

WINTER GROUNDWATER MONITORING

LAND EAST OF TYE LANE, WALBERTON

JUNE 2017





Geo-Environmental

GROUNDWATER MONITORING REPORT

for the site known as,

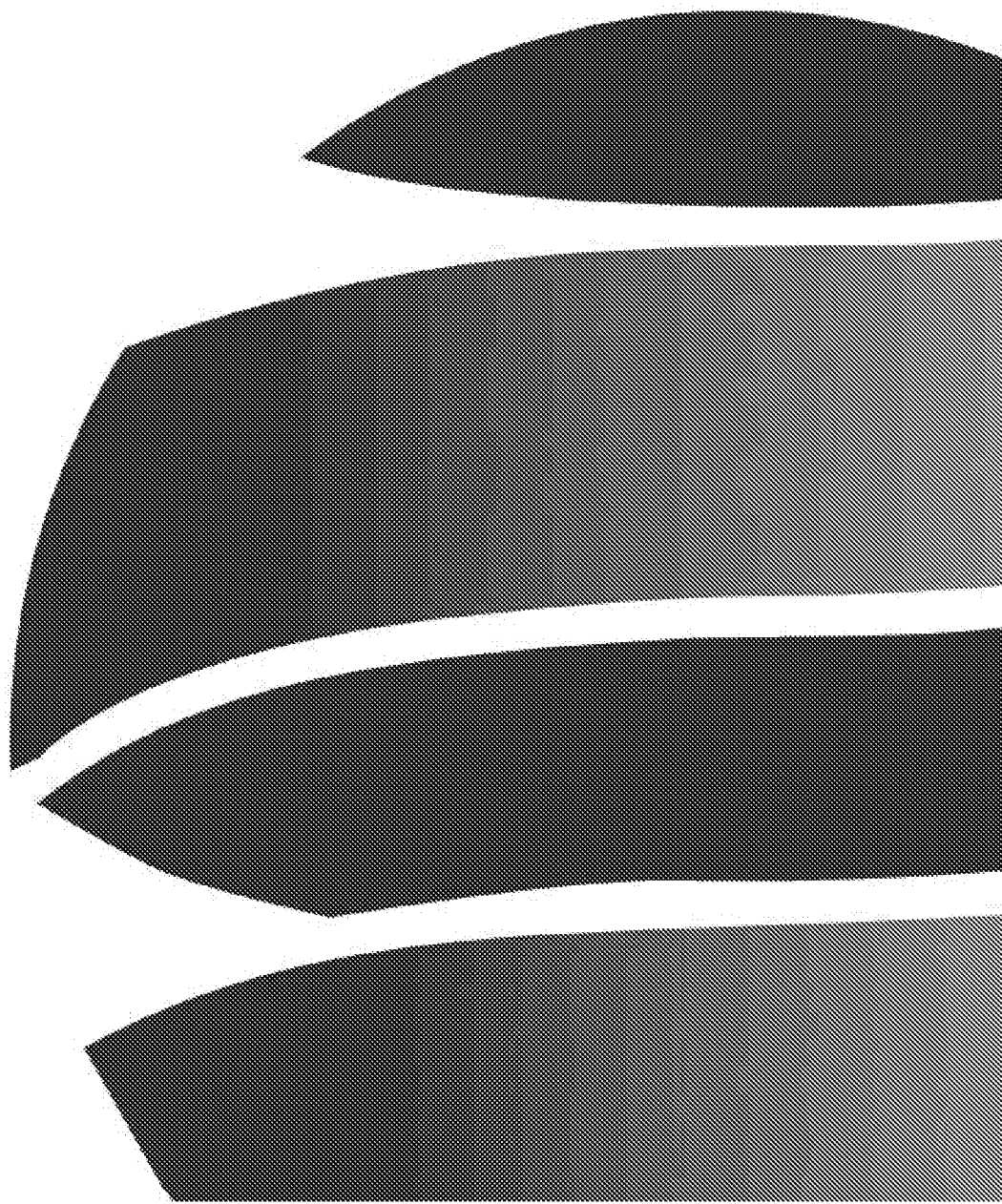
LAND EAST OF TYE LANE,

WALBERTON,

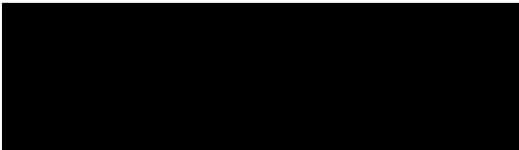
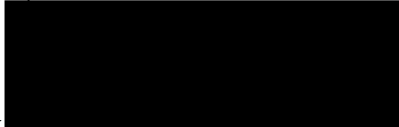
WEST SUSSEX

