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SUMMARY DRAINAGE STRATEGY AND COLLATION OF CALCULATIONS AND SITE INVESTIGATION MATERIAL

HALL & WOODHOUSE GARDNERS ARMS ARDINGLY RH17 6TJ

PLANNING REF: DM / 22 / 1680

DATED 18/05/26 VERSION 1.0

Appendices to Summary

A. **Ground Investigation Report G6718-01-2 by Ground Management Ltd**
B. **SDA 100-year soakaway calculation**
C. **SDA 30-year soakaway calculation**
D. **SDA 100-year permeable parking bay calculations**
E. **SDA 30-year permeable parking bay calculations**
F. **SuDS Mitigation indices for roof**
G. **SuDS Mitigation indices for parking bays**
H. **30-year storm network check**

We recommend to read this strategy in conjunction with SDA drawing 100, 200 & 201.

1. Storm Water design with National SuDS Standards

Design is carried out to comply with the seven National SuDS Standards (NSS) enforced in July 2025.

Standard 1 – Run off destinations - uses priority 1 & 2 respectively for the recycling of rainwater in water butts for baskets and planting and final infiltration for run off from the site.

The main roof of the new guest block drains to a geocrate soakaway located beneath in the new car park. 210 litre water butts are provided on selected downpipes.

The car park is drained using permeable areas.

Standard 2 – Management of every day rainfall (interception) - This standard is deemed compliant where infiltration is used.

Standard 3 – Management of extreme rainfall and flooding – Design provides storage for infiltration features to meet the 100 year (1%)+ 45% climate change events. The soakaway and permeable car parking features provide storage for the both the 1% and 3.33% storm events to overcome subsequent storms where half drain down times are less than required.

The half Drain down Time is required to be less than 24 hours for the 30- year event (3.33%) but this I not achievable for the permitted lowest rate of 4.7 x 10^{-6} m/s.

To overcome this issue storage is provided for the 100-year and 30-year events should they coincide. This event probability is estimated as 100-year (0.01) x 30 year (0.033) = 0.00033 or 1 in 3030 year event (0.033%)and is considered sufficient volume to provide the risk for subsequent storms.

These volumes are provided in the depths of the particular infiltration feature and are indicated in the relevant calculations to the rear of this summary.

The standing groundwater level is more than 1.0m below the base of the infiltration features – See the site investigation report.

Standard 4- Water quality – The SuDS simple index mitigation procedure has been used to overcome pollution indices derived from the uses of 'roofs' and 'light car parks'.

Standard 5- Amenity – The project does not lend itself to offering rainwater amenity opportunities save the water butts shown.

Standard 6 - Biodiversity – With limited areas for landscaping, the project does not lend itself to offering opportunities for biodiversity.

Standard 7 - Design of drainage for construction, operation, maintenance decommissioning and structural integrity –

Construction - The design ensures risk for construction is mitigated where all pipes, chambers, geocrate and pavements are as shallow as can practicably be.

The geocrate soakaway construction is a proven method in the last twenty-five years for offering soakaway storage and is well known and used throughout the industry. They are lightweight and simple to install.

The excavation for the soakaway will be to a max depth of less than 1.5m. Traditional trench support will safely enable this construction.

Pipe and geocrate strengths and associated bedding is detailed to ensure longevity of products for the expected load.

Maintenance - All maintenance for the new guest block will be carried by the Brewery using their term contractors already in place for drainage and SuDS maintenance.

All storm drain runs are accessible, many in two directions between chambers. Blind branches that enter main runs from RWPs and channel gullies are fitted with access points for CCTV and jetting.

The prevention of silt migration to the soakaway is imperative as the geocrate design of the soakaway has limited access. To meet this objective the following is recommended:-

- **Catchpits** should have silt removed/sucked out **twice a year**.

- **Pipes** should be jetted and cleaned out **every two years**.

- **Roof downpipes** and **water butts** should be cleaned out **twice a year**.

- **Geocrate soakaways** should be inspected by CCTV camera to assess any settled silts and sucked out **once a year**.

2. Site Porosity Results – Refer to the Site Investigation report appended

The design uses the lowest test rate of 4.70 x 10^{-6} m/s.

This rate has been factored by 5.0 for design purposes.

3. Groundwater Monitoring - Refer to the Site Investigation report appended

Monitoring was carried out from January to March with a standing water level found to be 2.0m below ground level with an ordnance datum of 128.300m AOD

4. Summary of volumes for combined storm events

There are two infiltration features receiving the run off from the proposed site:-

- The geocrate soakaway accepting roof run off.
- Permeable parking bays receiving bays and surrounding car park circulation access run off

The geocrate soakaway requires a depth of 0.146m for the 100-year event and 0.110m for the 30-year event when using a geocrate with 0.96 void ratio and for the total area of 24m x 8m. These combined depths sum to 0.256 therefore a commercial crate depth of 0.3m (300mm) is suitable all as tabled below.

Storm Event	Catchment area + 10% urban creep (A_D)	Area of geocrate	Depth required (0.96 voids)	Total depth required offered for combined event
30 year	288 sq.m	24.0m x 8.0m	0.146m	0.256m
100 year	288 sq.m	24.0m x 8.0m	0.110m	

The permeable parking bays receive varying areas and are of varying sizes and are tabled below along with the required depths:-

Permeable Area No.	Storm Event	Area of Permeable Parking (A_b)	Catchment area + 10% urban creep (A_D)	Depth required for 0.30 voids	Depth required for 0.96 voids
1	30 year	132 sq.m	347 sq.m	0.701m	0.219m
	100 year			0.903m	0.282m
2	30 year	276 sq.m	396 sq.m	0.340m	0.105m
	100 year			0.442m	0.138m
3	30 year	217 sq.m	584 sq.m	0.720m	0.225m
	100 year			0.927m	0.290m

These total depths are shown below but can be met by combining the required minimum depth of granular material for water quality with a 300mm deep geocellular module beneath and the selected make up for the 3 nr. permeable areas are shown below.

Permeable Area ref	Permeable Area (A_b)	Total stone depth required for 0.30 voids	Total Depth required by geocellular 0.96 voids	Water volumes required for combined 1% and 3.33% event
1	132 sq.m	1.604m	0.501m	35.75 cu.m (1%) 27.77 cu.m (3.33%)
2	276 sq.m	0.782m	0.243m	36.62 cu.m (1%) 27.98 cu.m (3.33%)
3	217 sq.m	1.647m	0.515m	60.48 cu.m (1%) 46.99 cu.m (3.33%)

Permeable Area ref	Total stone depth required (0.30)	Volume offered by geocellular module (0.30)	Total Depth provided by geocellular (0.96)	Volume offered by geocellular (0.96)	Total water volume required
1	0.644m	25.50 cu.m	0.300m	38.0 cu.m	63.52 cu.m
2	0.300m	24.86 cu.m	0.150m	39.74 cu.m	64.60 cu.m
3	0.690m	44.97 cu.m	0.300m	62.5 cu.m	107.47 cu.m

A. Ground Investigation Report G6718-01-2 by Ground Management Ltd

GROUNDWATER MONITORING AND SOAKAGE TESTING

AT

GARDENERS ARMS, ARDINGLY

FOR

HALL AND WOODHOUSE

G6719

23 April 2026

Ground Management Ltd

Civil and Geotechnical Engineering Services

DOCUMENT CONTROL

Report Title:	Groundwater Monitoring and Soakage Testing Gardeners Arms, Ardingly		
Report No./ Issue:	G6719-01/2		
Report Status:	Issued for Client Comment		
Distribution:	Hall and Woodhouse	PDF copy	23 April 2026
	PSE Associates		
	Simon Dent Associates		
Prepared by:	Alistair Tyler BSc MSc DIC CEng MICE		

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Groundwater Monitoring

Site Photographs

1.0 INTRODUCTION

1.1 Ground Management Ltd have carried out a groundwater monitoring and soakage testing at The Gardeners Arms, Ardingly (location indicated on Figure 1) to inform drainage design for a proposed hotel development.

1.2 Proposed exploratory hole locations were indicated by the drainage engineer Simon Dent Associates (SDA) and adjusted to improve accessibility with final locations as indicated on Figure 2.

1.3 Two boreholes, referenced as BH1 & BH2 were excavated on 13 January 2026 using a dynamic (windowless) sampling rig. The holes extended to the target depth of 2m and terminated in dense sand / sandstone / siltstone. Further excavation with the dynamic sampling rig was not possible due to the high strength of the ground. A standpipe was installed in each borehole to allow monitoring of groundwater levels.

1.4 Based on the initial observations the scope of soakage testing was agreed with the drainage engineer.

1.5 Excavation of two trial pits, referenced as TP1 and TP2, was carried out during a return visit on 22 January 2026. The pits each extended to a depth of 1m and were used for soakage testing carried out in accordance with BRE365. Testing continued over subsequent days and was concluded on 29 January 2026 when pits were backfilled with compacted arisings and the car park gravel surface reinstated.

1.6 Details of the soils encountered are presented on the appended exploratory hole logs together with soakage test results and groundwater monitoring carried out to date.

1.7 Monitoring of the standpipes indicates groundwater to have remained below a depth of 2m as recorded by BH1 remaining dry throughout the monitoring period 13/1/26 to 15/3/26. Observations in BH2 revealed occasional peak water levels to within 0.9m of ground level and seeming to correspond with infiltration of surface water during heavy rainfall. This was further investigated by installation of a datalogger in BH2 to continually record water level and the results are included on the appended charts. Interpretation of the monitoring results is discussed in the following section of this report. Monitoring has now ceased but standpipes remain in place should further monitoring be required in the future.

1.8 The soakage testing was impacted by heavy rain during the test period. Tests were recorded by manual observation supplemented by continuous recording by dataloggers. Where apparent and significant the influence of rain infiltration has been filtered out. A summary of the infiltration test results and the derived infiltration rates is presented below:

Trial Pit	Pit Dimensions LxWxD (metres)	Test No.	Water Level at start of test (mm below ground level)	Duration of test (mins)	Fall of water level during test (mm)	Infiltration Coefficient (m/s) (see note)
TP1	0.31 x 1.1 x 1.0	1	170	1254	330	*9.2×10^{-7}
		2	100	4220	825	7.7×10^{-7}
		3	155	1020	385	*7.5×10^{-7}
		4	199	2310	540	*6.0×10^{-7}
TP2	0.31 x 1.1 x 1.0	1	225	280	725	9.6×10^{-6}
		2	170	520	830	5.4×10^{-6}
		3	95	650	905	4.7×10^{-6}

Note: Infiltration Coefficients marked * are based on projected results

1.9 The lowest infiltration coefficients that were determined for trial pits TP1 and TP2 were 6.0×10^{-7} m/s and 4.7×10^{-6} m/s respectively. The influence of rainfall during the testing period is discussed in the following section of this report.

1.10 Ground conditions should be verified during construction and further testing would be recommended if conditions differ from those encountered during this investigation.

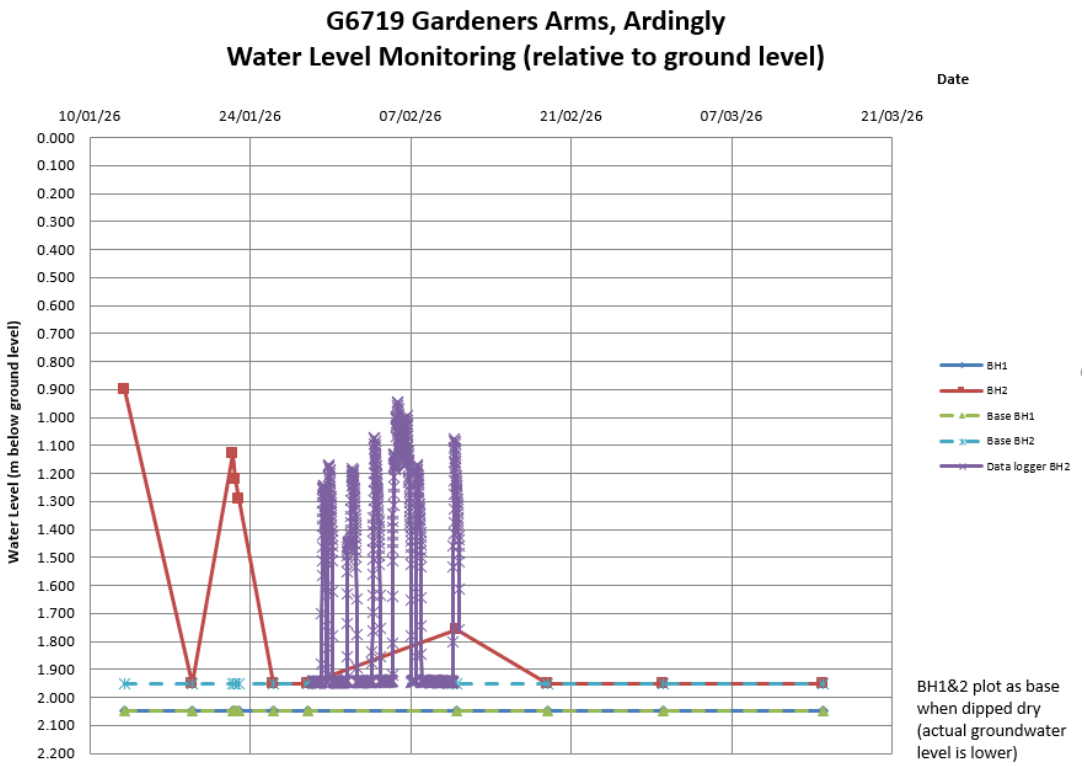
1.11 The work was carried out for Hall and Woodhouse with instruction from Simon Dent Associates and PSE Associates. Nothing in this report confers or purports to confer on any third party, any benefit or any right to enforce any term of this report pursuant to the Contract (Rights of Third Parties) Act 1999.

