 19.71 Daniel MC BREAK 19.70 VOLNT, To, planae, rough, minor Carbonate Containing. 19.32 Boxiss BREAK 19.71 Daniel MC BREAK 19.70 Joint, So, planae, rough	27. 08	HQ KUN ZO CO					51/5			- 26,78 B6 cheve 26,57 DRILLING BREAK - 24,77 Possible PARTING, 18, planar, rough 24,98 DRILLING BREAK.	
8,60 18.60 METR-SHALE, lamination at 15 9 Fine grained Inspaceous SANDSTONE Continues. 19.26 BOXING BREAK. 11.71 DHILLING BREAK. 11.97 Joint, 60°, planas, rough 30.00 As above.	18	Kan 21					Ŷť			MARE DRILLING BREAK	
Fine grained Tustaceous SANDSTONE Continues. 29.36 BOXING BREAK 21.71 DRILLING BREAK 21.47 JOINT, 60°, planar, rough 3.00 - 70.00 As above	28,60			—18,60m METR-SHALE Tamination at 19							
5.00 21,47 JOINT, 60°, planar, rough	<i>2</i>]			Fine grained Turfaceou SANDSTONE Continue	15 X.						
	2									24,47 JOINT, 60°, planas, rough	
aged by: VOHN VOHNSC Date: 15.2.08 Site Supervisor MARK ASHOVER	20 , 69 Temarks:	<u> . .</u>	Box	TENDS AT 17. HBM	L		I	Ц		Job / Report No. GAI 25A	A

Commerce PROJECT TILLEGRA LOCATION QUARRY			GEOTECHNICAL &	BOREHOLE No.				
		EGRH	I DAM AREA B	CO-OF E	GEOLOGY co-ordinates e 375664 n 6423067			DDH 9
			TRIPLE CONTRACTOR MC TRIPLE DRILLER SHALIN			* PRILL	COMMENCE	
CORE BARRE	t he in	IF Q	ROCK SUBSTANCE		,,,	-74	ROCK MASS DEFECTS	
depth (R.L.) Metres	Method Casing, Run Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED Strength	DEFECT SPACING (mm)	DEFECT DESCRIPTION TYPE Inclination, planarity, roughness, coatings or infillings	ROD
31 31.90 32.37 32.37 32.98 33.60 34 34 34	PUN 22 HO RUN 27-		- 20.01 METR-SHALE TUFFALGOUS SANDSTONE continues, fune grained, grey. - 21:37m METR-SHALE (armination at 15 - 21:48m Medium grained Tuff; SANDSTONE from 32.48m, grey. - 31.88m METR-SHALE class Madium for very coarse grained with depth. - 24:30m TuffALGOUS SANDSTONE, fune grained, grey	F	S/VS		30.20 Possible PARTING, 10°, plan minor carbonate con 70.25 BoxING BREAK 31.25 BoxING BREAK 31.25 BoxING BREAK 31.26 Possible PARTING, 15°, pl 32.03 PARTING, 20°, planar, 1 32.20 Possible PARTING, 10°, recight, minor Fest. 32.31 PARTING, 17°, planar, 1 memor Fest. 32.32 PARTING, 17°, planar, 1 MEMOR Fest. 33.38 Probable DRILLING BREAK 33.37 BOXING BREAK 33.97 PARTING, 20°, planar, r 33.97 Probable DRILLING BR 34.16 HANDLING BREAK 34.61 PARTING, 20°, planar, re	aman, rough rough, Fast. planan, rough, rough, rough, REPK ough, Fest. enk
35			- 0 Fuer 1 - 0 - 10					Report No. GN 15 A
Remarks: Logged by:		-	NX 8 ENDS AT 31.35m YOUNC	D.4	: 15		Site Supervisor MARK ASHOV,	

OUNDATES NAMET ILLEGRA DAM BALLET DAMA BARNARY AREM B NOTON DAMARY AREM B DAMARY AREM B DAMARY AREM B DAMARY AREM AREM AREM AREM AREM AREM AREM AREM										BOREHOLE No.		
BASET ILL ECIS A DMM BUNK ALD DUADRY ARED E 277644' BUNK ALD BELL DECTR 20007, TRAVE How HIMP CONTINCTOR MELL PERTAR DELLATION COMMEDIA ADD BELL DECTR 20007, TRAVE How HIMP CONTINCTOR MELL PERTAR DELLATION COMMEDIA COMMEDIA ADD ADD BELL DECTR 20007, TRAVE How HIMP CONTINCTOR MELL PERTAR DELLATION COMMEDIA ADD ADD BELL DECTR 20007, TRAVE HOW HIMP CONTINCTOR MELL PERTAR DESCRPTION DESCRPTION COMMEDIA ADD ADD BELL DECTR 20007, TRAVE BOOK SUBSTANCE DESCRPTION DE									Y 	11.0 .1	N// (\mathcal{I}
Description N 64/2 AOG/7 COUNTER (FITCAL) Description	PROJECT									DATUM AHD VL	H	
DRE RAMEL HOL TRIPLY DRLEB SUMMA TAYLOR DOMETED 14.2.08 RULNE DATA ROCK SUSSIANCE ROCK MASS DEFECTS ROCK MASS DEFECTS RULNE DATA ROCK SUSSIANCE ROCK MASS DEFECTS RULNE DATA ROCK SUSSIANCE ROCK MASS DEFECTS REAL PROCESSION Status DEFECT DESCRIPTION Status Status DEFECT DESCRIPTION <	LOCATION	Q1.	IARR;		N				•	INCLINATION VERTICAL Sheet		2 She
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B B		5	ß	3 DESCRIPTION			0 1	SPACING				
SANDSTOLE continues.	depth (R.L.) Metres	Method Casing, R Water		ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WFATHER		ESTIMATE STRENGTI	(iiiii) 5000 5000	38	TYPE Inclination, planarity, roughness, coatings or infillings		KUD.
46.54 1 207.54 Россий Рактич, 5, planar, rough 20.00 2	35	TWILL		Fine grained TUFFACEDO SANDSTONE CONTINUES.	15					15 1 POPTING 5° plande Fough &	est.	
94,00 9	<i>56.64</i>	27 601		35.54m METASHALE								.1.00
4.00 4.00		RUN		famination at 5								
46.88 36.88 m MSTA-SHALE 37 36.88 m MSTA-SHALE 38 36.88 m MSTA-SHALE 37 37 38 37.97 Pessible PARTIME, 15, planar, rough 39.09 76.88 PARTIME, 10, planar, rough 39.09 76.88 PARTIME, 50 and 30; 39.19 76.85 PARTIME, 50 and 30; 39.19 76.85 PARTIME, 5, planar, rough 39.21 70.016 PARTIME, 10, planar, rough 39.22 71.017 bitsoche PARTIME, 10, planar, rough 39.24 80.005 Partime 39.25 71.018 PARTIME, 10, planar, rough, minor 29.30 Partime 70.00 PRALINE PREPAR 39.25 39.26 Partime 39.26 70.00 PRALINE PREPAR 39.26 70.00 PRALINE PREPAR 39.26 70.00 PRALINE PREPAR 39.26 70.017, bo', planar, rough 39.26 70.017, bo', planar, rough	2.00	-								* 79.97 DRILLING BREAK		
36.28 37 36.28 36.69 36.88 us NISTA-SHALE 16000000000000000000000000000000000000					F	;)	-			= 36,33 BOXING BREAK		
33 Idmination at 10' 34 Idmination at 10' 37 Idmination at 10' 38 Idmination at 10' 39, 39 Box 100 a BREAK 38 Idmination at 10' 39, 30 Box 100 a BREAK 39, 40 BOX 100 a BREAK 39, 40 BOX 1		0									-	
1.65 1	46.88 31	HC I		36.88 m MATA-SHALE lamination at 10'			1			Possible PARTING, 10, plands, rou	ighs	
38 Fine gracined Tuff ACEOUS SAND STONE continues. F 39.00 DRILLING BREAK 39.00 DRILLING BREAK 39.00 DRILLING BREAK 39.00 DRILLING BREAK 39.00 DRILLING BREAK 39.00 DRILLING BREAK 39.00 DRILLING BREAK 39.40 BOKING BREAK							2/NS			planar, rough, Fe st. 231.31 BoxING BREAK	3	
38 Fine gracined Tuff ACEOUS SAND STONE continues. F 39.00 DRILLING BREAK 39.00 DRILLING BREAK 39.00 DRILLING BREAK 39.00 DRILLING BREAK 39.00 DRILLING BREAK 39.00 DRILLING BREAK 39.00 DRILLING BREAK 39.40 BOKING BREAK	N,6F	121			-	-				37.55 PARTING, 1, planat, rough, partly Festi		V. 1101
B9.00 BREAK SAND STONE continues. F B9.34 BOXING BREAK SAND STONE continues. F B9.00 DRILING BREAK 39.00 DRILING BREAK 39.00 DRILING BREAK 39.30 BOXING BREAK 39.48 HANDLING BREAK 39.48 HANDLING BREAK 39.48 HANDLING BREAK 39.48 JOINT, bo', planae, rough.	38	RUI									olign ·	
39.00 19.85 19												
39.00 39.00 11 39.00 29.30 BOXING BREAK 39.30 BOXING BREAK				time grained tuffaceou SAND STONE continues.		1.						
9.85 - 39.85 METB-SHALE, 1.85 - 39.85 JOINT, 60°, planas, rough.											no1	
9.85	39.00									- 31.00 DRILLING BREAK		
		GUN 14								I F		
				1.1 OT MOTO LUAIS						24 of Tour (" also		
emarks: Box 9 ENDS NT 35,30M Box 10 ENDS AT 39.30M Job/Report No. GN 25A	89.85 40			- 14.8000 PETE-SHALE aumination at 10								

	inme:		GEOTECHNICAL ENGINEERIN	G (GE		0				NGINEERING OLE LOG /63.4m	BOREHOLE No.)	\rangle
			RA DAM Y AREA B	E	7	3750	664			DATUM Bearing	AHD	VDH .	Ϊ	ſ
			,	N A.D.G		542 1000			-		VERTICAL COMMENCED	Sheet 9 of 12 30, 1. DS		he
ORE BARREI			RACK MOUNTED CONTRACTOR M RIPLE DRILLER SI	HAUN	к ја 1	TAY	Lo Lo	r.r. R	ler for	.////	COMPLETED	13.2.08		
RILLING DA		Τ	ROCK SUBSTANCE							R	ROCK MASS DEFECTS			
		6	DESCRIPTION				DE SP/	FECT			DEFECT DESCRIPTION			
S	h Bun	00 1			NEATHERING	ATED IGTH	(1	mm)			TYPE			
depth (R.L.) Metres	Method Casing,	Water GRAPHIC	Grainsize, texture, colour, composition, structure, hardness		WEAT	ESTIMATED STRENGTH	2000	3888	VICI IN	AUGIA	Inclination, planarity, roughness, coatings or infillings		U.N.H	
fo			Fine grained TUFFACEOUS						,	40.05	2X'S JOINTE, 50's planar,	rough,		
			SANDSTONE continues,							=40,26	BOXING BREAK	,		
			greef.					Π		\F 70.32 1 F	Toint, 60; planar, rough	13 · .		
40,50			-40, Fom			-				- 40,60 V	TOINT, 45°, as above			
	0		Fine-medium to coarse grained with depth (b 40)	Hore)						40.71	24's JOINTS, Spand 45, 6	rs above		
6.90	300		40,10m							E 40, 81 A	HANDLING BREAK			
FI	CONTINUED									E E				
	CO		Fine to coarse grained with depth (40.90 to 41.5	~)						- 41.25 k	BOXING BREAK		18	
	25		(70.70 10 71.5		C	MA								
41.55	SUN		- 41,55 m	. I	F	50/				F				
1.69	~	-	41,55 m Fine grained - 41,69m META-SHALE classes	\$		N				F				
• . •	116		Fine gr. Tuff. Sts continu	ues						Ē				
12.00								-		+1,96	DRILLING BREAK	-		
										41.19	BOXING BREAK			
										42,36	JOINT, 60; planar, ro	ugh		
42.50			- 47.50 m							F		V		
	26													
	RUN		Medium grained.											
13										Ē				
17										47,16	BOXING BREAK			
42,29			- 43.29 m	-						E.			101	
			Fine grained							=43,47 J	towr, 44, planar, rough,	Fest	<i>u</i>	
43.55			- 49, 54 m							Ē			1	
			Medium grained							Ē.,	Tour, 90, planar, rough minor curbonate cedi	h, Felimasta		
4.				1	C 3					E43.87	miner cerbonats colfi	ing'		
44.1%				\$	2					HUL INT &	BOXING BREAK			
N 312 W			Fina grained.						$\ $	F				
			¢						ľ	******* F	Town, 45, planar, rough	, test.		
										F.				
										44.70	- Several JoINTS 45 L	15. plance		
1- 1										TE	Several Joints, 45 fe rough, Fe st.	- a g f an an a g		
<i>45,00</i> marks:	ĹĹ		Box 11 ENDS. AT 43,16m	, 1		<u> </u>	LL.		L	<u> </u>	Job / Re	eport No. GN 2	45	
gged by:	.7	OHN)ate:	16,	7.	08		Site Super	visor MARK ASHOVE	R		ĺ

		j tol						ENTAL ENGINEERING BOREHOLE LOG	BOREHOLE No.
PROJECT	mmei Til		ENGINEERII		CO-0F	DINATI	S	RL COLLAR 163, 4m DATUM AND	DDH 9
LOCATION	Qu	AR	T AREA B				664 23067	BEARING	ihest / 0 of 1/2 Sh
DRILL <i>Del</i>	TH 7.0	70, TR	NCK MOUNTED CONTRACTOR	Mc	DER	MON	T DRIL	LING COMMENCED	70.1.08
CORE BARRE		40 7	ROCK SUBSTANCE	SH	Alli	u 7.	AYLOR	COMPLETED ROCK MASS DEFECTS	13.2.08
			NUCK SUBSTANCE				DEFECT		
	Bun	907 0	DESCRIPTION		ERING	EE EE	SPACING (mm)		R.Q.D.
depth (r.l.) Metres	Method Casing, Run	GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition structure, hardness		WEATHERING	ESTIM/ STREN	(mm) 888888	Inclination, planarity, roughness,	<u>R.O.D.</u>
45 45,10			Fine gr. TUFF, \${\$, contin - 45, 10m					49.10 See above	
,								45.75 TOINT, 40°, planar, rough (may be drilling ind	lucad t.
			Medium to very coarse grained with depth.					HE HE ATLINITY MA	.14
									E.d.
					E			45.73 Josvir, 45, planar, vough,	2 -1
46					Fay				
46.27	12 N.		11					= 46.08 As above 46.20 As above	
4870P .	RUN								
			Fine grained.						.Ye
	ଡ		V					46.67 DRILLING BREAK	100
	R					18			
47						1.04		47.05 BOXING BREAK	
								- 47,28 PARTING, 15, planar, very rou	gh, Fest
								47.60 2 Paretrusk 15 and Toust M	olaner
								47.60 PARTINS (15" and Jourt, 70", rough, Fe. st.	
48.00				٠				-48.00 DRILLING BREAK	
76,0 <i>9</i>									
48,40 48.50	821		— 42,40 <i>m</i> Medium grained — 42,50 m						e e e e e e e e e e e e e e e e e e e
•	RUN		Grader to pale gray fro. 48. Tom medium to	(m				48.66 - Jourt PARTING FRACIME	2075
			coarse grained with depth.	læ .				8 49.84 Ceresched zone core frag	mented), s
49								- 48.97 Possible PAKTING, 78°, plane 48.03 As above.	r, rough
								- 48.26 As above	
								I wreak the second	
49,84 50			— 49.85m Fine-medición gr. (paleg	vey)				49.15 BOXING BREAK	
emarks:		1	0x 12 ENDS AT 47.					Job / Report	No. GN 25
ogged by:	Ú	OHN	YOUNG		Date	: 161	2,08	Site Supervisor MARK ASHOVER	

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UDURING OUTARY HARDS IN CONTROLM IN CARTING MARTING IN THE INCOMPLEX INCOMPL	ROJECT		EG R	EI A DAM	NGINEE		GE CO-OF		OGY		INGINEERING		BOREHOLE I	\cap
Bill SO DESCRIPTION DESCRIPTION Bill	ORILL <i>dela</i> Core Barrei	11 Ioa 1 h	0, TR	ACK MOUNTED RIPLE	CONTRACTO		ERM	DTT	DRILL	INCLINATION			70,1,0	8
$F_{i} = \frac{1}{2} + \frac{1}{2$		d , Run		DE	SCRIPTION	osition,	WEATHERING	ESTIMATED Strength	SPACING	VISUAL LOG	TYPE Inclination, plana	rity, roughness,		R.Q.D.
 57. 57. 57. 57. 57. 70 m 57. 70 m 58. 70 m 59. 70 m 50. 100 m 50. 100 m 50. 100 m 51. 100 m <	ĩo ,40	110 29 818 PAR 1012		continues fine-med	as abor rum gri	Ser 3								%.24
53.00 Very course grained bland 53.00 53.00 Fine fine - madicing gri, pale greef. 54.00 54.00 54.00 54.00 55.00 Fine fine - madicing gri, pale greef. 54.00 54.00 55.00 50	- 	Ha But to					F _(S)	5/15		51.56	Холит, 60°, ріл РАПТІЛІЧ, 18°, р	enar, roy Ianar, roy	rh gls, Fe St.	14.
54.00 Jower To st. 54.00 Jower To st. 54.00 Jower To st. 54.00 Jower, 55, planar, rough, Fest. 54.00 Jower, 10, planar, rough, Fest. 55.00 Jower, 10, planar, rough, 10, pla				Very co <i>cen</i> — 53,68 m						- 72.38 73,05	Јоглят, 50°, р.Гал Вохлюц ВРЕРК	ian, very n	eugh	100
- 54.82 PARTING, 10, planar, rough, fe st.	F4•, 6B	Run 31		pare of	·					54.00 54.21 / 54.32 1 14.51	Jourt, 55°, pla PMRTINIC, 10°, p POIDT, 60°, plann Soucrat Sol Pough.	nar, rough lanar, rou ar rough, kensidad, kensidad,	, Fest. 196, Fest 60°, plana,	17

Co	himer	će						ITAL ENGINEERING BOREHOLE LOG	BOREHOLE No.	- -
ROJECT OCATION			RA DAM Y AREA 8	E		s 564 3067	I I	R.L. COLLAR 163,4-m DATUM 1440 BEARING	DDH)	1
RILL DEC	TA LOO	o, TRI	CONTRACTOR MCD			-			<u>Sheet 12 of 11</u> 70. 1. 08	
ORE BARRE		4Q		IUN	TAY	LOR			13.2.08	-
RILLING DA			ROCK SUBSTANCE			DECENT		ROCK MASS DEFECTS		-
	'n	ß	DESCRIPTION	ING	e ≖	DEFECT SPACING	LOG	DEFECT DESCRIPTION		
DEPTH (R.L.) Metres	Method Casing, Run Water	GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATE	(mm) 888828	VISUAL L	TYPE Inclination, planarity, roughness, coatings or infillings		H.U.U.
F5 FF1/8	1621		TUFFACEOUS SANDSTONE continues, fine to fine-medium gr., pale gray.					-FF, 60 DRILLING BREAK 55.10 2 1x's PAPTINUS, 15 and 20, p 57.18 Simeoth, Fast 57.18 3x's Joints, 49, planer, 55.40 4x's Joints, 49, planer, 55.40	1	
F6 F6,447	24 MM		– 56.45m META-SHALE lamination at 15°	F.(s)	<u>\</u>			56.45 PARTING, 15°, planar, voug	(100) (a	the area of
57,00				•)	15			16,80 Вохнис ВАЕАК , 16,95 Тошт, 60, ріаная, rough, Ге: 57.00 DRILLING BREAK 57.10 As above 57.20 Трінт, 60, ріаны, гоцун, бо		
<i>7</i> 8	HQ		•					- 57.76 BOXING BREAK F8.17 JOINT, 60°, planar, rough, 1	Fc/Mn st.	· · · · ·
9	15 MM		•					58.44 As above 58.54 Box/NG BREAK	٤	200/
,							1 1	59,155 JOINT, 45°, planas, rough, 59,72 As above	Fast.	
0,60			HOLE ENDS AT 60,00 m					60,00 Jowit, 60, planar, smoot		
marks:	Boy	(15]	NDS AT 58.54m BOX 16	END	5 A7	- 60.00)M	NEND OF HOLE Job / Report	No. GNZ	4





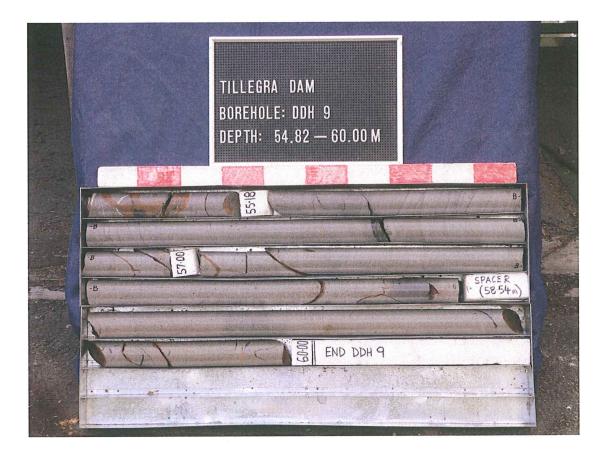












		9 zz. of	GEOTECHNICAL 8 ENGINEERING						BOREHOLE	No.	
PROJECT	omme TILL		za Dam	CO-0F	DINAT	S	R.L. COLLAR DATUM	227.4 m AHD	DDH /	7	9
LOCATION	LAN	1051	IP 2A		765 471	146 5443	BEARING Inclination		Sheet / of	- 1.	,
DRILL TRU	ICK M	DUNT	ED EDSON JODD CONTRACTOR AP.	S DA			MOLINATION	COMM	ENCED 14.8.0	8	SUBER
CORE BARR		10 7		1 51	me) 		COMPL ROCK MASS DEFECTS	ETED 17.8.0	8	
DRILLING D		-	ROCK SUBSTANCE			DEFECT				Τ	K
DEPTH RLL) Metres	Method Casing, Run	water GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colou7, composition, structure, hardness	WEATHERING	ESTIMATED Strength	SPACING (mm)	VISUAL LOG	DEFECT DESCRIPTION TYPE Inclination, planarity, roughr coatings or infillings	less,	R.O.D.	TESTS WP
Р <i>т</i>			NON CORE CORING COMMENCES NT 2.19m								
7.15 7.65	1 MPZ		TUFFACEOUS SANOSTONE, Lodies grained, brown f greybrown, poorly defined bedding at 10	mw	4		2.78	Your FRAGMENTS, rough, minor Fel M Numerous Jourts, Intersecting Parti	30 to To, with	1.52	
3.00	Q WIRELINE KUNJ		META-SHAPE, greybroicnf frey, thirty laminatedf laminated at 10°. Includes rare Tuppnepous SANDSTONE laminations.	mm/sm	1115/5			planar, rough, gan stained. Includes tomer, b with pale grey cl thuk, roottets.	endly Feltin	70	
7,347	KUNN	\mathbf{X}	CERE LOSS O. HOM					24'S PARTHERS IN	to lating Alle	1. 41	
7.68 7.11 3.95 4			TUPFACEOUS SANDSTONE, Madium grained, brown to 2.11m, then gray. 5 Asia	<u>MW</u> Fesj			- 7.89 ~ - 7.95 -	- 24'S PARTINGS, 16', Pough, minor B DRILLING BREAK			No TEST
14.3¢	tr WBY		Grey with grey prown tings 4.46 m Grey	SW Faj	5/12			0x.1NG BRENK PARTING, 10°, planar, ve Fa/Mn Staened	vy rough,	7,08	
- 4,99 - 17 Damarka			Corrie graved, grave with graves	5W			L4	<u> </u>	b /Report No. GN	31	<u></u>
Remarks: Logged by:	7.	4N	YOUNCI	Date	4- 9	1.08	Site Sune	visor DOUGLAS PAR		//	0