on behalf of

WATES DEVELOPMENTS LIMITED





Report:	GROUND APPRAISAL REPORT
Site:	LAND EAST OF TYE LANE, WALBERTON, WEST SUSSEX
Client:	WATES DEVELOPMENTS LIMITED
Date:	15/06/2017
Reference:	GE16054-GWMR-JUNE17
Version:	2.0
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Geo-Environmental Services Limited

Unit 7, Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex, BN6 9GL

ii



CONTENTS

- 1.0 Introduction
- 2.0 Site Description
- 3.0 Ground Conditions
- 4.0 Encountered Groundwater and Groundwater Monitoring Results

FIGURES

- FIGURE 1 Exploratory Hole Location Plan

APPENDICES

- APPENDIX A Exploratory Hole Logs



1.0 Introduction

Geo-Environmental was instructed by Wates Developments Limited to undertake an intrusive investigation at the site off Tye Lane, Walberton, BN18 0AN.

Eight monitoring wells were installed within window sampling boreholes to depths of 3.0mbgl to allow for groundwater monitoring. The purpose of this was in response to local concerns of ground conditions on the site and ultimately to inform the drainage strategy to be designed by the client's engineers.

2.0 Site Description

The intrusive site investigation was undertaken an area of open farmland situated east of Tye Lane, Walberton, Arundel, BN18 0AN. At the time of the site walkover, the site was generally flat and roughly rectangular in plan area, and comprised rough pasture and was vacant of any buildings.

The site was bound by mature and semi-mature trees with Tye Lane to the west. Avisford Park Golf Club was located immediately adjacent to the northern boundary, with the surrounding land comprising a residential properties with amenities to the south and east. Access to the site was via Yapton Lane to the east.

3.0 Ground Conditions

The ground conditions encountered during the investigation were broadly consistent with the anticipated published sequence of strata. In summary, ground conditions typically comprised a mantle of Topsoil locally overlying the River Terrace Deposits with the London Clay at depth.

Topsoil was encountered in all investigation positions to depths of 0.15m to 0.30mbgl and typically consisted of grass overlying dark brown slightly sandy clay with occasional rootlets and flint gravel.

Soils inferred to be the River Terrace Deposits were encountered in all locations from underlying the Topsoil to a depth of 3.0m bgl (maximum depth of the investigation). The deposits were of a mixed composition comprising silty CLAY and gravelly silty CLAY.

It was anticipated that the London Clay Formation (Clay, Silt and Sand) would underlie the River Terrace Deposits, however, this formation was not proved during the investigation. A summary of the encountered ground conditions is presented in Table 1.

On completion of the window sampling borehole, groundwater monitoring standpipes were installed within all borehole locations to facilitate return monitoring on seven occasions between 30th January 2017 and 11th April 2017, during what would be considered the wetter months in the year.

Depth (m bgl)	Description	Stratum	Position
0.0 – 0.15 - 0.30	Grass overlying dark brown slightly sandy clay with occasional rootlets.	Topsoil	All Positions
0.15-0.30 – 3.0	Brown silty CLAY with rare fine to coarse angular flint gravel, overlying orangish brown gravelly silty CLAY with rare black specks.	River Terrace Deposits	

Table 1: Summary of encountered ground conditions.



The approximate positions of the window sampler boreholes are presented in Figure 1. For more detailed descriptions of the ground conditions at specific locations, reference should be made to the borehole logs attached in Appendix A.