2.0 DISCUSSION

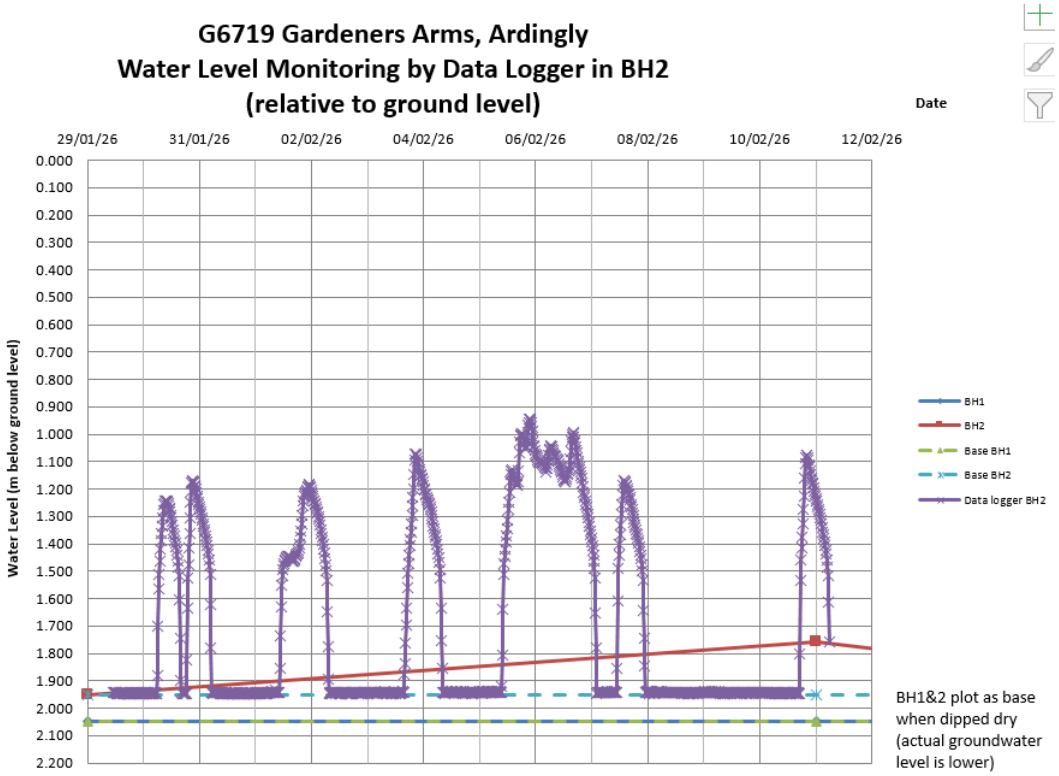
2.1 Groundwater level monitoring

On 13/1/26 two standpipes were installed on the site at locations BH1 and BH2. Prolonged heavy rainfall was recorded prior to and during the installation visit. Groundwater was observed at 0.9m bgl in BH2 shortly after excavation but not encountered during excavation of BH1. Both boreholes terminated at a depth of 2m due to the presence of sandstone layers preventing further excavation with the dynamic sampling rig.

During the monitoring period following installation on 13/1/26 until latest readings on 15/3/26 recorded BH1 to remain dry to the base 2.05m bgl throughout:



During initial observations, the fluctuation of water level in BH2 and comparison with BH1 observations was considered inconsistent with normal groundwater behaviour and this was investigated through installation of a data logger to continuously monitor water levels. The data logger was installed for the period 29/1/26 to 11/2/26 that included a number of heavy rainfall events (site specific rainfall records were not collected).



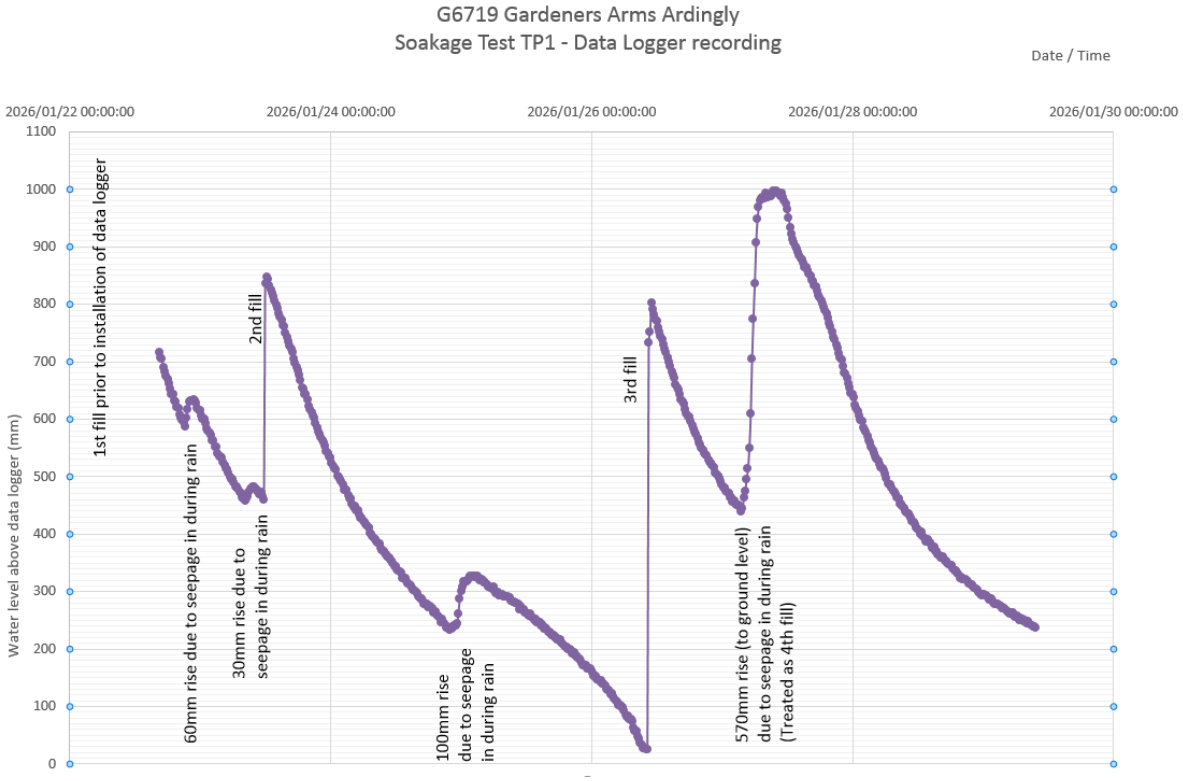
It was observed that the water level in the standpipe rose rapidly during the rainfall events and then dropped rapidly after the event with the recorded level typically falling by 500mm in 45 minutes. This is clearly not recording fluctuation of the groundwater table and is considered to represent seepage of surface water into the open borehole that then soaks away. The contrast with observations in BH1 indicate this is due to local variation in the ground conditions.

It is concluded that the true groundwater level at the site during the monitoring period remained below the base of the standpipes (2m bgl).

2.2 Soakage Test Interpretation

Soakage tests were carried out on the site within two 1m deep pits referenced as TP1 and TP2. Periods of heavy rainfall were recorded during the period of testing that ran from 22/1/26 to 29/1/26.

Comparison of the results indicate the testing within TP1 was heavily influenced by seepage into the pit during rainfall. This is illustrated by reference to the levels recorded by data logger that shows a rise in water level during periods of rain shown below:

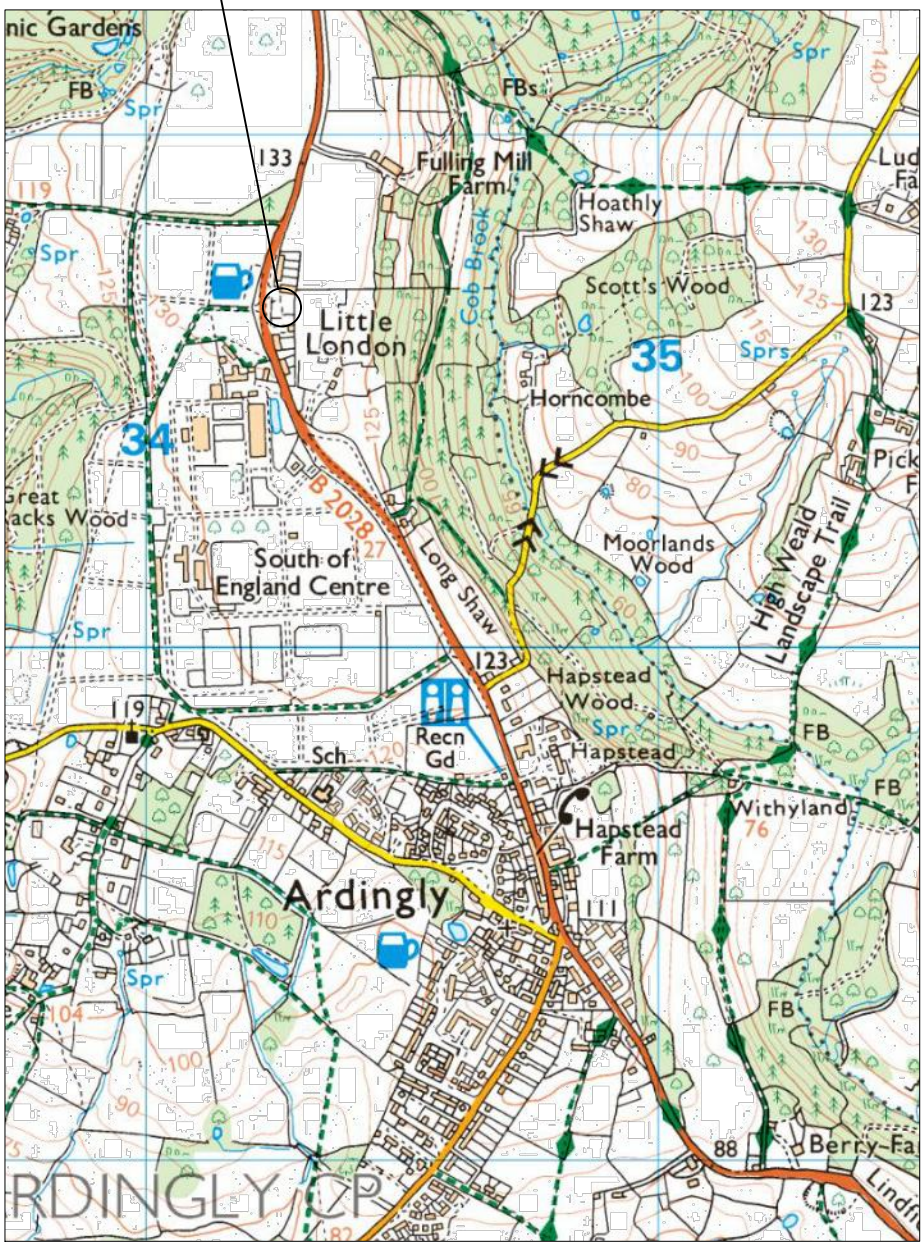


Analysis of the test data presented within earlier reporting and as attached has attempted to filter out the effect of the rain by removing the rising sections of the curves. Further consideration concludes that there will have been additional underlying influence due to ongoing seepage into the pits that has not been factored out. All the derived infiltration coefficients should therefore be considered lower bound and actual values are expected to be higher.

Ground Management Ltd Civil and Geotechnical Engineering Services	Robin Hill Farm Clay Lane Fishbourne CHICHESTER West Sussex PO18 8AB Phone/Fax 01243 575073	PROJECT NO:	G6719
		FIGURE REF:	Figure 1
PROJECT:	Gardeners Arms, Ardingly	PREPARED:	AJHT
SECTION:	Groundwater Monitoring and Soakage Testing	CHECKED:	AJHT
TITLE:	Site Location Plan	DATE:	Jan 2026

North
(Not to scale)

Site Location



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Ground Management Ltd Civil and Geotechnical Engineering Services	Robin Hill Farm Clay Lane Fishbourne CHICHESTER West Sussex PO18 8AB Phone/Fax 01243 575073	PROJECT NO:	G6719
		FIGURE REF:	Figure 2
PROJECT:	Gardeners Arms, Ardingly	PREPARED:	AJHT
SECTION:	Groundwater Monitoring and Soakage Testing	CHECKED:	AJHT
TITLE:	Exploratory Hole Location Plan	DATE:	Jan 2026

HOLE LOCATIONS ARE INDICATIVE ONLY UNLESS DIMENSIONED

Based on SD Associates drawing dated 15/12/25

Ground Management Ltd

Civil and Geotechnical Engineering Services

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Site	Number
Gardeners Arms, Ardingly	BH1

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic (windowless) sampling using Archway Dart	100mm to 1.00m 90/80/70 to 1.60m 60/50 to 2.05m	130.60	Hall and Woodhouse	G6719
	Location	**Dates**	**Engineer**	**Sheet**
	See Location Plan	13/01/2026	SDA Engineers	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15)	Grass over moist dark brown slightly sandy slightly clayey organic rich silt TOPSOIL with occasional fine to medium subangular sandstone and flint gravel		
				130.45	0.15	Moist firm slightly friable slightly sandy (fine) CLAY / SILT with a little coarse medium and fine angular to subangular flint and sandstone gravel. Rare fine brick fragments. (Possibly reworked)		
					(0.35)			
0.50-0.70	D1			130.10	0.50	Stiff yellow brown slightly clayey sandy (fine) SILT with some coarse medium and fine angular blocky sandstone gravel		
					(0.20)			
0.70-1.80	D2			129.90	0.70	Yellow brown and brown thinly bedded (2-6mm) sandstone. Recovered as moderately weak coarse medium and fine tabular sandstone gravel		
					(1.10)			
1.80-2.00	D3			128.80	1.80	Light yellow slightly silty fine SAND with a little fine and medium gravel of weakly cemented sand		
					(0.25)			
				128.55	2.05	Complete at 2.05m		

Remarks
Borehole remained stable and open during excavation
19mm dia standpipe installed on completion - 1m slotted with geosoc and gravel surround then plain with bentonite pellet seal and flush cover
Groundwater was not encountered. Standpipe remained dry 2hrs after installation
Ground level estimated by reference to topo survey on Simon Dent Associates' drawing dated Dec 2025

Scale (approx)	Logged By
1:20	AT

Figure No. G6719.BH1

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Site
Gardeners Arms, Ardingly

Number
BH2

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic (windowless) sampling using Archway Dart	100mm to 1.00m 90/80/70 to 1.60m 60/50 to 2.05m	130.60	Hall and Woodhouse	G6719
	Location See Location Plan	**Dates** 13/01/2026	**Engineer** SDA Engineers	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.65)	Grass over moist dark brown slightly sandy (fine) slightly clayey silty TOPSOIL / MADE GROUND with occasional medium and fine subangular gravel of sandstone and flint ... whole brick at 0.5m bgl		
0.70-1.00	D1			129.95	0.65 (0.45)	Firm brown slightly clayey sandy SILT with occasional medium and fine sandstone gravel		
1.20-1.40	D2			129.50	1.10 (0.30)	Yellow brown thinly bedded SANDSTONE. Recovered as coarse medium and fine subangular blocky / tabular gravel of moderately weak sandstone		
1.40-1.90	D3			129.20	1.40 (0.50)	Dense silty fine SAND interbedded with extremely thinly laminated (1-4mm) sandstone and siltstone		
1.90-2.00	D4			128.70	1.90 (0.15)	Light yellow slightly silty fine SAND interbedded (?) with thin layers (2-5mm) sandstone recovered as fine to medium gravel		
				128.55	2.05	Complete at 2.05m		

Remarks
Borehole remained stable and open during excavation
19mm dia standpipe installed on completion - 1m slotted with geosoc and gravel surround then plain with bentonite pellet seal and flush cover
Some groundwater seepage. Groundwater level rose to 0.9m bgl after 1 hr
Ground level estimated by reference to topo survey on Simon Dent Associates' drawing dated Dec 2025

