

Lands Soils & Geology Chapter

Appendix 7A

Historic BH Logs

(Application Area 2022)







tms environment ltd 53 Broomhill Drive, Tallaght, Dublin 24, Ireland. Tel: +353-1-4626710	BOREHOLE LOG	Sheet 1 of 2 BOREHOLE NO.BH01
GENERAL DETAILS Project No: 13517 Client: Irish Asphalt Ltd. Site Name: Kinnegad Quarry Grid Ref: 257053.911/243177.2 Ground Level: 85.337 Top of Casing: 85.853 Total Depth: 36 meters Commenced: 20/10/2008 Completed: 20/10/2008 Contractor: Dunnes Drilling Serve Machine: Atlas Copco Drilling Method: Air Rotary Logged by: Phoebe Conway, TM DRILLING DETAILS Ground level - 6mbgl: drilled at 6 - 36mbgl: drilled at 8-inch diar Casing diameter: 8-inch to 6mbg WATER WATER Water strike at 3mbgl Estimated Yield: 400 gallons per FINAL INSTALLATION Left as open hole NOTES Drilling stopped at 36mtrs as no	42 vices Ltd IS Environment Ltd.one ver- noter of diameter. neter of diameter. neter of the diameter. neter of the diameter. neter of the diameter of the diam	trike sealed off with casing



Depth (m) Lithology Legend Construction 0 Paralem light group onidized line stars with sticks also also also also also also also als	tms	environment ltd	Project No. 13517 Site Name: Kinnegad Quarry Borehole No. BH01		Sheet 2 of 2 NOT TO SCALE
0 Persken light men enidieed lines tere with sticker also and a line for the second state of the second st	Depth (m)		Lithology	Legend	Construction
2 Droken night grey oxidised limestone with sticky clay and calcite 4 Broken light grey oxidised limestone with sticky clay and calcite 6 with some darker grey limestone pieces 10 Medium grey limestone with slight oxidation and calcite 11 Medium grey limestone with calcite 12 Medium grey limestone with calcite 18 Softer rock - Light grey limestone, no oxidations 18 Medium grey limestone with slight oxidation 19 Medium dark grey limestone with no oxidation or calcite 19 Medium to dark grey limestone with no oxidation or calcite 19 Construction of calcite 10 Construction of calcite 10 Construction of calcite 11 Construction of calcite 12 Construction of calcite 13 End of hole at 36m 14 Construction of calcite 14 Construction of calcite 14 Construction of calcite 14 Construction of calcite 15 End of hole at 36m 16 Construction of calcite 16 Construction of calcite 16	(m) 0 2 4 6 8 10 12 14 16 18 20 24 26 30 22 24 26 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 70	Broken light grey oxidised Broken light grey oxidised with some darker grey lim Medium grey limestone wi Softer rock - Light grey lin Medium grey limestone wi Medium to dark grey lime End of hole at 36m	d limestone with sticky clay and calcite limestone with sticky clay and calcite estone pieces th slight oxidation and calcite vith calcite nestone, no oxidations th slight oxidation sectone with no oxidation or calcite or methods of the state o		



Lands Soils & Geology Chapter

Appendix 7B

2021 Site Investigation Results

Monitoring Wells & Production Wells Detail

The Monitoring Wells (MWs) are essentially Site Investigation (SI) BHs, which were drilled and completed by Petersen Drilling Ltd. using Rotary ODEX technique with reference to industry guidelines (Guidance on the design and installation of groundwater quality monitoring points, EA).

The drilling diameter was 120 mm and installation consisted of 50 mm ID HDPE standpipe with slotted casing used in the water-bearing sections. The annulus was filled with 10mm gravel around the slotted casing. Bentonite clay was used as a seal to surface. Temporary ODEX casing was used for drilling close to ground level and was removed upon completion after the HDPE standpipe was installed.

Raised lockable headworks, set within a concrete plinth, completed the installations. The headworks extend 0.5m above and below ground level.

Summary Information of note is presented in Table Appendix 7B_A, overleaf.

Borehole Logs for these 2021 MW Installations are also presented in this Appendix.

Figure 7.8 of the LSG Chapter presents MW Locations.

MWs were installed across the entire landholding and not just the application area.

In addition to the SI MWs, three Production Wells (PWs) were drilled in the application area for the Water Assessment: The PW IDs = ONGW18S, ONGW18D & ONGW19. Summary details for those three PWs are also presented in the Summary Table Appendix7BA. PW Logs are presented in The Water Chapter's Appendices.



Table Appendix 7B A: Geology summary of 2021/2022 well drilling programme

(Refer to Figure 7.8 for locations)

