

Edward Rees (Domusea Developments)

Via email only: ed@edwardsrees.com

17th April 2020

Our Ref.: 17891/LR/GW

Dear Edward,

Re: Scyld, Horsemere Green Lane, Climping, Littlehampton, BN17 5QZ

We are writing with the results of the winter groundwater monitoring that was undertaken at the above site between 1st November 2019 and 31st March 2020. The scope of the investigation was set out in Soils Limited Quotation ref: Q21707 Rev1.02 dated 24th September 2019 and comprised the drilling of three windowless sampler boreholes, the installation of three groundwater monitoring wells and manually dipping these wells over the course of the winter with the aim of recording the highest (shallowest) groundwater level over the monitoring period. Initially a total of six readings were scheduled however this was increased to eight following the wettest February on record to ensure that the peak groundwater level was captured.

Site Works

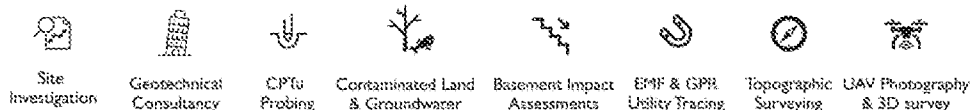
On the 24th October 2019 three windowless sampler boreholes were drilled to depths of 4.00m bgl and groundwater monitoring wells were installed. The groundwater wells comprised a 1m plain length of 33mm diameter pipe surrounded by a bentonite seal to a depth of 1.00m bgl and a 3m length of slotted 33mm from 1.00m to 4.00m bgl which was surrounded by a gravel filter pack.

Anticipated Geology

A review of the BGS Geology 1:50,000 mapping showed that the site was located directly onto superficial deposits of the River Terrace Deposits overlying the Lewes Nodular Chalk Formation. The soils of the River Terrace Deposits were anticipated to comprise sand, silt and clay.

Ground Conditions

The ground conditions encountered during the site investigation have been summarised in Table 1.

Topsoil (TS)

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Head Deposits (HD) Undifferentiated Chalk Formations (CK)

Table 1 – Summary of Ground Conditions

Strata	Depth Encountered (m bgl)		Typical Description
	Top	Base	
TS	0.00	0.20 – 0.35	Soft dark brown slightly sandy silty CLAY. Occasional fine angular gravel. Fine rootlets present.
HD	0.20 – 0.35	2.80 – 3.10	Stiff to firm light greyish brown slightly silty sandy CLAY. Sand is fine to medium, occasional angular fine to medium flint gravel and rare rootlets.
CK	2.80 – 3.10	>5.00 ¹	Off white CHALK. Recovered as angular to sub-rounded fine to medium gravel sized clasts of intact moderately strong chalk in a comminuted chalk matrix.

Notes: ¹ encountered to base of trial hole

Full engineer logs are presented in Appendix 1.

Results of the Winter Groundwater Monitoring

Groundwater monitoring wells were installed in WS1, WS2 and WS3 to allow for continued monitoring of the depth to groundwater over the winter and early spring period and to capture the highest groundwater level. It was initially proposed to carry out six monitoring visits however given the extreme amount of rainfall in February 2020 it was decided to extend the monitoring period to the end of March to ensure that the peak groundwater level was recorded. The base depth of the wells is presented in Table 1.

Table 1 Monitoring Well Depths

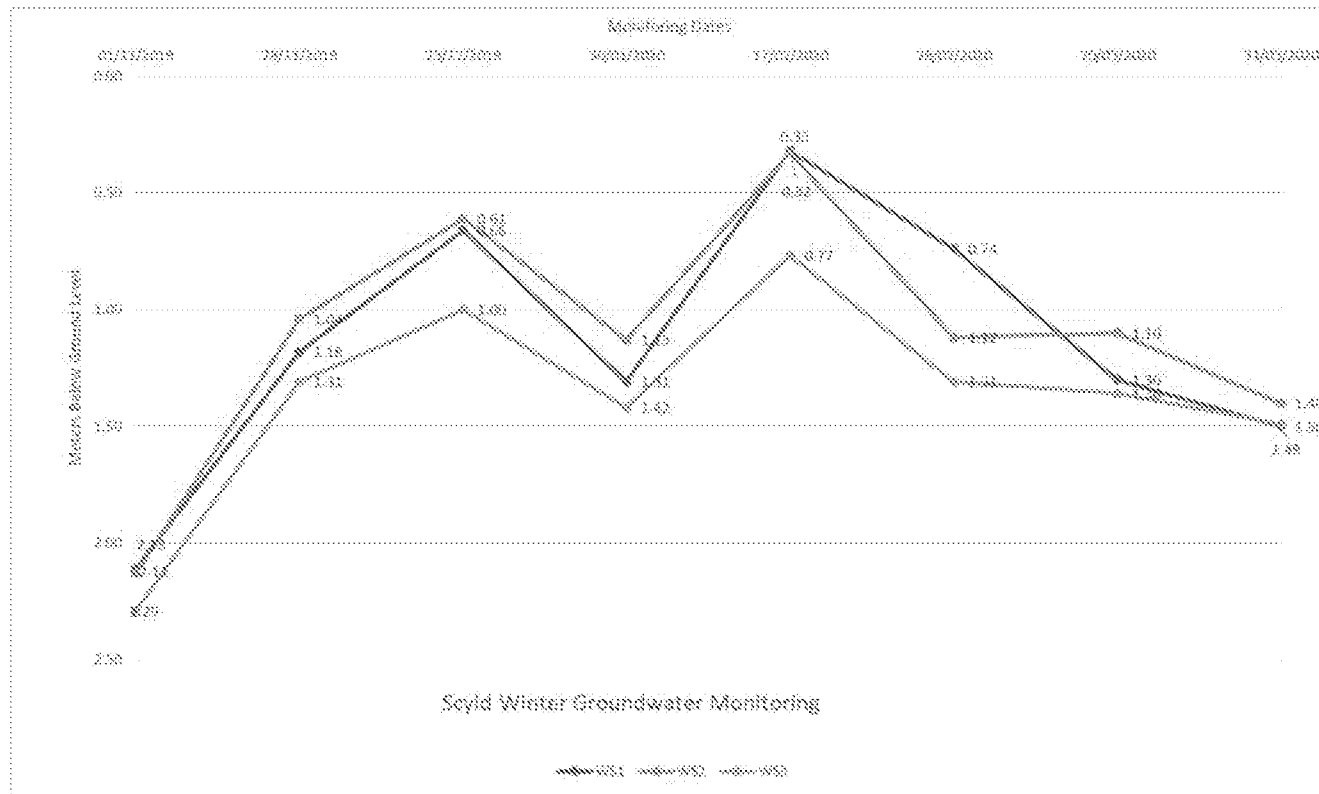
Trial Hole	Depth (m bgl)
WS1	4.00
WS2	4.90
WS3	5.00

