

**Surface Water Drainage
Technical Note
Planning Condition 10**

Grays Lane
Hitchin
Hertfordshire

RLC Ref: 251029

March 2026

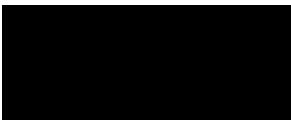
[Rev 00]

Prepared for
Hill Holdings Ltd

Revision Schedule

RLC Ref. 251029

March 2026

Rev	Date	Details	Prepared by	Reviewed by
00	19 March 2026	SW Technical Note (Initial Issue)	Paul Cosford CEng, MICE, MCIHT Technical Director	Mike Lloyd BEng(Hons), CEng, MStructE Director
				

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Table of Contents

1	Introduction and Client's Brief	5
2	Surface Water Drainage Updates	6
3	Summary.....	8
4	Appendices.....	9
	Appendix A – MAC Surface Water Strategy Plan	10
	Appendix B – Ground Investigation Reports	11
	Appendix C – Drainage Strategy Plans	12
	Appendix D – Surface Water Drainage Calculations.....	13

1 Introduction and Client's Brief

- 1.1 Rossi Long Consulting Ltd were instructed by Hill Holdings Ltd to prepare a Surface Water Technical Note for the Gray's Lane site, to address comments raised by the Lead Local Flood Authority (LLFA) in connection with Condition 10 of planning permission 25/01745/S73 granted on 18 December 2025. The recent Section 73 application contained updates to the site layout and housing mix, which amended the originally submitted details which received planning permission in March 2024 under consent 22/0309/FP.
- 1.2 A Flood Risk Assessment (FRA) originally prepared by MAC in October 2021 and subsequently updated in April 2023 was submitted in support of the original application, and this contained a drainage strategy which comprised a solution based on a mix of infiltration and disposal to an off-site sewer. This strategy established the principles to be utilised in the final detailed design, and a copy of the approved MAC Proposed Drainage Strategy plan is included at Appendix A.
- 1.3 The FRA contained two sets of infiltration test results, one set obtained by Environment Management Solutions in January 2017 and a second more recent and more comprehensive set of test results obtained by Geo-Environmental in October 2021. The results of the testing influenced the area of housing which could drain by infiltration, and the corresponding area which drained off -site to Anglian Water'
- 1.4 This report has been prepared in response to the comments made in the LLFA's correspondence dated 12 February 2026 which are reproduced below:
1. *We note that a number of changes have been made to the drainage strategy when compared to the approved documents from 25/01745/S73. These include the removal of the detention basin in the south (replaced by a swale and an attenuation tank) and the introduction of individual soakaways to some of the northern plots. We would expect to see some commentary on the changes which have been made, especially regarding the attenuation tank, given there was no below ground storage in the approved strategy. If updated calculations have been carried out to support the latest drainage plan, these should also be provided.*

2 Surface Water Drainage Updates

- 2.1 The site layout has been subject to minor updates since the original permission, to accommodate changes to the housing mix and house locations – the overall road layout is largely unchanged, with amendments to parking areas the only changes of note. The updated layout retains the infiltration basin in the north-east corner and the elongated SuDS feature in the south-west corner.
- 2.2 Infiltration testing has been undertaken across the site to inform the drainage design, with two sets of testing completed. The first set of tests were undertaken by Geo-Environmental (GE) in October 2021, with further testing to assist with detail design undertaken by Enzygo in May 2025. A copy of both reports is included in Appendix B.
- 2.3 The GE testing confirmed infiltration potential across the north-east portion of the site, with infiltration potential at depth suitable for soakaways confirmed in the very north of the site. Deeper testing in the west and south of the site failed, with tests SA101 and SA109 failing to yield a result, however the shallower testing did yield results suitable for the design of permeable paving systems. Ground conditions in the south-west of the site are not suitable for the use of infiltration techniques, with SA04 and SA06 and SA109 failing to yield satisfactory results and trial pit records indicating the presence of clay subgrade.
- 2.4 The second set of tests undertaken by Enzygo confirmed the GE results, with deeper testing across the south-east of the site failing to yield suitable results – tests SA03, SA04 and SA06 failed. This confirmed the strategy of infiltration for the north-east section of the site, with the south-west area draining via a gravity system into a small swale with cellular detention tank beneath, with restricted outlet into an AW sewer in Grays Lane.
- Drainage to Off-Site Sewer – Network 2
- 2.5 During development of the detailed design it became evident that in some cases it would not be possible to dispose of the roof runoff via driveways comprising permeable paving. This is the case with plots 20–22 (formerly plots 18–20) and 37 (formerly plot 36). The small isolated areas of driveway paving are not sufficiently large in area to cope with the volumes generated by the roof and driveway combined - roof runoff from these plots has therefore been directed to the gravity system which drains to the swale in the south-west corner.
- 2.6 At detail design it became clear that the detention basin indicated on the MAC strategy plan could not be delivered - ground levels in the vicinity coupled with the proximity of the housing restricted the plan area available below that envisaged at outline stage. Although a basin is not feasible, it is possible to maintain an above ground feature, a swale of smaller footprint. What also became evident is that the smaller swale was not capable of accommodating the volumes generated by the catchment.
- 2.7 The addition of four plots to the Network 2 catchment also resulted in the generation of greater volumes of runoff, therefore to accommodate the volumes a detention tank has been introduced beneath the swale. Runoff enters the tank only after passing the full length of the swale, after which it drops into the tank beneath - this arrangement will provide the expected water quality benefits from the previously proposed basin before runoff is discharged to the off-site sewer at the previously agreed maximum flow rate of 1.8 l/s.
- 2.8 A copy of the Drainage Strategy Plan and Catchment Area Plan are included in Appendix C and a full set of hydraulic calculations for Network 2 are included in Appendix D. It should be noted that the design parameters used are those included in the approved MAC strategy.

- 2.9 Drainage Via Infiltration – Network 1
The area of housing to drain via infiltration utilises extensive areas of permeable paving in conjunction with some use of domestic soakaways where this is feasible. Infiltration testing to BRE365 has been undertaken across the site, a summary of the results is provided below:

Location	Test Depth	Infiltration Rate
SA01	1.10 m	1.25×10^{-5} m/s
SA02	1.60 m	7.10×10^{-7} m/s
SA03	1.60 m	6.12×10^{-7} m/s
SA04	1.50 m	Test Failed
SA05	1.35 m	6.50×10^{-6} m/s
SA06	1.40 m	Test Failed
SA101	1.25 m	Test Failed
SA102	0.60 m	3.90×10^{-6} m/s
SA103	0.70m	1.20×10^{-5} m/s
SA104	1.60m	6.60×10^{-6} m/s
SA105	1.75m	1.10×10^{-5} m/s
SA106	0.64m	1.20×10^{-5} m/s
SA107	1.92m	1.00×10^{-5} m/s
SA108	0.67m	3.30×10^{-5} m/s
SA109	1.88m	Test Failed
SA110	0.68m	8.30×10^{-6} m/s

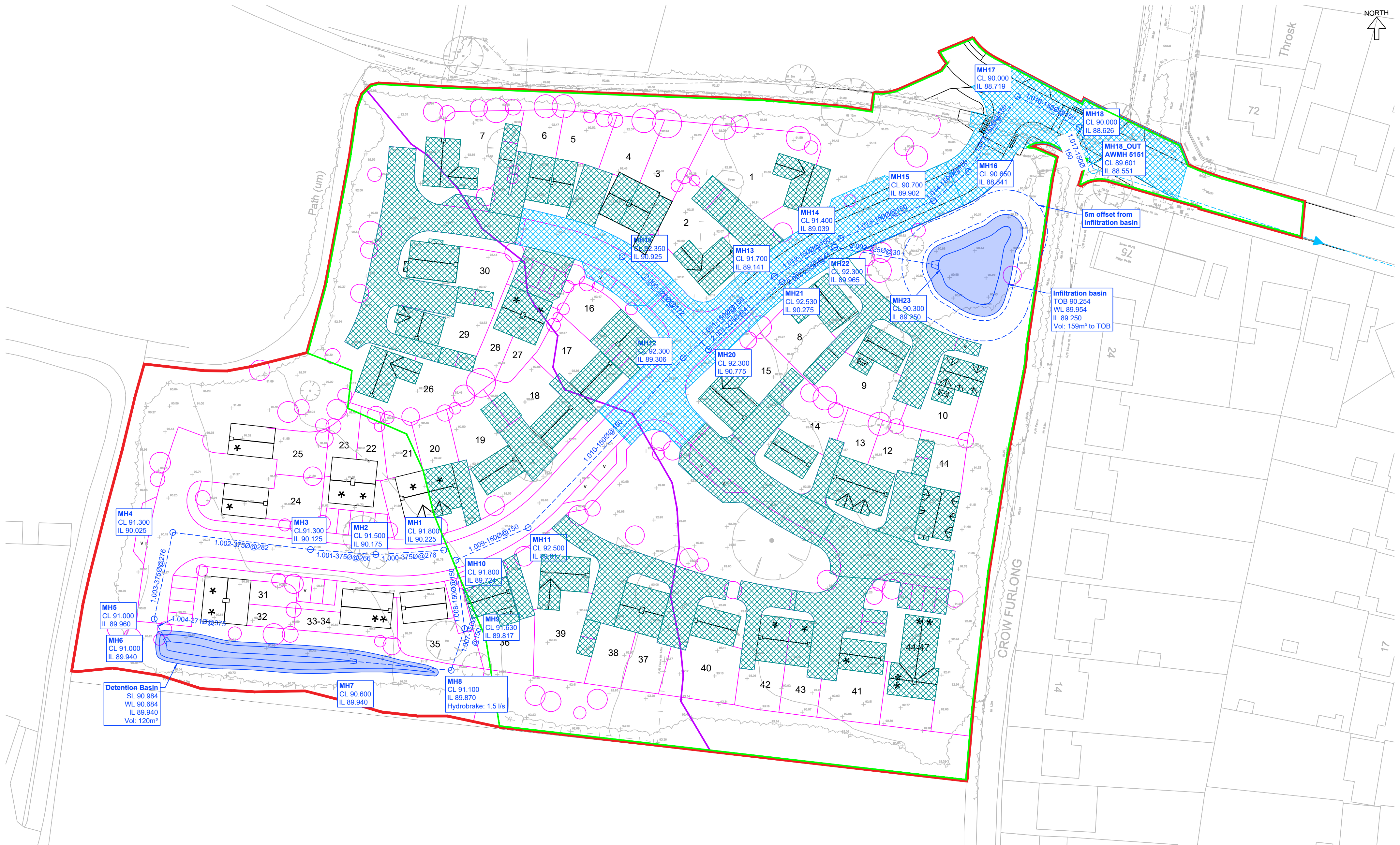
- 2.10 Across much of the site infiltration testing at depth (i.e. over 1m) did not yield satisfactory results. The exception to this was across the north of the site, where satisfactory results were obtained (SA101, SA104, SA105) and this is where it has been possible to introduce traditional soakaways to the rear gardens of plots 1–5 for roof drainage.
- 2.11 Testing within the footprint of the proposed infiltration basin at SA105 yielded a result of 1.10×10^{-5} m/s which demonstrates moderate infiltration potential. The nearby test SA106 also yielded a satisfactory result of 1.20×10^{-5} m/s at 0.6m depth, to reinforce the result from SA105.
- 2.12 Network 1 collects runoff from the first section of access road, along with the roof runoff from plot 8 and part of plot 1, and discharges into the infiltration basin. Hydraulic calculations are included in Appendix D and a copy of the Catchment Area Plan and Drainage Strategy Plan are included in Appendix C.

3 Summary

- 3.1 The surface water drainage strategy has been adapted to reflect the minor updates made to the site layout. The principles established in the updated MAC Flood Risk Assessment Rev.E dated April 2023 have been retained in the detailed design, with amendments made to address issues which arose during the course of detail design.
- 3.2 All drainage features have been designed to accommodate the volumes generated by the critical 1% AEP +40% climate change event without flooding. The infiltration basin is indicated to have a half-drain time of 2475 minutes during the critical 1% rainfall event, therefore calculations for a follow-on 10% (10yr) event have also been undertaken. The results indicate that the maximum water level in the basin during this scenario is 89.814m, which results in 436mm of freeboard to the notional top of bank level of 90.250m.
- 3.3 The design as presented is therefore in accordance with the approved strategy, albeit with minor adjustments to suit the updates made to the site layout and the results of more recent infiltration testing.

4 Appendices

Appendix A – MAC Surface Water Strategy Plan



Notes:

- Based on MSurv 'Topographical Survey', drawing number 1215/1649/1 dated 09/10/15.
- Based on AT Architecture 'Illustrative Masterplan', drawing number 1A_1622 PL100 P dated 17.04.23.
- CLs are typically (expect the SW corner) based on existing ground levels. These are subject to change depending on results of the final level design for the site.

- Key
- Site Boundary = 21,935m²
 - Existing Surface Water Drainage
 - Proposed Surface Water Drainage
 - Proposed Surface Water Attenuation
 - Approximate Ridge Line of Drainage Catchment

- Boundary where infiltration techniques are to be used as permeable paving
- Pipe code - diameter @ fall
- Drains to infiltration basin
- Drains to permeable paving

MAC

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Martin Andrews Consulting Ltd

- Transport Assessments - Flood Risk Assessments - Highway Advice - Access Design - Drainage Strategies - Vehicle tracking	Client: Manor Oak Homes	Project: Land off Crow Furlong Hitchin	
	Title: Proposed Drainage Strategy		Date: 21/04/23
	Drawing No: 188-FRA113		Drw: MJA
	Revision: A		Chk: MJA
		Scale: 1:500	Size: A2

Appendix B – Ground Investigation Reports

27th October 2021

Our ref: GE20375/SA02/211027



Oscar Briggs
Manor Oak Homes
White Lodge Farm
Walgrave
Northampton
NN6 9PY

Dear Oscar,

RE: Land at Gray's Lane, Hitchin, Hertfordshire – Soakage Testing

We are pleased to present the results of the soakage testing undertaken at the above site. The soakage tests were undertaken in accordance with BRE Digest 365 'Soakaway Design' BRE, 2016 with the testing limited to a two day period.

A geo-environmental engineer attended site on the 18th and 19th October 2021 to undertake the intrusive investigation. Five trial pits (TP101 to TP105) were excavated to assess ground and groundwater conditions followed by a further ten trial pits (SA101 to SA110) which were utilised for soakage testing at various depths. Two additional trial pits (TP106 and TP107) were excavated to assess ground and groundwater conditions in the west of the site in the location of proposed attenuation ponds.

The locations for testing were specified by the drainage engineer MAC Pre-planning Engineering and are shown on Figure 2.

Background

It is understood that the site is proposed to be developed for a residential land use, with gardens and/or landscaping and associated development infrastructure. As such, soakage testing was required to confirm the suitability of underlying soils for soakaway drainage and to inform the planning, design and construction strategies for the site.

Published geological records indicate that the ground conditions are likely to comprise Glaciofluvial Deposits overlying West Melbury Marly Chalk Formation and Zig Zag Chalk Formation in the west of the site.

Previous soakage testing was undertaken at the site by Environmental Management Solutions (ref. EMS6636a, dated January 2017). Testing in three locations across five trial pits was undertaken at various depths of between 0.75m and 3.60m bgl. The ground conditions reportedly comprised a mantle of Topsoil overlying clay based soils of the Glaciofluvial Deposits with more granular soils present at depth. Soakage testing recorded insufficient infiltration to successfully complete tests in three of the five test pits. Infiltration rates of between 1.7×10^{-5} m/s and 2.6×10^{-5} m/s were recorded in SA03 at a depth of 2.10m bgl and rates of between 8.1×10^{-6} m/s and 2.1×10^{-5} m/s were recorded in SA02-S at 0.75m bgl. Only two test cycles were completed in these locations. For further details reference should be made to the full EMS report.

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Geo-Environmental Services Ltd incorporated in England number 3214980 VAT number 679544479



Site Description

At the time of the investigation works, the site comprised an approximately rectangular shaped field covered by grass with a number of mature deciduous trees species present. A water trough was present in the north-eastern corner. Access to the site was also in the north-eastern corner via a farm gate. The majority of the site sloped gently downhill to the south-east with the western part sloping downhill to the south-west.

The whole site was bounded by a post and wire stock fence and high deciduous hedgerows or trees. A track ran along the northern boundary with an open grass field and residential property and garden beyond. Large buildings, assumed to be in residential usage, were present to the west. Crow Furlong access road was located to the east providing access to residential bungalows. Woodland was present to the south of the site.

Ground Conditions

The ground conditions encountered comprised a mantle of Topsoil overlying Glaciofluvial Deposits. A generalised summary of the encountered conditions is presented in Table 1.

Top (m bgl)	Base (m bgl)	Geology	Locations
0	0.20 – 0.25	TOPSOIL: Dark brown SILT with varying sand and gravel component, and dark brown SAND with varying silt and gravel content. Dark brown slightly gravelly sandy CLAY in TP107. Roots and rootlets frequently noted throughout. Rare metal and glass in SA102 and rare brick cobbles in SA103.	All
0.20 – 2.60	0.60 – 3.10	GLACIOFLUVIAL DEPOSITS (cohesive): Brownish orange, yellowish orange, yellowish brown, dark orangish brown, orange and orange to brown CLAY with varying silt, sand and gravel content. Flint cobbles occasional present. Orangish greyish brown CLAY with rare yellowish off-white weak chalk inclusions encountered in TP102 from 2.60m to 3.00m bgl. Yellowish orange slightly gravelly clayey sandy SILT recorded in TP101 from 2.60m to 3.00m bgl. Orangish brown slightly clayey slightly sandy SILT with rare sub-angular gravel encountered in SA103 from 0.20m to 0.60m bgl.	TP101, SA101, SA102, TP102, SA103, SA104, TP103, SA106, TP105, TP106 & TP107
0.20 – 1.80	0.70 – 3.20	GLACIOFLUVIAL DEPOSITS (granular): Typically SAND with varying proportions of clay, silt and gravel or GRAVEL with varying proportions of clay, silt and sand. Some soil components were absent in some locations. SAND with no, or rare, secondary constituents recorded in TP103 from 1.80m to 3.10m bgl and SA105 from 0.90m to 1.80m bgl. Colouration was variously orange, yellowish brown, orangish brown, orangish yellow, brownish orange and yellowish grey.	TP101, SA101, TP102, SA104, TP103, SA105, TP104, SA107, SA108, TP105, SA109, SA110, TP106 & TP107

Table 1 Summary of Ground Conditions

For further details of the ground conditions encountered, reference should be made to the trial pit logs included within Appendix A.

Obstructions

No manmade or natural obstructions were encountered during the investigation. The presence of obstructions elsewhere at the site cannot be completely discounted.

Groundwater

No groundwater was recorded within the trial pits during the investigation. Monitoring to determine any possible variation in groundwater levels over time did not form part of the agreed scope of investigation.

Soakage Testing

Soakage testing was undertaken in accordance with BRE Digest 365 Soakaway Design in ten trial pits. Testing was undertaken in SA101, SA104, SA105, SA107 and SA190 at depths between 1.25m and 1.92m bgl, suitable for likely proposed conventional soakaways. Testing in SA102, SA103, SA106, SA108 and SA110 was undertaken at depths between 0.60m and 0.70m bgl to inform the design of permeable pavement. Wherever possible within the two day testing period agreed, three filling and drainage cycles were completed in each trial pit.

The results of the testing are summarised in Table 2 below. The soakage test results are included within Appendix B.

Location	Pit depth (m bgl)	Infiltration Rate (m/s)		
		Test 1	Test 2	Test 3
SA101	1.25	Insufficient fall in water to complete test	Insufficient fall in water to complete test	-
SA102	0.60	2.3×10^{-5}	7.1×10^{-6}	3.9×10^{-6}
SA103	0.70	2.9×10^{-5}	1.5×10^{-5}	1.2×10^{-5}
SA104	1.60	1.0×10^{-5}	7.6×10^{-6}	6.6×10^{-6}
SA105	1.75	2.3×10^{-5}	1.4×10^{-5}	1.1×10^{-5}
SA106	0.64	6.3×10^{-5}	1.9×10^{-5}	1.2×10^{-5}
SA107	1.92	2.8×10^{-5}	1.5×10^{-5}	1.0×10^{-5}
SA108	0.67	1.3×10^{-4}	4.0×10^{-5}	3.3×10^{-5}
SA109	1.88	Insufficient fall in water to complete test	Insufficient fall in water to complete test	-
SA110	0.68	2.2×10^{-5}	8.9×10^{-6}	8.3×10^{-6}

Table 2 Soakage Test Results

Conclusions

The testing undertaken indicates that the majority of the granular soils of the Glaciofluvial Deposits are likely to be suitable for drainage via conventional soakaways. However, where more cohesive soils and bands have been identified as part of the investigation (SA101 and SA109), soakaways in these soils are considered unlikely to be effective. The near-surface soils tested are also likely to be suitable for permeable paving. Soakaways should be designed with suitable clearance above groundwater levels. Soakaways should be located no closer than 5m from any buildings.

Closure

We trust that we have interpreted your instructions correctly, and please do not hesitate to contact us should you have any queries.

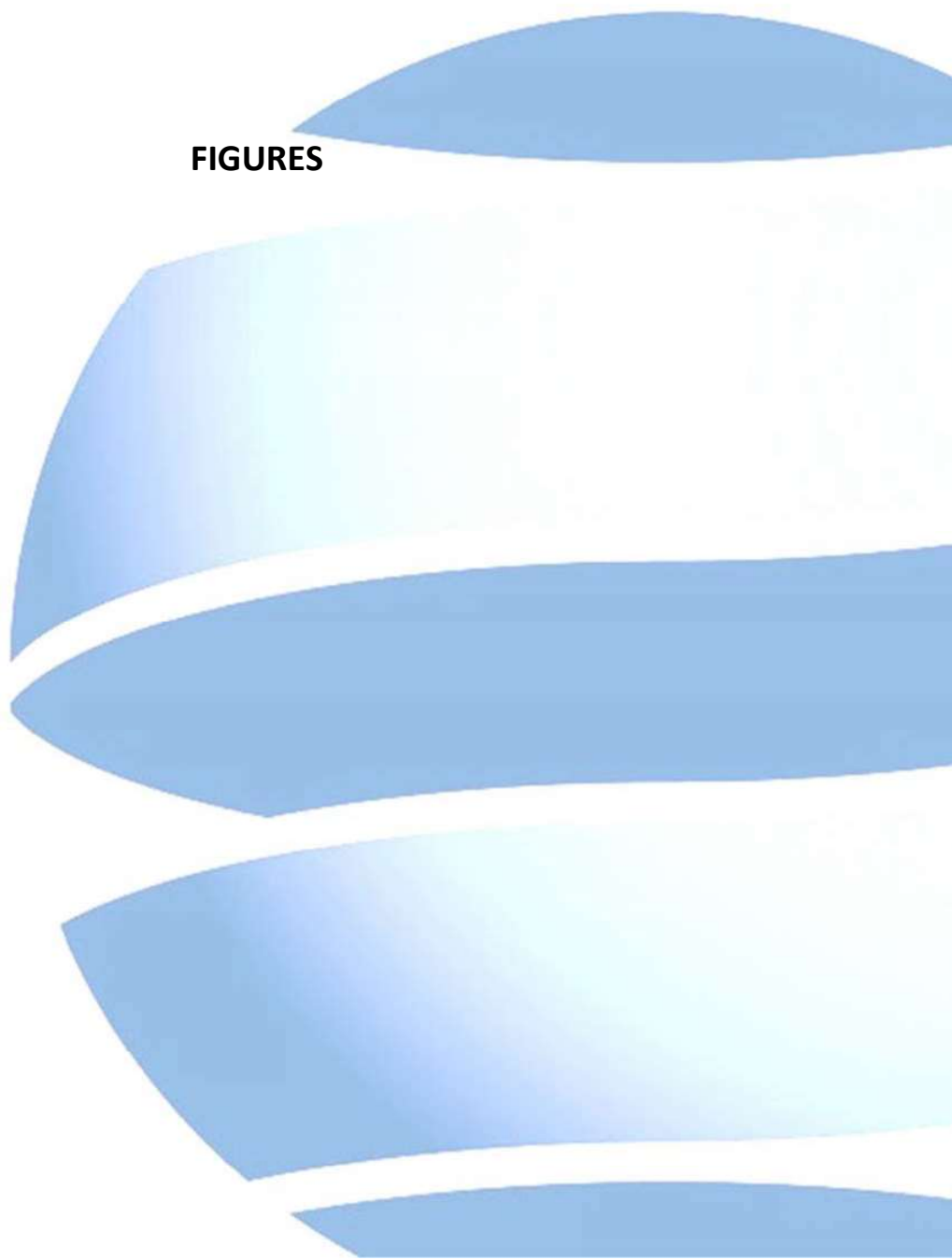
Yours sincerely
For and on Behalf of Geo-Environmental



SHAUN ARMITAGE BSc (Hons), FGS
Principal Engineer
shaun.armitage@gesl.net

Enc	Figure 1	Site Location Plan
	Figure 2	Exploratory Hole Locations Plan
	Appendix A	Exploratory Hole Logs
	Appendix B	Soakage Test Results

FIGURES





Project:	Gray's Lane, Hitchin, SG5 2HN			Title	Site Location Plan
Client:	Manor Oak Homes			Geo-Environmental Services Ltd	
Ref No:	GE20375	Revision:	0	Unit 7 Danworth Farm, Cuckfield Road	
Drawn:	SA	Date:	08/10/2021	Hurstpierpoint, West Sussex BN6 9GL	
Figure:	1	Scale:	Not To Scale	+44(0)1273 832972 www.gesl.net	
				 Geo-Environmental	