E = 376 576 BURNER A FED BEARING N GYZ 54443 INCLINATION VERTICAL NOLINATION VERTICAL Sheet Z of G sh BEARING N GYZ 54443 INCLINATION VERTICAL Sheet Z of G sh BEARING N GYZ 54443 INCLINATION VERTICAL Sheet Z of G sh DESCRIPTION ROCK SUBSTANCE ROCK MASS DEFECTS DEFECT DESCRIPTION SPACING SPA	UNDER PLACEDER JAHN E 276596 DATUM AHD DATUM A	Contraction of the second seco	mmer	źe							ENGINEERING	BOREHOLE N	o.	
RELIVENCE Instrument delistical Janes Contraction APS MULLING COMMENCE I/ Contract Proceedings Contraction APS MULLING COMMENCE I/ Contract Proceedings Contraction Contraction Contraction Contraction C	BLI FRANK INSTRUMENT AND STATES CONTRACTOR APS Delitions Distribution Distribution <thdistribution< th=""> Distribution</thdistribution<>	PROJECT				E	37(6 54	6	DATUM Bearin	AHD G	DDH/	/ l / (/
BRLING DATA ROCK SUBSTANCE ROCK MASS DEFECTS BRLING DATA DESCRIPTION Second State of the second sta	NUMB NOCK SUBSTANCE NOCK MASS DEFECTS NUMB DESCRIPTION OPECT TESCRIPTION OPECT TESCRIPTION Barling Barling DESCRIPTION OPECT TESCRIPTION DEFECT TESCRIPTION Barling Barling DESCRIPTION DEFECT TESCRIPTION DEFECT TESCRIPTION Barling Description State of the stat	ORILL FRANC	K MOG	WTED.	EDSON 2000 CONTRA	CTOR APS D.	RIL.	LIN	9	INCLINA	COMM	ENCED 14:8.01	8	sn
B B DESCRIPTION B DESCRIPTION DESCRIPTION <thdescription< th=""> DESCRIPION</thdescription<>	B B B CECRPTION B SAUNO S DEFECT DESCRIPTION B B COCK TYPE Contacts, first, data, comparison, the second s		~			E				1	ROCK MASS DEFECTS		-	
$\begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 $	7.97 The FRANCE LINE SAMASTERIA Control georgeneral grant of georgeneral georgeneral grant of georgeneral georgeneral grant of georgeneral georgeneral grant of georgeneral grant of georgene		d L. Run	IC F00			IENING	ete 1971	SPACING	500 T	TYPE			
$ \begin{bmatrix} 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5$	 Northersteints Sandstrand, gray and have the set of the s	depth (R.L.) Metre	Metho Casing Water	GRAPH	Grainsize, texture, colour, co structure, hardnes	omposition, s	WEALF	STREM	88888	VISUA	coatings or infillings	1855,	R.O.D.	
1.97 1.97	7.97 7.97 1.97		RIPLE RUN 4 CONT.		Continues, coaria gray with graybre 5.62m Very fine grained, 5.79 7.79 7.79 7.79 Coaris grained, gra graybrown tinge. Commenced, gra Fine grained, gra Commenced	gratered, ian tenge \$1 gray <u>Fr</u> ay with 51 t.	(3)			9.19 9.10 9.17 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1 9.1	BOSING BREAK D DRILLING BREAK T J 2x's PARTINGS 10 to 15; Fe fillin Solened. T Town, Jo, planar, rought C PARTING, 10; planar, Fe carbonate coafed.	gh, Felima st. Stained,		
9.96 9.97 9.97 9.97 9.97 9.97 9.97 9.97 9.97 9.97 9.97 9.97 105TR-SHALE, dark grey, 105TR-SHALE, dark grey,	A.90 398 998 998 11this fragments 11this fragments 11this fragments 12this fr	7.95 S	Run F Mag 1		- Includes clonaute	META-		5/45		-7.03 -7.03 -7.8 -7.8 -7.8 -9.1 - 	P BORING BREAK P PORING BREAK P PARTING 10°, planae, re MINER CARbondo COATRA - P DRILLIASE [HANDLING - - - - - - - - - - - - -	h, Te/Mn stamed ough, Fe stamed	16	
		997 9.77 9.77	RUN (O		Corades to very coas includes subangu lithue fragmente METR-SHALE, dash laminated et 10° TUFFACEDUS SANDS	grey, ToME,				\$.\$ \$.9	F] DRILLING BREAKS	0 ha se ce r, Jen 1 12 CV		

C	ommer	F Ind	GEOTECHNICAL 8 ENGINEERING						BOREHOLE N	0. ^ ^
PROJECT	TILLE	56 R	'A DAM P 2A	CO-OF E <i>3</i>	RDINATI 76 <i>54</i>	S	R.L. COLLAR DATUM BEARING INCLINATION	227.4 007 AHD	Sheet 3 of 4	1
DRILL TRE CORE BARR			RIPLE DRILLER VOHA	- /	DRIL Mo	ING N		COMMENCED		
DRILLING D			ROCK SUBSTANCE					ROCK MASS DEFECTS		Ĩ,
DEPTH (R.L.) Metres	Method Casing, Run Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED STRENGTH	DEFECT SPACING (mm) දිසිදිසි	VISUAL LOG	DEFECT DESCRIPTION TYPE Inclination, planarity, roughness, coatings or infillings		R.Q.D. Tests ////7
/// // // // // // // //	RUN 6 LONTINUED		METR-SHALE dask gran, sammaded, differbed bedding in upper part, otherwise log by 15.		× 5/45		- 10.472 - 10.472 - 11.70 - 11.67 - 11.87	BOXING BREAK BOXING BREAK RILLING BREAK PLANG BREAK Plandr, rough, mines Fe Carbonate coating at 11.8 DRILLING BREAK	3 / J	1.86
13	RUN T. PHAN TO TRIPLE		TUFFACEOUS SANDSTONE, Loarse grained, gray.		514/5			JOINT, 60°, planar, rough BOXING BREAK VOINT, 65°, planar, rou		100 // 1 nr
- 13,9] 14 14	RUM &						- <i>13, 91</i>	Voint, 65°, planar, roa stained, minor carbod coating. DRILLING BREAK BOXING BREAK	laté .	
Remarks:		Boy	3 ENDS AT 12.98M.		<u> </u>			Job /Re	port No. GN	<u>ц</u> 31А
Logged by:	Jo,		lounc	Date:	4.9	1.08	Site Super	VISON DOLIGLAS PARTN.		

Commer	će		IG G	E(OL	OGY	E	ITAL ENGINEERING BOREHOLE LOG	lo. 7/	9
project <i>Tille</i> .ocation <i>Law</i>			E	37(INATE 6 <i>55</i> 42.57			R.L. COLLAR 227.4m DATUM AHD BEARING — NCLINATION VERTICAL Sheet 4 of	6 si	ih ih
DRILL <i>TRUCE MOUN</i> CORE BARRELL <i>A</i>			IPS L N S.					COMMENCED 14.8.08 COMPLETED 25.8.0		
DRILLING DATA	90	DESCRIPTION	UNI		· 프	DEFECT SPACING (mm)	90	ROCK MASS DEFECTS DEFECT DESCRIPTION		1011
DEPTH (R.L.) METRES Method Casing, Run Wator	GRAPHIC	ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	LOTILAT	STRENG	(mm) ବ୍ଲୁଚ୍ଚିଚ୍ଲିକ୍ଷର	VISUAL 1	TYPE Inclination, planarity, roughness, coatings or infillings	R.Q.D.	
16.00 16.00 16.09 16.09 16.09 16.09 17.07 17 17 17 18.00		ILIFFREEOLIS SANDSTONE continues, coasse grau grey. Includes occasional derboinate vecus 1 to 5u thuk (parallel to beddu thuk (parallel to beddu - 14.95m TUFFREEOLIS SANDSTONE contances as above - 17.65m Includes conneck META-SHA Losis to Somm, subangula to subrowned. - 18.00 m TUFFREEOLIS SANDSTONE continues as above, ebarse graved, grey Includes rare carbonate vecus Imm thick, IF and	19 ed, 19), 19), 15 F(s		5/15			15. 10 JOINT, planar, rough, fe stamed, minor carbonate contrang. 15. 47 15. 47 15. 63 15. 82 BOXING BREAK 16. 00 DRILLING BREAK 16. 00 DRILLING BREAK 16. 90 16. 98 16. 98 16. 98 16. 98 17. 72 DRILLING BREAK 17. 72 DRILLING BREAK 17. 74 DRILLING BREAK 17. 97 Joseph Fe st., 17. 97 Joseph PARTINGS, planar, rough, Fe st., 17. 97 Joseph PARTINGS, planar, rough, Te st. 18. 10 As above 18. 10 PARTING, 15°, planar, rough, Te st.	1.000	
19,00 OI (VII)								18.85 BOXING BREAK 14.00 DRILLING BREAK 14.73 BOXING BREAK 19.73 Probable DRILLING BREAK	1001	

Contraction (mmerc	é	GEOTECHNICAL ENGINEERIN						BOREHOLE LOG	
PROJECT			9 DATH			DINATI 76 9			R.L. COLLAR 727,44 M DATUM AND DOH	9
LOCATION		DSLIP	·			42			NCLINATION VERTICAL Sheet 5 of 6	Shee
DRILL TRUCK				P5 7		R II I		16	COMMENCED 14.8.68	
CORE BARRE		Q TAIVL	CE DRILLER ROCK SUBSTANCE	TOHN	2	11111) <i>N</i>		COMPLETED 25, 2, 02 Rock Mass defects	Т
	un	500 FOG	DESCRIPTION		DQ	 ⊖ ∓	I SPA	ECT CING	DEFECT DESCRIPTION	WPT
DEPTH (R.L.) Metres	Method Casing, F Water		ROCK TYPE Grainsize, texture, colour, composition, structure, hardness		WEATHERING	ESTIMATE STRENGT	5000 2000	888	R Inclination, planarity, roughness, coatings or infillings	TECTC
20 2] 2], <i>49</i> 7	RUNIO CONTINUED	CL I	FFACEOUS SAMDSTONSE Intraves, coarse grun rey.			5/45			20.00 Th's possible Jourse 45; planar 20.10 rough, carbonate coated (may be drilling induced) 10.34 Probable DRNLING BREAK 20.43 JOINT, DO, planar, rough, Fe stained, carbonate coated. 71.10 71.10 21.17 Fe stained. 21.78 Boxinsc BREAK 21.77 JOINT, 60; planar, rough, fe stained.	<i>III</i> 1
, 1, 44 72, 06 72, 06 72, 60 72,	Ha 7/2	G. S. FROM	21.9Fm rading to very coarse radinal, conglomeratic Includes subangular Uprounded Interestor only defended backder the to 15th of 24.60 m outse ground.	lo 15					14:00 DRILLING BREAK 14:00 DRILLING BREAK 14:00 DRILLING BREAK 14:00 DRILLING BREAK 14:00 DRILLING BREAK 14:17 DRILLING BREAK 14:19 DRILLING BREAK 14:19 DRILLING BREAK 14:19 DRILLING BREAK 14:19 DRILLING BREAK 14:19 DRILLING BREAK 14:19 DRILLING BREAK	
Remarks:		Box 6	ENDS AT 27, 90 m.	I			LĘI	ل_ا_أ_	Job /Report No. GN 3	IA
ogged by:	TAU	V YOUR	116-	Da	ate:	4.9	7:0	8	Site Supervisor DOUGLAS PARTNERS	

~	ommer	at	GEOTECHNICAL ENGINEERING								Ì	BOREHOLE	No.
	TILLE	GL,	A DAM	СО-О Е	RDINAT	ES 55	-6		R.L. COLLAR Datum Bearing	777, 4ms AUD		MH	19
				<u>n (</u> 35 <i>D</i> .	- 42 RILL				INCLINATION	VERTICAL	COMMENCED	Sheet 6 of 14.8.08	
CORE BAR	RELL 6		TRIPLE DRILLER JOHN				•					14.8.0	8
DRILLING [DATA		ROCK SUBSTANCE		1	$\frac{1}{1}$	DEFEC	, T	F I	IOCK MASS DEFECTS			
DEPTH (R.L.) Metres	Method Casing, Run Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED Strength	IS	PACIN	IG L		DEFECT DESCR TYPE Inclination, planarit coatings or in	y, roughness, fillings		R.Q.D. TESTS M/P
29.00 29.89 25.90 26 26 26 26	RIT N RUN IO CONTINUED		TUPPPLEOUS SANDSTONE Continue grades to very coarse, Complomaratu from 24,00 m. Subrounded littic clasts fo 12 mm. - 15.50 Coarse grace.od	55, F(s)	3/1% · · · ·				29.36 J	RILLING BREAM	K.		7017 117.001
27 29 29 30			HOLE ENDS AT 26.100										
Remarks:												t No. GN 2	S/A
Logged by:	VOHN	Ve	SUM	Date:	4.9	1. 6	18		Site Supervis	SOT DOUGLAS	PARTNE	25	

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	TILLEGRA DAM LANDSLIP 2A BOREHOLE DDH 29 DEPTH 5.95-12.98M
	En-
1 and	





PROJECT	LAN		RA DAM	, 	_ ~					BOREHOLE LOG			
DRILL <i>TRuc</i> Core Barreli			KH DWW	СО-С Е 2		IATES				R.L. COLLAR 2-21.6m DATUM AHD	DDH	14	/)[
CORE BARREL	CK. M	VDSL	1P 2A			29				BEARING INCLINATION VERTICAL	Sheet /	of E	<u></u>
			ED EDSON BOOD CONTRACTOR AI				'G			СОММ			
		Q TR	<u>IPLE</u> DRILLER VOHN ROCK SUBSTANCE	1 3/11	101	<u>~</u>				COMPL ROCK MASS DEFECTS	ETED 28,8	, 08	Т
depth (R.L.) Metres	Method Casing, Run Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	NEATHERING	STIMATED	STRENGTH	SPA	ECT CIN(im)	3 L.	DEFECT DESCRIPTION	1ess,		R.Q.D.
Dm	∑ S S S S	: 5	structure, naroness		<u>m</u>					coatings or infillings			=
1			NON CORE										
, 55 1,75 208 15	THING REAL		CORNEL COMMENCES AT 1. TUPFACEOUS SANDSTONE, Darse : grached, greep	<u> 5и</u>						1.74 FOINT PARTING FRA 1.74 Plande, Very roug 1.87 JOINT, curved, ru Fel Man station 2.05 2.15 JOINT, 90, undul rough, Fe /Min sta	rieg ba,		100 22X
	6° UNI 25 - 159 AN			F (<)	<u> </u>	2/12				2.60 2.93 - 28's parallel Four rough, Fe (Min Star car Bossathe Coart	¹⁵ , 65°, plan. med, attere ng-		50%
- 55 - 80 + 	J. c.t.		-b, FRM GREYBROWN / brown- CONGLODERATE SHUPSTOTLE Subrounded Intencelaste for In medium greenter matri brown / greenter con.	Ми ж.	11/11	W/111>				7,14 Johns, 65 to 50°, auron 3,65 Fo st., claycy fill 6m. 7,80 IF, planar, rough, 7,99 Jonst, 60°, planar, ro alfered catboute co. 4,19 Probable Jonst, 60°, rough, Fe stacmed	FRAGMENT Te stached ugh, Te sti oten	,	10%
•	R Ale		CORELOSS 0-9000 (WILDER Sandy gras recovery)	rel									
marks:		<u> </u>								<u> </u>	ob / Report No. 🧹	3N	$\frac{1}{2}$

Distance			: af	GEOTECHNICAL ENGINEERINO					IGINEERING DLE LOG	BOREHOLE No.	
NUMBER NUMBER TAULATION TAULATION <thtaulation< th=""> <thtaulation< th=""> TAULATION<th>ROJECT</th><th>TILLE</th><th>EGR</th><th>A DAM</th><th>CO-OF E 3</th><th>ndinati 76°9</th><th>is 10</th><th>R.L. COLLAR DATUM BEARING</th><th>221,6m AHP</th><th>ADH S</th><th>C</th></thtaulation<></thtaulation<>	ROJECT	TILLE	EGR	A DAM	CO-OF E 3	ndinati 76°9	is 10	R.L. COLLAR DATUM BEARING	221,6m AHP	ADH S	C
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B B				ROCK SUBSTANCE		1		、 RO	CK MASS DEFECTS		4
2.06 1.07 Junt / Martin Statistics 8.07 Chickmann Statistics 1.07 8.07 Chickmann Statistics	depth . (r.l.) Metres	Method Casing, Run Water		ROCK TYPE	WEATHERING	ESTIMATED Strength	SPACING	VISUAL LOG	TYPE Inclination, planarity, roughness,	u co	<u>N.U.U.</u>
1,80 Reduce grained.	5. 15 5. 15 5. 15 7. 29 7. 20 7. 20	KuN7 RUN6 HOTRE RUN6 C		CORE LOSS CONTINUES CONGLOMERATIC SAMPSTANE Contentions TUFFACEOUS SAMPSTANE, madium / coarse gramed, graybrow or to 5. Usin, the gray brow or to 5. Usin, the gray of the graves, filler and the formation of the META-SHALE dark gray, filler gramed, frading to Medium with depth, gray. -7.1800 Coarse grained, includes elongate META-SHALE charts -7.1800 Coarse grained, includes elongate META-SHALE charts -7.1800 Coarse grained, includes elongate META-SHALE charts -7.1800 Coarse grained, includes elongate META-SHALE charts -7.1900 META-SHALE, dk grey, faminat -1.1200 TufFACEOUS SANDSTONE coarse grained, gray, with elongate META-SHALE class, -7.900 TufFACEOUS SANDSTONE coarse grained, gray, with elongate META-SHALE class, -7.900 TufFACEOUS SANDSTONE coarse grained, gray, with elongate META-SHALE class, -7.900 Tuff Paceous SANDSTONE coarse grained, gray, with elongate META-SHALE class, -7.900 Tuff Paceous SANDSTONE coarse grained, gray, with elongate META-SHALE class, -7.900	F(s)	R 5		F. 45 F. 45 F. 20 F.	Joint / PARTING FRAGMEN blande, rough, Foldin sh wit, 65, planar, rough, Fel Matting, 10, planar, rough Tel Ma St onut, 60°, planar, rough core, very rough, Fellinh St's PARTINGS planar, rough refun Stacked. 10° THE, 10°, planar, rough, Fe WT, 55°, planar, smooth, Te Felmin Stacked OARTING ALG, 81, 10°, planar rough, Felmin St Elim Stacked OARTING ALG, 81, 10°, planar rough, Felmin St bablo DRILLING FRAGMENT lanar, rough, Fe st (ma lander, rough, Fe st (ma lander, rough, Fe st (ma lander, For stack VIIIG BREAK SSIBLE PARTING, 15°, plana SSIBLE PARTING, 15°, planar SSIBLE PARTING FROMENTS	acmed. In stained ight, Fe fmn st. Inforct stained. Stained. N. Pough, St IMN St. V. Pough, Fe fmn St. Fe fmn St. Fe fmn St. St. 10 to 50°, To 10°, St. To 70°, St. St. St. St. St. St. St. St.	
	1,80 0	8 mn		Mectuum grain oct.				1 = 9.11 DR.		ugh, Fest.	

PROJECT TILLEC, DR DATT CO-ORDINATES E 776470 RL COLLAR DATUM RL COLLAR HAD BERRING RL COLLAR HAD BERRING DITL DITL LOCATION LAM DSLIP ZA E 776470 DATUM AHD BERRING DITL DITL AHD BERRING DITL COMMENCED 75.8.08 CORE BAREL HO TROPHE BERRING DITLER VOIN STITUTE BILLER VOIN STITUTE BILLER COMMENCED 75.8.08 DITLING DATA ROCK SUBSTANCE DITLER VOIN STITUTE STITUTE BILLER VOIN STITUTE BILLER VOIN STITUTE BILLER VOIN STITUTE BILLER DITLER COMMENCED 75.8.08 DITLING DATA ROCK SUBSTANCE BILLER VOIN STITUTE BILLER STITUTE BILLER COMMENCED TO	C	M	že -	GEOTECHN ENGINEE						ENTAL ENGINE BOREHOLE		BOR	EHOLE N).).) /
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ODE HARL (H0 TRIPLE DULUE VOLV STATUS DOULTED 26.9.08 DRUMO MAR ROX SUBSTACE BOX MOS DEFORM										INCLINATION VERTIN				6 Shee
Statute Statute Description Statute Description Image: Statute Statute Description Statute Description	CORE BARR	ELL <i>H</i> é		IPLE DRILLER		Sim	1071			DOCK MACC		ETED 28.	8,08	
Bit	DRILLING D	ATA		ROCK SUBSTANCE				DEFEC	л					12
100 100 <th></th> <th>Run</th> <th></th> <th></th> <th></th> <th>RING</th> <th></th> <th>SPACII (mm</th> <th>NG)</th> <th></th> <th></th> <th></th> <th></th> <th>M</th>		Run				RING		SPACII (mm	NG)					M
11 11 <td< td=""><td></td><td>Method Casing, Water</td><td>GRAPHIC</td><td>ROCK TYPE Grainsize, texture, colour, comp structure, hardness</td><td>osition,</td><td>WEATHE</td><td>ESTIMAT</td><td>888</td><td>58 7</td><td>Inclina KISIA CC</td><td>tion, planarity, rough</td><td>ness,</td><td></td><td>R.O.D. TESTS</td></td<>		Method Casing, Water	GRAPHIC	ROCK TYPE Grainsize, texture, colour, comp structure, hardness	osition,	WEATHE	ESTIMAT	888	58 7	Inclina KISIA CC	tion, planarity, rough	ness,		R.O.D. TESTS
14:40 14:30 15 14:30 16 14:30 Remarks: Box 3 ENDS AT 12:55m	11 11.40 11.47 11.82 12.70 12.76 13 14 14	TRIPLE PUN &		- 14-53 Eincludes clongete Turffice of the start III - 11-82 Tuff, s/s continues Jiamed, grey-Inc META-SHALE lamin at 10° - plus clongete Turffaceous SANDS medium gracued, gr	to	F(5)	5/15			10,95 Joint, 9 Probable 11.53 Veny re 11.65 BOXING A 11.90 Probable 12.55 DRILLING 13.53 BOXING A 13.53 BOXING A 14.10 DRILLING 14.51 BOXING 14.51 DRILLING	Io, planar, PRETING, J Jugh, Foldm BREAK DRILLING B Planar, row BREAK BREAK G BREAK BREAK	10, pland 54, REAK gh, To sta BREAK BREAK	ts med	0/- 0/- 1/- 00/- 1/
Remarks: BOX 3 ENDS AT 12.55m Job/Report No. GN 31A										e /4,\$3 -				
	Remarks:				4m	1.		12					GN.	31A

