

Drainage Statement – Proposed Havant and South Downs College Carpark 6.

Existing surface water drainage

Existing topographical plans indicate a network of surface water private sewers which flow into existing public roads to the west of the Havant and South Downs College (HSDC). However, at this stage the location of discharge is unknown as there are no watercourses in the local area. The existing site comprises a large multi-storey building, a smaller single storey building along with soft and hard landscaping areas. These areas drain into rainwater downpipes and gullies but there is no indication of any existing watercourses, soakaways or direct infiltration into the ground. An existing plan of HSDC with the proposed car park location can be found under **Appendix A**.

Site investigation works

A Preliminary Geo-Environmental and Geotechnical Assessment has been carried out over two days by G+W in January 2022. As part of this investigation G+W undertook two soil infiltration tests in accordance with BRE Digest 365 infiltration testing. The proposed location of the bore holes and infiltration rates can be found in **appendix B**. Due to the nature of the test area reasonable long duration permeability of this area was achieved, under normal testing criteria four out of six tests did not achieve a 75% drain time. However, the two tests left overnight indicated suitable levels of infiltration.

Surface Water Philosophy Conclusion

Following the CIRIA SuDs manual discharge hierarchy, it has been concluded that direct discharge into an existing ground via a permeable sub-base soakaway is possible and forms the most sustainable drainage as part of the proposed development.

Proposed surface water drainage

The existing buildings and landscaping will be demolished with material graded and stored on site for potential future re-use. Existing underground drainage will be capped and covered to achieve suitable formation levels. Existing buildings which remain will continue to drain as normal and act independently of the proposed works. The proposed drainage strategy can be found in **appendix C**.

We propose to adopt a system of attenuated storage utilising the sub-base below the full extent of proposed car park area. Based on the proposed car park layout and indicative levels, the surface water which falls onto this area will discharge via a permeable surface finish and will fill the 30% void space within the 0.3m deep sub-base covering an area of approx. 1,778m² of 10-63 clean angular stone and infiltrate directly into the ground. Design calculations can be found in **appendix D** for a 1 in 100-year event plus 40% climate change.

For all storm events up to 1 in 100-year plus 40% climate change, the depth of water in the sub-base does not exceed 300mm and therefore there is no flood risk.

Water treatment

Table 4.3 in chapter 4 of the CIRIA SuDS Manual looks at the land use of a site and identifies the pollution hazard level and requirements for discharge associated with it. The proposed site classifies as residential roofs for the buildings and residential car parking. The requirements for discharge to ground water for a site of this land use is the Simple Index Approach.

The Simple Index Approach characterises hazards and calculates how to reduce risk for discharge to surface water and groundwater in three steps.

Step 1 – Allocate suitable pollution hazard indices for the proposed land use.

Step 2 – Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index.

Step 3 – Where the discharge is to protected surface waters or groundwater, consider the need for a more precautionary approach.

The pollution hazard indices for different land use classifications are provided in table 26.2 in CIRIA 753 and have been repeated below:

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

It can be seen from the table that for the proposed site, the residential roofs have a Very Low pollution hazard level. For the residential parking areas, the pollution hazard indices give indices of 0.5 for Total suspended solids (TSS), 0.4 for metals and 0.4 for Hydrocarbons.

For the indicative SuDS mitigation indices for discharge to groundwater, mitigation indices are applied for different SuDS components. Table 26.4 from CIRIA 753 is repeated below:

TABLE 26.4 Indicative SuDS mitigation indices for discharges to groundwater			
Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates ¹	TSS	Metals	Hydrocarbons
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ²	0.6*	0.5	0.6
A soil with good contaminant attenuation potential ² of at least 300 mm in depth ²	0.4*	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, ie graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20 mm gravel) underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ²	0.4*	0.4	0.4
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ²	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ²	0.8*	0.8	0.8
Proprietary treatment systems ³ *	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

For the proposed parking areas, Permeable Paving SuDS components are being used, giving mitigation indices of 0.7 for TSS, 0.6 for metals and 0.7 for Hydrocarbons.

The proposed parking areas will utilise permeable paving to provide surface water quality treatment at the source.

This provides sufficient treatment in accordance with SuDS manual C753.

Maintenance

This section sets out the inspection and maintenance requirements for long term management of the developments surface water drainage strategy. This work is to be undertaken by a private maintenance company.

All those responsible for maintenance should take appropriate health, safety and welfare precautions for all activities including lone working, if relevant, and risk assessments should always be undertaken. The sites infrastructure Health and Safety File should be consulted before carrying out any works either inside or outside of the development's boundary and information regarding the location of existing utilities passed on to operatives.

The requirements of the Health and Safety at Work Act 1974 and The Construction (Design and Management) Regulations 2015 should be adhered to and any residual risks identified in the Health and Safety File should be managed and information passed on the maintenance operatives through task specific risk assessments.

There are three types of maintenance activities associated with surface water drainage systems.

The SuDS Manual, CIRIA C753, defines these as:

- Regular Maintenance – ‘basic tasks undertaken on a frequent and predictable schedule’ including vegetation management, litter and debris removal, and inspections.’
- Occasional Maintenance – ‘tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).’
- Remedial Maintenance – ‘intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.’

Operation and Maintenance Activity	SuDs Component		
	Piped Network / Inspection Chambers	Cellular / Modular Storage	Permeable Pavement
Regular Maintenance			
Inspection	■	■	■
Litter and debris removal	■	□	■
Grass cutting		□	□
Weed and invasive plant control			□
Occasional Maintenance			
Sediment management	■	■	■
Vacuum sweeping and brushing			■
Remedial Maintenance			
Structure rehabilitation/ repair	□	□	□
Infiltration surface reconditioning			□
■ Will be required □ May be required			
Extract from The SuDs Manual Table 32.1 : Typical key SuDs components operation and maintenance activities			