4.0 Encountered Groundwater and Groundwater Monitoring Results

The majority of boreholes were dry on completion with the exception of WS5 and WS8 which recorded levels between 0.95mbgl and 1.06mbgl. Based on the underlying ground conditions set out above, this is not considered to be groundwater, but is most likely an accumulation of water sitting on top of the London Clay Formation within the more granular soils of the River Terrace Deposits.

Monitoring of the standpipes within the boreholes identified that groundwater was still present within WS5 and WS8 at relatively shallow depths of around 0.61m and 2.26m bgl., whilst no groundwater was encountered in any of the other exploratory holes. As previously discussed, this is believed to be an accumulation of water sitting on top of the London Clay Formation within the more granular soils of the River Terrace Deposits.

It should be noted that changes in groundwater levels do occur for a number of reasons including seasonal effects and variations in drainage. Such fluctuations may only be recorded by the measurement of the groundwater level within a standpipe or piezometer installed within appropriate response zones. However, the testing was undertaken during winter months and therefore represent a worst case scenario.

The depths of groundwater recorded during the intrusive investigation and over the monitoring period are presented in Table 2.

Groundwater Depths (mbgl)							
	Fieldwork	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6	Visit 7
Location	30/01/17	09/02/17	14/02/17	28/02/17	14/03/17	28/03/17	11/04/17
WS1	Dry	Dry	Dry	Dry	Dry	Dry	Dry
WS2	Dry	Dry	Dry	Dry	Dry	Dry	Dry
WS3	Dry	Dry	Dry	Dry	Dry	Dry	Dry
WS4	Dry	Dry	Dry	Dry	Dry	Dry	Dry
WS5	1.06	1.52	1.49	1.14	1.54	1.90	2.26
WS6	Dry	Dry	Dry	Dry	Dry	Dry	Dry
WS7	Dry	Dry	Dry	Dry	Dry	Dry	Dry
WS8	0.95	0.61	0.90	0.74	1.15	1.85	2.00

Table 2: Groundwater Depths

FIGURES

Project Title: Land West of Yapton Road
Location : Walberton
Project No. : GE16054
Client : Wates Developments

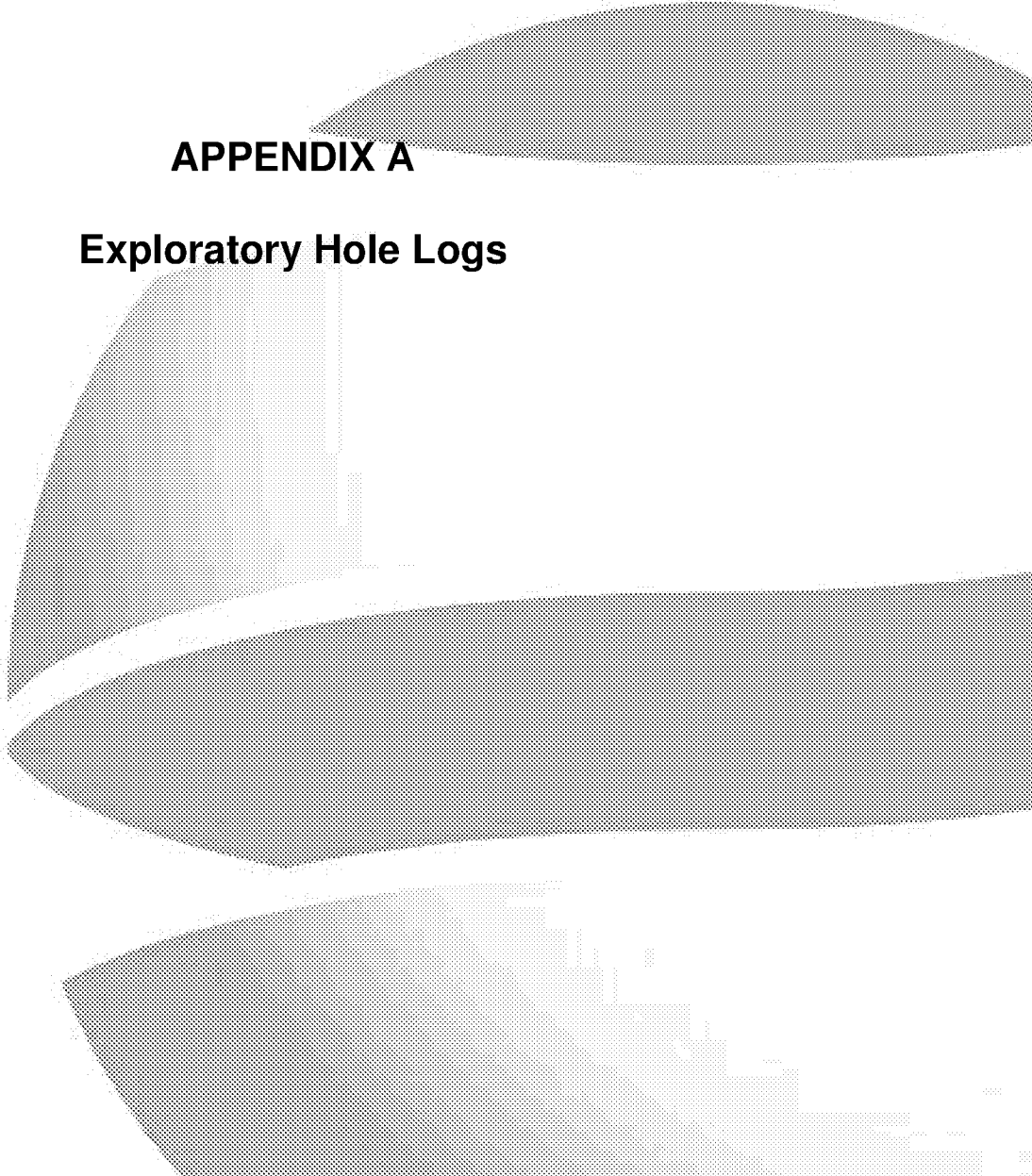
Title : Figure 1 - Site Location Plan
Scale: 1:5000
Engineer: Cesar Azevedo