PROJECT		<u>aacono - 1</u>					BOREHOLE LOG] /
DRILL TAU	LANL	GRI	A DAM		IDINATE 764	S	R.L. COLLAR 27.1, 6m DATUM AHD DDH	
		SLIF	P 2A			F7 Z 8	BEARING INCLINATION VERTICAL Shoot 4 of	6 She
COKE BARKEI			TO FOSON 3060 CONTRACTOR APS RIPLE DRILLER VOHN		RILLI		COMMENCED 25, 8, 08 COMPLETED 28, 8, 08	
DRILLING DA			ROCK SUBSTANCE	0,	1110		ROCK MASS DEFECTS	
depth (RL) Metres	<u>Method</u> Casing, Run Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	ESTIMATED Strength	DEFECT SPACING (mm)	DEFECT DESCRIPTION TYPE Inclination, planarity, roughness, coatings or infillings	R.0.D.
15 5,20	1K9 1		TUFFACEOUS SANDSTONE, mechum graenes, gray.	E.S	5/15		15.20 DRILLING BREAK 15.29 - Numerous breaks, probably 15.43 - Stilling induced 14.54 DRILLING POREAK. 15.23 Probable DRILLING BREAK 15.90 PARTING, F, planar, lough, MILLON Fest,	
16. 57 17	HO TRIPLE RUN 10						16.75 BOXING BREAK 16.77 DRILLING BREAK, 16.97 DRILLING BREAK (along carbomate Jack at 15 7 17.18 JOINT, FF, planar, rough, Felmin st.	01 1
17.62			- 17,62 M Cost de / Very coasse gracened, Includes Subsocunded Interio				17,45 AC above 17,45 AC above 18.10 BOXING BRETTER.	1.001
19	Kan V		clasts to 10 mm dia				- 19.08 BOXING BREAK	
1 <i>9.55</i>	Kun 17						19.20 DRILLING BREAK - 19.75 DRILLING BREAK - 19.73 DRILLING BREAK - 19.75 DRILLING BREAK - 19.76: BOXING BREAK	
emarks:		B	ox 4 ENDS AT 16. tom			ENDS. 9.08	AT 19,95m Job /Report No. GN31 Site Supervisor DOLIGIAS PARTNERS	IA

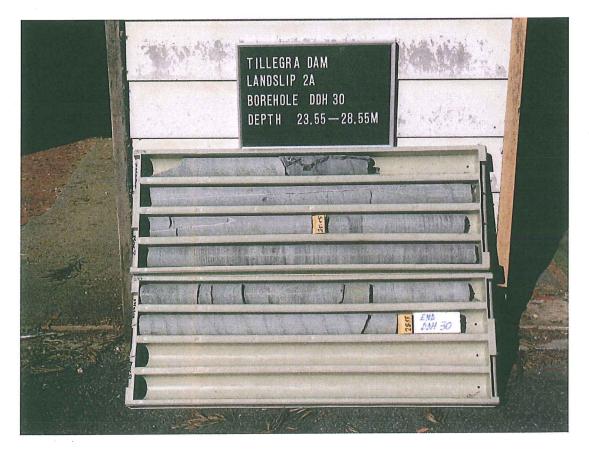
Co	mmer	źe –						ITAL ENGINEERING)	BOREHOLE	No.	\cap
PROJECT			A DAM SLIP 2A	E	ndinati 3769	-70	C E	R.L COLLAR 2-7-7.6 m DATUM AHD BEARING		DDH -	Ś	
			EDEON 3000 CONTRACTOR AP			5528 .ING		NCLINATION VERTICAL	COMMENCED	Sheet 5 of Z5, 8, 08		Shee
CORE BARRE	-				mor				COMPLETED	28.8.0		
DRILLING DA			ROCK SUBSTANCE	<u> </u>	1	DEFEAT	1.1	ROCK MASS DEFECTS				L
depth (r.l.) Metres	<u>Method</u> Casing, Run Water	GRAPHIC LOG	DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness	WEATHERING	TIMATED Rength	DEFECT SPACING (mm)	SUAL LOG	DEFECT DESCI TYPE Inclination, planari	ty, roughness,		R.Q.D.	тесте /// Р.7
Para Para Para Para Para Para Para Para	Mer の <i>MT WULE D</i> Case Wa	080	The FFACEOUS SANDSTONE Continues as above, continues as above, conselvery coarsed graced.	F ₅			NIS	coatings or in 20,40 Jonot, 67°, pla carbonate felt 20.92 Boxinc BREPH	nor, rougi 3mm -	b, Fest,	R(T
71.78 71.28 72 77.10 77.10 77.10 77.10 77.10 77.10 77.10	HO TRIPLE KUN IL G		11.78m META-SHALE de gray, Idminated at 10" 71.29m TUFFACEOUS SANDSTONE, 27.10 time gr, gray Maducon graceset, carbonate versing Limm thick Commonity at 70 META-SHATE, de gray, bodding 10"	F	51/5			11.72 BOXING BREA 12.40 - Numerous 12.97 - HAHDLING P	DR1111144 5RE4465		7.001	*
723	Ruis FR		IUFFACEAUS SANDSTONE, moduum to coarre, grained with depth.					17.12 JOINT FO, Ph MINOY CANDON MINOY CANDON 17, FF BOXINC PSRE		n, inte V		(1 m
73.84 24 74:10			- 12.84 META-SHALE, dark grey, thinky beddeel - 24.10 THFFREECCIS SANDSTORE, CRARGE/VERY LOARSE grained, gley.					Voust (pour Induced) to cose as carbohate thuck i	cbly drill , 85, sch s, planar fell 1 to 7	ing 6 parallel 1 source b 2 source	7, 901	
ZF Demoder		:::	Box 6 ENDS AT 23	. Gler]	F V	Joh /Ren	ort No. GN	<u> </u>	L A
Remarks:			, BOX BENDS AT TH			. 1. 08		Site Supervisor DOUGLAS	PARTNE			7

C	mmer	đ	,							BOREHOLE LOG
PROJECT	ÎIL	LEG	RA DAM IP ZA	C	10-01 2	101NAT1 376 5 542	ES 1-7-	0		R.L. COLLAR 221.6 m DATUM AHD BEARING INCLINATION VERTICAL Sheet 6 of 6 Sh
CORE BARRE	IL H		RIPLE DRILLER	APS JOH						COMMENCED 25, 8, 08 COMPLETED 28, 8, 08 ROCK MASS DEFECTS
DRILLING DA	Method Casing, Run Water	GRAPHIC LOG	ROCK SUBSTANCE DESCRIPTION ROCK TYPE Grainsize, texture, colour, composition, structure, hardness		WEATHERING	ESTIMATED Strength	SP SP	EFECT ACIN mm)	GĹ	DEFECT DESCRIPTION
24 17,84			TUFFACEOUS SANDSTONE Confinues, coansel ver coarse grained, greg	чү Ү.		,				25.95 BOXING BREAK
-26 -27	HQ TRIPLE				F	SN/S				16.90 BOXING BREAK 27.03 17.07 27.03 17.07 14.00 14.
28										27.53 Possible PARTIAN, 5°, planar, rough, carbonate codied. 27.80 Roxins BREAK
28. <i>FF</i> 79		·····	Hole ENDS AT 28.46m	,						7.9.44 HANDLING DR/LLING BREAK
30 Remarks: Logged by:	~		os AT SUNG			EN AS 12,			<u>6,</u>	Frm-END OF HOLE Job / Report No. GN 21A Site Supervisor DOLIGLAS PARTNERS









Appendix G

Summary of Water Pressure Test Results – DDH1 to DDH8

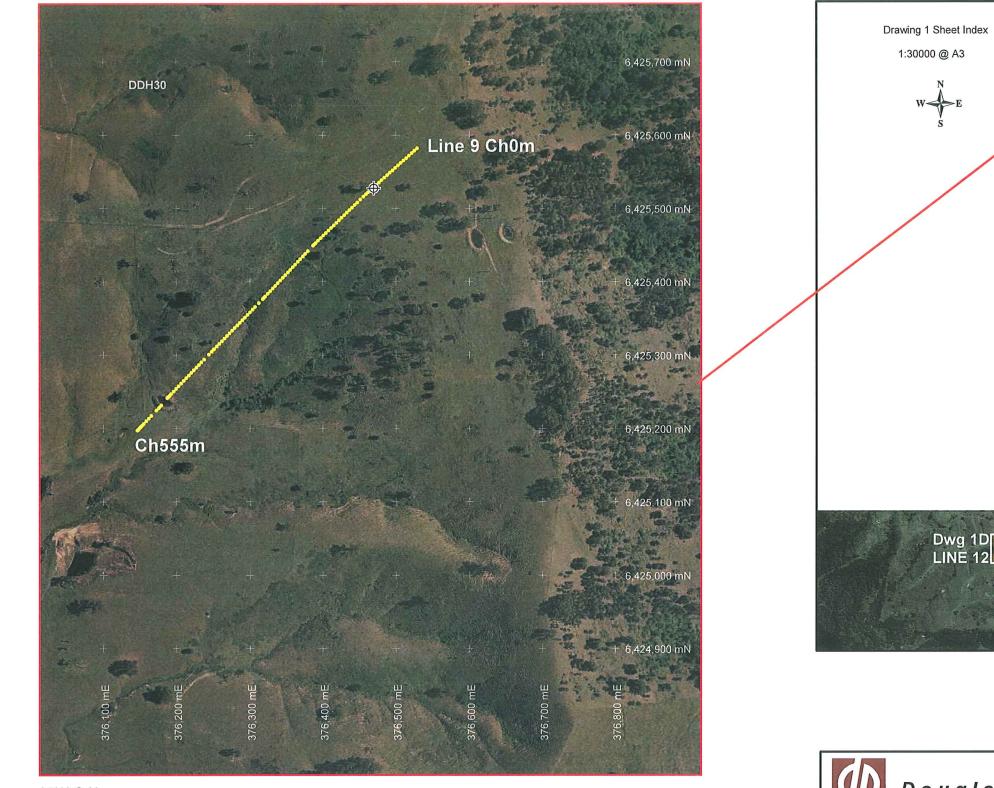
Comments		Close to wide defect spacing in test section. Fe-stained.	Very close to generally moderately wide defect spacing. Fe and Fe/Mn-stained. Minor clay coating on joint at 13.25 to 13.40m.	Very close (in meta-shale) to generally moderately wide defect spacing. Fe-stained, occasionally Fe/Mn-stained. Rare (minor) carbonate coatings. Sandy clay fill in partings from 19.85 to 20.05m, minor clay coating on parting at 20.17m	Very close defect spacing (in meta-shale) to wide defect spacing. Fe-stained.	Close to generally moderately wide/wide defect spacing. Fe-stained.	Close to generally moderately wide/wide defect spacing. Fe-stained, heavily in several joints from 33.50 to 33.93m. Several joints/parting carbonate coated (34.15 to 34.40, 35.05, 35.44 36.62 and 36.80 to 37.09m).	Moderately wide to wide defect spacing. Fe-stained to 39.75m (then fresh). Carbonate coated at 39.23, 40.20, 40.60 and 40.92m.	Moderately wide to wide defect spacing. Minor Fe-staining from 42.70m. Carbonate coating on joints at 42.51, 42.70 to 42.88, 43.37, and 44.40m.	Moderately wide to wide defect spacing. Fe-stained. Carbonate coated joints at 44.40 and 46.28m.	Moderately wide to generally wide defect spacing. Fe-stained	Generally wide defect spacing. Fe-stained. Carbonate coated joint at 56.10m	Very close to wide defect spacing. Fe and Fe/Mn-stained.	Close to wide defect spacing. Fe-stained. Numerous carbonated coated joints.	Very close to moderately wide defect spacing. Fe and Fe/Mn-stained.	Moderately wide to wide defect spacing. Fe-stained.	Sheared zone from 21.30 to 22.68m (extremely close/very close defect spacing). Otherwise wide. Fe-stained.	Generally close to wide defect spacing. Fe-stained.	Generally moderately wide to wide defect spacing. Fragmented core recovery from 29.21 to 29.33m. Fe-stained.	Very close to moderately wide defect spacing. Crushed zone from 31.72 to 31.76m and again at 32.07m (10mm thick). Fe-stained. Clay fill 10mm thick in parting at 30.26m	Very close to moderately wide defect spacing. Fe-stained.	Generally moderately wide to Wide defect spacing. Very close defects from 36.02 to 36.42m (partines with joint). Fe-stained to 37m.	Very close to very wide defect spacing. Often carbonate coated.
Flow Type		Laminar	Laminar	Washout	Washout	NA	Turbulent	Turbulent	Laminar	Washout	Laminar	Laminar	Laminar	Laminar	Washout (Turbulent Flow)	Washout (Turbulent Flow)	Turbulent	Washout (Turbulent Flow)	NA	Slight Washout	Turbulent	Turbulent	Turbulent
Lugeon Value	(NL)	<1		14	2.5	0	80	5	$\overline{\nabla}$	30		~		₽	15	10	>100	38	>100	8	L	1.5	1.5
Test	Length(m)	3.00	6.50	6.83	3.50	6.50	6.50	3.50	3.50	6.50	3.50	3.00	5.00	6.50	3.40	3.50	3.50	3.50	3.22	3.00	3.53	3.53	3.55
(m)	T_0	11.70	17.70	24.03	26.70	32.70	38.70	41.70	44.70	50.70	53.70	56.50	8.83	14.73	17.73	20.80	23.80	26.80	29.52	32.83	35.83	38.83	41.85
Depth (m)	From	8.70	11.20	17.20	23.20	26.20	32.20	38.20	41.20	44.20	50.20	53.50	3.83	8.33	14.33	17.30	20.30	23.30	26.30	29.83	32.30	35.30	38.30
Borehole	°N N			(уби	llic		nuənnu 1 HOO		tdgi	A)					Г)	νΩ τι	ເອເມາ ເອ 3	nq¥ H U		Я P!	W)	

Comments		Extremely close to moderately wide defect spacing. Fe and Fe/Mn-stained.	Very close to moderately wide defect spacing. Fe and Fe/Mn-stained.	Very close to wide defect spacing. Fe and Fe/Mn-stained.	Close to wide defect spacing. Fe and Fe/Mn-stained. Partly carbonate coated joint from 15.80 to 16.08m.	Generally moderately wide to wide defect spacing. Very closely spaced joint fragments from 19.77 to 20.00m. Fe and Fe/Mn-stained. Partly carbonate coated joint from 15.80 to 16.08m	t spacing. Fe-stained.	Very close to moderately wide defect spacing, ranging to wide from 32.56m. Fe-stained, occasionally Fe/Mn-stained, to 32.75m. Carbonate vein 12mm thick at 30.24m.	Wide to generally very wide defect spacing. Unstained.	Very close to moderately wide/wide defect spacing. Fe-stained.	Generally close to moderately wide defect spacing. Fe stained, rarely Fe/Mn-stained.	Close to moderately wide/wide defect spacing. Fe-stained to 11.55m. Common (minor) carbonate coating. ranging to fill 5mm thick in partings at 13.99 and 14.02m.	Close to moderately wide/wide defect spacing. Defects generally carbonate coated.	Very close to close defect spacing. Includes joint at 90° to \emptyset from 18.66 to 20.10m. Defects carbonate coated.	Very close to moderately wide defect spacing. Includes an interval of very closely spaced joint fragments from 21.70 to 23.46m. Carbonate coated.	Moderately wide to very wide defect spacing. Minor carbonate coatings.	Very close to wide defect spacing. Carbonate coated.	Close to wide defect spacing. Carbonate coated, ranging to fill 4mm thick in joint fragments from 35.10 to 35.23m.
		Extremely close to mode	Very close to moderately	Very close to wide defec	Close to wide defect space 15.80 to 16.08m.	Generally moderately wi from 19.77 to 20.00m. F 16.08m	Wide to very wide defect spacing. Fe-stained.	Very close to moderately occasionally Fe/Mn-stair	Wide to generally very w	Very close to moderately	Generally close to moder	Close to moderately wid carbonate coating, rangir	Close to moderately wid	Very close to close defect Defects carbonate coated.	Very close to moderately joint fragments from 21.	Moderately wide to very	Very close to wide defec	Close to wide defect spacing. Ca fragments from 35.10 to 35.23m.
Flow Type		Laminar	Laminar	Turbulent	Dilation	Laminar	NA	Laminar	Laminar	Laminar	Laminar	Laminar	Turbulent	Laminar	Turbulent	Laminar	Turbulent	Laminar
Lugeon Value	(UL)	12	13	11	4		0	V	<1	1.5	32	24	44	12	25	<1	12	4
Test	Length(m)	3.40	3.40	3.40	3.40	6.40	6.40	6.40	6.40	3.02	4.03	3.95	3.40	3.40	3.40	3.00	5.30	4.10
h (m)	To	7.20	10.20	13.20	16.20	22.20	28.20	34.20	40.20	6.82	10.83	14.75	17.75	20.75	23.75	26.75	31.65	35.75
Depth (m)	From	3.80	6.80	9.80	12.80	15.80	21.80	27.80	33.80	3.80	6.80	10.80	14.35	17.35	20.35	23.75	26.35	31.65
Borehole	No		u	ois	iyer	DDH T misə Botta	цse	цU)		s	S/N	l tuə		(90) NGA GHC	ffəJ	GI.	MO	(Fr

To Lei	Lugeon Value	Flow Type	Comments
	(UL)	r	
3.80 8.18 4.38	s.	Washout	Extremely close to moderately wide defect spacing. Shear zone associated with jointing from 7.41 to 8.13m. Core loss from 8.13 to 8.18m. Fe and Fe/Mn-stained. Occasional clay coatings.
8.10 12.50 4.40	1.8	Laminar	Close to moderately wide defect spacing. Core loss from 8.13 to 8.18m. Fc/Mn-stained. Minor carbonate coating associated with joint between 9.04 and 9.47m.
. 12.45 16.23 3.78	2.5	Laminar	Generally very close to moderately wide defect spacing. Fe and Fe/Mn-stained.
15.75 19.23	0	NA	Close to wide defect spacing. Fe-Stained.
18.75	0	NA	Generally wide to very wide defect spacing. Fe-stained.
5P 24.75 28.23	>100	NA	Generally wide defect spacing. Complete drilling water loss at 27.70m at Fe/Mn-stained joint. Fe and Fe/Mn-stained.
DH E 28.23 31.23 3.00	>100	NA	Very close to moderately wide defect spacing. Fragmented joint from 30.60 to 30.71m. Core loss from 30.71 to 30.76m. Fe-stained.
	~	Laminar	Generally moderately wide to very wide defect spacing. Fe-stained. Carbonate fill 1mm thick in joint at 34.10m.
et 33.75 37.23 3.48	60	Turbulent	Very close to wide defect spacing. Minor shear zone associated with bedding from 37.12 to 37.28m. Fe-stained.
± 37.23 40.23 3.00	32	Turbulent	Moderately wide to wide defect spacing. Fe-stained.
43.23	54	Washout (Turbulent Flow)	Extremely close to moderately wide defect spacing. Shear zone associated with bedding from 41.91 to 42.40m, includes clayey crushed zones. Fe-stained.
42.75 46.23 3.48	50	Washout (Turbulent Flow)	Close to moderately wide defect spacing. Fe-stained to 45.40m. Carbonate coating on defects at 44.45, 45.76 and 45.87m.
45 75 40 73 3 48		Laminar	Very close to wide defect spacing. Common carbonate coatings.

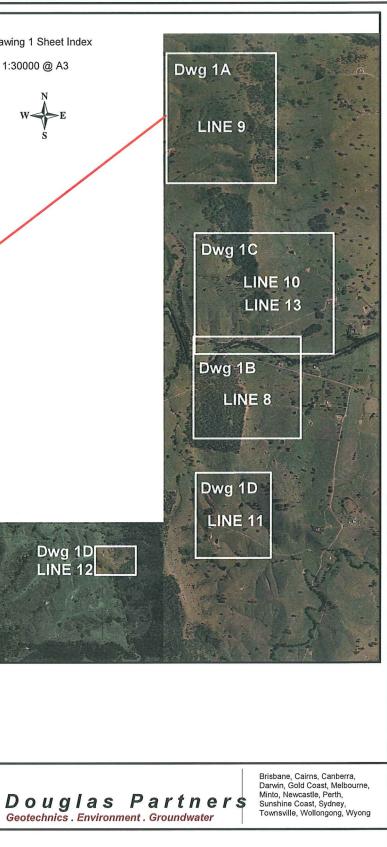
Appendix H

Seismic Refraction Survey – Landslip 2A



1:5000 @ A3

LEGEND Grid: GDA94 / MGA94 (Zone 56) ↓ Dept. of Commerce Borehole Geophone location along seismic line



SEISMIC LINE 9 (SLIP ZONE 2A) AND TEST BORE LOCATIONS

TITLE:

DRAWN BY: JL

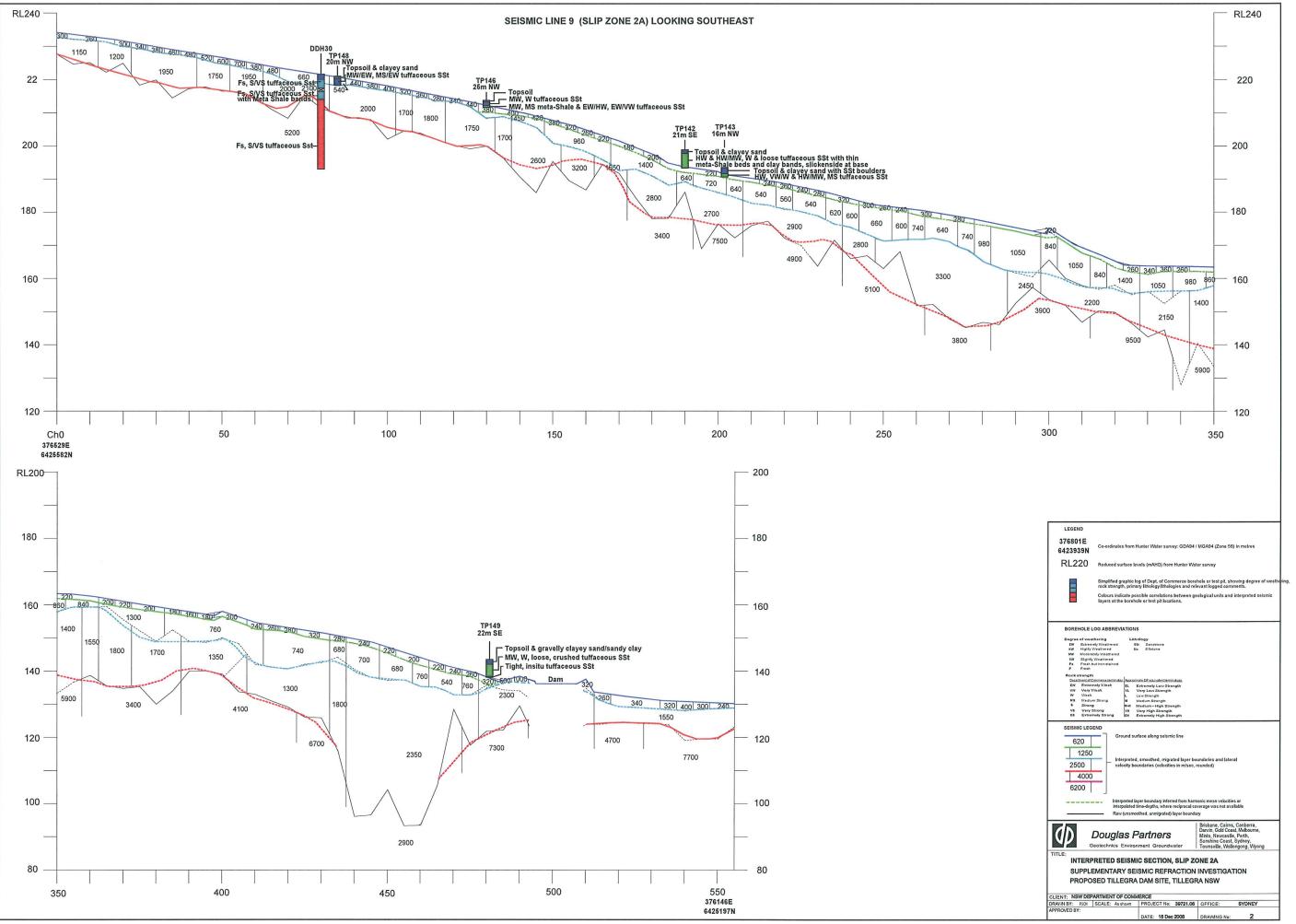
APPROVED BY:

CLIENT: NSW Department of Commerce

SCALE: As Shown

SUPPLEMENTARY SEISMIC REFRACTION INVESTIGATION PROPOSED TILLEGRA DAM SITE TILLEGRA, NSW

PROJECT No: 39721.06	OFFICE: SYDNEY
DATE: 18 December 2008	DRAWING No: 1A



Appendix I

Laboratory Test Results

Geotechnical Centre

Unit W4K, 42 Wattle St, ULTIMO, NSW 2007 Telephone 02- 9552 4864 Facsimile 02-9552 3615



CLIENT: GEOTECHNIC	CAL & ENVIR	ONMENTAL		BATCH No:	08050
			RY SHEET		
PROJECT: TILLEGRA DA				COMPILED BY:	MA
LOCATION: SLIDE 2A	1101			DATE:	10/09/2008
	NT-t All tt		in diasta di an asa		10/09/2008
General Information		I		ompanying test reports.	
Sample No.	6307	6308	6309		
Bore/Reference	TP142	TP142	TP143		
Depth (m)	N/A	5.5	1.9		
Sample Type	Disturbed	Disturbed	Disturbed		
Soil Colour & Description	Grey Sandy	Grey Brown Silty	Grey Silty		
(v) indicates visual classification	Silty	Clayey	Sandy		
(v) indicates visual classification	Clay	Sand	Clay		
	Ciuy	June	Citty		
Unified Classification	СН	CI	СН		
Moisture Content & Density					
Field Moisture Content (%)	26.2	24.6			
Field Wet Density (t/m ³)					
Field Dry Density (t/m ³)					
Soil Particle Density (t/m ³)					
Particle Size Distribution					
Cobble Size (%)					
Gravel Size (%)					
Sand Size (%)	25	42	41		
Silt Size (%)	23	26	17		
Clay Size (%)	52	32	42		
Effective Size (mm)					
Uniformity Coefficient					
Curvature Coefficient					
Plasticity					
Liquid Limit (%)	60	42	60		
Plastic Limit (%)	25	22	24		
Plasticity Index (%)	35	20	36		
Linear Shrinkage (%)					
Dispersion		6			
Dispersal Index					ana ka ananana ka mana ka ka ka ka Banang
Percent Dispersion (%)					
Emerson Class No.	1	2	3		
Compaction	.				ware and a second s
Compaction Type					
Optimum Moisture Content (%)					1 – 1 s
Maximum Dry Density (t/m ³)					
California Bearing Ratio					
Placement Moisture Content (%)					
Placement Dry Density (t/m ³)			-		
Swell under 4.5kg Surcharge (%)	···· · · · · · · · · · · · · · · · · ·				
C.B.R. at 2.5% Penetration (%)					· · · · · · · · · · · · · · · · · · ·
C.B.R. at 5.0% Penetration (%)			-		
Shrink-Swell Index		25111111/2005-001005-00004-000-0000-000		กลายแหละ และแม่วนที่สุดสารสารและ และ และ และ และ สารกระสารสุของและเป็นสารกระสารกระสารกระสารกระสารกระสารกระสาร	
Shrink Strain (%)			[
Swell Strain (%)			<u>├</u>		<u></u>
Shrink-Swell Index (Iss)			<u> </u>		
Land Cherry (199)			L		

Geotechnical Centre

ATTERBERG LIMITS R1115 (ISSUE 4, 2005)

with ISO/IEC 17025.