Info	Name	Easting	Northing	Location	Depth (m)	Base of BH Elev (m OD)	Lithology (m bgl)
	ONGW12	657,500	744,200	Adjacent to sandpit near northern settlement	10.7	63.77	0 – 3.5 = medium dense, brow n, silty gravelly SAND with cobbles and boulders 3.5 – 9.7 = medium dense, fine, grey/brow n silty SAND
	ONGW13	657,271	742,722	west of	80.5	6.21	9.7 - 10.7 = firm to stiff grey, sitty gravelly CLAY with high amount of cobbles 0 - 0.5 = hardcore fill MADE GROUND 0.5 - 3.5 = grey clayey fill, MADE GROUND 3.5 - 7.2 = firm, grey sitty CLAY possible fill
				quarry sump			7.2 – 9.8 = firm to stiff, brow n CLAY, frequent limestone fragments and boulder, possible fill 9.8 – 80.5 = strong to very strong grey LIMESTONE with rare fractures
	ONGW14	657,038	743,167	Centre of application area	60	10	0.3 – 1.3 = weak, highly fracture LIMESTONE 1.3 – 4.8 = medium strong, grey LIMESTONE, occasional fractures 4.8 – 7.5 = extremely weak, brow n, weathered LIMESTONE with brow n clay infill 7.5 – 10.0 = strong grey LIMESTONE with occasional to rare fractures
Peterssen Drilling Monitoring Wells [MW] Site Investigation BHc (2021)	ONGW15S	657,216	743,355	Immediately north of balancing pond	80	6.7	0 – 0.3 = firm brown TOPSOIL 0.3 – 1.1 = firm, brown silty sandy CLAY 1.1 – 1.7 = firm to stiff light brown silty sandy gravelly CLAY with frequent limestone fragments, possibly highly weathered rock 1.7 – 30.0 = strong grey LIMESTONE with frequent fractures and occasional clay infill
Drilled over the entire landholding.	ONGW15D	657,215	743,356	Immediately north of balancing pond	25	61.67	30.0 - 80.0 = strong to very strong grey Links i ONE with rare fractures, occasional calcite 0 - 0.3 = firm brow n TOPSOL 0.3 - 1.7 = firm, brow n silty sandy CLAY 1.7 - 3.5 = medium strong grey weathered LIMESTONE 3.5 - 25.0 = strong to very strong grey LIMESTONE with occasional fractures
	ONGW16	657,040	743,553	Northw est of application area, close to boundary of ow nership	27.5	57.21	0 – 1.0 = hardcore fill MADE GROUND 1.0 - 3.5 = medium dense, brown silty gravelly SAND 3.5 – 6.4 = soft to firm brown sandy SILT 6.4 – 10.10 = stiff to very stiff dark grey blackish silty, gravelly CLAY with occasional cobbles 10.10 – 27.5 = w eak to medium strong laminated greyish black MUDSTONE SHALE, occasional we eathered ioints
	ONGW17	657,166	743,484	Immediately north of application area. Adjacent to road overpass	80	4.27	0 – 0.3 = soft brown TOPSOL 0.3 – 3.5 = firm to stiff, silty sandy gravelly CLAY with frequent limestone boulder 3.5 – 4.0 = weak to medium strong grey weathered LIMESTONE 4.0 – 19.5 = very strong grey limestone with rare fractures 19.5 – 20.0 = minor fractured zone 20.0 - 80.0 = very strong grey limestone with rare fractures
Briedy Drilling	ONGW18S	657,034	743,171	6 m from ONGW14	9	58.32	0 – 2 = fill material 3 – 7 = strong grey limestone 7 – 8.5 = clay with gravels 8.5 – 9.0 = strong grey limestone
Production Wells [PW] in Application Area (2022)	ONGW18D	657,031	743,174	6 m from ONGW14	63	7	0 – 2 = fill material 3 – 7 = strong grey limestone 7 – 8.5 = clay with gravels 8.5 – 63 = strong grey limestone Small 0.5 – 1.0 m clay bands logged at 19 m, 31 m, 48 m.
	ONGW19	657,093	743,298	Southw est of balancing pond	63	4.79	0 – 63 = strong grey limestone

Pe	eterse	en Dril	lling S	Service	es Lt	d.	on beł	nalf of				В	reed	on (Ceme	nt					Rotary	/ Drillir	ng Log						
Depth of			Drille	ar's Strat	tum				Sample /	Hole / Te	est Details	3		-	Drilling	Details					Standard	I Penetra	tion Test					Ке	netix
Stratum Top (m)			Dillie	escriptio	n			No	Туре	Insitu test	From (m)	To (m)	Liner Dia (mm)	Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
									RO		0.00	10.70		0000		100	grey											0.00	0.00
0.00	Medium	dense brown	n silty gravel	ly SAND with	frequent	cobbles and	d boulders																						
3 50		Modi	ium donco fi	no brownich d	arov cilty S																								
5.50		Medi	uni dense n	ne brownish g	grey sitty c																								
9.70		Firm to sti	ff grey high o	cobble conter	nt silty grav	velly CLAY																							
								<u> </u>																					
	Shift o	details						Dri	lling E	quipm	ent De	etails								G	round	Water	Reco	rd			Ba	ckfill (m	1)
Start time (hhmm)	Hole (m)	Water (m)	Casing (m)	Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit	Туре	Casing	Туре	Bit serial No	Flush	Polymer	Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)	Туре	From (m)	To (m)
1235				C RO	140.00	0.00	10.70				DTH B	utton Bit	Sim. C	asing	115	Air	No	1345	3.50	3.50	Very Slow	0.00	0.00	0.00	0.00	N/S			
Finish time (hhmm)	Hole (m)	Water (m)	Casing (m)			0.00										, ui		1545	9.50	9.50	Medium	0.00	0.00	0.00	0.00	10.50			
1555	10.70	3.50	10.70																										
Time from	Duration (hhmm)	Remark	s or detail	s of any ad	ditional	testing in	formation,	Daywor	ks			SPT I.I	D. Numb	er	PD	01	Calibrat Date	tion	01/02	2/2021	Proj	ect T	Title						
1235		CAT Scann	ned: Yes									SPT Ro	od Type		23/8 F	Regular	Ratio	ergy	0.	00				K	inne	hene			
1235		Permit Com	npleted: Yes									Drilling	Crew D	etails					CSC	S No			-			-guu			
												Suppor	t Operat	ive		J	ohn Why	te			Weathe	r		Fi	ne		Project No	40-	21
												Lead D	riller			Step	han Pete	ersen			Date			20/10	/2021		Day	Wedne	esday
												Site cat	egory					Green			Rig typ	e		Knebe	I HY79	,	Borel	nole Num	ber
												Project	Engine	ər			F	P Bartley	,		Inclinat	ion		Orienta	ition		ON	IGW 1	2
												Lead D	riller's si	ignatur	e						Sheet			1	of	2	Comp	leted	Y

