18th October 2017

Our ref: GE16226/GR02.2/171018

Geo-Environmental

Daniel Crawford
Miller Homes
Spinnaker House
Lime Tree Way
Hampshire International Business Park
Chineham
Basingstoke
Hampshire
RG24 8GG

Dear Daniel,

RE: Downend Road, Portchester

Further to the request received via Odyssey and your subsequent instruction, we write to present the findings of the supplementary permeability testing undertaken on this site. The site location is shown on Figure 1 enclosed. This letter includes a minor revision from letter ref. GE16226/GR02/170217 in that the enclosed Figures 2 and 3 reflect the revised site extent as indicated on TOR Drawings ref. 2495-01/PP-002 Aug 2017 and 2495-01/SK-013 Rev C Oct 2017. These drawings should be referred to for the definitive red line boundary and the proposed development layout.

Background

The findings presented within this letter supplement the Desk Study Report, ref. GE15996-DSR-OCT17v1.2, and aim to provide clarification with regards to recommendations set out in Section 4.2 of the Desk Study Report.

Trial pit soakage testing was undertaken on site by Geo-Environmental for Miller Homes. The ground conditions and soakage tests were somewhat variable and as such, Geo-Environmental was requested by Odyssey to undertake further testing in the vicinity of trial pits TP5 and TP6.

Scope of Works

The following scope of works was undertaken:

- Attendance of a Geo-Environmental Engineer to set out and supervise the intrusive investigation, undertake sampling, in-situ testing and logging of recovered soils from exploratory holes. It is estimated that the works would extend to two days.
- The construction of up to 6No. machine dug trial pits to provisional depths of 3m bgl.
- Construction of 2No. cable percussion boreholes to a provisional depth of 10m bgl together with in-situ testing and sampling at regular intervals.
- Attendance of a 4x4 bowser to supply water for trial pit soakage and borehole falling head tests.
- Undertake soakage tests in trial pits and falling head permeability tests within the boreholes at two depths per borehole.

The exploratory holes were located in the vicinity of the previous trial pits TP5 and TP6, with BH1 and TP501-TP503 located in the vicinity of TP5; and BH2 and TP601-TP603 located in the vicinity of TP6. Exploratory hole locations

from the previous phase of investigation are shown on Figure 2 and positions form the supplementary investigation are shown on Figure 3 enclosed herein.

Ground and Groundwater Conditions

The ground conditions encountered within the exploratory holes were generally consistent with those encountered during the previous phase of investigation. A summary of the conditions encountered during the supplementary investigations is presented in Table 1 below and exploratory hole logs from both phases of investigation are enclosed.

Top depth (m bgl)	Base depth (m bgl)	Description
0	0.30 – 0.78	TOPSOIL: Brown gravelly silty CLAY
0.30 – 0.78	4.80 – 5.80	HEAD DEPOSITS: Very soft, soft, firm and stiff brown, grey and cream gravelly CLAY with gravelly comprising flint and chalk clasts
4.80 – 5.80	10.0+	CHALK: Recovered as destructured white CHALK. Tentatively inferred as CIRIA Grade Dm/Dc becoming less weathered, possibly CIRIA Grade C at depth.

Table 1 Summary of ground conditions encountered during the supplementary investigation

Groundwater was not encountered within any of the exploratory holes during the investigation. Additionally, monitoring within standpipes installed elsewhere across the site as part of a previous phase of assessment has not encountered groundwater.

However, changes in groundwater levels do occur for a number of reasons including 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. Changes in groundwater level can have a direct effect on excavation stability, soakaway performance and more cohesive soils can soften under rising or high groundwater conditions.

Permeability Testing

In line with the agreed scope of works, soakage tests were undertaken in general accordance with BRE Digest 365 in each of the trial pits and falling head permeability tests were undertaken at depths of 3m and 10m bgl within the cable percussion boreholes (BH1 and BH2). The rate of outflow within the trial pits was slow and thus three inundations, as detailed in BRE Digest 365, within each trial pit was not achievable. Permeability values from the borehole falling head tests were derived in accordance with BS5930:2015 and BS ISO EN22282:2012 Parts 1 and 2.

Whilst the objective of the supplementary investigation included targeting of Chalk for soakage testing, this was not encountered within the trial pits. In addition, the Chalk was only present from between 4.8m and 5.8m bgl in the boreholes. Thus each of the trial pit soakage tests and the shallower falling head test within each borehole was undertaken within the superficial Head Deposits. Table 2 summarises the results of the various permeability tests undertaken from both phases of investigation.

Location	Permeability (m/s)	Comment
TP1	3.0×10^{-5}	-
TP2	-	Insufficient fall in water level to estimate permeability
TP3	$1.4\text{-}2.0 \times 10^{-5}$	-

Location	Permeability (m/s)	Comment
TP4	-	Water outflow too rapid to undertake test. Permeability likely to be 10^{-4}m/s or better.
TP5	$1.9x10^{-6}$	-
TP6	$1.5x10^{-6}$	-
TP501	$1.2x10^{-5}$	Value estimated from measured range rather than achieving 75% discharge.
TP502	$4.2x10^{-6}$	Value estimated from measured range rather than achieving 75% discharge.
TP503	$9.3x10^{-6}$	Value estimated from measured range rather than achieving 75% discharge.
TP601	$5.1x10^{-6}$	Value estimated from measured range rather than achieving 75% discharge.
TP602	$1.2x10^{-5}$	Value estimated from measured range rather than achieving 75% discharge.
TP603	$2.6x10^{-6}$	Value estimated from measured range rather than achieving 75% discharge.
BH1	$3.51x10^{-6}$	Test in partially cased borehole at 3m bgl
BH1	$2.86x10^{-6}$	Test in partially cased borehole at 10m bgl
BH2	$2.64x10^{-5}$	Test in partially cased borehole at 3m bgl
BH2	$2.83x10^{-6}$	Test in partially cased borehole at 10m bgl

Table 2 Summary of permeability results

It should be noted that the fall in water level within each pit tested as part of the supplementary investigation was insufficient to achieve the 75% drained depth required to determine a soil infiltration rate. As such, the infiltration rates presented for each of these trial pits (TP501-503 and TP601-603) are estimates based on the actual fall in water level recorded during the test. It is possible that the permeability could be lower than this estimated value.

The permeability values derived from the tests in Chalk at depth in boreholes BH1 and BH2 would suggest that the outflow of water from these exploratory holes was into a general rock mass. Whilst a higher permeability value might be achievable if open fractures are present, the presence of any such fractures should not be relied upon.

Closure

We trust we have interpreted your instructions correctly and provided sufficient information for your current requirements. Should you have any queries please do not hesitate to contact us.

Yours sincerely
For and on Behalf of Geo-Environmental

GAVIN ROBERTS CGeol, BEng (Hons), MSc, FGS
Technical Director
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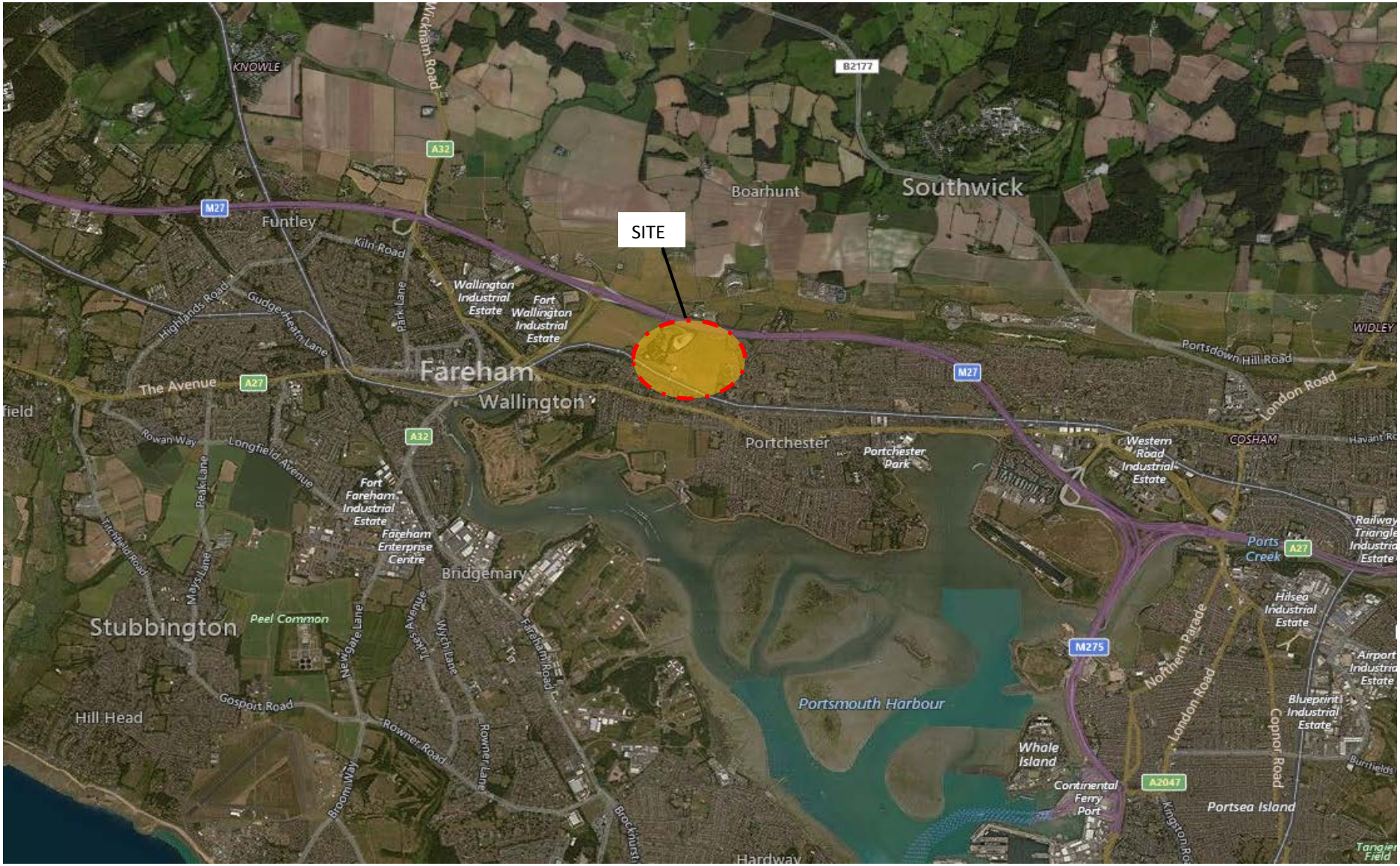
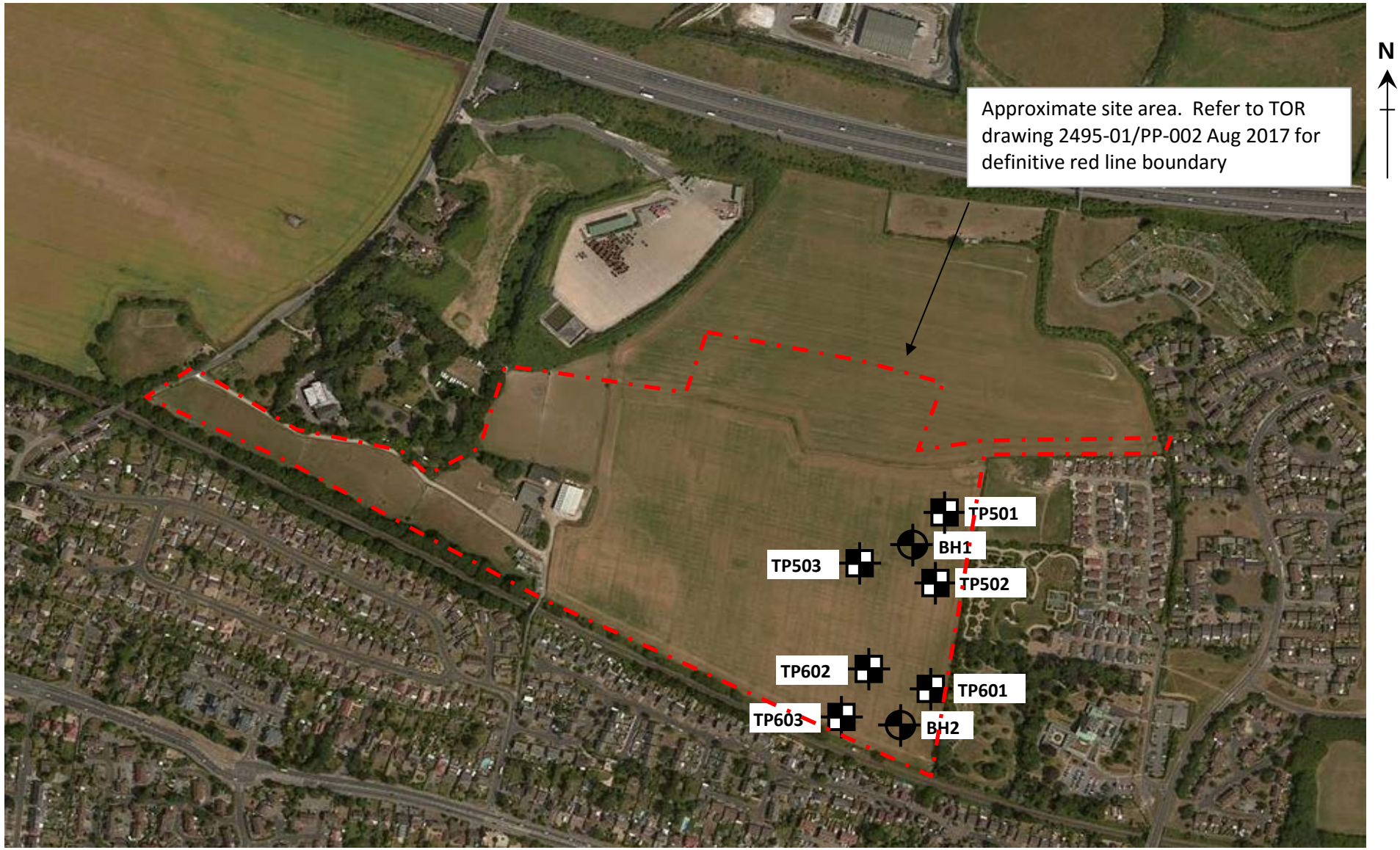
Enc Figure 1 Site Location Plan
Figure 2 Exploratory Hole Location Plan (preliminary investigation)
Figure 3 Exploratory Hole Location Plan (supplementary investigation)
Exploratory hole logs
Trial pit soakage test and falling head permeability test results



Project:	Land off Downend Road, Portchester PO16 8PX			**Title**	Site Location Plan
Client:	Miller Homes			**Geo-Environmental Services Ltd** **Unit 7 Danworth Farm, Cuckfield Road** **Hurstpierpoint, West Sussex BN6 9GL** **+44(0)1273 832972 www.gesl.net**	Geo-Environmental
Ref No:	GE16226	**Revision:**	1.0		
Drawn:	VB	**Date:**	18/11/2016		
Figure:	1	**Scale:**	Not To Scale		

Project:	Land off Downend Road, Portchester PO16 8PX			**Title**	Exploratory Hole Location Plan (preliminary investigation)
Client:	Miller Homes			**Geo-Environmental Services Ltd** **Unit 7 Danworth Farm, Cuckfield Road** **Hurstpierpoint, West Sussex BN6 9GL** **+44(0)1273 832972 www.gesl.net**	Geo-Environmental
Ref No:	GE16226	**Revision:**	1.1		
Drawn:	GR	**Date:**	11/10/2017		
Figure:	2	**Scale:**	Not To Scale		



Project:	Land off Downend Road, Portchester PO16 8PX			**Title**	Exploratory Hole Location Plan (Supplementary investigation)
Client:	Miller Homes			**Geo-Environmental Services Ltd**	
Ref No:	GE15996	**Revision:**	1.1	**Unit 7 Danworth Farm, Cuckfield Road**	
Drawn:	GR	**Date:**	11/10/2017	**Hurstpierpoint, West Sussex BN6 9GL**	
Figure:	3	**Scale:**	Not To Scale	**+44(0)1273 832972 www.gesl.net**	Geo-Environmental

