

Edward Rees (Domusea Developments)30th April 2020

Our Ref.: 17893/LR/GW

Dear Edward,

Re: Boweries, Barnham Road, Eastergate, Chichester, PO22 0HD

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

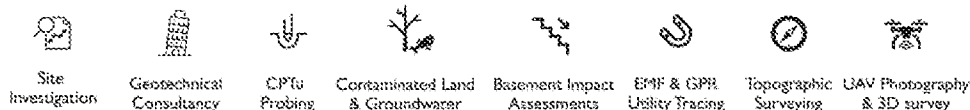
On the 24th October 2019 three windowless sampler boreholes were drilled to depths of between 3.60 and 4.70m bgl and groundwater monitoring wells were installed. The groundwater wells comprised a 1m plain length of 33mm diameter pipe surrounded by a bentonite seal to a depth of 1.00m bgl and a 3m length of slotted 33mm from 1.00m to the base 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 London Clay 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.



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Topsoil (TS)
River Terrace Deposits (RTD)

Table 1 – Summary of Ground Conditions

Strata	Depth Encountered (m bgl)		Typical Description
	Top	Base	
TS	0.00	0.30 – 0.60	Soft dark greyish brown slightly sandy silty CLAY. Occasional fine angular gravel.
RTD	0.30 – 0.60	>4.70	Interbedded firm sandy silty CLAY and Sandy silty GRAVEL and silty SAND.

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

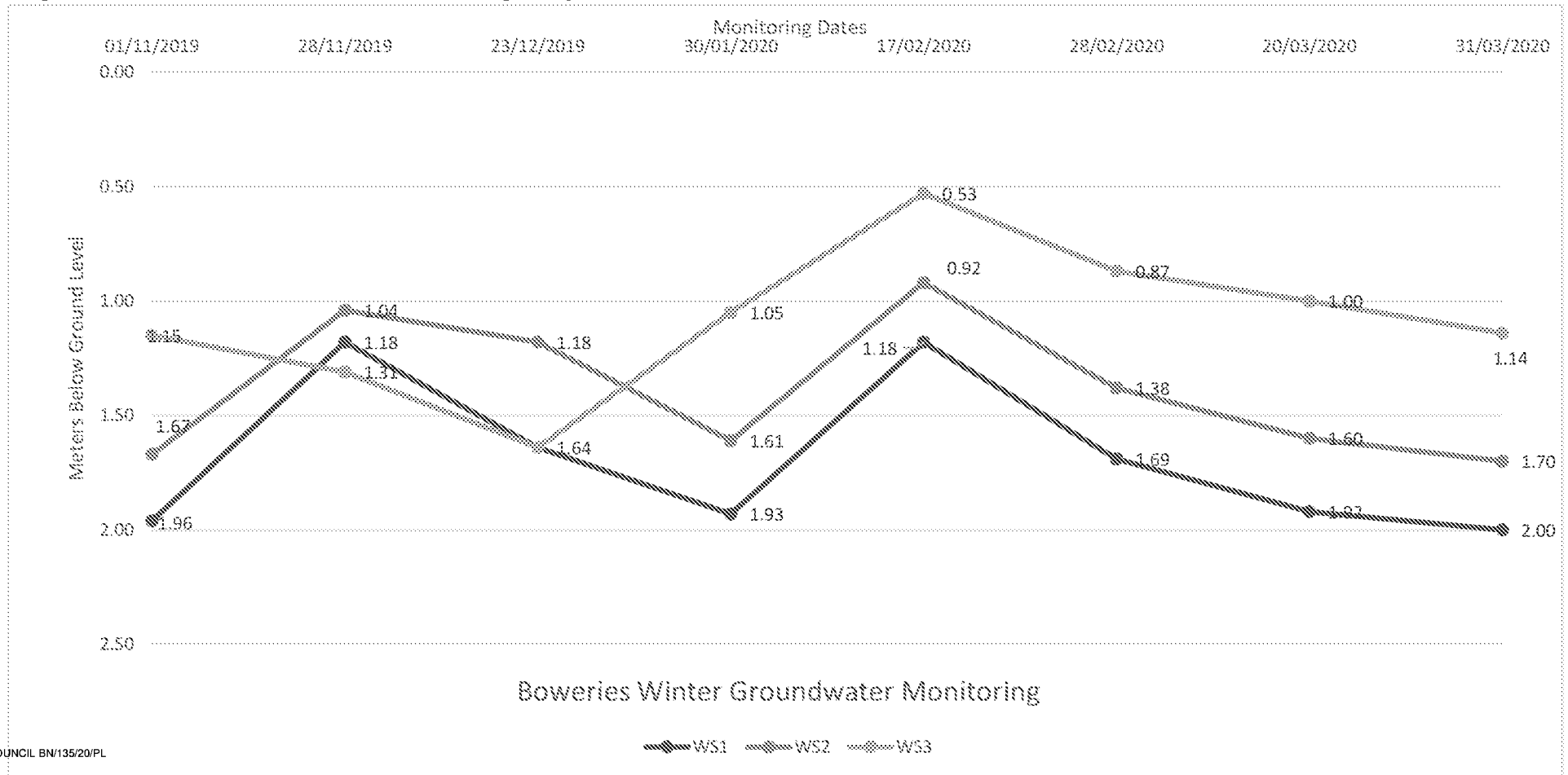
Trial Hole	Depth (m bgl)
WS1	4.00
WS2	3.50
WS3	3.00

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	1.96	1.18	1.64	1.93	1.18	1.69	1.92	2.00
WS2	1.67	1.04	1.18	1.61	0.92	1.38	1.60	1.70
WS3	1.15	1.31	1.64	1.05	0.53	0.87	1.00	1.14