Pe	eterse	en Dri	lling S	Service	es Lt	d.	on be	half of				B	reed	on (Ceme	nt					Rotary	/ Drillir	ng Log						
Depth of			Drill	or's Strat	um				Sample /	Hole / Te	est Details			-	Drilling	Details					Standard	d Penetra	tion Test					Kę	metix
Stratum Top (m)			D	escriptio	n			No	Туре	Insitu test	From (m)	To (m)	Liner Dia (mm)	Core run time (hhmm)	l otal core Recovery (m)	Flush Return %	Flush Colour	Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	flush level (m)
																													-
	Shift d	lotaile		1				Dril	ling F	auinm	ent De	tails								6	round	Water	Reco	rd			Ba	ckfill (n	n)
Start time	Hole	Water	Casing	Casing (C) Open Hole (RO)	Dia.	From	То	Barrel	Liner	Core Dia	Bit 1	ype	Casing	Type	Bit serial	Flush	Polymer	Time of	Depth Struck	Casing	Inflow	5 min	10 min	15 min	20 min	Depth Sealed	Type	From	То
(hhmm)	(m)	(m)	(m)	Coring (RC)	(mm)	(m)	(m)		Туре	(mm)					No			strike	(m)	(m)						(m)	.,,,,	(m)	(m)
0820	10.70	4.30	10.70																										
(hhmm)	(m)	(m)	(m)																										
0940																													
Time from	Duration (hhmm)	Remark	s or detail	s of any add	ditional	testing in	formation,	Daywor	ks	·		SPT I.I	D. Numb	er	PD	D1	Calibrat	tion	01/02	2/2021	Proj	ject 7	Title						-
												SPT Ro	od Type		2 3/8 F	Regular	SPT En	ergy	0.	00				V	:				
												Drilling	Crew D	etails					CSC	S No	1			n	inne	gau			
												Suppo	rt Operat	ive		J	ohn Why	te			Weathe	er		Fi	ne		Project No	40	-21
												Lead D	riller			Step	han Pete	ersen			Date			21/10	/2021		Day	Thur	sday
												Site ca	tegory					Green			Rig typ	e		Knebe	HY79		Borel		nber
												Project	Engine	er	<u>م</u>		F	' Bartley	/		Inclinat	ion		Orienta	ation	2	Comp	IGVV 1 leted	2
												Leau D	11161 3 5	gnatur	C						Sheet			2	U	2	comp	icieu	1



Summary of Standpipe Installation



P	eterse	en Dril	ling S	Service	es Lto	J.	on bel	half of				В	reed	on (Ceme	nt					Rotary	/ Drillir	ng Log						
Depth of			Drille	or's Strat	um				Sample /	Hole / Te	st Details			-	Drilling	J Details					Standard	l Penetra	tion Test					Kę	ynetix
Stratum Top (m)			Dille	escriptio	n			No	Туре	Insitu test	From (m)	To (m)	Liner Dia (mm)	Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
0.00																													
0.00			Hardcore	Fill MADE GI	ROUND				-											-									
0.50			grey clayey	/ Fill MADE G	ROUND																								
2 50			Firm		aaihla fill																								
3.50			Firm grey s	SIILY CLAY PO	SSIDIE IIII																								
7.20	Firm to stiff	f brown CLA	Y with frequ	ent limestone fill	e fracments	s and bould	ler possible																						
9 80		Strong to	Verv strong	arev LIMEST	ONE rare	fractures			-											-									
0.00		ottong to	rony onlong	9.09 2201		naotaroo																-			-				
Start time	Shift d	letails	Casing	Casing (C)	Dia	From	То	Dri			ient De	etails	1		Bit sorial	1	1	Time of	Depth	G	round	Water	Reco	rd		Depth	Ba	ckfill (n	n)
(hhmm)	(m)	(m)	(m)	Open Hole (RO) Coring (RC)	(mm)	(m)	(m)	Barrel	Туре	(mm)	Bit 1	Гуре	Casing	Type	No	Flush	Polymer	strike	Struck (m)	(m)	Inflow	5 min	10 min	15 min	20 min	Sealed (m)	Туре	(m)	(m)
0800				RO	154.00	0.00	11.00				DTH Bu	utton Bit	3111. C	asing	115	Air	No	0935	10.00	10.00	Slow	0.00	0.00	0.00	0.00	N/S			
Finish time (hhmm)	Hole (m)	Water (m)	Casing (m)															1535	64.50	11.00	Medium	0.00	0.00	0.00	0.00	N/S			
1650	80.00	0.00	11.00																										
																	0												
Time from	Duration (hhmm)	Remarks	s or details	s of any ad	ditional t	esting inf	formation,	Daywor	ks			SPT I.I	D. Numb	er	PE	D1	Date	tion	01/02	2/2021	Proj	ect 7	Title						
0800		CAT Scann	ed: Yes									SPT Ro	od Type		23/8 F	Regular	SPT En Ratio	ergy	0.	.00				ĸ	inne	hend			
0800		Permit Com	pleted: Yes									Drilling	Crew D	etails					CSC	S No						.yau			
		DREM (30.3	30m - 30.60	m): minor frac	cture, chan	ige in flush	to brown					Suppor	rt Operat	tive		J	ohn Why	rte			Weathe	r		Vari	able		Project No	40	-21
		DREM (36.0	00m - 39.00	m): minor frac	cture, chan	ige in flush	to brown					Lead D	riller			Step	han Pete	ersen			Date			03/11	/2021		Day	Wedn	lesday
		DREM (64.0	00m - 65.50	m): fractured	rock zone,	with some	clay infill					Site ca	tegory					Green			Rig typ	e		Knebe	I HY79		Borel	nole Num	nber
												Project	Engine	er			F	P Bartley	/		Inclinat	ion		Orienta	ation		ON	IGW 1	13
												Lead D	riller's s	ignatur	e						Sheet			1	of	2	Comp	leted	Y