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	Trial Pit Log	TrialPit No TP1 Sheet 1 of 1

Project Name:	Downend Road, Portchester	Project No. GE15996	Co-ords: 460199.43 - 106388.88 Level:	Date 13/12/2016
Location: Downend Road, Portchester			Dimensions (m): 2.36 × 0.60 Depth 3.00	Scale 1:25
Client:	Miller Homes			Logged VB

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.26 0.26	D ES					Dark brown clayey gravelly cobbly SILT. Gravel and cobbles consist of subangular flint.
				0.40			Light brown and off-white structureless CHALK composed of a silt and sand matrix with gravel and cobble size weak low to medium density clasts and some gravel sized flint. CIRIA Grade Dc.
				0.75			White and off-white structureless CHALK composed of a silt and sand matrix with gravel to cobble size weak medium density clasts and some gravel and cobble sized flint. CIRIA Grade Dc.
	1.55 1.55	D ES					
				3.00			End of Pit at 3.00m

1 2 3 4 5

Water Strikes	
Depth Strike	Rose to (mbgl)

Remarks None encountered

Stability

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	Trial Pit Log	TrialPit No TP2 Sheet 1 of 1

Project Name:	Downend Road, Portchester	Project No. GE15996	Co-ords: 460189.58 - 106221.54 Level:	Date 13/12/2016
Location: Downend Road, Portchester			Dimensions (m): 2.50 × 0.60 Depth 3.00	Scale 1:25
Client:	Miller Homes			Logged VB

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.25 0.25	D ES		0.30			Dark brown clayey gravelly cobbly SILT. Gravel and cobbles consist of subangular flint.
	0.68 0.68	D ES		0.80			Orange gravelly cobbly CLAY. Gravel and cobbles of subangular flint.
	1.46 1.46	D ES		3.00			Firm orange-brown and reddish brown clayey slightly gravelly SILT. Gravel is fine to medium subangular flint. End of Pit at 3.00m

1
2
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Water Strikes	
Depth Strike	Rose to (mbgl)

Remarks None encountered

Stability

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	Trial Pit Log	TrialPit No TP3 Sheet 1 of 1

Project Name:	Downend Road, Portchester	Project No. GE15996	Co-ords: 460301.58 - 106281.29 Level:	Date 13/12/2016
Location: Downend Road, Portchester			Dimensions (m): 2.37 × 0.60 Depth 3.00	Scale 1:25
Client:	Miller Homes			Logged VB

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Dark brown clayey gravelly cobbly SILT. Gravel and cobbles consist of subangular flint.
	0.25 0.25	D ES		0.25			Orange-brown gravelly cobbly CLAY. Gravel and cobble is subangular flint.
	0.67 0.67	D ES					
				0.85			Light brown and off-white structureless CHALK composed of a silt and sand matrix with gravel size weak low to medium density clasts and some gravel and cobble sized flint. CIRIA Grade Dc.
	1.06 1.06	D ES					
				1.60			White and off-white structureless CHALK composed of a silt and sand matrix with gravel to cobble size weak medium density clasts and some gravel to cobble sized flint. CIRIA Grade Dc.
	2.80 2.80	D ES					
				3.00			End of Pit at 3.00m

1 2 3 4 5

Water Strikes	
Depth Strike	Rose to (mbgl)

Remarks None encountered

Stability

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	Trial Pit Log	TrialPit No TP4 Sheet 1 of 1
Project Name:	Downend Road, Portchester	Project No. GE15996	Co-ords: 460255.03 - 106126.47 Level:	Date 13/12/2016
Location: Downend Road, Portchester		Dimensions (m): 2.40 × 0.60 Depth 3.00	Scale 1:25
Client: Miller Homes			Logged VB

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.33 0.33	D ES		0.35			Greyish brown gravelly clayey SILT. Gravel is subangular flint.
	0.67	D		1.10			Firm orange-brown gravelly cobbly CLAY. Gravel and cobble is subangular flint.
	1.20 1.20	D ES		2.20			Firm to stiff orange-brown silty CLAY.
	2.40 2.40	D ES		3.00			Orange-brown very slightly clayey GRAVEL. Gravel is fine to medium subanglar to sub-rounded flint. End of Pit at 3.00m

1 2 3 4 5

Water Strikes	
Depth Strike	Rose to (mbgl)

Remarks None encountered

Stability

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	Trial Pit Log	TrialPit No TP5 Sheet 1 of 1

Project Name:	Downend Road, Portchester	Project No. GE15996	Co-ords: 460478.59 - 106180.29 Level:	Date 13/12/2016
Location: Downend Road, Portchester			Dimensions (m): 2.20 × 0.60 Depth 3.10	Scale 1:25
Client:	Miller Homes			Logged VB

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.25 0.25	D ES					Dark brown clayey gravelly cobbly SILT. Gravel and cobbles consist of subangular flint.
				0.50			Firm orange-brown gravelly cobbly CLAY. Gravel and cobble of subangular flint.
	1.00 1.00	D ES					
				1.70			Firm to stiff orange-brown silty CLAY with occasional black flecks/mottling
				1.90			Firm light greyish brown silty sandy gravelly CLAY. Gravel is subangular flint.
	2.80 2.80	D ES					
				3.10			End of Pit at 3.10m

1 2 3 4 5

Water Strikes	
Depth Strike	Rose to (mbgl)

Remarks None encountered

Stability

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	Trial Pit Log	TrialPit No TP6 Sheet 1 of 1

Project Name:	Downend Road, Portchester	Project No. GE15996	Co-ords: 460503.05 - 105999.77 Level:	Date 13/12/2016
Location: Downend Road, Portchester			Dimensions (m): 2.30 × 0.60 Depth 3.00	Scale 1:25
Client:	Miller Homes			Logged VB

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
	0.25 0.25	D ES		0.30			Dark brown clayey gravelly cobbly SILT. Gravel and cobbles consist of subangular flint.
	1.00 1.00	D ES		1.60			Firm reddish brown graavelly cobbly CLAY. Gravel and cobble consist of subangular flint, which become sparse from 1.25m.
	2.00 2.00	D ES		3.00			Light brown to light orange-brown and off-white structureless CHALK composed of a silt and sand matrix with gravel size weak low to medium density clasts and some gravel sized flint. CIRIA Grade Dc. End of Pit at 3.00m

1 2 3 4 5

Water Strikes	
Depth Strike	Rose to (mbgl)

Remarks None encountered

Stability

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	Borehole Log	Borehole No. **WS1** Sheet 1 of 1

Project Name:	Downend Road, Portchester	Project No. GE15996	Co-ords: 460533E - 106045N	Hole Type WLS
Location:	Downend Road, Portchester		Level:	Scale 1:25
Client:	Miller Homes		Dates: 14/12/2016	Logged By VB

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.15 0.15	D ES					Greyish brown slightly SILT with some subangular flint gravel
					0.30			Firm reddish brown silty slightly gravelly CLAY. Gravel is subangular flint.
					0.65			Slightly reddish brown silty clayey fine to coarse flint GRAVEL with occasional cobble sized flint
		1.50 1.50	D ES					
					2.05			Firm orange brown CLAY
		2.50 2.50	D ES					
					3.00			End of Borehole at 3.00m

1 2 3 4 5

Casing		Water Strikes (mbgl)		Chiselling (mbgl)	
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to

Remarks

No water encountered

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	Borehole Log	Borehole No. **WS2** Sheet 1 of 1

Project Name:	Downend Road, Portchester	Project No. GE15996	Co-ords: 460291E - 106526N	Hole Type WLS
Location:	Downend Road, Portchester		Level:	Scale 1:25
Client:	Miller Homes		Dates: 14/12/2016	Logged By VB

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20 0.20	D ES					Greyish brown slightly SILT with some subangular flint gravel
					0.35			
		0.50 0.50	D ES					Firm reddish brown and off-white sandy gravelly CLAY. Gravel is subangular flint and chalk.
					0.75			Recovered as off-white CHALK compopsed of a silt size matrix with sand and gravel sized weak low density clasts. Possible CIRIA Grade Dc.
		2.00 2.00	D ES					
G					3.00			End of Borehole at 3.00m

1 2 3 4 5

Casing		Water Strikes (mbgl)		Chiselling (mbgl)	
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to

Remarks

No water encountered

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	# Borehole Log	Borehole No. **WS3** Sheet 1 of 1

Project Name:	Downend Road, Portchester	Project No. GE15996	Co-ords:	460094E - 106309N	Hole Type WLS
Location:	Downend Road, Portchester		Level:		Scale 1:25
Client:	Miller Homes		Dates:	14/12/2016	Logged By VB

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.30 0.30	D ES					Greyish brown slightly SILT with some subangular flint gravel
					0.40			Firm brown silty gravelly CLAY. Gravel is subangular flint.
		0.75 0.75	D ES					
					1.50			Recovered as off-white CHALK compopsed of a silt size matrix with sand and gravel sized weak low density clasts. Possible CIRIA Grade Dc.
		2.00 2.00	D ES					
					3.00			End of Borehole at 3.00m

1 2 3 4 5

Casing		Water Strikes (mbgl)		Chiselling (mbgl)	
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to

Remarks

No water encountered

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	Borehole Log	Borehole No. **WS4** Sheet 1 of 1

Project Name:	Downend Road, Portchester	Project No. GE15996	Co-ords: 460089E - 106209N	Hole Type WLS
Location:	Downend Road, Portchester		Level:	Scale 1:25
Client:	Miller Homes		Dates: 14/12/2016	Logged By VB

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.10			Worn, broken conctrete hardstanding.
		0.20 0.20	D ES					Brown and black mottled silty clayey flint gravel with some fine gravel sized charcoal fragments
					0.50			Reddish brown silty clayey fine to coarse flint GRAVEL.
		1.00 1.00	D ES		1.00			Firm reddish brown gravelly CLAY. Gravel is fine to coarse size subangular flint.
					2.00			Firm reddish brown silty CLAY
		2.50 2.50	D ES					
G					3.00			End of Borehole at 3.00m

Casing		Water Strikes (mbgl)		Chiselling (mbgl)	
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to

Remarks

No water encountered

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	# Borehole Log	Borehole No. **WS5** Sheet 1 of 1

Project Name:	Downend Road, Portchester	Project No. GE15996	Co-ords:	459978E - 106320N	Hole Type WLS
Location:	Downend Road, Portchester		Level:		Scale 1:25
Client:	Miller Homes		Dates:	14/12/2016	Logged By VB

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.20 0.20	D ES					Dark brown and locally black mottled clayey gravelly SILT. Gravel is fine to coarse subangular flint.
					0.40			Firm reddish brown silty slightly gravelly CLAY. Gravel is subangular flint.
		0.75 0.75	D ES					
					1.00			Pale brown staining GRAVEL. Weathered, unstructured chalk.
					1.25			Recovered as off-white CHALK composed of a silt size matrix with sand and gravel sized weak low density clasts. Possible CIRIA Grade Dm/ Dc.
		2.75 2.75	D ES					
G					3.00			End of Borehole at 3.00m

1 2 3 4 5

Casing		Water Strikes (mbgl)		Chiselling (mbgl)	
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to

Remarks

No water encountered

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	Borehole Log	Borehole No. **WS6** Sheet 1 of 1

Project Name:	Downend Road, Portchester	Project No. GE15996	Co-ords: 459732E - 106397N	Hole Type WLS
Location:	Downend Road, Portchester		Level:	Scale 1:25
Client:	Miller Homes		Dates: 14/12/2016	Logged By VB

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.10 0.10	D ES		0.20			Dark brown silty CLAY.
					0.50			Firm reddish brown silty slightly gravelly CLAY. Gravel is subangular flint.
		2.50 2.50	D ES		3.00			Recovered as off-white CHALK composed of a silt size matrix with sand and gravel sized weak low density clasts. Possible CIRIA Grade Dc. End of Borehole at 3.00m

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2
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4
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Casing		Water Strikes (mbgl)		Chiselling (mbgl)	
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to

Remarks

No water encountered

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	# Borehole Log	Borehole No. **BH1** Sheet 1 of 1
Project Name:	Portchester II	Project No. GE16226	Co-ords:	Hole Type CP
Location:	Downend Road, Portchester	Level:	Scale 1:50
Client:	Miller Homes	Dates: 10/02/2017	Logged By

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
		0.50	D		0.70			Brown gravelly silty CLAY	
		1.00	C	N=18 (2,3/4,5,4,5)				Firm to stiff brown gravelly CLAY. Medium to coarse gravel of flint	1
		1.45	D						
		1.70	D						
		2.00	C	N=14 (2,3/3,3,4,4)					2
		2.45	D		2.30			Firm brown gravelly CLAY. Gravel is fine to medium sized clasts of chalk and flint	
		2.60	D		2.70			Firm light grey silty CLAY with gravel of chalk	
		3.00	S	N=10 (1,2/2,2,3,3)					3
		3.45	D						
		4.00	S	N=12 (1,2/2,3,4,3)					4
		4.45	D		4.80			Structureless CHALK composed of silty matrix with some gravel size weak clasts of chalk occasional iron staining. CIRIA Grade Dm/Dc	
		5.00	S	N=12 (5,4/2,3,4,3)					5
		5.45	D		5.50			CHALK recovered as moderately weak gravel to cobble sized clasts due to drilling process. Presumed CIRIA Grade D/C.	
		5.60	D						6
		6.20	D		6.10			White CHALK recovered as moderately weak gravel sized chalk clasts and occasional flint nodules. Probable CIRIA Grade C/B	
		6.50	S	N=34 (4,5/7,8,9,10)					
		6.95	D						7
		7.50	D						
		8.00	S	N=20 (6,7/5,4,5,6)					8
		8.45	D						
		9.00	D						9
		9.50	S	N=22 (6,6/6,5,6,5)					
		9.95	D		10.00			End of Borehole at 10.00m	10

Casing Diameter	Casing Depth (m)	Water Strikes (mbgl) Depth Strike	Water Strikes (mbgl) Rose to	Chiselling (mbgl) Depth from	Chiselling (mbgl) Depth to
				0.00	1.00
				5.50	6.10

Remarks

Falling head tests conducted in borehole

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	**Borehole Log**	Borehole No. **BH2** Sheet 1 of 1
Project Name:	Portchester II	Project No. GE16226	Co-ords:	Hole Type CP
Location:	Downend Road, Portchester	Level:	Scale 1:50
Client:	Miller Homes	Dates: 09/02/2017	Logged By

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
					0.30			Brown gravelly silty CLAY	
		0.50	D					Firm brown gravelly CLAY. Gravel is fine to medium sized flint	
		1.00	S	N=10 (1,2/2,2,3,3)					1
		1.45	D		1.50				
		1.70	D					Firm brown gravelly CLAY. Gravel is fine to medium sized clasts of chalk and flint	
		2.00	S	N=11 (1,2/2,3,3,3)					2
		2.45	D		2.60				
		2.70	D					Soft to firm brown gravelly CLAY. Gravel is fine chalk clasts	
		3.00	S	N=6 (1,2/2,1,1,2)					3
		3.45	D		3.50			Firm brown silty gravelly CLAY. Gravel is of fine to medium sized chalk clasts	
		4.00	S	N=10 (1,2/2,2,3,3)					4
		4.45	D						
		5.00	S	N=11 (1,2/2,2,3,4)					5
		5.45	D		5.80				
		6.00	D					White CHALK recovered as moderately weak gravel sized chalk clasts and occasional flint nodules. Probable CIRIA Grade D/C grading to C/B	6
		6.50	S	N=16 (2,3/4,3,4,5)					
		6.95	D						7
		7.50	D						
		8.00	S	N=17 (2,3/4,4,4,5)					8
		8.45	D						
		9.00	D						9
		9.50	S	N=18 (3,3/4,4,5,5)					
		9.95	D		10.00			End of Borehole at 10.00m	10