Permeable Pavement Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over the whole surface). Care should be taken in adjusting vacuuming equipment to avoid removal of jointing material if present. Any lost material should be replaced.	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturers' recommendations – pay particular attention to areas where water runs from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas.	As required.
	Removal of weed or management using glyphosate applied directly to the weeds by an applicator rather than spraying.	As required – once per year on less frequently used pavements
Remedial Maintenance	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving.	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structured performance or a hazard to users, and replace lost jointing material.	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 year or as required (if infiltration and filtration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and / or weed growth - If required, take remedial action.	Three-monthly, forty-eight hours after large rainfall events in the first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

The SuDS Manual Table 20.15: Operation and maintenance requirements for pervious pavements

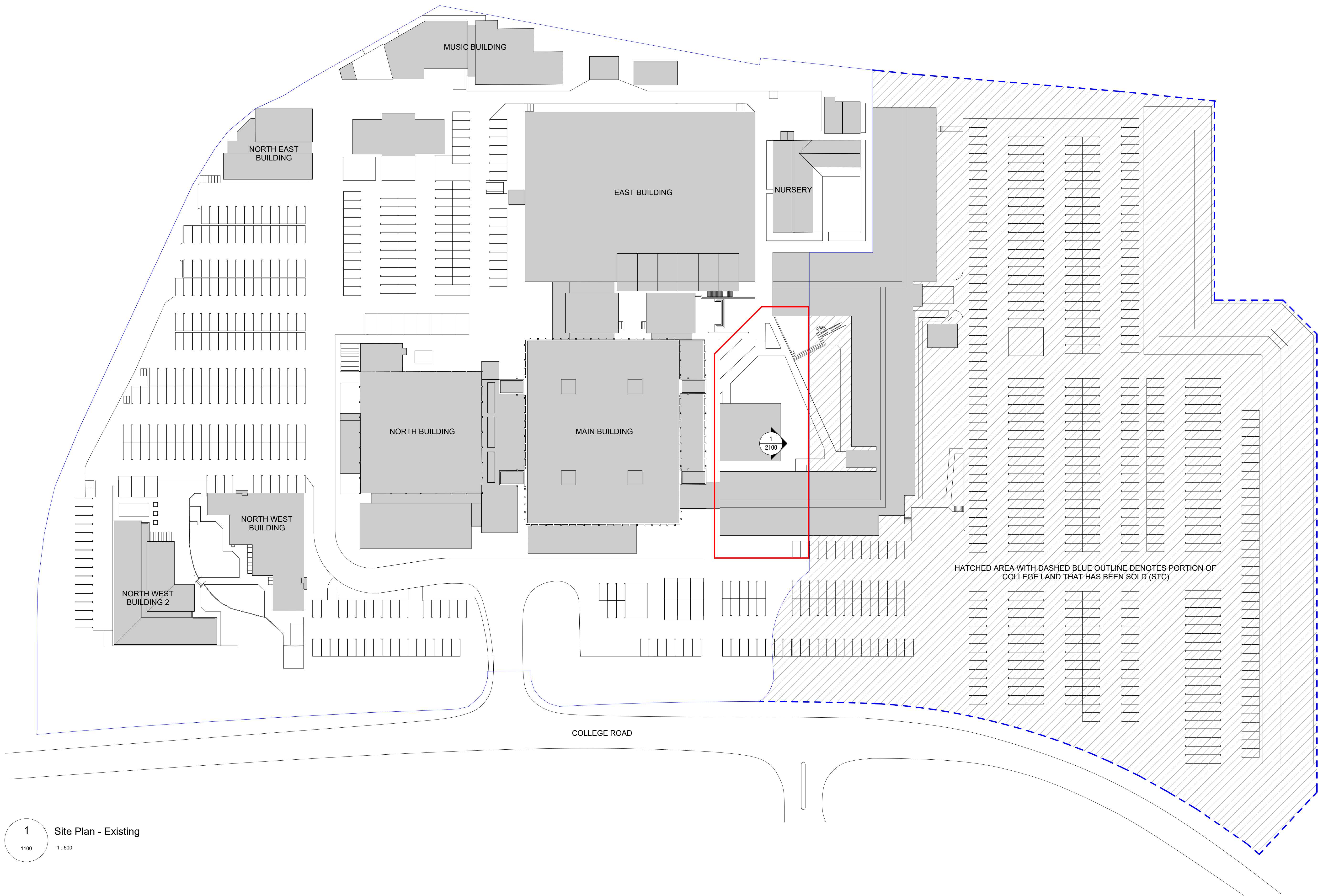
Tim Killingback – Engineering team leader

Scott White and Hookins

February 2022

Appendix A

Existing Site Layout



HATCHED AREA WITH DASHED BLUE OUTLINE DENOTES PORTION OF COLLEGE LAND THAT HAS BEEN SOLD (STC)

1

Site Plan - Existing

1100

1 : 500

Drawing Reference: 2202-HOST-ZZ-00-DR-A-1100		Revision P4	Drawing Status: PLANNING (REV 1)	<table><tr><th>Rev</th><th>Date</th><th>Note</th><th>CHKD</th></tr><tr><td>P1</td><td>01.02.22</td><td>FOR REVIEW</td><td>JG</td></tr><tr><td>P2</td><td>03.02.22</td><td>FOR REVIEW</td><td>JG</td></tr><tr><td>P3</td><td>07.02.22</td><td>PLANNING</td><td>JG</td></tr><tr><td>P4</td><td>14.02.22</td><td>PLANNING (REV 1)</td><td>JG</td></tr><tr><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td></tr><tr><td> </td><td> </td><td> </td><td> </td></tr></table>	Rev	Date	Note	CHKD	P1	01.02.22	FOR REVIEW	JG	P2	03.02.22	FOR REVIEW	JG	P3	07.02.22	PLANNING	JG	P4	14.02.22	PLANNING (REV 1)	JG																					Notes: GENERAL NOTES: Dimensions, areas and levels where given are only approximate and subject to site survey. All dimensions are to be checked on site. Any discrepancies or variations are to be reported to the architect before work commences. Electronic data / drawings are issued as "read only" and should not be interrogated for measurement. All dimensions and levels should be read, only from those values stated in text, on the drawing. DO NOT SCALE OFF THIS DRAWING
Rev	Date	Note	CHKD																																										
P1	01.02.22	FOR REVIEW	JG																																										
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P3	07.02.22	PLANNING	JG																																										
P4	14.02.22	PLANNING (REV 1)	JG																																										
Scale @A1: 1 : 500		Issue Date: 14.02.22	Drawing Title: Site Plan - Existing																																										
Drawn By: JG Checked By: JG		Client: PMC / HSDC																																											
Project Title: 2202-HSDC Car Park 6																																													