Unit W4K, 42 Wattle Street, ULTIMO NSW 2007 Telephone 02 9552 4864Facsimile 02 9552 3615NATA Accreditation Number: 13380



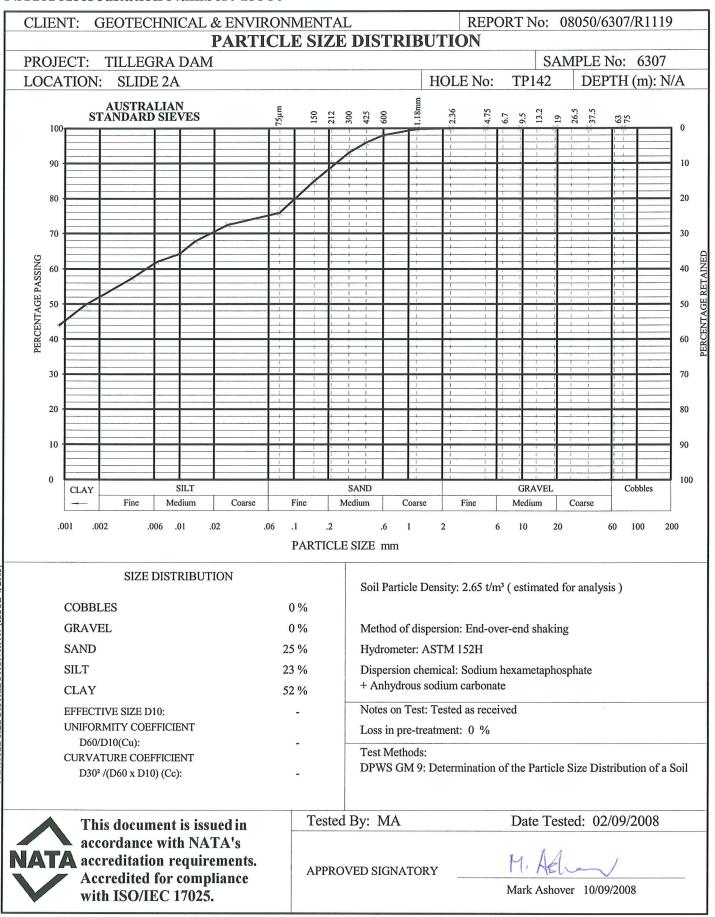
NAIA Accreditation Number: 13380			-	EPORT No: 08050/6307/R1115									
	: GEOTECHNICAL & ENVIRONMENTAL SOIL INDEX PROPERTIES												
	NDEX PRO	PERTIE	S	C.L.									
PROJECT: TILLEGRA DAM		IIC			MPLE No: 6307								
LOCATION: SLIDE 2A		HC	DLE No:	TP142	DEPTH (m): N/A								
SOIL INDEX PROPERTIES		RESULT		TES	I METHOD								
Moisture Content (as received)	:	26	.2 %	AS 1	289.2.1.1								
Liquid Limit	:	60	%	AS 1	289.3.1.1								
Plastic Limit	:	25	%	AS 1	289.3.2.1								
Plasticity Index	:	35	%	AS 1	289.3.3.1								
Linear Shrinkage	:	-		AS 1	289.3.4.1								
Soil Particle Density	:	-		AS 1	289.3.5.1								
Classification	:	CF	I	AS 1	726								
Sample History:	Jatural State	X Air	Dried	Over	Dried								
Method of Preparation:	Vet Sieved	X Dry	Sieved										
Linear Shrinkage Sample: 🗌 C	Curling	Crur	nbling										
Notes on test: Sample tested as rece	ived from clien	t.											
	Tactal Day	A # A											
This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance	Tested By: M		TORY Date Tested: 05/09/2008										

Mark Ashover 10/09/2008

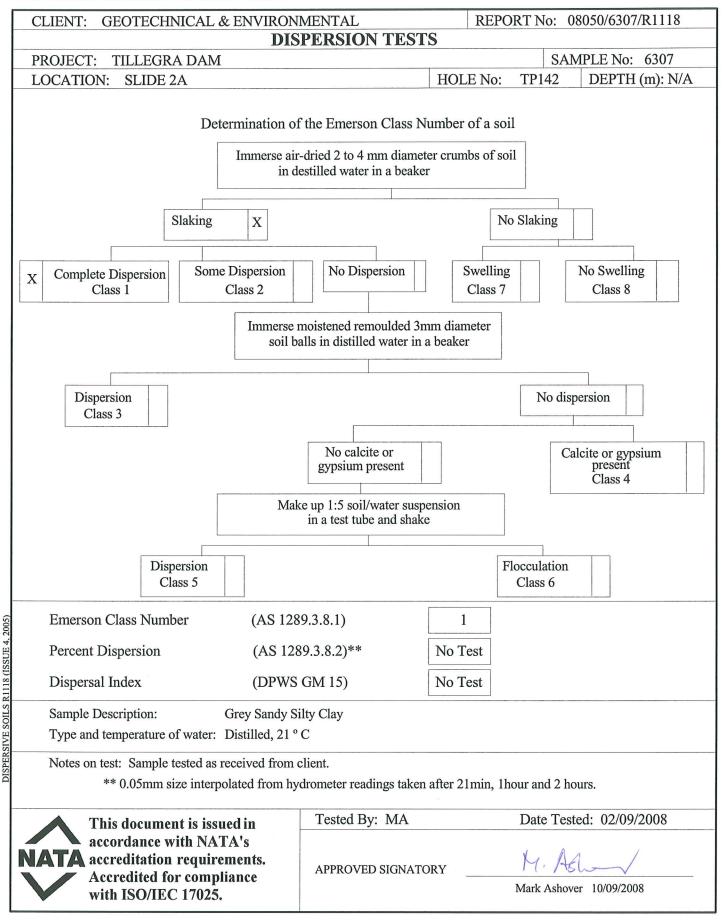
Geotechnical Centre

Unit W4K, 42 Wattle Street, ULTIMO NSW 2007 Telephone 02 9552 4864 Facsimile 02 9552 3615 NATA Accreditation Number: 13380







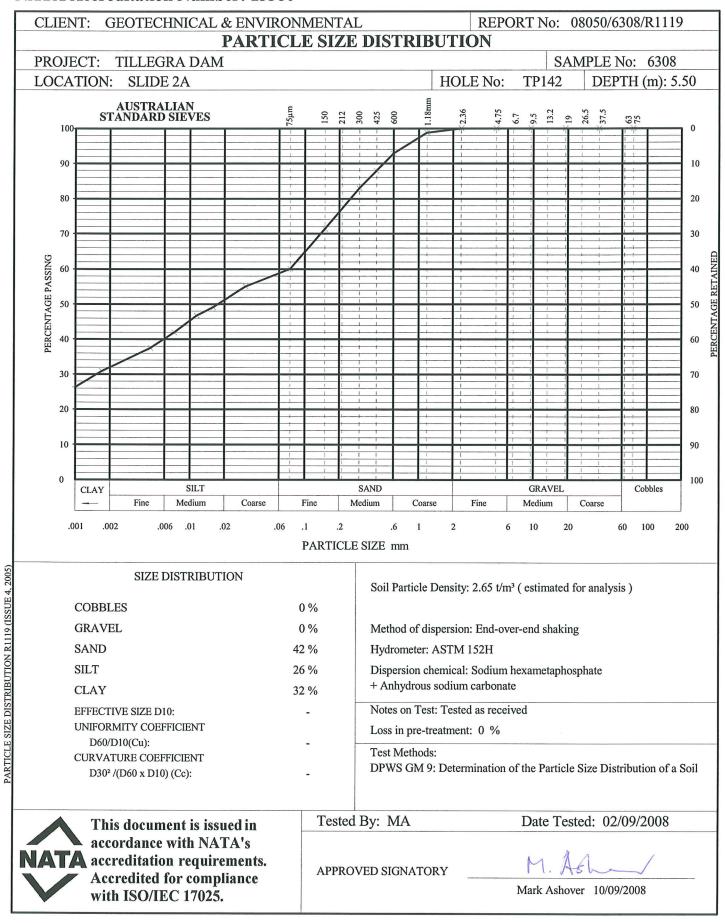


ATTERBERG LIMITS R1115 (ISSUE 4, 2005)



TATA Accreation Number: 15500						
CLIENT: GEOTECHNICAL & ENVIRONME				REPC	ORT No:	08050/6308/R1115
SOIL INI	DEX PRC	PERT	TIES			
PROJECT: TILLEGRA DAM						MPLE No: 6308
LOCATION: SLIDE 2A			HOLI	E No:	TP142	DEPTH (m): 5.50
SOIL INDEX PROPERTIES Moisture Content (as received) Liquid Limit Plastic Limit Plasticity Index		RESUI		% % % %	TES AS AS AS	T METHOD 1289.2.1.1 1289.3.1.1 1289.3.2.1 1289.3.3.1
Linear Shrinkage Soil Particle Density Classification	:		- - CI		AS	1289.3.4.1 1289.3.5.1 1726
	ural State t Sieved ling	X	Air Dri Dry Sie Crumb	eved	Ove	n Dried
Notes on test: Sample tested as receive						
accordance with NATA's	Tested By: APPROVED S		RY _		M.A.	sted: 05/09/2008

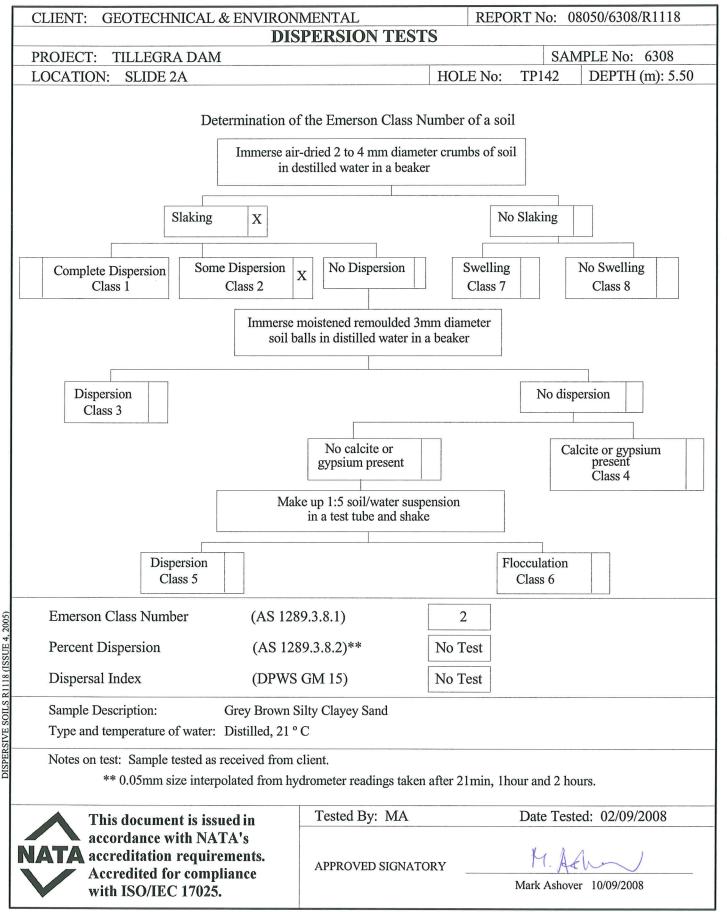




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NATA Accreditation Number: 13380



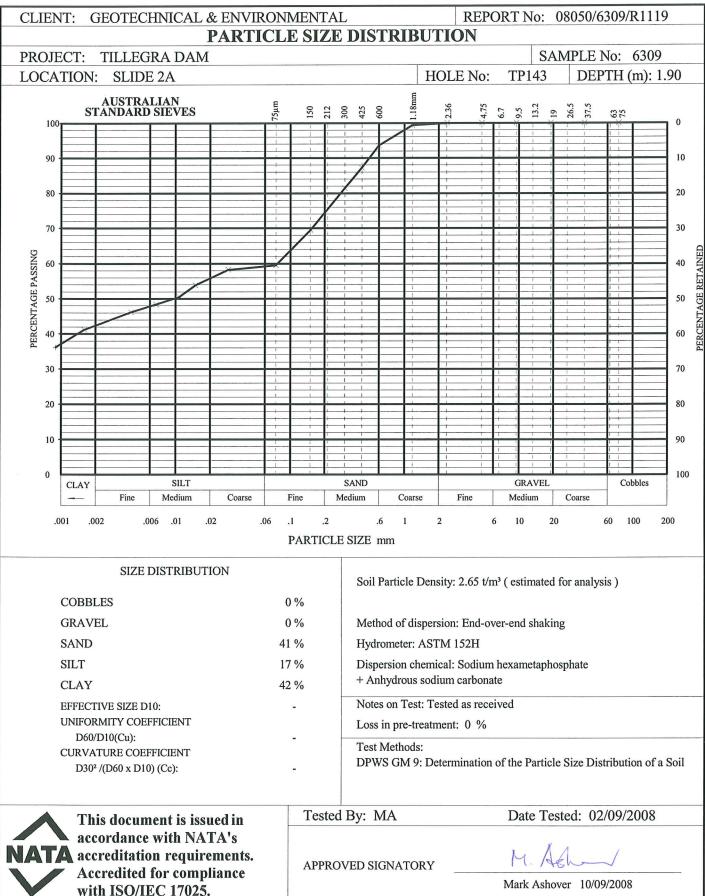


ATTERBERG LIMITS R1115 (ISSUE 4, 2005)



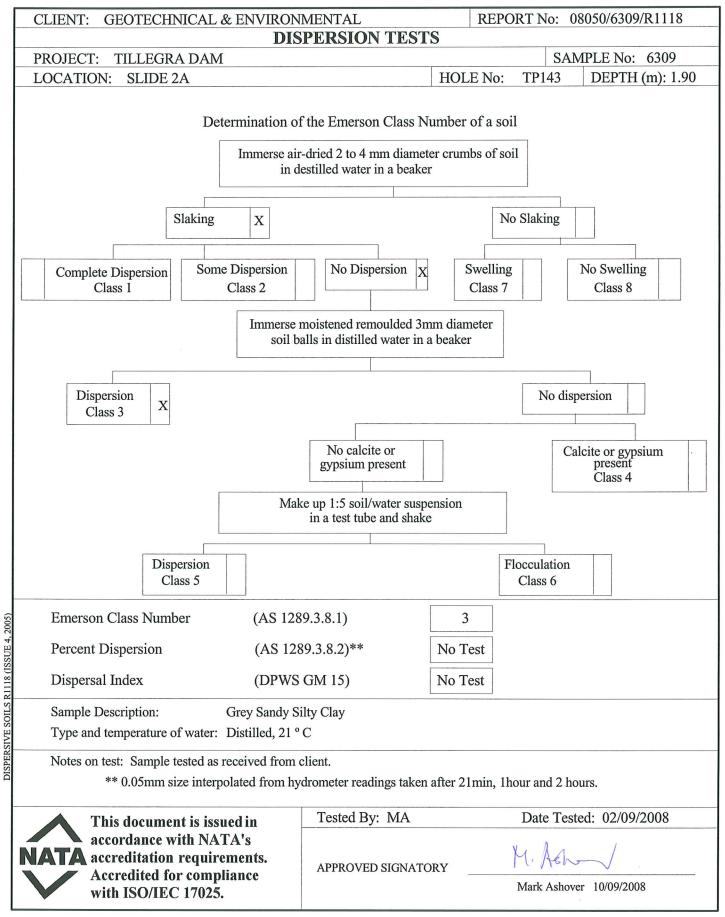
										-
CLIENT							REPO	ORT I	No: 08050/6309/R111	5
		OIL	INDEX	X PRC	PER	TIES				
PROJEC						TIOL		TD	SAMPLE No: 6309	
LOCAT	ION: SLIDE 2A					HOL	E No:	TP	DEPTH (m): 1	1.90
	SOIL INDEX PROPERT	ĨES			RESU	ЛТ			TEST METHOD	
	Moisture Content (as receiv	ed)		:		-			AS 1289.2.1.1	
	Liquid Limit			:		60	%		AS 1289.3.1.1	
	Plastic Limit			:		24	%		AS 1289.3.2.1	
	Plasticity Index			:		36	%		AS 1289.3.3.1	
	Linear Shrinkage			:		-			AS 1289.3.4.1	
	Soil Particle Density			:		-			AS 1289.3.5.1	
	Classification			:		СН			AS 1726	
	Sample History: Method of Preparation:		Natural Wet Sie		X	Air Dr Dry Si			Oven Dried	
	Linear Shrinkage Sample:		Curling			Crumb	ling			
	Notes on test: Sample tester	d as re	ceived fr	rom clier	nt.					
	This document is issued in	n	Test	ted By:	MA			Da	te Tested: 08/09/2008	
NATA	accordance with NATA's accreditation requiremen Accredited for complianc with ISO/IEC 17025.	ts.	APP	ROVED S	SIGNAT	ORY			1, Ach- k Ashover 10/09/2008	

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NSW Department of





MINERALOGY OF CLAY SAMPLE

ΒY

ZHONGSHENG LI AND COLIN R. WARD

SCHOOL OF BIOLOGICAL, EARTH AND ENVIRONMENTAL SCIENCES UNIVERSITY OF NEW SOUTH WALES

FOR

DEARTMENT OF COMMERCE

ATTN: JOHN YOUNG, GEOTECH & ENVIRONMENTAL SECTION PROJECT: TILLEGRA DAM GEOTECHNICAL INVESTIGATION



GEOLOGICAL ANALYSIS REPORT

Oct 10, 2008

PROCEDURE

One wet clay sample, supplied by John Young, was first oven dried at 50 degree, then finely powdered and analysed by X-ray powder diffraction using a Phillips X'pert diffractometer with copper K α radiation. The minerals present were identified by reference to the JCPDS Powder Diffraction File. Quantitative analyses of mineral phases in the powdered samples were made using SIROQUANTTM, commercial interpretation software written by CSIRO (J.C. Taylor, *Powder Diffraction*, 6, 2-9, 1991) based on the Rietveld XRD analysis technique.

The clay fraction (less than 2 µm effective diameter) of each sample was isolated by ultrasonic dispersion and subsequent settling. The clay fraction was investigated further by X-ray diffraction of oriented aggregates, using glycol and heat treatment. The relative proportions of the different clay minerals in this fraction for each sample were determined by the method of Griffin (in R.E. Carver, *Procedures in Sedimentary Petrology*, Wiley, 1971).

RESULTS

Table 1 provides data on the percentages of the individual minerals in the various samples from the SIROQUANT interpretation. The table lists the estimated weight percentage of the crystalline phases recognised in each sample, together with the relative error in the estimation (estimated standard deviation or ESD) for each individual mineral determination. The overall level of fit for the SIROQUANT evaluation in each case is given by the relevant global chi² value at the foot of each table. The total error for each mineral percentage can be calculated from the product of the ESD associated with that mineral and the square root of the global chi² value for the relevant SIROQUANT analysis.

Further notes on the clay fractions, based on the separate oriented aggregate XRD study, are provided in Table 2. These data may differ from those in Table 1; different fractions were analysed in each case, and different methods were used for mineral percentage estimations.

Table 1: Mineralogy of the clay powder by X-ray Powder Diffractometry

Phase	Weight (%)	Error of Fit
Quartz	21.5	0.58
Kaolinite	7.3	0.67
Montmorillonite	40.0	0.99
Feldspar (albite)	31.3	0.83

Sample: 6306, Pit 142, 1m depth

Scan File: C:\Misc 08\08172.cpb Global Chi Sguared: 6.29 Table 2: Mineralogy of <2 micron fraction by oriented aggregate XRD

Sample	Kaolinite	Illite	Expandable	Nature of
Number	%	%	Clay %	Expandable Clay
6306	42	0	58	Montmorillonite

Zhongsheng Li BSc, MSc, PhD, MAIG **Colin R. War** BSc, PhD, FAusIMM(CP), FAIG

Oct 10, 2008

Appendix J

Douglas Partners Borehole Logs (412 to 414, 421 to 423)

CLIENT: **PROJECT:** LOCATION:

Opus International Consultants (NSW) Pty Ltd Tillegra Dam, Diversion of Salisbury Road Localities of Bandon Grove, Munni and Underbank

SURFACE LEVEL: 231.7 AHD* 376674 EASTING: 6425591 NORTHING: DIP/AZIMUTH: 90°/--

BORE No: 412 PROJECT No: 39721.01 DATE: 4-5 Mar 08 SHEET 1 OF 6

	Description	Degree of Ueathering	Rock Strength	Fracture	e Discontinuities				In Situ Testing
Depth (m)	of	Degree of Weathering	LOG Ex Low Very Low Medium High		B - Bedding J - Joint	Type	c. %	ROD %	Test Results &
		W H M S S H H	Low Very Low Low High Very High	0.05 0.10 0.50	S - Shear D - Drill Break	F.	ပမ္ရ	<u>к</u>	Comments
	SILTY CLAY - stiff, dark brown silty clay, M>Wp from 0.5m, grading to weathered rock								
0.7	SANDSTONE - extremely low strength, extremely weathered brown and grey sandstone								
1.8	TUFFACEOUS SANDSTONE- high to very high strength, slightly weathered, slightly fractured, grey tuffaceous sandstone				1.8m: Unless otherwise stated defects are joints, 5° to 40°, ro, un, fe 1.95m: J, 85°, ro, un, extending to 2.3m				
-3					2.4m: DB 2.67m: DB 2.8m: DB 2.9m: DB	ucs c	100	100	80.6 MPa PL(D) = 5.52M
					3.2m: DB 3.35m: J, 85°, healed, un 3.42m: P, 5°, pl, ro 3.45m: J, 50°, pl, healed				
3.8	PEBBLY SANDSTONE - low to medium strength, highly weathered to moderately weathered brown pebbly sandstone from 4.1m, medium to high strength				3.82m: P, clay infill 5mm thick 3.9m: J, 20°, ro, un, cy 3.94m: J,40°,un,ro,cy 4.1m: J, 50°, ro, un, cy 4.25m: J, 85°, ro, un extending to 4.65m	С	100	100	PL(D) = 0.95N
					4.55m: P, un, ro 4.76m: J, 50°, ro, un, fe	с	100	100	

TYPE OF BORING: SFA to 1.8m then NMLC coring to 25m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

 WATIONS: No free groundwater observed whilst adgening

 Preferred route, approximately Ch 3515 offset 25m left.