Casing		Water Strikes (mbgl)		Chiselling (mbgl)	
Diameter	Depth (m)	Depth Strike	Rose to	Depth from	Depth to
				0.00	1.00

Remarks

Falling head tests conducted in borehole

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	Trial Pit Log	TrialPit No TP501 Sheet 1 of 1

Project Name: Portchester II	Project No. GE16226	Co-ords: - Level:	Date 09/02/2017
Location: Downend Road, Portchester		Dimensions (m): 200.00 × 0.60	Scale 1:25
Client: Miller Homes		Depth 3.00	Logged V. Bennett

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Dark brown clayey gravelly cobbly SILT. Gravel and cobbles consist of subangular flint.
				0.60			Firm orange-brown gravelly cobbly silty CLAY. Gravel and cobbles of subrounded to subangular flint.
	1.20	PP	PP=1.5kg/cm2				
				1.50			Soft becoming very soft light greyish brown silty sandy slightly gravelly CLAY. Gravel medium sized, subangular flint and chalk.
	1.76	PP	PP=0.6kg/cm2				
	3.00	PP	PP=0.25kg/cm2	3.00			End of Pit at 3.00m

1 2 3 4 5

Water Strikes	
Depth Strike	Rose to (mbgl)

Remarks

Stability

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	Trial Pit Log	TrialPit No TP502 Sheet 1 of 1
Project Name: Portchester II	Project No. GE16226	Co-ords: - Level:	Date 09/02/2017
Location: Downend Road, Portchester		Dimensions (m): 0.60 × 212.50 Depth 3.00	Scale 1:25
Client: Miller Homes			Logged V. Bennett

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Dark brown clayey gravelly cobbly SILT. Gravel and cobbles consist of subangular flint.
				0.40			Soft orange-brown gravelly cobbly silty CLAY. Gravel and cobbles of subrounded to subangular flint.
	1.90	PP	PP=0.25kg/cm2				
				2.10			Very soft becoming firm pale grey mottled slightly orange CLAY. Rare gravel inclusions of flint and chalk.
	2.40	PP	PP=0.1kg/cm2				
	3.00	PP	PP=1.5kg/cm2	3.00			End of Pit at 3.00m

1 2 3 4 5

Water Strikes	
Depth Strike	Rose to (mbgl)

Remarks

Stability

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	Trial Pit Log	TrialPit No TP503 Sheet 1 of 1

Project Name: Portchester II	Project No. GE16226	Co-ords: - Level:	Date 09/02/2017
Location: Downend Road, Portchester		Dimensions (m): 0.60 × 210.00 Depth 3.00	Scale 1:25
Client: Miller Homes			Logged V. Bennett

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Dark brown clayey gravelly cobbly SILT. Gravel and cobbles consist of subangular flint.
				0.40			Firm orange-brown gravelly cobbly silty CLAY. Gravel and cobbles of subrounded to subangular flint.
	1.80	PP	PP=1.1kg/cm2				
				2.00			Stiff light greyish brown silty sandy slightly gravelly CLAY. Gravel medium sized, subangular flint and chalk.
	2.10	PP	PP=1.6kg/cm2				
				3.00			End of Pit at 3.00m

1 2 3 4 5

Water Strikes	
Depth Strike	Rose to (mbgl)

Remarks

Stability

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	Trial Pit Log	TrialPit No TP601 Sheet 1 of 1

Project Name: Portchester II	Project No. GE16226	Co-ords: - Level:	Date 09/02/2017
Location: Downend Road, Portchester		Dimensions (m): 0.60 × 195.00	Scale 1:25
Client: Miller Homes		Depth 3.00	Logged V. Bennett

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Dark brown clayey gravelly cobbly SILT. Rare roots (2-3mm). Gravel and cobbles consist of subangular flint.
				0.70			Dark brown clayey very gravelly very cobbly SILT. Gravel and cobbles consist of subangular flint.
				1.50			Orange-brown gravelly cobbly silty CLAY. Gravel and cobbles of subrounded to subangular flint.
	2.00	PP	PP=0.5kg/cm2	1.95			Soft creamy orange brown silty sandy slightly gravelly CLAY. Gravel medium sized, subangular flint and chalk.
				3.00			End of Pit at 3.00m

1 2 3 4 5

Water Strikes	
Depth Strike	Rose to (mbgl)

Remarks

Stability

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	Trial Pit Log	TrialPit No TP602 Sheet 1 of 1

Project Name: Portchester II	Project No. GE16226	Co-ords: - Level:	Date 09/02/2017
Location: Downend Road, Portchester		Dimensions (m): 210.00 × 0.60	Scale 1:25
Client: Miller Homes		Depth 3.00	Logged V. Bennett

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Dark brown clayey gravelly cobbly SILT. Gravel and cobbles consist of subangular flint.
				0.78			Very soft orange-brown gravelly cobbly silty CLAY. Gravel and cobbles of subrounded to subangular flint.
	1.00	PP	PP=0.25kg/cm2				
				1.97			Soft creamy orange brown silty sandy slightly gravelly CLAY. Gravel medium sized, subangular flint and chalk.
	2.50	PP	PP=0.75kg/cm2				
				3.00			End of Pit at 3.00m

1 2 3 4 5

Water Strikes	
Depth Strike	Rose to (mbgl)

Remarks

Stability

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	Trial Pit Log	TrialPit No TP603 Sheet 1 of 1

Project Name: Portchester II	Project No. GE16226	Co-ords: - Level:	Date 09/02/2017
Location: Downend Road, Portchester		Dimensions (m): 0.60 × 205.00 Depth 3.00	Scale 1:25
Client: Miller Homes			Logged V. Bennett

Water Strike	Samples & In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.40			Dark brown clayey gravelly cobbly SILT. Gravel and cobbles consist of subangular flint.
	0.60	PP	PP=0.75kg/cm2				Soft becoming stiff orange-brown gravelly cobbly silty CLAY. Gravel and cobbles of subrounded to subangular flint.
	3.00	PP	PP=2kg/cm2	3.00			End of Pit at 3.00m

1 2 3 4 5

Water Strikes	
Depth Strike	Rose to (mbgl)

Remarks

Stability

AGS

Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-EnvironmentalServices Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Downend Road, Portchester	**Job No. :**	GE15996
Client :	Miller Homes	**Date :**	13/12/2016

Pit reference	**TP1**
Pit depth (m)	3.00
Pit width (m)	0.60
Pit length (m)	1.43
Depth to standing water (m)	

Test 1

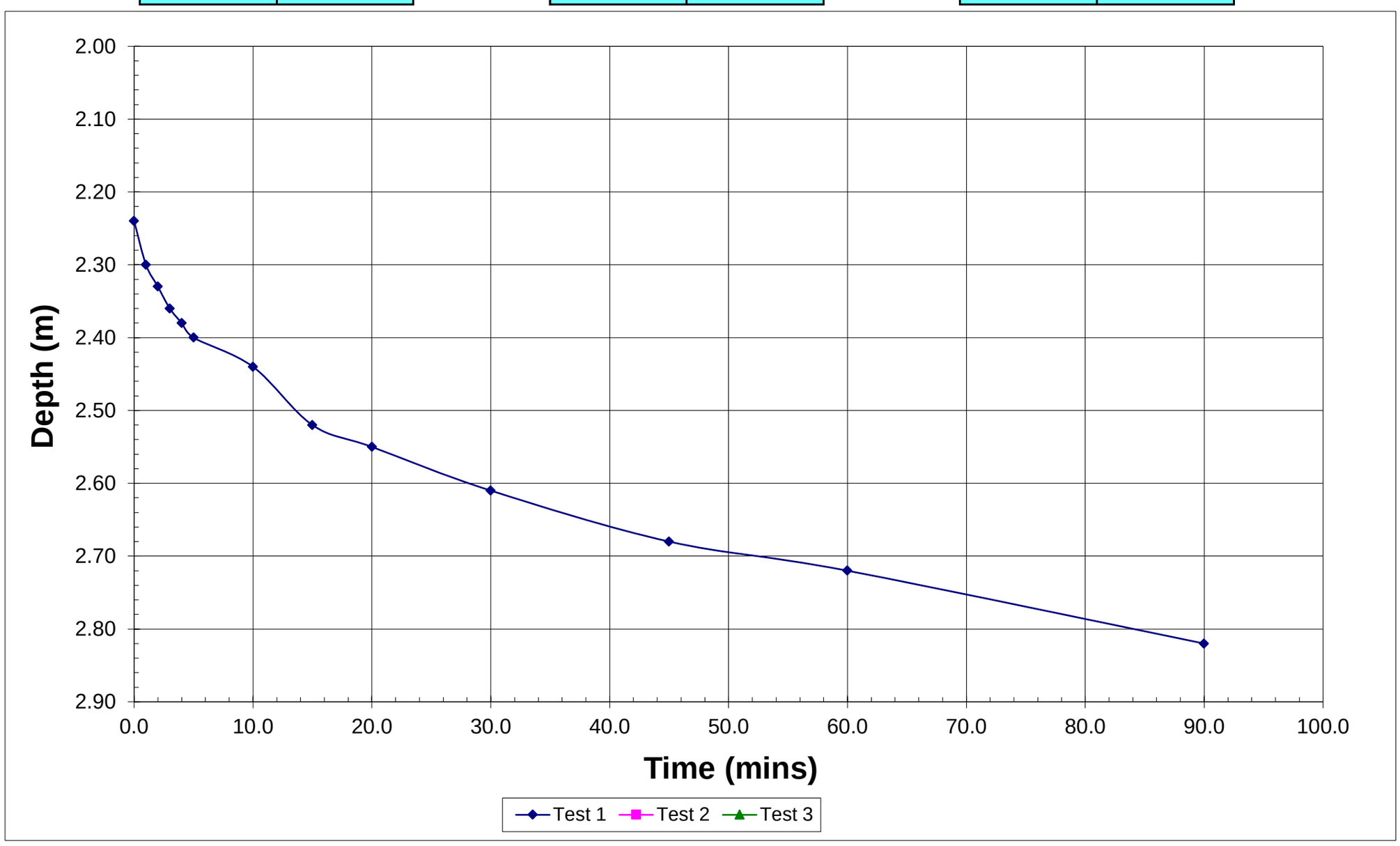
Time (min)	Depth (m)
0.0	2.24
1.0	2.30
2.0	2.33
3.0	2.36
4.0	2.38
5.0	2.40
10.0	2.44
15.0	2.52
20.0	2.55
30.0	2.61
45.0	2.68
60.0	2.72
90.0	2.82

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)



	Test 1	Test 2	Test 3
Max. depth (m)	3.00	3.00	3.00
Effective depth (m)	0.76	3.00	3.00
75% effective depth (m)	2.43	0.75	0.75
50% effective depth (m)	2.62	1.50	1.50
25% effective depth (m)	2.81	2.25	2.25
t75 (min)	12.00		
t50 (min)	32.00		
t25 (min)	88.00		
Vp 75-25	0.33	1.29	1.29
ap 50	2.4008	6.948	6.948
tp 75-25	76.00	0.00	0.00

Soil infiltration rate (m/s)	**3.0E-05**	**#DIV/0!**	**#DIV/0!**
Soil infiltration rate (mm/hr)	**1.07E+02**	**#DIV/0!**	**#DIV/0!**

Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-EnvironmentalServices Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Downend Road, Portchester	**Job No. :**	GE15996
Client :	Miller Homes	**Date :**	13/12/2016

Pit reference	**TP2**
Pit depth (m)	3.00
Pit width (m)	0.60
Pit length (m)	1.80
Depth to standing water (m)	

Test 1

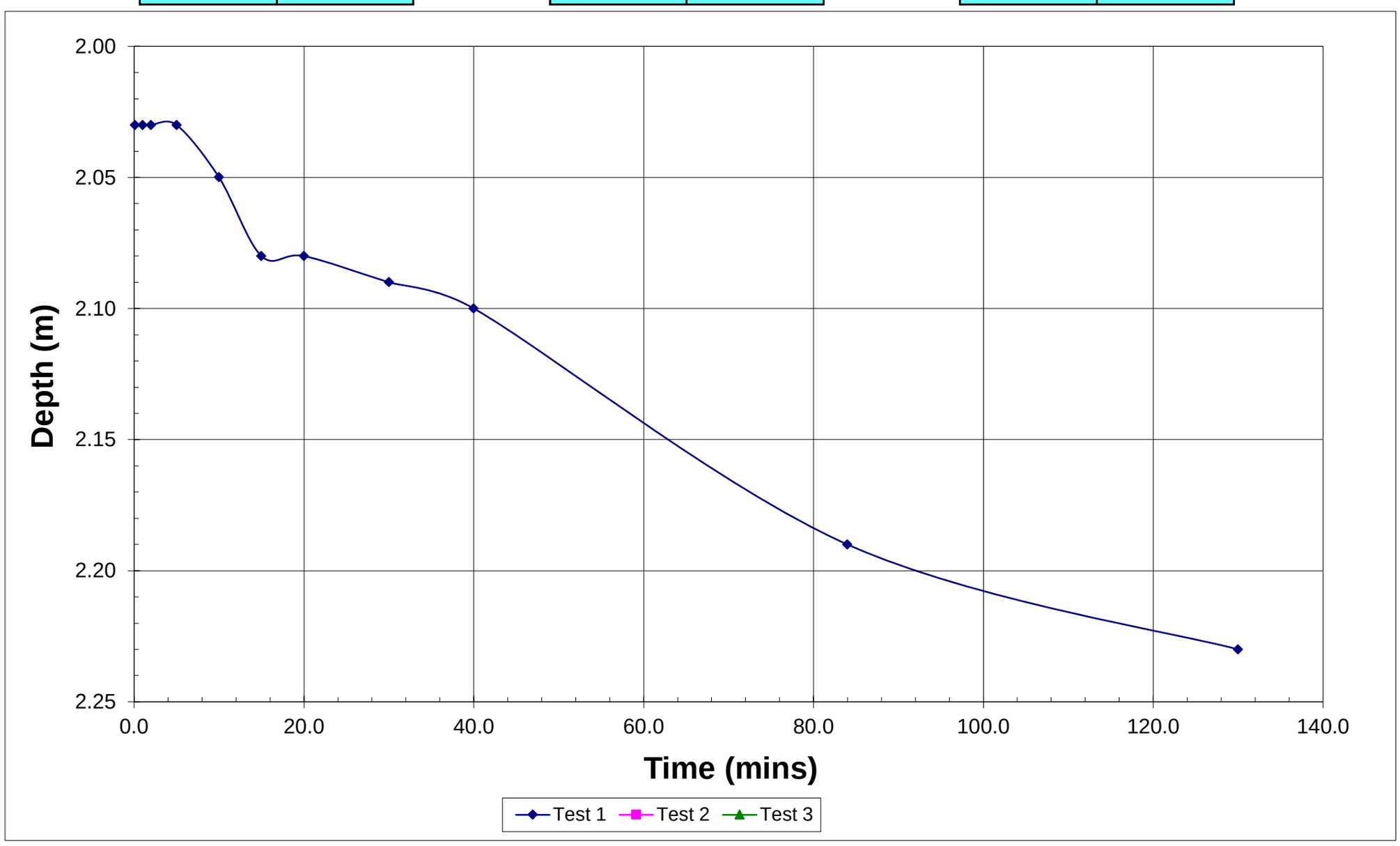
Time (min)	Depth (m)
0.1	2.03
1.0	2.03
2.0	2.03
5.0	2.03
10.0	2.05
15.0	2.08
20.0	2.08
30.0	2.09
40.0	2.10
84.0	2.19
130.0	2.23

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)