Scale (approx)	Logged By
1:20	AT

Figure No.
G6719.BH2

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Site	Trial Pit Number
Gardeners Arms, Ardingly	TP1

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated using Kubota U17-3	0.31 x 1.1	130.25	Hall and Woodhouse	G6719
	Location	**Dates**	**Engineer**	**Sheet**
	See Location Plan	22/01/2026	SDA Engineers	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	MADE GROUND of coarse subrounded to rounded flint gravel on compact brick rubble fill comprising whole / half brick and concrete with some sandy coarse medium and fine gravel of flint and brick		
				130.05	0.20	Firm brown and yellow brown sandy silty CLAY with a little sandstone gravel		
					(0.20)			
				129.85	0.40	Yellow brown coarse medium and fine subangular blocky GRAVEL of sandstone with much slightly clayey very silty fine to medium sand		
					(0.50)	... locally clayey		
				129.35	0.90	Yellow brown closely fractured (10-60mm) thinly bedded (5-20mm) weathered SANDSTONE recovered as coarse medium and fine weak to moderately weak subangular / blocky sandstone gravel with some very silty fine sand. Occasional thin clay band.		
					(0.10)			
				129.25	1.00	Complete at 1.00m		

Plan

Remarks

Pit sides stable and vertical during excavation
Groundwater was not encountered
Ground level estimated by reference to topo survey on Simon Dent Associates' drawing dated Dec 2025

Scale (approx)	Logged By	Figure No.
1:10	AT	G6719.TP1

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PT

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Civil and Geotechnical Engineering Services

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Site	Trial Pit Number
Gardeners Arms, Ardingly	TP2

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated using Kubota U17-3	0.31 x 1.1	130.24	Hall and Woodhouse	G6719
	Location	**Dates**	**Engineer**	**Sheet**
	See Location Plan	22/01/2026	SDA Engineers	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	MADE GROUND of coarse subrounded to rounded flint gravel on compact brick rubble fill comprising whole / half brick and concrete with some sandy coarse medium and fine gravel of flint and brick		
				130.04	0.20	Moist dark brown slightly sandy slightly clayey SILT with occasional fine and medium subangular flint gravel		
					(0.15)			
				129.89	0.35	Firm brown and yellow brown sandy silty CLAY with a little sandstone gravel		
					(0.20)			
				129.69	0.55	Yellow brown coarse medium and fine subangular / blocky sandstone GRAVEL with much very silty fine to medium sand		
					(0.30)	... locally clayey		
				129.39	0.85	Yellow brown closely fractured (10-50mm) thinly bedded (5-10mm) weathered SANDSTONE recovered as coarse medium and fine extremely weak to weak subangular / blocky sandstone gravel with some silty fine sand.		
					(0.15)			
				129.24	1.00	Complete at 1.00m		

Plan

Remarks

Pit sides stable and vertical during excavation
Groundwater was not encountered
Ground level estimated by reference to topo survey on Simon Dent Associates' drawing dated Dec 2025

Scale (approx)	Logged By	Figure No.
1:10	AT	G6719.TP2

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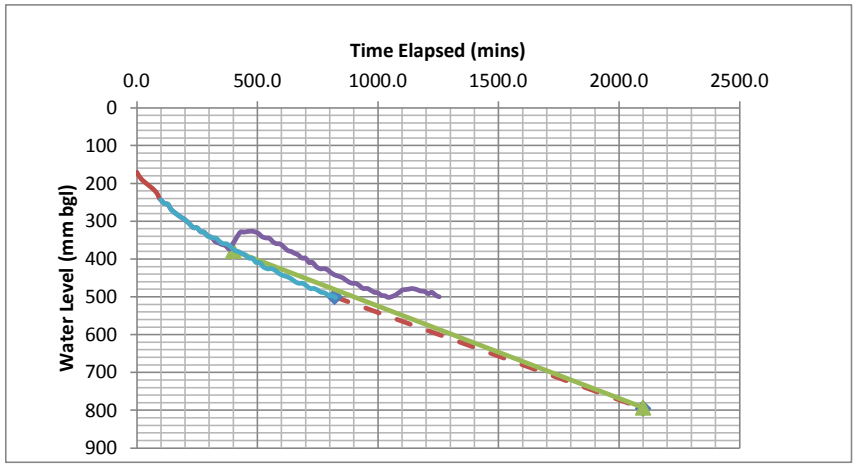
G6719 Gardeners Arms Ardingly
Soakage Test

TP1 Test 1

Test Start Date: 22-Jan-26

Dimensions (m): width = 0.31 length = 1.10 depth = 1.00

Date	Time	Date and time	Elapsed	Dip	End Fit	Weather
22/01/2026	14:49	22/01/2026 14:49	start	dry		
22/01/2026	14:51	22/01/2026 14:51	0.0	170		Rain/showers
22/01/2026	14:54:00	22/01/2026 14:54	3.0	175		
22/01/2026	15:12:00	22/01/2026 15:12	21.0	190		
22/01/2026	15:21:00	22/01/2026 15:21	30.0	195		
22/01/2026	16:07:00	22/01/2026 16:07	76.0	220		
22/01/2026	16:25:00	22/01/2026 16:25	94.0	240		
23/01/2026	11:45:00	23/01/2026 11:45	1254.0			
			820.0		500	
			2100.0		795	Projected
Test monitored using datalogger - plotted as purple line then adjusted to remove						
the influence of heavy rainfall and re-plotted as blue line						



		Time (mins)
t0	170	
t25	377.5	400
t50	585	
t75	792.5	2100
t100	1000	
fall		0.83
t25 - t75		0.415
Area t50		1.5113

Infiltration Coefficient = 9.2E-07 m/s

G6719 Gardeners Arms Ardingly
Soakage Test

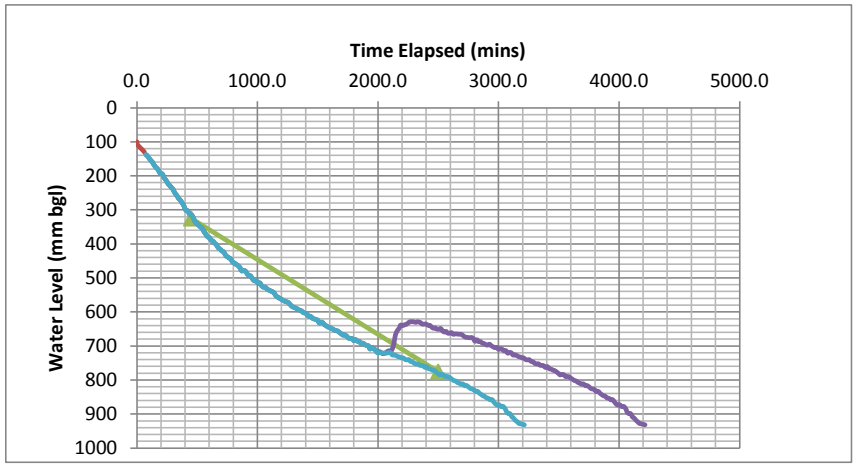
TP1 Test 2

Test Start Date: 23-Jan-26

Dimensions (m): width = 0.31 length = 1.10 depth = 1.00

Date	Time	Date and time	Elapsed	Dip	End Fit	Weather
23/01/2026	11:59	23/01/2026 11:59	start	500		
23/01/2026	12:00	23/01/2026 12:00	0.0	100		Rain/showers
23/01/2026	12:02:00	23/01/2026 12:02	2.0	105		
23/01/2026	12:08:00	23/01/2026 12:08	8.0	110		
23/01/2026	12:23:00	23/01/2026 12:23	23.0	115		
23/01/2026	12:36:00	23/01/2026 12:36	36.0	120		
23/01/2026	12:51:00	23/01/2026 12:51	51.0	125		
23/01/2026	13:01:00	23/01/2026 13:01	61.0	130		
26/01/2026	10:20:00	26/01/2026 10:20	4220.0			
						0
						0 Projected

Test monitored using datalogger - plotted as purple line then partially adjusted to remove some of the influence of heavy rainfall and re-plotted as blue line



		Time (mins)
t0	100	
t25	325	450
t50	550	
t75	775	2500
t100	1000	
fall		0.9
t25 - t75		0.45
Area t50		1.61

Infiltration Coefficient = 7.7E-07 m/s

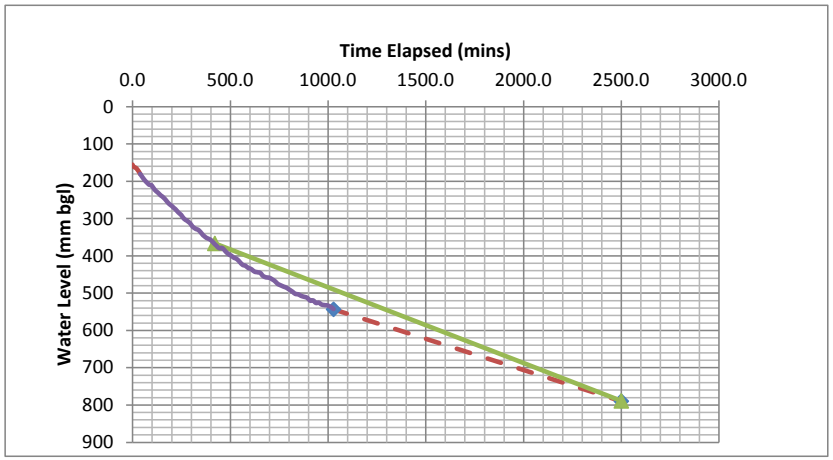
G6719 Gardeners Arms Ardingly
Soakage Test

TP1 Test 3

Test Start Date: 26-Jan-26

Dimensions (m): width = 0.31 length = 1.10 depth = 1.00

Date	Time	Date and time	Elapsed	Dip	End Fit	Weather
26/01/2026	10:20	26/01/2026 10:20	start	dry		
26/01/2026	10:22	26/01/2026 10:22	0.0	155		dry o'cast
26/01/2026	10:26:00	26/01/2026 10:26	4.0	160		
26/01/2026	10:41:00	26/01/2026 10:41	19.0	165		v.heavy rain
26/01/2026	11:01:00	26/01/2026 11:01	39.0	180		night26/1
			1028.0		543	
			2500.0		790	Projected
Test monitored using datalogger - plotted as purple line						



		Time (mins)
t0	155	
t25	366.25	420
t50	577.5	
t75	788.75	2500
t100	1000	
fall		0.845
t25 - t75		0.4225
Area t50		1.53245

Infiltration Coefficient = 7.5E-07 m/s

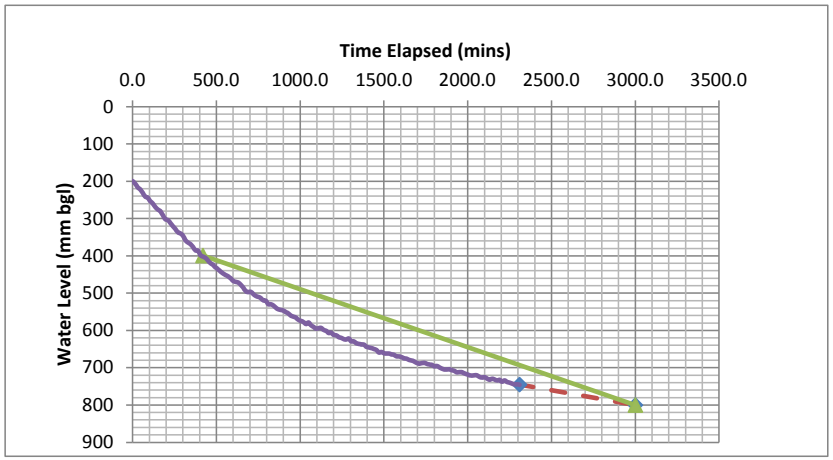
G6719 Gardeners Arms Ardingly
Soakage Test

TP1 Test 4

Test Start Date: 26-Jan-26

Dimensions (m): width = 0.31 length = 1.10 depth = 1.00

Date	Time	Date and time	Elapsed	Dip	End Fit	Weather
		2026/01/27 19:15:00	0.0	199		
			2310.0		745	
			3000.0		800 Projected	
Test monitored using datalogger -						



		Time (mins)
t0	199	
t25	399.25	420
t50	599.5	
t75	799.75	3000
t100	1000	
fall		0.801
t25 - t75		0.4005
Area t50		1.47041

Infiltration Coefficient = 6.0E-07 m/s

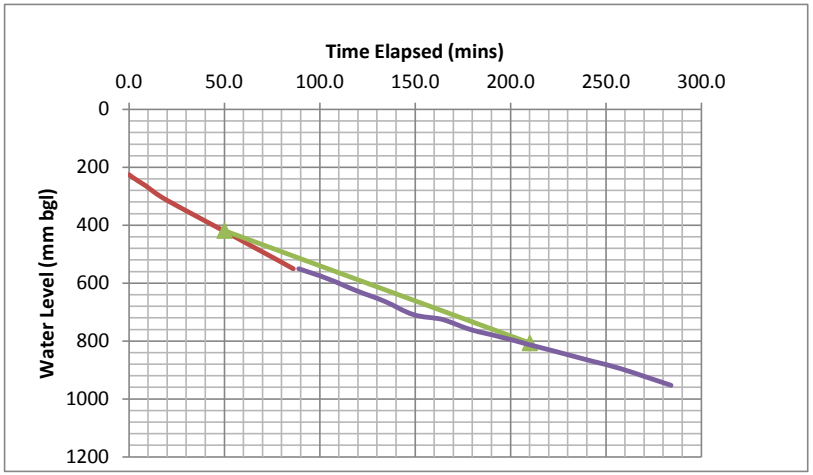
G6719 Gardeners Arms Ardingly
Soakage Test

TP2 Test 1

Test Start Date: 22-Jan-26

Dimensions (m): width = 0.31 length = 1.10 depth = 1.00

Date	Time	Date and time	Elapsed	Dip	End Fit	Weather
22/01/2026	15:00	22/01/2026 15:00	start	dry		
22/01/2026	15:01	22/01/2026 15:01	0.0	225		Rain/sho
22/01/2026	15:03:00	22/01/2026 15:03	2.0	235		wers
22/01/2026	15:10:00	22/01/2026 15:10	9.0	265		
22/01/2026	15:20:00	22/01/2026 15:20	19.0	310		
22/01/2026	16:05:00	22/01/2026 16:05	64.0	470		
22/01/2026	16:27:00	22/01/2026 16:27	86.0	550		
22/01/2026	18:00:00	22/01/2026 18:00	179.0			
						0
						0 Projected
Test monitored using datalogger and plotted as purple line - influence of rain ignorec						



		Time (mins)
t0	225	
t25	418.75	50
t50	612.5	
t75	806.25	210
t100	1000	
fall	0.775	
t25 - t75	0.3875	
Area t50	1.43375	