P	eterse	en Dri	lling S	Service	es Lt	d.	on bel	half of				В	reed	on (Ceme	nt					Rotary	/ Drillir	ng Log						
Depth of			Drill	or's Stra	tum				Sample /	Hole / Te	est Details	3		-	Drilling	Details					Standard	l Penetra	tion Test					Кę	netix
Stratum Top (m)			D	escriptio	n			No	Туре	Insitu test	From (m)	To (m)	Liner Dia (mm)	Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
									RO		0.00	80.50		0000		100	grey											0.00	0.00
									-																				
									-																				
	Shift o	details						Dril	lling E	quipm	ent De	etails								G	round	Water	Reco	rd			Ba	ckfill (n	ו)
Start time (hhmm)	Hole (m)	Water (m)	Casing (m)	Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit	Туре	Casing	ј Туре	Bit serial No	Flush	Polymer	Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)	Туре	From (m)	To (m)
0820	80.00	0.00	11.00	RO	120.00	11.00	80.50				DIHB	utton Bit				Air	NO												
Finish time (hhmm)	Hole (m)	Water (m)	Casing (m)																										
1145																													
																		ļ											
Time from	Duration (hhmm)	Remark	s or detai	ls of any ad	ditional	testing in	formation,	Daywor	ks			SPT I.I	D. Numb	er	PD	01	Calibrat Date	tion	01/02	2/2021	Proj	ect T	Title						
1145	0030	Dayworks:	Airlift devel	opment of wel	I							SPT Ro	od Type	otaile	2 3/8 F	Regular	Ratio	ergy	0.	00				K	inne	gad			
												Suppo	rt Operat	tive		J	ohn Why	te	000	5 110	Weathe	r		Vari	able		Project	40-	21
												Lead D	riller			Step	han Pete	ersen			Date			04/11	/2021		<u>No</u> Day	Thur	sday
												Site ca	tegory					Green			Rig typ	e		Knebe	I HY79		Borel	nole Num	ber
												Project	Engine	er			F	Bartley	/		Inclinat	ion		Orienta	ation		ON	IGW 1	3
												Lead D	riller's s	ignatur	e						Sheet			2	of	2	Comp	leted	Y



Summary of Standpipe Installation



Pe	eterse	en Dril	lling S	Service	es Lto	d.	on be	half of				В	reed	on (Ceme	nt					Rotary	/ Drillir	ng Log						
Depth of			Drille	er's Strat	tum				Sample /	Hole / Te	est Details	3		0	Drilling	Details		0-16	1		Standard	l Penetra	tion Test					Ke	metix
Stratum Top (m)			De	escriptio	n			No	Туре	Insitu test	From (m)	To (m)	Liner Dia (mm)	Core run time (hhmm)	l otal core Recovery (m)	Flush Return %	Flush Colour	Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
0.00			Rock fil	II MADE GRO	DUND																								
0.30		,	Weak highly	fractured LIN	IESTONE																								
1.30		Medium s	trona arev L	IMESTONE	occasional	fractures																							
			333																										
4.80	Extrem	ely weak bro	own weather	ed karst LIM	ESTONE v	vith brown o	clay infill																						
7.50		Strong g	grey LIMEST	FONE with oc	casional fr	actures																							
10.00		Vonvot	rong grov Li	MESTONE	on, roro fro	oturoo																							
10.00		very st	Iong grey Li	IVIESTONE V	ely lale lla	actures																							
	Shift d	details						Dri	ling E	quipm	ent De	etails								G	round	Water	Reco	rd			Ва	ckfill (r	n)
Start time	Hole (m)	Water	Casing	Casing (C) Open Hole (RO)	Dia.	From	To (m)	Barrel	Liner	Core Dia	Bit	Туре	Casing	ј Туре	Bit serial	Flush	Polymer	Time of	Depth Struck	Casing	Inflow	5 min	10 min	15 min	20 min	Depth Sealed	Туре	From	To
1040	(,	()	()	Coring (RC)	140.00	0.00	2.20		.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	()			Sim. C	asing				1210	(m) 1.20	1.20	Fast	0.40	0.00	0.00	0.00	(m) N/S		(,	(,
Finish time	Hole	Water	Casing	RO	154.00	0.00	2.20				DTH B	utton Bit			115	Air	No												
(hhmm)	(m)	(m)	(m)															1											
1620	45.00	0.40	2.20																										
Time from	Duration (hhmm)	Remarks	s or details	s of any ad	ditional t	esting inf	ormation,	Daywor	ks			SPT I.I	D. Numb	er	P	D1	Calibrat Date	tion	01/02	2/2021	Proj	ect 1	ītle						
1040		CAT Scann	ed: Yes									SPT Ro	od Type		2 3/8 F	Regular	SPT En Ratio	ergy	0.	.00				k	innc	aad			
1040		Permit Corr	npleted: Yes									Drilling	Crew D	etails					CSC	S No				I.	IIIIIE	gau			
		General; yi	ield test at 4	m approx 1 l/	s							Suppo	rt Operat	tive		J	ohn Why	te			Weathe	r		Fi	ne		Project No	40	-21
												Lead D	riller			Step	han Pete	ersen			Date			29/10	/2021		Day	Fri	day
												Site ca	tegory					Green			Rig typ	e		Knebe	el HY79		Bore	hole Nun	nber
												Project	Engine	er			F	Bartley	/		Inclinat	ion		Orienta	ation		ON	IGW [^]	14
												Lead D	riller's s	ignatur	e						Sheet			1	of	2	Comp	leted	Y

Pe	eterse	en Dril	lling S	Service	es Lte	d.	on be	half of				В	reed	on (Ceme	nt					Rotary	/ Drillir	ng Log						
Depth of			Drill	ar'e Strat	hum				Sample /	Hole / Te	est Details	3			Drilling	g Details	-				Standard	d Penetra	tion Test					Kę	metix
Stratum Top (m)			Dilli	escriptio	n			No	Туре	Insitu test	From (m)	To (m)	Liner Dia (mm)	Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
									RO		0.00	60.00		0000		100	grey											0.00	0.30
																			-										
	01.14			1														l T			<u> </u>		<u> </u>						<u> </u>
Start time	Shift c	Veter	Casing	Casing (C)	Dia	From	То	Drii		quipm	ient De	etalis	1		Bit corial	1	1	Time of	Depth	G	rouna	water	Reco	ra		Depth	Ва	CKTIII (n	n)
(hhmm)	(m)	(m)	(m)	Open Hole (RO) Coring (RC) RO	(mm)	(m) 2.20	(m) 60.00	Barrel	Туре	(mm)	Bit DTH B	Type utton Bit	Casing	ј Туре	No	Flush Air	Polymer No	strike	Struck (m)	(m)	Inflow	5 min	10 min	15 min	20 min	Sealed (m)	Туре	(m)	(m)
0810	45.00	0.30	2.20																										
Finish time (hhmm)	Hole (m)	Water (m)	Casing (m)																										
1540																													
Time from	Duration (hhmm)	Remarks	s or detail	s of any add	ditional	testing in	formation,	, Dayworl	ks			SPT I.I	D. Numb	er	P	D1	Calibrat Date	tion	01/02	2/2021	Proj	ject T	Title						
1100	0230	Dayworks:	Reaming bo	rehole. Cleare	ed obstruc	ction from be	orehole					SPT Ro	od Type		2 3/8 F	Regular	Ratio	ergy	0.	00				K	inne	hene			
1410	0030	Dayworks:	Airlift develo	pment of well								Drilling	Crew D	etails					CSC	S No						guu			
		General; re	peated bore	hole collapse	around 7	m, 60-57m l	backfall					Suppo	rt Operat	tive		J	ohn Why	te			Weathe	er		Vari	able		Project No	40	-21
												Lead D	riller			Step	han Pete	ersen			Date			01/11	/2021		Day	Mor	nday
												Site ca	tegory	or			-	Green			Rig typ	e		Knebe	HY79		Borel		nber
													riller's s	ianatur	ē		F	Dartie	y		Sheet	lion		2	of	2	Comp		14 V
													11101 3 3	gnatur	u d						Sheet			2	U	2	South		'