Legend Key

- Locations By Type - Empty
- Locations By Type - WLS

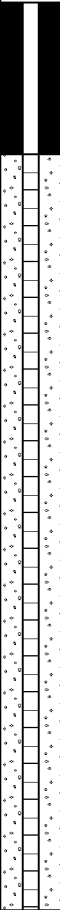
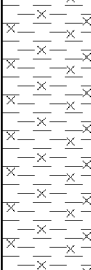
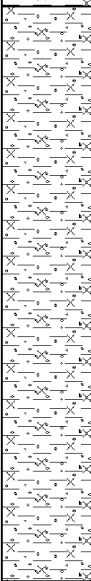
An aerial photograph of a rural area with fields and some buildings. Overlaid on the map are several labels in parentheses: (WS8), (WS5), (WS7), (WS6), (WS4), (WS3), (WS2), and (WS1). These labels are positioned over different areas of the land. A scale bar in the bottom right corner indicates 200 Metres and 800 Feet. A Bing logo is visible in the bottom left corner of the map area.



APPENDIX A

Exploratory Hole Logs

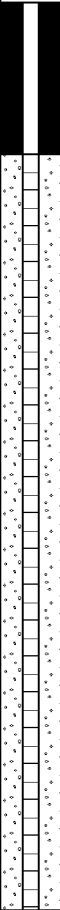
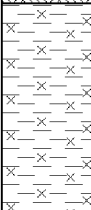
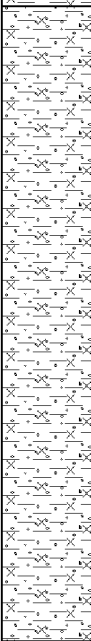
 Geo-Environmental www.gesl.net		Unit 7, Danworth Farm Hurstpierpoint BN6 9GL		Borehole Log			Borehole No. WS1	
Project Name: Land West of Yapton Road		Project No. GE16054		Co-ords: 497636E - 106265N		Sheet 1 of 1 Hole Type WLS		
Location: Walberton				Level:		Scale 1:25		
Client: Wates Developments				Dates: 30/01/2017		Logged By CA		

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.15		 Grass over dark brown slightly sandy clay with occasional rootlets. TOPSOIL	 Firm dark orangish brown silty CLAY with rare fine to coarse angular flint gravel. RIVER TERRACE DEPOSITS	1
					1.10		 Firm dark orangish brown gravelly silty CLAY with rare black specks. Gravel is fine to coarse angular flint. RIVER TERRACE DEPOSITS		2
					3.00		End of Borehole at 3.00m		3
									4
									5

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
						Groundwater not encountered.