Figure 1: Winter Groundwater Monitoring Graph

In summary, the depth to groundwater rose to its peak on the 17th February 2020 between 0.53 and 1.18m bgl, before dropping away to between 1.14 and 2.00m 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



6

WS1

WS2

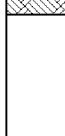
B2223

WS3

79 m

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Google Earth

	Contract Name: Boweries				Client: Edward Rees				Hole ID: WS1					
	Contract Number: 17893		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, greyish brown, slightly sandy, silty desiccated CLAY. Frequent rootlets. Occasional angular to sub-angular fine to medium flint, and very rare fine brick gravel.								
				0.30										Soft, slightly black speckled, brown, slightly sandy, silty CLAY. Occasional rootlets. Rare angular, fine flint gravel. RIVER TERRACE DEPOSITS.
				(0.70)		Firm to stiff, slightly black speckled, brown, slightly sandy, very gravelly silty CLAY. Gravel is angular to sub-angular, fine to coarse flint. Rare rootlets. RIVER TERRACE DEPOSITS.						1		
				1.00										
				(0.70)		Firm to stiff, white and light brown mottled, slightly sandy silty GRAVEL. Gravel is angular to rounded, fine to medium chalk and flint. RIVER TERRACE DEPOSITS.						2		
				1.70										
				(1.00)		Soft, slightly brown and white mottled, light brown, slightly sandy, gravelly SILT. Gravel is angular to rounded, fine to coarse flint and chalk. RIVER TERRACE DEPOSITS.						3		
				2.70										
				2.90		Slightly light brown and light green mottled, slightly sandy, silty GRAVEL. Sand is fine, light green, and features in occasional pockets. Gravel is angular to sub-angular, fine to medium chalk and flint. Very silty from 2.9 - 3.2m bgl. RIVER TERRACE DEPOSITS.						4		
				(0.80)										
				3.70		Yellowish brown, slightly silty fine SAND. Occasional angular, fine to medium flint and chalk gravel. RIVER TERRACE DEPOSITS.						5		
				(1.00)										
				4.70	End of Borehole at 4.70m						6			
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 1.4m bgl. High blow count from 1 to 3.5mb/gf. Too high from 4.3 to 4.7mb/gf - hole stopped. Hole collapsed to 4mb/gf - 5th drive. Well installed to 4mb/gf. Water strike at 1.5mb/gf.					
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	1.50			0	0.00	
					1.00	4.00	SLOTTED	33						
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														
ARUN DISTRICT COUNCIL BN/135/20/PL														

	Contract Name: Boweries				Client: Edward Rees				Hole ID: WS2					
	Contract Number: 17893		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	
				(0.40)		MADE GROUND: Soft, greyish brown, slightly sandy, silty desiccated CLAY. Frequent rootlets. Occasional angular to sub-angular fine to medium flint, clinker, and brick gravel.								
				0.40										
				(0.40)		Soft, slightly black speckled, brown, slightly sandy, silty CLAY. Occasional rootlets. Rare angular, fine flint gravel. RIVER TERRACE DEPOSITS.								
				0.80										
				1.00		Soft, slightly black speckled, brown, slightly sandy, slightly gravelly silty CLAY. Occasional rootlets. Gravel is angular, fine to medium flint. RIVER TERRACE DEPOSITS.						1		
						Brown and white mottled, light brown, slightly sandy, silty GRAVEL. Gravel is angular to sub-rounded, fine to coarse chalk and flint. Occasional yellow and purplish brown stained areas. RIVER TERRACE DEPOSITS.								
				(1.60)								2		
				2.60										
				(0.30)		Light brown mottled and banded, yellowish brown, slightly silty, very gravelly SAND. Sand is fine. Gravel is angular to sub-angular, fine to coarse, flint and rare chalk. RIVER TERRACE DEPOSITS.								
				2.90								3		
						Yellowish brown, slightly silty fine SAND. Rare angular, fine to medium flint and chalk gravel. RIVER TERRACE DEPOSITS.								
				(1.10)										
				4.00		End of Borehole at 4.00m						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)	Rootlets observed to 1.0m bgl. High blow count from 1.2 to 2mb/gl. Hole collapsed to 2.3 after 4 th drive. Well installed to 3.5mb/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	1.90			0	0.00	
					1.00	3.50	SLOTTED	33						
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														
ARUN DISTRICT COUNCIL BN/135/20/PL														

	Contract Name: Boweries				Client: Edward Rees				Hole ID: WS3					
	Contract Number: 17893		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	
				(0.60)		TOPSOIL: Soft, greyish brown, slightly sandy, silty desiccated CLAY. Frequent rootlets. Occasional angular to sub-angular fine to medium flint, and very rare fine brick gravel.								
				0.60								Brown and white mottled, light brown, slightly sandy, silty GRAVEL. Gravel is angular to sub-rounded, fine to coarse chalk and flint. Occasional yellow and purplish brown stained areas. RIVER TERRACE DEPOSITS.		
				(1.40)		Yellowish brown, slightly silty fine SAND. Rare angular, fine to medium flint and chalk gravel. RIVER TERRACE DEPOSITS.								
				2.00										
				(1.60)										
				3.60								End of Borehole at 3.60m		
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 0.6m bgl. High blow count from 0.6 to 2mb/gl. Water strike at 1.4mb/gl. Hole collapsed to 2.3mb/gl after 4th drive. Well installed to 3mb/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	1.40			0	0.00	
					1.00	3.00	SLOTTED	33						
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														
ARUN DISTRICT COUNCIL BN/135/20/PL														