Project Title:

Gray's Lane, Hitchin

Location :

Hertfordshire, SG5 2HN

Project No. :

GE20375

Client :

Manor Oak Homes

Title :

Figure 2 - Exploratory Hole Location Plan

Scale:

1:1250

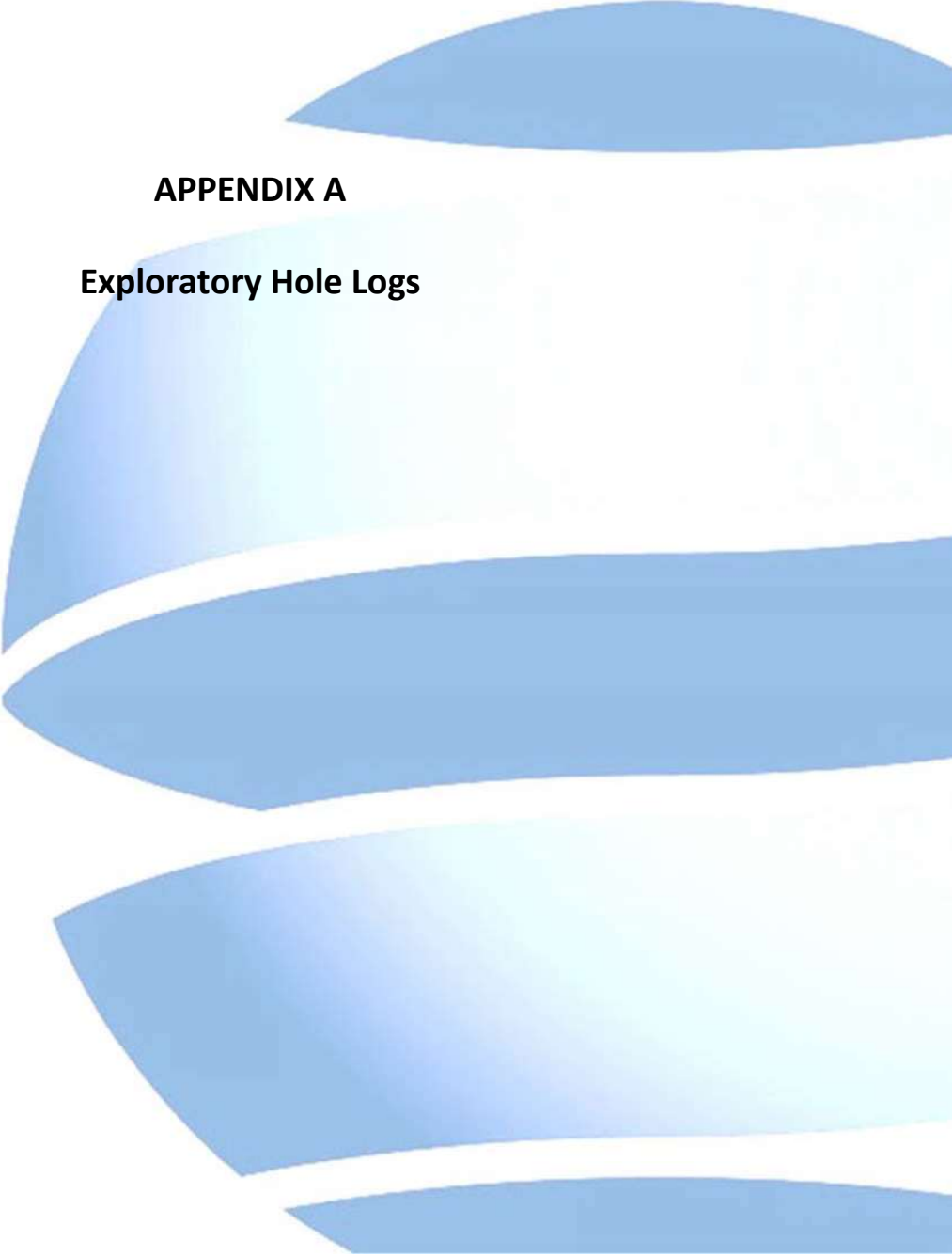
Engineer:

SA



Geo-Environmental





APPENDIX A

Exploratory Hole Logs

Trial Pit Log

Project Name: Gray's Lane, Hitchin

Project No.
GE20375

Co-ords: 517385.55 - 229153.32
Level:

Date
18/10/2021

Location: Hertfordshire, SG5 2HN

Dimensions (m): 1.80

Scale
1:25

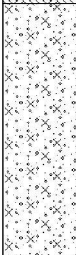
Client: Manor Oak Homes

Depth
1 25

0.45

1.80

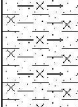
Logged
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Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	1.20	PP	PP=3kg/cm2	0.20			Dark brown gravelly sandy SILT. Gravel composed of rounded to angular flint. Frequent rootlets TOPSOIL
				1.10			Yellowish brown silty very sandy GRAVEL composed of rounded to sub-angular flint. Occasional flint cobbles. GLACIOFLUVIAL DEPOSITS
				1.25			Yellowish orange gravelly sandy CLAY. Gravel composed of sub-angular flint. GLACIOFLUVIAL DEPOSITS
				End of Pit at 1.25m			
							</

Remarks	No groundwater encountered. Soakage testing undertaken
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Stability	Sides stable
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 Geo-Environmental www.gesl.net		Unit 7, Danworth Farm Hurstpierpoint BN6 9GL		Trial Pit Log		Trial Pit No SA102 Sheet 1 of 1	
Project Name: Gray's Lane, Hitchin		Project No. GE20375		Co-ords: 517382.92 - 229133.34 Level:		Date 18/10/2021	
Location: Hertfordshire, SG5 2HN				Dimensions (m): 1.40 0.45 		Scale 1:25	
Client: Manor Oak Homes				Depth 0.60		Logged JC	

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20			Dark brown slightly gravelly silty SAND. Gravel composed of sub-angular flint. Rare metal and glass. Frequent rootlets. TOPSOIL	
				0.60			Dark orangish brown sandy silty CLAY. Rare sub-angular flint gravel. GLACIOFLUVIAL DEPOSITS	
							End of Pit at 0.60m	

Water Striker Depth Striker	Notes to (impl)	Remarks No groundwater encountered. Soakage testing undertaken
		Stability Sides stable



Trial Pit Log

Project Name: Gray's Lane, Hitchin

Project No.
GE20375

Co-ords: 517428.71 - 229151.44
Level:

Date
18/10/2021

Location: Hertfordshire, SG5 2HN

Dimensions (m): 2.00

Scale
1:25

Client: Manor Oak Homes

Depth
0.70

0.45

Logged
.JC

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.50	PP	PP=1.5kg/cm2	0.20		 	Dark brown sandy SILT. Rare sub-rounded to sub-angular flint gravel. Rare sub-angular brick cobbles. Frequent rootlets TOPSOIL Orangish brown slightly clayey slightly sandy SILT. Rare sub-angular gravel. Rare rootlets. GLACIOFLUVIAL DEPOSITS
				0.70			End of Pit at 0.70m

Remarks	No groundwater encountered. Soakage testing undertaken
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Stability	Sides stable
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Trial Pit Log

Project Name: Gray's Lane, Hitchin

Project No.
GE20375

Co-ords: 517443.52 - 229150.12
Level:

Date
18/10/2021

Location: Hertfordshire, SG5 2HN

Dimensions (m): 2.00

Scale
1:25

Client: Manor Oak Homes

Depth
1 60

0.45

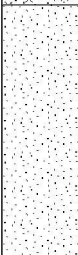
Logged
.JC

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.20			Dark brown slightly gravelly slightly clayey SILT. Gravel composed of sub-angular gravel. Rare rootlets. TOPSOIL
	0.50	PP	PP=3.5kg/cm2				Slightly gravelly sandy CLAY. Gravel is composed of rounded to angular flint. Occasional rounded to angular flint cobbles. GLACIOFLUVIAL DEPOSITS
				1.40			Brownish orange slightly gravelly clayey SAND. Gravel composed of rounded to angular flint. GLACIOFLUVIAL DEPOSITS
				1.60			End of Pit at 1.60m

Water Strikes		Remarks
Depth Strike	Rose to (mbgh)	
		No groundwater encountered. Soakage testing undertaken

Stability	Sides stable
-----------	--------------

 Geo-Environmental www.gesl.net		Unit 7, Danworth Farm Hurstpierpoint BN6 9GL		Trial Pit Log		Trial Pit No SA105 Sheet 1 of 1	
Project Name: Gray's Lane, Hitchin		Project No. GE20375		Co-ords: 517495.80 - 229140.33 Level:		Date 18/10/2021	
Location: Hertfordshire, SG5 2HN				Dimensions (m): 2.00		Scale 1:25	
Client: Manor Oak Homes				Depth 1.80		Logged JC	

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.25			Dark brown slightly gravelly silty SAND. Gravel is composed of sub-angular flint. Frequent rootlets and rare roots 1-3mm. TOPSOIL	
	0.50	PP	PP=3kg/cm2				Dark orangish brown slightly clayey silty SAND. GLACIOFLUVIAL DEPOSITS	
				0.90			Orangish yellow SAND. Rare sub angular flint gravel. GLACIOFLUVIAL DEPOSITS	1
				1.80			End of Pit at 1.80m	2
								3
								4
								5

Water Strikes Depth Strikes	Remarks No groundwater encountered. Soakage testing undertaken
Stability Sides stable	



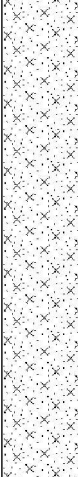
 Geo-Environmental www.gesl.net		Unit 7, Danworth Farm Hurstpierpoint BN6 9GL		Trial Pit Log		Trial Pit No SA106 Sheet 1 of 1	
Project Name: Gray's Lane, Hitchin		Project No. GE20375		Co-ords: 517484.82 - 229148.30 Level:		Date 18/10/2021	
Location: Hertfordshire, SG5 2HN				Dimensions (m): 1.80 		Scale 1:25	
Client: Manor Oak Homes				Depth 0.65		Logged JC	

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20			Dark brown slightly gravelly silty SAND. Gravel is composed of sub-angular flint. Frequent rootlets and rare roots 1-3mm.	
	0.50	PP	PP=3.5kg/cm2				TOPSOIL	
				0.65			Orange slightly gravelly sandy CLAY. Gravel is sub-angular flint.	
							GLACIOFLUVIAL DEPOSITS	
							End of Pit at 0.65m	

Water Strike 	Depth Strike 	Remarks No groundwater encountered. Soakage testing undertaken
		Stability Sides stable



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Trial Pit Log		Trial Pit No SA107 Sheet 1 of 1	
Project Name: Gray's Lane, Hitchin		Project No. GE20375	Co-ords: 517466.63 - 229070.76 Level:		Date 18/10/2021
Location: Hertfordshire, SG5 2HN			Dimensions (m): 2.00 		Scale 1:25
Client: Manor Oak Homes			Depth 1.90		Logged JC

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20			Dark brown slightly gravelly silty SAND. Gravel is composed of sub-angular flint. Frequent rootlets and rare 1-2mm roots. TOPSOIL	
				1.90			Brownish orange silty SAND. Rare sub-angular flint gravel. GLACIOFLUVIAL DEPOSITS	
							End of Pit at 1,90m	

Water Strikes Depth Strike: Sides to (m):		Remarks No groundwater encountered. Soakage testing undertaken
Stability		Sides stable



Trial Pit Log

Project Name: Gray's Lane, Hitchin

Project No.
GE20375

Co-ords: 517456.12 - 229082.09
Level:

Date
18/10/2021

Location: Hertfordshire, SG5 2HN

Dimensions (m): 1.90

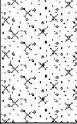
Scale
1:25

Client: Manor Oak Homes

Depth
0 70

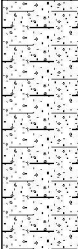
0.45

Logged
.JC

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.25		 Dark brown slightly gravelly silty SAND. Gravel is composed of sub angular to angular flint. Frequent rootlets and occasional roots 1-15mm. TOPSOIL	1 - 100 2 - 100 3 - 100 4 - 100 5 - 100
				0.70		 Orangish brown slightly gravelly slightly silty SAND. Gravel is composed of rounded to angular flint. Rare rootlets and roots 1-2mm. GLACIOFLUVIAL DEPOSITS	
						End of Pit at 0.70m	

Remarks	No groundwater encountered. Soakage testing undertaken
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Stability	Sides stable
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 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Trial Pit Log		Trial Pit No SA109 Sheet 1 of 1				
Project Name: Gray's Lane, Hitchin		Project No. GE20375		Co-ords: 517405.46 - 229104.60 Level:				
Location: Hertfordshire, SG5 2HN		Dimensions (m): Depth 2.00 0.45		Date 18/10/2021				
Client: Manor Oak Homes		Depth 1.90		Scale 1:25 Logged JC				
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.50	PP	PP=4kg/cm2	0.25			Dark brown gravelly sandy SILT. Gravel is sub-angular to angular flint. Frequent rootlets. TOPSOIL	1
				1.00			Brownish orange slightly gravelly clayey SAND. Gravel is composed of sub-angular flint. GLACIOFLUVIAL DEPOSITS	
				1.90			Orangish brown gravelly very clayey SAND. Gravel is sub-angular flint and rare sandstone. GLACIOFLUVIAL DEPOSITS	
				End of Pit at 1,90m		2		
								3
								4
								5
		Remarks No groundwater encountered. Soakage testing undertaken						
		Stability Sides stable						



Trial Pit Log

Project Name: Gray's Lane, Hitchin

Project No.
GE20375

Co-ords: 517416.44 - 229102.63
Level:

Date
18/10/2021

Location: Hertfordshire, SG5 2HN

Dimensions (m): 2.00

Scale
1:25

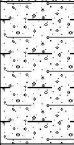
Client: Manor Oak Homes

Depth
0 70

0.45

2.00

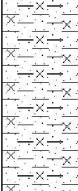
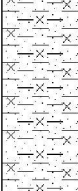
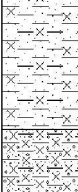
Logged
.JC

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.20		 Dark brown slightly gravelly silty fine to medium SAND. Gravel is sub-angular flint. Abundant rootlets and occasional roots 1 - 15mm TOPSOIL	1 - 1.00m 2 - 1.00m 3 - 1.00m 4 - 1.00m 5 - 1.00m
				0.70		 Yellowish brown slightly sandy clayey GRAVEL composed of sub rounded to angular flint. Rare roots. GLACIOFLUVIAL DEPOSITS End of Pit at 0.70m	

Remarks	No groundwater encountered. Soakage testing undertaken
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Stability	Sides stable
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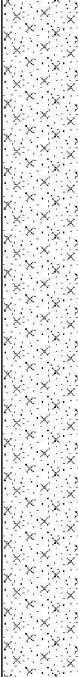
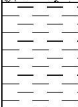
 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Trial Pit Log		TrialPit No TP101 Sheet 1 of 1	
Project Name: Gray's Lane, Hitchin		Project No. GE20375		Co-ords: 517385.79 - 229161.66 Level:	
Location: Hertfordshire, SG5 2HN		Dimensions (m): 3.00 0.60 		Date 18/10/2021 Scale 1:25 Logged JC	
Client: Manor Oak Homes					

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20			Dark brown slightly gravelly sandy SILT. TOPSOIL	
				0.80			Orange slightly gravelly clayey SAND GLACIOFLUVIAL DEPOSITS	
	1.00	PP	PP=3.5kg/cm2				Orange and brownish orange slightly sandy silty CLAY. Rare flint cobbles GLACIOFLUVIAL DEPOSITS	1
	1.50	PP	PP=4kg/cm2					
	2.00	PP	PP=3kg/cm2					2
				2.60			Yellowish orange slightly gravelly clayey sandy SILT. Gravel is composed of rounded to sub angular flint. Occasional silt laminations. GLACIOFLUVIAL DEPOSITS	
	3.00	PP	PP=2kg/cm2	3.00			End of Pit at 3.00m	3
								4
								5

	Remarks No groundwater encountered Stability Sides stable
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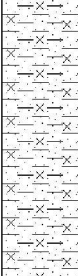
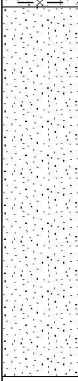


		Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Trial Pit Log		Trial Pit No TP102 Sheet 1 of 1	
Project Name: Gray's Lane, Hitchin		Project No. GE20375		Co-ords: 517429.77 - 229161.81 Level:		Date 18/10/2021	
Location: Hertfordshire, SG5 2HN				Dimensions (m): 3.00 		Scale 1:25	
Client: Manor Oak Homes				Depth 3.00		Logged JC	

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20			Dark brown slightly sandy SILT. Frequent rootlets and rare 10mm -20mm roots. TOPSOIL	
	0.50	PP	PP=3kg/cm2				Orange silty fine SAND with grey greyish brown clay inclusions. Clay has dark brown staining. GLACIOFLUVIAL DEPOSITS	1
	1.00	PP	PP=3kg/cm2					
	1.50	PP	PP=3kg/cm2					
	2.00	PP	PP=3kg/cm2					2
	2.40	PP	PP=3.5kg/cm2					
				2.60			Orangish greyish brown CLAY. Rare yellowish off-white weak chalk inclusions . GLACIOFLUVIAL DEPOSITS	
	3.00	PP	PP=4kg/cm2	3.00			End of Pit at 3.00m	3
								4
								5

Water Strike 	Depth Strike 	Remarks No groundwater encountered
		Stability Sides stable



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Trial Pit Log		TrialPit No TP103 Sheet 1 of 1				
Project Name: Gray's Lane, Hitchin		Project No. GE20375		Co-ords: 517509.04 - 229144.53 Level:				
Location: Hertfordshire, SG5 2HN		Dimensions (m):		3.00 				
Client: Manor Oak Homes		Depth 3.10		0.60 				
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.20		 Dark brown slightly gravelly silty SAND. Gravel is composed of sub-angular to angular flint. Abundant rootlets. Rare roots <10mm TOPSOIL	1	
	0.70	PP	PP=4kg/cm2		 Orangish brown sandy silty CLAY. Rare rounded to angular flint gravel and cobbles. Rare rootlets and roots 1-2mm. GLACIOFLUVIAL DEPOSITS			
	1.30	PP	PP=3kg/cm2	1.20	 Yellowish brown sandy silty CLAY. Rare white to yellowish white very weak chalk inclusions. GLACIOFLUVIAL DEPOSITS	2		
				1.80	 Orangish yellow SAND. Rare very weathered chalk/grey clay. Rare sub-angular fine to medium flint gravel. GLACIOFLUVIAL DEPOSITS		3	
				3.10		End of Pit at 3.10m		4
								5
Remarks No groundwater encountered Stability Sides stable								



Trial Pit Log

Project Name: Gray's Lane, Hitchin

Project No.
GE20375

Co-ords: 517472.18 - 229065.89
Level:

Date
18/10/2021

Location: Hertfordshire, SG5 2HN

Dimensions (m): 3.00

Scale
1:25

Client: Manor Oak Homes

Depth
3.00

0.60

Logged
.JC

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.50	PP	PP=4kg/cm2	0.20			Dark brown slightly gravelly sandy SILT. Gravel is composed of sub angular to angular flint. TOPSOIL
							Brownish orange slightly clayey silty SAND. Rare roots GLACIOFLUVIAL DEPOSITS
				3.00			End of Pit at 3.00m

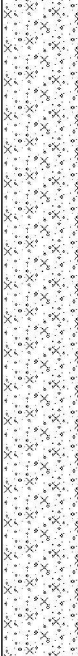
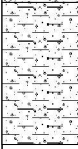
Remarks	No groundwater encountered
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Stability	Sides stable
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 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Trial Pit Log		Trial Pit No TP105 Sheet 1 of 1				
Project Name: Gray's Lane, Hitchin		Project No. GE20375		Co-ords: 517408.70 - 229089.54 Level:				
Location: Hertfordshire, SG5 2HN				Dimensions (m): 3.20 				
Client: Manor Oak Homes				Depth 3.20 0.60				
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.25			Dark brown slightly gravelly sandy SILT. Gravel is composed of sub-angular flint. Frequent rootlets TOPSOIL	
	0.50	PP	PP=2kg/cm2	0.70			Yellowish brown slightly gravelly slightly sandy CLAY. Gravel is composed of rounded to angular flint. Rare flint cobbles and single rounded flint boulder. GLACIOFLUVIAL DEPOSITS	
	1.00	PP	PP=2.5kg/cm2	1.20			Yellowish grey slightly gravelly very clayey fine SAND. Gravel is sub-angular flint. GLACIOFLUVIAL DEPOSITS	1
				2.30			Brownish orange slightly gravelly silty SAND. Gravel is sub-angular to angular flint. Rare sub-angular cobbles. Rare grey clay. GLACIOFLUVIAL DEPOSITS	2
				3.20			Orange slightly gravelly clayey SAND. Gravel is sub-angular to angular flint. Rare sub-angular flint. GLACIOFLUVIAL DEPOSITS	3
							End of Pit at 3.20m	4
								5
Water Strike Depth Strike		Remarks: No groundwater encountered						
Sides to (m)		Stability: Sides stable						

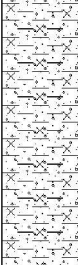
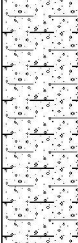
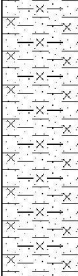


		Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Trial Pit Log		TrialPit No TP106 Sheet 1 of 1	
Project Name: Gray's Lane, Hitchin		Project No. GE20375		Co-ords: 517364.92 - 229114.37 Level:		Date 19/10/2021	
Location: Hertfordshire, SG5 2HN				Dimensions (m): 3.10 		Scale 1:25	
Client: Manor Oak Homes				Depth 3.10		Logged JC	

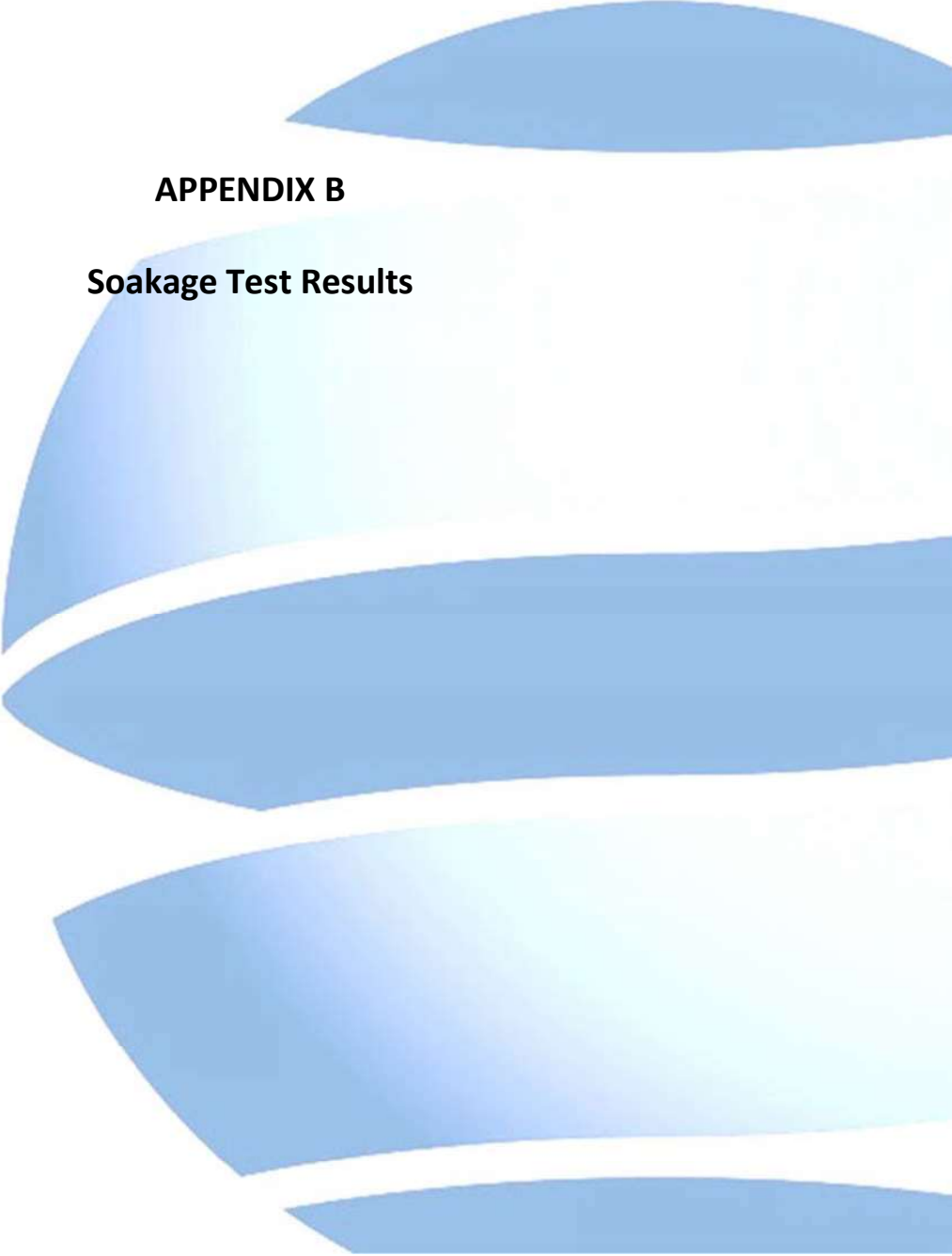
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.25			Brown slightly silty gravelly SAND. Gravel is composed of sub-angular flint. Rare charcoal. Frequent rootlets and occasional roots <30mm TOPSOIL	
							Orange slightly silty very sandy GRAVEL composed of well rounded to angular flint. Frequent well rounded to angular flint cobbles. GLACIOFLUVIAL DEPOSITS	1
				2.60			Orange to brown slightly gravelly slightly sandy CLAY. Gravel is composed white weak chalk and rare sub-angular flint. Occasional roots 10-20mm. GLACIOFLUVIAL DEPOSITS	2
	3.00	PP	PP=5kg/cm2	3.10				3
							End of Pit at 3.10m	4
								5