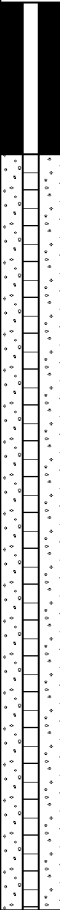
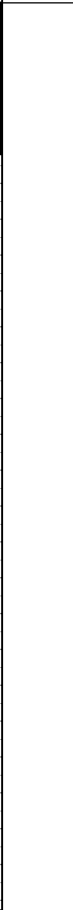
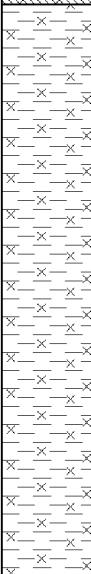
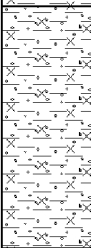
 Geo-Environmental www.gesl.net		Unit 7, Danworth Farm Hurstpierpoint BN6 9GL				Borehole Log				Borehole No. WS2	
Project Name: Land West of Yapton Road		Project No. GE16054		Co-ords: 497571E - 106216N		Hole Type WLS					
Location: Walberton		Level:		Scale 1:25		Logged By CA					
Client: Wates Developments		Dates: 30/01/2017									

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20		 Grass over dark brown slightly sandy clay with occasional rootlets. TOPSOIL	 Firm dark brown silty CLAY with rare fine to coarse angular flint gravel. RIVER TERRACE DEPOSITS	 Firm dark orangish brown gravelly silty CLAY with rare black specks. Gravel is fine to coarse angular flint. RIVER TERRACE DEPOSITS
					0.90				
					3.00				
								End of Borehole at 3.00m	

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
						Groundwater not encountered.



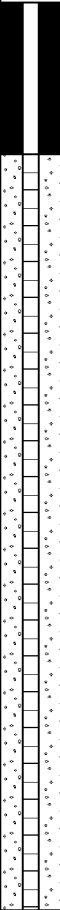
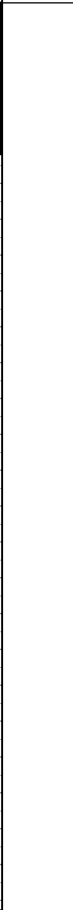
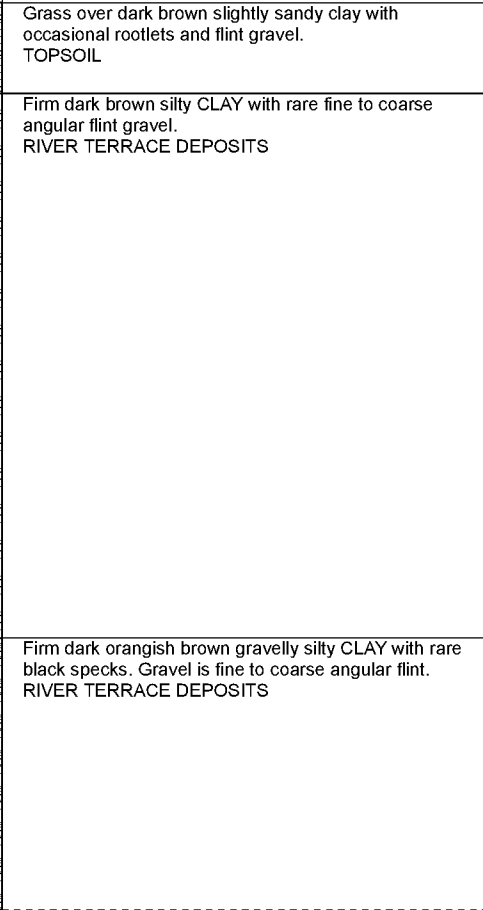
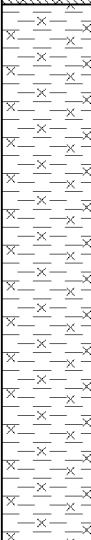
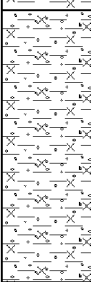
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Project Name: Land West of Yapton Road		Project No. GE16054		Co-ords: 497493E - 106072N		Hole Type WLS	
Location: Walberton				Level:		Scale 1:25	
Client: Wates Developments				Dates: 30/01/2017		Logged By	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30		 Grass over dark brown slightly sandy clay with occasional rootlets. TOPSOIL		
					2.20		 Firm dark brown silty CLAY with rare fine to coarse angular flint gravel. RIVER TERRACE DEPOSITS		
					3.00		 Firm dark orangish brown gravelly silty CLAY with rare black specks. Gravel is fine to coarse angular flint. RIVER TERRACE DEPOSITS		
End of Borehole at 3.00m									