	Test 1	Test 2	Test 3
Max. depth (m)	3.00	3.00	3.00
Effective depth (m)	0.97	3.00	3.00
75% effective depth (m)	2.27	0.75	0.75
50% effective depth (m)	2.52	1.50	1.50
25% effective depth (m)	2.76	2.25	2.25
t75 (min)			
t50 (min)			
t25 (min)			
Vp 75-25	0.52	1.62	1.62
ap 50	3.408	8.28	8.28
tp 75-25	0.00	0.00	0.00

Soil infiltration rate (m/s)	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**
Soil infiltration rate (mm/hr)	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**

Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-EnvironmentalServices Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Downend Road, Portchester	**Job No. :**	GE15996
Client :	Miller Homes	**Date :**	13/12/2016

Pit reference	**TP3**
Pit depth (m)	3.00
Pit width (m)	0.60
Pit length (m)	1.94
Depth to standing water (m)	

Test 1

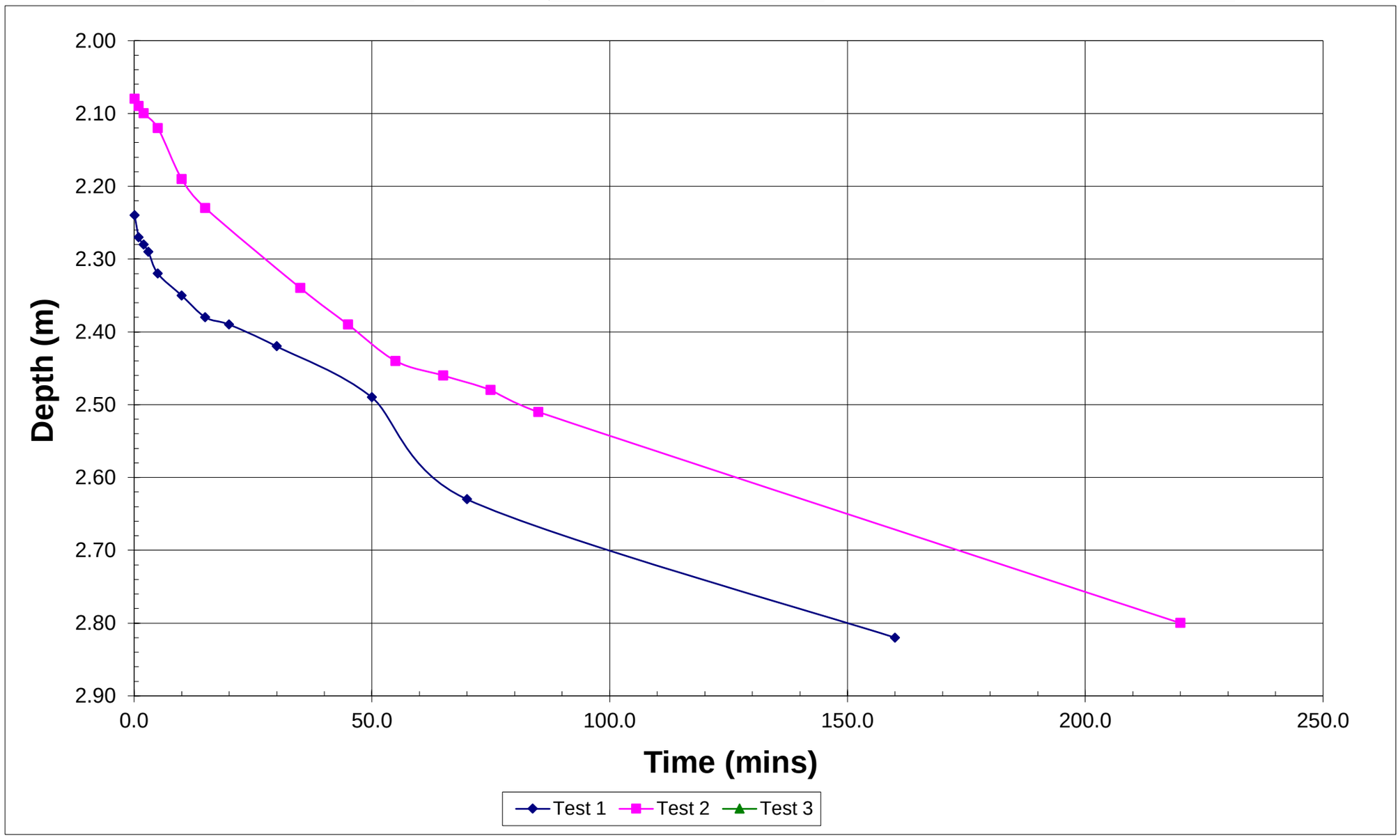
Time (min)	Depth (m)
0.1	2.24
1.0	2.27
2.0	2.28
3.0	2.29
5.0	2.32
10.0	2.35
15.0	2.38
20.0	2.39
30.0	2.42
50.0	2.49
70.0	2.63
160.0	2.82

Test 2

Time (min)	Depth (m)
0.1	2.08
1.0	2.09
2.0	2.10
5.0	2.12
10.0	2.19
15.0	2.23
35.0	2.34
45.0	2.39
55.0	2.44
65.0	2.46
75.0	2.48
85.0	2.51
220.0	2.80

Test 3

Time (min)	Depth (m)



	Test 1	Test 2	Test 3
Max. depth (m)	3.00	3.00	3.00
Effective depth (m)	0.76	0.92	3.00
75% effective depth (m)	2.43	2.31	0.75
50% effective depth (m)	2.62	2.54	1.50
25% effective depth (m)	2.81	2.77	2.25
t75 (min)	34.00	30.00	
t50 (min)	68.00	100.00	
t25 (min)	155.00	210.00	
Vp 75-25	0.44	0.54	1.75
ap 50	3.0944	3.5008	8.784
tp 75-25	121.00	180.00	0.00

Soil infiltration rate (m/s)	**2.0E-05**	**1.4E-05**	**#DIV/0!**
Soil infiltration rate (mm/hr)	**7.09E+01**	**5.10E+01**	**#DIV/0!**

Soakaway Test Results
(after BRE Digest 365)

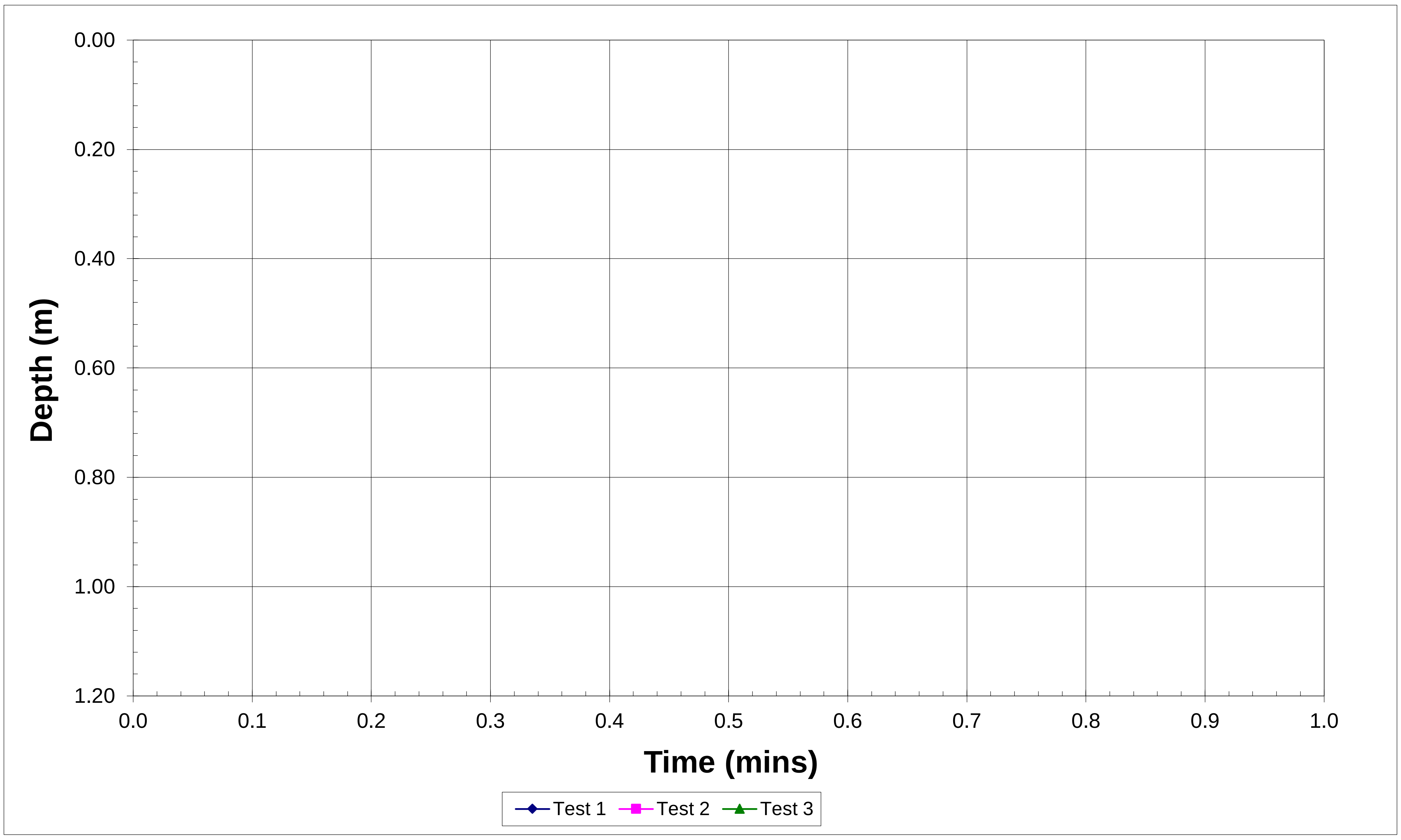
Geo-EnvironmentalServices Limited
Unit 7 Danworth Farm, Cuckfield Road,
Hurstpierpoint, West Sussex BN6 9GL
+44(0)1273 832972 www.gesl.net

Project Name :	Downend Road, Portchester	**Job No. :**	GE15996
Client :	Miller Homes	**Date :**	13/12/2016

Pit reference	**TP4**
Pit depth (m)	3.00
Pit width (m)	0.60
Pit length (m)	1.95
Depth to standing water (m)	

Test 1		**Test 2**		**Test 3**	
Time (min)	**Depth (m)**	**Time (min)**	**Depth (m)**	**Time (min)**	**Depth (m)**

Water outflow was too fast for a head of water to build in the pit. c. 1800litres of water pumped into the pit for the test. Water drained out immediately. Multiple fillings were attempted, each having the same outcome.



	Test 1	Test 2	Test 3
Max. depth (m)	3.00	3.00	3.00
Effective depth (m)	3.00	3.00	3.00
75% effective depth (m)	0.75	0.75	0.75
50% effective depth (m)	1.50	1.50	1.50
25% effective depth (m)	2.25	2.25	2.25
t75 (min)			
t50 (min)			
t25 (min)			
Vp 75-25	1.76	1.76	1.76
ap 50	8.82	8.82	8.82
tp 75-25	0.00	0.00	0.00

Soil infiltration rate (m/s)	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**
Soil infiltration rate (mm/hr)	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**

Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-EnvironmentalServices Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Downend Road, Portchester	**Job No. :**	GE15996
Client :	Miller Homes	**Date :**	13/12/2016

Pit reference	**TP5**
Pit depth (m)	3.10
Pit width (m)	0.60
Pit length (m)	1.70
Depth to standing water (m)	

Test 1

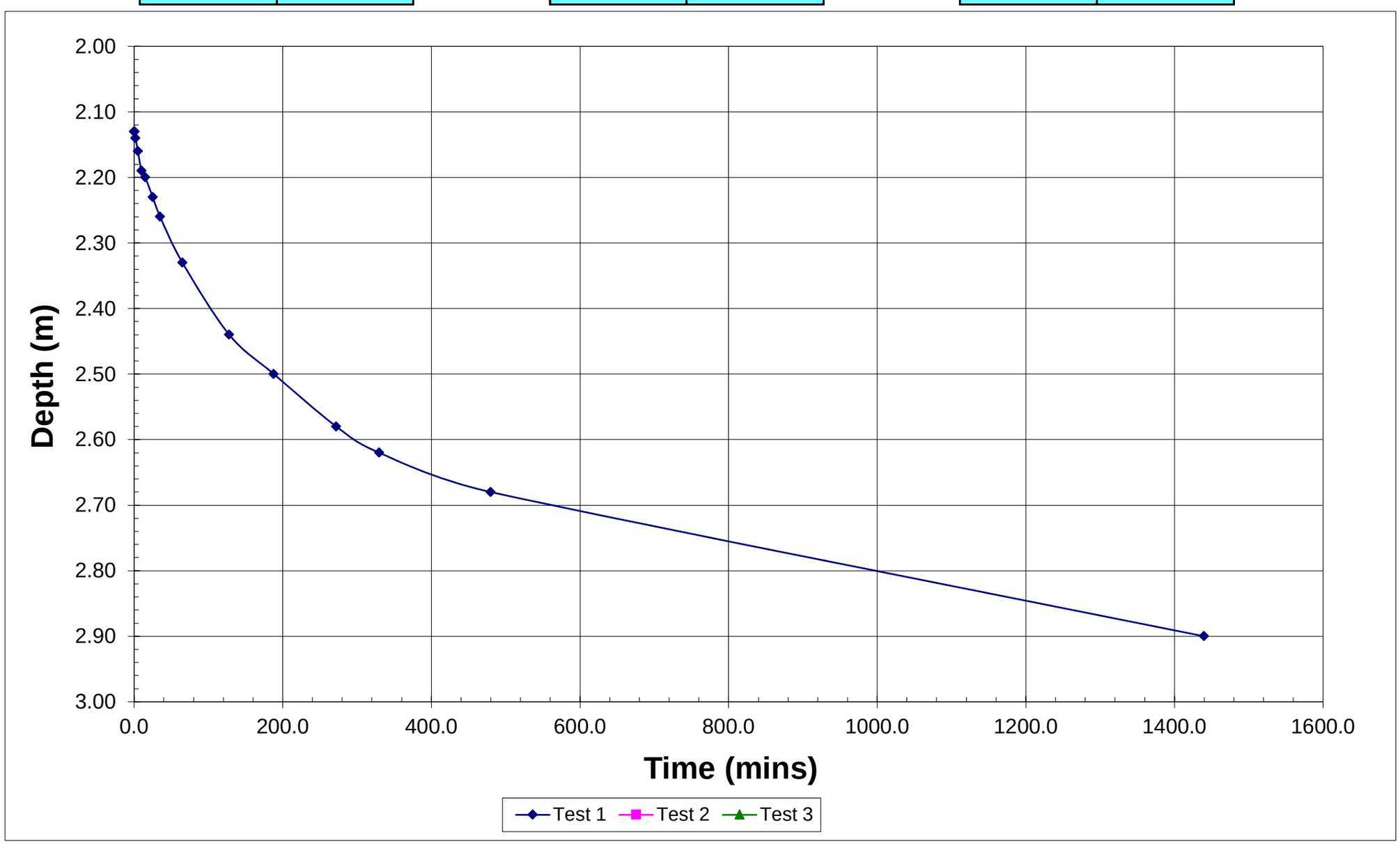
Time (min)	Depth (m)
0.1	2.13
1.0	2.13
2.0	2.14
5.0	2.16
10.0	2.19
15.0	2.20
25.0	2.23
35.0	2.26
65.0	2.33
128.0	2.44
188.0	2.50
272.0	2.58
330.0	2.62
480.0	2.68
1440.0	2.90

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)



	Test 1	Test 2	Test 3
Max. depth (m)	3.10	3.10	3.10
Effective depth (m)	0.97	3.10	3.10
75% effective depth (m)	2.37	0.78	0.78
50% effective depth (m)	2.62	1.55	1.55
25% effective depth (m)	2.86	2.33	2.33
t75 (min)	85.00		
t50 (min)	330.00		
t25 (min)	1400.00		
Vp 75-25	0.49	1.58	1.58
ap 50	3.251	8.15	8.15
tp 75-25	1315.00	0.00	0.00