APPLICATION BOUNDARY

OWNERSHIP BOUNDARY

10m

50m

NORTH

host

www.host-architecture.co.uk

info@host-architecture.co.uk

Appendix B
G+W Ground Investigation Report

SOAKAGE LETTER REPORT

CLIENT	Scott White and Hookins LLP
SITE ADDRESS	HSDC South Downs College Road, Widley, Waterlooville PO7 8AA
REPORT REFERENCE	GWPR4602 The conditions and limitations of this preliminary summary can be viewed within Appendix A.
ENGINEER	Ryan Jones, Ground and Water Limited.
GENERAL	Ground and Water Limited were instructed by Scott White and Hooking LLP on the 13th January 2022 to conduct a Ground Investigation Letter Report on the site HSDC South Downs College Rd, Widley, Waterlooville PO7 8AA. The scope of the investigation was detailed within the quote ref: GW-0429 dated 7th January 2022. The aim of the investigation was understood to be to supply the client and their designers with information regarding the underlying geology and groundwater conditions underlying the site to assist them in preparing an appropriate scheme for development.
SITE DESCRIPTION	The site comprised a courtyard area The site comprised a ~203m² roughly rectangular plot of land which was part of the HSDC South Downs college complex. The site was an area of soft landscaping with pedestrian pathway across the site and a building to the north-west of the site which was used as a Coffee House, with larger college surrounding the courtyards on all sides. The courtyard had a single storey classroom in the centre with a grassed area covering the majority of the site. The site sloped steeply from the south to the north of the site levelling off in the northern part of the courtyard. A site location plan and an aerial view of the site can be seen in Figures 1 and 2 respectively.
PROPOSED DEVELOPMENT	At the time of reporting, February 2022, the proposed development was understood to comprise a car park area to replace an existing building within the South Downs College complex. A proposed development can be seen in Figure 3.
INVESTIGATION LOCATIONS AND SCOPE OF WORKS	Site works were undertaken on the 28th and 29th January 2022 and comprised the excavation of 2No. Trial Pits (TP1 and TP2) to depths between 1.30 – 1.50m bgl. Soakage testing in accordance with BRE Digest 365 were carried out in all trial pits. A trial hole location plan has been provided within Figure 4.
GROUND CONDITIONS ENCOUNTERED	A summary of the ground conditions encountered can be viewed below. The trial hole logs can be seen within Appendix B.

SOAKAGE LETTER REPORT

Summary of Strata Encountered (TP1 & TP2)

Strata	Top Depth (m bgl)	Base Depth (m bgl)	Thickness (m)
Topsoil (TP1 & TP2)	GL	0.10 – 0.20	0.10 – 0.20
MADE GROUND: Dark brown gravelly silty fine to coarse SAND. The gravel was angular to subrounded fine to coarse flint, brick, plastic and charcoal-like material. (TP1 Only)	0.10	0.25	0.15
Orange brown mottled grey slightly gravelly silty fine to coarse SAND with frequent horizons of silty sandy clay. (WITTERING FORMATION) (TP1 & TP2)	0.20 – 0.25	1.30 – 1.50	1.10 – 1.25

GROUNDWATER AND MONITORING

Groundwater was not encountered in any of the trial pits excavated. However, it should be noted that a groundwater strike may have been obstructed by the excavation process.

It should be noted that exact groundwater levels may only be determined through long term measurements from monitoring wells installed on-site. It should be noted that changes in groundwater level do occur for a number of reasons including seasonal effects and variations in drainage.

ROOTS

No roots were encountered in any of the trial holes.

It should be noted that roots may be found to greater depths at other locations on the site, particularly close to trees and/or trees that have been removed both within the site and its close environs.

INFILTRATION TESTING

Soakage testing in accordance with BRE365 guidance was undertaken in TP1 & TP2 Please see the results tabulated below.

BRE 365 Soakage Testing Results

Trial Hole	Test Number	Depth (m bgl)	Start Depth (m bgl)	Finish Depth (m bgl)	Time Taken (mins)	Infiltration Rate (m/sec)
TP1	1*	1.50	0.34	0.71	240	3.44×10^{-6}
	2**	1.50	0.26	1.50	1140	3.03×10^{-6}
	3*	1.50	0.42	0.89	410	2.63×10^{-6}
TP2	1*	1.30	0.35	0.65	240	3.51×10^{-6}
	2**	1.30	0.35	1.30	1133	3.65×10^{-6}
	3*	1.30	0.35	0.47	360	1.09×10^{-6}

*Given the relatively slow infiltration rate encountered, the volume of water did not drain by 75%.

** These tests were left overnight and measured in the morning.

Three tests were undertaken within both trial pits (TP1 and TP2), however, Test 1 and 3 for TP1 and TP2 were noted as incomplete tests as they did not drain to 75%. Test 2 for TP1 and TP2 had soakage testing which was left to drain overnight and measured the next morning.

Any soakaways should be located sufficiently away from buildings and infrastructure, in order to prevent undermining of foundations.

SOAKAGE LETTER REPORT

Consultation with the Environment Agency must be sought regarding any use that may have an impact on groundwater resources, abstractions and surface water features/watercourses.

Please feel free to contact us should you have any queries regarding the information enclosed within this letter report.