The three wells were monitored eight times between the 1st November 2019 and 31st March 2020. The results of the monitoring are presented in Table 2 and Figure 1.

The location of the monitoring wells is presented in Figure 2.

Table 2 Results of Winter Groundwater Monitoring

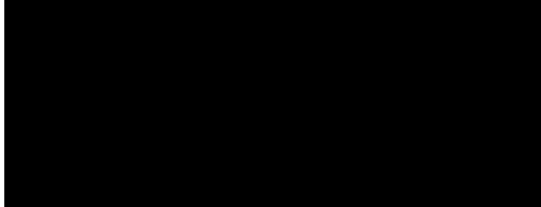
	01/11/2019	28/11/2019	23/12/2019	30/01/2020	17/02/2020	28/02/2020	20/03/2020	31/03/2020
Trial Hole	Depth (m bgl)	Depth (m bgl)	Depth (m bgl)	Depth (m bgl)	Depth (m bgl)	Depth (m bgl)	Depth (m bgl)	Depth (m bgl)
WS1	2.11	1.18	0.66	1.31	0.32	0.74	1.30	1.50
WS2	2.13	1.04	0.61	1.13	0.33	1.12	1.10	1.40
WS3	2.29	1.31	1.00	1.42	0.77	1.31	1.36	1.49

Figure 1: Winter Groundwater Monitoring Graph

In summary, the depth to groundwater was relatively consistent across all three wells and rose to its peak on the 17th February 2020 between 0.32 and 0.77m bgl before dropping away to between 1.40 and 1.50m bgl by the end of March 2020.

If you have any questions regarding the information presented within this letter report please contact the undersigned.

Yours sincerely



T Rees-Blanchard BEng (Hons), ProfGradIMMM, FGS
Senior Geotechnical Engineer

Figure 2: Trial Hole Location Plan



	Contract Name: Scyld. Horsemere Green Lane				Client: Edward Rees				Hole ID: WS1					
	Contract Number: 17891		Start and End Date: 24/10/19		Logged By: DW		Checked By: TRB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: Premier 1		Print Date: 15/04/2020		Scale: 1:50			
Weather:				Termination:				Sheet 1 of 1						
Samples & In Situ Testing					Strata Details							Groundwater		
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description						Water Strike	Backfill/Installation	
				0.20		Bark mulch. MADE GROUND.								
				0.35		TOPSOIL: Dark brown and greyish brown mottled, slightly silty, sandy CLAY. Occasional angular fine to medium flint and very fine brick gravel (<5%).								
				(1.80)		Very stiff to firm, light greyish brown and yellowish brown mottled, slightly silty, sandy CLAY. Sand is fine to medium, and features in occasional pockets and lenses. Occasional organic black smudges. Occasional angular fine to medium flint gravel. Rare rootlets. HEAD DEPOSITS								
				2.15		Firm to soft, white, yellowish brown and light grey mottled, slightly sandy, gravelly CLAY. Gravel is angular to surrounded, fine to coarse chalk and flint. HEAD DEPOSITS								
				(0.65)		Off-white CHALK. Recovered as angular to sub-rounded, fine to medium white weak to moderately strong clasts in a cream silty matrix. Occasional orange staining from 2.8 - 3.0m bgl. Occasional sub-angular to sub-rounded, coarse rinded flint nodules. UNDIFFERENTIATED CHALK FORMATIONS								
				2.80										
				(1.20)										
				4.00		End of Borehole at 4.00m								
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Rootlets observed to 2.15m bgl. Zero recovery from 4th drive - recovered on 2nd attempt. Well installed to 4mb/gl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
					0.00	1.00	PLAIN	33						
					1.00	4.00	SLOTTED	33						
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