Soil infiltration rate (m/s)	**1.9E-06**	**#DIV/0!**	**#DIV/0!**
Soil infiltration rate (mm/hr)	**6.94E+00**	**#DIV/0!**	**#DIV/0!**

Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-EnvironmentalServices Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Downend Road, Portchester	**Job No. :**	GE15996
Client :	Miller Homes	**Date :**	13/12/2016

Pit reference	**TP6**
Pit depth (m)	3.00
Pit width (m)	0.60
Pit length (m)	1.75
Depth to standing water (m)	

Test 1

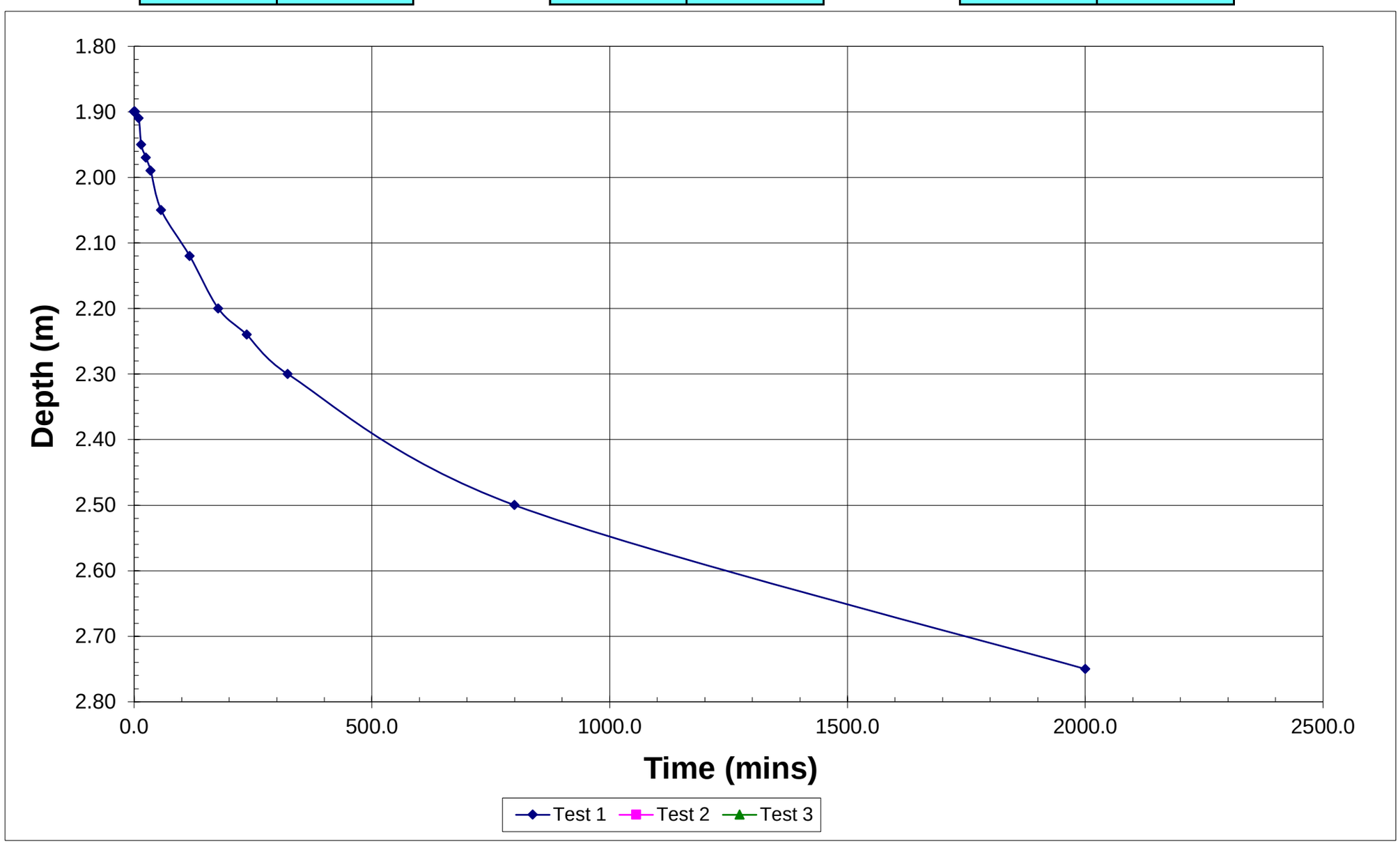
Time (min)	Depth (m)
0.1	1.90
1.0	1.90
2.0	1.90
10.0	1.91
15.0	1.95
25.0	1.97
35.0	1.99
57.0	2.05
117.0	2.12
177.0	2.20
237.0	2.24
323.0	2.30
800.0	2.50
2000.0	2.75

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)



Max. depth (m)	3.00	3.00	3.00
Effective depth (m)	1.10	3.00	3.00
75% effective depth (m)	2.18	0.75	0.75
50% effective depth (m)	2.45	1.50	1.50
25% effective depth (m)	2.73	2.25	2.25
t75 (min)	160.00		
t50 (min)	650.00		
t25 (min)	1900.00		
Vp 75-25	0.58	1.58	1.58
ap 50	3.635	8.1	8.1
tp 75-25	1740.00	0.00	0.00

Soil infiltration rate (m/s)	**1.5E-06**	**#DIV/0!**	**#DIV/0!**
Soil infiltration rate (mm/hr)	**5.48E+00**	**#DIV/0!**	**#DIV/0!**

Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-EnvironmentalServices Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Downend Road, Portchester II	**Job No. :**	GE16226
Client :	Miller Homes	**Date :**	09/02/2017

Pit reference	**TP501**	
Pit depth (m)	2.35	Base depth adjusted to maximum water depth during test
Pit width (m)	0.60	
Pit length (m)	2.00	
Depth to standing water (m)		

Test 1

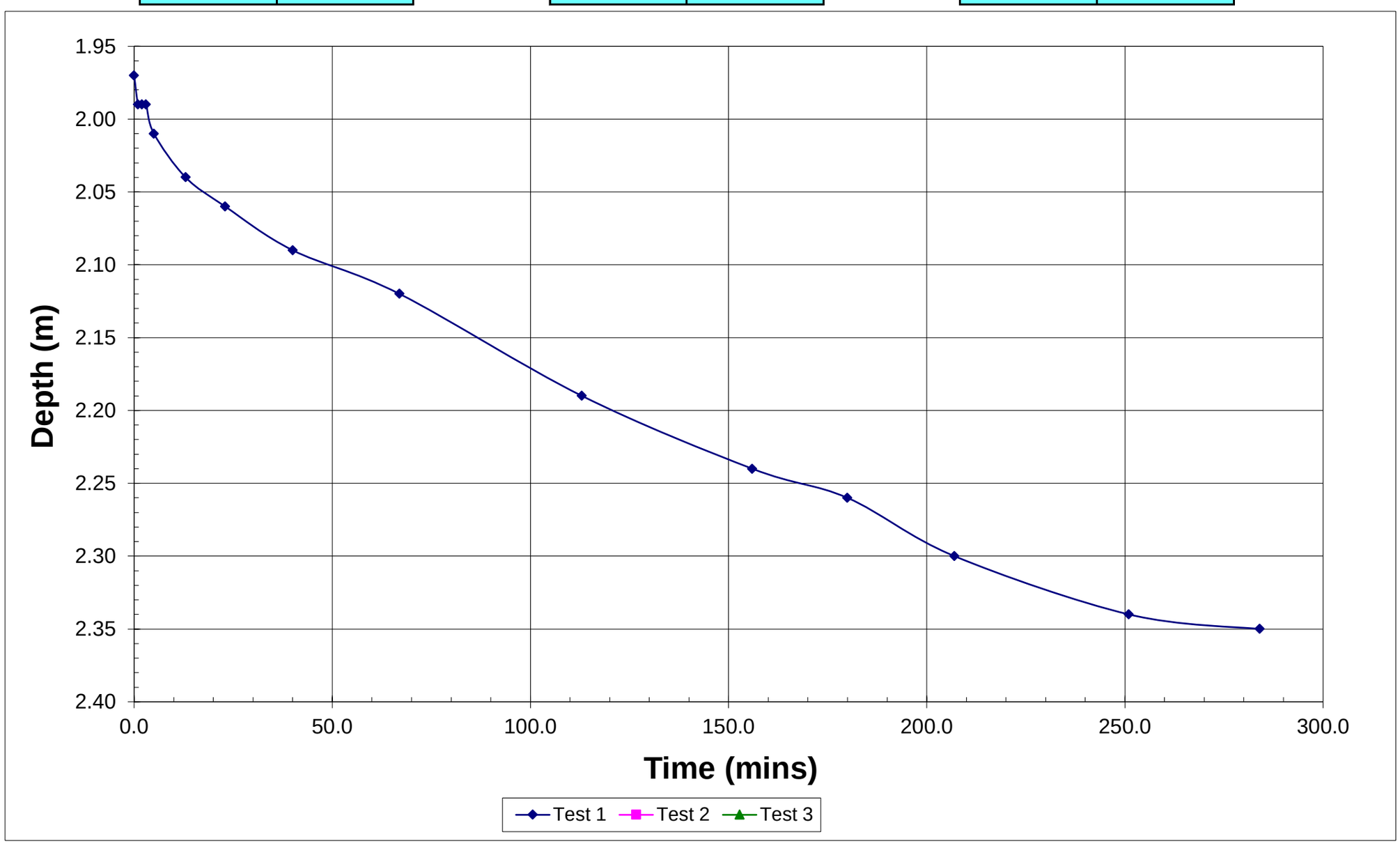
Time (min)	Depth (m)
0.0	1.97
1.0	1.99
2.0	1.99
3.0	1.99
5.0	2.01
13.0	2.04
23.0	2.06
40.0	2.09
67.0	2.12
113.0	2.19
156.0	2.24
180.0	2.26
207.0	2.30
251.0	2.34
284.0	2.35

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)



Max. depth (m)	2.35	2.35	2.35
Effective depth (m)	0.38	2.35	2.35
75% effective depth (m)	2.07	0.59	0.59
50% effective depth (m)	2.16	1.18	1.18
25% effective depth (m)	2.26	1.76	1.76
t75 (min)	30.00		
t50 (min)	90.00		
t25 (min)	180.00		
Vp 75-25	0.23	1.41	1.41
ap 50	2.188	7.31	7.31
tp 75-25	150.00	0.00	0.00

NOTE: Values are based on the measured final water depth and not a fully drained test. Thus results are indicative only of the test range and the permeability over an extended test range could be lower.

Soil infiltration rate (m/s)	**1.2E-05**	**#DIV/0!**	**#DIV/0!**
Soil infiltration rate (mm/hr)	**4.17E+01**	**#DIV/0!**	**#DIV/0!**

Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-EnvironmentalServices Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Downend Road, Portchester II	**Job No. :**	GE16226
Client :	Miller Homes	**Date :**	09/02/2017

Pit reference	**TP502**	
Pit depth (m)	2.05	Base depth adjusted to maximum water depth during test
Pit width (m)	0.60	
Pit length (m)	2.15	
Depth to standing water (m)		

Test 1

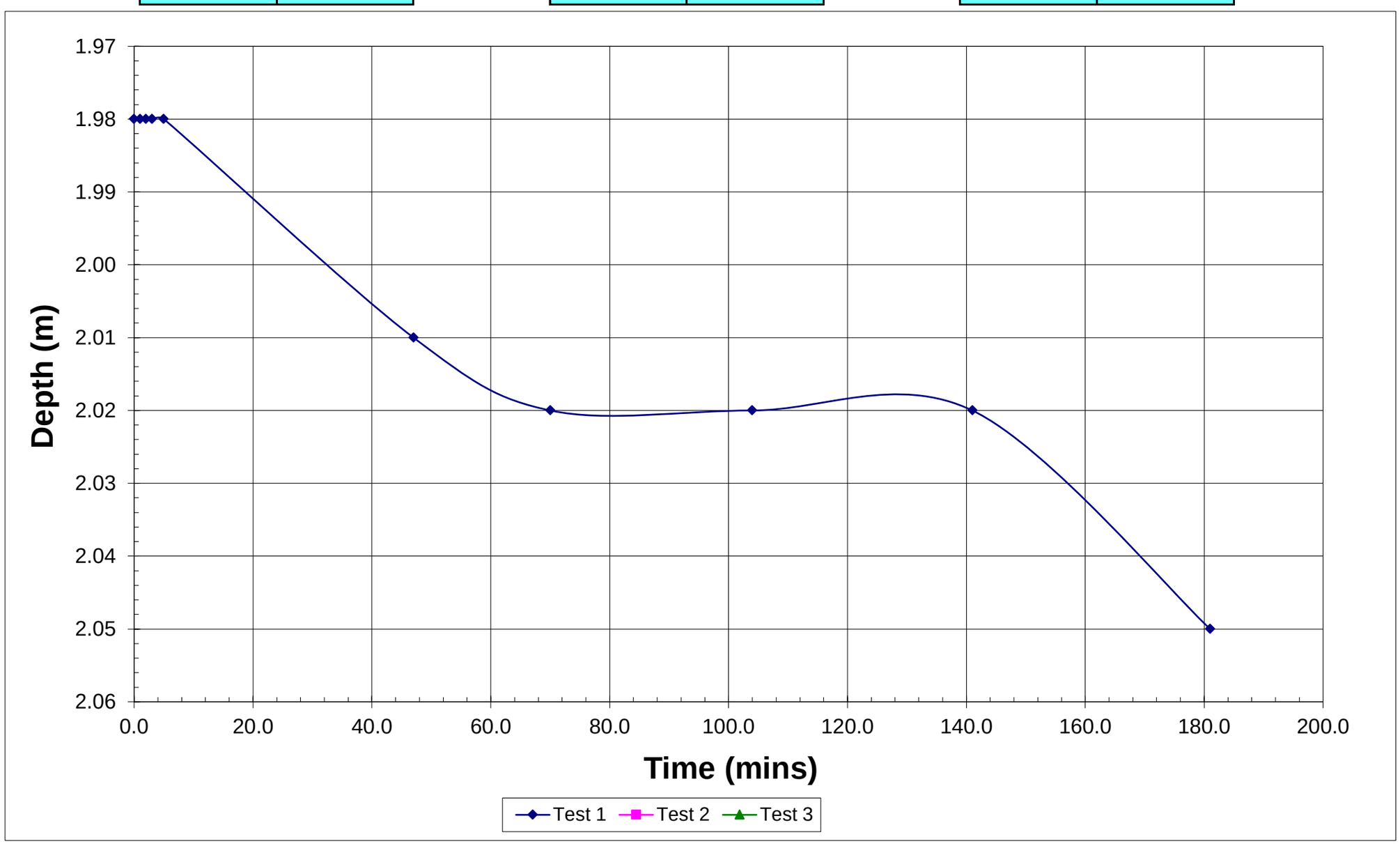
Time (min)	Depth (m)
0.0	1.98
1.0	1.98
2.0	1.98
3.0	1.98
5.0	1.98
47.0	2.01
70.0	2.02
104.0	2.02
141.0	2.02
181.0	2.05

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)



	Test 1	Test 2	Test 3
Max. depth (m)	2.05	2.05	2.05
Effective depth (m)	0.07	2.05	2.05
75% effective depth (m)	2.00	0.51	0.51
50% effective depth (m)	2.02	1.03	1.03
25% effective depth (m)	2.03	1.54	1.54
t75 (min)	36.00		
t50 (min)	70.00		
t25 (min)	156.00		
Vp 75-25	0.05	1.32	1.32
ap 50	1.4825	6.9275	6.9275
tp 75-25	120.00	0.00	0.00

NOTE: Values are based on the measured final water depth and not a fully drained test. Thus results are indicative only of the test range and the permeability over an extended test range could be lower.