Infiltration Coefficient = 9.6E-06 m/s

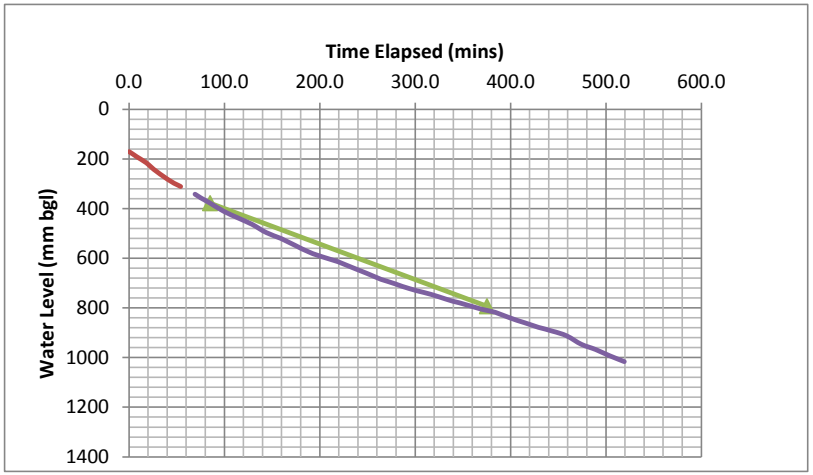
G6719 Gardeners Arms Ardingly
Soakage Test

TP2 Test 2

Test Start Date: 23-Jan-26

Dimensions (m): width = 0.31 length = 1.10 depth = 1.00

Date	Time	Date and time	Elapsed	Dip	End Fit	Weather
23/01/2026	12:04	23/01/2026 12:04	start	dry		
23/01/2026	12:06	23/01/2026 12:06	0.0	170		Rain/sho
23/01/2026	12:14:00	23/01/2026 12:14	8.0	190		wers
23/01/2026	12:24:00	23/01/2026 12:24	18.0	215		
23/01/2026	12:35:00	23/01/2026 12:35	29.0	250		
23/01/2026	12:50:00	23/01/2026 12:50	44.0	290		
23/01/2026	13:00:00	23/01/2026 13:00	54.0	310		
26/01/2026	10:20:00	26/01/2026 10:20			dry	
						0
						0 Projected
Test monitored using datalogger and plotted as purple line - influence of rain ignorec						



		Time (mins)
t0	170	
t25	377.5	85
t50	585	
t75	792.5	375
t100	1000	
fall		0.83
t25 - t75		0.415
Area t50		1.5113

Infiltration Coefficient = 5.4E-06 m/s

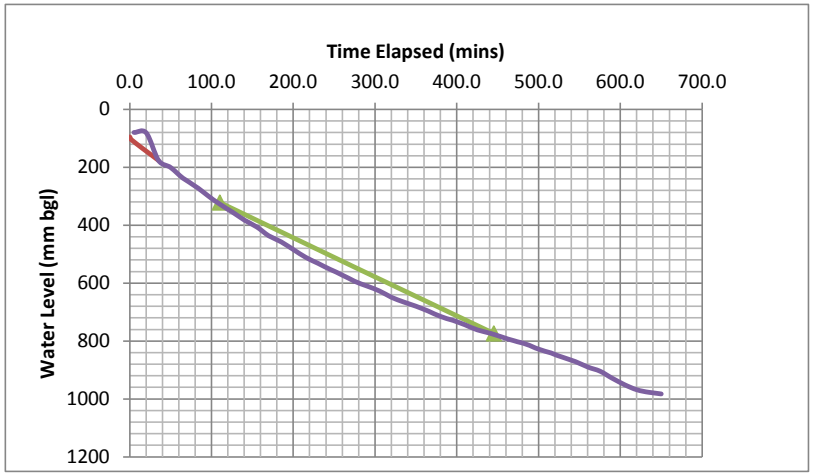
G6719 Gardeners Arms Ardingly
Soakage Test

TP2 Test 3

Test Start Date: 26-Jan-26

Dimensions (m): width = 0.31 length = 1.10 depth = 1.00

Date	Time	Date and time	Elapsed	Dip	End Fit	Weather
26/01/2026	10:20	26/01/2026 10:20	start	dry		
26/01/2026	10:25	26/01/2026 10:25	0.0	95		dry o'cast
26/01/2026	10:27	26/01/2026 10:27	2.0	105		
26/01/2026	10:41:00	26/01/2026 10:41	16.0	135		
26/01/2026	11:00:00	26/01/2026 11:00	35.0	175		
29/01/2026	09:47:00	29/01/2026 09:47				v.heavy rain night26/1
					0	
					0	Projected
Test monitored using datalogger and plotted as purple line						



		Time (mins)
t0	95	
t25	321.25	110
t50	547.5	
t75	773.75	445
t100	1000	
fall	0.905	
t25 - t75	0.4525	
Area t50	1.61705	

Infiltration Coefficient = 4.7E-06 m/s

Project No: G6719
Gardeners Arms, Ardingly
11-Feb-26

	BH1	BH2			
Upstand (m)	0.000	0.000			
Ground Level (mAOD)	130.600	130.600			
Cover level (mAOD)	130.600	130.600			
Base dip (m)	2.050	1.950			

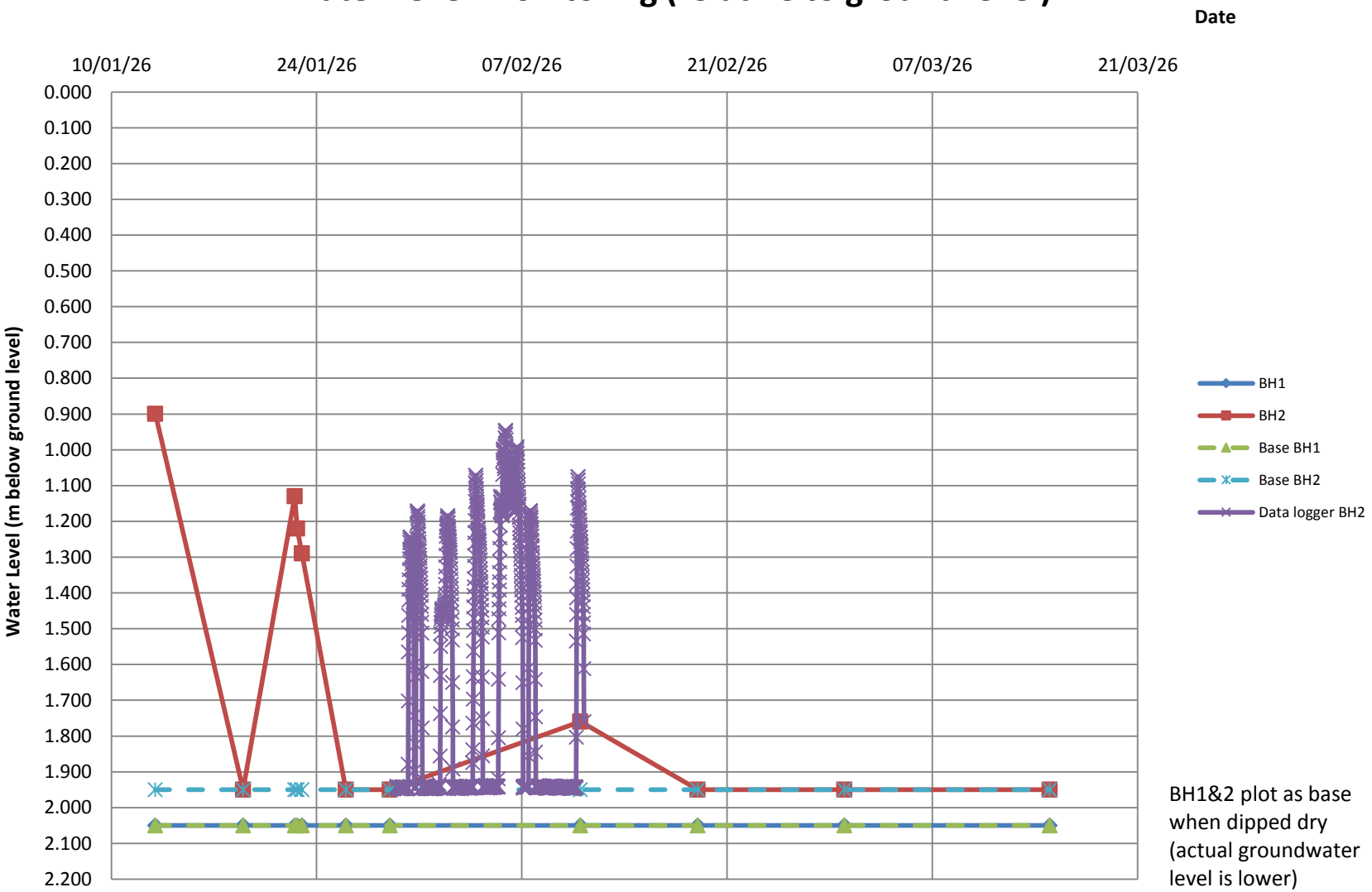
mAOD: metres Above Ordnance Datum

Ground levels estimated by reference to topo survey presented within Simon Dents Associates Drg dated Dec 2025

** Note : When BH recorded dry to base level plotted as 2.05m bgl and 128.55m AOD

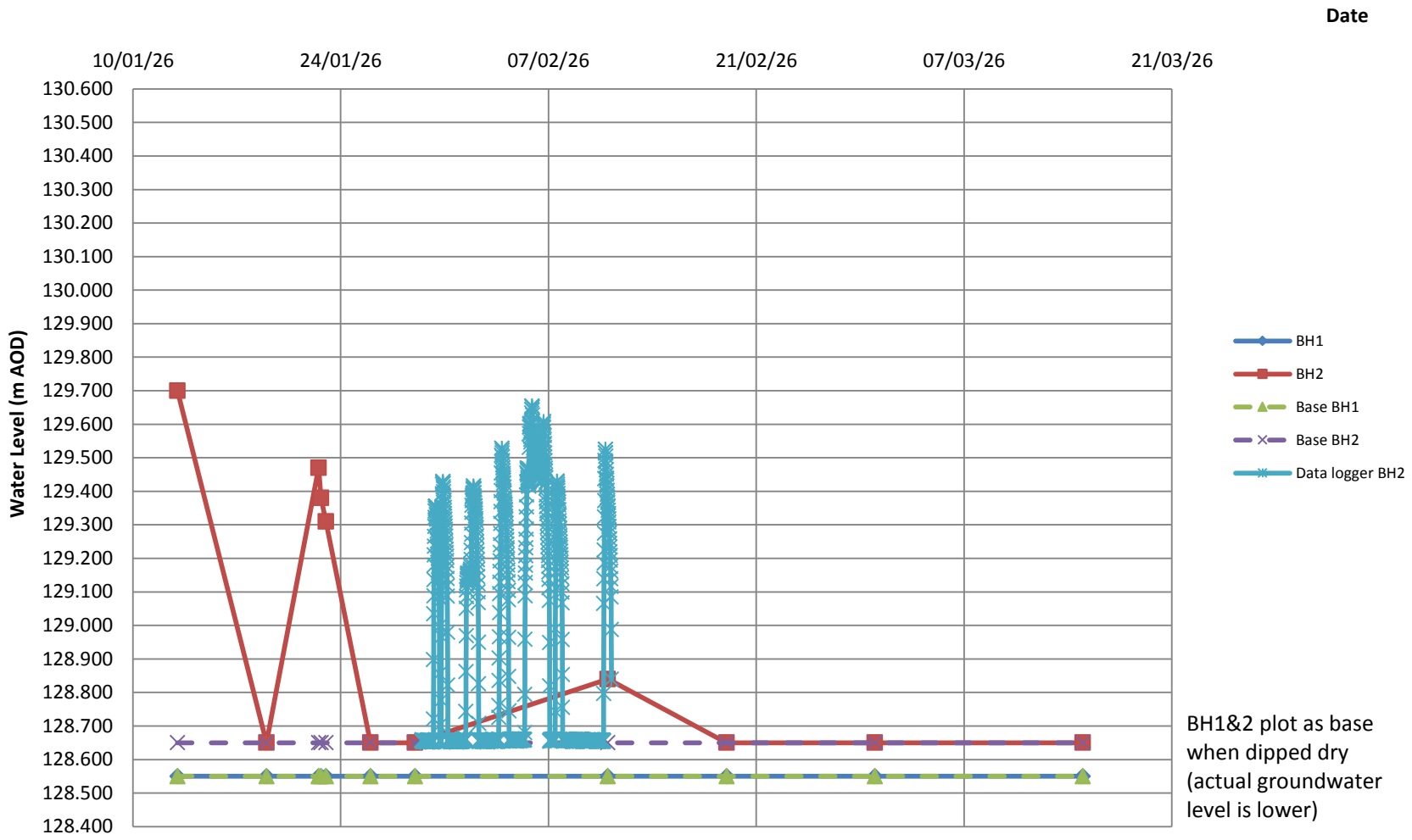
	Dip from top of standpipe cover					**Water level below ground level (m)**					**Water level (mAOD)**				
Date	**BH1**	**BH2**				**BH1**	**BH2**	**Base BH1**	**Base BH2**		**BH1**	**BH2**	**Base BH1**	**Base BH2**	**Weather**
13/01/26	dry	0.9				2.050	0.900	2.050	1.950		128.550	129.700	128.550	128.650	Heavy rain
19/01/26	dry	dry				2.050	1.950	2.050	1.950		128.550	128.650	128.550	128.650	Mainly o'cast, occ shower. Some rain during prev. few days
2026/01/22 12:15:00	dry	1.13				2.050	1.130	2.050	1.950		128.550	129.470	128.550	128.650	Rain/showers all day. Some heavy rain prev few days
2026/01/22 16:10:00	dry	1.22				2.050	1.220	2.050	1.950		128.550	129.380	128.550	128.650	
23/01/26	dry	1.29				2.050	1.290	2.050	1.950		128.550	129.310	128.550	128.650	Minly dry. Heavy rain o'night
26/01/26	dry	dry				2.050	1.950	2.050	1.950		128.550	128.650	128.550	128.650	Dry, o'cast. Heavy rain on 24/1, showers on 25/1
29/01/26	dry	dry				2.050	1.950	2.050	1.950		128.550	128.650	128.550	128.650	
11/02/26	dry	1.76				2.050	1.760	2.050	1.950		128.550	128.840	128.550	128.650	Dry sunny spells. Some heavy rain prev week
19/02/26	dry	dry				2.050	1.950	2.050	1.950		128.550	128.650	128.550	128.650	Overcast. Heavy rain prev 24hr
01/03/26	dry	dry				2.050	1.950	2.050	1.950		128.550	128.650	128.550	128.650	Showers. Dry prev few days
15/03/26	dry	dry				2.050	1.950	2.050	1.950		128.550	128.650	128.550	128.650	Dry. Some rain prev week