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
						Groundwater not encountered.



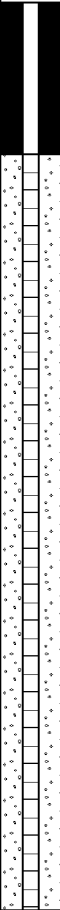
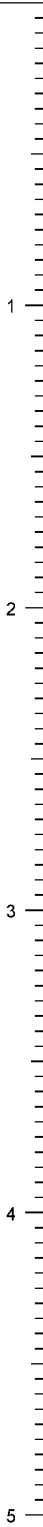
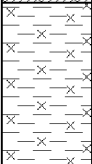
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Project Name: Land West of Yapton Road		Project No. GE16054		Co-ords: 497351E - 106182N		Hole Type WLS					
Location: Walberton		Level:		Scale 1:25							
Client: Wates Developments		Dates: 30/01/2017		Logged By CA							

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30		 Grass over dark brown slightly sandy clay with occasional rootlets and flint gravel. TOPSOIL		
							 Firm dark brown silty CLAY with rare fine to coarse angular flint gravel. RIVER TERRACE DEPOSITS		
									 Firm dark orangish brown gravelly silty CLAY with rare black specks. Gravel is fine to coarse angular flint. RIVER TERRACE DEPOSITS
					3.00		End of Borehole at 3.00m		

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
						Groundwater not encountered.



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log		Borehole No. WS5 Sheet 1 of 1	
Project Name: Land West of Yapton Road		Project No. GE16054		Co-ords: 497268E - 106264N	
Location: Walberton		Level:		Hole Type WLS	
Client: Wates Developments		Dates: 30/01/2017		Scale 1:25	
Logged By CA					

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.25		 Grass over dark brown slightly sandy clay with occasional rootlets and flint gravel. TOPSOIL		
							 Firm dark brown silty CLAY with rare fine to coarse angular flint gravel. RIVER TERRACE DEPOSITS		
					0.80		 Firm dark orangish brown gravelly silty CLAY with rare black specks. Gravel is fine to coarse angular flint. RIVER TERRACE DEPOSITS		
							<i>Groundwater encountered at 1.06m likely to be perched water.</i>		
					2.60		 Firm dark orangish brown very gravelly silty CLAY with rare black specks. Gravel is fine to coarse angular flint. RIVER TERRACE DEPOSITS		
				3.00		End of Borehole at 3.00m			

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
						Groundwater encountered at 1.06m (probably perched water).





Geo-Environmental

Unit 7, Danworth Farm
Hurstpierpoint
BN6 9GL
www.gesl.net

Borehole Log

Borehole No.