Yours Sincerely

Ryan Jones
Geotechnical and Geo-Environmental Engineer
For and on behalf of Ground and Water Limited

Figure 1	Site Location Plan
Figure 2	Proposed Site Area
Figure 3	Aerial View of the site
Figure 4	Trial Hole Location Plan
Appendix A	Conditions and Limitations
Appendix B	Trial Hole Logs

FIGURES

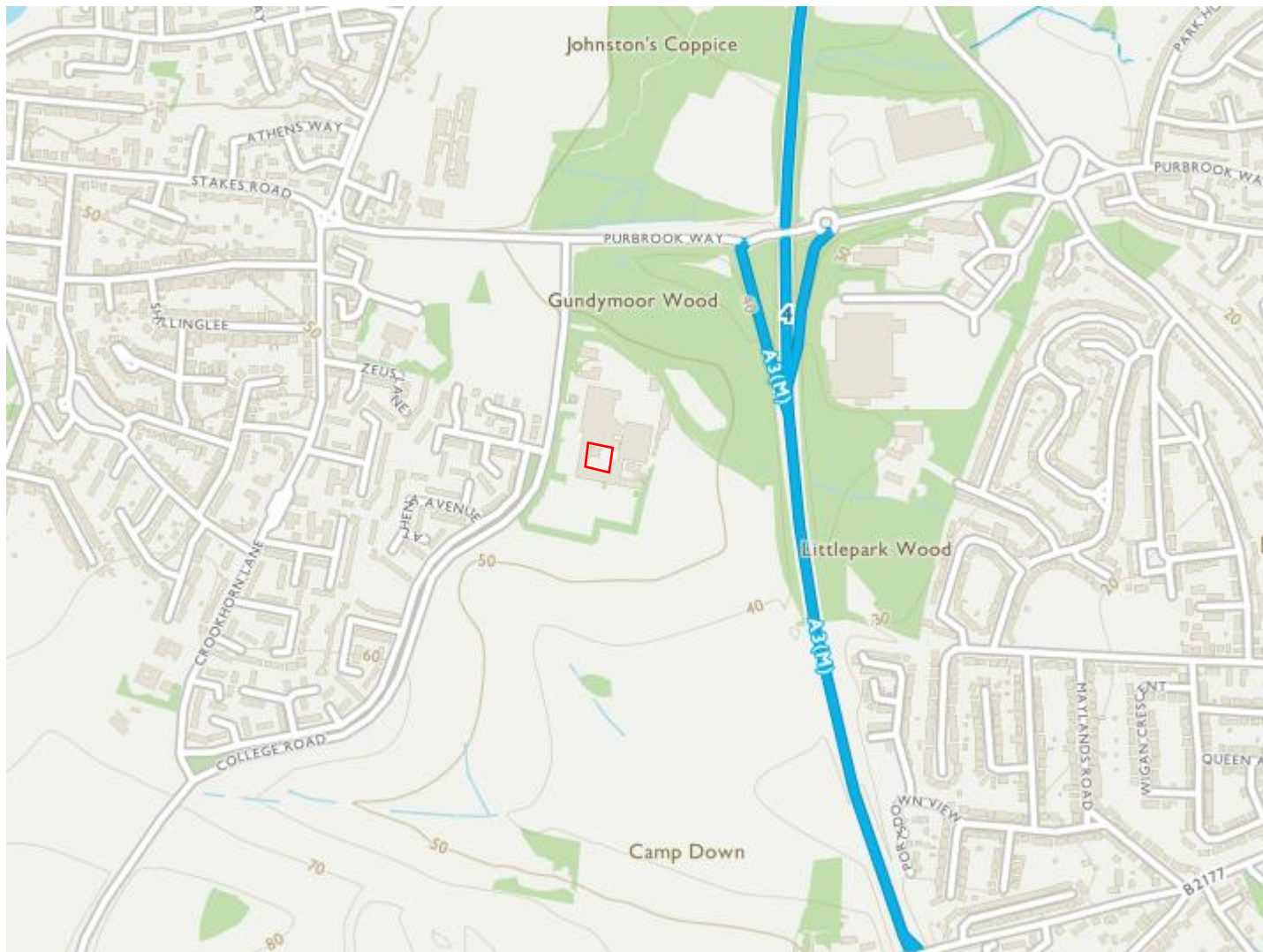


Figure 2 – Site Development Area



Approximately 100m

HSDC South Downs College Rd, Widley, Waterlooville PO7 8AA

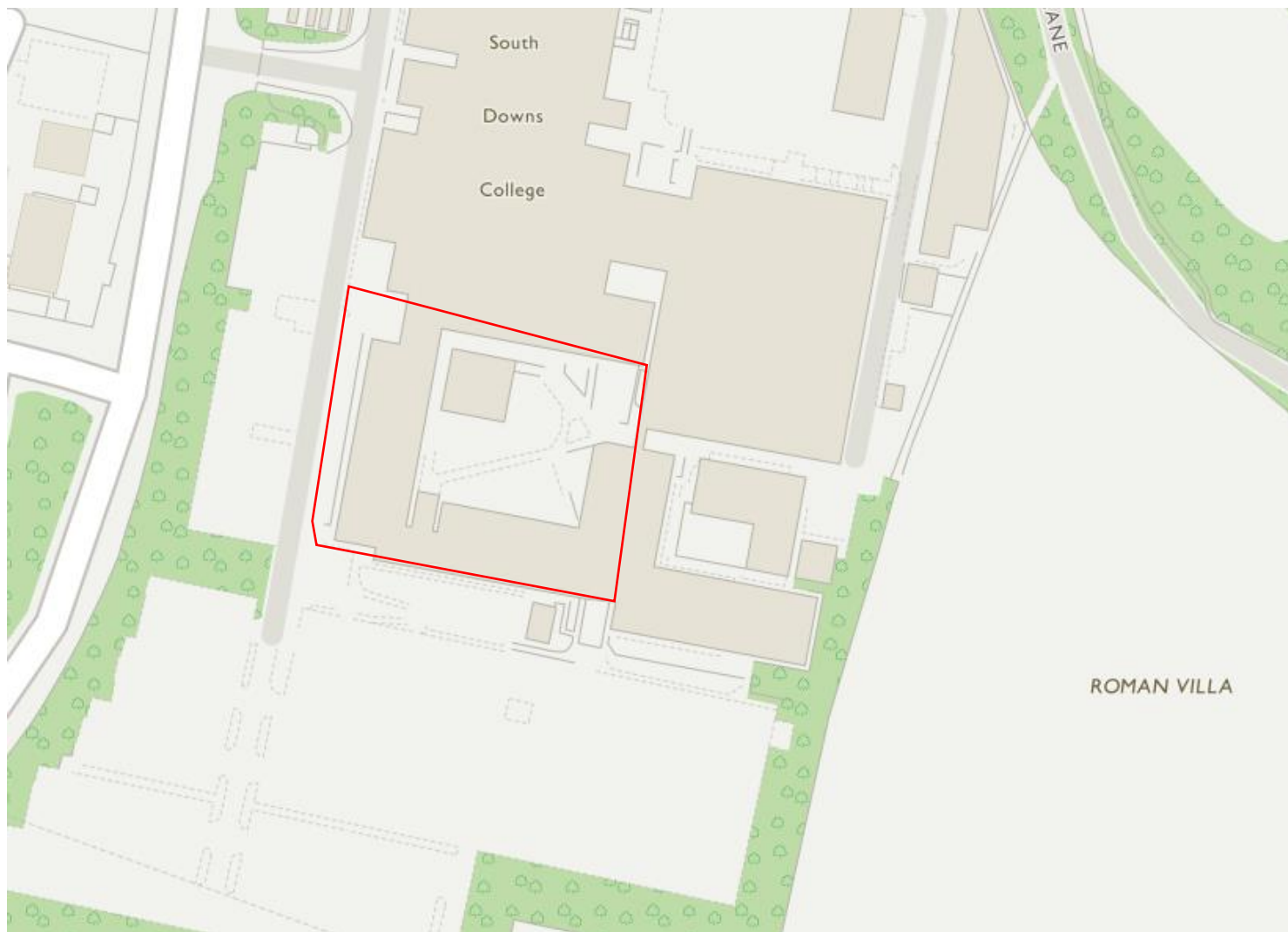
Scott White and Hookins LLP

February 2022

Figure 1 – Site Location Plan

GWPR4602





Site Boundary

Approximately 20m

HSDC South Downs College Rd, Widley, Waterlooville PO7 8AA

Scott White and Hookins LLP

February 2022

Figure 2 – Site Development Area

GWPR4602





 Site Boundary



Approximately 25m

HSDC South Downs College Rd, Widley, Waterlooville PO7 8AA

Scott White and Hookins LLP

February 2022

Figure 3 – Aerial View of the Site

GWPR4602





Existing Building Footprint

NTS

HSDC South Downs College Rd, Widley, Waterlooville PO7 8AA

Scott White and Hookins LLP

February 2022

Figure 4 – Proposed Development Plan

GWPR4602





 Machine Excavated
Trial Pit


Approximately 15m

HSDC South Downs College Rd, Widley, Waterlooville PO7 8AA

Scott White and Hookins

February 2022

Figure 5 – Trial Hole Location Plan

GWPR4602



APPENDIX A: Conditions and Limitations

The ground is a product of continuing natural and artificial processes. As a result, the ground will exhibit a variety of characteristics that vary from place to place across a site, and also with time. Whilst a ground investigation will mitigate to a greater or lesser degree against the resulting risk from variation, the risks cannot be eliminated.

The report has been prepared on the basis of information, data and materials which were available at the time of writing. Accordingly any conclusions, opinions or judgements made in the report should not be regarded as definitive or relied upon to the exclusion of other information, opinions and judgements.

The investigation, interpretations, and recommendations given in this report were prepared for the sole benefit of the client in accordance with their brief; as such these do not necessarily address all aspects of ground behaviour at the site. No liability is accepted for any reliance placed on it by others unless specifically agreed in writing.

Any decisions made by you, or by any organisation, agency or person who has read, received or been provided with information contained in the report ("you" or "the Recipient") are decisions of the Recipient and we will not make, or be deemed to make, any decisions on behalf of any Recipient. We will not be liable for the consequences of any such decisions.

Current regulations and good practice were used in the preparation of this report. An appropriately qualified person must review the recommendations given in this report at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