G6719 Gardeners Arms, Ardingly
Water Level Monitoring (relative to ground level)



BH1&2 plot as base when dipped dry (actual groundwater level is lower)

G6719 Gardeners Arms, Ardingly
Water Level Monitoring (relative to Ordnance Datum)



BH1&2 plot as base when dipped dry (actual groundwater level is lower)

Photograph 1 : BH1 location

Photograph 2 : Samples extracted BH1

Photograph 3 : BH2 location

Photograph 4 : Samples extracted BH2

Photograph 5 : Excavation TP1

Photograph 6 : Trial Pit TP1 Arisings

Photograph 7 : Excavation TP2

Photograph 8 : Arisings TP2

B. SDA 100-year soakaway calculation

PLANE BASE INFILTRATION SYSTEMS CIRIA C753 - EQ 25.1 & 25.2 - using FEH 22 rainfall data

PROJECT TITLE:	Gardners Arms New hotel block			JOB No:	25049
SOAKAWAY NO.:	1	LOCATION:	Roof water soakaway in car park	DATE:	Apr-26

1. FEH Rainfall data		2. Design Inflow		3. Test rate calculations				4. Design Outflow results	
Event:	100 year	Roof (m^2):	262	Test pit L:	2.00	Tot vol.:	2.0	a_{p50} (sq.m):	3.00
CC %	1.45	Yard (m^2):	0	Test pit W:	1.00	a_{p50}:	3.0	Inflow (cu.m):	0.00
Index:	10	Paths/patios (m^2):	0	Test pit D:	1.00	V_{p75-25}:	1.0	Outflow (cu.m):	1.00
Urban Creep (%):	10	Total Area (sq.m):	288	Free vol (%):	100	t_{p75-25}:	1182	Storage (cu.m):	-2.00
						Effective depth:	1.000		
						Infiltration rate (f) (m/s):	4.700E-06		

5. Infiltration system data						6. Infiltration coefficient (q) (m/h)		7. FOS
Length (m):	24.000	Width (m):	8.00	q value (m/h):	0.0034	Rate (q) provided by SI:		5
Estimated depth (d):	0.500	Inlet IL:	9.355	Calculated base:		Calculated Soil Rate (f):	0.016920	
Porosity n %:	96	diam inlet:	0.100	Top of s/away:	9.490			

Summary of designer's sizes for chosen D min duration for 100 year storm

L	W	d	A_b	A_d	P	R	n
24.00	8.00	0.500	192	288	64.00	1.50	0.96

Soakaway calculations are based on BRE 365 Infiltration results and the calculated method shown in CIRIA document C697 & C753 and uses FEH 22 rainfall data. The rainfall depths are factored by the climate change growth factor choses. The porosity rate is further factored for safety to suit risk from long term silting. Always refer to the project construction detail sheets 200 or 201 for the soakaway or permeable pavement make-up and the main general arrangement (GA) showing the size, levels and position of the soakaway.

Calculations used are derived from CIRIA document C753 - SUDS manual Eq 25.4

D (Hrs)	mm	I (m/h)	h_{max}
0.25	27.05	0.1569	0.0604
0.50	36.37	0.1055	0.0807
1.00	46.78	0.0678	0.1025
2.00	56.52	0.0410	0.1211
4.00	66.65	0.0242	0.1370
6.00	72.56	0.0175	0.1434
10.00	80.05	0.0116	0.1462
24.00	92.26	0.0056	0.1246
36.00	98.80	0.0040	0.0971
48.00	104.26	0.0031	0.0672
60.00	109.20	0.0026	0.0361
72.00	113.80	0.0023	0.0042
84.00	118.16	0.0020	-0.0282
96.00	122.36	0.0018	-0.0610

MAX HEIGHT (H_{max}): 0.1462

$$h_{max} = \frac{D\,(R\,i - q)}{n}$$

where:

h_{max} = maximum head of water above base of infiltration component

R = ratio of the drained area to the infiltration area. $R = \frac{A_D}{A_b}$

q = infiltration coefficient, from percolation test (m/h), adjusted by the appropriate factor of safety

i,D = intensity and duration of rainfall events with the required return period at the site location (m/h, h)

A_b = base area of infiltration system (m^2)

A_D = area to be drained (m^2)

n = porosity of fill material (voids volume/total volume)

This may be obtained from laboratory tests, or else the guide values provided in the following table may be used. If a value of porosity greater than 0.3 is used, the material delivered to site should be tested to ensure that it meets the design requirement.

Material	Porosity, n
geocellular systems	0.9–0.95
uniform gravel	0.3–0.4
graded sand or gravel	0.2–0.3

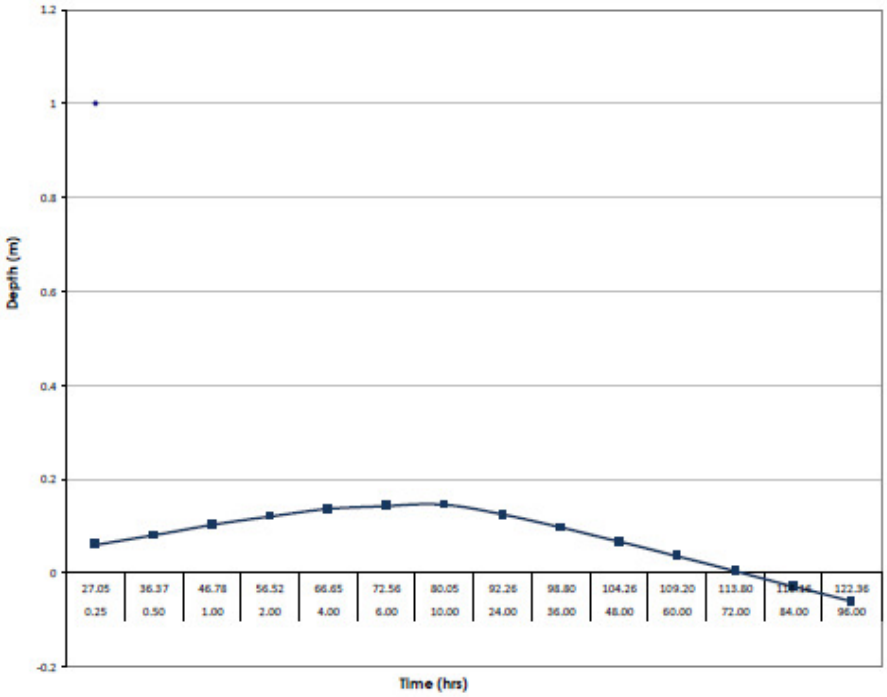
Time to empty

H_{max}:	0.1462
R:	1.50
Time to empty (hrs):	853

The time to empty is high due to the the base not included in the calculation.

Recalculated q (m/h):	0.00282174
Equivalent f rate:	0.00000078

EMPTY TIME IS GREATER THAN 24 HOURS SEE REQUIRED q ABOVE



C. SDA 30-year soakaway calculation

PLANE BASE INFILTRATION SYSTEMS CIRIA C753 - EQ 25.1 & 25.2 - using FEH 22 rainfall data

PROJECT TITLE:	Gardners Arms New hotel block			JOB No:	25049
SOAKAWAY NO.:	1	LOCATION:	Roof water soakaway in car park	DATE:	Apr-26

1. FEH Rainfall data		2. Design Inflow		3. Test rate calculations				4. Design Outflow results	
Event:	30 year	Roof (m^2):	262	Test pit L:	2.00	Tot vol.:	2.0	a_{50} (sq.m):	3.00
CC %	1.45	Yard (m^2):	0	Test pit W:	1.00	a_{p50}:	3.0	Inflow (cu.m):	0.00
Index:	7	Paths/patios (m^2):	0	Test pit D:	1.00	V_{p75-25}:	1.0	Outflow(cu.m):	1.00
Urban Creep (%):	10	Total Area (sq.m):	288	Free vol (%):	100	t_{p75-25}:	1182	Storage(cu.m):	-2.00
						Effective depth:	1.000		
						Infiltration rate (f) (m/s):	4.700E-06		

5. Infiltration system data						6. Infiltration coefficient (q) (m/h)		7. FOS
Length (m):	24.000	Width (m):	8.00	q value (m/h):	0.0034	Rate (q) provided by SI:		5
stimated depth (d):	0.500	Inlet IL:	9.355	Calculated base:		Calculated Soil Rate (f):	0.016920	
Porosity n %:	96	diam inlet:	0.100	Top of s/away:	9.490			

Summary of designer's sizes for chosen D min duration for 30 year storm

L	W	d	A_b	A_d	P	R	n
24.00	8.00	0.500	192	288	64.00	1.50	0.96

Soakaway calculations are based on BRE 365 infiltration results and the calculated method shown in CIRIA document C697 & C753 and uses FEH 22 rainfall data. The rainfall depths are factored by the climate change growth factor choses. The porosity rate is further factored for safety to suit risk from long term silting. Always refer to the project construction detail sheets 200 or 201 for the soakaway or permeable pavement make-up and the main general arrangement (GA) showing the size, levels and position of the soakaway.

Calculations used are derived from CIRIA document C753 - SUDS manual Eq 25.4

D (Hrs)	mm	i (m/h)	h_{max}
0.25	21.56	0.1250	0.0480
0.50	28.73	0.0833	0.0634
1.00	36.66	0.0532	0.0796
2.00	45.16	0.0327	0.0953
4.00	53.75	0.0195	0.1078
6.00	58.49	0.0141	0.1115
10.00	64.17	0.0093	0.1102
24.00	73.89	0.0045	0.0829
36.00	79.57	0.0032	0.0535
48.00	84.56	0.0026	0.0225
60.00	89.15	0.0022	-0.0094
72.00	93.48	0.0019	-0.0419
84.00	97.63	0.0017	-0.0748
96.00	101.66	0.0015	-0.1079

$$h_{max} = \frac{D\,(R\,i - q)}{n}$$

where:

h_{max} = maximum head of water above base of infiltration component

R = ratio of the drained area to the infiltration area, $R = \frac{A_D}{A_b}$

q = infiltration coefficient, from percolation test (m/h), adjusted by the appropriate factor of safety

i, D = intensity and duration of rainfall events with the required return period at the site location (m/h, h)

A_b = base area of infiltration system (m^2)

A_D = area to be drained (m^2)

n = porosity of fill material (voids volume/total volume)

This may be obtained from laboratory tests, or else the guide values provided in the following table may be used. If a value of porosity greater than 0.3 is used, the material delivered to site should be tested to ensure that it meets the design requirement.

Material	Porosity, n
geocellular systems	0.9–0.95
uniform gravel	0.3–0.4
graded sand or gravel	0.2–0.3

MAX HEIGHT (H_{max}): 0.1115

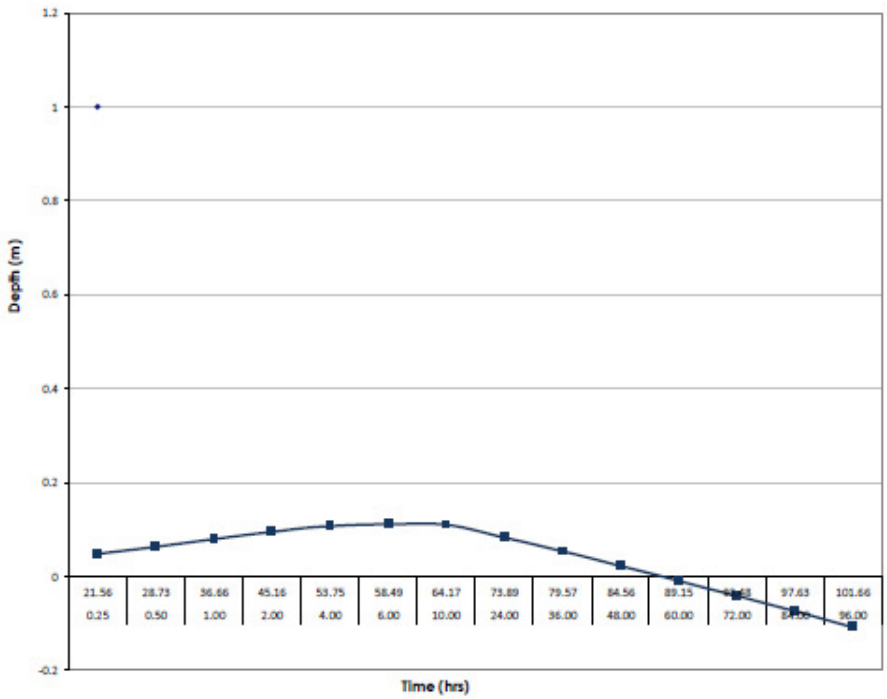
Time to empty

H_{max}:	0.1115
R:	1.50
Time to empty (hrs):	656

The time to empty is high due to the the base not included in the calculation.

Recalculated q (m/h):	0.00216879
Equivalent f rate:	0.00000060

EMPTY TIME IS GREATER THAN 24 HOURS SEE REQUIRED q ABOVE



D. SDA 100-year permeable parking bay calculations

PLANE BASE INFILTRATION SYSTEMS CIRIA C753 - EQ 25.1 & 25.2 - using FEH 22 rainfall data

PROJECT TITLE:	Gardners Arms New hotel block			JOB No:	25049
PERM AREA No.:	1	LOCATION:	Permeable Area 1	DATE:	Apr-26

1. FEH Rainfall data		2. Design Inflow		3. Test rate calculations				4. Design Outflow results	
Event:	100 year	Roof (m^2):	0	Test pit L:	2.00	Tot vol.:	2.0	a_{p50} (sq.m):	3.00
CC %	1.45	Yard (m^2):	0	Test pit W:	1.00	a_{p50}:	3.0	Inflow (cu.m):	315.00
Index:	10	Paths/patios (m^2):	315	Test pit D:	1.00	V_{p75-25}:	1.0	Outflow(cu.m):	1.00
Urban Creep (%):	10	Total Area (sq.m):	347	Free vol (%):	100	t_{p75-25}:	1182	Storage(cu.m):	628.00
						Effective depth:	1.000		
						Infiltration rate (f) (m/s):	4.700E-06		

5. Infiltration system data						6. Infiltration coefficient (q) (m/h)		7. FOS
Length (m):	27.500	Width (m):	4.80	q value (m/h):	0.0034	Rate (q) provided by SI:		5
stimated depth (d):	0.500	Inlet IL:	9.355	Calculated base:	9.490	Calculated Soil Rate (f):	0.016920	
Porosity n %:	30	diam inlet:	0.100	Top of s/away:	9.490			

Summary of designer's sizes for chosen D min duration for 100 year storm

L	W	d	A_b	A_d	P	R	n
27.50	4.80	0.500	132	347	64.60	2.63	0.30

Soakaway calculations are based on BRE 365 infiltration results and the calculated method shown in CIRIA document C697 & C753 and uses FEH 22 rainfall data. The rainfall depths are factored by the climate change growth factor choses. The porosity rate is further factored for safety to suit risk from long term silting. Always refer to the project construction detail sheets 200 or 201 for the soakaway or permeable pavement make-up and the main general arrangement (GA) showing the size, levels and position of the soakaway.