Summary of Standpipe Installation



Pe	eterse	en Dril	lling S	Service	es Lto	d.	on bel	half of				В	reed	on (Ceme	nt					Rotary	/ Drillir	ng Log						
Depth of			Drille	er's Strat	tum				Sample /	Hole / Te	est Details	5		0	Drilling	Details		0			Standard	l Penetrat	tion Test					Ke	ynetix
Stratum Top (m)			De	escriptio	n			No	Туре	Insitu test	From (m)	To (m)	Liner Dia (mm)	run time (hhmm)	core Recovery (m)	Flush Return %	Flush Colour	Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	flush level (m)
0.00			-																										
0.00			Firm bro	wn sandy TO	PSOIL				-											-									
0.30			Firm brow	n silty gravel	ly CLAY																								
1 10	Firm to	o stiff light br	own silty sar	ndy gravelly C	CLAY with	frequent lin	nestone																						
1.10		frac	cments poss	sible highly we	eathered ro	ock																							
1.70	Strong	grey LIMES	TONE with f	frequent fract	ures and c	occasional o	clay infill																						
30.00	Strong to	Verv strong	dark grev L	IMESTONE r	are fractur	es occasio	nal kalside																						
	3	.,	5.5																										
	0.14							<u> </u>													<u> </u>								<u> </u>
Start time		details _{Water}	Casing	Casing (C)	Dia.	From	To	Dri		QUIPM Core Dia	ient De	etalis		_	Bit serial			Time of	Depth	Casing	rouna	water	Reco	ra		Depth	ва	CKTIII (r	n) ⊺₀
(hhmm)	(m)	(m)	(m)	Open Hole (RO) Coring (RC)	(mm)	(m)	(m)	Barrel	Туре	(mm)	Bit	уре	Sim C	asing	No	Flush	Polymer	strike	Struck (m)	(m)	Inflow	5 min	10 min	15 min	20 min	Sealed (m)	Туре	(m)	(m)
0945				RO	154.00	0.00	2.00				DTH Bu	utton Bit	0	doing	115	Air	No	_											
Finish time (hhmm)	Hole (m)	Water (m)	Casing (m)															-											
1645	60.00	Dry	2.00																										
Time	Duration																Calibra	tion											
from	(hhmm)	Remarks	s or details	s of any ad	ditional t	esting in	formation,	Daywor	ks			SPT I.I	D. Numb	er	PE	01	Date	erav	01/02	2/2021	Proj	ect I	itle						
0945		CAT Scann	ned: Yes									SPT Ro	od Type		23/8 F	Regular	Ratio	ergy	0.	.00				K	inne	egad			
0945		Permit Corr	npleted: Yes									Drilling	Crew D	etails		1			CSC	S No			1			5	Project	1	
		DREM (5.5	0m - 5.80m)	: fractured ro	ck zone, w	ith some cl	lay infill					Suppor	rt Operat	tive		J	ohn Why	te			Weathe	r		Fi	ne		No	40	-21
												Lead D	riller			Step	han Pete	ersen			Date			21/10	/2021		Day	Thu	rsday
												Site ca	tegory				-	Green	,		Rig typ	e Ion		Knebe	HY79		Bore		nber
													riller's e	ianatur	e		F	- Dartie)	/		Sheet	ion		1	of	2	Comr		
														gnatui	v						5			1	01	2	20114		

Pe	eterse	en Dri	lling S	Service	es Lte	d.	on be	half of				В	reed	on (Ceme	nt					Rotary	/ Drillir	ng Log						
Depth of			Drill	or's Strat	tum				Sample /	Hole / Te	est Details	3		-	Drilling	Details					Standard	l Penetrat	tion Test					Кę	netix
Stratum Top (m)			D	escriptio	n			No	Туре	Insitu test	From (m)	To (m)	Liner Dia (mm)	Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
									RO		0.00	80.00		0000		100	grey											0.00	Dry
	Shift d	letails						Dril	ling E	quipm	ent De	etails					•			G	round	Water	Reco	rd			Ba	ckfill (n	n)
Start time (hhmm)	Hole (m)	Water (m)	Casing (m)	Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit	Туре	Casing	Туре	Bit serial No	Flush	Polymer	Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)	Туре	From (m)	To (m)
0750	60.00	5.00	2.00	RO	120.00	2.00	80.00				DTH B	utton Bit				Air	No												
Finish time (hhmm)	Hole (m)	Water (m)	Casing (m)																										
1545																													
10-10																													
Time from	Duration (hhmm)	Remark	s or detail	s of any ad	ditional	testing in	formation,	Dayworl	ĸs			SPT I.I	D. Numb	er	PD	01	Calibrat Date	lion	01/02	2/2021	Proj	ect T	Title						
												SPT Ro	od Type		23/8 R	Regular	Ratio	ergy	0.	00				K	inne	gad			
												Drilling	Crew D	etails		1			CSC	S No						0	Ducient	-	
												Suppor	t Operat	ive		J	ohn Why	te			Weathe	r		Vari	able		No	40-	-21
												Lead D	riller			Step	han Pete	ersen			Date			26/10	/2021		Day	Tues	sday
												Site cat	Engine	ər			F	Green Bartlev	1		Rig typ	e ion		Knebe Orient:	ation		Boreh		iber 5
												Lead D	riller's si	ignatur	e	1		Dantoy			Sheet		1	2	of	2	Comp	leted	Y