Soil infiltration rate (m/s)	**4.2E-06**	**#DIV/0!**	**#DIV/0!**
Soil infiltration rate (mm/hr)	**1.52E+01**	**#DIV/0!**	**#DIV/0!**

Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-EnvironmentalServices Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Downend Road, Portchester II	**Job No. :**	GE16226
Client :	Miller Homes	**Date :**	09/02/2017

Pit reference	**TP503**	
Pit depth (m)	2.29	Base depth adjusted to maximum water depth during test
Pit width (m)	0.60	
Pit length (m)	2.10	
Depth to standing water (m)		

Test 1

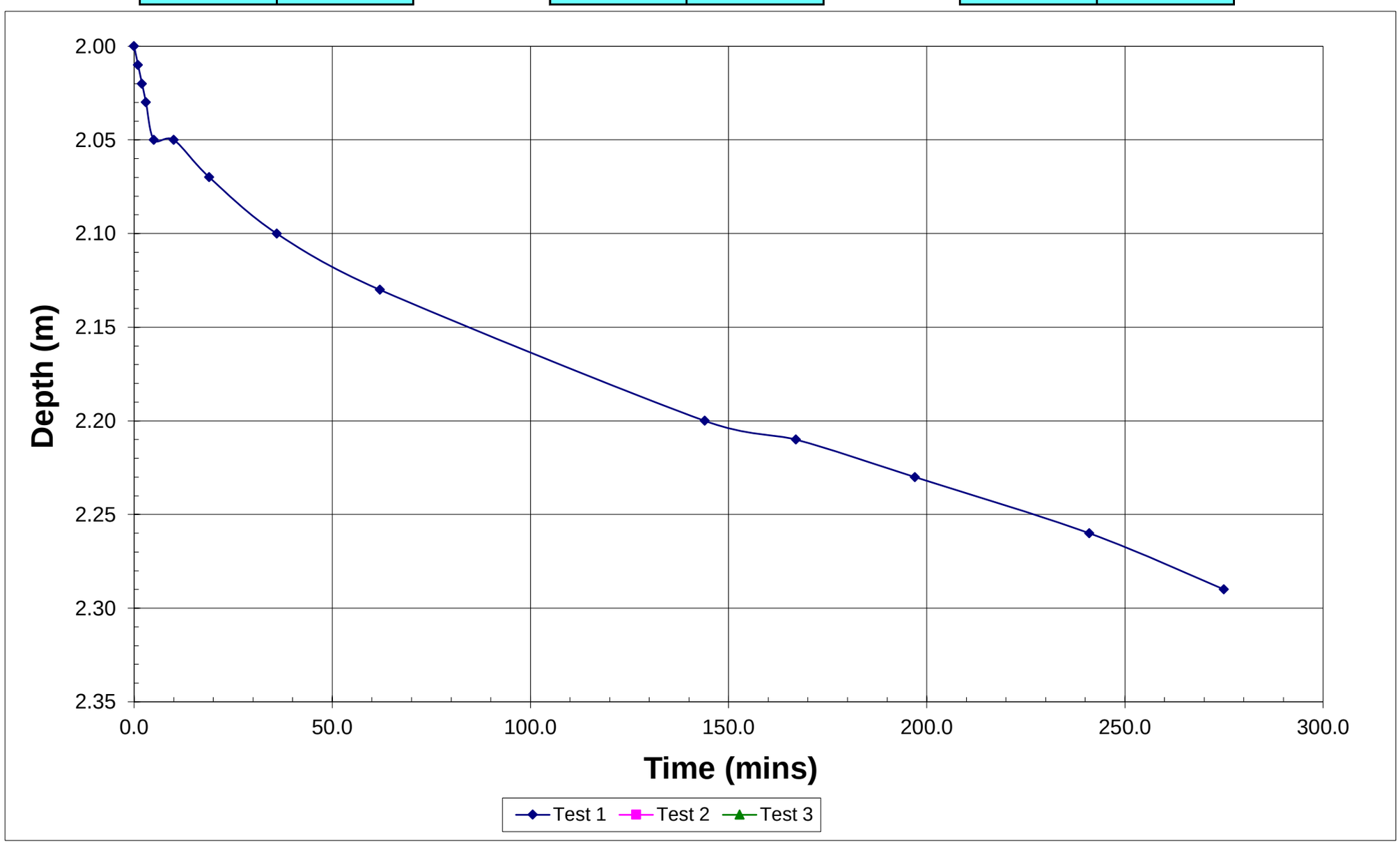
Time (min)	Depth (m)
0.0	2.00
1.0	2.01
2.0	2.02
3.0	2.03
5.0	2.05
10.0	2.05
19.0	2.07
36.0	2.10
62.0	2.13
144.0	2.20
167.0	2.21
197.0	2.23
241.0	2.26
275.0	2.29

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)



Max. depth (m)	2.29	2.29	2.29
Effective depth (m)	0.29	2.29	2.29
75% effective depth (m)	2.07	0.57	0.57
50% effective depth (m)	2.15	1.15	1.15
25% effective depth (m)	2.22	1.72	1.72
t75 (min)	19.00		
t50 (min)	85.00		
t25 (min)	180.00		
Vp 75-25	0.18	1.44	1.44
ap 50	2.043	7.443	7.443
tp 75-25	161.00	0.00	0.00

NOTE: Values are based on the measured final water depth and not a fully drained test. Thus results are indicative only of the test range and the permeability over an extended test range could be lower.

Soil infiltration rate (m/s)	**9.3E-06**	**#DIV/0!**	**#DIV/0!**
Soil infiltration rate (mm/hr)	**3.33E+01**	**#DIV/0!**	**#DIV/0!**

Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-EnvironmentalServices Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Downend Road, Portchester II	**Job No. :**	GE16226
Client :	Miller Homes	**Date :**	09/02/2017

Pit reference	**TP601**	
Pit depth (m)	2.04	Base depth adjusted to maximum water depth during test
Pit width (m)	0.60	
Pit length (m)	1.95	
Depth to standing water (m)		

Test 1

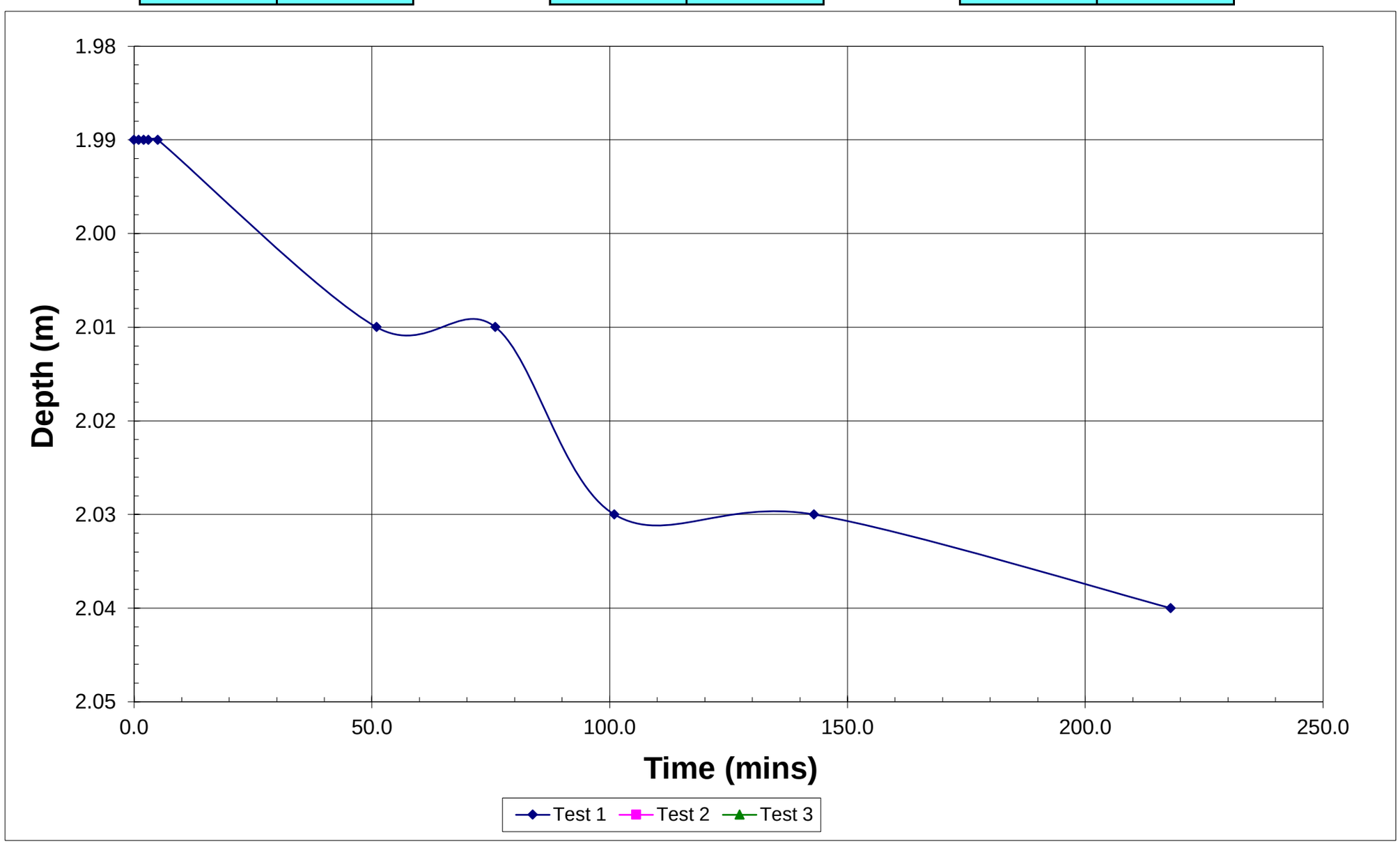
Time (min)	Depth (m)
0.0	1.99
1.0	1.99
2.0	1.99
3.0	1.99
5.0	1.99
51.0	2.01
76.0	2.01
101.0	2.03
143.0	2.03
218.0	2.04

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)



Max. depth (m)	2.04	2.04	2.04
Effective depth (m)	0.05	2.04	2.04
75% effective depth (m)	2.00	0.51	0.51
50% effective depth (m)	2.02	1.02	1.02
25% effective depth (m)	2.03	1.53	1.53
t75 (min)	27.00		
t50 (min)	85.00		
t25 (min)	100.00		
Vp 75-25	0.03	1.19	1.19
ap 50	1.2975	6.372	6.372
tp 75-25	73.00	0.00	0.00

NOTE: Values are based on the measured final water depth and not a fully drained test. Thus results are indicative only of the test range and the permeability over an extended test range could be lower.

Soil infiltration rate (m/s)	**5.1E-06**	**#DIV/0!**	**#DIV/0!**
Soil infiltration rate (mm/hr)	**1.85E+01**	**#DIV/0!**	**#DIV/0!**

Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-EnvironmentalServices Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Downend Road, Portchester II	**Job No. :**	GE16226
Client :	Miller Homes	**Date :**	09/02/2017

Pit reference	**TP602**	
Pit depth (m)	2.15	Base depth adjusted to maximum water depth during test
Pit width (m)	0.60	
Pit length (m)	2.10	
Depth to standing water (m)		

Test 1

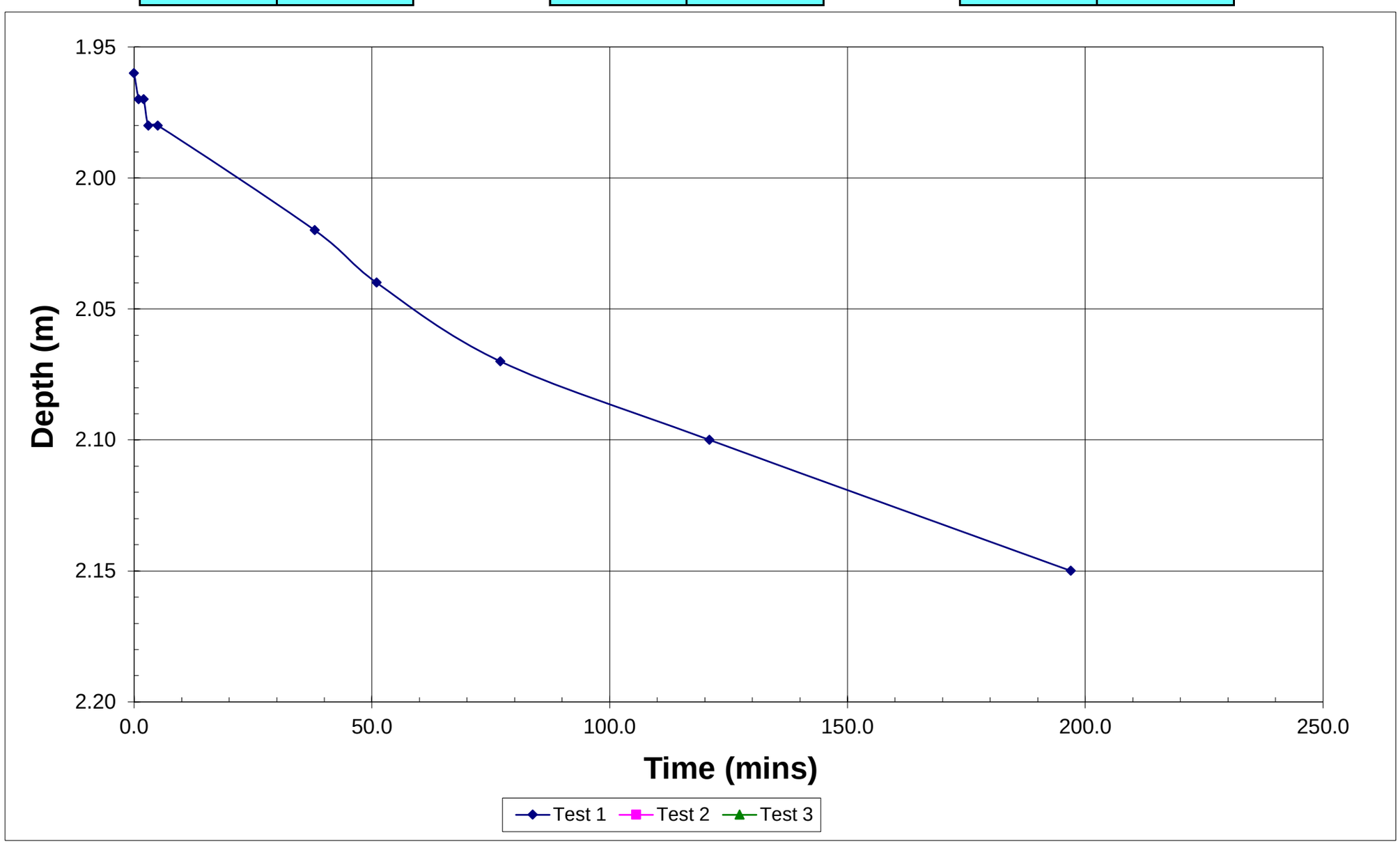
Time (min)	Depth (m)
0.0	1.96
1.0	1.97
2.0	1.97
3.0	1.98
5.0	1.98
38.0	2.02
51.0	2.04
77.0	2.07
121.0	2.10
197.0	2.15

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)



	Test 1	Test 2	Test 3
Max. depth (m)	2.15	2.15	2.15
Effective depth (m)	0.19	2.15	2.15
75% effective depth (m)	2.01	0.54	0.54
50% effective depth (m)	2.06	1.08	1.08
25% effective depth (m)	2.10	1.61	1.61
t75 (min)	30.00		
t50 (min)	65.00		
t25 (min)	121.00		
Vp 75-25	0.12	1.35	1.35
ap 50	1.773	7.065	7.065
tp 75-25	91.00	0.00	0.00

NOTE: Values are based on the measured final water depth and not a fully drained test. Thus results are indicative only of the test range and the permeability over an extended test range could be lower.