Calculations used are derived from CIRIA document C753 - SUDS manual Eq 25.4

D (Hrs)	mm	i (m/h)	h_{max}
0.25	27.05	0.1569	0.3404
0.50	36.37	0.1055	0.4558
1.00	46.78	0.0678	0.5822
2.00	56.52	0.0410	0.6945
4.00	66.65	0.0242	0.8005
6.00	72.56	0.0175	0.8529
10.00	80.05	0.0116	0.9028
24.00	92.26	0.0056	0.8998
36.00	98.80	0.0040	0.8474
48.00	104.26	0.0031	0.7813
60.00	109.20	0.0026	0.7087
72.00	113.80	0.0023	0.6317
84.00	118.16	0.0020	0.5516
96.00	122.36	0.0018	0.4695

$$h_{max} = \frac{D\,(R\,i - q)}{n}$$

where

h_{max} = maximum head of water above base of infiltration component

R = ratio of the drained area to the infiltration area, $R = \frac{A_D}{A_b}$

q = infiltration coefficient, from percolation test (m/h), adjusted by the appropriate factor of safety

i, D = intensity and duration of rainfall events with the required return period at the site location (m/h, h)

A_b = base area of infiltration system (m^2)

A_D = area to be drained (m^2)

n = porosity of fill material (voids volume/total volume)

This may be obtained from laboratory tests, or else the guide values provided in the following table may be used. If a value of porosity greater than 0.3 is used, the material delivered to site should be tested to ensure that it meets the design requirement.

Material	Porosity, n
geocellular systems	0.9–0.95
uniform gravel	0.3–0.4
graded sand or gravel	0.2–0.3

MAX HEIGHT (H_{max}):	0.9028
MAX WATER VOL (cu.m):	35.75

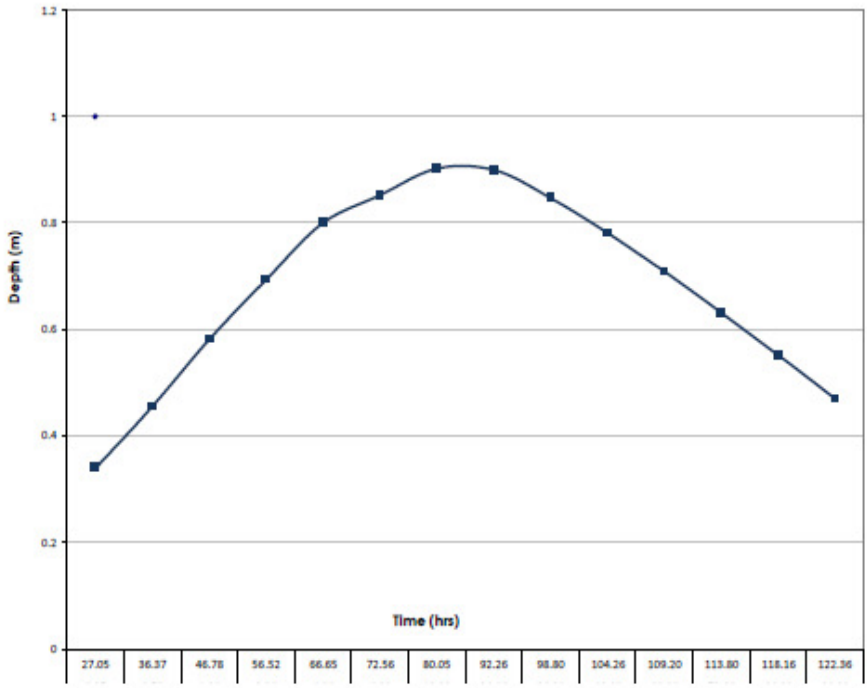
Time to empty

H_{max}:	0.9028
R:	2.63
Time to empty (hrs):	741

The time to empty is high due to the the base not included in the calculation.

Recalculated q (m/h):	0.00424799
Equivalent f rate:	0.00000118

EMPTY TIME IS GREATER THAN 24 HOURS SEE REQUIRED q ABOVE



PLANE BASE INFILTRATION SYSTEMS CIRIA C753 - EQ 25.1 & 25.2 - using FEH 22 rainfall data

PROJECT TITLE:	Gardners Arms New hotel block			JOB No:	25049
PERM AREA No.:	2	LOCATION:	Permeable Area 2	DATE:	Apr-26

1. FEH Rainfall data		2. Design Inflow		3. Test rate calculations				4. Design Outflow results	
Event:	100 year	Roof (m^2):	0	Test pit L:	2.00	Tot vol.:	2.0	a_{p50} (sq.m):	3.00
CC %	1.45	Yard (m^2):	0	Test pit W:	1.00	a_{p50}:	3.0	Inflow (cu.m):	360.00
Index:	10	Paths/patios (m^2):	360	Test pit D:	1.00	V_{p75-25}:	1.0	Outflow(cu.m):	1.00
Urban Creep (%):	10	Total Area (sq.m):	396	Free vol (%):	100	t_{p75-25}:	1182	Storage(cu.m):	718.00
						Effective depth:	1.000		
						Infiltration rate (f) (m/s):	4.700E-06		

5. Infiltration system data						6. Infiltration coefficient (q) (m/h)		7. FOS
Length (m):	57.500	Width (m):	4.80	q value (m/h):	0.0034	Rate (q) provided by SI:		5
:timated depth (d):	0.500	Inlet IL:	9.355	Calculated base:	9.490	Calculated Soil Rate (f):	0.016920	
Porosity n %:	30	diam inlet:	0.100	Top of s/away:	9.490			

Summary of designer's sizes for chosen D min duration for 100 year storm

L	W	d	A_b	A_d	P	R	n
57.50	4.80	0.500	276	396	124.60	1.43	0.30

Calculations used are derived from CIRIA document C753 - SUDS manual Eq 25.4

Soakaway calculations are based on BRE 365 infiltration results and the calculated method shown in CIRIA document C697 & C753 and uses FEH 22 rainfall data. The rainfall depths are factored by the climate change growth factor choses. The porosity rate is further factored for safety to suit risk from long term silting. Always refer to the project construction detail sheets 200 or 201 for the soakaway or permeable pavement make-up and the main general arrangement (GA) showing the size, levels and position of the soakaway.

D (Hrs)	mm	i (m/h)	h_{max}
0.25	27.05	0.1569	0.1848
0.50	36.37	0.1055	0.2466
1.00	46.78	0.0678	0.3131
2.00	56.52	0.0410	0.3694
4.00	66.65	0.0242	0.4171
6.00	72.56	0.0175	0.4355
10.00	80.05	0.0116	0.4423
24.00	92.26	0.0056	0.3691
36.00	98.80	0.0040	0.2791
48.00	104.26	0.0031	0.1816
60.00	109.20	0.0026	0.0805
72.00	113.80	0.0023	-0.0230
84.00	118.16	0.0020	-0.1281
96.00	122.36	0.0018	-0.2344

$$h_{max} = \frac{D\,(R\,i - q)}{n}$$

where:

h_{max} = maximum head of water above base of infiltration component

R = ratio of the drained area to the infiltration area, $R = \frac{A_D}{A_b}$

q = infiltration coefficient, from percolation test (m/h), adjusted by the appropriate factor of safety

i, D = intensity and duration of rainfall events with the required return period at the site location (m/h, h)

A_b = base area of infiltration system (m^2)

A_D = area to be drained (m^2)

n = porosity of fill material (voids volume/total volume)

This may be obtained from laboratory tests, or else the guide values provided in the following table may be used. If a value of porosity greater than 0.3 is used, the material delivered to site should be tested to ensure that it meets the design requirement.

Material	Porosity, n
geocellular systems	0.9–0.95
uniform gravel	0.3–0.4
graded sand or gravel	0.2–0.3

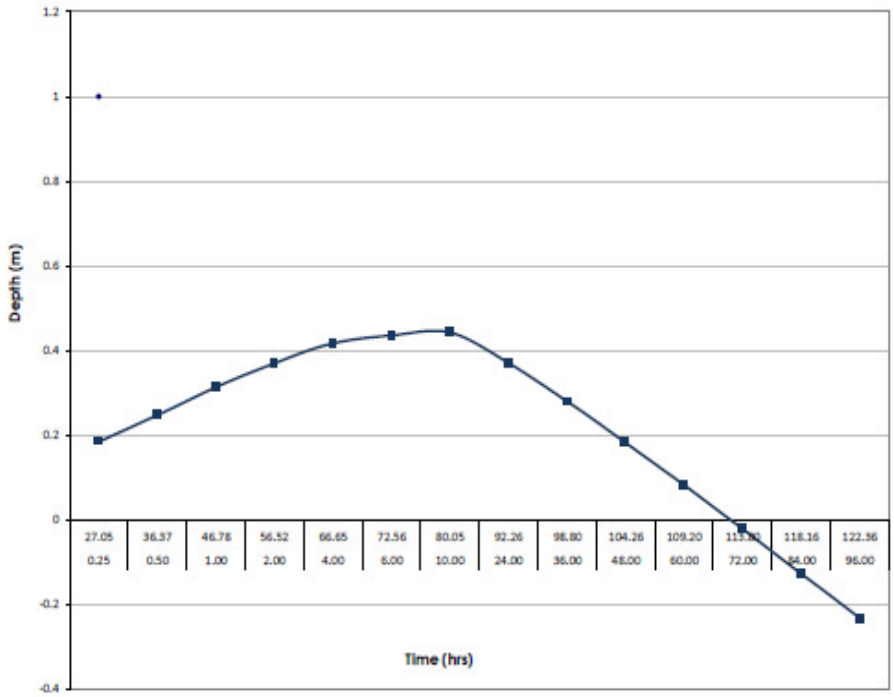
MAX HEIGHT (H_{max}):	0.4423
MAX WATER VOL (cu.m):	36.62

Time to empty	
H_{max}:	0.4423
R:	1.43
Time to empty (hrs):	1482

The time to empty is high due to the the base not included in the calculation.

Recalculated q (m/h):	0.00240595
Equivalent f rate:	0.00000067

EMPTY TIME IS GREATER THAN 24 HOURS SEE REQUIRED q ABOVE



PLANE BASE INFILTRATION SYSTEMS CIRIA C753 - EQ 25.1 & 25.2 - using FEH 22 rainfall data

PROJECT TITLE:	Gardners Arms New hotel block			JOB No:	25049
PERM AREA No.:	3	LOCATION:	Permeable Area 3	DATE:	Apr-26

1. FEH Rainfall data		2. Design Inflow		3. Test rate calculations				4. Design Outflow results	
Event:	100 year	Roof (m^2):	0	Test pit L:	2.00	Tot vol.:	2.0	a_{s50} (sq.m):	3.00
CC %	1.45	Yard (m^2):	0	Test pit W:	1.00	a_{p50}:	3.0	Inflow (cu.m):	531.00
Index:	10	Paths/patios (m^2):	531	Test pit D:	1.00	V_{p75-25}:	1.0	Outflow(cu.m):	1.00
Urban Creep (%):	10	Total Area (sq.m):	584	Free vol (%):	100	t_{p75-25}:	1182	Storage(cu.m):	1060.00
						Effective depth:	1.000		
						Infiltration rate (f) (m/s):	4.700E-06		

5. Infiltration system data						6. Infiltration coefficient (q) (m/h)		7. FOS
Length (m):	45.300	Width (m):	4.80	q value (m/h):	0.0034	Rate (q) provided by SI:		5
;timated depth (d):	0.500	Inlet IL:	9.355	Calculated base:	9.490	Calculated Soil Rate (f):	0.016920	
Porosity n %:	96	diam inlet:	0.100	Top of s/away:	9.490			

Summary of designer's sizes for chosen D min duration for 100 year storm

L	W	d	A_b	A_d	P	R	n
45.30	4.80	0.500	217	584	100.20	2.69	0.96

Soakaway calculations are based on BRE 365 infiltration results and the calculated method shown in CIRIA document C697 & C753 and uses FEH 22 rainfall data. The rainfall depths are factored by the climate change growth factor choses. The porosity rate is further factored for safety to suit risk from long term silting. Always refer to the project construction detail sheets 200 or 201 for the soakaway or permeable pavement make-up and the main general arrangement (GA) showing the size, levels and position of the soakaway.

Calculations used are derived from CIRIA document C753 - SUDS manual Eq 25.4

D (Hrs)	mm	i (m/h)	h_{max}
0.25	27.05	0.1569	0.1089
0.50	36.37	0.1055	0.1458
1.00	46.78	0.0678	0.1863
2.00	56.52	0.0410	0.2223
4.00	66.65	0.0242	0.2563
6.00	72.56	0.0175	0.2733
10.00	80.05	0.0116	0.2895
24.00	92.26	0.0056	0.2897
36.00	98.80	0.0040	0.2740
48.00	104.26	0.0031	0.2538
60.00	109.20	0.0026	0.2316
72.00	113.80	0.0023	0.2079
84.00	118.16	0.0020	0.1833
96.00	122.36	0.0018	0.1581

$$h_{max} = \frac{D\,(R\,i - q)}{n}$$

where:

h_{max} = maximum head of water above base of infiltration component

R = ratio of the drained area to the infiltration area, $R = \frac{A_D}{A_b}$

q = infiltration coefficient, from percolation test (m/h), adjusted by the appropriate factor of safety

i,D = intensity and duration of rainfall events with the required return period at the site location (m/h, h)

A_b = base area of infiltration system (m^2)

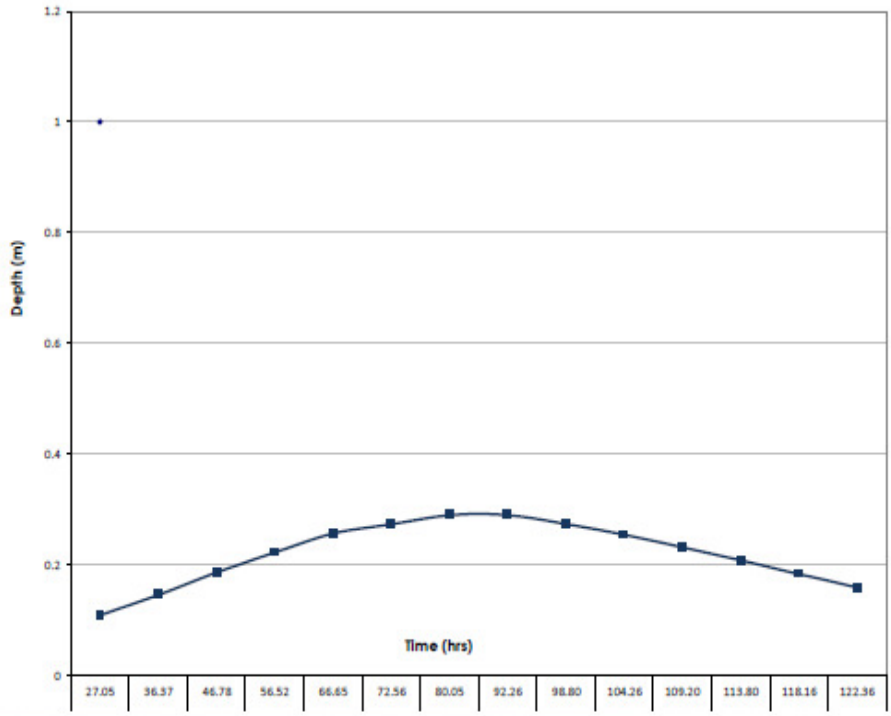
A_D = area to be drained (m^2)

n = porosity of fill material (voids volume/total volume)

This may be obtained from laboratory tests, or else the guide values provided in the following table may be used. If a value of porosity greater than 0.3 is used, the material delivered to site should be tested to ensure that it meets the design requirement.