Any Recipient must take into account any other factors apart from the Report of which they and their experts and advisers are or should be aware. The information, data, conclusions, opinions and judgements set out in the report may relate to certain contexts and may not be suitable in other contexts. It is your responsibility to ensure that you do not use the information we provide in the wrong context.

This report is based on readily available geological records, the recorded physical investigation, the strata observed in the works, together with the results of completed site and laboratory tests. Whilst skill and care has been taken to interpret these conditions likely between or below investigation points, the possibility of other characteristics not revealed cannot be discounted, for which no liability can be accepted. The impact of our assessment on other aspects of the development required evaluation by other involved parties.

The opinions expressed cannot be absolute due to the limitations of time and resources within the context of the agreed brief and the possibility of unrecorded previous in ground activities. The ground conditions have been sampled or monitored in recorded locations and tests for some of the more

common chemicals generally expected. Other concentrations of types of chemicals may exist. It was not part of the scope of this report to comment on environment/contaminated land considerations.

The conclusions and recommendations relate to Borrow Farm Cottage, North of Jumps Road, Churt GU10 2LB.

Trial hole is a generic term used to describe a method of direct investigation. The term trial pit, borehole or window sampler borehole implies the specific technique used to produce a trial hole.

The depth to roots and/or of desiccation may vary from that found during the investigation. The client is responsible for establishing the depth to roots and/or of desiccation on a plot-by-plot basis prior to the construction of foundations. Where trees are mentioned in the text this means existing trees, recently removed trees (approximately 15 years to full recovery on cohesive soils) and those planned as part of the site landscaping.

Ownership of copyright of all printed material including reports, laboratory test results, trial pit and borehole log sheets, including drillers log sheets, remain with Ground and Water Limited. Licence is for the sole use of the client and may not be assigned, transferred or given to a third party.

Only our client may rely on this report and should this report or any information contained in it be provided to any third party we accept no responsibility to the third party for the contents of this report save to the extent expressly outlined by us in writing in a reliance letter addressed from us to the third party.

Recipients are not permitted to publish this report outside of their organisation without our express written consent.