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	Contract Name: Scyld. Horsemere Green Lane				Client: Edward Rees				Hole ID: WS2					
	Contract Number: 17891		Start and End Date: 24/10/19		Logged By: DW		Checked By: TRB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: Premier 1		Print Date: 15/04/2020		Scale: 1:50			
Weather:				Termination:				Sheet 1 of 1						
Samples & In Situ Testing				Strata Details								Groundwater		
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description						Water Strike	Backfill/Installation	
				(0.30)		TOPSOIL: Soft, dark brown, slightly sandy, silty CLAY. Frequent rootlets. Rare angular, coarse flint gravel. Rare sub-rounded, fine black ferruginous fragments.	1							
				0.30										
				(0.70)		Soft, greyish brown, slightly sandy, silty CLAY. Frequent rootlets. Rare sub-rounded, fine black ferruginous fragments. HEAD DEPOSITS								
				1.00										
				(1.00)		Stiff to firm, light greyish brown and brown mottled, yellowish brown slightly silty, sandy CLAY. Sand is fine. Occasional organic black smudges. Occasional angular fine to medium flint gravel. Occasional sub-rounded, fine black ferruginous fragments. Rare rootlets. HEAD DEPOSITS								
				2.00										
				(1.10)		Soft to very soft, black speckled, yellowish brown, slightly sandy, silty CLAY. HEAD DEPOSITS								
				3.10										
				(0.90)		Off-white CHALK. Recovered as angular to sub-rounded, fine to coarse white weak to moderately strong clasts in an orange stained, cream silty matrix. Occasional sub-angular to sub-rounded, coarse rinded flint nodules. UNDIFFERENTIATED CHALK FORMATIONS								
				4.00										
(0.90)		Off-white CHALK. Recovered as angular to sub-rounded, fine to coarse light orange and occasionally white weak to strong clasts in an orange stained, cream silty matrix. Occasional sub-angular to sub-rounded, coarse rinded flint nodules. UNDIFFERENTIATED CHALK FORMATIONS												
4.90														
End of Borehole at 4.90m						5								
							6							
							7							
							8							
							9							
							10							
Start & End of Shift Observations				Borehole Diameter		Casing Diameter		Remarks:						
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Blow count to high from 4.4 to 4.9mb/gl -hole stopped. Well installed to 4.9mb/gl.					
Chiselling				Installation				Water Strikes						
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
					0.00	1.00	PLAIN	33						
					1.00	4.90	SLOTTED	33						
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														

	Contract Name: Scyld. Horsemere Green Lane				Client: Edward Rees				Hole ID: WS3					
	Contract Number: 17891		Start and End Date: 24/10/19		Logged By: DW		Checked By: TRB		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: Premier 1		Print Date: 15/04/2020		Scale: 1:50			
Weather:				Termination:				Sheet 1 of 1						
Samples & In Situ Testing					Strata Details							Groundwater		
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description						Water Strike	Backfill/Installation	
				0.20		TOPSOIL: Soft, dark brown, slightly sandy, silty CLAY. Frequent rootlets. Rare angular, coarse flint gravel.						1		
				(0.35)		Firm to stiff, slightly dark brown mottled and black speckled, brown, slightly sandy, silty CLAY. Frequent rootlets. HEAD DEPOSITS								
				0.55		Very stiff to stiff, yellowish brown, slightly sandy, silty CLAY. Frequent rootlets and woody roots ~2mm diameter. Occasional angular, fine to coarse flint gravel. HEAD DEPOSITS								
				(0.65)		Slightly orange and light brown mottled, yellowish brown, slightly clayey, fine to medium SAND. Occasional angular, fine to medium flint gravel. HEAD DEPOSITS								
				1.20		Very stiff to firm, light greyish brown and yellowish brown mottled, slightly silty, sandy CLAY. Sand is fine to medium, and features in occasional pockets and lenses. Occasional organic black smudges. Occasional angular fine to medium flint gravel. Rare rootlets. HEAD DEPOSITS								
				(0.40)		Firm to soft, yellowish brown, brown and light grey mottled, slightly silty, sandy, CLAY. Occasional angular fine to coarse flint gravel. HEAD DEPOSITS								
				1.60		Off-white CHALK. Recovered as angular to sub-rounded, fine to medium white weak to moderately strong clasts in a cream silty matrix. Occasional sub-angular to sub-rounded, coarse rinded flint nodules. UNDIFFERENTIATED CHALK FORMATIONS								
				(0.40)										
				2.00										
				(1.00)										
3.00								2						
						End of Borehole at 5.00m						3		
												4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Very low blow count from 2.5 to 3mb/gl. Water strike at 2.4mb/gl. Well installed to 5mb/gl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
					0.00	1.00	PLAIN	33						
					1.00	5.00	SLOTTED	33						
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														