Material	Porosity, n
geocellular systems	0.9–0.95
uniform gravel	0.3–0.4
graded sand or gravel	0.2–0.3

MAX HEIGHT (H_{max}):	0.2897
MAX WATER VOL (cu.m):	60.48



Time to empty	
H_{max}:	0.2897
R:	2.69
Time to empty (hrs):	1394

The time to empty is high due to the the base not included in the calculation.

Recalculated q (m/h):	0.00526880
Equivalent f rate:	0.00000146

EMPTY TIME IS GREATER THAN 24 HOURS SEE REQUIRED q ABOVE

E. SDA 30-year permeable parking bay calculations

PLANE BASE INFILTRATION SYSTEMS CIRIA C753 - EQ 25.1 & 25.2 - using FEH 22 rainfall data

PROJECT TITLE:	Gardners Arms New hotel block			JOB No:	25049
PERM AREA No.:	1	LOCATION:	Permeable Area 1	DATE:	Apr-26

1. FEH Rainfall data		2. Design Inflow		3. Test rate calculations				4. Design Outflow results	
Event:	30 year	Roof (m^2):	0	Test pit L:	2.00	Tot vol.:	2.0	a_{p50} (sq.m):	3.00
CC %	1.45	Yard (m^2):	0	Test pit W:	1.00	a_{p50}:	3.0	Inflow (cu.m):	315.00
Index:	7	Paths/patios (m^2):	315	Test pit D:	1.00	V_{p75-25}:	1.0	Outflow(cu.m):	1.00
Urban Creep (%):	10	Total Area (sq.m):	347	Free vol (%):	100	t_{p75-25}:	1182	Storage(cu.m):	628.00
						Effective depth:	1.000		
						Infiltration rate (f) (m/s):	4.700E-06		

5. Infiltration system data						6. Infiltration coefficient (q) (m/h)		7. FOS
Length (m):	27.500	Width (m):	4.80	q value (m/h):	0.0034	Rate (q) provided by SI:		5
stimated depth (d):	0.500	Inlet IL:	9.355	Calculated base:	9.490	Calculated Soil Rate (f):	0.016920	
Porosity n %:	30	diam inlet:	0.100	Top of s/away:	9.490			

Summary of designer's sizes for chosen D min duration for 30 year storm

L	W	d	A_b	A_d	P	R	n
27.50	4.80	0.500	132	347	64.60	2.63	0.30

Soakaway calculations are based on BRE 365 infiltration results and the calculated method shown in CIRIA document C697 & C753 and uses FEH 22 rainfall data. The rainfall depths are factored by the climate change growth factor choses. The porosity rate is further factored for safety to suit risk from long term silting. Always refer to the project construction detail sheets 200 or 201 for the soakaway or permeable pavement make-up and the main general arrangement (GA) showing the size, levels and position of the soakaway.

Calculations used are derived from CIRIA document C753 - SUDS manual Eq 25.4

D (Hrs)	mm	i (m/h)	h_{max}
0.25	21.56	0.1250	0.2707
0.50	28.73	0.0833	0.3589
1.00	36.66	0.0532	0.4538
2.00	45.16	0.0327	0.5504
4.00	53.75	0.0195	0.6368
6.00	58.49	0.0141	0.6744
10.00	64.17	0.0093	0.7014
24.00	73.89	0.0045	0.6668
36.00	79.57	0.0032	0.6035
48.00	84.56	0.0026	0.5314
60.00	89.15	0.0022	0.4543
72.00	93.48	0.0019	0.3738
84.00	97.63	0.0017	0.2911
96.00	101.66	0.0015	0.2069

$$h_{max} = \frac{D\,(R\,i - q)}{n}$$

where:

h_{max} = maximum head of water above base of infiltration component

R = ratio of the drained area to the infiltration area, $R = \frac{A_D}{A_b}$

q = infiltration coefficient, from percolation test (m/h), adjusted by the appropriate factor of safety

i, D = intensity and duration of rainfall events with the required return period at the site location (m/h, h)

A_b = base area of infiltration system (m^2)

A_D = area to be drained (m^2)

n = porosity of fill material (voids volume/total volume)

This may be obtained from laboratory tests, or else the guide values provided in the following table may be used. If a value of porosity greater than 0.3 is used, the material delivered to site should be tested to ensure that it meets the design requirement.

Material	Porosity, n
geocellular systems	0.9–0.95
uniform gravel	0.3–0.4
graded sand or gravel	0.2–0.3

MAX HEIGHT (H_{max}):	0.7014
MAX WATER VOL (cu.m):	27.77

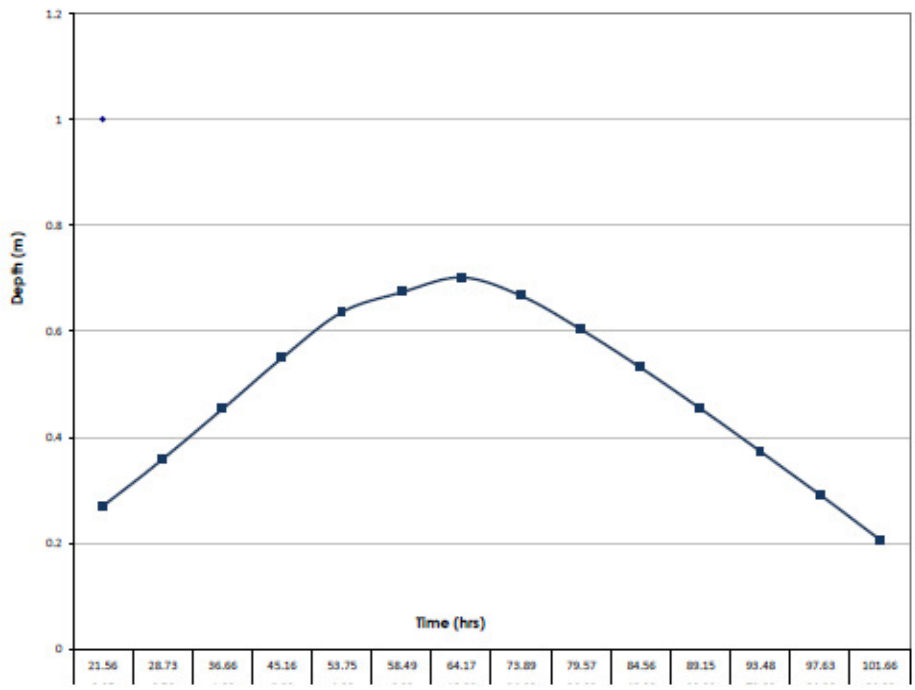
Time to empty

H_{max}:	0.7014
R:	2.63
Time to empty (hrs):	609

The time to empty is high due to the the base not included in the calculation.

Recalculated q (m/h):	0.00349148
Equivalent f rate:	0.00000097

EMPTY TIME IS GREATER THAN 24 HOURS SEE REQUIRED q ABOVE



PLANE BASE INFILTRATION SYSTEMS CIRIA C753 - EQ 25.1 & 25.2 - using FEH 22 rainfall data

PROJECT TITLE:	Gardners Arms New hotel block			JOB No:	25049
PERM AREA No.:	2	LOCATION:	Permeable Area 2	DATE:	Apr-26

1. FEH Rainfall data		2. Design Inflow		3. Test rate calculations				4. Design Outflow results	
Event:	30 year	Roof (m^2):	0	Test pit L:	2.00	Tot vol.:	2.0	a_{50} (sq.m):	3.00
CC %	1.45	Yard (m^2):	0	Test pit W:	1.00	a_{p50}:	3.0	Inflow (cu.m):	360.00
Index:	7	Paths/patios (m^2):	360	Test pit D:	1.00	V_{p75-25}:	1.0	Outflow(cu.m):	1.00
Urban Creep (%):	10	Total Area (sq.m):	396	Free vol (%):	100	t_{p75-25}:	1182	Storage(cu.m):	718.00
						Effective depth:	1.000		
						Infiltration rate (f) (m/s):	4.700E-06		

5. Infiltration system data						6. Infiltration coefficient (q) (m/h)		7. FOS
Length (m):	57.500	Width (m):	4.80	q value (m/h):	0.0034	Rate (q) provided by SI:		5
stimated depth (d):	0.500	Inlet IL:	9.355	Calculated base:	9.490	Calculated Soil Rate (f):	0.016920	
Porosity n %:	30	diam inlet:	0.100	Top of s/away:	9.490			

Summary of designer's sizes for chosen D min duration for 30 year storm

L	W	d	A_b	A_d	P	R	n
57.50	4.80	0.500	276	396	124.60	1.43	0.30

Soakaway calculations are based on BRE 365 infiltration results and the calculated method shown in CIRIA document C697 & C753 and uses FEH 22 rainfall data. The rainfall depths are factored by the climate change growth factor choses. The porosity rate is further factored for safety to suit risk from long term silting. Always refer to the project construction detail sheets 200 or 201 for the soakaway or permeable pavement make-up and the main general arrangement (GA) showing the size, levels and position of the soakaway.

Calculations used are derived from CIRIA document C753 - SUDS manual Eq 25.4

D (Hrs)	mm	i (m/h)	h_{max}
0.25	21.56	0.1250	0.1467
0.50	28.73	0.0833	0.1936
1.00	36.66	0.0532	0.2429
2.00	45.16	0.0327	0.2906
4.00	53.75	0.0195	0.3276
6.00	58.49	0.0141	0.3379
10.00	64.17	0.0093	0.3322
24.00	73.89	0.0045	0.2417
36.00	79.57	0.0032	0.1457
48.00	84.56	0.0026	0.0450
60.00	89.15	0.0022	-0.0586
72.00	93.48	0.0019	-0.1639
84.00	97.63	0.0017	-0.2705
96.00	101.66	0.0015	-0.3779

$$h_{max} = \frac{D\,(R\,i - q)}{n}$$

where:

h_{max} = maximum head of water above base of infiltration component

R = ratio of the drained area to the infiltration area, $R = \frac{A_D}{A_b}$

q = infiltration coefficient, from percolation test (m/h), adjusted by the appropriate factor of safety

i, D = intensity and duration of rainfall events with the required return period at the site location (m/h, h)

A_b = base area of infiltration system (m^2)

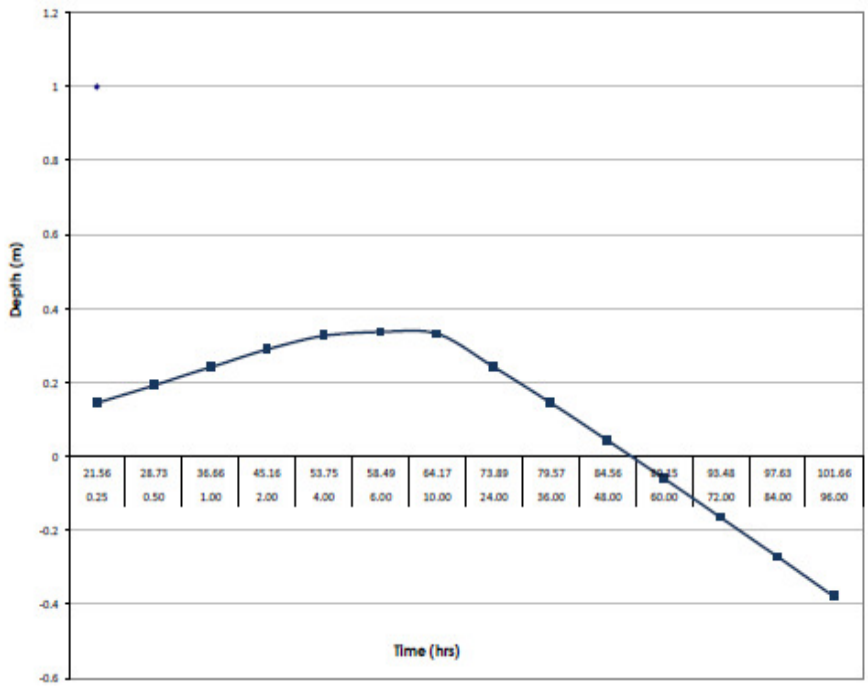
A_D = area to be drained (m^2)

n = porosity of fill material (voids volume/total volume)

This may be obtained from laboratory tests, or else the guide values provided in the following table may be used. If a value of porosity greater than 0.3 is used, the material delivered to site should be tested to ensure that it meets the design requirement.

Material	Porosity, n
geocellular systems	0.9–0.95
uniform gravel	0.3–0.4
graded sand or gravel	0.2–0.3

MAX HEIGHT (H_{max}):	0.3379
MAX WATER VOL (cu.m):	27.98



Time to empty

H_{max}:	0.3379
R:	1.43
Time to empty (hrs):	1168

The time to empty is high due to the the base not included in the calculation.