 * Surface levels interpolated by client from surface terrain model and are approximate only

 SAMPLING & IN SITU TESTING LEGEND PD Photo ionisation detector S Standard penetration test mm dia.)
 PL Point load strength (s(50) MPa V Shear Vane (RPa) Water seep ¥ Water level

- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B U W C



CLIENT: PROJECT: LOCATION:

REMARKS:

Opus International Consultants (NSW) Pty Ltd Tillegra Dam, Diversion of Salisbury Road Localities of Bandon Grove, Munni and Underbank
 SURFACE LEVEL:
 231.7 AHD*

 EASTING:
 376674

 NORTHING:
 6425591

 DIP/AZIMUTH:
 90°/-

BORE No: 412 PROJECT No: 39721.01 DATE: 4-5 Mar 08 SHEET 2 OF 6

		Description	Degree of Weathering	jc	Rock Strength	Fracture	Discontinuities		-	-	n Situ Testing
2	Depth (m)	of	l	Graphic Log		Spacing (m)	B - Bedding J - Joint	Type	Core Rec. %	0% 0%	Test Results &
		Strata	FR SW HW	Ø	Ex Low Very Low Medium High Ex High Ex High	1.00	S - Shear D - Drill Break	Ę	ပိစ္ဆို	х,	Comments
t	5.0	PEBBLY SANDSTONE (Continued)		<u></u>			^L 4.95m: J, 40°,pl, ro				
	5.15-	TUFFACEOUS SANDSTONE - high to very high strength, moderately weathered, slightly fractured grey and brown tuffaceous sandstone with some siltstone bands 10mm to 50mm thick and sporadic fine to					5.15m: J, 20°, un, ro, cy 5.26m: J, 25°, un, ro, fe 5.5m: J, 85°, ro, un	с	100	100	
977	6	coarse pebbly bands					extending to 5.85m	с	100	100	
	0	at 6.1m, calcite vein approx 70°		\sim			6.01m: J, 45°, un, ro, he, di 6.25m: J, 75°, ro, un				
-			a saan aasa taan taa				6.3m: J, 75°, ro, fe, un 6.35m: J, 85°, ro, un, extending to 6.7m				
225							ղ 6.91m: J, 25°, un, ro				PL(A) = 1.74MP PL(D) = 1.28MP
	7	at 7.0m, DB shows fe, calcite and chlorite precipitate	anno				^L 6.94m: J, 25°, he	с	100	88	
-		from 7.25m to 7.6m, subhorizontal to 20° siltstone bands	Image Table Table Table State State State State State State State State State State State State State State State State State State State State State State State State State State State				7.35m: J, 35°, un, ro, fe 7.4m: J, 50°, un, ro, fe 7.45m: J, 45°, healed, un				
224	8		Manage Manage<				7.6m: J, 30°, pl, sm, fe 7.62m: J, 15°, un, sm, fe From 7.70m to 7.92m, discontinuous fractures, sh to sv, healed				
		from 8.3m, slightly weathered to					¹ 8m: P, sh, ro, un 8.06m: J, 15°, un, ro, di				
-		fresh	And the second s								
223		from 8.7m, very high strength					8.66m: P, 5°, un, ro 8.69m: P, 5°, un, ro	с	100	98	PL(D) = 8.21MF
	- 9										
222		from 9.75m to 10.7m, moderately		· · · · · · · · · · · · · · · · · · ·			9.78m: P, sh, un, ro, fe				
$\left \right $		weathered					∽9.86m: J, 30°, un, ro, fe	С	100	67	

Preferred route, approximately Ch 3515 offset 25m left. * Surface levels interpolated by client from surface terrain model and are approximate only

	Sunace leve	ela interpolatou by cherit norri ouridoo torran	rinodol and all app	
	SAMPLING & II	IN SITU TESTING LEGEND	CHECKED	
A	Auger sample	pp Pocket penetrometer (kPa)	1	
D	Disturbed sample	PID Photo ionisation detector	Initials:	
B	Bulk sample	S Standard penetration test	minuals.	[(/)] Douglas Partners
U.	Tube sample (x mm dia.)	PL Point load strength Is(50) MPa		I I I I DUIMIAS I AI LICIS
U, W	Water sample	V Shear Vane (kPa)	Date:	
C	Core drilling	D Water seep F Water level	Date.	Geotechnics • Environment • Groundwater
L	· · · · · · · · · · · · · · · · · · ·			



Opus International Consultants (NSW) Pty Ltd Tillegra Dam, Diversion of Salisbury Road Localities of Bandon Grove, Munni and Underbank

SURFACE LEVEL: 231.7 AHD* EASTING: 376674 NORTHING: 6425591 DIP/AZIMUTH: 90°/--

BORE No: 412 PROJECT No: 39721.01 DATE: 4-5 Mar 08 SHEET 3 OF 6

Π		Description	Degree of Weathering	≧ Rock Strength to	Fracture	Discontinuities	Sa	ampli	ng &	In Situ Testing
ᆋ	Depth (m)	of	e = 1 Degree of Weathering $e = 1$	Very High Ex High Water Van Wedium Very High	Spacing (m)	B - Bedding J - Joint	Type	ore 2.%	ROD %	Test Results &
		Strata	M A A A A A A A A A A A A A A A A A A A	Very Very Very V	0.01 0.10 0.50 1.00	S - Shear D - Drill Break	Тy	ပိမ္နိ	α°.	Comments
	10.01	TUFFACEOUS SANDSTONE (Continued) from 10.05m to 10.55m, with coarser grained lithic clasts				10.05m: J, 40°, un, ro 10.25m: J, 35°, un, ro 10.35m: J, 25°, un, ro 10.55m: J, 30°, un, ro	С	100		
	11	from 10.7m to 12.1m, fresh from 11.0m to 11.3m, with coarser grained lithic clasts				^U 10.6m: J, sv, un, ro, fe ^V 10.7m: J, 10°, un, ro				
	- 12					11.45m: J, 50°, un, ro, fe 11.5m: J, sv, un, ro, fe, extending to 11.6m 11.6m: J, 85°, ro, un, fe extending to 11.8m 11.85m: DB 11.95m: J, 30°, un, ro	С	100	94	
219	.12	from 12.1m to 13.3m, moderately weathered to highly weathered, very low to medium strength from 12.5m to 12.65m, with coarser grained lithic clasts from 12.65m to 15.12m, altered zone (chloritic alteration?), (mottled grey-green and orange-brown)				12.05m: J, sv, un, ro, clay veneer 12.08m: J, 30°, un, ro, clay veneer From 12.14m to 12.4m, highly weathered, clay filled and fg along joints 12.16m: J, 85°, pl, ro, cy 12.25m: J, 50°, pl, ro, cy filled 12.5m: J, 45°, curved, ro, fe	U			PL(A) = 0.86MPa
	• 13	from 13.3m to 15.12m, moderately				13.06m: P, 5°, pl, sm, fe 13.12m: P, 5°, pl, sm, cy filled (5mm) 13.23m: P, 5°,un, ro, fe 13.27m: J, sv, un, ro, fe				
218		weathered, high to very high strength				13.64m: P, 5°, un, ro, fe				
	- 14					14.11m: J, 15°, pl, ro, fe	с	100	80	
217		from 14.43m to 14.62m, slighly weathered to fresh, very high strength, (intrusion?)				14.43m: J, 50°, un, ro 14.62m: J, 15°, un, ro, fe 14.8m: P				PL(D) = 3.31MPa
						14.8m: P 14.84m: J, 10°, un, ro, fe				

RIG: Scout 103

DRILLER: Chittleburgh (Total) LOGGED: Niland/Bear CASING: HQ to 1.8m

TYPE OF BORING: SFA to 1.8m then NMLC coring to 25m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

Preferred route, approximately Ch 3515 offset 25m left. * Surface levels interpolated by client from surface terrain model and are approximate only

SAMP Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B U W C

SAMPLING & IN SITU TESTING LEGEND pp Pocket penetrometer (kPa) PID Photo ionisation detector S Standard penetration test nm dia.) PL Point load strength Is(50) MPa V Shear Vane (kPa) V Water seep ¥ Water level

CHECKED Initials: Date:



Douglas Partners Geotechnics · Environment · Groundwater

CLIENT: **PROJECT:** LOCATION:

Opus International Consultants (NSW) Pty Ltd Tillegra Dam, Diversion of Salisbury Road Localities of Bandon Grove, Munni and Underbank

SURFACE LEVEL: 231.7 AHD* EASTING: 376674 6425591 NORTHING: DIP/AZIMUTH: 90°/--

BORE No: 412 PROJECT No: 39721.01 DATE: 4-5 Mar 08 SHEET 4 OF 6

	-		Description	Degree of Weathering	ic -	Rock Strength	Fracture Spacing	Discontinuities	-		-	n Situ Testing
묍	Dep (m		of Strata	Weathering	Grapt	Very Low Very Low Medium Medium Very High Ex High Ex High	(m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core lec. %	RQD %	Test Results &
	1 - -	5.0	TUFFACEOUS SANDSTONE (Continued) at 15.2m to 15.5m, extremely low to very low strength, extremely weathered to highly weathered, orange-brown	EW EW EWENE	× 			^L 14.92m: J, 15°, pl, ro, fe 15.1m to 15.5m - P at 10-50mm spacings	c	100		Comments
	- 16 1	16.0 -	TUFFACEOUS SANDSTONE - high to very high strength, moderately weathered, fractured grey and brown tuffaceous sandstone					15.5m to 17.8m - P at 50-200mm spacings 15.65m: J, 80° sv, ro, un, fe, ca, chlorite 300mm long 15.68m: J, 65°, pl, sm, fe 15.8m: J, 20°, pl, ro, fe (2nd J 5mm) 15.96m: J, 80°, pl, ro, fe, ca, chlorite 16.2m: J, sv, ro, un, fe 250mm long				
215	- 1 - 17 -	6.8	CONGLOMERATE - very high strength, moderately weathered grey conglomerate		$) \circ ($			16.65m: J, su, ro, un, fe, 100mm long 16.9m: J, 80°, un, ro, fe, 300mm long 17.25m: J, 10°, ro, un, fe	С	100	82	
214	- 18 -	7.5	TUFFACEOUS SANDSTONE - very high strength, moderately weathered to slightly weathered, blue grey tuffaceous sandstone					17.55m: J, 85°, healed, pl, ro, fe, extending to 18.2m				
			from 18.2m to 18.35m, intersecting joints at 45° and 70°					18.25m: J, 45°, pl, ro, fe 18.28m: J, 70°, pl, ro, fe				
213	- 19							18.65m: J, 15°, un, sm, fe 18.8m: J, 15°, un, sm, fe 19m: J, 40°, pł, sm, fe 19.2m: J, 30°, sm, un, fe	UCS C	100	73	80.2 MPa PL(D) = 3.64MPa
212	. 1	9.6 -	AGGLOMERATE - very high strength, moderately weathered, grey agglomerate					19.28m: P, healed, pl, ro, fe, chlorite 19.35m to 19.60m - P at 20-70mm spacings with some clay veneers 19.65m: J, 40°, un, ro, fe		400		
					1				C	100	80	

TYPE OF BORING: SFA to 1.8m then NMLC coring to 25m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

Preferred route, approximately Ch 3515 offset 25m left. * Surface levels interpolated by client from surface terrain model and are approximate only

A Auger sample pp Pocket penetrometer (kPa) D Disturbed sample PID Photo ionisation detector B Bulk sample S Standard penetration test U_ Tube sample (x mm dia.) PL Point load strength Is(50) MPa W Water sample V SharVane (kPa) C Core drilling D Water seep	Douglas Partners Geotechnics • Environment • Groundwater
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CLIENT: **PROJECT:** LOCATION: Opus International Consultants (NSW) Pty Ltd Tillegra Dam, Diversion of Salisbury Road Localities of Bandon Grove, Munni and Underbank

SURFACE LEVEL: 231.7 AHD* EASTING: 376674 **NORTHING:** 6425591 DIP/AZIMUTH: 90°/--

BORE No: 412 PROJECT No: 39721.01 DATE: 4-5 Mar 08 SHEET 5 OF 6

	D. "	Description	Degree of Weathering ሕ≩≩ ଛ ଝ ଝ		Rock Strength ត្រ	Fracture Spacing	Discontinuities				In Situ Testing
R	Depth (m)	of		Grapt	Very Low Very Low High High Ex High Water	(m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Sore Sc. %	RQD %	Test Results &
	20.0	Strata AGGLOMERATE (Continued)	HW H	202	Ex I Mec Higi		S-Shear D-Din Dreak			ш. ———	Comments
· · ·	21 21.25 21.65	TUFFACEOUS SANDSTONE - very high strength, moderately weathered, blue-grey and brown tuffaceous sandstone (altered)					20.12m to 20.36m - J, 80°, un, ro, fe 20.17m to 20.29m - F, 60°, pl, he 20.40m to 20.46m - J, 50°, un, ro, fe 20.63m to 20.68m - P, 45°, pl, ro, fe 20.89m: P, sh, un, ro, fe 21.15m: DB 21.25m: DB 21.38m to 21.48m - J, 70°, pl, ro	С	100	80	
210	22	AGGLOMERATE - very high strength, moderately weathered, green-grey to blue-grey agglomerate	Anno Antonio A				21.87m to 22.03m - J, sv, un, ro, fe 22.06m: DB				
	23						22.82m: J, sh, un, ro 23.03m: J, 20°, un, ro 23.14m to 23.17m - J, 35°, curved, sm, fe	C	100	100	
	24						23.64m to 23.75m - J, 70°, pl, ro, fe 23.91m: J, 25°, un, ro, fe, ca 24.13m: J, sh, un, sm, fe 24.22m to 24.28m - J, 60°, curved, sm, fe 24.43m to 24.49m - J, 40°, un, ro, fe, ca				
207				200 200			24.67m: P, 20°, un, sm, fe - DI? 24.71m to 24.76m - J, 55°, un, ro				
tyi Wa	PE OF E	BORING: SFA to 1.8m then NMLC c BSERVATIONS: No free groundwate	r observed w Ch 3515 off	/hilst a set 25	augering im left.	GGED: Niland		NG:	HQ to	o 1 <i>.</i> 8ı	n
A D B U W C	Auger sa Disturbed Bulk sam Tube sar Water sa Core drill	SAMPLING & IN SITU TESTING mple pp. Pocket r d sample PiD Photo io ple Standar mple (xmm dia.) PL Point loc mmple V Shear V	LEGEND enetrometer (kPa hisation detector I penetration test d strength Is(50) I ane (kPa)) MPa	CHE		PN	a: • Em	s I	Pa ment	r tners • Groundwater

CLIENT: **PROJECT:** LOCATION:

Opus International Consultants (NSW) Pty Ltd Tillegra Dam, Diversion of Salisbury Road Localities of Bandon Grove, Munni and Underbank

SURFACE LEVEL: 231.7 AHD* EASTING: 376674 NORTHING: 6425591 DIP/AZIMUTH: 90°/--

BORE No: 412 PROJECT No: 39721.01 DATE: 4-5 Mar 08 SHEET 6 OF 6

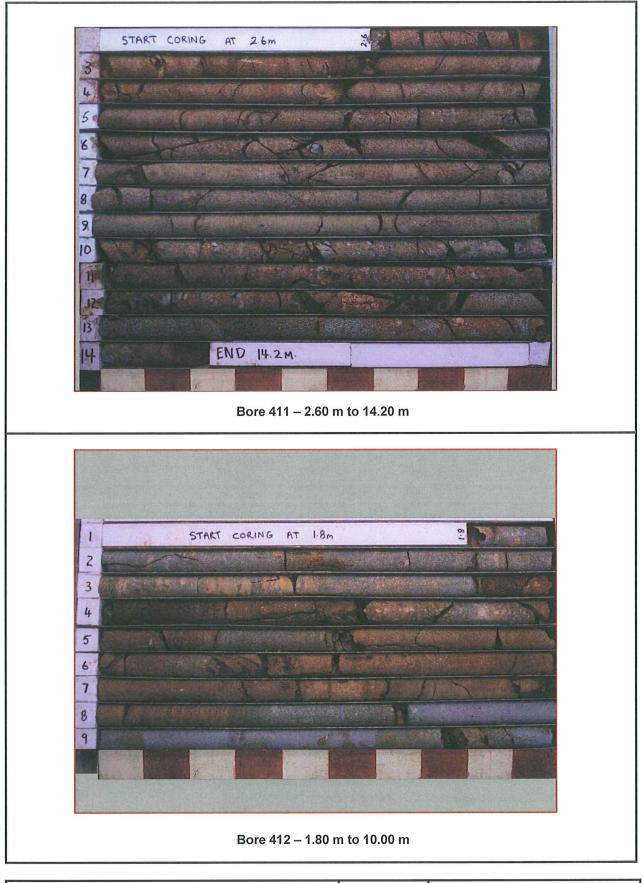
	Depth	Description		Degree of Weathering ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓			Rock Strength			Fracture Spacing			re	Discontinuities			Sampling & In Situ Testing			
ᆋ	Depth (m)	of				raph Log	MO		E I	HgH Hg	Water	Spa (I	acin m)	ıg [B - Bedding	J - Joint	Type	Sre 2. %	RQD %	Test Results
		Strata	EW	Ŵ	N SE B	Ó	Ex Lo	No.	High	Very Ex H	>	0.05	m)	1.00	S - Shear	D - Drill Break	Ļ	ပိန္စိ	ц М	& Comments
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TYPE OF BORING: SFA to 1.8m then NMLC coring to 25m

WATER OBSERVATIONS: No free groundwater observed whilst augering **REMARKS:**

Preferred route, approximately Ch 3515 offset 25m left. * Surface levels interpolated by client from surface terrain model and are approximate only

Surface levels interpolated by elicit from surface terrain i	······································
SAMPLING & IN SITU TESTING LEGEND	CHECKED
A Auger sample pp Pocket penetrometer (kPa)	
D Disturbed sample PD Photo ionisation detector	
B Bulk sample S Standard penetration test	I I I I I I I I I I I I I I I I I I I
U _x Tube sample (x mm dia.) PL Point load strength Is(50) MPa	
W Water sample V Shear Vane (kPa)	
C Core drilling D Water seep Vater level	Date: Geotechnics • Environment • Groundwater

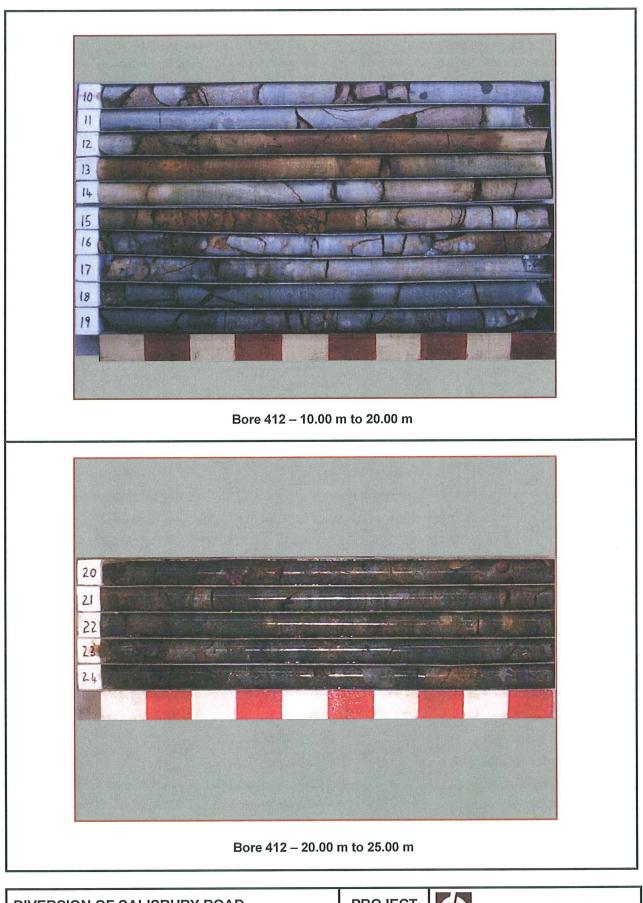


DIVERSION OF SALISBURY ROAD TILLEGRA DAM PROJECT



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Douglas Partners Geotechnics · Environment · Groundwater



DIVERSION OF SALISBURY ROAD TILLEGRA DAM PROJECT



Douglas Partners Geotechnics · Environment · Groundwater

Opus International Consultants (NSW) Pty Ltd CLIENT: Tillegra Dam, Diversion of Salisbury Road PROJECT: Localities of Bandon Grove, Munni and LOCATION: Underbank

SURFACE LEVEL: 244.0 AHD* EASTING: 376219 NORTHING: 6427216 DIP/AZIMUTH: 90°/--

BORE No: 413 PROJECT No: 39721.01 DATE: 05 Mar 08 SHEET 1 OF 3

Τ		Description	Degree of Weathering ·≌	Rock	5	Fracture	Discontinuities	Sa	ampli	ng &	In Situ Testing
1	Depth (m)	of	Weathering		Vate	Spacing (m)	B - Bedding J - Joint	Type)re : %	RQD %	Test Results &
	(11)	Strata	월 번 월 85 만 월 월 85 만 전 ④	High Very Low		0.05	S - Shear D - Drill Break	Ļ	ပိမ္ရွိ	Я,	Comments
	0.15	TOPSOIL - dark brown clayey silt, some rootlets GRAVELLY SANDY CLAY - stiff to very stiff brown gravelly sandy clay, gravel and sand fine to coarse grained fines content decreasing with depth. Grading to extra weathered sandstone									
	1	TUFFACEOUS SANDSTONE - high strength, moderately weathered, yellow brown tuffaceous sandstone					1.1m to 1.21m - Fg 1.2m: J, 40°, pl, sm 1.33m to 1.43m - J, sv,				PL(A) = 1.69MF PL(D) = 2.25M
	1.55	LITHIC SANDSTONE - very high strength, slightly weathered brown and grey lithic sandstone with some pebbly sandstone bands			arana Annan Arana Arana Arana Ana		√ (78°-88°) un, ro 1.43m to 1.56m - Fg 1.56m to 1.70m - J, 85°, pl, sm, fe	С	100	56	
	2						2.01m to 2.16m - J, 75°, pl, sm, ca				PL(A) = 3.42M
	3						2.84m to 2.89m - J, 45°, un, ro 2.90m to 3.3m - J, sv, un, ro, fe (partially he)	С	100	94	PL(D) = 4.98N
ļ						╎┢┛╎╎	3.5m: DB 3.58m: P, sh, un, ro, fe				PL(A) = 2.56M PL(A) = 3.66M
	4	from 4.0m to 4.4m, subvertical cacite veins (healed joints?)					3.69m: P, sh, un, ro, fe 3.88m: DB 4.17m: DB 4.40m to 4.48m - J, 60°,irr/ un, ro, trace clay	с	100	77	PL(A) = 3.55M PL(D) = 3.26M
		from 4.77m to 4.95m, subvertical calcite veins, partially open					¹ 4.59m: P, 30°, pl, sm, fe				