Soil infiltration rate (m/s)	**1.2E-05**	**#DIV/0!**	**#DIV/0!**
Soil infiltration rate (mm/hr)	**4.45E+01**	**#DIV/0!**	**#DIV/0!**

Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-EnvironmentalServices Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Downend Road, Portchester II	**Job No. :**	GE16226
Client :	Miller Homes	**Date :**	09/02/2017

Pit reference	**TP603**	
Pit depth (m)	2.20	Base depth adjusted to maximum water depth during test
Pit width (m)	0.60	
Pit length (m)	2.05	
Depth to standing water (m)		

Test 1

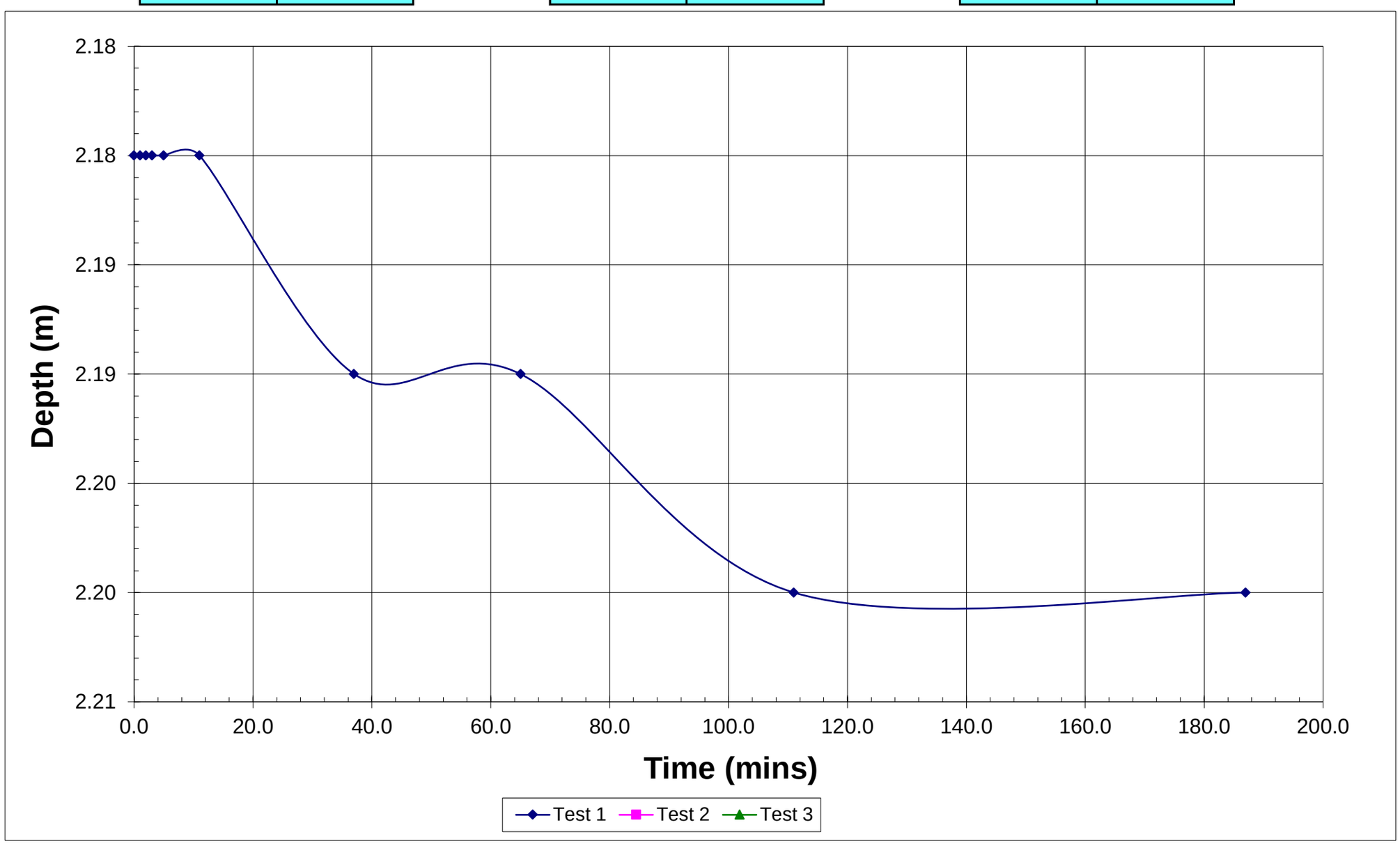
Time (min)	Depth (m)
0.0	2.18
1.0	2.18
2.0	2.18
3.0	2.18
5.0	2.18
11.0	2.18
37.0	2.19
65.0	2.19
111.0	2.20
187.0	2.20

Test 2

Time (min)	Depth (m)

Test 3

Time (min)	Depth (m)



	Test 1	Test 2	Test 3
Max. depth (m)	2.20	2.20	2.20
Effective depth (m)	0.02	2.20	2.20
75% effective depth (m)	2.19	0.55	0.55
50% effective depth (m)	2.19	1.10	1.10
25% effective depth (m)	2.20	1.65	1.65
t75 (min)	24.00		
t50 (min)	24.00		
t25 (min)	86.00		
Vp 75-25	0.01	1.35	1.35
ap 50	1.283	7.06	7.06
tp 75-25	62.00	0.00	0.00

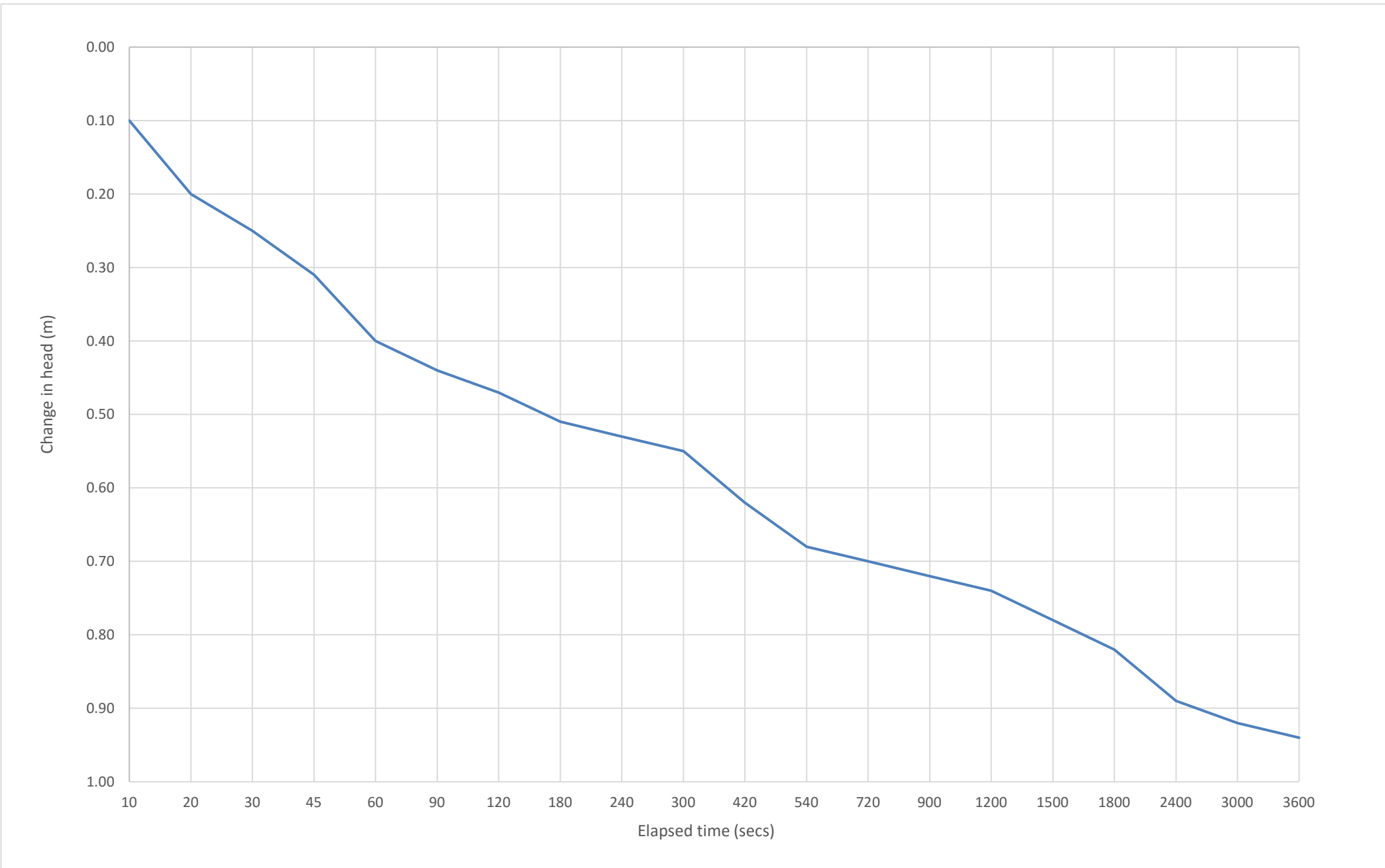
NOTE: Values are based on the measured final water depth and not a fully drained test. Thus results are indicative only of the test range and the permeability over an extended test range could be lower.

Soil infiltration rate (m/s)	**2.6E-06**	**#DIV/0!**	**#DIV/0!**
Soil infiltration rate (mm/hr)	**9.28E+00**	**#DIV/0!**	**#DIV/0!**

Variable Head Permeabillity Test (after BS5930:2015 and BS EN ISO 22282:2012)

Location	Downend Road, Portchester II	**Position**	BH1	**Date:**	10/02/2017
Borehole depth (m bgl)	3	**Standing water level (m bgl)**	-		
Casing height above ground level (m)	-	**Depth of casing below ground level (m bgl)**	1.5	**Casing diameter (m)**	0.15

Time elapsed				Depth (m)					
mins	**secs**	**total time (secs)**	**t-t0 (secs)**		**h_0**	**h_0/ht**	**ln (h_0/ht)**	**dh/dt (m/s)**	
0	10	10	0.00	0.10	0.10	1.00	0.00	0.00	
0	20	20	10.00	0.20	0.10	0.50	0.69	0.10	
0	30	30	20.00	0.25	0.10	0.40	0.92	0.05	
0	45	45	35.00	0.31	0.10	0.32	1.13	0.06	
1	-	60	50.00	0.40	0.10	0.25	1.39	0.09	
1	30	90	80.00	0.44	0.10	0.23	1.48	0.04	
2	-	120	110.00	0.47	0.10	0.21	1.55	0.03	
3	-	180	170.00	0.51	0.10	0.20	1.63	0.04	
4	-	240	230.00	0.53	0.10	0.19	1.67	0.02	
5	-	300	290.00	0.55	0.10	0.18	1.70	0.02	
7	-	420	410.00	0.62	0.10	0.16	1.82	0.07	
9	-	540	530.00	0.68	0.10	0.15	1.92	0.06	
12	-	720	710.00	0.70	0.10	0.14	1.95	0.02	
15	-	900	890.00	0.72	0.10	0.14	1.97	0.02	
20	-	1200	1190.00	0.74	0.10	0.14	2.00	0.02	
25	-	1500	1490.00	0.78	0.10	0.13	2.05	0.04	
30	-	1800	1790.00	0.82	0.10	0.12	2.10	0.04	
40	-	2400	2390.00	0.89	0.10	0.11	2.19	0.07	
50	-	3000	2990.00	0.92	0.10	0.11	2.22	0.03	
60	-	3600	3590.00	0.94	0.10	0.11	2.24	0.02	



Shape Factor F (from BS EN ISO 22282-1

L =	1.50
D =	0.15
L/D =	10.00
F=	**3.15**

Permeability (from BS EN ISO 22282-2)

t0	10.00	
t	3600.00	
h0	0.10	
h	0.94	
S =	0.0177	
k =	**-3.51E-06** m/s	(negative value means falling head of water)

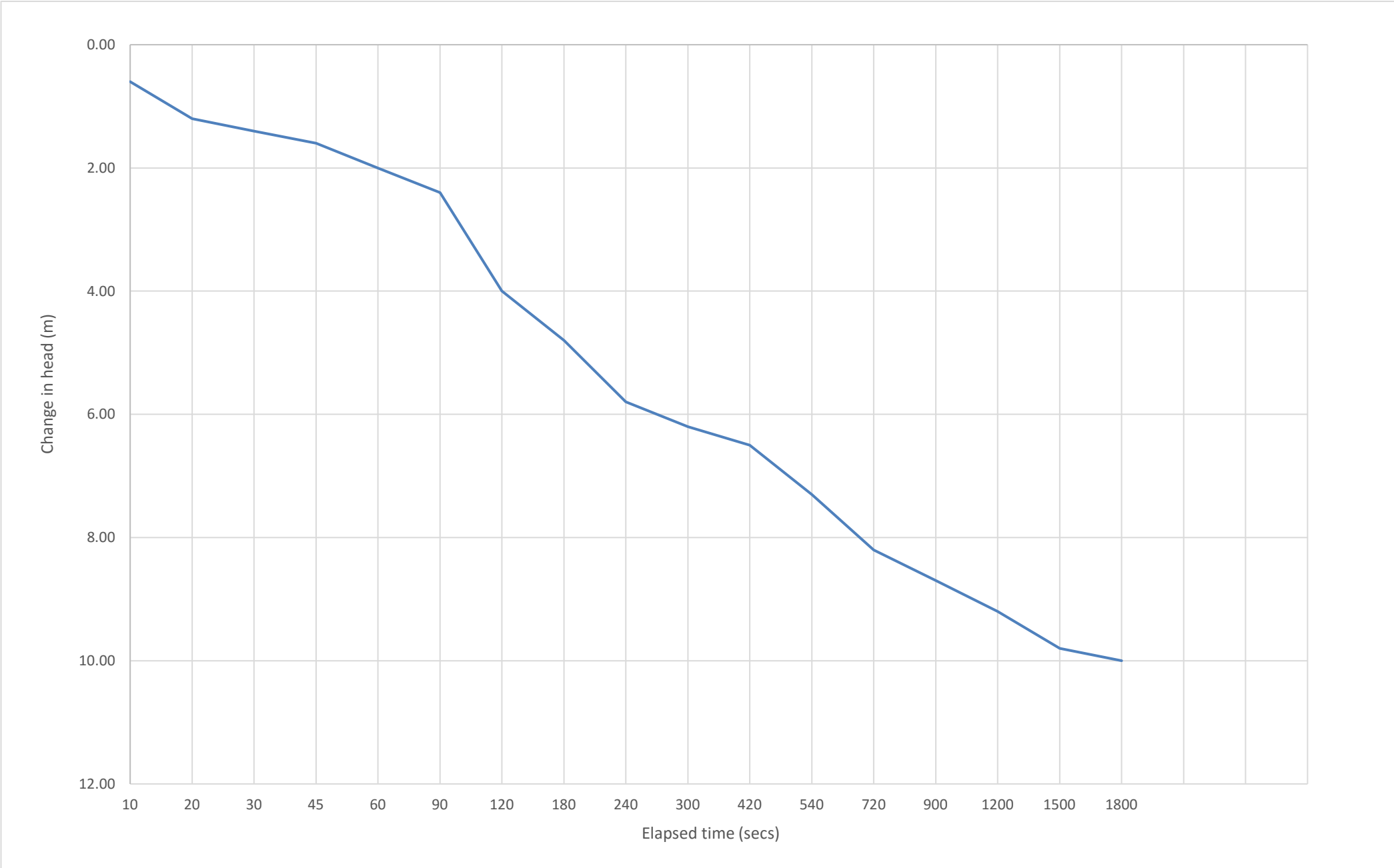
Project:	Downend Road, Portchester II			**Title**	BH1 A Variable Head Permeability Test at 3m bgl
Client:	Miller Homes			**Geo-Environmental Services Ltd**	
Ref No:	GE16226	**Rev:**	0	**Unit 7 Danworth Farm, Cuckfield Road**	
Drawn:	VB	**Date:**	10/02/2017	**Hurstpierpoint, West Sussex BN6 9GL**	
Figure:		**Scale:**	Not To Scale	**+44(0)1273 832972 www.gesl.net**	