		Remarks No groundwater encountered
		Stability Sides stable



 Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net		Trial Pit Log		Trial Pit No TP107 Sheet 1 of 1				
Project Name: Gray's Lane, Hitchin		Project No. GE20375		Co-ords: 517356.46 - 229068.40 Level:				
Location: Hertfordshire, SG5 2HN				Dimensions (m): 3.10 Depth 0.60				
Client: Manor Oak Homes				Scale 1:25 Logged JC				
Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.25			Dark brown slightly gravelly sandy CLAY. Gravel is composed of sub angular flint. TOPSOIL	
							Brownish orange slightly gravelly slightly sandy silty CLAY. Gravel is composed of sub-angular to angular flint. Rare sub-angular flint cobbles. GLACIOFLUVIAL DEPOSITS	1
				1.20			Orangish brown to brownish white slightly clayey sandy GRAVEL composed of rounded to sub-angular white weak chalk and rare rounded to sub-angular flint. Rare rounded to sub-rounded flint cobbles. GLACIOFLUVIAL DEPOSITS	2
				2.10			Orangish brown slightly gravelly very sandy silty CLAY. Gravel is composed of rounded to angular white chalk and flint and rare sandstone. GLACIOFLUVIAL DEPOSITS	3
				3.10			End of Pit at 3.10m	4
								5
		Remarks No groundwater encountered Stability Sides stable						





APPENDIX B

Soakage Test Results

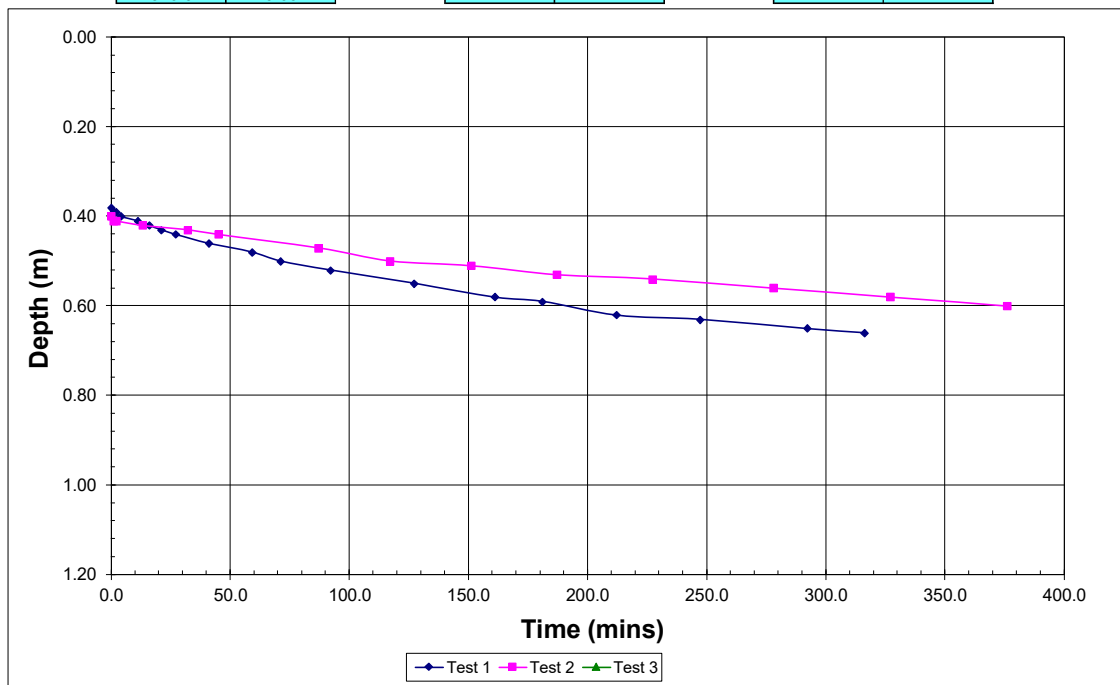
 Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-Environmental Services Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net
Project Name : Grays Lane, Hitcham Client : Manor Oak Homes		Job No. : GE20375 Date : 18/10/2021 to 19/10/2021

Pit reference	SA101
Pit depth (m)	1.25
Pit width (m)	0.45
Pit length (m)	1.40
Depth to standing water (m)	

Test 1	
Time (min)	Depth (m)
0.0	0.38
1.0	0.39
2.0	0.39
4.0	0.40
11.0	0.41
16.0	0.42
21.0	0.43
27.0	0.44
41.0	0.46
59.0	0.48
71.0	0.50
92.0	0.52
127.0	0.55
161.0	0.58
181.0	0.59
212.0	0.62
247.0	0.63
292.0	0.65
316.0	0.66

Test 2	
Time (min)	Depth (m)
0.0	0.40
1.0	0.41
2.0	0.41
13.0	0.42
32.0	0.43
45.0	0.44
87.0	0.47
117.0	0.50
151.0	0.51
187.0	0.53
227.0	0.54
278.0	0.56
327.0	0.58
376.0	0.60

Test 3	
Time (min)	Depth (m)



Max. depth (m)	1.25	1.08	1.25
Effective depth (m)	0.87	0.85	1.25
75% effective depth (m)	0.60	0.61	0.31
50% effective depth (m)	0.82	0.83	0.63
25% effective depth (m)	1.03	1.04	0.94
t75 (min)			
t50 (min)			
t25 (min)			
Vp 75-25	0.27	0.27	0.39
ap 50	2.2395	2.2025	2.9425
tp 75-25	0.00	0.00	0.00

Soil infiltration rate (m/s)	Insufficient fall in water to complete test	
Soil infiltration rate (mm/hr)	Insufficient fall in water to complete test	

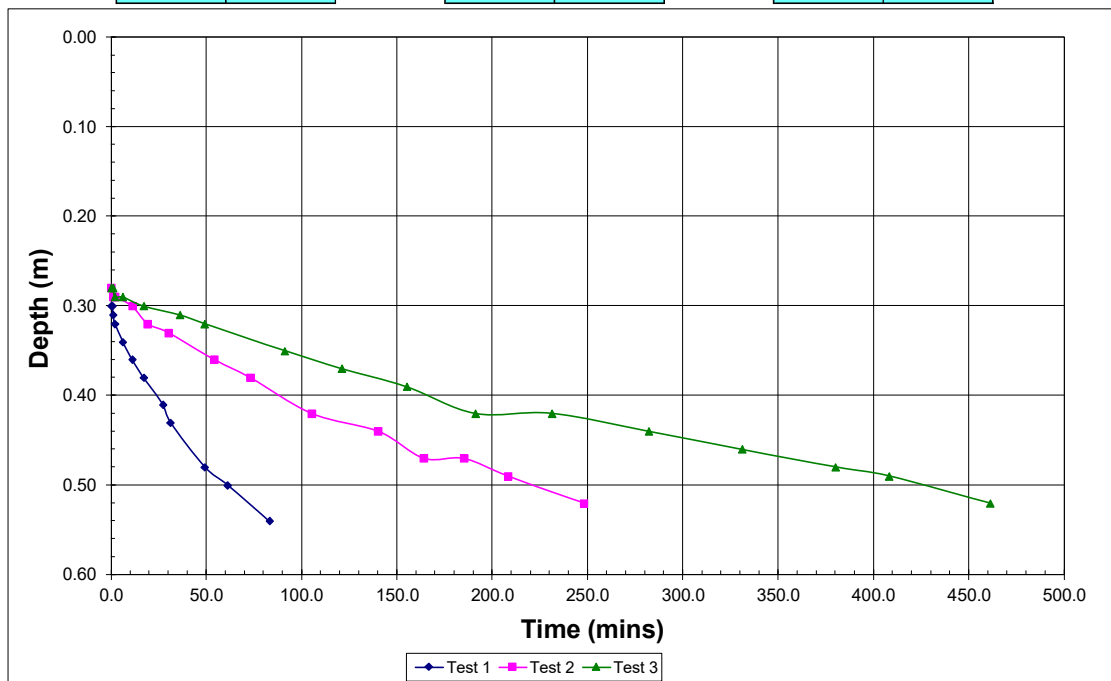
 Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-Environmental Services Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net
Project Name : Grays Lane, Hitcham Client : Manor Oak Homes		Job No. : GE20375 Date : 18/10/2021 to 19/10/2021

Pit reference	SA102
Pit depth (m)	0.60
Pit width (m)	0.45
Pit length (m)	1.40
Depth to standing water (m)	

Test 1	
Time (min)	Depth (m)
0.0	0.30
0.5	0.30
1.0	0.31
2.0	0.32
6.0	0.34
11.0	0.36
17.0	0.38
27.0	0.41
31.0	0.43
49.0	0.48
61.0	0.50
83.0	0.54

Test 2	
Time (min)	Depth (m)
0.0	0.28
1.0	0.29
2.0	0.29
11.0	0.30
19.0	0.32
30.0	0.33
54.0	0.36
73.0	0.38
105.0	0.42
140.0	0.44
164.0	0.47
185.0	0.47
208.0	0.49
248.0	0.52

Test 3	
Time (min)	Depth (m)
0.0	0.28
1.0	0.28
2.0	0.29
6.0	0.29
17.0	0.30
36.0	0.31
49.0	0.32
91.0	0.35
121.0	0.37
155.0	0.39
191.0	0.42
231.0	0.42
282.0	0.44
331.0	0.46
380.0	0.48
408.0	0.49
461.0	0.52



Max. depth (m)	0.60	0.55	0.55
Effective depth (m)	0.30	0.32	0.32
75% effective depth (m)	0.38	0.36	0.36
50% effective depth (m)	0.45	0.44	0.44
25% effective depth (m)	0.53	0.52	0.52
t75 (min)	17.00	54.00	110.00
t50 (min)	35.00	140.00	282.00
t25 (min)	75.00	248.00	461.00
Vp 75-25	0.09	0.10	0.10
ap 50	1.185	1.222	1.222
tp 75-25	58.00	194.00	351.00

Soil infiltration rate (m/s)	2.3E-05	7.1E-06	3.9E-06
Soil infiltration rate (mm/hr)	8.25E+01	2.55E+01	1.41E+01

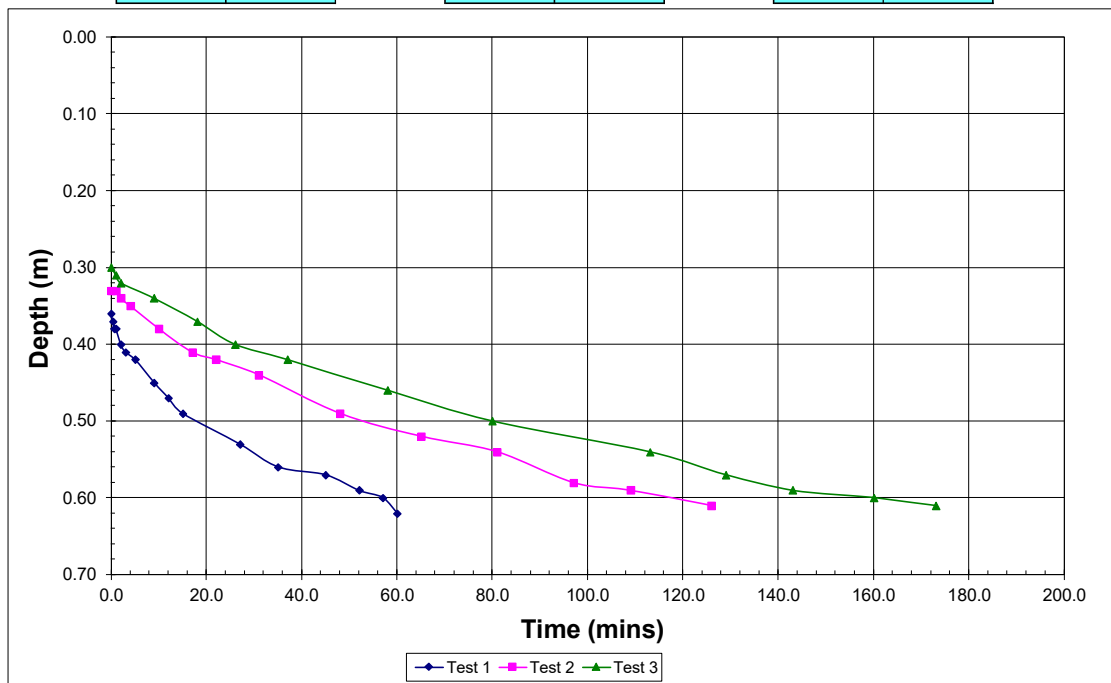
 Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-Environmental Services Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net
Project Name : Grays Lane, Hitcham Client : Manor Oak Homes		Job No. : GE20375 Date : 18/10/2021 to 19/10/2021

Pit reference	SA103
Pit depth (m)	0.70
Pit width (m)	0.45
Pit length (m)	2.00
Depth to standing water (m)	

Test 1	
Time (min)	Depth (m)
0.0	0.36
0.3	0.37
0.7	0.38
1.0	0.38
2.0	0.40
3.0	0.41
5.0	0.42
9.0	0.45
12.0	0.47
15.0	0.49
27.0	0.53
35.0	0.56
45.0	0.57
52.0	0.59
57.0	0.60
60.0	0.62

Test 2	
Time (min)	Depth (m)
0.0	0.33
1.0	0.33
2.0	0.34
4.0	0.35
10.0	0.38
17.0	0.41
22.0	0.42
31.0	0.44
48.0	0.49
65.0	0.52
81.0	0.54
97.0	0.58
109.0	0.59
126.0	0.61

Test 3	
Time (min)	Depth (m)
0.0	0.30
1.0	0.31
2.0	0.32
9.0	0.34
18.0	0.37
26.0	0.40
37.0	0.42
58.0	0.46
80.0	0.50
113.0	0.54
129.0	0.57
143.0	0.59
160.0	0.60
173.0	0.61



Max. depth (m)	0.60	0.60	0.60
Effective depth (m)	0.34	0.37	0.40
75% effective depth (m)	0.45	0.42	0.40
50% effective depth (m)	0.53	0.52	0.50
25% effective depth (m)	0.62	0.61	0.60
t75 (min)	9.00	22.00	26.00
t50 (min)	27.00	65.00	80.00
t25 (min)	60.00	126.00	160.00
Vp 75-25	0.15	0.17	0.18
ap 50	1.733	1.8065	1.88
tp 75-25	51.00	104.00	134.00

Soil infiltration rate (m/s)	2.9E-05	1.5E-05	1.2E-05
Soil infiltration rate (mm/hr)	1.04E+02	5.32E+01	4.29E+01

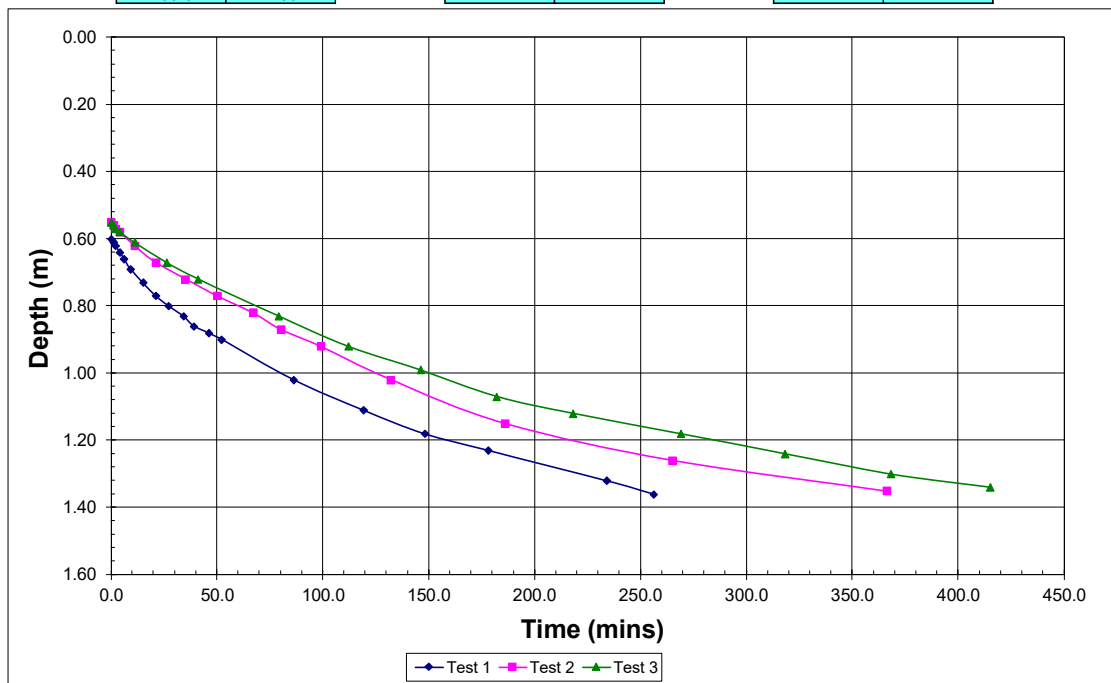
 Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-Environmental Services Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net
Project Name : Grays Lane, Hitcham Client : Manor Oak Homes		Job No. : GE20375 Date : 18/10/2021 to 19/10/2021

Pit reference	SA104
Pit depth (m)	1.60
Pit width (m)	0.45
Pit length (m)	2.00
Depth to standing water (m)	

Test 1	
Time (min)	Depth (m)
0.0	0.60
1.0	0.61
2.0	0.62
4.0	0.64
6.0	0.66
9.0	0.69
15.0	0.73
21.0	0.77
27.0	0.80
34.0	0.83
39.0	0.86
46.0	0.88
52.0	0.90
86.0	1.02
119.0	1.11
148.0	1.18
178.0	1.23
234.0	1.32
256.0	1.36

Test 2	
Time (min)	Depth (m)
0.0	0.55
1.0	0.56
2.0	0.57
4.0	0.58
11.0	0.62
21.0	0.67
35.0	0.72
50.0	0.77
67.0	0.82
80.0	0.87
99.0	0.92
132.0	1.02
186.0	1.15
265.0	1.26
366.0	1.35

Test 3	
Time (min)	Depth (m)
0.0	0.55
1.0	0.56
2.0	0.57
4.0	0.58
11.0	0.61
26.0	0.67
41.0	0.72
79.0	0.83
112.0	0.92
146.0	0.99
182.0	1.07
218.0	1.12
269.0	1.18
318.0	1.24
368.0	1.30
415.0	1.34



Max. depth (m)	1.60	1.55	1.50
Effective depth (m)	1.00	1.05	1.05
75% effective depth (m)	0.85	0.81	0.81
50% effective depth (m)	1.10	1.08	1.08
25% effective depth (m)	1.35	1.34	1.34
t75 (min)	36.00	62.00	70.00
t50 (min)	112.00	160.00	185.00
t25 (min)	250.00	360.00	415.00
Vp 75-25	0.45	0.47	0.47
ap 50	3.35	3.4725	3.4725
tp 75-25	214.00	298.00	345.00

Soil infiltration rate (m/s)	1.0E-05	7.6E-06	6.6E-06
Soil infiltration rate (mm/hr)	3.77E+01	2.74E+01	2.37E+01

 Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-Environmental Services Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net
Project Name : Grays Lane, Hitcham Client : Manor Oak Homes		Job No. : GE20375 Date : 18/10/2021 to 19/10/2021

Pit reference	SA105
Pit depth (m)	1.75
Pit width (m)	0.45
Pit length (m)	2.00
Depth to standing water (m)	

Test 1

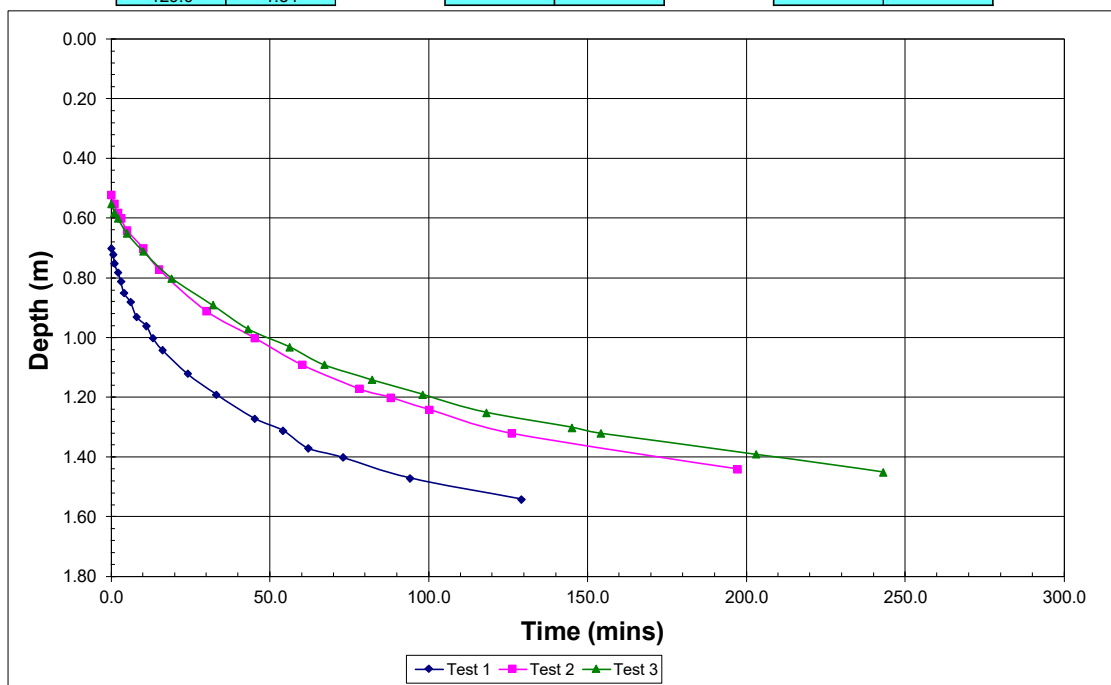
Time (min)	Depth (m)
0.0	0.70
0.5	0.72
1.0	0.75
2.0	0.78
3.0	0.81
4.0	0.85
6.0	0.88
8.0	0.93
11.0	0.96
13.0	1.00
16.0	1.04
24.0	1.12
33.0	1.19
45.0	1.27
54.0	1.31
62.0	1.37
73.0	1.40
94.0	1.47
129.0	1.54

Test 2

Time (min)	Depth (m)
0.0	0.52
1.0	0.55
2.0	0.58
3.0	0.60
5.0	0.64
10.0	0.70
15.0	0.77
30.0	0.91
45.0	1.00
60.0	1.09
78.0	1.17
88.0	1.20
100.0	1.24
126.0	1.32
197.0	1.44

Test 3

Time (min)	Depth (m)
0.0	0.55
1.0	0.58
2.0	0.60
5.0	0.65
10.0	0.71
19.0	0.80
32.0	0.89
43.0	0.97
56.0	1.03
67.0	1.09
82.0	1.14
98.0	1.19
118.0	1.25
145.0	1.30
154.0	1.32
203.0	1.39
243.0	1.45



Max. depth (m)	1.75	1.57	1.57
Effective depth (m)	1.05	1.23	1.20
75% effective depth (m)	0.96	0.83	0.85
50% effective depth (m)	1.23	1.14	1.15
25% effective depth (m)	1.49	1.44	1.45
t75 (min)	11.00	25.00	30.00
t50 (min)	40.00	70.00	83.00
t25 (min)	110.00	197.00	243.00
Vp 75-25	0.47	0.55	0.54
ap 50	3.4725	3.9135	3.84
tp 75-25	99.00	172.00	213.00

Soil infiltration rate (m/s)	2.3E-05	1.4E-05	1.1E-05
Soil infiltration rate (mm/hr)	8.25E+01	4.93E+01	3.96E+01

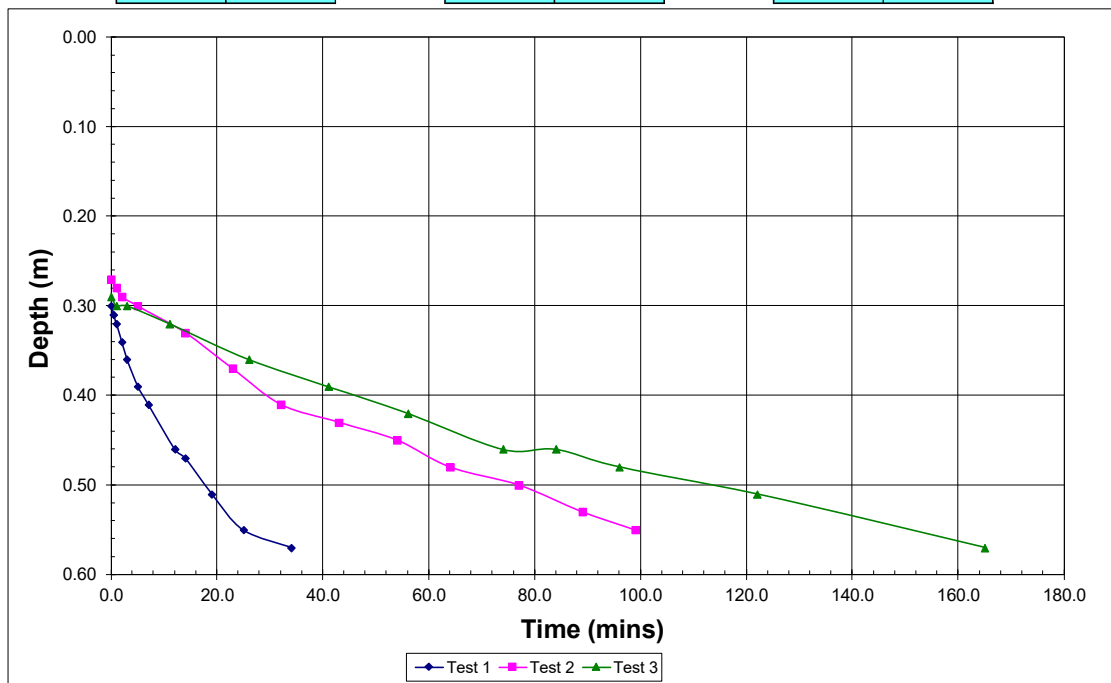
 Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-Environmental Services Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net
Project Name : Grays Lane, Hitcham Client : Manor Oak Homes		Job No. : GE20375 Date : 18/10/2021 to 19/10/2021