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

Preferred route, approx Ch 5250 offset 20m right. * Surface levels interpolated by client from surface terrain model and are approximate only

	Suracen	evels interpolated by client norm surface terrain	i model and are apply	oninato	Only	
		K IN SITU TESTING LEGEND pp Pocket penetrometer (kPa) PID Photo ionisation detector Standard penetration test PL Point load strength Is(50) MPa V Shear Vane (kPa)	CHECKED Initials:		\mathcal{D}	Douglas Partners
Č	Core drilling	► Water seep	Date:			Geotechnics • Environment • Groundwater

Opus International Consultants (NSW) Pty Ltd CLIENT: Tillegra Dam, Diversion of Salisbury Road PROJECT: Localities of Bandon Grove, Munni and LOCATION: Underbank

SURFACE LEVEL: 244.0 AHD* EASTING: 376219 6427216 NORTHING: DIP/AZIMUTH: 90°/--

BORE No: 413 PROJECT No: 39721.01 DATE: 05 Mar 08 SHEET 2 OF 3

		Description	Degree of Weathering	jic	Rock Strength	Fracture	Discontinuities				In Situ Testing
묍	Depth (m)	of Strata	Degree of Weathering ≥ ≥ ≥ ≤ ∞ œ	Graph Log		Spacing (m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results &
239	5.0	LITHIC SANDSTONE (Continued)	M H M M M M M M M M M M M M M M M M M M		Ex Low Very Low High Ex H				- œ.		Comments
· ·		from 5.25m to 5.9m, some large subrounded pebble inclusions in sandstone					5.07m: DB 5.28m: P, sh, un, ro, fe				
							5.79m: P, sh, un, ro, fe 5.85m: P, sh, un, ro, fe				PL(A) = 2.6MPa
238	-6						6.04m: P, sh, un, ro, fe	c ucs	100	83	PL(D) = 6.9MPa 79.6 MPa
							6.32m: J, 20°, irr, ro, fe				
							6.51m to 6.57m - J, 50°, pl, sm, fe, some fg 6.71m to 6.92m - J, 80°,				
	6.92	TUFFACEOUS SANDSTONE -high					0.7 m to 0.92m - 0, 80 , pl, ro, fe \ 6.92m: P, sh, un, ro, fe				
237	-7	to very high strength, moderately weathered, grey tuffaceous sandstone with some siltstone					^L 6.92m to 6.98m - Fg 7.12m: P, sh, pl, sm, fe				PL(A) = 1.94MPa PL(D) = 1.34MPa
		bands 10mm to 50mm thick from 7.39m to 7.6m, altered zone					7.22m: P, sh, un, ro, fe 7.25m to 7.27m - Fg 7.3m: P, sh, un, ro				
		green, orange and brown (chloritic?) from 7.84m to 7.9m, siltstone					7.55m: J, un/st,40°, ro, fe and calcite				PL(A) = 2.99MPa PL(D) = 4.76MPa
236	- 8	inclusions					√7.91m: J, 24°, irr/un, ro 7.95m: DB 8.13m: DB				
235	-9						8.72m: DB	С	100	96	PL(A) = 3.47MPa PL(D) = 4.34MPa
		from 9.45m to 9.55m, siltstone inclusions					9.30m to 9.33m - J, 30°, pl, ro, fe 9.30m to 9.42m - J, 70°, pl, sm, fe 9.42m: P, sh, un, ro, fe 9.58m: P, sh, irr/un, ro, fe 9.81m: P, sh, un, ro, fe				PL(D) = 5.59MPa PL(A) = 2.2MPa
		Bore discontinued at 10.0m, limit of	.ER: Chittleb	urgh	(Total)		9.58m: P, sh, irr/un, ro, fe 9.81m: P, sh, un, ro, fe	NG:	HQ to	p 1.1	PĽ(Á) = 2.2MF

чy REMARKS:

Preferred route, approx Ch 5250 offset 20m right. * Surface levels interpolated by client from surface terrain model and are approximate only

	Surface levels	interpolated by client from surface terral	rinouel and are ap	proximate only
		SITU TESTING LEGEND	CHECKED	
	Auger sample	pp Pocket penetrometer (kPa)		
	Disturbed sample Bulk sample	PID Photo ionisation detector S Standard penetration test	Initials:	
ប	Tube sample (x mm dia.)	PL Point load strength Is(50) MPa		[[(
N		V Shear Vane (kPa)	Date:	
C	Core drilling	Water seep ¥ Water level	Date.	🛛 🚺 📶 Geotech



CLIENT:Opus International Consultants (NSW) Pty LtdPROJECT:Tillegra Dam, Diversion of Salisbury RoadLOCATION:Localities of Bandon Grove, Munni and
Underbank

 SURFACE LEVEL:
 244.0 AHD*

 EASTING:
 376219

 NORTHING:
 6427216

 DIP/AZIMUTH:
 90°/-

BORE No: 413 PROJECT No: 39721.01 DATE: 05 Mar 08 SHEET 3 OF 3

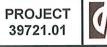
Description of Strate Description of Strate Description (s = 0.5 km/s) Sampling & In Situ Testing (s = 0.5 km/s) Testing (s = 0.5 km/s) 1	Π		Description	Degree Weathe	e of	<u>.</u>	R Str	ock ength	5	Fracture	Discon	tinuities				In Situ Testing
	묍	Depth (m)	of			Graph Log	y Low		Wate	(m)			Type	Core ec. %	åD %	Test Results &
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RIG: Scout 103 DRILLER: Chittleburgh (Total) LOGGED: Niland/ Rogers CASING: HQ to 1.1m TYPE OF BORING: SFA to 1.1m then NMLC to 10m					ttlebi	urgh	(Iotal)		LOG	GED: Nilan	a/ Rogers	CAS	ING:	nQt	0 1.11	111
WATER OBSERVATIONS: No free groundwater observed whilst augering	W.	ATER O	BSERVATIONS: No free groundwate	r observ												
REMARKS: Preferred route, approx Ch 5250 offset 20m right. * Surface levels interpolated by client from surface terrain model and are approximate only	RE	EMARK	 Preferred route, approx Ch 52 * Surface levels interpolated by 	50 offset client fr	20n om s	n righ surfac	t. xe terra	iin mod	el and	are approx	imate only					

	SAMPLING &	IN SITU TESTING LEGEND	CHECKED	
1 A	Auger sample	pp Pocket penetrometer (kPa)		
D	Disturbed sample	PID Photo ionisation detector	Initials:	
в	Bulk sample	S Standard penetration test	initials.	
U.	Tube sample (x mm dia.)	PL Point load strength Is(50) MPa		
Ŵ	Water sample	V Shear Vane (kPa)		
C	Core drilling	Water seep ¥ Water level	Date:	





TILLEGRA DAM PROJECT



Opus International Consultants (NSW) Pty Ltd CLIENT: Tillegra Dam, Diversion of Salisbury Road PROJECT: Localities of Bandon Grove, Munni and LOCATION: Underbank

SURFACE LEVEL: 247.2 AHD* 376615 EASTING: NORTHING: 6425914 DIP/AZIMUTH: 90°/--

BORE No: 414 PROJECT No: 39721.01 DATE: 06 Mar 08 SHEET 1 OF 3

		Description	Description Degree of Weathering Stream		Rock Strength	racture Spacing	Discontinuities				In Situ Testing
ᆔ	Depth (m)	of		Log	Vate	(m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	% %	Test Results &
		Strata	M A M S R R	~~		0.05	S - Shear D - Dhii Break	-	0 %	<u>и</u> .	Comments
247	0.1	TOPSOIL - dark brown clayey silt, some rootlets CLAY - firm grey clay damp to moist		\mathcal{D}							
-	- 1	becoming more sandy with depth. Grading to extremely weathered sandstone/rhyodacite									
246	1.3	SANDSTONE - high to very high strength, moderately to slightly weathered, banded brown and					1.3m to 1.38m - Fg 1.45m to 1.50m - J, 55°,				PL(A) = 1.51MPa
-		grey-green sandstone with fine cross-bedded lenses of mudstone from 1.6m, high strength, slightly weathered, blue grey sandstone		••••			un, clay filled 1.55m: P, sh, un, ro, fe	с	100	76	
245	-2	from 1.82m to 2.67m, moderately weathered					1.86m: P, sh, Fg/clay filled 1.99m to 2.05m, J, 55°, un, ro ~2.15m: DB				PL(D) = 2.86MPa
· • • • • • • • • • • • • • • • • • • •	-3	-					2.28m to 2.31m - Fg/clay filled 2.35m: P, Fg 2.43m to 2.48m - J, 60°, un, ro, clay filled 2.59m to 2.66m - Fg 2.76m to 2.82m - J, 50°, pl, ro 2.96m to 3.0m - J, 30°, pl, clay filled				
244		from 3.33m to 4.70m, moderately weathered to highly weathered					3.34m to 3.35m - J, 30°, pl, clay filled (4mm thick) 3.35m P, sh, un, ro 3.35m to 3.57m - J, sv, un, ro, fe/clay filled 3.68m to 4.0m - Fg	С	100	35	
243	-4						4.0m to 4.06m - J, 60°, un, ro 4.13m to 4.48m - J, sv, un, ro, clay filled				PL(D) = 8.58MP
							4.48m to 4.60m - Fg 4.67m: P, 10°, pl, sm, fe 4.81m to 4.89m - J, 60°, 1 un, ro, fe				PL(D) = 1.69MP

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

Preferred route, approx Ch 3860 offset 20m left.

	Sunace le	evels interpolated by client from surface te	shall model and are approximate only	
		& IN SITU TESTING LEGEND	CHECKED	
D B	Auger sample Disturbed sample Buik sample	PID Photo ionisation detector S Standard penetration test		e P
U, W C	Tube sample (x mm dia.) Water sample Core drilling	PL Point load strength Is(50) MPa V Shear Vane (kPa) ▷ Water seep 某 Water level	Date: Geotechnics • Env	



Opus International Consultants (NSW) Pty Ltd CLIENT: PROJECT: Tillegra Dam, Diversion of Salisbury Road Localities of Bandon Grove, Munni and LOCATION: Underbank

SURFACE LEVEL: 247.2 AHD* EASTING: 376615 NORTHING: 6425914 **DIP/AZIMUTH:** 90°/--

BORE No: 414 PROJECT No: 39721.01 DATE: 06 Mar 08 SHEET 2 OF 3

		Description	Degree of Weathering .≌	Rock Strength ត្រ	Fracture	Discontinuities	Sa	ampli	ng &	In Situ Testing
ᆔ	Depth (m)	of	Degree of Weathering	Log Ex Low Very Low Medium Medium Medium Medium Medium Medium Mater 0.01	Spacing (m)	B - Bedding J - Joint	Type	ore 2.%	RQD %	Test Results &
		Strata	G G G		0.05 0.10 0.50 1.00	S - Shear D - Drill Break	L_	йằ	Ϋ́ς,	Comments
242	5.0	SANDSTONE (Continued) CONGLOMERATE/AGGLOMERATE - high strength, moderately to slightly weathered, brown-grey conglomerate/agglomerate				⁴ 4.92m to 5.05m - J, 60°, un, ro, fe 5.13m: J, 30°, un, clay filled 5.17m: P, sh, pl, clay filled 5.31m to 5.35m - J, 45°, pl, ro 5.50m to 5.55m - J, 45°,				PL(A) = 4.65MP PL(D) = 4.65MP
	- 5.69 - -6	SANDSTONE - high to very high strength, slightly weathered, blue-grey to grey-green and brown sandstone				pl, ro 5.68m: DB 5.87m: P, sh, pl, ro, fe 5.95m to 6.11m - J, 70°, un, ro	C	100	93	
24						6.16m: P, sh, un, clay filled 6.29m: DB 6.4m: P, 10°, pl, clay filled 6.46m to 6.84m - J, sv, he				PL(A) = 3.52MPa PL(D) = 2.46MP
240	-7					7.28m: P, sh, pl, sm, fe	ucs			PL(A) = 4.77MP 56.5 MPa
-		from 7.51m to 7.75m, high strength, moderately weathered				7.65m: DB	с	100	67	PL(A) = 4.12MP
239	-8 8.0	SANDSTONE - very high strength, slightly weathered grey-green sandstone								r E(A) - 4. IZWI
238	-9					8.67m to 8.8m - J, sv, un, ro, fe 8.8m: Fg 8.82m to 9.10m - J, sv, pl, sm, fe				PL(A) = 0.72MF
		from 9.27m to 9.46m, medium strength, moderately weathered, orange-brown				9.32m: DB 9.34m: P, sh, pl, clay filled 9.42m: P, sh, pl, clay filled 9.45m: P, sh, pl, clay filled 9.85m to 10.12m, J, 80°, pl, ro, fe	с	100	70	

TYPE OF BORING: SFA to 1.3m then NMLC coring to 13.6m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

Preferred route, approx Ch 3860 offset 20m left. * Surface levels interpolated by client from surface terrain model and are approximate only

	Our lace iev	veis interpolated by olient norm surface terrai	i modol and alo ap	provintian	<i>,</i> 01119	
Γ	SAMPLING 8	& IN SITU TESTING LEGEND	CHECKED			
A	Auger sample	pp Pocket penetrometer (kPa)				
D	Disturbed sample	PID Photo ionisation detector	Initials:			
B	Bulk sample	S Standard penetration test	miniais.		AW	Douglas Partners
U.	Tube sample (x mm dia.)	PL Point load strength Is(50) MPa		† R <i>V/</i>	7 A	bundias Lairieis
Ŵ	Water sample	V Shear Vane (kPa)			' A	~
C	Core drilling	Water seep Vater level	Date:			Geotechnics • Environment • Groundwater
	~ ~ ~		•			

Opus International Consultants (NSW) Pty Ltd CLIENT: Tillegra Dam, Diversion of Salisbury Road PROJECT: Localities of Bandon Grove, Munni and LOCATION: Underbank

SURFACE LEVEL: 247.2 AHD* EASTING: 376615 NORTHING: 6425914 DIP/AZIMUTH: 90°/--

BORE No: 414 PROJECT No: 39721.01 DATE: 06 Mar 08 SHEET 3 OF 3

Π		Description	Degree of Weathering ລັ≩≩§ຄູແແ	jç	Rock Strength	Fracture	Discontinuities	Sa			In Situ Testing
ᆋ	Depth (m)	of	····································	Braph Log	Ex Low Very Low Needium Kex High Ex High Ex High Ex High Notes 0.01	Spacing (m)	B - Bedding J - Joint	Type	Core Rec. %	a 0%	Test Results &
\bot	10.04		N N N N N N N N N N N N N N N N N N N	ļ.,	Ex Low Very Ex H Don	0.05 1.00 1.00	S - Shear D - Drill Break		ပမ္ရ	8	Comments
237	10.01	from 10m to 10.2m, moderately to highly weathered, orange-brown SANDSTONE (Continued)					10.12m to 10.15m - J, 45°, pl, ro 10.28m: DB				PL(A) = 8.28MPa
236	11	from 11.15m, very high to extremely high strength, slightly weathered					10.91m to 11.16m - J, 85°, pl, sm	С	100	70	
							11.82m: DB				PL(A) = 8.5MPa
235	12										PL(D) = 8.92MPa
	13							с	100	92	PL(A) = 7.84MPa PL(D) = 10.36MPa
7							13.05m: J, clay filled				
234							13.30m to 13.34m - J, 50°, un, ro				PL(A) = 9.07MPa PL(D) = 8.17MPa
• •	13.6	Bore discontinued at 13.6m, limit of investigation									
	14										
RIC	: Scou		LER: Chittleb		(Total) LOG	GED: Niland	d/ Rogers CASI	NG:	HQ t	o 1.3	m

TYPE OF BORING: SFA to 1.3m then NMLC coring to 13.6m

WATER OBSERVATIONS: No free groundwater observed whilst augering

REMARKS:

Preferred route, approx Ch 3860 offset 20m left. * Surface levels interpolated by client from surface terrain model and are approximate only

	SAMPLING & IN SIT	I TESTING LEGEND	СНЕСКЕР]
А D B U W C	Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling	pp Pocket penetrometer (kPa) PID Photo ionisation detector S standard penetration test PL Point load strength Is(50) MPa V Shear Vane (kPa) ▷ Water seep ₹ Water level	Initials:	



Opus International Consultants (NSW) Pty Ltd CLIENT: Tillegra Dam, Diversion of Salisbury Road PROJECT: Localities of Bandon Grove, Munni and LOCATION: Underbank

SURFACE LEVEL: 153.2 AHD* EASTING: 377035 NORTHING: 6424898 DIP/AZIMUTH: 90°/--

BORE No: 421 PROJECT No: 39721.01 DATE: 17-18 Mar 08 SHEET 1 OF 2

Γ	Τ		Description	Degree of	0	Rock		Fracture	Discontinuities	Sa	amplii	ng &	In Situ Testing
R		Depth	of	Weathering	Graphic Log	Ex Low Very Low Low Medium High Ex High	ater	Spacing (m)	B - Bedding J - Joint				
ľ		(m)	Strata	H M M M M M M M M M M M M M M M M M M M	5	X Low (ery Low figh X Higt	\geq		S - Shear D - Drill Break	Type	Core Rec. %	RQ %	& Comments
\vdash	╈	0.05	ر FILL - gravelly silty clay, grey, dry										
153	****		SILTSTONE - extremely low strength, extremenly weathered grey siltstone										
152		I											
151		2											
150		2.55	META SILTSTONE -medium to high strength, moderately weathered, fractured, grey brown meta siltstone calcite veins and infilled joints between 3.10m and 3.38m, microfaulting evident along joints at 81° to 83° (2mm to 5mm displacement), (shear zone)						2.75m to 4.2m, unless otherwise stated, partings at 5° to 25°, ro, un, fe, typically 30-100mm spacings, fragmented in parts (shearzone) 2.55m to 2.75m, fg zone 2.75m to 3.12m, J, 65°, irr, ro, ca filled, he 3.08m to 3.70m, multiple parallel and cross-cutting joint sets at 65° to 85°, 10mm to 30mm horizontal spacing, fe and ca, pl, sm, some fg,	С	100	35	PL(D) = 0.98MPa PL(D) =0.65MPa
011		4 4.6 4.8	from 4.15m to 4.21m, extremely weathered to highly weathered, very low strength yellow brown sandstone band CORE LOSS - from 4.6m to 4.8m META SILTSTONE - (See below)						(shearzone) 3.7m to 4.2m, multiple joints at 50-54°, pl to irr, sm to ro, some fe and calcite infill, 50-80mm spacing 4.15m to 4.2m, clay seam, ew zone 4.2m: Unless otherwise stated, joints 60° to 85°, ro, un, fe, extending 300mm at approximately 400mm spacings 4.2m to 4.4m, multiple parallel J sets at 60° to 80°, curved, partially	C	82	0	
ŀ	-								healed, calcite infill 3mm thick (15-20mm	С	100	0	
		: Scou PE OF I	It 103 DRILI BORING: SFA to 2.55m, then NLM0	LER: Chittlet	-	(Total)	LO	GGED: Nilan	d/ Rogers CASI	NG:	HW	to 2.5	55m

WATER OBSERVATIONS: No free groundwater observed whilst augering Prefered route, approx Ch 2695 offset 20m right; Bore drilled on benched pad. REMARKS:

REWARNS.		olated by client from surface terrain		
A Auger sample D Disturbed sa B Bulk sample U _x Tube sample W Water sampl C Core drilling	nple P S (x mm dia.) P	D Pocket penetrometer (kPa) ID Photo ionisation detector Standard penetration test	CHECKED Initials: Date:	Douglas Partners Geotechnics · Environment · Groundwater

CLIENT:Opus International Consultants (NSW) Pty LtdPROJECT:Tillegra Dam, Diversion of Salisbury RoadLOCATION:Localities of Bandon Grove, Munni and
Underbank

 SURFACE LEVEL:
 153.2 AHD*

 EASTING:
 377035

 NORTHING:
 6424898

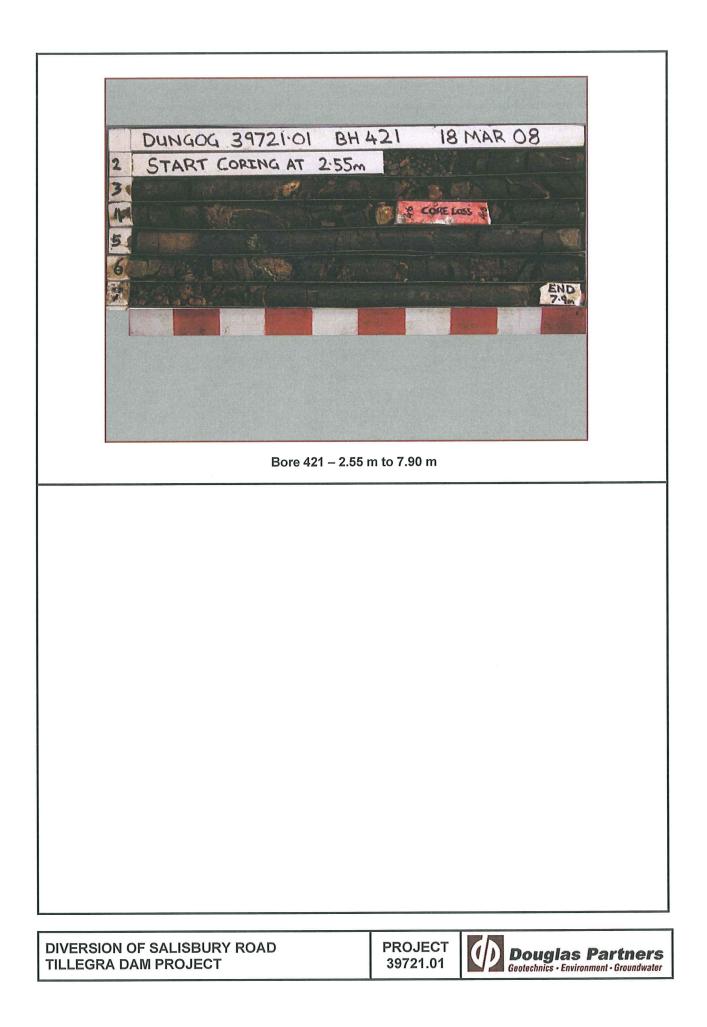
 DIP/AZIMUTH:
 90°/-

BORE No: 421 PROJECT No: 39721.01 DATE: 17-18 Mar 08 SHEET 2 OF 2

П		Description	Degree of Weathering	<u>ں</u>	Rock Strength	Fracture	Discontinuities	Sa	ampli	ng &	In Situ Testing
Ч	Depth (m)	of	weathening	Graphic Log	Strendth High Medium And Kery Low Low High Medium Kery High Medium Kery High Medium Water	Spacing (m)	B - Bedding J - Joint	Type	Core Rec. %	2~	Test Results &
		Strata	HW W REW	Ū	Ex Low Very Low Medium Medium Very High Ex High	0.01 0.10 0.10 1.00	S - Shear D - Drill Break	È	ပိမ္ထိ	8~	Comments
147 148	5.0° - - - -	from 5.0m to 5.15m, meta sandstone, fine grained, orange brown, iron stained META SILTSTONE - medium to high strength, moderately weathered, fractured to highly fractured, grey brown meta siltstone with some very low and low to medium strength bands in parts					horizontal spacing) 14.4m to 4.6m, highly fractured (shearzone), multiple sv joints 14.6m: CORE LOSS: 200mm 4.8m to 5.0m, parallel Jx2, 83°, irr, calcite infill, 1mm, partially open (drilling induced) with cross cutting J's at 82° and 84°, pl, sm, fe 15.13m to 5.15m, J, 36°, irr, ro, fe 5.67m to 6.05m, parallel sv joints (83°-90°), calcite infill, he, 10mm horizontal spacing 5.76m to 5.90m, parallel	с	100	0	PL(A) =0.23MPa PL(D) =0.70MPa
146	-7						Jx3, 30°-40°, pl to st, sm, fe, 40-60mm spacing 5.98m to 6.05m, cross cutting joint sets x2 at 40°, pl, sm, fe 6.07m to 6.17m, fg zone 6.27m to 6.37m, ew zone, friable 6.44m to 6.49m, fg zone 6.44m to 6.49m, fg zone 6.65m to 6.85m, J, 75°, irr, sm to ro, fe and ca 6.68m to 7.0m, J, 27°, pl, sm, fe, multiple sv joints and calcite veins 7.0m to 7.2m, fg zone, (sv joint sets, calcite) 7.2m to 7.85m, numerous joints at	с	100	23	PL(D) =0.97MPa
145	- 8	Bore discontinued at 7.9m, limit of investigation					25°-30°, pl to un, sm to ro, some fe and calcite 77.2m to 7.37m, multiple sv joints, irr, fe, some calcite infilling 7.37m: p 7.8m to 7.86m, sv joints, healed, some calcite, irr				
144	- 9 - 9 										
ΤY		tt 103 DRILL BORING: SFA to 2.55m, then NLMC BSERVATIONS: No free groundwate	-	Əm		GGED: Nilan	d/ Rogers CASI	NG:	HW t	o 2.5	5m
	MARKS	•	5 offset 20m	riaht:	Bore drilled on be	enched pad. Id are approx	imate only				