WS6

Sheet 1 of 1

Project Name: Land West of Yapton Road

Project No.
GE16054

Co-ords: 497187E - 106209N

Hole Type
WLS

Location: Walberton

Level:

Scale
1:25

Client: Wates Developments

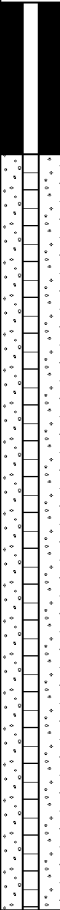
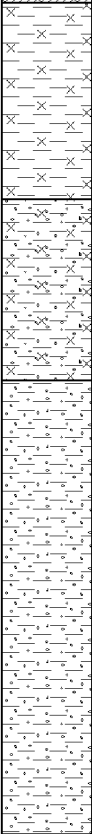
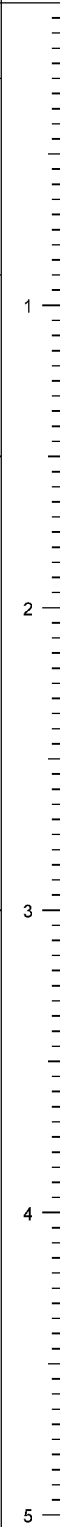
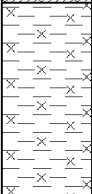
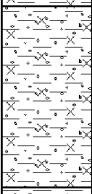
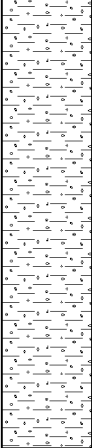
Dates: 30/01/2017

Logged By
CA

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.25			Grass over dark brown slightly sandy clay with occasional rootlets and flint gravel. TOPSOIL	
								Firm dark brown silty CLAY with rare fine to coarse angular flint gravel. RIVER TERRACE DEPOSITS	
					1.20			Firm dark orangish brown gravelly silty CLAY with rare black specks. Gravel is fine to coarse angular flint. RIVER TERRACE DEPOSITS	
					2.30			Firm dark orangish brown very gravelly silty CLAY with rare black specks. Gravel is fine to coarse angular flint. RIVER TERRACE DEPOSITS	
					3.00		End of Borehole at 3.00m		3
									4
									5

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
						Groundwater not encountered.

 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Borehole Log		Borehole No. WS7 Sheet 1 of 1	
Project Name: Land West of Yapton Road		Project No. GE16054		Co-ords: 497082E - 106184N	
Location: Walberton		Level:		Hole Type WLS	
Client: Wates Developments		Dates: 30/01/2017		Scale 1:25	
Logged By CA					

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.25		 Grass over dark brown slightly sandy clay with occasional rootlets and flint gravel. TOPSOIL		
							 Firm dark brown silty CLAY with rare fine to coarse angular flint gravel. RIVER TERRACE DEPOSITS		
					0.90		 Firm dark orangish brown gravelly silty CLAY with rare black specks. Gravel is fine to coarse angular flint. RIVER TERRACE DEPOSITS		
					1.50		 Firm dark orangish brown very gravelly silty CLAY with rare black specks. Gravel is fine to coarse angular flint. RIVER TERRACE DEPOSITS		
					3.00		End of Borehole at 3.00m		

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to	
						Groundwater not encountered.





Geo-Environmental

Unit 7, Danworth Farm
Hurstpierpoint
BN6 9GL
www.gesl.net

Borehole Log

Borehole No.

WS8

Sheet 1 of 1

Project Name: Land West of Yapton Road

Project No.
GE16054

Co-ords: 497104E - 106341N

Hole Type
WLS

Location: Walberton

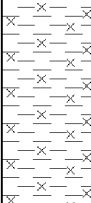
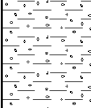
Level:

Scale
1:25

Client: Wates Developments

Dates: 30/01/2017

Logged By
CA

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20			Grass over dark brown slightly sandy clay with occasional rootlets and flint gravel. TOPSOIL	1
								Firm dark brown orangish silty CLAY with rare fine to coarse angular flint gravel. RIVER TERRACE DEPOSITS	
					0.90			Firm dark orangish brown gravelly silty CLAY with rare black specks. Gravel is fine to coarse angular flint. RIVER TERRACE DEPOSITS	
					1.10			Firm dark orangish brown very gravelly silty CLAY with rare black specks. Gravel is fine to coarse angular flint. RIVER TERRACE DEPOSITS	
					3.00			End of Borehole at 3.00m	3
									4
									5

Casing		Water Strikes (mbgl)		Chiselling (mbgl)		Remarks	AGS
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to		
						Groundwater encountered at 0.95m (probably perched water).	