

DRAINAGE STATEMENT REPORT
PREMIER INN PORTSMOUTH HAVANT
BEDHAMPTON HILL
HAVANT
P09 3JN

PREPARED FOR:



JOB NO: P24-0399

DATE: 4th November 2024

ISSUE NO: 1



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1. INTRODUCTION

- 1.1 This report has been prepared by Simpson TWS on behalf of Premier Inn Hotels Ltd. to accompany a planning application for the knock down re-build of the existing restaurant to new hotel bedrooms, alterations to the car parking layout and associated soft/hard landscaping.
- 1.2 The report details a strategy for the disposal & management of surface & foul water runoff that will be generated by the development.

2. SITE LOCATION AND TOPOGRAPHY

- 2.1 The site is located on Bedhampton Hill, Havant as shown on *Figure 1*, below. The site is centred on Ordnance Survey grid reference SU 69718 06219 and co-ordinates X: 469720; Y: 106219. The site's post code is PO9 3JN.

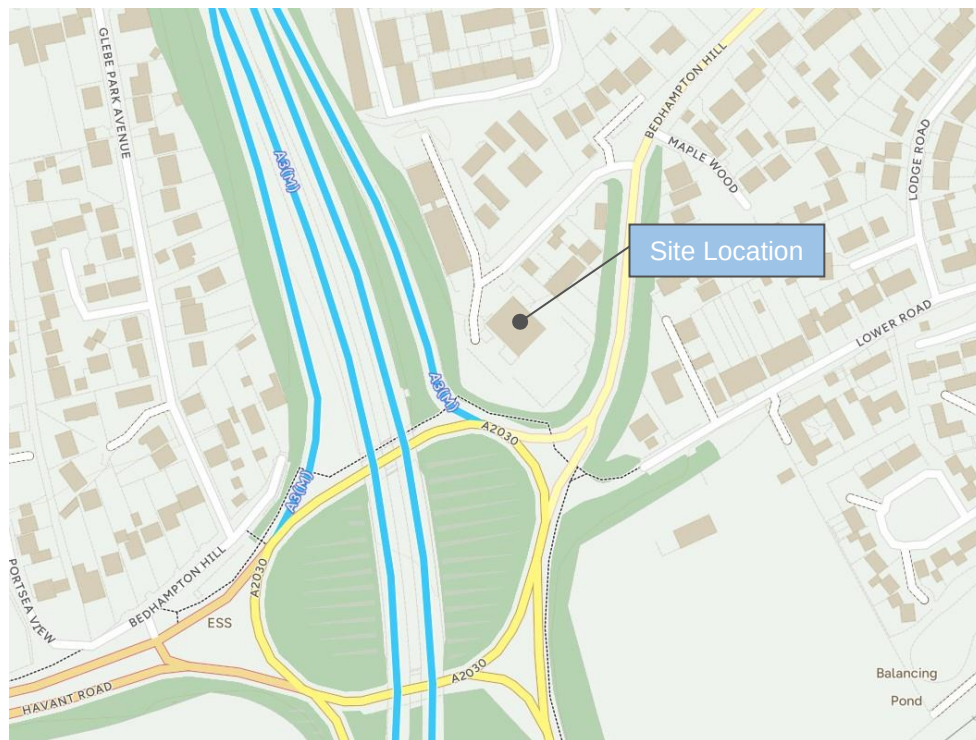


Figure 1: Site Location

Site Description

- 2.2 The existing site comprises a Premier Inn hotel & Beefeater restaurant, with associated parking, hard/soft landscaping. Vehicular access is gained from Bedhampton Hill northeast of the site. A copy of the topographical survey is included in *Appendix A*.

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Topography

- 2.3 Levels on the topographical survey show the site to have a steep fall in a southeasterly direction from a level of circa 29.68mAOD in the car park along the northern boundary of the site, to level of circa 14.17mAOD along the southeastern edge of the car park.

Existing Drainage Characteristics

- 2.4 The topographical survey identifies that the site is drained by separate foul and surface water pipework.
- 2.5 Whilst the topographical survey shows surface water to drain to soakaways the site investigation report states that infiltration drainage is unlikely to be feasible due to underlying clay ground conditions. In addition, the Southern Water sewer records indicate a surface water sewer which runs through the southern portion of the site which is identified to drain surface water and discharge off site to the south. On this basis, it is considered that the soakaway indicated in the south of the site on the topographical survey is likely to be a Southern Water manhole which directs surface water off site to the south.
- 2.6 All foul water runoff discharges to the Southern Water foul sewer which runs through the southern portion of the site and discharges off site to the southeast. An extract of the Southern Water sewer records is included in *Figure 2* below.