* Surface levels interpolated by client from surface terrain model and are approximate only

			, , , , , , , , , , , , , , , , , , , ,	,	···· ,	
	SAMPLING	G & IN SITU TESTING LEGEND	CHECKED	Berner and a		
А	Auger sample	pp Pocket penetrometer (kPa)				
D	Disturbed sample	PID Photo ionisation detector	Initials:			85% H 16% d
в	Bulk sample	S Standard penetration test	initials.		IAN	Douglas Partners
υ,	Tube sample (x mm dia.)	PL Point load strength Is(50) MPa		† ₿.▼	IFA	Bongias i alticis
Ŵ	Water sample	V Shear Vane (kPa)	Date:			
С	Core drilling	Water seep § Water level	Date.			Geotechnics • Environment • Groundwater



CLIENT: **PROJECT:** LOCATION:

Opus International Consultants (NSW) Pty Ltd Tillegra Dam, Diversion of Salisbury Road Localities of Bandon Grove, Munni and Underbank

SURFACE LEVEL: 182.0 AHD* EASTING: 376916 NORTHING: 6425026 DIP/AZIMUTH: 90°/--

BORE No: 422 PROJECT No: 39721.02 DATE: 26-28 May 08 SHEET 1 OF 3

	Underbank				AZINIUTH	,				UF 3
1	Description	Degree of Weathering	<u>.</u>	Rock Strength	Fracture	Discontinuities	Sa			In Situ Testing
Depth (m)	of Strata	Weathering :	Graph Log	Very Low Very Low Medium Medium Very High Ex High Ex High	Spacing (m)	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
	CLAY AND GRAVEL - Hard brown clay and gravel and fine to medium sized subrounded gravel, M <wp< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></wp<>									
0.7 	AGGLOMERATE - Variable strength (very low to high), highly weathered, brown agglomerate)°(0.82m: P, sh, h 0.87m: J, 45°, h 0.94m: P, sh, un, ro From 1.0m to 1.05m Fg	с	100	0	
) 0) 0 (1.09m: P, sh, clay infill 1.12m: J, 45°, h 1.18m: J, SV, h From 1.24m to 1.25m P, sh, clay lined 10mm thick	с	100	20	PL(D) = 0.02MP
+ 1.5	CORE LOSS - 0.15m		Ň			1.3m: P, sh, h 1.36m: J, 20°, h, clay				
1.65	AGGLOMERATE - Extremely low strength, extremely weathered brown agglomerate		$) \sim ($			lined 1.42m: P, sh, un, ro 1.5m: CORE LOSS: 150mm From 1.65m to 1.8m Fg	с	70	20	
⁸ 2 2.05	CORE LOSS - 0.05m		*			From 1.8m to 2.0m Friable 2m: CORE LOSS:	С	0	0	
-	LITHIC SANDSTONE - Very high strength, fine grained, grey-blue lithic sandstone		ſ			206m: J, 20°, pl, sm, clay lined 1mm thick 2.36m: P, sh, un, sm 2.38m: P, sh, un, sm 2.42m: J, 45°, clay filled up to 5mm thick 2.53m: P, sh, Friable	с	100	57	
B 3						infill 5mm thick 2.6m: J, 70°, pl, sm, clay lined 1mm thick 2.75m: P, sh, un, ro	с	100	33	
827-4						3.05m: P, sh, un, ro 3.1m: P, sh, un, ro 3.1m: P, sh, un, ro 3.2m: P, sh, un, ro 3.24m: P, sh, un, ro 3.28m: P, sh, un, ro 3.36m: J, 20°, un, ro 3.4m: J, 45°, h 3.44m: P, sh, un, ro 3.55m: P, sh, un, ro 3.55m: P, sh, un, ro, clay lined 2mm thick 3.7m: Fr, SV, h From 3.83m to 3.86m Fg 4m: Fr, SV, h 4.07m: P, sh, un, ro 4.24m: P, sh, un, ro 4.24m: P, sh, un, ro-sm, clay lined 1mm thick From 4.44m to 4.7m Fg	c	100	50	PL(A) = 3.5MPa
						4.75m: Fr, SV, pl, sm	с	80	0	
4.9	CORE LOSS - 0.1m		\ge			4.9m: CORE LOSS:				
YPE OF	BORING: Solid flight auger to 0.7m (DBSERVATIONS: Free groundwater of	observed due f Ch 2870 on cei) the to dr ntreli	n NMLC coring to illing fluids			NG:	NW	to 8m	1
B Bulk sail	SAMPLING & IN SITU TESTING sample pp Pocket ed sample PID Photo i mple S Standa ample (x mm dia.) PL Point lo sample V Shear V	LEGEND penetrometer (kPa) onisation detector d penetration test ad strength Is(50) M /ane (kPa)	1Pa	CHEC Initials:			la • Ent	S I viron	Pa men	rtner: t • Groundwate



Opus International Consultants (NSW) Pty Ltd Tillegra Dam, Diversion of Salisbury Road Localities of Bandon Grove, Munni and Underbank

SURFACE LEVEL: 182.0 AHD* EASTING: 376916 NORTHING: 6425026 DIP/AZIMUTH: 90°/--

BORE No: 422 PROJECT No: 39721.02 DATE: 26-28 May 08 SHEET 2 OF 3

		Description	Degree of Weathering	<u>e</u>	Rock Strength	5	Fracture	Discontinuities	S	ampli	ng &	n Situ Testing
ļ	Depth (m)	of	Weathering	de g	No E F	Water	Spacing (m)	B - Bedding J - Joint	be	sre %	RQD %	Test Result
	100	Strata	FR S W W	ō -	Ex Low Very Low Low Medium Very High Ex High	5	• • •	S - Shear D - Drill Break	Type	ပြီးမှိ	8	& Comments
-	5.0	The content of the state of the		۶Ă		Í		\100mm			1	
ſ		medium strength, extremely weathered to highly weathered,		(U				^L From 5.0m to 5.3m Fg	С	100	0	
Ī		brown agglomerate)°C	-							
[5.3 5.4	CORE LOSS - 0.1m	\searrow	\ge				5.3m: CORE LOSS: 100mm	С	60	0	
	0	AGGLOMERATE - High to very high strength, highly weathered to		ŝ'n				5.43m: P, sh, un, ro				
		moderately weathered brown		Vad				5.47m: J, 65°, un, ro 5.55m: J, 25°, un, ro				
ŀ		agglomerate						5.67m: J, 55°, un, ro	C	100	24	
ŀ				ίŲ				5.7m: J, 70°, un, ro 5.8m: J, 45°, un, ro				
ŀ				$)^{o}($				5.86m: J, 45°, un, ro			-	
╞	6		╎╷┛╎╷╷╏	3				5.95m: P, sh, un, ro From 6m to 6.15m Fg				
ŀ)07	Viene a			-	С	100	0	
ŀ				\tilde{s}				6.15m: J, 45°, pl, ro-sm 6.2m: J, 45°, pl, ro-sm				
ŀ					A month		i F g i i	6.25m: J, 45°, pl, ro-sm				
ł								6.3m: J, 45°, pl, ro-sm 6.42m: J, 45°, st, pl, sm				
ŀ				(6.46m: J, 40°, pl, ro-sm				
ł)0				6.5m: J, 40°, pl, ro-sm 6.51m: P, sh, h	С	100	0	
ŀ								6.56m: P, sh, clay filled 3mm thick				
ŀ				101			į «Δηγγγγγγγγγγγγγγγγγγγγγγγγγγγγγγγγγγγγ	6.6m: P, sh, clay filled				
Ļ	-			$\frac{1}{2}$		Å		3mm thick 16.67m: J, 75°, h				
ľ	/			U.		ÿ.		6.7m: J, 30°, pl, ro				
[6.86m: P, sh, un, ro 6.9m: P, sh, un, ro				
				³ ()				\ ^L From 6.9m to 7.12m Fg				
)07		ites.		7.25m: J, 45°, un, ro 7.34m: J, 65°, un, ro				
ŀ				37				7.4m: J, 65°, un, ro	С	100	38	
ŀ				10d				7.54m: P, sh, un, ro				
ŀ				10				From 7.6m to 7.76m J/Fr, SV, un, ro				
ŀ				ίU			4	7.8m: J, 50°, pl, st, ro				
ŀ)°C				From 7.9m to 8m Fg				
╞	8			$\left(\right)$								
ŀ)07				8.12m: P, sh, un, ro				
ŀ				37			i i j ti	8.24m: J, 45°, un,				
ŀ				Jac	venere en			ro-sm, clay lined 1mm	с	100	22	
ŀ								thick 8.32m: J, 20°, pl, ro-sm				
ł				(\mathbf{U})				18.35m: J, 20°, pl, ro-sm				
ľ) $^{\circ}$				^L 8.4m: J, 20°, pl, ro-sm 8.64m: P, sh, un, ro				
I	0.0	0		3				8.7m: J, 70° to 80°, pl			ļ	
[8.8	° CORE LOSS - 0.2m		\bigvee				From 8.75m to 8.8m Fg 8.8m: CORE LOSS:	с	0	0	
L	9 9.0			\bigtriangleup				200mm	Ľ	ļ	Ļ	
		AGGLOMERATE - Medium strength, moderately weathered,		37				From 9m to 9.25m Fg	С	100	0	
ŀ	_	brown aggiomerate (Matrix washed		107						1		
ŀ		5 out during drilling)		${\succ}$			\searrow	9.25m: CORE LOSS:	c	71	0	
ŀ	9.3	5 CORE LOSS - 0.1m		50				100mm From 9.35m to 9.55m	ĺ _	1		
ŀ	9.5	AGGLOMERATE - As above, 9.0m		5				Fg	c	50	0	
ŀ		CORE LOSS - 0.05m		\approx				9.55m: CORE LOSS: 50mm	۴		۲°	
ł		AGGLOMERATE - High strength,		$^{2}(]$				∖ 9.7m: P, sh, st, sm			1	
ł		slightly weathered, brown-grey agglomerate)07				\ ^L 9.72m: J, 70°, h	C	94	25	
ŀ		aggiomerate		۶Č				9.79m: P, sh, un, ro 9.86m: P, sh, un, ro		ł		PL(D) = 0.13
				<u> </u>				-I	I	.1		

WATER OBSERVATIONS: Free groundwater observed due to drilling fluids

REMARKS:

Preferred route (E2), approx Ch 2870 on centreline * Surface levels interpolated by client from surface terrain model and are approximate only.

- **SAMPLING & IN SITU TESTING LEGEND**
- Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample A D B U W C
- Core drilling
- PICS INVG LEGEND

 pp
 Pocket penetrometer (kPa)

 PID Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength Is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

CHECKED Initials: Date:



Douglas Partners Geotechnics · Environment · Groundwater

CLIENT: PROJECT: LOCATION: Opus International Consultants (NSW) Pty Ltd Tillegra Dam, Diversion of Salisbury Road Localities of Bandon Grove, Munni and Underbank
 SURFACE LEVEL:
 182.0 AHD*

 EASTING:
 376916

 NORTHING:
 6425026

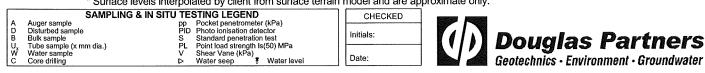
 DIP/AZIMUTH:
 90°/-

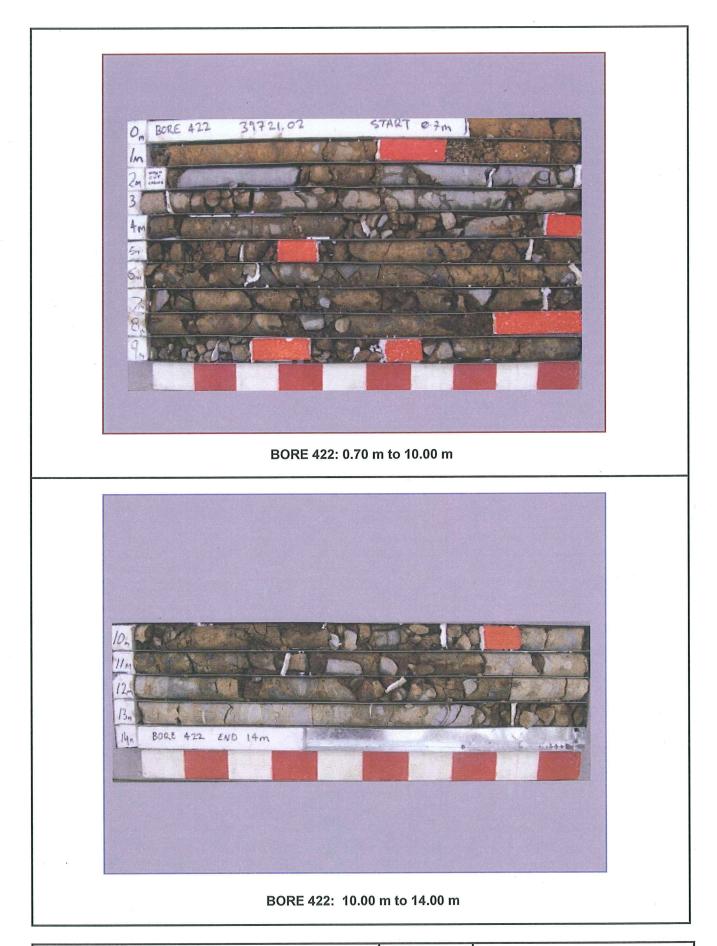
BORE No: 422 PROJECT No: 39721.02 DATE: 26-28 May 08 SHEET 3 OF 3

_	Description	Degree of Weathering	Dic	Rock Strength	Fracture	Discontinuities	Si	ampli	ng &	In Situ Testing
교 Depth (m)	of Strata	Degree of Weathering ﷺ ≩ ≩ ⊗ ድ ଝ	Graph	Strendth Medium High Key High Key High Kater	Spacing (m) 6.50 5.50 5.50 5.50 5.50 5.50 5.50 5.50	B - Bedding J - Joint S - Shear D - Drill Break	Type	Core Rec. %	RaD %	Test Results & Comments
112	AGGLOMERATE - High strength, slightly weathered, brown-grey agglomerate (continued)					From 10m to 10.12m Fg 10.2m: J, 70°, un, ir, ro ∖ 10.33m: J, 20°, pl, sm	с	94	25	Commone
		Anna Anna Anna Anna Anna Anna Anna Anna Anna)°C			10.35m: J, SV, ir, partially h From 10.4m to 10.75m Fg	с	100	0	
10.75	CORELOSS - 0.1m)oč			10.75m: CORE LOSS:	с	50	0	
- 5- 11 - 5- 11	AGGLOMERATE - High to very high strength, slightly weathered, grey-blue agglomerate	The same rate and the same rate to the same rate and the same rate				100mm 10.9m: P, sh, un, ro From 11.1m to 11.5m J/Fr, SV to 70°, un, ro, partially h	с	100	0	
						11.53m: P, sh, un, ro 11.6m: J/Fr, SV, un, ro 11.76m: P, sh, un, ro 11.84m: J, 45°, h 11.89m: P, sh, un, ro 12.22m: J, 70°, un, ro 12.42m: P, sh, h 12.49m: J, 45°, un,	С	100	58	PL(D) = 1.9MPa
 	Rockmass fresh with staining below 13m					ro-sm 12.65m: J, 45°, un, ro-sm 12.68m: J, 45°, un, ro 12.72m: J, 45°, un, ro 12.83m: P, sh, pl, ro 13.95m: P, sh, un, ro 13.2m: P, sh, un, ro 13.39m: P, sh, un, ro 13.49m: P, sh, h, calcite 13.57m: P, sh, h, calcite 13.63m: J, 45°, h 13.67m: J, 45°, h 13.67m: J, 45°, h	С	100		PL(D) = 1.8MPa
	Bore discontinued at 14.0m, limit of investigation					Calcite vein -13.71m: J, 45°, un, ro -13.75m: J, 45°, pl, ro From 13.8m to 14m Fg	С	100	0	
	on 3000 Truck DRILI BORING: Solid flight auger to 0.7m (LER: J Simor		6) LO	GGED: Harris	s CASI	NG:	NW1	to 8m	

WATER OBSERVATIONS: Free groundwater observed due to drilling fluids REMARKS: Preferred route (E2), approx Ch 2870 on centreline

ARKS: Preferred route (E2), approx Ch 2870 on centreline * Surface levels interpolated by client from surface terrain model and are approximate only.





DIVERSION OF SALISBURY ROAD TILLEGRA DAM PROJECT





CLIENT: PROJECT: LOCATION:

Opus International Consultants (NSW) Pty Ltd Tillegra Dam, Diversion of Salisbury Road Localities of Bandon Grove, Munni and Underbank

SAMPLING & IN SITU TESTING LEGEND

Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling

A D B U W C

J IESTING LÉGEND pp Pocket penetrometer (kPa) PID Photo ionisation detector S Standard penetration test PL Pioti Load strength (Is(50) MPa V Shear Vane (kPa) ▷ Water seep ₹ Water level
 SURFACE LEVEL:
 202.0 AHD*

 EASTING:
 376866

 NORTHING:
 6425265

 DIP/AZIMUTH:
 90°/--

BORE No: 423 PROJECT No: 39721.02 DATE: 14-26 May 08 SHEET 1 OF 4

	Description	Degree of Weathering A ₹ ≹ % % 2 #	Rock	Fracture	Discontinuities	Sa	ampli	ng &	n Situ Testing
Depth (m)	of	Weathering	Strength		B - Bedding J - Joint				Test Result
(m)	Strata	₩¥¥%%%₩ ₽	Ex Low Very Low Low High Very High	0.10 0.10 1.00	S - Shear D - Drill Break	Type	S S	RQD %	& Comments
	SILTY CLAY AND GRAVEL - Hard,								
-	brown silty clay and gravel	10							
		l l'	(
0.7	GRAVEL AND CLAY - Extremely					С	100	0	
	weathered brown gravel and clay (with soil like properties), with					С	100	0	
. 1	general composition of clay with								
-1	embedded fine to coarse sized subrounded fragments of	et a							
	agglomerate and lithic sandstone	l l l l l l l l l l l l l l l l l l l							
								1	
		Pol	1						
			1	a second a s					
		Pol				c	100	0	
		0				ľ			
		Pol							
2		111108							
		S S							
			1						
		8							
						С	100	0	
-3									
-	•					c	57	0	
3.15	CORE LOSS - 0.15m				3.15m: CORE LOSS: 150mm				
3.3	GRAVEL AND CLAY - As above						1		
			1			С	57	0	
						-			
		Pot of	1						
3.9	CORE LOSS - 0.14m				3.9m: CORE LOSS:				
- 4 4.04					140mm				
4.14					4.14m: CORE LOSS:	С	48	0	
					340mm				
. 4.48	GRAVEL AND CLAY - As above	TITIE			1				
				anna one o					
		70							
						c	51	0	
4.92	CORE LOSS - 0.2m				4.92m: CORE LOSS:		1		
G: Trac	k Mounted DRI	LLER: J Simon (AF	PS)	LOGGED: Hand	lley/Harris CAS	ING:	NW	to 8.1	lm
	BORING: Solid flight auger to 0.7m	(TC bit refusal) the	en NMLC corin	g to 16.0m)	-				
		choon and due to d	rilling fluide QC	% water lose from	n 15 3m				
	DBSERVATIONS: Free groundwater S: Preferred route (E2), approx	observed due to d	niing nuus. se	70 Water 1055 1101					

CHECKED

Initials:

Date:

Douglas Partners

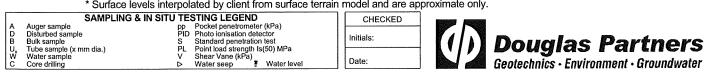
Geotechnics • Environment • Groundwater

CLIENT: PROJECT: LOCATION: Opus International Consultants (NSW) Pty Ltd Tillegra Dam, Diversion of Salisbury Road Localities of Bandon Grove, Munni and Underbank

SURFACE LEVE	L: 202.0 AHD*
EASTING:	376866
NORTHING:	6425265
DIP/AZIMUTH:	90°/

BORE No: 423 PROJECT No: 39721.02 DATE: 14-26 May 08 SHEET 2 OF 4

		Description	Degree of Weathering	jç	Rock Strength	2	Fracture	Discontinuities	Sa			In Situ Testing
	Depth (m)	of	Weathering	Log	Ex Low Very Low Low Medium Very High Ex High	Water	Spacing (m)	B - Bedding J - Joint	Type	c. %	RQD %	Test Results &
	X 7	Strata	WH W S S H S S S S S S S S S S S S S S S	G	Ex Low Very Low Low High Very High Ex High	>	0.01 0.10 0.50 1.00	S - Shear D - Drill Break	Ê	ပိမ္ဆိ	<u> </u>	Comments
1	5.0	CORE LOSS - 0.2m (continued)		\boxtimes		1		80mm 5m: CORE LOSS:		F 4		
	5.12 5.2	GRAVEL AND CLAY - Extremely		Þ٧]		120mm	С	51	0	
-		weathered brown gravel and clay (with soil like properties), with		$\mathbb{N}/$				5.2m: CORE LOSS: 300mm				
-		general composition of clay with		IX								
	5.5	embedded fine to coarse sized subrounded fragments of		łJ		ł				0.5	0	
-		agglomerate and lithic sandstone		ΓŌ	9				С	25	0	
ŀ	5.65	CORE LOSS - 0.3m		$\overline{\mathbb{N}}$		1		5.65m: CORE LOSS: 200mm				
·	5.85	GRAVEL - subangular fragments of		\square				20011111				
		CORE LOSS - 0.2m		20					С	100	0	
2-6		GRAVEL - subangular fragments of							c	47	0	
ł	6.07 6.15	lithic sandstone		\geq]		6.07m: CORE LOSS: 80mm		41		
•		CORE LOSS - 0.08m						oomin	с	100	0	
Ī		POSSIBLE BRECCIA ZONE -										
Ī		Extremely weathered, brown possible breccia zone with								400	0	
ſ		subangular gravel and clay			1				С	100	0	
[$\Delta \Delta $				From 6.65m to 7.2m				
				$\lambda \Delta$				Friable				
							M N.	N		100	0	
8-7	,					Í			С	100		
-	7.08	LITHIC SANDSTONE - Extremely		<u>Å</u>	4			- W				
		low strength, extremely weathered										
		brown lithic sandstone, with interbedded layers of silty clay (soil		[::::		1		7.25m: Fr, SV, un, ro-sm				
-		properties), friable to 7.95m										
-						1.48	▓▃▃┙╵	7.48m: P, sh, clay lined				
ŀ					N i i Mi			√7.51m: P, sh, clay lined √7.56m: P, sh, clay lined				
r				$\left \vdots \right $				1€7.63m: P, sh, clay lined	с	100	10	
ŀ								From 7.63m to 7.73m clay layer 100mm thick,				
Ļ	7.95		LOPPON.					2 by J's, 55°, pl, sm, clay smear				
<u>6</u> - 8	3	LITHIC SANDSTONE - Very low to low strength, highly weathered					7	From 7.8m to 7.95m				
Ī		brown lithic sandstone	Ni i i i					Friable clay 7.98m: P, sh, h, clay				
Ĩ								lined 1mm thick				
				ŀ				¹ 8m: J, 45°, pl, sm, clay lined 2mm thick				PL(D) = 0.52MP
							j	8.06m: P, sh, un, sm,				
							▁	F8.1m: P, sh, un, sm				
Ļ				[::::				*8.14m: P, sh, un, sm	С	100	0	
-								⁻ 8.17m: P, sh, un, sm ⁻ 8.2m: P, sh, un, ro-sm				
								*8.3m: P, sh, un, ro-sm *8.38m; P, sh, h				
<u>6 - 9</u>	•							8.44m: J, 20°, st, un,				
ŀ								ro-sm 1 8.48m: J, 45°, h				
ł				ŀ				8.54m: J, 45°, h				
ŀ								-8.58m: J, 45°, st, un, partially h				
ŀ				::::				From 8.60m to 8.7m J,				PL(D) = 2.3MPa
ŀ				[::::				65°, un, ro-sm From 8.7m to 8.8m Fr,	С	100	0	
ŀ	9.63	LITHIC SANDSTONE - High to very						SV, st, un, ro 8.85m: 2 by J's, 45°, un,				
ł		high strength, fresh, grey-blue lithic		[::::				ro-sm				
ľ		sandstone		· · · ·				From 8.95m to 8.98m Fg				
				····				-9m: J, 45°, un, ro-sm				
			FD . 101	/	0)	. ~				NILA /		~
			ER: J Simon				GGED: Hand	ley/Harris CASI	NG:	INVV	ιo 8.1	111
		BORING: Solid flight auger to 0.7m (BSERVATIONS: Free groundwater of						15.3m				
EN	IARKS	 Preferred route (E2), approx C * Surface levels interpolated by 	n 3125 on ce / client from s	entrel surfac	ine. Bore collar ce terrain mode	osin Lar	g from GL to id are approxi	8.1m while drilling. mate only.				