APPENDIX B:

Trial Hole Logs



Trial Pit Log

Project Name: HSDC South Downs College
Rd, Widley, Waterlooville PO7 8AA

Client: Scott White and Hookins LLP

Date:

Location:

Contractor:

Project No. : GWPR4602

Crew Name:

Equipment: 3 Tonne Excavator

Location Number	Location Type	Level	Logged By	Scale	Page Number
TP1	TP		RJ	1:25	Sheet 1 of 1

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10			0.10			Topsoil.	
		0.20	D		0.25			MADE GROUND: Dark brown gravelly silty fine to coarse sand. Gravel is angular to subrounded fine to coarse flint, brick, plastic and occasional charcoal-like material. Sand is fine to coarse.	
		0.50	D					Orange brown mottle grey slightly slightly gravelly fine to coarse SAND with frequent horizons of very sandy very silty clay. (WITTERING FORMATION)	
		1.00	D						1
		1.50	D		1.50				
								End of Borehole at 1.500m	2
									3
									4
									5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.35	0.35	Trial pit stable					

Remarks

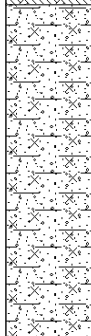
No roots encountered in trial pit. No groundwater encountered in trial pit.





Trial Pit Log

Project Name: HSDC South Downs College Rd, Widley, Waterlooville PO7 8AA		Client: Scott White and Hookins LLP		Date:	
Location:		Contractor:			
Project No. : GWPR4602		Crew Name:		Equipment: 3 tonne Excavator	
Location Number TP2	Location Type TP	Level	Logged By RJ	Scale 1:25	Page Number Sheet 1 of 1

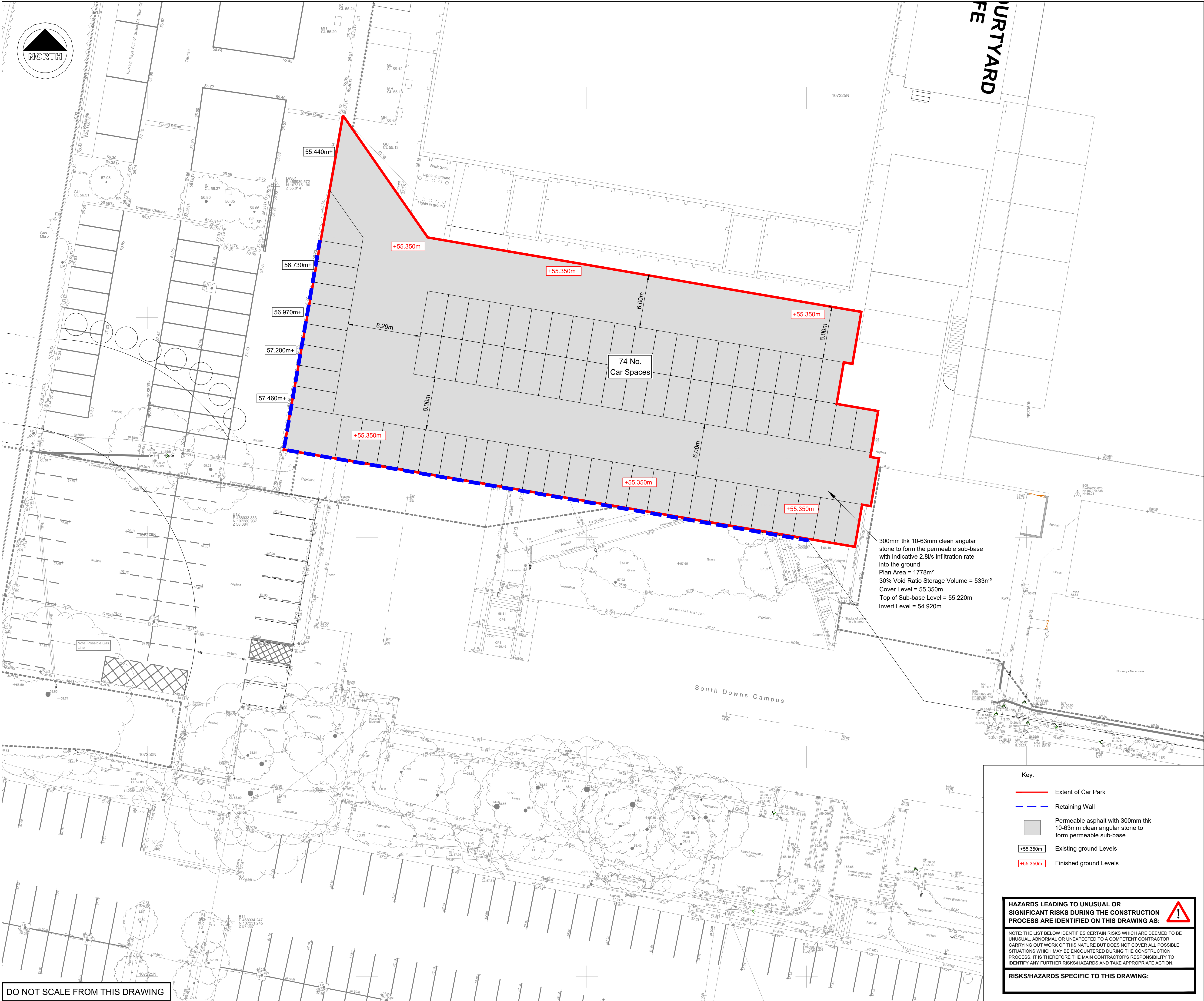
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.10	D		0.20			Topsoil.	1	
		0.50	D					Orange brown mottled grey and light brown silty fine to coarse SAND with frequent horizons of very silty very sandy clay. (WITTERING FORMATION)		
		0.80	D							
		1.30	D		1.30		End of Borehole at 1.300m	2		
									3	
										4
										5

Dimensions		Trench Support and Comment			Pumping Data		
Pit Length	Pit Width	Pit Stability	Shoring Used	Remarks	Date	Rate	Remarks
1.35	0.35	Trial pit stable					

Remarks	
No roots encountered in trial pit. No groundwater encountered in trial pit.	