Pit reference	SA106
Pit depth (m)	0.64
Pit width (m)	0.45
Pit length (m)	1.80
Depth to standing water (m)	

Test 1	
Time (min)	Depth (m)
0.0	0.30
0.5	0.31
1.0	0.32
2.0	0.34
3.0	0.36
5.0	0.39
7.0	0.41
12.0	0.46
14.0	0.47
19.0	0.51
25.0	0.55
34.0	0.57

Test 2	
Time (min)	Depth (m)
0.0	0.27
1.0	0.28
2.0	0.29
5.0	0.30
14.0	0.33
23.0	0.37
32.0	0.41
43.0	0.43
54.0	0.45
64.0	0.48
77.0	0.50
89.0	0.53
99.0	0.55

Test 3	
Time (min)	Depth (m)
0.0	0.29
1.0	0.30
3.0	0.30
11.0	0.32
26.0	0.36
41.0	0.39
56.0	0.42
74.0	0.46
84.0	0.46
96.0	0.48
122.0	0.51
165.0	0.57



Max. depth (m)	0.64	0.60	0.56
Effective depth (m)	0.34	0.37	0.35
75% effective depth (m)	0.39	0.36	0.38
50% effective depth (m)	0.47	0.46	0.47
25% effective depth (m)	0.56	0.55	0.55
t75 (min)	5.00	20.00	36.00
t50 (min)	14.00	56.00	90.00
t25 (min)	28.00	99.00	156.00
Vp 75-25	0.14	0.15	0.14
ap 50	1.575	1.6425	1.5975
tp 75-25	23.00	79.00	120.00

Soil infiltration rate (m/s)	6.3E-05	1.9E-05	1.2E-05
Soil infiltration rate (mm/hr)	2.28E+02	6.93E+01	4.44E+01

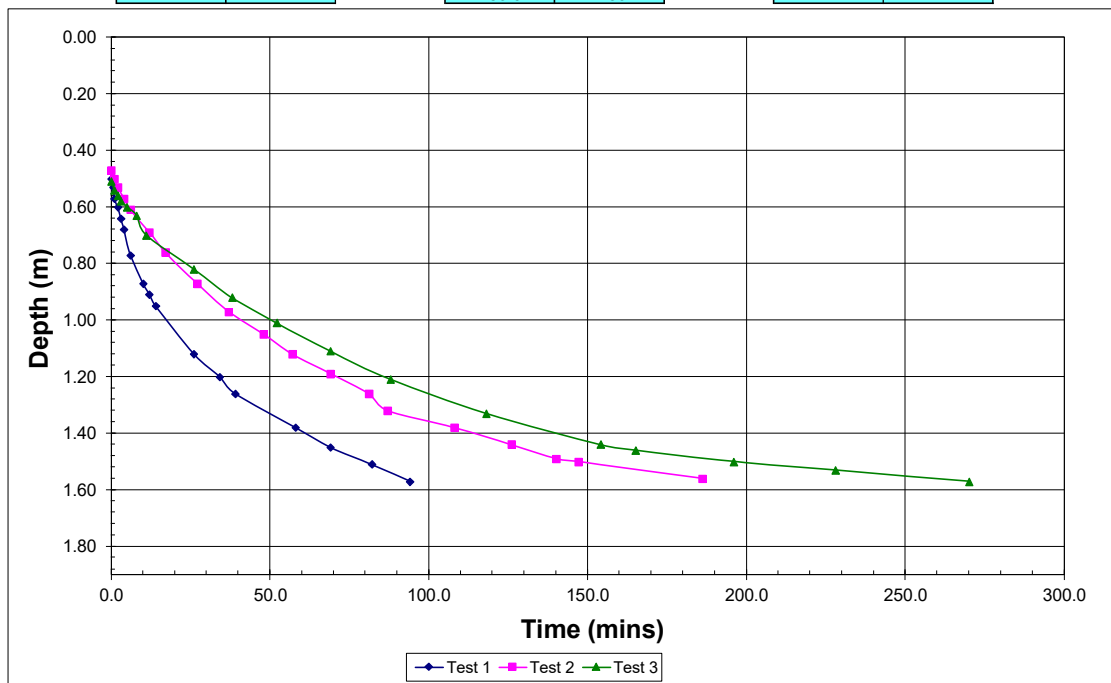
 Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-Environmental Services Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net
Project Name : Grays Lane, Hitcham Client : Manor Oak Homes		Job No. : GE20375 Date : 18/10/2021 to 19/10/2021

Pit reference	SA107
Pit depth (m)	1.92
Pit width (m)	0.45
Pit length (m)	2.00
Depth to standing water (m)	

Test 1	
Time (min)	Depth (m)
0.0	0.50
0.5	0.53
1.0	0.57
2.0	0.60
3.0	0.64
4.0	0.68
6.0	0.77
10.0	0.87
12.0	0.91
14.0	0.95
26.0	1.12
34.0	1.20
39.0	1.26
58.0	1.38
69.0	1.45
82.0	1.51
94.0	1.57

Test 2	
Time (min)	Depth (m)
0.0	0.47
1.0	0.50
2.0	0.53
4.0	0.57
6.0	0.61
12.0	0.69
17.0	0.76
27.0	0.87
37.0	0.97
48.0	1.05
57.0	1.12
69.0	1.19
81.0	1.26
87.0	1.32
108.0	1.38
126.0	1.44
140.0	1.49
147.0	1.50
186.0	1.56

Test 3	
Time (min)	Depth (m)
0.0	0.51
1.0	0.54
2.0	0.56
3.0	0.58
5.0	0.60
8.0	0.63
11.0	0.70
26.0	0.82
38.0	0.92
52.0	1.01
69.0	1.11
88.0	1.21
118.0	1.33
154.0	1.44
165.0	1.46
196.0	1.50
228.0	1.53
270.0	1.57



Max. depth (m)	1.92	1.81	1.76
Effective depth (m)	1.42	1.45	1.41
75% effective depth (m)	0.86	0.83	0.86
50% effective depth (m)	1.21	1.20	1.22
25% effective depth (m)	1.57	1.56	1.57
t75 (min)	8.00	23.00	28.00
t50 (min)	36.00	70.00	89.00
t25 (min)	94.00	186.00	270.00
Vp 75-25	0.64	0.65	0.63
ap 50	4.379	4.4525	4.3545
tp 75-25	86.00	163.00	242.00

Soil infiltration rate (m/s)	2.8E-05	1.5E-05	1.0E-05
Soil infiltration rate (mm/hr)	1.02E+02	5.39E+01	3.61E+01



Soakaway Test Results (after BRE Digest 365)

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

Project Name : Grays Lane, Hitcham

Client : Manor Oak Homes

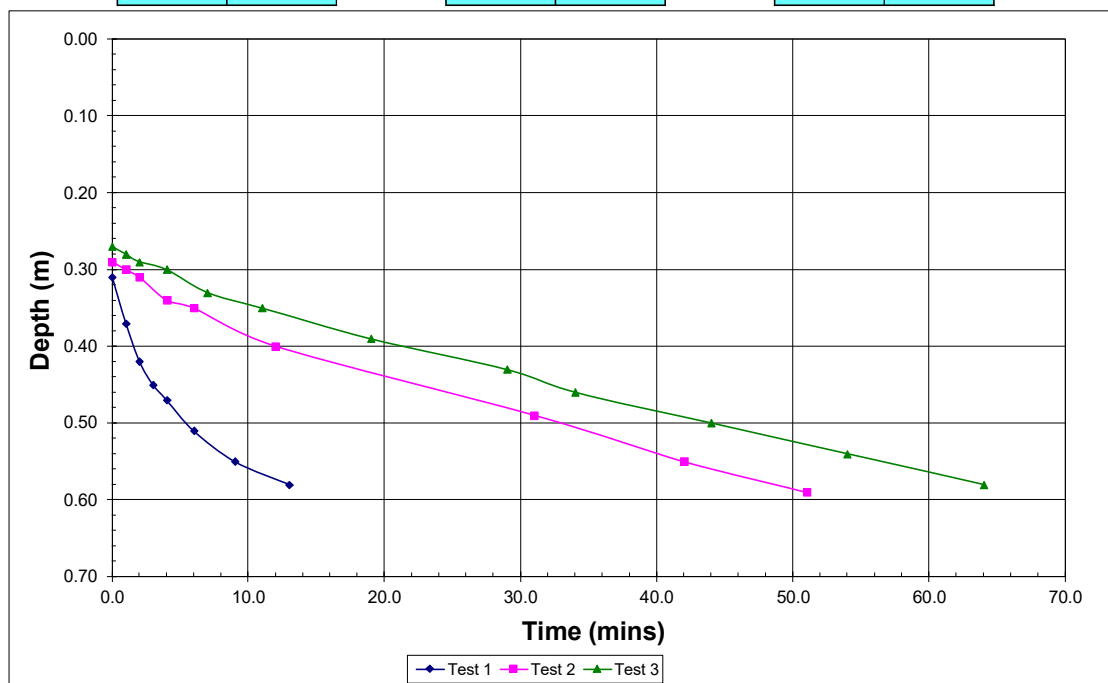
Job No. : GE20375

Date : 18/10/2021 to 19/10/2021

Pit reference	SA108
Pit depth (m)	0.67
Pit width (m)	0.45
Pit length (m)	1.90
Depth to standing water (m)	

[illegible][illegible]

Time (min)	Depth (m)
0.0	0.27
1.0	0.28
2.0	0.29
4.0	0.30
7.0	0.33
11.0	0.35
19.0	0.39
29.0	0.43
34.0	0.46
44.0	0.50
54.0	0.54
64.0	0.58



Max. depth (m)	0.67	0.67	0.67
Effective depth (m)	0.36	0.38	0.40
75% effective depth (m)	0.40	0.39	0.37
50% effective depth (m)	0.49	0.48	0.47
25% effective depth (m)	0.58	0.58	0.57
t75 (min)	1.50	10.00	15.00
t50 (min)	5.00	29.00	36.00
t25 (min)	13.00	49.00	63.00
Vp 75-25	0.15	0.16	0.17
ap 50	1.701	1.748	1.795
tp 75-25	11.50	39.00	48.00

Soil infiltration rate (m/s)	1.3E-04	4.0E-05	3.3E-05
Soil infiltration rate (mm/hr)	4.72E+02	1.43E+02	1.19E+02



Soakaway Test Results (after BRE Digest 365)

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

Project Name : Grays Lane, Hitcham

Client : Manor Oak Homes

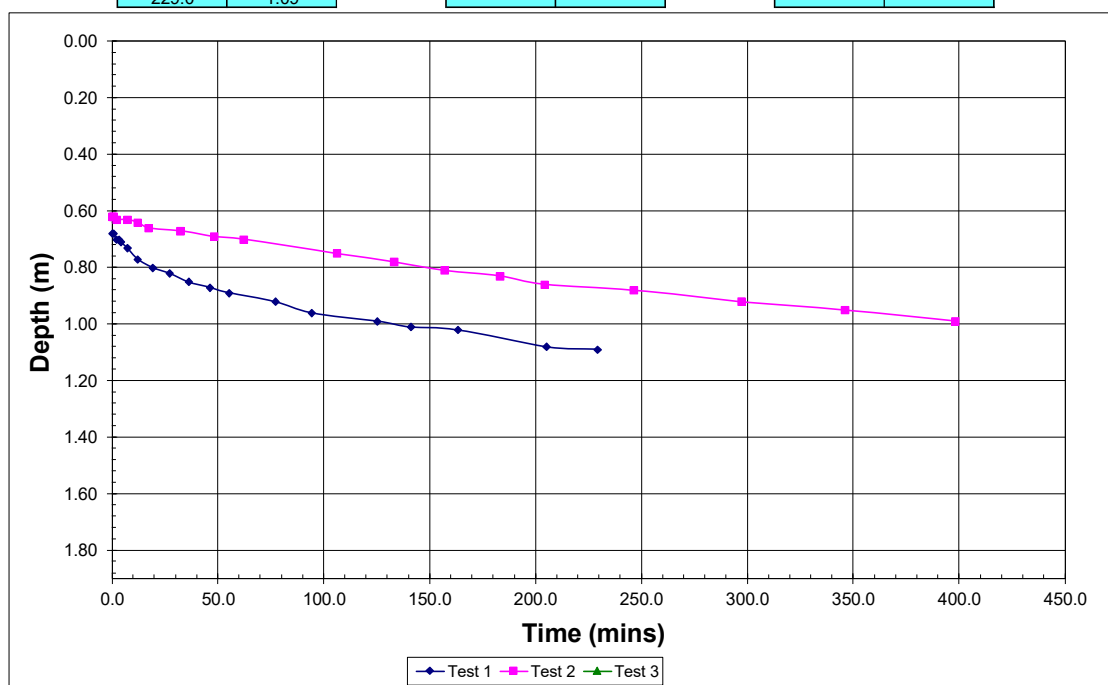
Job No. : GE20375

Date : 18/10/2021 to 19/10/2021

Pit reference	SA109
Pit depth (m)	1.88
Pit width (m)	0.45
Pit length (m)	2.00
Depth to standing water (m)	

Test 1	
Time (min)	Depth (m)
0.0	0.68
0.5	0.68
2.0	0.70
3.0	0.70
4.0	0.71
7.0	0.73
12.0	0.77
19.0	0.80
27.0	0.82
36.0	0.85
46.0	0.87
55.0	0.89
77.0	0.92
94.0	0.96
125.0	0.99
141.0	1.01
163.0	1.02
205.0	1.08
229.0	1.09

Time (min)	Depth (m)
0.0	0.62
0.5	0.62
2.0	0.63
7.0	0.63
12.0	0.64
17.0	0.66
32.0	0.67
48.0	0.69
62.0	0.70
106.0	0.75
133.0	0.78
157.0	0.81
183.0	0.83
204.0	0.86
246.0	0.88
297.0	0.92
346.0	0.95
398.0	0.99

[illegible]

Max. depth (m)	1.88	1.70	1.70
Effective depth (m)	1.20	1.26	1.88
75% effective depth (m)	0.98	0.94	0.47
50% effective depth (m)	1.28	1.25	0.94
25% effective depth (m)	1.58	1.57	1.41
t75 (min)			
t50 (min)			
t25 (min)			
Vp 75-25	0.54	0.57	0.85
ap 50	3.84	3.987	5.506
tp 75-25	0.00	0.00	0.00

Soil infiltration rate (m/s)	Insufficient fall in water to complete test	
Soil infiltration rate (mm/hr)	Insufficient fall in water to complete test	

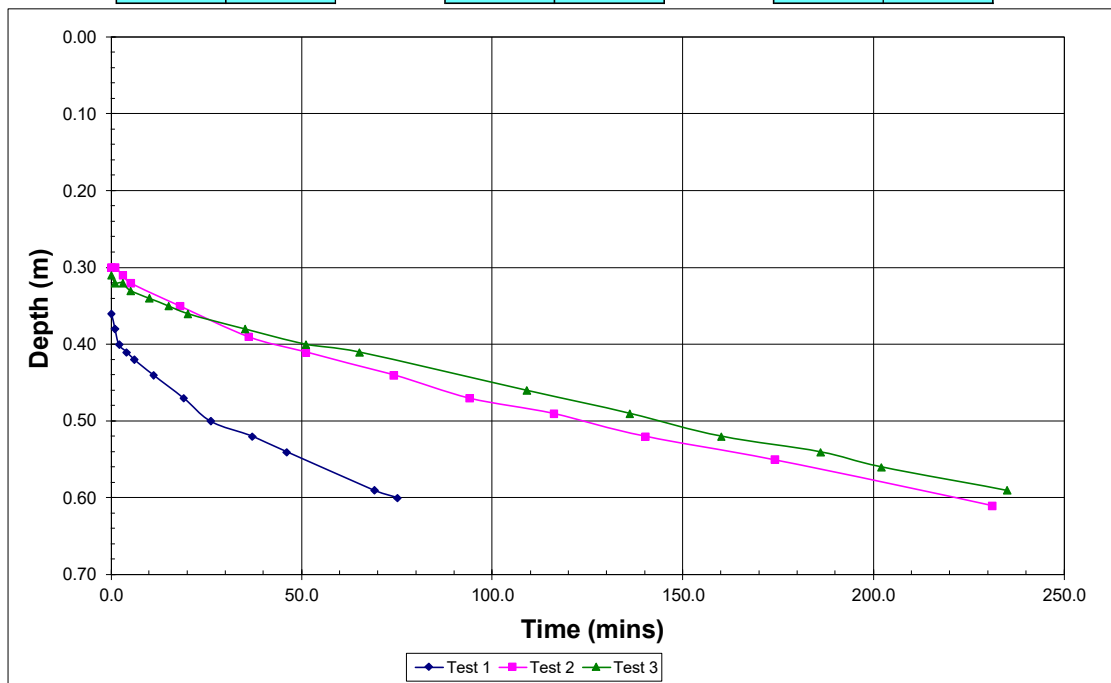
 Geo-Environmental	Soakaway Test Results (after BRE Digest 365)	Geo-Environmental Services Limited Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net
Project Name : Grays Lane, Hitcham Client : Manor Oak Homes		Job No. : GE20375 Date : 18/10/2021 to 19/10/2021

Pit reference	SA110
Pit depth (m)	0.68
Pit width (m)	0.45
Pit length (m)	2.00
Depth to standing water (m)	

Test 1	
Time (min)	Depth (m)
0.0	0.36
1.0	0.38
2.0	0.40
4.0	0.41
6.0	0.42
11.0	0.44
19.0	0.47
26.0	0.50
37.0	0.52
46.0	0.54
69.0	0.59
75.0	0.60

Test 2	
Time (min)	Depth (m)
0.0	0.30
1.0	0.30
3.0	0.31
5.0	0.32
18.0	0.35
36.0	0.39
51.0	0.41
74.0	0.44
94.0	0.47
116.0	0.49
140.0	0.52
174.0	0.55
231.0	0.61

Test 3	
Time (min)	Depth (m)
0.0	0.31
1.0	0.32
3.0	0.32
5.0	0.33
10.0	0.34
15.0	0.35
20.0	0.36
35.0	0.38
51.0	0.40
65.0	0.41
109.0	0.46
136.0	0.49
160.0	0.52
186.0	0.54
202.0	0.56
235.0	0.59



Max. depth (m)	0.68	66.00	0.61
Effective depth (m)	0.32	0.38	0.37
75% effective depth (m)	0.44	0.40	0.40
50% effective depth (m)	0.52	0.49	0.50
25% effective depth (m)	0.60	0.59	0.59
t75 (min)	11.00	45.00	51.00
t50 (min)	37.00	116.00	150.00
t25 (min)	75.00	220.00	235.00
Vp 75-25	0.14	0.17	0.17
ap 50	1.684	1.831	1.8065
tp 75-25	64.00	175.00	184.00

Soil infiltration rate (m/s)	2.2E-05	8.9E-06	8.3E-06
Soil infiltration rate (mm/hr)	8.02E+01	3.20E+01	3.01E+01

Your Ref:
Our Ref: CRM.1027.218.GE.R.002.A

Date: 27 May 2025
Email: steve.rhodes@enzygo.com

Leigh Hyam
Hill
The Power House,
Gunpowder Mill,
Powdermill Lane,
Waltham Abbey,
EN9 1BN

By Email: LeighHyam@hill.co.uk

Dear Leigh

RE Gray's Lane Hitchen SG5 2HW

Enzygo Geoenvironmental Ltd undertook additional soakaway testing at the above named site.

Site Works

Soakaway testing was undertaken between 20th and 23rd May 2025 comprising six soakaway test locations (SA1 to SA6), the locations of which are shown on the attached site plan. The soakaways were located within the area of the proposed soil infiltration.

Soakaway pits were excavated into the more granular soils where it was hoped that soil infiltration would be better. Previous ground investigations have shown that the Glaciofluvial Deposits become more clayey with depth.

Soakaway tests were undertaken over several days with the final measurement being undertaken on the following morning such that the soakaways could drain overnight.

During the testing the soakaway pits were fenced off using Heras fencing to make them safe.

All of the tests were undertaken within the Glaciofluvial Deposits.

Soakaway pit records and logs are attached. Soakaway results are summarised on the table below:

Soakaway Results

Soakaway Test	Depth (m)	Test No	Soil Infiltration Rate (m/s)	Notes
SA1	1.1	Test 1	3.08 E ⁻⁵	
		Test 2	1.6 E ⁻⁵	
		Test 3	1.25 E ⁻⁵	
SA2	1.6	Test 1	1.70 E ⁻⁶	
		Test 2	8.40 E ⁻⁷	
		Test 3	7.10 E ⁻⁷	
SA3	1.6	Test 1	8.11 E ⁻⁷	Extrapolated
		Test 2	7.20 E ⁻⁷	Extrapolated
		Test 3	6.12 E ⁻⁷	Extrapolated
SA4	1.5	Test 1	8.60 E ⁻⁷	Extrapolated
		Test 2	6.10 E ⁻⁷	Extrapolated
SA5	1.35	Test 1	1.69 E ⁻⁵	
		Test 2	7.0 E ⁻⁶	
		Test 3	6.5 E ⁻⁶	
SA6	1.4	Test 1	8.13 E ⁻⁷	Extrapolated

		Test 2	Insufficient Soakage
--	--	--------	----------------------

Due to poor soakage some of the results had to be extrapolated.

We hope that this satisfies your current requirements.

Yours sincerely,

For and on behalf of Enzygo



Steve Rhodes BSc(hon) MSc DIC CEng CGeol MIMMM MEnvSc FGS

Director

Enzygo Geoenvironmental Ltd



KEY:

- Site Boundary
- Soak Away Pits (SA01-SA06)
- Trial Pits (TP01-TP07)

NOTES:

ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS AND DOCUMENTS ASSOCIATED WITH THIS PROJECT.

ALL EXISTING AND PROPOSED DIMENSIONS, LEVELS AND LOCATIONS TO BE CHECKED AND VERIFIED BY THE MAIN CONTRACTOR ON SITE PRIOR TO THE COMMENCEMENT OF THE WORKS AND ANY ANOMALIES REPORTED TO THE ENGINEER.

P01	27/05/25	Issued for comment / approval	SD	SR	SR
Rev	Date	Description	DRA	CHK	APP

Project
Gray's Lane, Hitchen

Client
Hill Partnership Ltd

Drawing Title
Site Plan

Scale NTS @ A3	Date 27/05/25	Status Preliminary
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DWG No. CRM1027218-ENZ-XX-XX-DR-G-0001	Revision P01
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Bristol
01454 269 237

Manchester
0161 413 6444

Sheffield
0114 321 5151

Cardiff
02920 023 700

Cambridge
01799 542 473

Belfast
07377673948

@enzygo
enzygo.com
hello@enzygo.com

Results



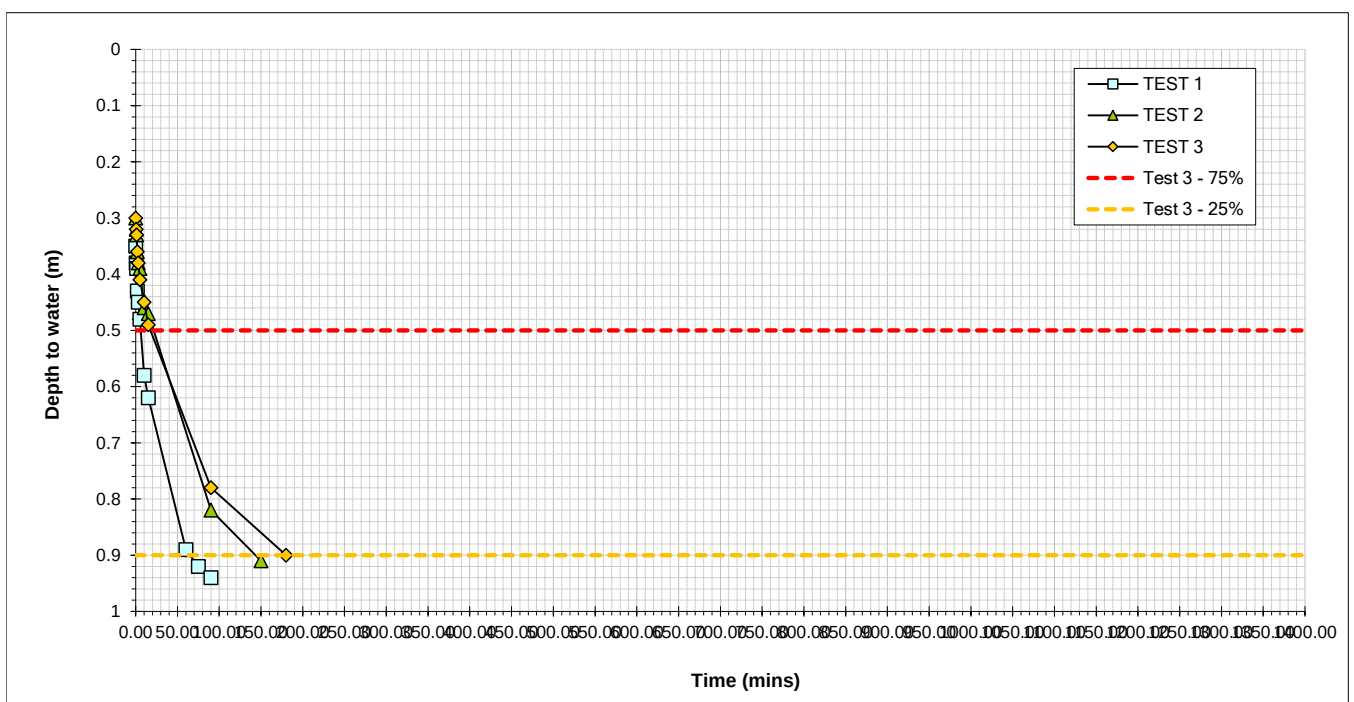
Site..... Grays Lane Hitchin
Job Number..... CRM.1027.218
Date of Test..... 21 to 23 May 2025

Soakaway Number..... SA1
Length..... 1.20 m
Width..... 0.50 m
Depth..... 1.10 m
Groundwater Level..... Dry m

SOIL INFILTRATION RATE TEST
See B.R.E. Digest 365, 1991, Soakaway Design.