Summary of Standpipe Installation



Pe	eterse	en Dril	lling S	Service	es Lto	d.	on be	half of				В	reed	on (Ceme	ent					Rotary	/ Drillir	ng Log						
Depth of			Drille	er's Strat	tum				Sample /	Hole / Te	est Details	5			Drilling	Details		.			Standard	l Penetra	tion Test					Kę	metix
Stratum Top (m)			Dillic	escriptio	n			No	Туре	Insitu test	From (m)	To (m)	Liner Dia (mm)	Core run time (hhmm)	l otal core Recovery (m)	Flush Return %	Flush Colour	Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)
									RO		0.00	25.00		0000		100	grey											0.00	Dry
0.00			Firm	brown TOPS	OIL																								
0.30			Firm brow	wn eilty eand																									
0.00			1 1111 510	wit sitty salidy	ULAI																								
1.70		Medi	ium strong g	rey weathere	d LIMEST	ONE																							
3.50	Str	ong to Very	strong grey	LIMESTONE	with occas	sional fract	ures																						
	Shift c	details						Dri	lling E	quipm	nent De	etails								G	round	Water	Reco	rd			Ba	ckfill (n	n)
Start time (hhmm)	Hole (m)	Water (m)	Casing (m)	Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit	Туре	Casing	у Туре	Bit serial No	Flush	Polymer	Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)	Туре	From (m)	To (m)
1550				C RO	140.00 154.00	0.00	2.10 2.10				DTH B	utton Bit	Sim. C	Casing	115	Air	No												
Finish time	Hole	Water	Casing	RO	120.00	2.10	25.00				DTH B	utton Bit				Air	No												
(hhmm)	(m)	(m)	(m)																										
1655	25.00	Dry	2.10																										
Time from	Duration (hhmm)	Remark	s or details	s of any ad	ditional t	testing in	formation,	Daywor	ks			SPT I.I	D. Numb	er	P	D1	Calibra Date	tion	01/02	2/2021	Proj	ect 7	Title						
1550		CAT Scann	ned: Yes									SPT Ro	od Type		2 3/8 F	Regular	SPT En Ratio	ergy	0.	.00				k	inna	aad			
1550		Permit Con	npleted: Yes									Drilling	Crew D	etails			1		CSC	S No				N	IIIIIe	gau			
		DREM (5.6	i0m - 5.90m)	: fractured ro	ck zone, w	vith some cl	lay infill					Suppor	rt Operat	tive		J	ohn Why	te			Weathe	r		Vari	able		Project No	40-	-21
												Lead D	riller			Step	han Pete	ersen			Date			26/10	/2021		Day	Tues	sday
												Site ca	tegory					Green			Rig typ	e		Knebe	I HY79		Boreh		iber
												Project	Engine	er			F	' Bartley	/		Inclinat	ion		Orienta	ation		ON	1 ۷۷ ق	5B
												∟ead D	riller's s	ignatur	re						Sneet			1	ot	2	Comp	leted	Y

Pe	Petersen Drilling Services Ltd. on behalf of													Breedon Cement								Rotary Drilling Log										
Depth of			Drill	or's Strat	tum				Sample /	Hole / Te	st Details			-	Drilling	Details					Standard	d Penetra	ion Test	n Test Keynet								
Stratum Top (m)			D	escriptio	n			No	Туре	Insitu test	From (m)	To (m)	Liner Dia (mm)	Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)			
	Shift c	details						Dril	lling E	quipm	ent De	etails								G	round	Water	Reco	rd			Ba	ckfill (n	n)			
Start time (hhmm)	Hole (m)	Water Casing (m) (m)		Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit T	Type Casing Type		Туре	Bit serial No	Flush	Polymer	Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)	Туре	From (m)	To (m)			
0810	25.00	5.00	2.10																													
Finish time (hhmm)	Hole (m)	Water (m)	Casing (m)																													
1055																																
												1					Calibrat															
Time from	Duration (hhmm)	Remarks or details of any additional testing information, Dayworks												er	PD	01	Date SPT En	erav	01/02	2/2021	Proj	ect 1	itle									
1350	0045	Dayworks:	Airlift develo	opment of both	n wells							SPT Ro Drilling	od Type	etails	23/8 F	legular	Ratio	5,	0. CSC	.00 S No				K	inne	egad	b					
												Support Operative				J	ohn Why	te			Weathe	er		Variable			Project No	40	-21			
										Lead D	riller			Stephan Petersen					Date			29/10	/2021		Day Friday							
									Site category						Green					Rig type			Knebel HY79				Borehole Number					
						Project Engineer								F	P Bartley	Inclination			Orientation			ONGW 15B										
													riller's s	ignatur	e					Sheet			2 of 2			Completed						