Appendix C

Proposed Drainage Strategy



- Notes**
- GENERAL**
- This drawing is to be read in conjunction with all relevant Engineers and Architects drawings and with the Specification.
 - For setting out refer to Architects drawings.
 - All dimensions are in millimetres and levels are in metres unless noted otherwise.
 - Contractor to take all relevant dimensions on site. Any discrepancies to be advised to the Engineer.
 - Contractor to check/scan for services prior to construction to avoid any damage during works.
 - Existing utilities are shown as indicative and traced from asset records supplied by emapsite and Technics (Utility_Fast-track_725342_944774) dated, 23rd December 2021.
 - Existing topographical survey and site layout plan supplied by AR Design Studio 23rd December 2021.

PRELIMINARY - NOT FOR CONSTRUCTION

P01	Draft - Preliminary	RD	TK	RH	07.02.2022
	Amendment	Drn.	Chkd.	Appd.	Date

Havnt & South Downs College
South Downs Campus
Travel to Learn Strategy

Drainage Strategy

Havnt & South Downs College

Scott White and Hookins
Structural Engineering Civil Engineering Sustainability and BREEAM CDM Consultancy

Harman House, Andover Road, Winchester, Hampshire SO23 7BS
T: +44 (0)1902 844855 W: www.swh.co.uk E: info@swh.co.uk

Scale at A1 - 1:200 Preliminary
303322-SWH-XX-XX-DR-C-0500-P01
Project | Originator | Zone | Level | Type | Role | Number | Rev.