		TEST 1		TEST 2		TEST 3	
		Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
		0.0	0.35	0.0	0.30	0.0	0.30
		0.5	0.38	0.5	0.32	0.5	0.32
		1.0	0.39	1.0	0.33	1.0	0.33
		2.0	0.43	2.0	0.36	2.0	0.36
		3.0	0.45	3.0	0.38	3.0	0.38
		5.0	0.48	5.0	0.39	5.0	0.41
		10.0	0.58	10.0	0.46	10.0	0.45
		15.0	0.62	15.0	0.47	15.0	0.49
		60.0	0.89	90.0	0.82	90.0	0.78
		75.0	0.92	150.0	0.91	180.0	0.90
		90.0	0.94				
Effective Storage Depth	m		0.75		0.80		0.80
75% Effective Storage Depth	m		0.56		0.60		0.60
(i.e. depth below GL)	m		0.54		0.50		0.50
25% Effective Storage Depth	m		0.19		0.20		0.20
(i.e. depth below GL)	m		0.91		0.90		0.90
Effective Storage Depth 75%-25%	m		0.38		0.40		0.40
Time to fall to 75% effective depth	mins		8.00		20.00		17.00
Time to fall to 25% effective depth	mins		73.00		145.00		180.00
V (75%-25%)	m3		0.23		0.24		0.24
a (50%)	m2		1.88		1.96		1.96
t (75%-25%)	mins		65.00		125.00		163.00
SOIL INFILTRATION RATE	m/s		3.08E-05		1.6E-05		1.3E-05

DESIGN SOIL INFILTRATION RATE, f **1.25E-05** m/s



Compiled By:	Date:	Checked By:	Date:	Approved By:	Date:
G.Parr	16.12.21	R.Hamilton	16.12.21	S.Rhodes	16.12.21



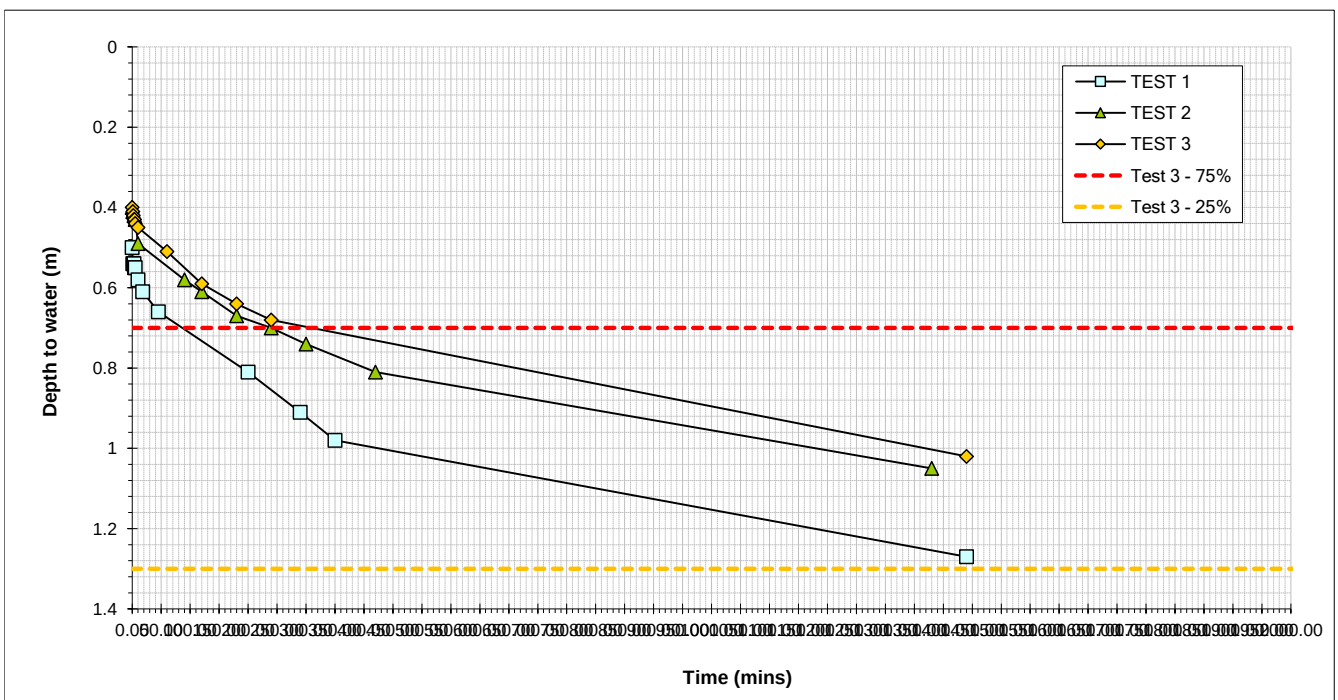
Site..... Grays Lane Hitchin
Job Number..... CRM.1027.218
Date of Test..... 21 to 23 May 2025

Soakaway Number..... SA2
Length..... 1.30 m
Width..... 0.50 m
Depth..... 1.60 m
Groundwater Level..... Dry m

SOIL INFILTRATION RATE TEST
See B.R.E. Digest 365, 1991, Soakaway Design.

		TEST 1		TEST 2		TEST 3	
		Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
		0.0	0.50	0.0	0.40	0.0	0.40
		1.0	0.54	1.0	0.41	1.0	0.41
		2.0	0.54	2.0	0.41	2.0	0.42
		3.0	0.54	3.0	0.42	3.0	0.43
		4.0	0.55	4.0	0.42	4.0	0.43
		5.0	0.55	5.0	0.43	5.0	0.44
		10.0	0.58	10.0	0.49	10.0	0.45
		18.0	0.61	90.0	0.58	60.0	0.51
		45.0	0.66	120.0	0.61	120.0	0.59
		200.0	0.81	180.0	0.67	180.0	0.64
		290.0	0.91	240.0	0.70	240.0	0.68
		350.0	0.98	300.0	0.74	1440.0	1.02
		1440.0	1.27	420.0	0.81	0.0	0.00
		0.0	0.00	1380.0	1.05	0.0	0.00
		0.0					
		0.0					
Effective Storage Depth	m		1.10		1.20		1.20
75% Effective Storage Depth	m		0.83		0.90		0.90
(i.e. depth below GL)	m		0.78		0.70		0.70
25% Effective Storage Depth	m		0.28		0.30		0.30
(i.e. depth below GL)	m		1.33		1.30		1.30
Effective Storage Depth 75%-25%	m		0.55		0.60		0.60
Time to fall to 75% effective depth	mins		170.00		240.00		240.00
Time to fall to 25% effective depth	mins		1500.00		3000.00		3500.00
V (75%-25%)	m3		0.36		0.39		0.39
a (50%)	m2		2.63		2.81		2.81
t (75%-25%)	mins		1330.00		2760.00		3260.00
SOIL INFILTRATION RATE	m/s		1.70E-06		8.4E-07		7.1E-07

DESIGN SOIL INFILTRATION RATE, f **7.10E-07** **m/s**



Compiled By:	Date:	Checked By:	Date:	Approved By:	Date:
G.Parr	16.12.21	R.Hamilton	16.12.21	S.Rhodes	16.12.21



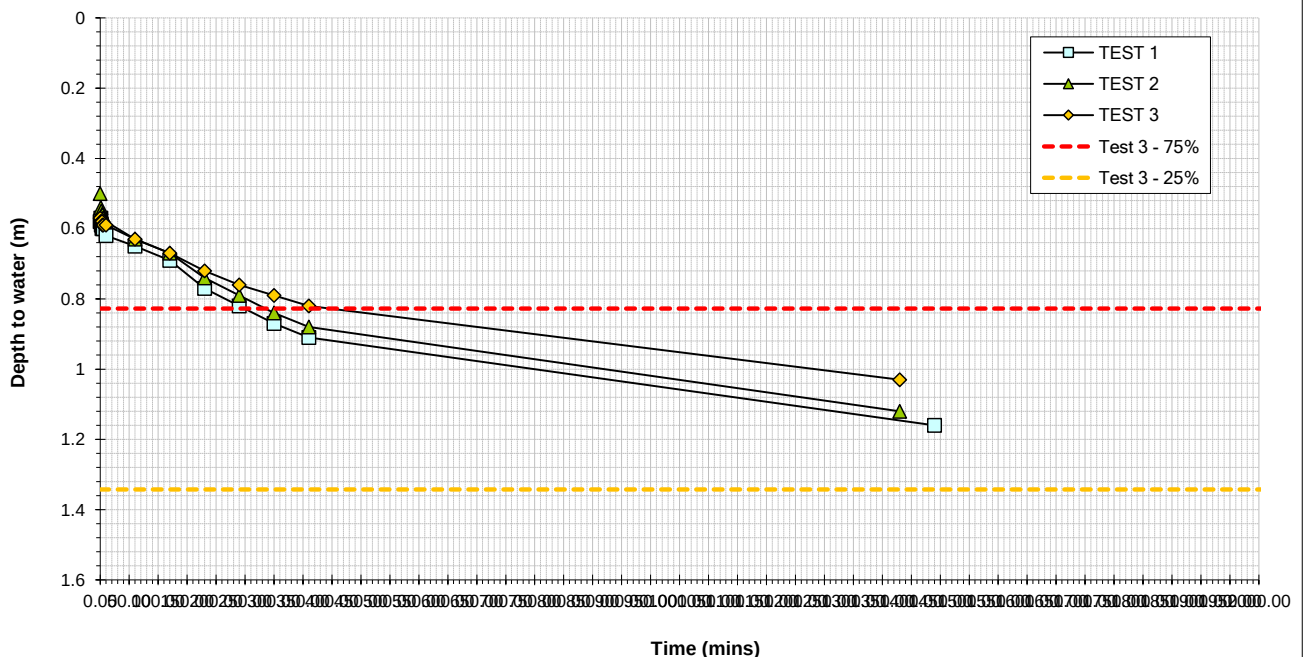
Site..... Grays Lane Hitchin
Job Number..... CRM.1027.218
Date of Test..... 21 to 23 May 2025

Soakaway Number..... SA3
Length..... 1.30 m
Width..... 0.50 m
Depth..... 1.60 m
Groundwater Level..... Dry m

SOIL INFILTRATION RATE TEST
See B.R.E. Digest 365, 1991, Soakaway Design.

		TEST 1		TEST 2		TEST 3	
		Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
		0.0	0.58	0.0	0.50	0.0	0.57
		1.0	0.57	1.0	0.54	1.0	0.58
		2.0	0.59	2.0	0.55	2.0	0.58
		3.0	0.60	3.0	0.56	3.0	0.58
		4.0	0.60	4.0	0.56	4.0	0.59
		5.0	0.60	5.0	0.57	5.0	0.59
		10.0	0.62	10.0	0.58	10.0	0.59
		60.0	0.65	60.0	0.63	60.0	0.63
		120.0	0.69	120.0	0.67	120.0	0.67
		180.0	0.77	180.0	0.74	180.0	0.72
		240.0	0.82	240.0	0.79	240.0	0.76
		300.0	0.87	300.0	0.84	300.0	0.79
		360.0	0.91	360.0	0.88	360.0	0.82
		1440.0	1.16	1380.0	1.12	1380.0	1.03
		0.0		0.0	0.00	0.0	0.00
		0.0		0.0	0.00		
Effective Storage Depth	m		1.02		1.10		1.03
75% Effective Storage Depth	m		0.77		0.83		0.77
(i.e. depth below GL)	m		0.84		0.78		0.83
25% Effective Storage Depth	m		0.26		0.28		0.26
(i.e. depth below GL)	m		1.35		1.33		1.34
Effective Storage Depth 75%-25%	m		0.51		0.55		0.52
Time to fall to 75% effective depth	mins		260.00		240.00		360.00
Time to fall to 25% effective depth	mins		3000.00		3400.00		4000.00
V (75%-25%)	m3		0.33		0.36		0.33
a (50%)	m2		2.49		2.63		2.50
t (75%-25%)	mins		2740.00		3160.00		3640.00
SOIL INFILTRATION RATE	m/s		8.11E-07		7.2E-07		6.1E-07

DESIGN SOIL INFILTRATION RATE, f **6.12E-07** **m/s**



Compiled By:	Date:	Checked By:	Date:	Approved By:	Date:
G.Parr	16.12.21	R.Hamilton	16.12.21	S.Rhodes	16.12.21



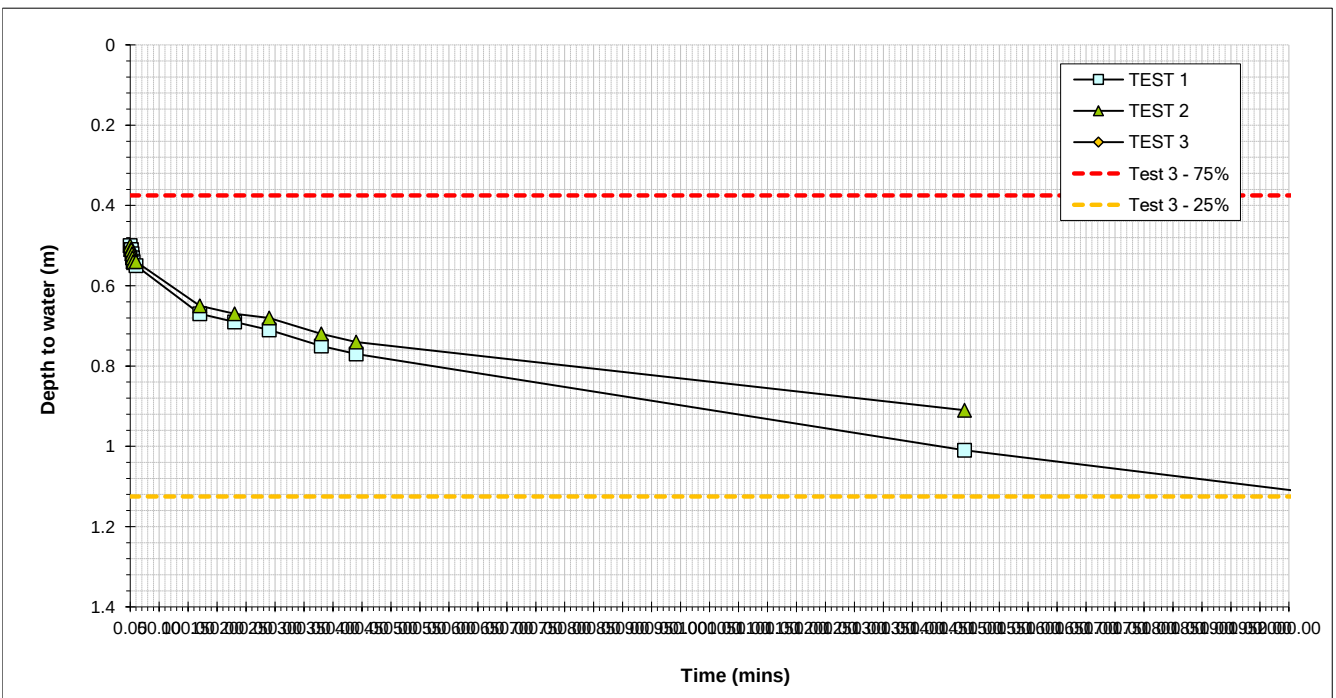
Site..... Grays Lane Hitchin
Job Number..... CRM.1027.218
Date of Test..... 21 to 23 May 2025

Soakaway Number..... SA4
Length..... 1.30 m
Width..... 0.50 m
Depth..... 1.50 m
Groundwater Level..... Dry m

SOIL INFILTRATION RATE TEST
See B.R.E. Digest 365, 1991, Soakaway Design.

		TEST 1		TEST 2		TEST 3	
		Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
		0.0	0.50	0.0	0.50	0.0	0.00
		1.0	0.51	1.0	0.51	0.5	0.00
		2.0	0.51	2.0	0.51	1.0	0.00
		3.0	0.52	3.0	0.52	2.0	0.00
		4.0	0.53	4.0	0.53	3.0	0.00
		5.0	0.54	5.0	0.54	5.0	0.00
		10.0	0.55	10.0	0.54	10.0	0.00
		120.0	0.67	120.0	0.65	15.0	0.00
		180.0	0.69	180.0	0.67	90.0	0.00
		240.0	0.71	240.0	0.68	180.0	0.00
		330.0	0.75	330.0	0.72	0.0	0.00
		390.0	0.77	390.0	0.74	0.0	0.00
		1440.0	1.01	1440.0	0.91	0.0	0.00
		2800.0	1.25	0.0	0.00	0.0	0.00
		0.0	0.00	0.0	0.00	0.0	0.00
		0.0	0.00	0.0	0.00	0.0	0.00
Effective Storage Depth	m	1.00		1.00		1.50	
75% Effective Storage Depth	m	0.75		0.75		1.13	
(i.e. depth below GL)	m	0.75		0.75		0.38	
25% Effective Storage Depth	m	0.25		0.25		0.38	
(i.e. depth below GL)	m	1.25		1.25		1.13	
Effective Storage Depth 75%-25%	m	0.50		0.50		0.75	
Time to fall to 75% effective depth	mins	330.00		400.00			
Time to fall to 25% effective depth	mins	2900.00		4000.00			
V (75%-25%)	m3	0.33		0.33		0.49	
a (50%)	m2	2.45		2.45		3.35	
t (75%-25%)	mins	2570.00		3600.00		0.00	
SOIL INFILTRATION RATE	m/s	8.60E-07		6.1E-07		#DIV/0!	

DESIGN SOIL INFILTRATION RATE, f #DIV/0! m/s



Compiled By:	Date:	Checked By:	Date:	Approved By:	Date:
G.Parr	16.12.21	R.Hamilton	16.12.21	S.Rhodes	16.12.21



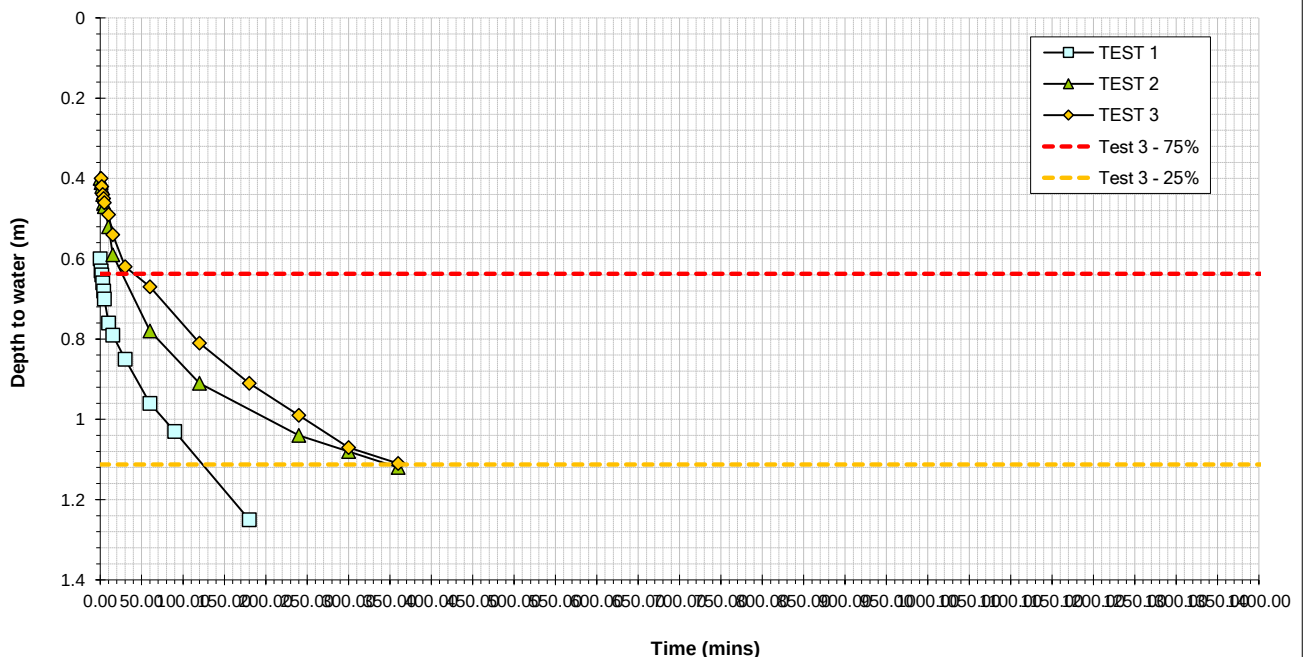
Site..... Grays Lane Hitchin
Job Number..... CRM.1027.218
Date of Test..... 21 to 23 May 2025

Soakaway Number..... SA5
Length..... 1.20 m
Width..... 0.50 m
Depth..... 1.35 m
Groundwater Level..... Dry m

SOIL INFILTRATION RATE TEST
See B.R.E. Digest 365, 1991, Soakaway Design.

		TEST 1		TEST 2		TEST 3	
		Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
		0.0	0.60	0.0	0.40	1.0	0.40
		1.0	0.63	1.0	0.41	2.0	0.42
		2.0	0.64	2.0	0.42	3.0	0.44
		3.0	0.66	3.0	0.44	4.0	0.45
		4.0	0.68	4.0	0.46	5.0	0.46
		5.0	0.70	5.0	0.47	10.0	0.49
		10.0	0.76	10.0	0.52	15.0	0.54
		15.0	0.79	15.0	0.59	30.0	0.62
		30.0	0.85	60.0	0.78	60.0	0.67
		60.0	0.96	120.0	0.91	120.0	0.81
		90.0	1.03	240.0	1.04	180.0	0.91
		180.0	1.25	300.0	1.08	240.0	0.99
		0.0	0.00	360.0	1.12	300.0	1.07
		0.0	0.00	0.0	0.00	360.0	1.11
		0.0	0.00				
		0.0	0.00				
		0.0	0.00				
Effective Storage Depth	m		0.75		0.95		0.95
75% Effective Storage Depth	m		0.56		0.71		0.71
(i.e. depth below GL)	m		0.79		0.64		0.64
25% Effective Storage Depth	m		0.19		0.24		0.24
(i.e. depth below GL)	m		1.16		1.11		1.11
Effective Storage Depth 75%-25%	m		0.38		0.48		0.48
Time to fall to 75% effective depth	mins		12.00		18.00		30.00
Time to fall to 25% effective depth	mins		130.00		340.00		360.00
V (75%-25%)	m3		0.23		0.29		0.29
a (50%)	m2		1.88		2.22		2.22
t (75%-25%)	mins		118.00		322.00		330.00
SOIL INFILTRATION RATE	m/s		1.69E-05		7E-06		6.5E-06

DESIGN SOIL INFILTRATION RATE, f **6.50E-06** m/s



Compiled By:	Date:	Checked By:	Date:	Approved By:	Date:
G.Parr	16.12.21	R.Hamilton	16.12.21	S.Rhodes	16.12.21



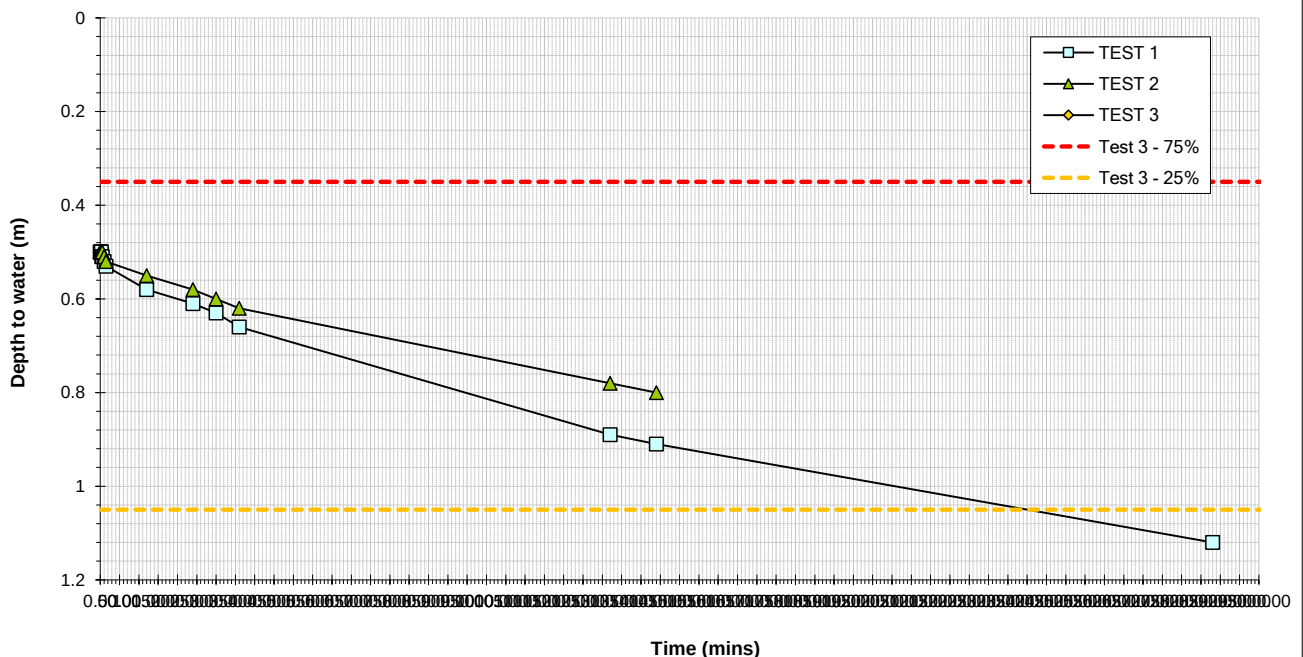
Site..... Grays Lane Hitchin
Job Number..... CRM.1027.218
Date of Test..... 21 to 23 May 2025

Soakaway Number..... SA6
Length..... 1.20 m
Width..... 0.50 m
Depth..... 1.40 m
Groundwater Level..... Dry m

SOIL INFILTRATION RATE TEST
See B.R.E. Digest 365, 1991, Soakaway Design.