Pe	Petersen Drilling Services Ltd. on behalf of													Breedon Cement									Rotary Drilling Log									
Depth of			Drille	ar's Strat	tum				Sample /	Hole / Te	st Details	5		-	Drilling	Details					Standard	l Penetra	tion Test				Keyneti					
Stratum Top (m)			Dille	escriptio	n			No	Туре	Insitu test	From (m)	To (m)	Liner Dia (mm)	Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)			
									RO		0.00	36.00		0000		100	black											0.00	0.00			
0.00			Hardcore	Fill MADE GF	ROUND																											
1.00		Ма	dium donoo	brown oilty a	rovelly SAI			-																								
1.00		IVIE	uluin dense	brown siity gi	Tavelly SAI																											
3.50			Soft to fir	m brown sand	dy SILT																											
6.40	Stiff to ve	ery stiff dark	grey blackis	sh silty gravell	ly CLAY wi	ith occasior	nal cobble																									
10 10	Weak to M	ledium stron	g laminated	greyish black	MUDSTO	NE SHALE	E occasional																									
10.10	weatherd joints																															
	Shift d	details						Dri	Drilling Equipment Details												round	Water	Reco	rd			Backfill (m		n)			
Start time (hhmm)	Hole (m)	Water (m)	Casing (m)	Casing (C) Open Hole (RO) Coring (RC)	Dia. (mm)	From (m)	To (m)	Barrel	Liner Type	Core Dia (mm)	Bit	Туре	Casing	ј Туре	Bit serial No	Flush	Polymer	Time of strike	Depth Struck (m)	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed (m)	Туре	From (m)	To (m)			
1405				C	140.00	0.00	11.00				DTH B	utton Bit	Sim. C	asing	115	Δir	No	0920	21.00	11.00	Medium	0.00	0.00	0.00	0.00	N/S	Collapse	36.00	27.50			
Finish time	Hole	Water	Casing	RO	120.00	11.00	36.00				DTH B	utton Bit			113	Air	No															
(hhmm)	(m)	(m)	(m)																													
1705																		_														
Time from	Duration (hhmm)	Remarks	s or details	s of any ad	ditional t	esting in	formation,	Daywor	ks			SPT I.I	D. Numb	er	P	D1	Calibrat Date	tion	01/02	2/2021	Proj	ect 7	Title			-						
1405		CAT Scann	ed: Yes									SPT Ro	od Type		2 3/8 F	Regular	SPT En Ratio	ergy	0.	.00				V	:		1					
1405		Permit Corr	npleted: Yes									Drilling	Crew D	etails			Ratio		CSC	S No				n	inne	gao						
		General; B		Suppor	rt Operat	tive		J	ohn Why	rte			Weathe	r		Vari	iable		Project 40-2 No		-21											
1500	0045	Dayworks: Airlift development of well											riller			Stephan Petersen			Date					02/11	/2021		Day Tuesday					
													tegory			Green					Rig typ	e		Knebe	el HY79		Borehole Number					
												Project	Engine	er		P Bartley									ation				16			
							Lear														Sneet		1	OT	1	Comp	ieled	Ŷ				



Summary of Standpipe Installation



colsco	Petersen Drilling Services Ltd. on behalf of													Breedon Cement										Rotary Drilling Log									
Structure Description in i	Depth of			Drille	er's Strat	tum				Sample /	Hole / Te	est Details	3	1	0	Drilling	Details		0			Standard	l Penetra	tion Test				Keyneti					
A B <th>Stratum Top (m)</th> <th></th> <th></th> <th>De</th> <th>escriptio</th> <th>n</th> <th></th> <th></th> <th>No</th> <th>Туре</th> <th>Insitu test</th> <th>From (m)</th> <th>To (m)</th> <th>Liner Dia (mm)</th> <th>core run time (hhmm)</th> <th>core Recovery (m)</th> <th>Flush Return %</th> <th>Flush Colour</th> <th>Seir Weight Pen (mm)</th> <th>75 mm</th> <th>150 mm</th> <th>Seating Pen (mm)</th> <th>75 mm</th> <th>150 mm</th> <th>225 mm</th> <th>300 mm</th> <th>Main Pen (mm)</th> <th>N value</th> <th>Casing Depth (m)</th> <th>flush level (m)</th>	Stratum Top (m)			De	escriptio	n			No	Туре	Insitu test	From (m)	To (m)	Liner Dia (mm)	core run time (hhmm)	core Recovery (m)	Flush Return %	Flush Colour	Seir Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	flush level (m)			
0.00 Set 58 MR 2004 Image: Mode 104:00. Ima	0.00			0.6.4		DOO!																											
0.0 Pere to all light shy area gravely CLV with frequent intension boalds Image: construction of the state	0.00			Soft to fi	rm brown TO	PSOIL																											
0.00 First satil gits ally sady gravely CLAV all frequent integene integene integene integene. 1 <th1< th=""> 1 <th1< th=""> <th1< th=""></th1<></th1<></th1<>																																	
A A	0.30	Firm to	stiff light silt	y sandy grav	velly CLAY wi	ith frequen	it limestone	boulder																									
3.0 1 <th1< th=""> 1<!--</td--><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th1<>																																	
3.30 Image: marked biolog up weithed Like 3 LMe	2.50		Magleta	Madium atua		hered I INA																											
4.00 1	3.50		weak to	wealum stra	ng grey weat	nerea Liivi	ESTONE																										
4.00Very storog givy Like STORE very rare fracturesIn </td <td></td>																																	
	4.00		Very st	rong grey Ll	MESTONE v	ery rare fra	actures																										
Normal Normal <td></td>																																	
Image: Normal and the state of the stat																																	
Normality Normality <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>																																	
Network Calified																																	
Shift Company																																	
Spirit circle Grading from the field of					1																												
Sale data Non Visite Column (m) Column (m) Column (m) Sale dot Visite Sale dot Point (m) Sale dot Sale dot Visite Sale dot Point (m) Sale dot Sale dot Visite Sale dot Sale do	Start time	Shift c	details	Consing	Casing (C)	Dia	From	Ta	Dril	ling E	quipm	ent De	etails		T		1	1	Time of	Depth	G	iround	Water	Reco	rd		Depth	Ва	ckfill (r	n)			
1250 Image: Construction of the cons	(hhmm)	(m)	(m)	(m)	Open Hole (RO) Coring (RC)	(mm)	(m)	(m)	Barrel	Туре	(mm)	Bit	Туре	Casing	Туре	No	Flush	Polymer	strike	Struck (m)	(m)	Inflow	5 min	10 min	15 min	20 min	Sealed (m)	Туре	(m)	(m)			
Findam Mar Casa	1250				RO	140.00 154.00	0.00	5.00				DTH B	utton Bit	Sim. C	asing	115	Air	No															
1650 42.00 Dry 5.00 Image: constraint of the state of any additional testing information, Dayworks SPT LD. Number PD1 Calibration Date 01/02/2021 Project Title 1250 CAT Scannet: Yes SPT kD. Number PD1 Calibration Date 0.00 No No<	Finish time (hhmm)	Hole (m)	Water (m)	Casing (m)																													
Note Line Line <thline< th=""> Line Line</thline<>	1650	42.00	Dry	5.00																													
Time from (hhmm) Remarks or details of any additional testing information, Dayworks SPT I.D. Number PD1 Calibration Date D1/D2/2021 Project Title 1250 CAT Scanned: Yes SPT Rod Type 2 3/8 Regular SPT Energy Ratio 0.00 Kinnegad 1250 Permit Completed: Yes Drilling Crew Details Support Operative John Whyte Ose Variable Project Nation Adv 1250 REM (19.50m - 20.50m): minor fractured zone Support Operative John Whyte Ose Odd Project Nation Adv Adv <td>1000</td> <td>12100</td> <td>5.9</td> <td>0.00</td> <td></td>	1000	12100	5.9	0.00																													
1250 CAT Scanned: Yes SPT Rod Type 2 3/8 Regular On Liningy 0.00 Kinnegad 1250 Permit Completed: Yes DREM (19.50m - 20.50m): minor fractured zone Drilling Crew Details CSCS No Kinnegad 40 Lead Driller Stephan Petersen Date 04/11/2021 Day Thun Site category Green Rig type Knebel HY79 Borehole Num Project Engineer P Bartley Inclination Orientation ONGW /	Time from	Duration (hhmm)	Remark	s or details	s of any ad	ditional t	esting in	formation,	Daywor	ks			SPT I.I	D. Numb	er	P	D1	Calibrat Date SPT En	tion	01/02	2/2021	Proj	ect 7	Title									
1250 Permit Completed: Yes Drilling Crew Details CSCS No Project No 40 DREM (19.50m - 20.50m): minor fractured zone Support Operative John Whyte Weather Variable Project No 40 Lead Driller Stephan Petersen Date 04/11/2021 Day Thur Site category Green Rig type Knebel HY79 Borehole Num Project Engineer P Bartley Inclination Orientation ONGW Y	1250		CAT Scanr	ned: Yes									SPT Ro	od Type		2 3/8 F	Regular	Ratio	0.99	0.	.00				K	inne	egad						
DREM (19.50m - 20.50m): minor fractured zone Support Operative John Whyte Weather Variable Project 40 Lead Driller Stephan Petersen Date 04/11/2021 Day Thur Site category Green Rig type Knebel HY79 Borehole Num Project Engineer P Bartley Inclination Orientation ONGW /	1250		Permit Con	npleted: Yes					Drilling	Crew D	etails		r			CSC	S No						0	Project	1								
Lead Driller Stephan Petersen Date 04/11/2021 Day Thur Site category Green Rig type Knebel HY79 Borehole Num Project Engineer P Bartley Inclination Orientation ONGW 1			DREM (19.	50m - 20.50	m): minor fra	ctured zon	e						Suppor	rt Operat	ive		J	ohn Why	te			Weathe	r		Vari	able		No 40-21		-21			
Site category Green Rig type Knebel HY79 Borehole Num Project Engineer P Bartley Inclination Orientation ONGW /														riller			Step	han Pete	ersen	Date					04/11	/2021		Day	Thu	rsday			
														Engine	-r		Gree			en Rig type			e	Orientation				ONGW 17					
Lead Driller's signature Sheet 1 of 2 Completed													Lead Driller's signature					. 20.00							1	of	2	Completed		Y			