CP004-01_FM_ST_008_D

Appendix D

Proposed Microdrainage Calculations

Scott White and Hookins				Page 1																																																																																																																																																																																																																			
St Nicholas House St Nicholas Road Sutton SM1 1EL																																																																																																																																																																																																																							
Date 03/02/2022 15:30		Designed by tkillingback																																																																																																																																																																																																																					
File SW - POROUS CAR PARK SU...		Checked by																																																																																																																																																																																																																					
Micro Drainage		Source Control 2020.1.3																																																																																																																																																																																																																					
Summary of Results for 100 year Return Period (+40%) Half Drain Time : 258 minutes. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>54.987</td><td>0.067</td><td>2.8</td><td>33.4</td><td>O K</td></tr><tr><td>30 min Summer</td><td>55.014</td><td>0.094</td><td>2.8</td><td>46.7</td><td>O K</td></tr><tr><td>60 min Summer</td><td>55.041</td><td>0.121</td><td>2.8</td><td>59.9</td><td>O K</td></tr><tr><td>120 min Summer</td><td>55.063</td><td>0.143</td><td>2.8</td><td>70.8</td><td>Flood Risk</td></tr><tr><td>180 min Summer</td><td>55.070</td><td>0.150</td><td>2.8</td><td>74.5</td><td>Flood Risk</td></tr><tr><td>240 min Summer</td><td>55.072</td><td>0.152</td><td>2.8</td><td>75.3</td><td>Flood Risk</td></tr><tr><td>360 min Summer</td><td>55.073</td><td>0.153</td><td>2.8</td><td>75.9</td><td>Flood Risk</td></tr><tr><td>480 min Summer</td><td>55.072</td><td>0.152</td><td>2.8</td><td>75.2</td><td>Flood Risk</td></tr><tr><td>600 min Summer</td><td>55.069</td><td>0.149</td><td>2.8</td><td>73.7</td><td>Flood Risk</td></tr><tr><td>720 min Summer</td><td>55.065</td><td>0.145</td><td>2.8</td><td>71.8</td><td>Flood Risk</td></tr><tr><td>960 min Summer</td><td>55.056</td><td>0.136</td><td>2.8</td><td>67.3</td><td>Flood Risk</td></tr><tr><td>1440 min Summer</td><td>55.036</td><td>0.116</td><td>2.8</td><td>57.6</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>55.010</td><td>0.090</td><td>2.8</td><td>44.4</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>54.989</td><td>0.069</td><td>2.8</td><td>34.3</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>54.968</td><td>0.048</td><td>2.7</td><td>23.7</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>54.959</td><td>0.039</td><td>2.2</td><td>19.6</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>54.954</td><td>0.034</td><td>1.9</td><td>16.8</td><td>O K</td></tr><tr><td>8640 min Summer</td><td>54.950</td><td>0.030</td><td>1.7</td><td>14.7</td><td>O K</td></tr><tr><td>10080 min Summer</td><td>54.947</td><td>0.027</td><td>1.5</td><td>13.2</td><td>O K</td></tr><tr><td>15 min Winter</td><td>54.998</td><td>0.078</td><td>2.8</td><td>38.5</td><td>O K</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr></thead><tbody><tr><td>15 min Summer</td><td>129.682</td><td>0.0</td><td>18</td></tr><tr><td>30 min Summer</td><td>87.133</td><td>0.0</td><td>33</td></tr><tr><td>60 min Summer</td><td>55.837</td><td>0.0</td><td>62</td></tr><tr><td>120 min Summer</td><td>34.509</td><td>0.0</td><td>122</td></tr><tr><td>180 min Summer</td><td>25.637</td><td>0.0</td><td>180</td></tr><tr><td>240 min Summer</td><td>20.604</td><td>0.0</td><td>214</td></tr><tr><td>360 min Summer</td><td>15.169</td><td>0.0</td><td>276</td></tr><tr><td>480 min Summer</td><td>12.185</td><td>0.0</td><td>340</td></tr><tr><td>600 min Summer</td><td>10.272</td><td>0.0</td><td>410</td></tr><tr><td>720 min Summer</td><td>8.930</td><td>0.0</td><td>478</td></tr><tr><td>960 min Summer</td><td>7.152</td><td>0.0</td><td>614</td></tr><tr><td>1440 min Summer</td><td>5.221</td><td>0.0</td><td>878</td></tr><tr><td>2160 min Summer</td><td>3.803</td><td>0.0</td><td>1252</td></tr><tr><td>2880 min Summer</td><td>3.033</td><td>0.0</td><td>1588</td></tr><tr><td>4320 min Summer</td><td>2.201</td><td>0.0</td><td>2248</td></tr><tr><td>5760 min Summer</td><td>1.751</td><td>0.0</td><td>2992</td></tr><tr><td>7200 min Summer</td><td>1.466</td><td>0.0</td><td>3680</td></tr><tr><td>8640 min Summer</td><td>1.270</td><td>0.0</td><td>4416</td></tr><tr><td>10080 min Summer</td><td>1.124</td><td>0.0</td><td>5144</td></tr><tr><td>15 min Winter</td><td>129.682</td><td>0.0</td><td>18</td></tr></tbody></table>						Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	54.987	0.067	2.8	33.4	O K	30 min Summer	55.014	0.094	2.8	46.7	O K	60 min Summer	55.041	0.121	2.8	59.9	O K	120 min Summer	55.063	0.143	2.8	70.8	Flood Risk	180 min Summer	55.070	0.150	2.8	74.5	Flood Risk	240 min Summer	55.072	0.152	2.8	75.3	Flood Risk	360 min Summer	55.073	0.153	2.8	75.9	Flood Risk	480 min Summer	55.072	0.152	2.8	75.2	Flood Risk	600 min Summer	55.069	0.149	2.8	73.7	Flood Risk	720 min Summer	55.065	0.145	2.8	71.8	Flood Risk	960 min Summer	55.056	0.136	2.8	67.3	Flood Risk	1440 min Summer	55.036	0.116	2.8	57.6	O K	2160 min Summer	55.010	0.090	2.8	44.4	O K	2880 min Summer	54.989	0.069	2.8	34.3	O K	4320 min Summer	54.968	0.048	2.7	23.7	O K	5760 min Summer	54.959	0.039	2.2	19.6	O K	7200 min Summer	54.954	0.034	1.9	16.8	O K	8640 min Summer	54.950	0.030	1.7	14.7	O K	10080 min Summer	54.947	0.027	1.5	13.2	O K	15 min Winter	54.998	0.078	2.8	38.5	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	129.682	0.0	18	30 min Summer	87.133	0.0	33	60 min Summer	55.837	0.0	62	120 min Summer	34.509	0.0	122	180 min Summer	25.637	0.0	180	240 min Summer	20.604	0.0	214	360 min Summer	15.169	0.0	276	480 min Summer	12.185	0.0	340	600 min Summer	10.272	0.0	410	720 min Summer	8.930	0.0	478	960 min Summer	7.152	0.0	614	1440 min Summer	5.221	0.0	878	2160 min Summer	3.803	0.0	1252	2880 min Summer	3.033	0.0	1588	4320 min Summer	2.201	0.0	2248	5760 min Summer	1.751	0.0	2992	7200 min Summer	1.466	0.0	3680	8640 min Summer	1.270	0.0	4416	10080 min Summer	1.124	0.0	5144	15 min Winter	129.682	0.0	18
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Scott White and Hookins				Page 2	
St Nicholas House St Nicholas Road Sutton SM1 1EL					
Date 03/02/2022 15:30 File SW - POROUS CAR PARK SU...		Designed by tkillingback Checked by			
Micro Drainage		Source Control 2020.1.3			
Summary of Results for 100 year Return Period (+40%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	55.028	0.108	2.8	53.6	O K
60 min Winter	55.058	0.138	2.8	68.5	Flood Risk
120 min Winter	55.084	0.164	2.8	81.4	Flood Risk
180 min Winter	55.094	0.174	2.8	86.2	Flood Risk
240 min Winter	55.097	0.177	2.8	87.5	Flood Risk
360 min Winter	55.096	0.176	2.8	87.0	Flood Risk
480 min Winter	55.093	0.173	2.8	85.5	Flood Risk
600 min Winter	55.088	0.168	2.8	83.0	Flood Risk
720 min Winter	55.081	0.161	2.8	79.9	Flood Risk
960 min Winter	55.067	0.147	2.8	72.6	Flood Risk
1440 min Winter	55.036	0.116	2.8	57.4	O K
2160 min Winter	54.996	0.076	2.8	37.8	O K
2880 min Winter	54.972	0.052	2.8	25.5	O K
4320 min Winter	54.958	0.038	2.2	18.9	O K
5760 min Winter	54.951	0.031	1.7	15.1	O K
7200 min Winter	54.946	0.026	1.5	12.7	O K
8640 min Winter	54.942	0.022	1.3	11.0	O K
10080 min Winter	54.940	0.020	1.1	9.7	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	87.133	0.0	32		
60 min Winter	55.837	0.0	62		
120 min Winter	34.509	0.0	118		
180 min Winter	25.637	0.0	176		
240 min Winter	20.604	0.0	230		
360 min Winter	15.169	0.0	296		
480 min Winter	12.185	0.0	368		
600 min Winter	10.272	0.0	446		
720 min Winter	8.930	0.0	520		
960 min Winter	7.152	0.0	666		
1440 min Winter	5.221	0.0	938		
2160 min Winter	3.803	0.0	1296		
2880 min Winter	3.033	0.0	1584		
4320 min Winter	2.201	0.0	2288		
5760 min Winter	1.751	0.0	3000		
7200 min Winter	1.466	0.0	3680		
8640 min Winter	1.270	0.0	4416		
10080 min Winter	1.124	0.0	5136		
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Model Details Storage is Online Cover Level (m) 55.350 Porous Car Park Structure <table><tr><td>Infiltration Coefficient Base (m/hr)</td><td>0.01238</td><td>Width (m)</td><td>25.4</td></tr><tr><td>Membrane Percolation (mm/hr)</td><td>1000</td><td>Length (m)</td><td>65.0</td></tr><tr><td>Max Percolation (l/s)</td><td>458.6</td><td>Slope (1:X)</td><td>0.0</td></tr><tr><td>Safety Factor</td><td>2.0</td><td>Depression Storage (mm)</td><td>5</td></tr><tr><td>Porosity</td><td>0.30</td><td>Evaporation (mm/day)</td><td>3</td></tr><tr><td>Invert Level (m)</td><td>54.920</td><td>Membrane Depth (m)</td><td>0</td></tr></table>			Infiltration Coefficient Base (m/hr)	0.01238	Width (m)	25.4	Membrane Percolation (mm/hr)	1000	Length (m)	65.0	Max Percolation (l/s)	458.6	Slope (1:X)	0.0	Safety Factor	2.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	54.920	Membrane Depth (m)	0
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