		TEST 1		TEST 2		TEST 3	
		Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)	Time(min)	Depth to Water (m)
		0.0	0.50	0.0	0.50	0.0	0.00
		1.0	0.50	1.0	0.50	0.5	0.00
		2.0	0.50	2.0	0.50	1.0	0.00
		3.0	0.50	3.0	0.50	2.0	0.00
		4.0	0.51	4.0	0.50	3.0	0.00
		5.0	0.51	5.0	0.50	5.0	0.00
		10.0	0.52	10.0	0.51	10.0	0.00
		15.0	0.53	15.0	0.52	15.0	0.00
		120.0	0.58	120.0	0.55	90.0	0.00
		240.0	0.61	240.0	0.58	180.0	0.00
		300.0	0.63	300.0	0.60		
		360.0	0.66	360.0	0.62		
		1320.0	0.89	1320.0	0.78		
		1440.0	0.91	1440.0	0.80		
		2880.0	1.12	0.0	0.00		
		0.0					
Effective Storage Depth	m		0.90		0.90		1.40
75% Effective Storage Depth	m		0.68		0.68		1.05
(i.e. depth below GL)	m		0.73		0.73		0.35
25% Effective Storage Depth	m		0.23		0.23		0.35
(i.e. depth below GL)	m		1.18		1.18		1.05
Effective Storage Depth 75%-25%	m		0.45		0.45		0.70
Time to fall to 75% effective depth	mins		900.00				
Time to fall to 25% effective depth	mins		3500.00				
V (75%-25%)	m3		0.27		0.27		0.42
a (50%)	m2		2.13		2.13		2.98
t (75%-25%)	mins		2600.00		0.00		0.00
SOIL INFILTRATION RATE	m/s		8.13E-07		#DIV/0!		#DIV/0!

DESIGN SOIL INFILTRATION RATE, f **#DIV/0!** m/s



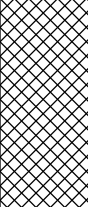
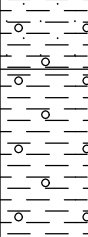
Compiled By:	Date:	Checked By:	Date:	Approved By:	Date:
G.Parr	16.12.21	R.Hamilton	16.12.21	S.Rhodes	16.12.21



Enzygo Ltd
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Web: www.enzygo.com

Site Grays Lane, Hitchin SG5 2HW				TP1
Job No CRM.1027.218	Dates Start 20-05-25 Finish 20-05-25	Ground Level (m)	Co-Ordinates	

Client Hill Partnerships	Sheet 1 of 1
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Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.40 - 0.60	ES					MADE GROUND: Grass over dark brown sandy slightly gravelly CLAY with occasional rootlets. Sand is fine to coarse. Gravel is angular and subrounded fine to medium flint, brick and occasional clinker.	0
	0.80	B		0.70			Soft orangish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to medium flint.	
	1.00	D		1.10			Firm light brown slightly gravelly to gravelly CLAY. Gravel is angular and subrounded fine to coarse flint.	1
				1.70			Firm light brown gravelly CLAY. Gravel is angular and subrounded fine to coarse chalk.	
	2.00	D		2.00			Light brown silty clayey fine to medium SAND.	2
							Trial Pit completed at 2.00m.	
								3
								4
				{4.00}				

General Remarks Dimensions: 1.20x0.50x2.00 1. Machine excavated pit from ground level to 2.00mbgl. 2. Trial pit sides remained vertical and stable. 3. Groundwater was not encountered. 4. On completion, the trial pit was backfilled with arisings.			
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All dimensions in metres Scale 1:25	Logged By BI
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1.1 ENZYGO TP LOG CRM.1027.218 HITCHIN GPJ GINT STD AGS 3.1 ENZYGO GPJ 23/5/25



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Site Grays Lane, Hitchin SG5 2HW						TP2				
Job No CRM.1027.218		Dates Start 20-05-25 Finish 20-05-25		Ground Level (m)				Co-Ordinates		
Client Hill Partnerships						Sheet 1 of 1				
Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description			
	Depth (m)	No/Type	Results							
	0.20 - 0.40	ES		0.50			MADE GROUND: Grass over dark brown gravelly fine to medium SAND with occasional rootlets and glass fragments. Gravel is angular and subrounded fine to medium flint and brick.	0		
	0.55	B					1.10		Orangish brown clayey gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse flint.	1
	1.00	D							Yellowish brown to orangish brown very clayey gravelly fine to coarse SAND with cobbles of flint. Gravel is angular and subrounded fine to coarse flint.	
				1.60			Orangish brown clayey to slightly clayey gravelly fine to coarse SAND with cobbles of flint. Gravel is angular and subrounded fine to coarse flint.	2		
	2.00	D		2.00			Trial Pit completed at 2.00m.			
				{4.00}				4		
General Remarks Dimensions: 1.30x0.50x2.00 1. Machine excavated pit from ground level to 2.00mbgl. 2. Trial pit sides remained vertical and stable. 3. Groundwater was not encountered. 4. On completion, the trial pit was backfilled with arisings.										
All dimensions in metres Scale 1:25						Logged By BI				

1.1 ENZYGO TP LOG CRM.1027.218 HITCHIN GPJ GINT STD AGS 3.1 ENZYGO.GPJ 23/5/25



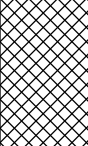
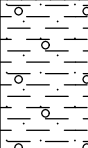
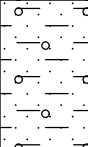
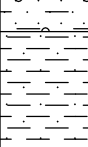
Enzygo Ltd
Tel: 01454 269237
Fax: 01454 269760
Web: www.enzygo.com

Site Grays Lane, Hitchin SG5 2HW						TP3		
Job No CRM.1027.218		Dates Start 20-05-25 Finish 20-05-25		Ground Level (m)				Co-Ordinates
Client Hill Partnerships						Sheet 1 of 1		
Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.10 - 0.30	ES		0.40			MADE GROUND: Grass over dark brown fine to coarse SAND with occasional rootlets.	0
	1.00	D		0.70			Brown sandy GRAVEL. Sand is fine to coarse. Gravel is angular and subrounded fine to coarse flint.	1
				1.70			Soft to firm reddish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to medium flint.	
				2.00			Orangish brown mottled light brown clayey silty fine to coarse SAND.	
				2.00			Trial Pit completed at 2.00m.	2
								3
								4
				{4.00}				
General Remarks Dimensions: 1.30x0.50x2.00 1. Machine excavated pit from ground level to 2.00mbgl. 2. Trial pit sides remained vertical and stable. 3. Groundwater was not encountered. 4. On completion, the trial pit was backfilled with arisings.								
All dimensions in metres Scale 1:25						Logged By BI		

1.1 ENZYGO TP LOG CRM.1027.218 HITCHIN GPJ GINT STD AGS 3.1 ENZYGO GPJ 23/5/25

Site Grays Lane, Hitchin SG5 2HW				TP4
Job No CRM.1027.218	Dates Start 20-05-25 Finish 20-05-25	Ground Level (m)	Co-Ordinates	

Client Hill Partnerships	Sheet 1 of 1
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Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.20 - 0.40	ES					MADE GROUND: Grass over dark brown very gravelly fine to coarse SAND with occasional rootlets. Gravel is angular and subrounded fine to coarse flint, brick, occasional chalk and clinker.	0
	0.55	B		0.50			Firm light brown to orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine flint.	
	1.00	D		1.00			Orangish brown clayey to very clayey slighty gravelly fine to coarse SAND. Gravel is subangular and subrounded fine flint.	1
				1.60			Firm light brown sandy CLAY. Sand is fine to coarse.	
	2.00	D		2.00			Trial Pit completed at 2.00m.	2
				{4.00}				4

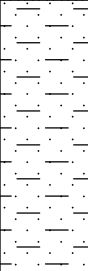
General Remarks

- Dimensions: 1.20x0.50x2.00
1. Machine excavated pit from ground level to 2.00mbgl.
 2. Trial pit sides remained vertical and stable.
 3. Groundwater was not encountered.
 4. On completion, the trial pit was backfilled with arisings.

All dimensions in metres Scale 1:25	Logged By BI
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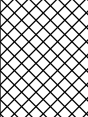
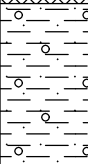
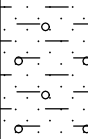
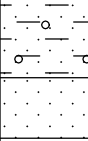
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Site Grays Lane, Hitchin SG5 2HW						TP5		
Job No CRM.1027.218		Dates Start 20-05-25 Finish 20-05-25		Ground Level (m)				Co-Ordinates
Client Hill Partnerships						Sheet 1 of 1		
Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.10 - 0.20	ES		0.30			MADE GROUND: Grass over brown slightly gravelly fine to medium SAND with occasional rootlets. Gravel is subangular and subrounded fine flint, chalk, brick and clinker.	0
	0.50	B					Reddish brown clayey fine to coarse SAND.	1
	1.00	D		1.20				
	2.00	D		2.00			Orangish brown fine to coarse SAND.	2
							Trial Pit completed at 2.00m.	3
								4
				{4.00}				
General Remarks Dimensions: 1.10x0.50x2.00 1. Machine excavated pit from ground level to 2.00mbgl. 2. Trial pit sides remained vertical and stable. 3. Groundwater was not encountered. 4. On completion, the trial pit was backfilled with arisings.								
All dimensions in metres Scale 1:25						Logged By BI		

1.1 ENZYGO TP LOG CRM.1027.218 HITCHIN GPJ GINT STD ACS 3.1 ENZYGO GPJ 23/5/25

Site Grays Lane, Hitchin SG5 2HW				TP6
Job No CRM.1027.218	Dates Start 20-05-25 Finish 20-05-25	Ground Level (m)	Co-Ordinates	

Client Hill Partnerships	Sheet 1 of 1
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Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.10 - 0.30	ES					MADE GROUND: Grass over dark brown slightly clayey slightly gravelly fine to medium SAND with occasional rootlets. Gravel is subangular and rounded fine to medium flint, brick and occasional clinker.	0
	0.50	B		0.40			Soft to firm reddish brown sandy CLAY with rare angular medium flint gravel. Sand is fine to coarse.	
	1.00	D		1.10			Light brown slightly clayey slightly gravelly fine to coarse SAND. Gravel is subangular and rounded fine to medium flint.	1
	2.00	D		2.10				2
				2.30			Light brown and brown fine to coarse SAND.	
							Trial Pit completed at 2.30m.	3
				{4.00}				4

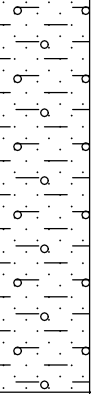
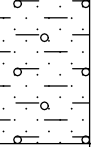
General Remarks

- Dimensions: 1.30x0.50x2.30
1. Machine excavated pit from ground level to 2.30mbgl.
 2. Trial pit sides remained vertical and stable.
 3. Groundwater was not encountered.
 4. On completion, the trial pit was backfilled with arisings.

All dimensions in metres Scale 1:25	Logged By BI
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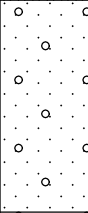
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Site Grays Lane, Hitchin SG5 2HW						TP7		
Job No CRM.1027.218		Dates Start 20-05-25 Finish 20-05-25		Ground Level (m)				Co-Ordinates
Client Hill Partnerships						Sheet 1 of 1		
Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.05 - 0.15	ES		0.20			MADE GROUND: Grass over dark brown fine to coarse SAND with occasional rootlets.	0
	1.00	D		1.50			Reddish brown slightly clayey very gravelly fine to coarse SAND. Gravel is angular and subrounded fine to coarse flint.	1
	2.00	D		2.00			Reddish brown clayey gravelly fine to coarse SAND. Gravel is angular and subrounded fine to coarse flint.	2
				{4.00}			Trial Pit completed at 2.00m.	4
General Remarks Dimensions: 1.40x0.50x2.00 1. Machine excavated pit from ground level to 2.00mbgl. 2. Trial pit sides remained vertical and stable. 3. Groundwater was not encountered. 4. On completion, the trial pit was backfilled with arisings.								
All dimensions in metres Scale 1:25						Logged By BI		

1.1 ENZYGO TP LOG CRM.1027.218 HITCHIN GPJ GINT STD AGS 3.1 ENZYGO GPJ 23/5/25



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Site Grays Lane, Hitchin SG5 2HW						SA1		
Job No CRM.1027.218		Dates Start 21-05-25 Finish 21-05-25		Ground Level (m)				Co-Ordinates
Client Hill Partnerships						Sheet 1 of 1		
Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.10 - 0.20	ES		0.30			MADE GROUND: Grass over dark brown slightly gravelly fine to coarse SAND with occasional rootlets. Gravel is rounded and subrounded fine to medium flint.	0
	1.00	D		1.00 1.10			Orangish brown very gravelly fine to coarse SAND. Gravel is angular and subrounded fine to coarse flint.	1
							Orangish brown slightly clayey very gravelly fine to coarse SAND. Gravel is angular and subrounded fine to coarse flint.	
							Trial Pit completed at 1.10m.	
				{4.00}				2
								3
								4
General Remarks Dimensions: 1.20x0.50x1.10 1. Machine excavated pit from ground level to 1.10mbgl. 2. Trial pit sides remained vertical and stable. 3. Groundwater was not encountered. 4. On completion, the trial pit was backfilled with arisings.								
All dimensions in metres Scale 1:25						Logged By BI		

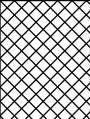
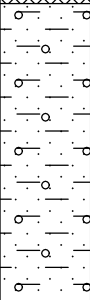
1.1 ENZYGO TP LOG CRM.1027.218 HITCHIN GPJ GINT STD AGS 3.1 ENZYGO GPJ 23/5/25



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Site Grays Lane, Hitchin SG5 2HW				SA2
Job No CRM.1027.218	Dates Start 20-05-25 Finish 20-05-25	Ground Level (m)	Co-Ordinates	

Client Hill Partnerships	Sheet 1 of 1
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Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.10 - 0.30	ES		0.40			MADE GROUND: Grass over brown slightly gravelly fine to medium SAND with occasional rootlets. Gravel is subangular and subrounded fine to medium flint.	0
	0.50	B					Brown clayey gravelly fine to coarse SAND. Gravel is subangular and subrounded fine to coarse flint.	1
	1.00	D					Soft to firm light brown sandy CLAY. Sand is fine to medium.	
				1.60			Trial Pit completed at 1.60m.	2
								3
								4
				{4.00}				

General Remarks Dimensions: 1.30x0.50x1.60 1. Machine excavated pit from ground level to 1.60mbgl. 2. Trial pit sides remained vertical and stable. 3. Groundwater was not encountered. 4. On completion, the trial pit was backfilled with arisings.			
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All dimensions in metres Scale 1:25	Logged By BI
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1.1 ENZYGO TP LOG CRM.1027.218 HITCHIN GPJ GINT STD AGS 3.1 ENZYGO GPJ 23/5/25



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Site Grays Lane, Hitchin SG5 2HW						SA3				
Job No CRM.1027.218		Dates Start 21-05-25 Finish 21-05-25		Ground Level (m)				Co-Ordinates		
Client Hill Partnerships						Sheet 1 of 1				
Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description			
	Depth (m)	No/Type	Results							
	0.30 - 0.50	ES		0.60			MADE GROUND: Grass over dark brown slightly clayey very gravelly fine to coarse SAND with occasional rootlets. Gravel is subangular and subrounded fine to coarse flint, chalk, brick, occasional charcoal and clinker.	0		
	0.65	B							Orangish brown very clayey fine to coarse SAND with rare subangular fine to medium flint gravel.	1
	1.00	D								
				1.50						
							Trial Pit completed at 1.50m.	2		
								3		
								4		
				{4.00}						
General Remarks Dimensions: 1.10x0.50x1.50 1. Machine excavated pit from ground level to 1.50mbgl. 2. Trial pit sides remained vertical and stable. 3. Groundwater was not encountered. 4. On completion, the trial pit was backfilled with arisings.										
All dimensions in metres Scale 1:25						Logged By BI				

1.1 ENZYGO TP LOG CRM.1027.218 HITCHIN GPJ GINT STD AGS 3 1 ENZYGO GPJ 23/5/25

Site

Grays Lane, Hitchin SG5 2HW

SA4

Job No

CRM.1027.218

Dates

Start 20-05-25
Finish 20-05-25

Ground Level (m)

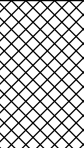
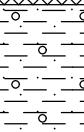
Co-Ordinates

Client

Sheet

1 of 1

Hill Partnerships

Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.30 - 0.40	ES		0.50			MADE GROUND: Grass over dark brown slightly gravelly fine to coarse SAND with occasional rootlets. Gravel is subangular and subrounded fine to medium flint.	0
	0.60	B					Soft to firm orangish brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse flint.	
	1.00	D						
							Soft brown sandy CLAY with rare subangular medium flint gravel. Sand is fine.	
				1.20				1
				1.50				
							Trial Pit completed at 1.50m.	2
								3
								4
				4.00				

General Remarks

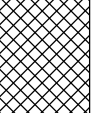
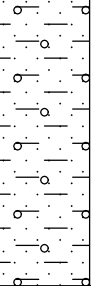
Dimensions: 1.30x0.50x1.50

1. Machine excavated pit from ground level to 1.50mbgl.
2. Trial pit sides remained vertical and stable.
3. Groundwater was not encountered.
4. On completion, the trial pit was backfilled with arisings.

All dimensions in metres
Scale 1:25

Logged By BI

Site Grays Lane, Hitchin SG5 2HW						SA5	
Job No CRM.1027.218		Dates Start 20-05-25 Finish 20-05-25		Ground Level (m)			
Client Hill Partnerships							Sheet 1 of 1

Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description	
	Depth (m)	No/Type	Results					
	0.10 - 0.20	ES		0.40			MADE GROUND: Grass over dark brown slightly gravelly fine to coarse SAND with occasional rootlets. Gravel is subangular and rounded fine to medium flint.	0
	0.50	B					1.35	
								3
				{4.00}				4

General Remarks

Dimensions: 1.20x0.50x1.35

1. Machine excavated pit from ground level to 1.35mbgl.
2. Trial pit sides remained vertical and stable.
3. Groundwater was not encountered.
4. On completion, the trial pit was backfilled with arisings.

All dimensions in metres Scale 1:25		Logged By BI
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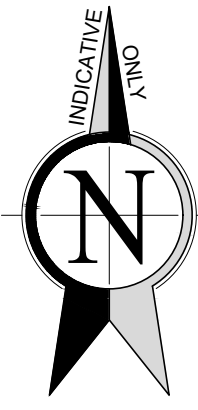


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Site Grays Lane, Hitchin SG5 2HW						SA6				
Job No CRM.1027.218		Dates Start 21-05-25 Finish 21-05-25		Ground Level (m)				Co-Ordinates		
Client Hill Partnerships						Sheet 1 of 1				
Water Levels	Samples & In Situ Testing			Depth (m)	Level (mAD)	Legend	Stratum Description			
	Depth (m)	No/Type	Results							
	0.10 - 0.30	ES		0.50			MADE GROUND: Grass over brown slightly clayey sandy GRAVEL with occasional rootlets. Sand is fine to medium. Gravel is angular and subrounded fine to coarse flint, quartz, marble, chalk, occasional brick and clinker.	0		
	0.55	B							Orangish brown mottled light brown very clayey slightly gravelly fine to coarse SAND. Gravel is subangular and subrounded fine to coarse flint.	
	1.00	D								1
				1.30						
				1.40			Orangish brown clayey gravelly fine to coarse SAND. Gravel is subangular and subrounded fine to coarse flint.			
							Trial Pit completed at 1.40m.			
								2		
								3		
								4		
General Remarks Dimensions: 1.20x0.50x1.40 1. Machine excavated pit from ground level to 1.40mbgl. 2. Trial pit sides remained vertical and stable. 3. Groundwater was not encountered. 4. On completion, the trial pit was backfilled with arisings.										
All dimensions in metres Scale 1:25								Logged By BI		

1.1 ENZYGO TP LOG CRM.1027.218 HITCHIN GPJ GINT STD AGS 3.1 ENZYGO GPJ 23/5/25

Appendix C – Drainage Strategy Plans



ADOPTABLE SURFACE WATER MANHOLE SCHEDULES									
REFERENCE	COVER LEVEL	INVERT LEVEL	DEPTH	CHAMBER TYPE	DIA	CHAMBER COVER	EASTING	NORTHING	
S01	92.180	90.680	1.500	C	1200	D400	517384.318	22907.511	
S02	91.930	90.500	1.380	C	1200	D400	517386.163	22908.112	
S03	91.735	90.705	1.030	C	1200	D400	517345.077	229108.805	
S04	91.540	90.470	1.070	C	1200	D400	517342.008	229091.955	
S05	91.635	90.430	1.215	C	1200	D400	517339.405	229075.074	
S06	91.400	89.700	1.810	D400	517385.505	229088.728			
S08	92.200	89.683	2.517	C	1200	D400	517387.296	229084.327	
S09	92.498	89.560	2.938	B	1200	D400	517405.780	229068.285	
S10	92.680	89.480	3.200	A2	1200	D400	517415.690	229094.311	
S11	92.415	89.185	3.230	A2	1200	D400	517443.534	229107.083	
S12	91.725	89.030	2.695	B	1200	D400	517462.953	229142.784	
S13	91.100	88.995	2.205	B	1200	D400	517480.248	229162.592	
S14	90.625	88.715	1.910	B	1200	D400	517505.377	229163.866	
S15	92.550	91.125	1.425	B	1200	D400	517443.629	229151.512	
S16	92.200	90.775	1.425	C	1200	D400	517451.326	229130.306	
S17	91.625	90.375	1.250	C	1200	D400	517465.366	229142.785	
S18	91.175	89.875	1.300	C	1200	D400	517477.824	229150.646	

ADOPTABLE FOUL WATER MANHOLE SCHEDULES									
REFERENCE	COVER LEVEL	INVERT LEVEL	DEPTH	CHAMBER TYPE	DIA	CHAMBER COVER	EASTING	NORTHING	
F01	91.585	89.825	1.640	B	1200	D400	517348.635	229068.719	
F02	92.285	89.428	2.857	B	1200	D400	517386.396	229066.082	
F03	92.545	89.140	3.405	A2	1200	D400	517406.702	229091.189	
F04	92.745	88.800	3.945	A2	1200	D400	517418.233	229106.426	
F05	92.720	88.850	3.870	A2	1200	D400	517437.831	229124.155	
F06	92.615	89.070	1.545	B	1200	D400	517390.322	229149.971	
F07	92.605	90.260	2.345	B	1200	D400	517422.858	229149.826	
F08	92.475	89.490	2.985	A2	1200	D400	517433.828	229144.295	
F09	92.270	89.755	2.515	A2	1200	D400	517447.590	229130.653	
F10	91.580	88.800	2.780	B	1200	D400	517464.444	229146.999	
F11	91.260	88.525	2.735	B	1200	D400	517474.003	229151.987	
F12	90.630	87.500	3.080	B	1200	D400	517503.840	229165.836	

LEGEND

- APPROXIMATE SITE BOUNDARY
- IMPERMEABLE ROOF AREA
- TYPE A PERMEABLE PAVING
- TYPE C PERMEABLE PAVING WITH CONNECTION TO THE PROPOSED SYSTEM
- IMPERMEABLE PAVING
- IMPERMEABLE ASPHALT CARRIAGEWAY
- IMPERMEABLE ASPHALT FOOTWAY
- 1.0m WIDE SERVICES ZONE
- SOAKAWAY - AQUACELL ECO OR EQUAL APPROVED
- ATTENUATION TANK - AQUACELL ECO OR EQUAL APPROVED
- PROPOSED SURFACE WATER SEWER
- PROPOSED SURFACE WATER DRAINAGE 1000 @ 1100 MIN. UNLESS NOTED OTHERWISE
- PROPOSED FOULED WATER DRAINAGE 1000 @ 180 MIN. UNLESS NOTED OTHERWISE
- PROPOSED FOULED WATER SEWER
- PROPOSED THRESHOLD DRAIN OR EQUAL APPROVED U.N.O.
- EXISTING FOULED WATER SEWER
- EXISTING SURFACE WATER SEWER
- ROAD GULLY