CLIENT: PROJECT: LOCATION:

Opus International Consultants (NSW) Pty Ltd Tillegra Dam, Diversion of Salisbury Road Localities of Bandon Grove, Munni and Underbank

SURFACE LEVE	L: 202.0 AHD*
EASTING:	376866
NORTHING:	6425265
DIP/AZIMUTH:	90°/

BORE No: 423 PROJECT No: 39721.02 DATE: 14-26 May 08 SHEET 3 OF 4

	Description	Degree of Weathering 은	Rock Strength	Fractur		Sa	ampli	ng &	In Situ Testing
Depth (m)	of Strata	Weathering Meathering Meathering Meathering Meathering Meathering	Log Ex Low Medium High Very High Ex High	(m) (m) (m)	B - Bedding J - Joint	Type	Core Rec. %	RQD %	Test Results & Comments
∑ 	LITHIC SANDSTONE - High to very high strength, fresh, grey-blue lithic sandstone (continued)				From 9.05m to 9.1m Fg 9.12m: J, 45°, un, ro 9.2m: J, 45°, un, ro 9.2m: J, 45°, un, ro 9.3m: J, 65°, h 9.45m: J, 45°, h 9.5m: J, 45°, h From 9.65m to 9.64m Fg From 9.65m to 10.1m Fr's, 45° to SV, hairline, h, calcited lined and 3 by J's, 65°, h 10.14m: P, sh, ir, st, ro 10.2m: J, 20°, h, calcite 10.47m: J, 20°, h, calcite 10.54m: J, 20°, pl, ro From 10.56m to 10.72m	с	100		
					Fr's, sh to 45°, h, calcite hairline, h 10.77m: P, sh, ir, st, ro From 10.8m to 11.3m Fr, SV, partially h, calcite	с	100	0	
					11.1m: P, sh, un, ro 11.33m: P, sh, un, ro 11.38m: J, 30° to sh, un, ro 11.42m: J, 30°, pl, un, ro	с	100	20	
<u>®</u> - 12 12.15	AGGLOMERATE - High to very high				11.58m: P, sh, un, ro 11.67m: J, 30°, un, ro 11.7m: J, 45°, un, ro 11.72m: J, 45°, un, ro	c	100	0	
	strength, slightly weathered to fresh grey-blue agglomerate				11.75m: J, 45°, h 11.82m: P, sh, un, ro 12.08m: P, sh, un, ro 12.1m: P, sh, un, ro 12.2m: P, sh, un, ro 12.26m: J	с	100	23	
²⁰ - 13					^L From 12.26m to 12.65m Fg 12.68m: P, sh, un, ro 12.72m: P, sh, un, ro 12.8m: P, sh, un, ro 12.801m: J, 65°, un, ro 13.28m: P, sh, un, ro 13.4m: J, 70° to SV, h, calcite 13.48m: J, 45°, h 13.55m: J/P, sh to 45°, h un, ro	С	100	75	
⁸ - 14 - 14.56	LITHIC SANDSTONE - Very high strength, fresh, grey-blue lithic sandstone				13.57m: P, sh, calcite, vien, h 13.71m: J, 30°, h, calcite 13.75m: P, sh, un, ro 13.8m: J, 50°, h From 13.9m to 14.4m Fr, SV, h, calcite 14m: P, sh, pl, sm, calcite 2mm thickness 14.27m: P, sh, un, ro-sm 14.56m: P, sh, un, ro-sm 14.65m: P, sh, un, ro-sm 14.65m: J, 70°, h	с	100	0	PL(D) = 3.9MPa PL(A) = 3.7MPa

TYPE OF BORING: Solid flight auger to 0.7m (TC bit refusal) then NMLC coring to 16.0m)

WATER OBSERVATIONS: Free groundwater observed due to drilling fluids. 90% water loss from 15.3m.

REMARKS: Preferred route (E2), approx Ch 3125 on centreline. Bore collapsing from GL to 8.1m while drilling.

	* Surface lev	vels interpolated by client from surface terrain	model and are app	proximate on	lly.
A	SAMPLING 8 Auger sample	k IN SITU TESTING LEGEND pp Pocket penetrometer (kPa)	CHECKED		
D B U W C	Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling	PID Photo ionisation detector S Standard penetration test PL Point Load strength Is(50) MPa V Shear Vane (kPa) ▷ Water seep ¥ Water level	Initials: Date:	$(\mathcal{P}$	Douglas Partners Geotechnics • Environment • Groundwater

CLIENT: PROJECT: LOCATION:

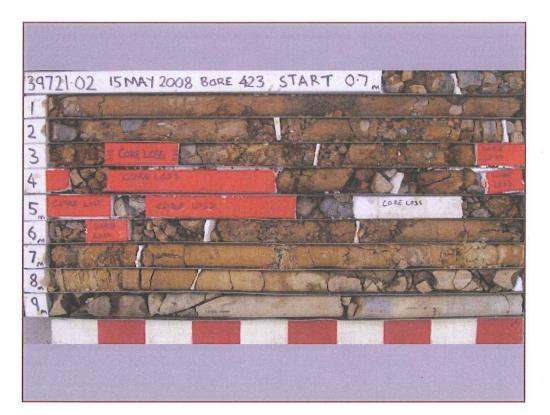
Opus International Consultants (NSW) Pty Ltd Tillegra Dam, Diversion of Salisbury Road Localities of Bandon Grove, Munni and Underbank

SURFACE LEVE	L: 202.0 AHD*
EASTING:	376866
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DIP/AZIMUTH:	90°/

BORE No: 423 PROJECT No: 39721.02 DATE: 14-26 May 08 SHEET 4 OF 4

		Description	Degree of Weathering	<u>ں</u>	Rock Strength	<u> </u>	Fracture	Discontinuities	Sa	amplii	ng & I	n Situ Testing
RL	Depth (m)	of	Wednening _	sraph ⊮Log	Very Low Medium High Ex High	Water	Spacing (m)	B - Bedding J - Joint	Type	ore c. %	RQD %	Test Results &
1\$7			M H M S L L L L L L L L L L L L L L L L L L	E C B	Very Low Low Medium Very High Ex High	0.01	0.10	S - Shear D - Drill Break	ΓĒ.	ပည္	R	Comments
186 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	- - - - 15.95 - 16 16.0	LITHIC SANDSTONE - Very high strength, fresh, grey-blue lithic sandstone (continued)				a solo data. Shina dataf adan anan data nisa shina kana taka taka s		15.25m: J, 45°, h 15.33m: P, sh, un, ro 15.4m: J, 65°, pl, un, ro, calcite 15.5m: J, 65°, pl, un, ro, calcite 15.6m: J, 65°, pl, un, ro, calcite 15.68m: P, sh, un, ro 15.7m: P, sh, un, ro	С	100	0	
18	- 10 16.0 ⁻	Borehole) Bore discontinued at 16.0m, limit of investigation				an Anna Addah Maada Kanada Annada Annada Kanada Kanada Kanada Annada Annada		15.92m: P, sh, h 15.95m: CORE LOSS: 50mm				
185	- 17											
184	- 18 - - - - -					200 (2000) 2000 (2000) 2000 (2000) 2000 (2000) 2000 (2000) 2000 (2000)						
183	- 19											
Ш												
			ER: J Simon (GED: Hand	ley/Harris CASI	NG:	NW t	o 8.1	m
		BORING: Solid flight auger to 0.7m (BSERVATIONS: Free groundwater of						15.3m.				
	MARKS	-										

	* Surface le	evels interpolated by client from surface terrain	n model and are ap	pproximate only.
	SAMPLING	& IN SITU TESTING LEGEND	CHECKED	
A D B U W C	Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling	pp Pocket penetrometer (kPa) PID Photo ionisation detector S Standard penetration test PL Point load strength Is(50) MPa V Shear Vane (kPa) ▷ Water seep ₹ Water level	Initials: Date:	Douglas Partners Geotechnics • Environment • Groundwater



BORE 423: 0.70 m to 10.00 m



BORE 423: 10.00 m to 16.00 m

DIVERSION OF SALISBURY ROAD TILLEGRA DAM PROJECT



Appendix K

2-D Stability Analysis - Large Scale Slide in Domain 1 (Section AA')

Tillegra Dam Storage Rim Stability Analysis SlopeW 2-D Analysis

c' = 0 kРа Ф = 12°

SlopeW 2-D Analysis	nalysis	Circle Clans	c' = 0 kPa		
Section AA from	Section AA from Report GN31A Analysed - reference Figures 1A & 2A	Assumed Silp Plane Strength Parameters	- 21 = Φ		
		PZ3 (with Dam) (WT -30m)	PZ4 (with Dam) (WT -15m)	PZ5 (without Dam)	
Case	Failure Plane Description	FOS (Ordinary)	FOS (Ordinary)	FOS (Ordinary)	Comment
-	2.68 degree plane from natural surface level RL139.95 (CH 1175) to exit at toe, RL90.77 (CH 2225)	3.355	3.032	3.190	
7	5 degree plane from natural surface level RL 139.95 (CH 1175) to intersection of flat plane at RL89.68 (CH 1749.6) continuing to exit at CH 2250	2.271	2.098	2.194	PZ4: Failure Plane strength parameters to obtain FOS = 1.0, c° = 0 kPa, ϕ = 5.788° PZ5: Failure Plane strength parameters to obtain FOS = 1.0, c° = 0 kPa, ϕ = 5.555°
ЗА	5 degree plane from natural surface RL152.3 (CH 1223.8) to intersection of flat plane at RL123.89 (CH 1548.5) continuing to exit at CH 1950	3.780	3.351	3.391	
B	Slip planes as for 3A above but with 45 degree exit at RL131.33 (CH 1875)	3.766	3.335	3.358	
4	8 degree plane from natural surface RL139.95 (CH 1175) to intersection of flat plane at RL89.68 (CH 1532.7) continuing to exit at CH 2250	2.536	2.354	2.431	
a	8 degree plane from natural surface RL177.4 (CH1335.3) to intersection of flat plane at RL131.33 (CH 1661.7) continuing to exit at CH 1875	t 1.550	1.347	1.350	
۵	8 degree plane from natural surface level RL194.8 (CH 1423.4) to exit at toe, RL131.33 (CH 1875)	1.360	1.159	1.159	PZ4: Failure Plane strength parameters to obtain FOS = 1.0, c² = 0 kPa, Φ = 10.39° PZ5: Failure Plane strength parameters to obtain FOS = 1.0, c² = 0 kPa, Φ = 10.39°
۲	8 degree plane from natural surface RL177.4 (CH1335.3) to intersection of flat plane at RL89.68 (CH 1959.4) continuing to exit at CH 2250	1.345	1.211	1.267	PZ4: Failure Plane strength parameters to obtain FOS = 1.0, c' = 0 kPa, Φ = 9.958° PZ5: Failure Plane strength parameters to obtain FOS = 1.0, c' = 0 kPa, Φ = 9.52°

Ordinary method was used to calculate the FOS for all cases Note:

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20/09/2008

Tillegra Dam Storage Rim Stability Analysis SlopeW 2-D Analysis

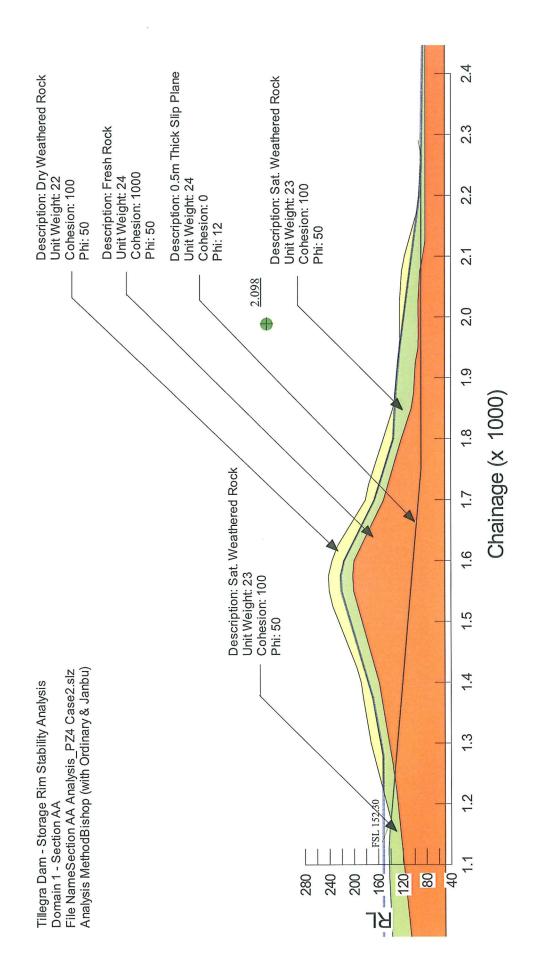
Section AA from Report GN31A Analysed - reference Figures 1A & 2A

c' = 1000 kPa Φ = 40° Assumed Slip Plane Strength Parameters

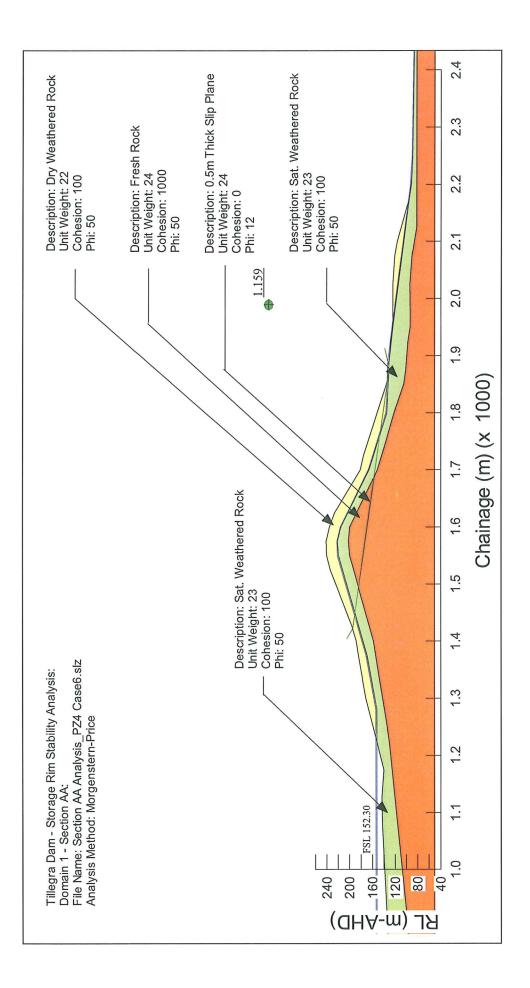
	lam)	ry) Comment								
1	PZ5 (without Dam)	FOS (Ordinary)		20.166		i			14.873	14.296
	PZ4 (with Dam) (WT -15m)	FOS (Ordinary)	,	19.787		,		•	14.873	14.074
	PZ3 (with Dam) (WT -30m)	FOS (Ordinary)		,		'n			'n	
Section AA from Report GN31A Analysed - reference Figures 1A & 2A		Failure Plane Description	2.68 degree plane from natural surface level RL139.95 (CH 1175) to exit at toe, RL90.77 (CH 2225)	5 degree plane from natural surface level RL 139.95 (CH 1175) to intersection of flat plane at RL89.68 (CH 1749.6) continuing to exit at CH 2250	5 degree plane from natural surface RL152.3 (CH 1223.8) to intersection of flat plane at RL123.89 (CH 1548.5) continuing to exit at CH 1950	Slip planes as for 3A above but with 45 degree exit at RL131.33 (CH 1875)	8 degree plane from natural surface RL139.95 (CH 1175) to intersection of flat plane at RL89.68 (CH 1532.7) continuing to exit at CH 2250	8 degree plane from natural surface RL177.4 (CH1335.3) to intersection of flat plane at RL131.33 (CH 1661.7) continuing to exit at CH 1875	8 degree plane from natural surface level RL194.8 (CH 1423.4) to exit at toe, RL131.33 (CH 1875)	8 degree plane from natural surface RL177.4 (CH1335.3) to intersection of flat plane at RL89.68 (CH 1959.4) continuing to exit at CH 2250
Section AA Irom		Case	-	8	A T	æ	4	ى م	ω	7

Ordinary method was used to calculate the FOS for all cases Note:

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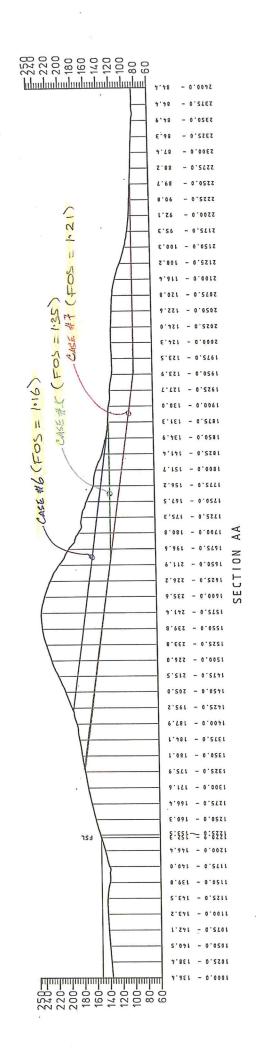






B. Failure Planes Above FSL 152:3

Recovering Bofile PZK - Dan in Place c'= 04Pa Assumed Slip Plane Strength Parameters



REDUCTION RATIO 1:4000 METRES

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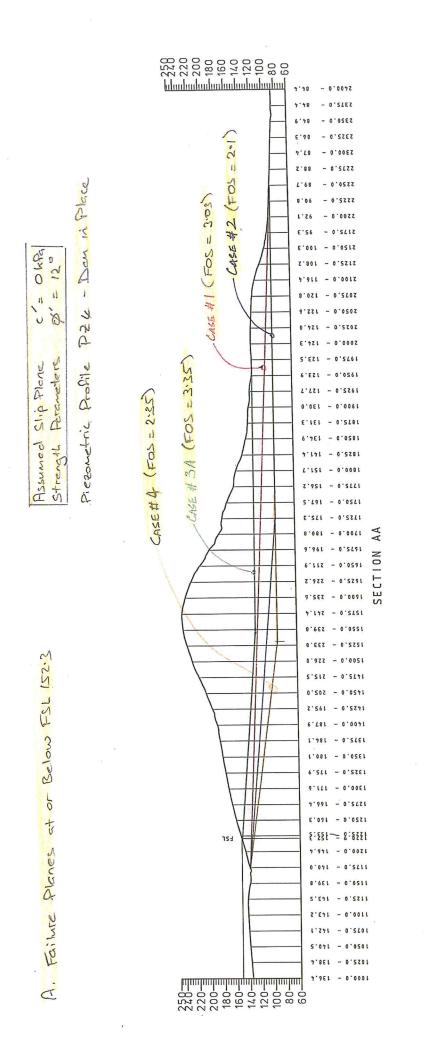
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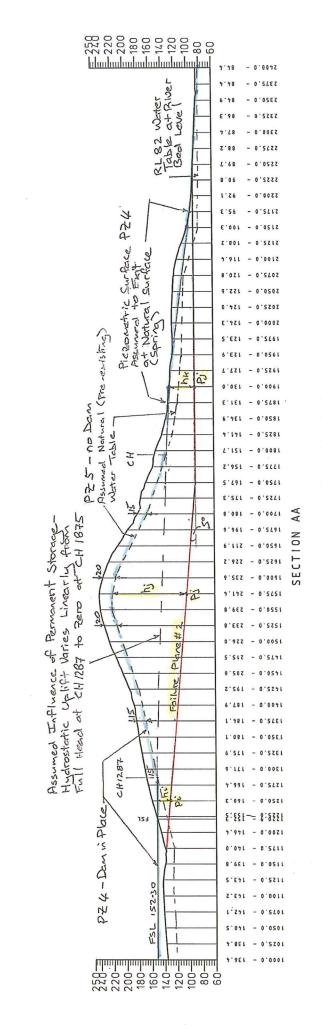
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19 September 2003.

Pore Pressure Model Adopted tar SLOPEW Analysis

Place Piezometric Surface with Dan in J 1 2d



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Pressure

Pore

REDUCTION RATIO 1:4000 METRES

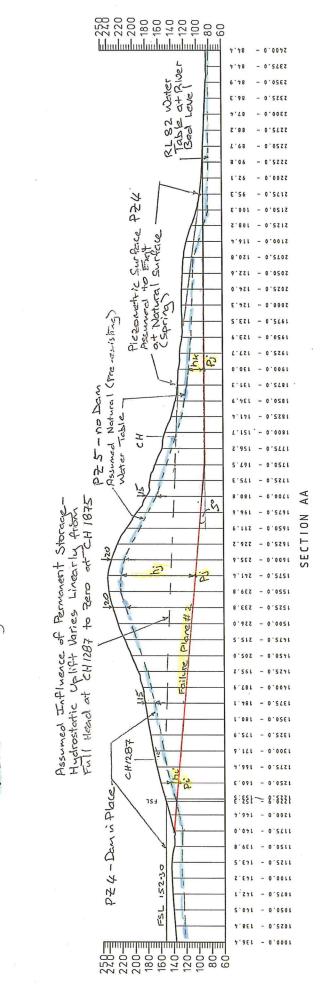
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19 September 2008.

Pore Pressure Model Adopted for SLOPEW Analysis

PZS - Re-existing Plezonetric Surface (No Dan)



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Pressure

Pore

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REDUCTION RATIO 1:4000 METRES