Recalculated q (m/h):	0.00189597
Equivalent f rate:	0.00000053

EMPTY TIME IS GREATER THAN 24 HOURS SEE REQUIRED q ABOVE

PLANE BASE INFILTRATION SYSTEMS CIRIA C753 - EQ 25.1 & 25.2 - using FEH 22 rainfall data

PROJECT TITLE:	Gardners Arms New hotel block			JOB No:	25049
PERM AREA No.:	3	LOCATION:	Permeable Area 3	DATE:	Apr-26

1. FEH Rainfall data		2. Design Inflow		3. Test rate calculations				4. Design Outflow results	
Event:	100 year	Roof (m^2):	0	Test pit L:	2.00	Tot vol.:	2.0	a_{50} (sq.m):	3.00
CC %	1.45	Yard (m^2):	0	Test pit W:	1.00	a_{p50}:	3.0	Inflow (cu.m):	531.00
Index:	10	Paths/patios (m^2):	531	Test pit D:	1.00	V_{p75-25}:	1.0	Outflow(cu.m):	1.00
Urban Creep (%):	10	Total Area (sq.m):	584	Free vol (%):	100	t_{p75-25}:	1182	Storage(cu.m):	1060.00
						Effective depth:	1.000		
						Infiltration rate (f) (m/s):	4.700E-06		

5. Infiltration system data						6. Infiltration coefficient (q) (m/h)		7. FOS
Length (m):	45.300	Width (m):	4.80	q value (m/h):	0.0034	Rate (q) provided by SI:		5
stimated depth (d):	0.500	Inlet IL:	9.355	Calculated base:	9.490	Calculated Soil Rate (f):	0.016920	
Porosity n %:	96	diam inlet:	0.100	Top of s/away:	9.490			

Summary of designer's sizes for chosen D min duration for 100 year storm

L	W	d	A_b	A_d	P	R	n
45.30	4.80	0.500	217	584	100.20	2.69	0.96

Soakaway calculations are based on BRE 365 infiltration results and the calculated method shown in CIRIA document C697 & C753 and uses FEH 22 rainfall data. The rainfall depths are factored by the climate change growth factor choses. The porosity rate is further factored for safety to suit risk from long term silting. Always refer to the project construction detail sheets 200 or 201 for the soakaway or permeable pavement make-up and the main general arrangement (GA) showing the size, levels and position of the soakaway.

Calculations used are derived from CIRIA document C753 - SUDS manual Eq 25.4

D (Hrs)	mm	i (m/h)	h_{max}
0.25	27.05	0.1569	0.1089
0.50	36.37	0.1055	0.1458
1.00	46.78	0.0678	0.1863
2.00	56.52	0.0410	0.2223
4.00	66.65	0.0242	0.2563
6.00	72.56	0.0175	0.2733
10.00	80.05	0.0116	0.2895
24.00	92.26	0.0056	0.2897
36.00	98.80	0.0040	0.2740
48.00	104.26	0.0031	0.2538
60.00	109.20	0.0026	0.2316
72.00	113.80	0.0023	0.2079
84.00	118.16	0.0020	0.1833
96.00	122.36	0.0018	0.1581

$$h_{max} = \frac{D\,(R\,i - q)}{n}$$

where:

h_{max} = maximum head of water above base of infiltration component

R = ratio of the drained area to the infiltration area, $R = \frac{A_D}{A_b}$

q = infiltration coefficient, from percolation test (m/h), adjusted by the appropriate factor of safety

i,D = intensity and duration of rainfall events with the required return period at the site location (m/h, h)

A_b = base area of infiltration system (m^2)

A_D = area to be drained (m^2)

n = porosity of fill material (voids volume/total volume)

This may be obtained from laboratory tests, or else the guide values provided in the following table may be used. If a value of porosity greater than 0.3 is used, the material delivered to site should be tested to ensure that it meets the design requirement.

Material	Porosity, n
geocellular systems	0.9–0.95
uniform gravel	0.3–0.4
graded sand or gravel	0.2–0.3

MAX HEIGHT (H_{max}):	0.2897
MAX WATER VOL (cu.m):	60.48

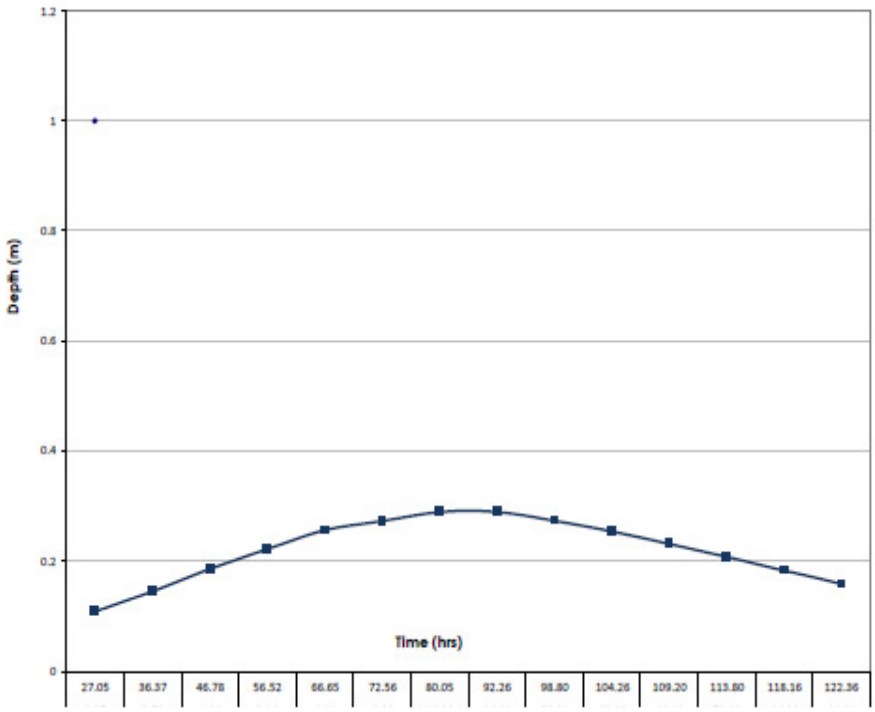
Time to empty

H_{max}:	0.2897
R:	2.69
Time to empty (hrs):	1394

The time to empty is high due to the the base not included in the calculation.

Recalculated q (m/h):	0.00526880
Equivalent f rate:	0.00000146

EMPTY TIME IS GREATER THAN 24 HOURS SEE REQUIRED q ABOVE



F. SuDS Mitigation indices for roof

SIMPLE INDEX WATER QUALITY CALCULATIONS CIRIA C753 - Chapter 26

PROJECT TITLE:	Roof water - Gardners Arms Ardingly			JOB No:	25049
SYSTEM:	Roofwater	LOCATION:	Car Park	DATE:	Apr-26

Pollution Hazard Indices - CIRIA 753 - Table 26.2

Land Use	PHL	TSS	Metals	Hydrocarbons
Resi roofs	Very Low	0.2	0.2	0.05
Other roofs	Low	0.3	0.5	0.05
Private driveways	Low	0.5	0.4	0.4
Yards, public car parks & roads	Medium	0.7	0.6	0.7
Lorry parks - industrial sites	High	0.8	0.8	0.9

Mitigation Indices - Discharge to surface water - CIRIA 753 Table 26.3

Type of SuDS	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Vortex desiliting chamber	0.5	0.4	0.5
Detention basin/tank	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8

Mitigation Indices - Discharge to ground water - CIRIA 753 - Table 26.4

Type of suds	TSS	Metals	Hydrocarbons
Dense vegetation of min 300mm	0.6	0.5	0.6
Soil of min 300mm	0.4	0.3	0.3
Infil. trench (300mm depth)	0.4	0.4	0.4
Perm pavement min 300mm depth c/w geotextile	0.7	0.6	0.7
Bio retention over soil of min 300mm depth	0.8	0.8	0.8

THE SIMPLE INDEX APPROACH

1. This method of determing water quality for SuDS discharges derives from Chapter 26.0 of the SuDS manual produced by CIRIA (doc C753).
2. The approach requires the **TOTAL SUDS MITIGATION INDICES > POLLUTION HAZARD INDICES** for the particular site.
3. Where multiple SuDS components are used, the mitigation index is multiplied by a factor of 0.5 for each additional feature.
4. Where discharges are to groundwater, a weighting and screening approach is used additionally to assess risk.
5. Note the figure for metals in Table 26.2 for Other roofs is the average between 0.2-0.8.
6. An estimated figure for TSS, Netals and hydrocarbons has been provided for the use of sit/catchpits on the storm water drainage system.

Pollution Hazard Indices

Land Use	Pollution Haz level	Total Sus Solids (TSS)	Metals	Hydrocarbons
Resi roofs	Very Low	0.2	0.2	0.05

Discharge to surface water or groundwater?

Ground Water

Total Pollution Hazard Index (PHI) for site is 0.450

SuDS Mitigation Indices for discharges to surface water

SuDS Component	No. off	TSS	Metals	Hydrocarbons
Filter strip	0	0	0	0
Filter drain	0	0	0	0
Swale	0	0	0	0
Bioretention	0	0	0	0
Permeable pavement	0	0	0	0
Vortex desiliting chamber	0	0	0	0
Detention basin/tank	0	0	0	0
Pond	0	0	0	0
Wetland	0	0	0	0
Total SuDS Mitigation Index (SMI) for discharge to surface water				0.00

SuDS Mitigation Indices for discharges to groundwater

SuDS Component	No. off	TSS	Metals	Hydrocarbons
Dense vegetation of min 300mm	0	0	0	0
Soil of min 300mm	0	0	0	0
Infil. trench (300mm depth)	1	0.4	0.4	0.4
Perm pavement min 300mm depth c/w geotexti	0	0	0	0
Bio retention over soil of min 300mm depth	0	0	0	0
Total SuDS Mitigation Index for discharge to groundwater				1.2

Not applicable

The design features used are acceptable

G. SuDS Mitigation indices for parking bays

SIMPLE INDEX WATER QUALITY CALCULATIONS CIRIA C753 - Chapter 26

PROJECT TITLE:	Parking Bays - Gardners Arms Ardingly	JOB No:	25049
SYSTEM: Park Bays	LOCATION: Car Park	DATE:	Apr-26

Pollution Hazard Indices - CIRIA 753 - Table 26.2

Land Use	PHL	TSS	Metals	Hydrocarbons
Roof roofs	Very Low	0.2	0.2	0.05
Other roofs	Low	0.3	0.5	0.05
Private driveways	Low	0.5	0.4	0.4
Yards, public car parks & roads	Medium	0.7	0.6	0.7
Lorry parks - industrial sites	High	0.8	0.8	0.9

Mitigation Indices - Discharge to surface water - CIRIA 753 Table 26.3

Type of SuDS	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Vortex desilting chamber	0.5	0.4	0.5
Detention basin/tank	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8

Mitigation Indices - Discharge to ground water - CIRIA 753 - Table 26.4

Type of suds	TSS	Metals	Hydrocarbons
Dense vegetation of min 300mm	0.6	0.5	0.6
Soil of min 300mm	0.4	0.3	0.3
Infil. trench (300mm depth)	0.4	0.4	0.4
Perm pavement min 300mm depth c/w geotextile	0.7	0.6	0.7
Bio retention over soil of min 300mm depth	0.8	0.8	0.8

THE SIMPLE INDEX APPROACH

1. This method of determing water quality for SuDS discharges derives from Chapter 26.0 of the SuDS manual produced by CIRIA (doc C753). 2. The approach requires the **TOTAL SUDS MITIGATION INDICES > POLLUTION HAZARD INDICES** for the particular site.
3. Where multiple SuDS components are used, the mitigation index is multiplied by a factor of 0.5 for each additional feature.
4. Where discharges are to groundwater, a weighting and screening approach is used additionally to assess risk.
5. Note the figure for metals in Table 26.2 for Other roofs is the average between 0.2-0.8.
6. An estimated figure for TSS, Metals and hydrocarbons has been provided for the use of silt/cat chpits on the storm water drainage system.

Pollution Hazard Indices

Land Use	Pollution Haz level	Total Sus Solids (TSS)	Metals	Hydrocarbons
Yards, public car parks & roads	Medium	0.7	0.6	0.7

Discharge to surface water or ground water?
Ground Water

Total Pollution Hazard Index (PHI) for site is	2.000

SuDS Mitigation Indices for discharges to surface water

SuDS Component	No. off	TSS	Metals	Hydrocarbons
Filter strip	0	0	0	0
Filter drain	0	0	0	0
Swale	0	0	0	0
Bioretention	0	0	0	0
Permeable pavement	0	0	0	0
Vortex desilting chamber	0	0	0	0
Detention basin/tank	0	0	0	0
Pond	0	0	0	0
Wetland	0	0	0	0
Total SuDS Mitigation Index (SMI) for discharge to surface water				0.00

SuDS Mitigation Indices for discharges to groundwater

SuDS Component	No. off	TSS	Metals	Hydrocarbons
Dense vegetation of min 300mm	0	0	0	0
Soil of min 300mm	0	0	0	0
Infil. trench (300mm depth)	0	0	0	0
Perm pavement min 300mm depth c/w geotexti	1	0.7	0.6	0.7
Bio retention over soil of min 300mm depth	0	0	0	0
Total SuDS Mitigation Index for discharge to groundwater				2

Not applicable

The design features used are acceptable

H – 30 -year storm network check

STORM WATER NETWORK DESIGN

PROJECT TITLE:	Gardners Arms Ardingly				25049
STATUS	PREL	SYSTEM:	$1.000, $2.000 & $3.000	Sheet	1 OF 1

1. Storm Water & pipe variables

Temp (C):	15	M5-60(mm):	20	Te (mins):	5	Design MD:	M30
K_s (mm):	0.6	C_v:	0.75	Min V:	0.6	Max V:	1.8
r value:	0.42	C_e:	1.30	Flat R I:	0	Min slope:	0

2. Glossary of terms:

Te - Time of entry; Ks - Roughness value; MD - Design storm year; Z2 - Factor which alters the MD-Dm; Q_{ff} - Full bore discharg; D_{RAT} - Proportional depth of flow

Tf - Time of flow; CSA - Crass sectional area; Z1 - Factor which alters the M5-D60; Q_{ACT} - Actual flow; V_{ff} - Full bore velocity; $Area_{CUM}$ - Cumulative contributing area

Tc - Time of concentration; Cv - Routing coefficient; R1 - Flat rate of rainfall; Q_{RAT} - Proportional discharge; V_{ACT} - Actual velocity for Q_{ACT}

Pipe ref	Length (m)	US IL (m)	DS IL (m)	(1: xx)	$Area_{CUM}$ (sq.m)	ks (mm)	Pref Dia (mm)	Pipe CSA (sq.m)	Pipe V_{ff} (m/s)	Pipe Q_{ff} (lit/s)	Coeff part full pipe	Tf (mins)	Tc (mins)	Z1 (factor)	M5dmin (mm)	Z2 (factor)	MD-Dmin (mm)	Rainfall (mm/hr)	$Area_{CUM}$ (sq.m)	Q_{ACT} (lit/sec)	Q_{RAT}	D_{RAT} (D_{RAT}/ D)	V_{ACT} (m/s)	Final Dia (mm)
$1.000	7.00	129.625	129.510	60.9	139	0.6	100	0.0079	1.00	7.87	59	0.12	5.12	0.38	7.6	1.41	10.72	75.4	139	2.84	0.361	0.40	0.90	100
$2.000	6.70	129.625	129.510	58.3	62	0.6	100	0.0079	1.02	8.04	60	0.11	5.11	0.38	7.6	1.41	10.72	75.5	62	1.27	0.158	0.26	0.73	100
$3.000	6.70	129.625	129.510	58.3	62	0.6	100	0.0079	1.02	8.04	60	0.11	5.11	0.38	7.6	1.41	10.72	75.5	62	1.27	0.158	0.26	0.73	100