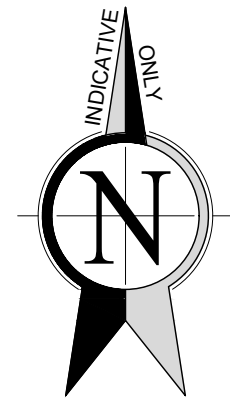
- SOAKAWAY SA05
BASE LEVEL 90.700m
SOFT LEVEL 91.100m
3m x 2.5m PLAN AREA = 7.5m²
0.8m DEEP
- SOAKAWAY SA04
BASE LEVEL 90.700m
SOFT LEVEL 91.100m
3m x 2.5m PLAN AREA = 7.5m²
0.8m DEEP
- SOAKAWAY SA03
BASE LEVEL 90.700m
SOFT LEVEL 91.100m
3m x 2.5m PLAN AREA = 7.5m²
0.8m DEEP
- SOAKAWAY SA02
BASE LEVEL 90.700m
SOFT LEVEL 91.100m
3m x 2.5m PLAN AREA = 7.5m²
0.8m DEEP
- SOAKAWAY SA01
BASE LEVEL 90.700m
SOFT LEVEL 91.100m
3m x 2.5m PLAN AREA = 7.5m²
0.8m DEEP
- CONSTRUCT NEW FOULED WATER MANHOLE ON EXISTING LATERAL FROM ADJACENT LUCAS LANE SITE
- CONSTRUCT NEW SURFACE WATER MANHOLE ON EXISTING LATERAL FROM ADJACENT LUCAS LANE SITE
- GULLIES AND OUTFALL FROM S278 WORKS
- INFILTRATION BASIN 20m² x 1.0m DEEP BASE AREA 15m²

PRIVATE SURFACE WATER CHAMBER SCHEDULES

REFERENCE	COVER LEVEL	INVERT LEVEL	DEPTH	CHAMBER TYPE	DIA	CHAMBER COVER
PS001	91.275	90.825	0.450	RODDING EYE	UC	0.450 C
PS002	91.450	90.450	1.000	UC	0.450 B	
PS003	91.400	90.500	1.000	UC	0.450 B	
PS004	91.425	90.825	0.600	RODDING EYE	UC	0.450 A
PS005	91.425	90.700	0.725	ST	0.500 E	
PS007	92.475	92.025	0.450	RODDING EYE	UC	0.450 B
PS008	92.400	91.950	0.450	RODDING EYE	UC	0.450 B
PS009	92.425	91.865	0.560	UC	0.450 B	
PS010	92.350	91.900	0.450	UC	0.450 B	
PS011	92.500	91.810	0.690	UC	0.450 B	
PS012	92.525	91.525	1.000	UC	0.450 C	
PS013	92.525	91.405	1.120	ST	0.500 E	
PS014	92.525	91.525	1.000	UC	0.450 C	
PS015	92.530	91.405	1.125	ST	0.500 E	
PS016	92.650	91.650	1.000	UC	0.450 C	
PS017	92.665	91.530	1.135	ST	0.500 E	
PS018	92.650	91.650	1.000	UC	0.450 C	
PS019	92.665	91.540	1.125	ST	0.500 E	
PS020	92.675	92.075	0.600	UC	0.450 B	
PS021	92.530	92.180	0.450	UC	0.450 C	
PS022	92.550	92.080	0.470	UC	0.450 C	
PS023	92.675	92.225	0.450	RODDING EYE	UC	0.450 B
PS024	92.640	92.140	0.500	UC	0.450 B	
PS025	92.660	92.035	0.625	UC	0.450 B	
PS026	92.625	92.175	0.450	RODDING EYE	UC	0.450 B
PS027	92.610	92.090	0.520	UC	0.450 B	
PS028	92.600	91.980	0.620	UC	0.450 B	
PS029	92.550	92.100	0.450	RODDING EYE	UC	0.450 B
PS030	92.500	91.975	0.525	UC	0.450 B	
PS031	92.525	91.925	0.600	UC	0.450 C	
PS032	92.530	91.980	0.450	RODDING EYE	UC	0.450 B
PS033	92.430	91.980	0.450	UC	0.450 B	
PS034	92.300	91.850	0.450	UC	0.450 B	
PS035	92.450	91.740	0.710	UC	0.500 C	
PS036	91.625	91.175	0.450	UC	0.450 B	
PS037	92.875	92.175	0.700	UC	0.450 C	
PS038	92.950	92.085	0.865	UC	0.450 B	
PS039	92.875	92.175	0.700	UC	0.450 C	
PS040	92.875	91.665	0.965	UC	0.500 F	
PS041	92.800	92.100	0.700	UC	0.450 C	
PS042	92.800	91.900	0.900	UC	0.450 C	
PS043	92.375	91.915	0.460	UC	0.450 C	
PS044	92.800	91.800	1.000	UC	0.450 C	
PS045	92.780	91.690	1.090	UC	0.450 B	
PS046	92.800	91.800	1.000	UC	0.450 C	
PS047	92.790	91.685	1.105	UC	0.450 B	
PS048	92.350	91.500	0.850	UC	0.450 B	
PS049	92.250	91.250	1.000	UC	0.450 B	
PS050	92.400	91.950	0.450	RODDING EYE	UC	0.450 B
PS051	92.250	91.250	1.000	UC	0.450 C	
PS052	92.200	91.950	1.105	UC	0.450 C	
PS053	92.250	91.800	0.450	RODDING EYE	UC	0.450 B
PS054	92.175	91.075	1.100	UC	0.450 B	
PS055	92.180	91.730	0.450	RODDING EYE	UC	0.450 B
PS056	92.175	90.860	1.315	UC	0.450 B	
PS057	91.950	90.820	1.130	UC	0.450 B	
PS058	91.700	91.250	0.550	RODDING EYE	UC	0.450 B
PS059	91.750	91.140	0.610	UC	0.450 B	
PS060	91.725	91.045	0.680	UC	0.450 B	
PS061	91.750	90.920	0.830	UC	0.450 C	
PS062	91.750	91.060	0.690	UC	0.450 B	
PS063	91.750	90.880	0.870	UC	0.450 B	
PS064	91.680	90.805	0.875	UC	0.450 B	
PS065	91.625	91.175	0.450	RODDING EYE	UC	0.450 B
PS066	91.750	91.050	0.700	UC	0.450 B	
PS067	91.525	90.925	0.600	UC	0.450 B	
PS068	91.625	90.690	0.935	UC	0.450 C	
PS069	92.120	91.670	0.450	RODDING EYE	UC	0.450 C
PS070	92.120	91.520	0.600	UC	0.450 B	
PS071	92.120	91.670	0.450	RODDING EYE	UC	0.450 B
PS072	92.015	91.015	1.000	UC	0.450 B	
PS073	92.500	92.000	0.500	RODDING EYE	UC	0.450 B
PS074	92.275	91.675	0.600	UC	0.450 B	
PS075	92.325	91.875	0.450	RODDING EYE	UC	0.450 B
PS076	92.250	91.250	1.000	UC	0.450 B	
PS077	92.475	91.575	0.900	UC	0.450 B	
PS078	92.450	91.450	1.000	UC	0.450 C	
PS079	92.325	91.325	1.000	UC	0.450 C	
PS080	92.175	91.175	1.000	UC	0.450 C	
PS081	92.800	92.400	0.400	RODDING EYE	UC	0.450 B
PS082	92.800	92.335	0.465	UC	0.450 B	
PS083	92.800	92.215	0.645	UC	0.450 B	
PS084	92.875	92.120	0.755	UC	0.450 C	
PS085	92.850	92.400	0.450	UC	0.450 C	
PS086	92.715	92.365	0.350	UC	0.450 C	
PS087	92.875	92.425	0.450	UC	0.450 B	
PS088	92.900	92.330	0.570	UC	0.450 B	
PS089	92.975	92.525	0.450	UC	0.450 B	
PS090	92.850	92.500	0.450	UC	0.450 B	
PS091	92.800	92.350	0.450	UC	0.450 B	
PS092	92.625	92.175	0.450	RODDING EYE	UC	0.450 B
PS093	92.640	92.090	0.550	UC	0.450 B	
PS094	92.525	92.075	0.450	RODDING EYE	UC	0.450 B
PS095	92.550	91.950	0.600	UC	0.450 B	
PS096	92.400	91.950	0.450	RODDING EYE	UC	0.450 C
PS097	92.400	91.765	0.635	UC	0.450 B	
PS098	92.400	91.660	0.740	UC	0.450 B	
PS099	92.000	91.600	0.400	RODDING EYE	UC	0.450 B
PS100	91.800	91.450	0.450	UC	0.450 B	
PS101	92.025	91.975	0.450	UC	0.450 C	
PS102	92.100	91.650	0.450	UC	0.450 B	
PS103	92.100	91.650	0.450	UC	0.450 B	
PS104	92.415	91.960	0.425	RODDING EYE	UC	0.450 B
PS105	92.275	91.825	0.450	RODDING EYE	UC	0.450 B
PS106	92.400	91.700	0.700	UC	0.450 B	
PS107	92.425	91.975	0.450	RODDING EYE	UC	0.450 C
PS108	92.520	91.900	0.620	UC	0.450 C	
PS109	91.275	90.825	0.450	RODDING EYE	UC	0.450 B
PS110	91.375	90.375	1.000	UC	0.450 B	
PS111	91.280	90.260	0.985	UC	0.450 C	
PS112	91.300	90.160	1.140	UC	0.450 C	
PS113	91.280	90.830	0.450	RODDING EYE	UC	0.450 B
PS114	91.280	90.740	0.540	UC	0.450 B	
PS115	91.280	90.740	0.540	UC	0.450 B	
PS116	91.360	90.910	0.450	RODDING EYE	UC	0.450 B
PS117	91.360	90.815	0.545	UC	0.450 B	
PS118	91.330	90.850	0.480	UC	0.450 B	

PRIVATE FOUL WATER CHAMBER SCHEDULES

REFERENCE	COVER LEVEL	INVERT LEVEL	DEPTH	CHAMBER TYPE	DIA	CHAMBER COVER
PF001	91.250	90.255	0.995	UC	0.450 B	



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- KEY**
- SITE BOUNDARY
 - TOTAL INFILTRATION PERMEABLE PAVING (TYPE A SYSTEM)
 - AREA DRAINING TO PERMEABLE PAVING SYSTEM TYPE A
 - AREA DRAINING TO INFILTRATION BASIN
 - AREA DRAINING TO LOCAL SOAKAWAY
 - GEO-ENVIRONMENTAL INFILTRATION TEST
 - ENZYGO INFILTRATION TEST

P01	INITIAL ISSUE	12.03.26	BJL	PDC
REV	DESCRIPTION	DATE	BY	AUTH



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CLIENT
HILL PARTNERSHIPS LTD
WALTHAM ABBEY

PROJECT
GRAYS LANE
HITCHIN

TITLE
CATCHMENT AREA PLAN

DRAWN	AUTHORISED	DATE	SCALE AT A1
BJL	PDC	MAR'26	1:500
SUITABILITY S2 - INFORMATION			
PROJECT NO.	DRAWING FIELD.	DRAWING NO.	REV
LGH	ROS-GRA-XX-D-C	01110	P01

CONTRIBUTING AREAS PLAN								
MH REF	PIPE NO.	HIGHWAY (m²)	ROOF AREA (m²)	10% URBAN CREEP (m²)	DRIVEWAY (m²)	GARAGES (m²)	BASIN (m²)	TOTAL (Ha)
S01	1.001	318.116	406.845	40.685	109.817	0	0	0.088
S02	1.002	0	328	32.800	204	0	0	0.056
S03	2.000	0	143.251	14.325	75.678	0	0	0.023
S04	1.003	616.712	0	0.000	0	0	0	0.062
S05	1.004	0	96.394	9.639	51.167	0	0	0.016
S06 (SWALE)	1.005	0	0	0.000	0	0	252.019	0.025
S07	1.006	0	0	0.000	0	0	0	0.000
S08	1.007	0	0	0.000	0	0	0	0.000
S09	1.008	0	0	0.000	0	0	0	0.000
S10	1.009	0	0	0.000	0	0	0	0.000
S11	1.010	0	0	0.000	0	0	0	0.000
S12	1.011	0	0	0.000	0	0	0	0.000
S13	1.012	0	0	0.000	0	0	0	0.000
S14	1.013	0	0	0.000	0	0	0	0.000
S15	1.000	165.716	0	0.000	0	0	0	0.017
S16	1.001	166.261	0	0.000	0	0	0	0.017
S17	1.002	103.816	0	0.000	0	0	0	0.010
S18	1.003	216.566	145	14.500	43.000	0	0	0.042
S19	INF.BASIN	287.323	0	0.000	0	0	303.668	0.059
TOTAL							0.415	



Appendix D – Surface Water Drainage Calculations

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	0.900
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	200.0		

Circular Link Type

Template	Freeform Carrier	Auto Increment (mm)	75
Shape	Circular	Follow Ground	x
Barrels	1		

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
S15	0.017	5.00	92.550	1200	517442.829	229121.512	1.425	91.125
S16	0.017	5.00	92.200	1200	517451.326	229130.306	1.425	90.775
S17	0.010	5.00	91.625	1200	517465.366	229142.785	1.250	90.375
S18	0.042	5.00	91.175	1200	517477.824	229150.646	1.300	89.875
BASIN	0.059		90.250	1200	517493.376	229146.070	1.000	89.250

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S15	S16	12.228	0.600	91.125	90.775	0.350	34.9	225	5.09	169.0
1.001	S16	S17	18.784	0.600	90.775	90.375	0.400	47.0	225	5.26	167.2
1.002	S17	S18	14.731	0.600	90.375	89.875	0.500	29.5	225	5.36	166.1
1.003	S18	BASIN	16.185	0.600	89.875	89.250	0.625	25.9	225	5.46	165.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	2.220	88.3	7.8	1.200	1.200	0.017	0.0	45	1.387
1.001	1.913	76.1	15.4	1.200	1.025	0.034	0.0	68	1.504
1.002	2.419	96.2	19.8	1.025	1.075	0.044	0.0	69	1.915
1.003	2.581	102.6	38.5	1.075	0.775	0.086	0.0	95	2.401

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	0.750	Drain Down Time (mins)	5760	Check Discharge Volume	x
Winter CV	0.840	Additional Storage (m³/ha)	0.0		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	35	0	0
100	40	0	0

Node BASIN Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.04320	Safety Factor	5.0	Invert Level (m)	89.250
Side Inf Coefficient (m/hr)	0.04320	Porosity	1.00	Time to half empty (mins)	2475

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	132.7	132.7	1.000	303.7	311.2

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S15	10	91.150	0.025	2.3	0.0281	0.0000	OK
15 minute winter	S16	10	90.813	0.038	4.5	0.0425	0.0000	OK
15 minute winter	S17	11	90.412	0.037	5.7	0.0420	0.0000	OK
15 minute winter	S18	10	89.932	0.057	11.2	0.0648	0.0000	OK
480 minute winter	BASIN	456	89.418	0.168	2.8	24.8848	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	S15	1.000	S16	2.3	0.679	0.025	0.0410
15 minute winter	S16	1.001	S17	4.4	1.032	0.058	0.0806
15 minute winter	S17	1.002	S18	5.7	0.990	0.060	0.0898
15 minute winter	S18	1.003	BASIN	11.3	2.229	0.110	0.0956
480 minute winter	BASIN	Infiltration		0.4			

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S15	10	91.171	0.046	8.3	0.0523	0.0000	OK
15 minute winter	S16	10	90.849	0.074	16.5	0.0833	0.0000	OK
15 minute winter	S17	10	90.446	0.071	21.2	0.0806	0.0000	OK
15 minute winter	S18	10	89.982	0.107	41.5	0.1206	0.0000	OK
480 minute winter	BASIN	480	89.706	0.456	7.8	78.7057	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	S15	1.000	S16	8.2	0.971	0.093	0.1048
15 minute winter	S16	1.001	S17	16.3	1.480	0.214	0.2071
15 minute winter	S17	1.002	S18	21.0	1.495	0.219	0.2157
15 minute winter	S18	1.003	BASIN	41.6	2.601	0.405	0.3646
480 minute winter	BASIN	Infiltration		0.5			

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S15	10	91.178	0.053	10.9	0.0599	0.0000	OK
15 minute winter	S16	10	90.861	0.086	21.7	0.0969	0.0000	OK
15 minute winter	S17	10	90.457	0.082	27.8	0.0930	0.0000	OK
15 minute winter	S18	10	89.999	0.124	54.2	0.1406	0.0000	OK
600 minute winter	BASIN	600	89.814	0.564	8.3	102.7666	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	S15	1.000	S16	10.8	1.041	0.122	0.1282
15 minute winter	S16	1.001	S17	21.4	1.589	0.282	0.2533
15 minute winter	S17	1.002	S18	27.5	1.599	0.286	0.2622
15 minute winter	S18	1.003	BASIN	54.2	2.662	0.528	0.4441
600 minute winter	BASIN	Infiltration		0.6			

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	0.900
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	200.0		

Circular Link Type

Template	Freeform Carrier	Auto Increment (mm)	75
Shape	Circular	Follow Ground	x
Barrels	1		

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
S15	0.017	5.00	92.550	1200	517442.829	229121.512	1.425	91.125
S16	0.017	5.00	92.200	1200	517451.326	229130.306	1.425	90.775
S17	0.010	5.00	91.625	1200	517465.366	229142.785	1.250	90.375
S18	0.042	5.00	91.175	1200	517477.824	229150.646	1.300	89.875
BASIN	0.059		90.250	1200	517493.376	229146.070	1.000	89.250

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S15	S16	12.228	0.600	91.125	90.775	0.350	34.9	225	5.09	169.0
1.001	S16	S17	18.784	0.600	90.775	90.375	0.400	47.0	225	5.26	167.2
1.002	S17	S18	14.731	0.600	90.375	89.875	0.500	29.5	225	5.36	166.1
1.003	S18	BASIN	16.185	0.600	89.875	89.250	0.625	25.9	225	5.46	165.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	2.220	88.3	7.8	1.200	1.200	0.017	0.0	45	1.387
1.001	1.913	76.1	15.4	1.200	1.025	0.034	0.0	68	1.504
1.002	2.419	96.2	19.8	1.025	1.075	0.044	0.0	69	1.915
1.003	2.581	102.6	38.5	1.075	0.775	0.086	0.0	95	2.401

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x
Rainfall Events	Consecutive	Drain Down Time (mins)	5760
Winter CV	0.840	Additional Storage (m³/ha)	0.0
Additional Area (A %)	0	Starting Level (m)	
Additional Flow (Q %)	0	Check Discharge Rate(s)	x
Analysis Speed	Normal	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Time Offset (mins)	Duration (mins)	Return Period (years)	Climate Change (CC %)	Time Offset (mins)	Duration (mins)	Return Period (years)	Climate Change (CC %)
0	600	100	40	1440		10	35

Node BASIN Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.04320	Safety Factor	5.0	Invert Level (m)	89.250
Side Inf Coefficient (m/hr)	0.04320	Porosity	1.00	Time to half empty (mins)	2475

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	132.7	132.7	1.000	303.7	311.2

Results for Consecutive Rainfall Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600-15	S15	2055	91.155	0.030	3.3	0.0334	0.0000	OK
600-15	S16	2055	90.820	0.045	6.5	0.0512	0.0000	OK
600-15	S17	2055	90.419	0.044	8.3	0.0502	0.0000	OK
600-15	S18	2055	89.935	0.060	16.3	0.0681	0.0000	OK
600-360	BASIN	2400	89.874	0.624	8.3	116.7035	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
600-15	S15	1.000	S16	3.3	0.754	0.037	0.0534
600-15	S16	1.001	S17	6.4	1.149	0.085	0.1051
600-15	S17	1.002	S18	8.2	1.178	0.085	0.1034
600-15	S18	1.003	BASIN	16.1	1.096	0.157	0.3907
600-360	BASIN	Infiltration		0.6			

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	0.900
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	0.0		

Circular Link Type

Template	Freeform Carrier	Auto Increment (mm)	75
Shape	Circular	Follow Ground	x
Barrels	1		

Available Diameters (mm)

100 | 150

Swale Link Type

Template	Freeform Carrier	Side Slope (1:X)	3.0
Shape	Trapezoidal	Auto Increment (mm)	75
Barrels	1	Follow Ground	x
Height (mm)	500		

Available Diameters (mm)

1000

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
Plot 23 (PP)	0.026	5.00	92.200	450	517387.469	229090.367	0.775	91.425
Plot 36 (PP)	0.019	5.00	92.175	450	517385.890	229081.082	0.840	91.335
S01	0.043	5.00	92.180	1200	517384.318	229087.511	1.500	90.680
Plot 24-25 (PP)	0.028	5.00	91.950	450	517370.776	229095.392	0.739	91.211
Plot 34-35 (PP)	0.028	5.00	91.885	450	517367.363	229084.542	0.785	91.100
S02	0.000	5.00	91.930	1200	517368.163	229089.112	1.380	90.550
Plot 26-27 (PP)	0.023	5.00	91.640	450	517350.593	229109.694	0.548	91.092
S03	0.000	5.00	91.735	1200	517345.077	229108.505	1.030	90.705
S04	0.062	5.00	91.540	1200	517342.058	229091.955	1.070	90.470
Plot 32-33 (PP)	0.016	5.00	91.563	450	517345.007	229077.758	0.735	90.828
S05	0.000	5.00	91.635	1200	517339.405	229075.074	1.215	90.420
HW01	0.025	5.00	91.000		517341.205	229069.183	0.600	90.400
HW02	0.000	5.00	91.000		517392.087	229063.369	1.200	89.800
S06	0.000		91.100	1200	517396.826	229063.533	1.310	89.790
S08	0.000	5.00	92.390	1200	517398.320	229086.735	2.707	89.683
S09	0.000		92.496	1200	517405.760	229088.265	2.936	89.560
S10	0.000		92.680	1200	517415.890	229094.311	3.200	89.480
S11	0.000		92.415	1200	517445.934	229127.093	3.230	89.185
S12	0.000		91.725	1200	517462.953	229142.784	2.695	89.030
S13	0.000		91.100	1200	517480.248	229153.592	2.205	88.895
S14	0.000		90.625	1200	517505.377	229163.866	1.910	88.715
SW09	0.000		90.460	1800	517515.523	229178.613	1.865	88.595

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	Plot 23 (PP)	S01	4.253	0.600	91.425	90.830	0.595	7.1	150	5.02	0.0
PS3.000	Plot 36 (PP)	S01	6.618	0.600	91.335	90.830	0.505	13.1	150	5.04	0.0
1.001	S01	S02	16.234	0.600	90.680	90.625	0.055	295.2	300	5.34	0.0
2.000	Plot 24-25 (PP)	S02	6.802	0.600	91.211	90.775	0.436	15.6	150	5.04	0.0
PS4.000	Plot 34-35 (PP)	S02	4.639	0.600	91.100	90.775	0.325	14.3	150	5.03	0.0
1.002	S02	S04	26.259	0.600	90.550	90.470	0.080	328.2	375	5.78	0.0
3.000	Plot 26-27 (PP)	S03	5.643	0.600	91.092	90.780	0.312	18.1	150	5.04	0.0
3.001	S03	S04	16.823	0.600	90.705	90.620	0.085	197.9	225	5.34	0.0
1.003	S04	S05	17.088	0.600	90.470	90.420	0.050	341.8	375	6.07	0.0
4.000	Plot 32-33 (PP)	S05	6.212	0.600	90.828	90.645	0.183	33.9	150	5.06	0.0
1.004	S05	HW01	6.160	0.600	90.420	90.400	0.020	308.0	375	6.17	0.0
1.005	HW01	HW02	52.175	0.600	90.400	90.350	0.050	1043.5	1000	6.93	0.0
1.006	HW02	S06	4.742	0.600	89.800	89.790	0.010	474.2	150	7.10	0.0
1.007	S06	S08	23.250	0.600	89.790	89.683	0.107	217.3	150	7.67	0.0
1.009	S08	S09	7.596	0.600	89.683	89.560	0.123	61.8	150	7.77	0.0
1.010	S09	S10	11.797	0.600	89.560	89.480	0.080	147.5	150	8.01	0.0
1.011	S10	S11	44.467	0.600	89.480	89.185	0.295	150.7	150	8.92	0.0
1.012	S11	S12	23.149	0.600	89.185	89.030	0.155	149.3	150	9.39	0.0
1.013	S12	S13	20.394	0.600	89.030	88.895	0.135	151.1	150	9.80	0.0
1.014	S13	S14	27.148	0.600	88.895	88.715	0.180	150.8	150	10.36	0.0
Ex. Lateral	S14	SW09	17.900	0.600	88.715	88.595	0.120	149.2	150	10.72	0.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	3.793	67.0	0.0	0.625	1.200	0.026	0.0	0	0.000
PS3.000	2.797	49.4	0.0	0.690	1.200	0.019	0.0	0	0.000
1.001	0.910	64.3	0.0	1.200	1.005	0.088	0.0	0	0.000
2.000	2.563	45.3	0.0	0.589	1.005	0.028	0.0	0	0.000
PS4.000	2.680	47.4	0.0	0.635	1.005	0.028	0.0	0	0.000
1.002	0.994	109.8	0.0	1.005	0.695	0.144	0.0	0	0.000
3.000	2.379	42.0	0.0	0.398	0.805	0.023	0.0	0	0.000
3.001	0.926	36.8	0.0	0.805	0.695	0.023	0.0	0	0.000
1.003	0.974	107.6	0.0	0.695	0.840	0.229	0.0	0	0.000
4.000	1.733	30.6	0.0	0.585	0.840	0.016	0.0	0	0.000
1.004	1.027	113.4	0.0	0.840	0.225	0.245	0.0	0	0.000
1.005	1.150	1437.6	0.0	0.100	0.150	0.270	0.0	0	0.000
1.006	0.455	8.0	0.0	1.050	1.160	0.270	0.0	0	0.000
1.007	0.678	12.0	0.0	1.160	2.557	0.270	0.0	0	0.000
1.009	1.282	22.7	0.0	2.557	2.786	0.270	0.0	0	0.000
1.010	0.825	14.6	0.0	2.786	3.050	0.270	0.0	0	0.000
1.011	0.816	14.4	0.0	3.050	3.080	0.270	0.0	0	0.000
1.012	0.820	14.5	0.0	3.080	2.545	0.270	0.0	0	0.000
1.013	0.815	14.4	0.0	2.545	2.055	0.270	0.0	0	0.000
1.014	0.816	14.4	0.0	2.055	1.760	0.270	0.0	0	0.000
Ex. Lateral	0.820	14.5	0.0	1.760	1.715	0.270	0.0	0	0.000