Geo-Environmental

Variable Head Permeabillity Test (after BS5930:2015 and BS EN ISO 22282:2012)

Location	Downend Road, Portchester II	**Position**	BH1	**Date:**	10/02/2017
Borehole depth (m bgl)	10	**Standing water level (m bgl)**		-	
Casing height above ground level (m)	-	**Depth of casing below ground level (m bgl)**	3	**Casing diameter (m)**	0.15

Time elapsed				Depth (m)					
mins	**secs**	**total time (secs)**	**t-t0 (secs)**		**h_0**	**h_0/ht**	**ln (h_0/ht)**	**dh/dt (m/s)**	
0	10	10	0.00	0.60	0.60	1.00	0.00	0.00	
0	20	20	10.00	1.20	0.60	0.50	0.69	0.60	
0	30	30	20.00	1.40	0.60	0.43	0.85	0.20	
0	45	45	35.00	1.60	0.60	0.38	0.98	0.20	
1	-	60	50.00	2.00	0.60	0.30	1.20	0.40	
1	30	90	80.00	2.40	0.60	0.25	1.39	0.40	
2	-	120	110.00	4.00	0.60	0.15	1.90	1.60	
3	-	180	170.00	4.80	0.60	0.13	2.08	0.80	
4	-	240	230.00	5.80	0.60	0.10	2.27	1.00	
5	-	300	290.00	6.20	0.60	0.10	2.34	0.40	
7	-	420	410.00	6.50	0.60	0.09	2.38	0.30	
9	-	540	530.00	7.30	0.60	0.08	2.50	0.80	
12	-	720	710.00	8.20	0.60	0.07	2.61	0.90	
15	-	900	890.00	8.70	0.60	0.07	2.67	0.50	
20	-	1200	1190.00	9.20	0.60	0.07	2.73	0.50	
25	-	1500	1490.00	9.80	0.60	0.06	2.79	0.60	
30	-	1800	1790.00	10.00	0.60	0.06	2.81	0.20	
40	-							-10.00	
50	-							0.00	
60	-							0.00	



Shape Factor F (from BS EN ISO 22282-1

L =	7.00
D =	0.15
L/D =	46.67
F=	**9.70**

Permeability (from BS EN ISO 22282-2)

t0	10.00	
t	1800.00	
h0	0.60	
h	10.00	
S =	0.0177	
k =	**-2.86E-06** m/s	(negative value means falling head of water)

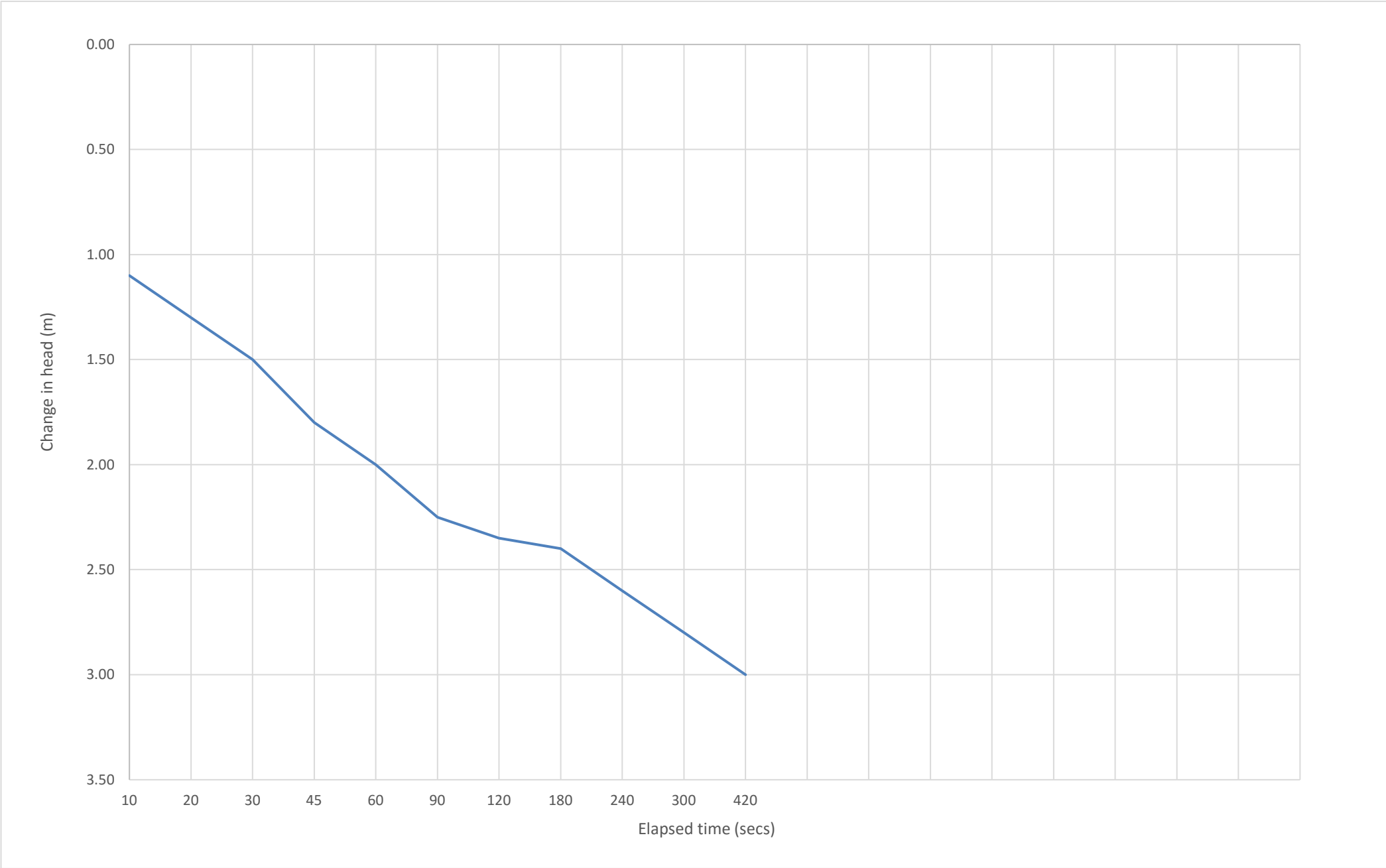
Project:	Downend Road, Portchester II			**Title**	BH1 A Variable Head Permeability Test at 10m bgl
Client:	Miller Homes			**Geo-Environmental Services Ltd**	
Ref No:	GE16226	**Rev:**	0	**Unit 7 Danworth Farm, Cuckfield Road**	
Drawn:	VB	**Date:**	10/02/2017	**Hurstpierpoint, West Sussex BN6 9GL**	
Figure:		**Scale:**	Not To Scale	**+44(0)1273 832972 www.gesl.net**	

Geo-Environmental

Variable Head Permeabillity Test (after BS5930:2015 and BS EN ISO 22282:2012)

Location	Downend Road, Portchester II	**Position**	BH2	**Date:**	10/02/2017
Borehole depth (m bgl)	3	**Standing water level (m bgl)**	-		
Casing height above ground level (m)	0.5	**Depth of casing below ground level (m bgl)**	2.5	**Casing diameter (m)**	0.15

Time elapsed				Depth (m)					
mins	**secs**	**total time (secs)**	**t-t0 (secs)**		**h_0**	**h_0/ht**	**ln (h_0/ht)**	**dh/dt (m/s)**	
0	10	10	0.00	1.10	1.10	1.00	0.00	0.00	
0	20	20	10.00	1.30	1.10	0.85	0.17	0.20	
0	30	30	20.00	1.50	1.10	0.73	0.31	0.20	
0	45	45	35.00	1.80	1.10	0.61	0.49	0.30	
1	-	60	50.00	2.00	1.10	0.55	0.60	0.20	
1	30	90	80.00	2.25	1.10	0.49	0.72	0.25	
2	-	120	110.00	2.35	1.10	0.47	0.76	0.10	
3	-	180	170.00	2.40	1.10	0.46	0.78	0.05	
4	-	240	230.00	2.60	1.10	0.42	0.86	0.20	
5	-	300	290.00	2.80	1.10	0.39	0.93	0.20	
7	-	420	410.00	3.00	1.10	0.37	1.00	0.20	
9	-							-3.00	
12	-							0.00	
15	-							0.00	
20	-							0.00	
25	-							0.00	
30	-							0.00	
40	-							0.00	
50	-							0.00	
60	-							0.00	



Shape Factor F (from BS EN ISO 22282-1

L =	0.50
D =	0.15
L/D =	3.33
F=	**1.64**

Permeability (from BS EN ISO 22282-2)

t0	10.00	
t	420.00	
h0	1.10	
h	3.00	
S =	0.0177	
k =	**-2.64E-05** m/s	(negative value means falling head of water)

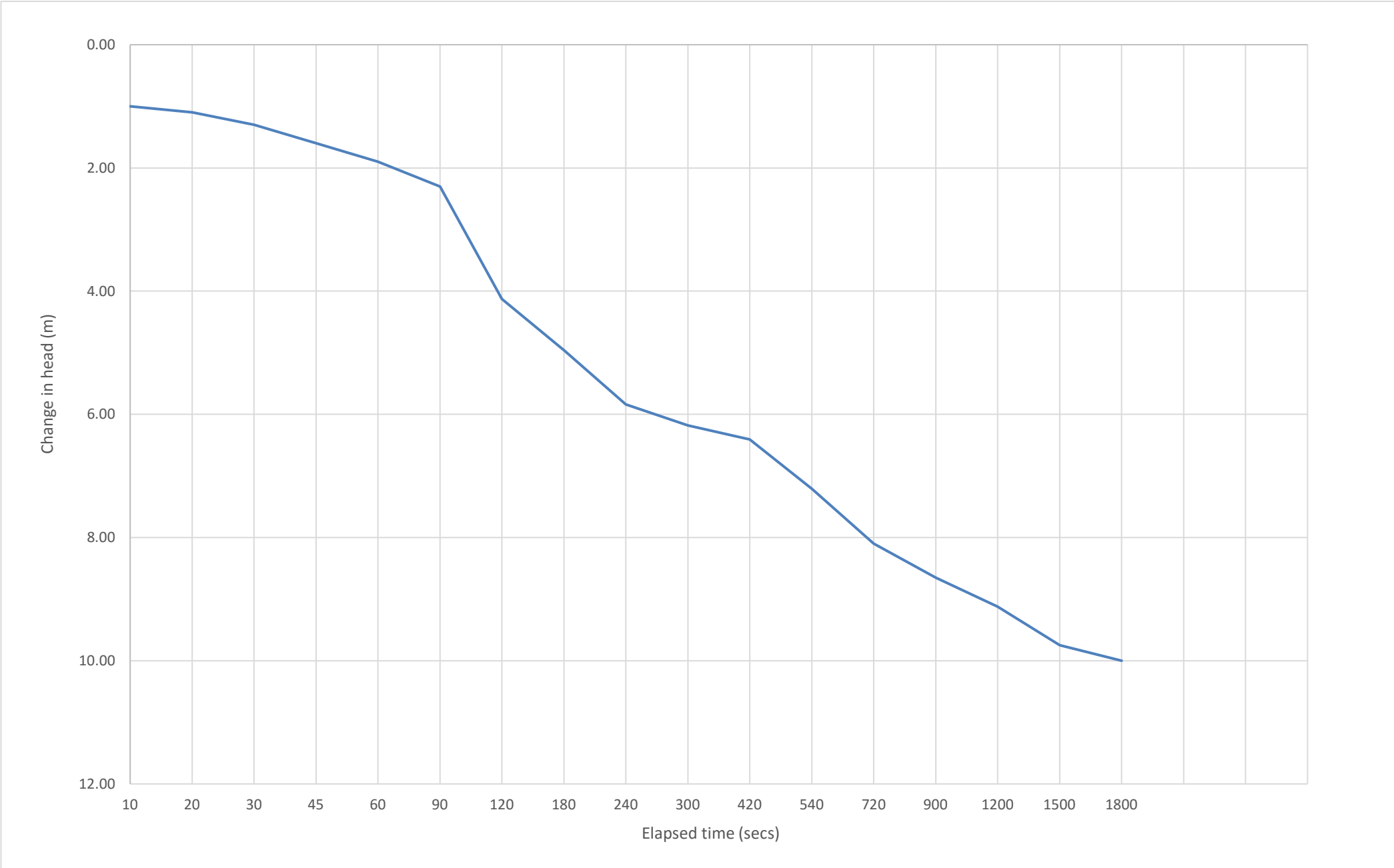
Project:	Downend Road, Portchester II			**Title**	BH2 A Variable Head Permeability Test at 3m bgl
Client:	Miller Homes			**Geo-Environmental Services Ltd**	
Ref No:	GE16226	**Rev:**	0	**Unit 7 Danworth Farm, Cuckfield Road**	
Drawn:	VB	**Date:**	10/02/2017	**Hurstpierpoint, West Sussex BN6 9GL**	
Figure:		**Scale:**	Not To Scale	**+44(0)1273 832972 www.gesl.net**	

Geo-Environmental

Variable Head Permeabillity Test (after BS5930:2015 and BS EN ISO 22282:2012)

Location	Downend Road, Portchester II	**Position**	BH2	**Date:**	10/02/2017
Borehole depth (m bgl)	10	**Standing water level (m bgl)**		-	
Casing height above ground level (m)		**Depth of casing below ground level (m bgl)**	4.5	**Casing diameter (m)**	0.15

Time elapsed				Depth (m)					
mins	**secs**	**total time (secs)**	**t-t0 (secs)**		**h_0**	**h_0/ht**	**ln (h_0/ht)**	**dh/dt (m/s)**	
0	10	10	0.00	1.00	1.00	1.00	0.00	0.00	
0	20	20	10.00	1.10	1.00	0.91	0.10	0.10	
0	30	30	20.00	1.30	1.00	0.77	0.26	0.20	
0	45	45	35.00	1.60	1.00	0.63	0.47	0.30	
1	-	60	50.00	1.90	1.00	0.53	0.64	0.30	
1	30	90	80.00	2.30	1.00	0.43	0.83	0.40	
2	-	120	110.00	4.13	1.00	0.24	1.42	1.83	
3	-	180	170.00	4.96	1.00	0.20	1.60	0.83	
4	-	240	230.00	5.84	1.00	0.17	1.76	0.88	
5	-	300	290.00	6.18	1.00	0.16	1.82	0.34	
7	-	420	410.00	6.41	1.00	0.16	1.86	0.23	
9	-	540	530.00	7.21	1.00	0.14	1.98	0.80	
12	-	720	710.00	8.10	1.00	0.12	2.09	0.89	
15	-	900	890.00	8.65	9.12	0.12	2.16	0.55	
20	-	1200	1190.00	9.12	9.75	0.11	2.21	0.47	
25	-	1500	1490.00	9.75	10.00	0.10	2.28	0.63	
30	-	1800	1790.00	10.00	1.00	0.10	2.30	0.25	
40	-							-10.00	
50	-							0.00	
60	-							0.00	



Shape Factor F (from BS EN ISO 22282-1

L =	5.50
D =	0.15
L/D =	36.67
F=	**8.05**

Permeability (from BS EN ISO 22282-2)

t0	10.00	
t	1800.00	
h0	1.00	
h	10.00	
S =	0.0177	
k =	**-2.83E-06** m/s	(negative value means falling head of water)

Project:	Downend Road, Portchester II			**Title**	BH2 A Variable Head Permeability Test at 10m bgl
Client:	Miller Homes			**Geo-Environmental Services Ltd**	
Ref No:	GE16226	**Rev:**	0	**Unit 7 Danworth Farm, Cuckfield Road**	
Drawn:	VB	**Date:**	10/02/2017	**Hurstpierpoint, West Sussex BN6 9GL**	
Figure:		**Scale:**	Not To Scale	**+44(0)1273 832972 www.gesl.net**	

Geo-Environmental