Pe	Petersen Drilling Services Ltd. on behalf of													Breedon Cement									Rotary Drilling Log										
Depth of	epth of Driller's Stratum								Sample /	Hole / Te	est Details	3		-	Drilling	Details					Standard	d Penetra	tion Test	rest Keyned									
Stratum Top (m)			D	escriptio	n			No	Туре	Insitu test	From (m)	To (m)	Liner Dia (mm)	Core run time (hhmm)	Total core Recovery (m)	Flush Return %	Flush Colour	Self Weight Pen (mm)	75 mm	150 mm	Seating Pen (mm)	75 mm	150 mm	225 mm	300 mm	Main Pen (mm)	N value	Casing Depth (m)	Water/ flush level (m)				
									RO		0.00	80.00		0000		100	grey											0.00	Dry				
	Shift d	letails						Dril	ling E	quipm	nent De	etails								G	round	Water	Reco	rd			Backfill (m)						
Start time (hhmm)	Hole (m)	ole Water Casing		Casing (C) Open Hole (RO)	Dia. (mm)	From (m)	To (m)	Barrel	Barrel Liner Core Dia Type (mm)		Bit	Туре	Casing	Casing Type		Flush	Polymer	Time of strike	Depth Struck	Casing (m)	Inflow	5 min	10 min	15 min	20 min	Depth Sealed	Туре	From (m)	To (m)				
0815	42.00	Drv	5.00	RO	120.00	5.00	80.00				DTH B	utton Bit				Air	No		(m)							(m)							
(hhmm)	(m)	(m)	(m)																														
1710																																	
												-																					
Time from	Duration (hhmm)	Remark	s or detail	s of any ad	ditional	testing in		SPT I.I	D. Numb	er	PD	01	Date SPT En	erav	01/02	2/2021	Proj	ject 1	Title														
												SPT Ro	Crew D	etails	23/8 R	legular	Ratio	,	0. CSC	00 S No				K	inne	gad							
												Suppor	rt Operat	ive		J	ohn Why	te			Weathe	er		Vari	able		Project	40-	21				
												Lead D	riller			Step	han Pete	ersen			Date			08/11	/2021		Day Monday						
												Site ca	tegory					Green			Rig typ	e		Knebe	I HY79	Borehole Number							
												Project Engineer				P Bartley				Inclination			Orientation			ONGW 17							
													riller's s	ignatur	e			Sheet			2 of 2			Completed									



Summary of Standpipe Installation





Lands Soils & Geology Chapter

Appendix 7C

Geophysical Report Apex (2022)