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	0.750	Drain Down Time (mins)	5760	Check Discharge Volume	x
Winter CV	0.840	Additional Storage (m³/ha)	0.0		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	35	0	0
100	40	0	0

Node S06 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	89.790	Product Number	CTL-SHE-0062-1800-1100-1800
Design Depth (m)	1.100	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.8	Min Node Diameter (mm)	1200

Node HW02 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	89.800	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	528	Inf Depth (m)	
Safety Factor	3.0	Pit Width (m)	5.000	Number Required	1
Porosity	0.95	Pit Length (m)	53.000		

Node Plot 23 (PP) Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	91.425	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.400
Safety Factor	2.0	Width (m)	3.400	Inf Depth (m)	
Porosity	0.30	Length (m)	10.950		

Node Plot 24-25 (PP) Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	91.211	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.400
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	12.500		

Node Plot 26-27 (PP) Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	91.092	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.400
Safety Factor	2.0	Width (m)	6.100	Inf Depth (m)	
Porosity	0.30	Length (m)	12.275		

Node Plot 32-33 (PP) Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	90.828	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.400
Safety Factor	2.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	10.000		

Node Plot 36 (PP) Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	91.335	Slope (1:X)	47.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.400
Safety Factor	2.0	Width (m)	11.900	Inf Depth (m)	
Porosity	0.30	Length (m)	3.500		

Node Plot 37 (PP) Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.000	Slope (1:X)	54.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.400
Safety Factor	2.0	Width (m)	6.500	Inf Depth (m)	
Porosity	0.30	Length (m)	4.600		

Node Plot 34-35 (PP) Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	91.100	Slope (1:X)	39.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.400
Safety Factor	2.0	Width (m)	7.600	Inf Depth (m)	0.400
Porosity	0.30	Length (m)	5.000		

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	Plot 23 (PP)	10	91.449	0.024	3.5	0.0657	0.0000	OK
15 minute winter	Plot 36 (PP)	10	91.359	0.024	2.5	0.0521	0.0000	OK
15 minute winter	S01	10	90.769	0.089	11.6	0.1001	0.0000	OK
15 minute winter	Plot 24-25 (PP)	11	91.241	0.030	3.7	0.1380	0.0000	OK
15 minute winter	Plot 34-35 (PP)	10	91.130	0.030	3.7	0.0471	0.0000	OK
15 minute winter	S02	11	90.654	0.104	18.5	0.1181	0.0000	OK
15 minute winter	Plot 26-27 (PP)	11	91.120	0.028	3.1	0.1512	0.0000	OK
15 minute winter	S03	11	90.748	0.043	2.9	0.0492	0.0000	OK
15 minute winter	S04	11	90.612	0.142	29.4	0.1601	0.0000	OK
15 minute winter	Plot 32-33 (PP)	11	90.855	0.027	2.1	0.1154	0.0000	OK
15 minute winter	S05	11	90.552	0.132	31.3	0.1493	0.0000	OK
15 minute winter	HW01	12	90.469	0.069	34.2	0.0000	0.0000	OK
360 minute winter	HW02	288	89.947	0.147	6.6	36.8960	0.0000	OK
360 minute winter	S06	288	89.946	0.156	1.5	0.1766	0.0000	SURCHARGED
360 minute winter	S08	288	89.710	0.027	1.5	0.0301	0.0000	OK
360 minute winter	S09	288	89.594	0.034	1.5	0.0381	0.0000	OK
360 minute winter	S10	288	89.513	0.033	1.5	0.0376	0.0000	OK
360 minute winter	S11	288	89.218	0.033	1.5	0.0377	0.0000	OK
360 minute winter	S12	288	89.064	0.034	1.5	0.0380	0.0000	OK
360 minute winter	S13	288	88.928	0.033	1.5	0.0378	0.0000	OK
360 minute winter	S14	288	88.749	0.034	1.5	0.0380	0.0000	OK
360 minute winter	SW09	288	88.628	0.033	1.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	Plot 23 (PP)	1.000	S01	3.4	1.924	0.051	0.0076	
15 minute winter	Plot 36 (PP)	PS3.000	S01	2.4	1.426	0.050	0.0114	
15 minute winter	S01	1.001	S02	11.4	0.703	0.177	0.2635	
15 minute winter	Plot 24-25 (PP)	2.000	S02	3.6	1.489	0.079	0.0163	
15 minute winter	Plot 34-35 (PP)	PS4.000	S02	3.6	1.527	0.077	0.0111	
15 minute winter	S02	1.002	S04	18.7	0.595	0.170	0.8278	
15 minute winter	Plot 26-27 (PP)	3.000	S03	2.9	1.329	0.070	0.0125	
15 minute winter	S03	3.001	S04	2.9	0.549	0.079	0.0885	
15 minute winter	S04	1.003	S05	29.3	0.807	0.272	0.6206	
15 minute winter	Plot 32-33 (PP)	4.000	S05	2.0	0.954	0.065	0.0130	
15 minute winter	S05	1.004	HW01	31.1	1.377	0.274	0.1473	
15 minute winter	HW01	1.005	HW02	31.5	0.477	0.022	3.4732	
360 minute winter	HW02	1.006	S06	1.5	0.175	0.193	0.0832	
360 minute winter	S06	Hydro-Brake®	S08	1.5				
360 minute winter	S08	1.009	S09	1.5	0.615	0.068	0.0192	
360 minute winter	S09	1.010	S10	1.5	0.529	0.106	0.0345	
360 minute winter	S10	1.011	S11	1.5	0.533	0.107	0.1292	
360 minute winter	S11	1.012	S12	1.5	0.529	0.107	0.0677	
360 minute winter	S12	1.013	S13	1.5	0.529	0.107	0.0597	
360 minute winter	S13	1.014	S14	1.5	0.529	0.107	0.0794	
360 minute winter	S14	Ex. Lateral	SW09	1.5	0.533	0.107	0.0519	55.9

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 99.58%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	Plot 23 (PP)	10	91.474	0.049	12.7	0.2507	0.0000	OK
15 minute winter	Plot 36 (PP)	10	91.382	0.047	9.3	0.1932	0.0000	OK
15 minute winter	S01	11	90.876	0.196	42.5	0.2214	0.0000	OK
15 minute winter	Plot 24-25 (PP)	11	91.271	0.060	13.7	0.5532	0.0000	OK
15 minute winter	Plot 34-35 (PP)	10	91.162	0.062	13.7	0.1848	0.0000	OK
15 minute winter	S02	11	90.821	0.271	67.8	0.3064	0.0000	OK
15 minute winter	Plot 26-27 (PP)	11	91.148	0.056	11.3	0.5944	0.0000	OK
15 minute winter	S03	11	90.793	0.088	10.6	0.0996	0.0000	OK
15 minute winter	S04	11	90.784	0.314	106.5	0.3551	0.0000	OK
15 minute winter	Plot 32-33 (PP)	11	90.882	0.054	7.8	0.4469	0.0000	OK
15 minute winter	S05	11	90.688	0.268	113.5	0.3027	0.0000	OK
360 minute winter	HW01	352	90.651	0.251	18.3	0.0000	0.0000	OK
360 minute winter	HW02	352	90.651	0.851	18.3	100.8259	0.0000	SURCHARGED
360 minute winter	S06	352	90.650	0.860	1.7	0.9729	0.0000	SURCHARGED
30 minute summer	S08	34	89.710	0.027	1.6	0.0308	0.0000	OK
60 minute winter	S09	42	89.595	0.035	1.6	0.0391	0.0000	OK
30 minute winter	S10	29	89.514	0.034	1.6	0.0386	0.0000	OK
30 minute summer	S11	37	89.219	0.034	1.6	0.0387	0.0000	OK
30 minute summer	S12	38	89.064	0.034	1.6	0.0390	0.0000	OK
15 minute winter	S13	18	88.930	0.035	1.6	0.0391	0.0000	OK
30 minute summer	S14	41	88.749	0.034	1.6	0.0390	0.0000	OK
30 minute summer	SW09	41	88.629	0.034	1.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	Plot 23 (PP)	1.000	S01	12.4	2.693	0.185	0.0199	
15 minute winter	Plot 36 (PP)	PS3.000	S01	9.0	2.033	0.183	0.0301	
15 minute winter	S01	1.001	S02	41.7	0.954	0.648	0.7908	
15 minute winter	Plot 24-25 (PP)	2.000	S02	13.1	2.095	0.289	0.0425	
15 minute winter	Plot 34-35 (PP)	PS4.000	S02	13.4	2.125	0.284	0.0294	
15 minute winter	S02	1.002	S04	67.8	0.736	0.618	2.4139	
15 minute winter	Plot 26-27 (PP)	3.000	S03	10.6	1.862	0.252	0.0321	
15 minute winter	S03	3.001	S04	10.7	0.664	0.292	0.3818	
15 minute winter	S04	1.003	S05	106.2	1.158	0.987	1.5614	
15 minute winter	Plot 32-33 (PP)	4.000	S05	7.3	1.351	0.239	0.0337	
15 minute winter	S05	1.004	HW01	103.0	1.881	0.908	0.3685	
360 minute winter	HW01	1.005	HW02	18.3	0.387	0.013	26.3865	
360 minute winter	HW02	1.006	S06	1.7	0.175	0.213	0.0835	
360 minute winter	S06	Hydro-Brake®	S08	1.6				
30 minute summer	S08	1.009	S09	1.6	0.623	0.072	0.0199	
60 minute winter	S09	1.010	S10	1.6	0.536	0.112	0.0358	
30 minute winter	S10	1.011	S11	1.6	0.587	0.113	0.1341	
30 minute summer	S11	1.012	S12	1.6	0.543	0.112	0.0702	
30 minute summer	S12	1.013	S13	1.6	0.569	0.113	0.0619	
15 minute winter	S13	1.014	S14	1.6	0.607	0.113	0.0823	
30 minute summer	S14	Ex. Lateral	SW09	1.6	0.541	0.112	0.0539	69.1

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.37%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	Plot 23 (PP)	9	91.477	0.052	15.8	0.2804	0.0000	OK
15 minute winter	Plot 36 (PP)	10	91.385	0.050	12.1	0.2220	0.0000	OK
15 minute winter	S01	11	90.989	0.309	55.8	0.3496	0.0000	SURCHARGED
15 minute winter	Plot 24-25 (PP)	10	91.277	0.066	17.9	0.6624	0.0000	OK
15 minute winter	Plot 34-35 (PP)	9	91.169	0.069	17.9	0.2261	0.0000	OK
15 minute winter	S02	11	90.935	0.385	89.2	0.4360	0.0000	SURCHARGED
15 minute winter	Plot 26-27 (PP)	10	91.156	0.064	14.7	0.7508	0.0000	OK
15 minute winter	S03	11	90.878	0.173	14.4	0.1956	0.0000	OK
15 minute winter	S04	11	90.866	0.396	141.1	0.4483	0.0000	SURCHARGED
15 minute winter	Plot 32-33 (PP)	11	90.890	0.062	10.2	0.5632	0.0000	OK
480 minute winter	S05	480	90.860	0.440	16.7	0.4973	0.0000	SURCHARGED
480 minute winter	HW01	472	90.859	0.459	18.0	0.0000	0.0000	OK
480 minute winter	HW02	472	90.859	1.059	18.4	100.8259	0.0000	FLOOD RISK
480 minute winter	S06	472	90.859	1.069	1.8	1.2087	0.0000	FLOOD RISK
480 minute winter	S08	472	89.711	0.028	1.8	0.0322	0.0000	OK
480 minute winter	S09	472	89.596	0.036	1.8	0.0410	0.0000	OK
480 minute winter	S10	472	89.516	0.036	1.8	0.0404	0.0000	OK
480 minute winter	S11	472	89.221	0.036	1.8	0.0405	0.0000	OK
480 minute winter	S12	472	89.066	0.036	1.8	0.0408	0.0000	OK
480 minute winter	S13	472	88.931	0.036	1.8	0.0406	0.0000	OK
480 minute winter	S14	472	88.751	0.036	1.8	0.0408	0.0000	OK
480 minute winter	SW09	472	88.630	0.035	1.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	Plot 23 (PP)	1.000	S01	16.1	2.583	0.240	0.0411	
15 minute winter	Plot 36 (PP)	PS3.000	S01	11.9	1.993	0.240	0.0750	
15 minute winter	S01	1.001	S02	53.8	0.961	0.837	1.1432	
15 minute winter	Plot 24-25 (PP)	2.000	S02	17.8	2.063	0.393	0.0846	
15 minute winter	Plot 34-35 (PP)	PS4.000	S02	17.9	2.168	0.378	0.0582	
15 minute winter	S02	1.002	S04	89.5	0.812	0.815	2.8963	
15 minute winter	Plot 26-27 (PP)	3.000	S03	14.4	1.878	0.342	0.0543	
15 minute winter	S03	3.001	S04	14.5	0.685	0.393	0.6100	
15 minute winter	S04	1.003	S05	141.2	1.305	1.312	1.7890	
15 minute winter	Plot 32-33 (PP)	4.000	S05	9.7	1.360	0.318	0.0559	
480 minute winter	S05	1.004	HW01	16.3	1.084	0.143	0.6794	
480 minute winter	HW01	1.005	HW02	18.4	0.388	0.013	62.0939	
480 minute winter	HW02	1.006	S06	1.8	0.175	0.222	0.0835	
480 minute winter	S06	Hydro-Brake®	S08	1.8				
480 minute winter	S08	1.009	S09	1.8	0.639	0.079	0.0212	
480 minute winter	S09	1.010	S10	1.8	0.550	0.122	0.0382	
480 minute winter	S10	1.011	S11	1.8	0.554	0.123	0.1429	
480 minute winter	S11	1.012	S12	1.8	0.550	0.123	0.0749	
480 minute winter	S12	1.013	S13	1.8	0.550	0.124	0.0660	
480 minute winter	S13	1.014	S14	1.8	0.550	0.123	0.0879	
480 minute winter	S14	Ex. Lateral	SW09	1.8	0.555	0.123	0.0574	209.8

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	1	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	3.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	0.0		

Nodes

Name	Area (ha)	Cover Level (m)	Depth (m)	Invert Level (m)
SA01	0.007	10.000	1.100	8.900

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x
Rainfall Events	Consecutive	Drain Down Time (mins)	2880
Winter CV	0.840	Additional Storage (m³/ha)	0.0
Additional Area (A %)	0	Starting Level (m)	
Additional Flow (Q %)	0	Check Discharge Rate(s)	x
Analysis Speed	Normal	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Time Offset (mins)	Duration (mins)	Return Period (years)	Climate Change (CC %)	Time Offset (mins)	Duration (mins)	Return Period (years)	Climate Change (CC %)
0	480	100	40	1440		10	40

Node SA01 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.02376	Invert Level (m)	8.900	Depth (m)	0.800
Side Inf Coefficient (m/hr)	0.02376	Time to half empty (mins)	1877	Inf Depth (m)	0.800
Safety Factor	3.0	Pit Width (m)	3.000	Number Required	1
Porosity	0.95	Pit Length (m)	3.000		

Results for Consecutive Rainfall Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480-480	SA01	2376	9.520	0.620	0.5	5.3016	0.0000	OK
Link Event (Upstream Depth)		US Node		Link		Outflow (l/s)		
480-480		SA01		Infiltration		0.0		

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	1	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	3.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	0.0		

Nodes

Name	Area (ha)	Cover Level (m)	Depth (m)	Invert Level (m)
SA02	0.007	10.000	1.100	8.900

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	0.750	Drain Down Time (mins)	10080	Check Discharge Volume	x
Winter CV	0.840	Additional Storage (m³/ha)	0.0		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	35	0	0
100	40	0	0

Node SA02 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.02376	Invert Level (m)	8.900	Depth (m)	0.800
Side Inf Coefficient (m/hr)	0.02376	Time to half empty (mins)	1210	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	2.500	Number Required	1
Porosity	0.95	Pit Length (m)	3.000		

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	SA02	328	9.004	0.104	0.1	0.7417	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
480 minute winter	SA02	Infiltration	0.0

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	SA02	570	9.435	0.535	0.3	3.8099	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
600 minute winter	SA02	Infiltration	0.0

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
600 minute winter	SA02	585	9.566	0.666	0.4	4.7441	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
600 minute winter	SA02	Infiltration	0.0

**Design Settings**

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	1	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)		Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
PPA	0.049	91.200	1	517489.936	229132.516	0.800
PPB	0.182	92.400	1	517391.721	229156.772	0.700
PPC	0.168	92.100	1	517468.884	229097.023	0.700
PPD	0.069	93.100	1	517430.234	229088.222	0.700
PPE	0.019	92.875	1	517421.982	229111.558	0.775

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	0.0		

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	35	0	0
100	40	0	0

Node PPA Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.04320	Invert Level (m)	90.400	Slope (1:X)	150.0
Side Inf Coefficient (m/hr)	0.04320	Time to half empty (mins)	286	Depth (m)	0.600
Safety Factor	3.0	Width (m)	9.000	Inf Depth (m)	
Porosity	0.30	Length (m)	28.700		

Node PPB Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.04320	Invert Level (m)	91.700	Slope (1:X)	250.0
Side Inf Coefficient (m/hr)	0.04320	Time to half empty (mins)	242	Depth (m)	0.600
Safety Factor	3.0	Width (m)	11.000	Inf Depth (m)	
Porosity	0.30	Length (m)	83.000		

Node PPC Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.11880	Invert Level (m)	91.400	Slope (1:X)	150.0
Side Inf Coefficient (m/hr)	0.11880	Time to half empty (mins)	87	Depth (m)	0.600
Safety Factor	3.0	Width (m)	11.000	Inf Depth (m)	
Porosity	0.30	Length (m)	83.300		



Node PPD Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.11880	Invert Level (m)	92.400	Slope (1:X)	175.0
Side Inf Coefficient (m/hr)	0.11880	Time to half empty (mins)	85	Depth (m)	0.600
Safety Factor	3.0	Width (m)	5.000	Inf Depth (m)	
Porosity	0.30	Length (m)	47.300		

Node PPE Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.02988	Invert Level (m)	92.100	Slope (1:X)	87.0
Side Inf Coefficient (m/hr)	0.02988	Time to half empty (mins)	261	Depth (m)	0.600
Safety Factor	2.0	Width (m)	11.000	Inf Depth (m)	
Porosity	0.30	Length (m)	6.500		

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +35% CC 15 minute summer	380.228	107.591
30 year +35% CC 15 minute winter	266.826	107.591
30 year +35% CC 30 minute summer	243.812	68.991
30 year +35% CC 30 minute winter	171.096	68.991
30 year +35% CC 60 minute summer	159.920	42.262
30 year +35% CC 60 minute winter	106.247	42.262
30 year +35% CC 120 minute summer	101.385	26.793
30 year +35% CC 120 minute winter	67.358	26.793
30 year +35% CC 180 minute summer	77.643	19.980
30 year +35% CC 180 minute winter	50.470	19.980
30 year +35% CC 240 minute summer	60.729	16.049
30 year +35% CC 240 minute winter	40.347	16.049
30 year +35% CC 360 minute summer	45.118	11.610
30 year +35% CC 360 minute winter	29.328	11.610
30 year +35% CC 480 minute summer	34.591	9.142
30 year +35% CC 480 minute winter	22.982	9.142
30 year +35% CC 600 minute summer	27.671	7.569
30 year +35% CC 600 minute winter	18.907	7.569
30 year +35% CC 720 minute summer	24.163	6.476
30 year +35% CC 720 minute winter	16.239	6.476
30 year +35% CC 960 minute summer	19.191	5.054
30 year +35% CC 960 minute winter	12.713	5.054
30 year +35% CC 1440 minute summer	13.292	3.562
30 year +35% CC 1440 minute winter	8.933	3.562
30 year +35% CC 2160 minute summer	9.127	2.522
30 year +35% CC 2160 minute winter	6.289	2.522
30 year +35% CC 2880 minute summer	7.408	1.985
30 year +35% CC 2880 minute winter	4.979	1.985
30 year +35% CC 4320 minute summer	5.496	1.437
30 year +35% CC 4320 minute winter	3.619	1.437
30 year +35% CC 5760 minute summer	4.514	1.156
30 year +35% CC 5760 minute winter	2.922	1.156
30 year +35% CC 7200 minute summer	3.861	0.985



Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +35% CC 7200 minute winter	2.492	0.985
30 year +35% CC 8640 minute summer	3.411	0.870
30 year +35% CC 8640 minute winter	2.201	0.870
30 year +35% CC 10080 minute summer	3.088	0.788
30 year +35% CC 10080 minute winter	1.993	0.788
100 year +40% CC 15 minute summer	496.093	140.377
100 year +40% CC 15 minute winter	348.136	140.377
100 year +40% CC 30 minute summer	321.271	90.909
100 year +40% CC 30 minute winter	225.453	90.909
100 year +40% CC 60 minute summer	212.434	56.140
100 year +40% CC 60 minute winter	141.136	56.140
100 year +40% CC 120 minute summer	131.346	34.711
100 year +40% CC 120 minute winter	87.263	34.711
100 year +40% CC 180 minute summer	99.808	25.684
100 year +40% CC 180 minute winter	64.878	25.684
100 year +40% CC 240 minute summer	77.773	20.553
100 year +40% CC 240 minute winter	51.671	20.553
100 year +40% CC 360 minute summer	57.556	14.811
100 year +40% CC 360 minute winter	37.413	14.811
100 year +40% CC 480 minute summer	44.079	11.649
100 year +40% CC 480 minute winter	29.285	11.649
100 year +40% CC 600 minute summer	35.234	9.637
100 year +40% CC 600 minute winter	24.074	9.637
100 year +40% CC 720 minute summer	30.744	8.240
100 year +40% CC 720 minute winter	20.662	8.240
100 year +40% CC 960 minute summer	24.371	6.418
100 year +40% CC 960 minute winter	16.144	6.418
100 year +40% CC 1440 minute summer	16.805	4.504
100 year +40% CC 1440 minute winter	11.294	4.504
100 year +40% CC 2160 minute summer	11.451	3.165
100 year +40% CC 2160 minute winter	7.890	3.165
100 year +40% CC 2880 minute summer	9.228	2.473
100 year +40% CC 2880 minute winter	6.202	2.473
100 year +40% CC 4320 minute summer	6.757	1.767
100 year +40% CC 4320 minute winter	4.450	1.767
100 year +40% CC 5760 minute summer	5.489	1.405
100 year +40% CC 5760 minute winter	3.552	1.405
100 year +40% CC 7200 minute summer	4.652	1.187
100 year +40% CC 7200 minute winter	3.002	1.187
100 year +40% CC 8640 minute summer	4.077	1.040
100 year +40% CC 8640 minute winter	2.631	1.040
100 year +40% CC 10080 minute summer	3.666	0.935
100 year +40% CC 10080 minute winter	2.366	0.935



Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
180 minute winter	PPA	172	90.760	0.360	6.8	20.5033	0.0000	OK
180 minute winter	PPB	172	92.157	0.457	25.2	79.7129	0.0000	OK
120 minute summer	PPC	86	91.870	0.470	45.2	54.7795	0.0000	OK
120 minute summer	PPD	90	92.858	0.458	18.6	22.9191	0.0000	OK
180 minute winter	PPE	172	92.530	0.430	2.6	8.4233	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
180 minute winter	PPA	Infiltration	1.1
180 minute winter	PPB	Infiltration	3.9
120 minute summer	PPC	Infiltration	9.0
120 minute summer	PPD	Infiltration	3.0
180 minute winter	PPE	Infiltration	0.4

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	PPA	176	90.861	0.461	8.7	28.3189	0.0000	OK
180 minute winter	PPB	176	92.263	0.563	32.4	108.8856	0.0000	OK
120 minute summer	PPC	88	91.947	0.547	58.6	74.0737	0.0000	OK
120 minute summer	PPD	98	92.984	0.584	24.1	31.8721	0.0000	OK
240 minute winter	PPE	232	92.667	0.567	2.7	11.3716	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)
180 minute winter	PPA	Infiltration	1.1
180 minute winter	PPB	Infiltration	4.0
120 minute summer	PPC	Infiltration	10.5
120 minute summer	PPD	Infiltration	3.1
240 minute winter	PPE	Infiltration	0.4