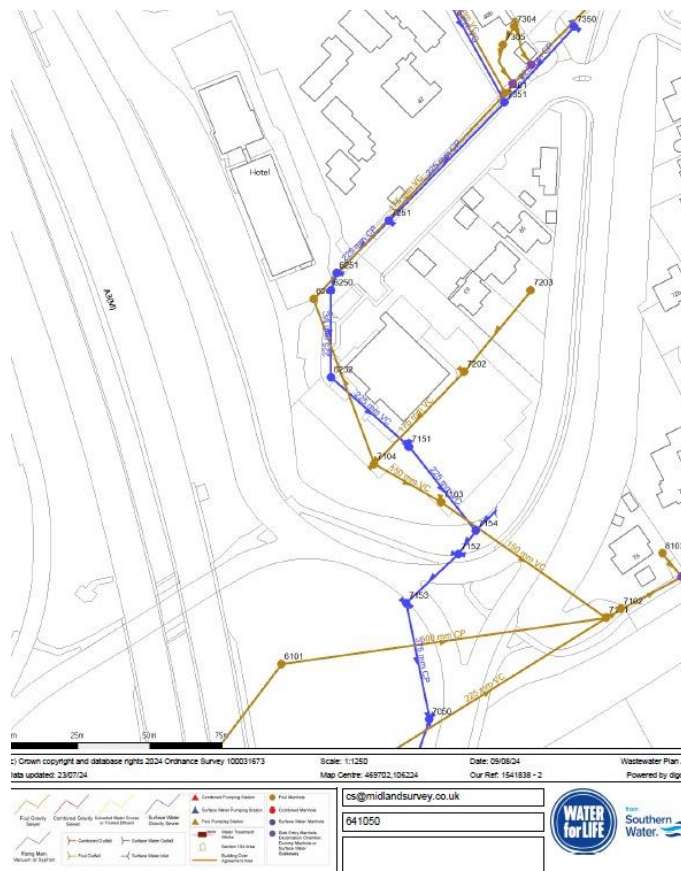


Figure 2: Southern Water Sewer Extract

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- 2.7 An extract from the ground investigation report that was carried out in 2012 has been included in *Appendix B* and identifies the following ground conditions. Made Ground was encountered to a maximum depth of 0.60m bgl which was underlain by gravelly clay and chalk. Additionally, no groundwater was encountered on site.
- 2.8 The ground investigation report also states that as the underlying soils will predominantly be cohesive in matrix the underlying soils are unlikely to provide a high degree of soakage potential for drainage systems.

Flood Risk

- 2.9 The site is in Flood Zone 1 and is not affected by fluvial flooding. The site is also considered to be at low risk from all other sources of flooding.

Development Proposals

- 2.10 It is proposed to knock down the existing Beefeater restaurant and build a Premier Inn Annexe with associated soft/ hard landscaping works. Minor amendments to the existing car parking layout are also proposed. A site plan showing the development proposals is included in *Appendix C*.

3. SURFACE WATER MANAGEMENT & DRAINAGE STRATEGY

Surface Water Disposal

- 3.1 In *Section 2* it was established that the site is drained by separate foul and surface water sewers running through the site and discharging off site in a southerly/ southeasterly direction.
- 3.2 It is proposed to have a new surface water drainage network to drain roof runoff from the proposed development. The proposed network will connect to the existing Southern Water sewer west of the site. As shown on the Areas Layout included in *Appendix E*, there is an 86m² increase in impermeable area. To account for the increase in impermeable area, it is proposed to drain the proposed annexe roof areas which equates to 426m² via a proposed flow control chamber with a minimum orifice diameter of 50mm, following the advice provided by Hydro-International Ltd. *Figure 3* below.

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From: Sharon King <sking@hydro-int.com>
Sent:
To:
Cc:
Subject:
Attachments: SHE-0067-2100-1100-2100_Design_Drawing(OD).pdf; SHE-0067-2100-1100-2100_Hydraulic_Characteristics_(OD).pdf; HBO With Mesh Guard.pdf

Good Morning Deanne

Many thanks for your email detailed below.

With regards to suggesting a minimum orifice size the DCG guidance states a minimum of 50mm orifice opening size when the design of the upstream system will prevent debris entering the system.

Many thanks

Sharon King
 Applications Engineer
 Direct Dial: 01275 878371

Looking for a general or tailored CPD on our products and how they can work for your site? Email cpdrequests@hydro-int.com

Figure 3: Hydro-International Ltd. Orifice Advice

3.3 A drainage strategy has been developed for the scheme and is shown on the Drainage Strategy included in *Appendix D*. A description of the main principles is provided below.

- The existing 100mm surface water drainage network collecting roof water from the existing restaurant would be removed.
- Roof water from the proposed annexe will be captured by a combination of rainwater gutters and downpipes that would discharge directly into a traditional network of gravity drained pipework. Runoff will be restricted via a proposed flow control chamber set to a maximum allowable discharge rate of 0.8 l/s using a 50mm orifice diameter, prior to it discharging to the existing Southern Water surface water sewer running through the development.
- Owing to the increase in impermeable area as a result of the annexe, which equates to 86m². It is necessary to restrict runoff rates using the flow control chamber to ensure that the existing surface water sewers are not overwhelmed as a result of the development.
- Excess flows will be stored and attenuated in a below ground geocellular attenuation tank located south of the proposed annexe. This tank will ensure no flooding occurs on site for all events up to and including a 1 in 100 year event with a 45% allowance for climate change.
- Brownfield runoff calculations using the Modified Rational Method for the existing unattenuated area of 0.582Ha have been calculated and a copy of the calculations is included in *Appendix F*. The calculations have been summarised below in *Table 1* for the 2,30,100 year, and 100 year plus 45% climate change return periods.

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Table 1: Pre-development brownfield runoff rates and volumes

Return Period	Cv	I _(peak) (mm)	I _(ave) (mm)	A (Ha)	Peak Runoff Rate (l/s)	Runoff Volume (m ³)
2	0.95	18.519	4.724	0.582	28.5	156.8
30	0.95	32.652	8.330	0.582	50.2	276.5
100	0.95	39.894	10.177	0.582	61.4	337.8
100 + 45%	0.95	57.846	14.757	0.582	88.9	489.5

- Table 2 below shows the brownfield runoff calculations using the Modified Rational Method for the proposed unattenuated area of 0.539Ha.

Table 2: Proposed Unattenuated Area Brownfield Runoff Rates and Volumes

Return Period	Cv	I _(peak) (mm)	I _(ave) (mm)	A (Ha)	Peak Runoff Rate (l/s)	Runoff Volume (m ³)
2	0.95	18.519	4.724	0.539	26.4	145.1
30	0.95	32.652	8.330	0.539	46.5	255.9
100	0.95	39.894	10.177	0.539	56.8	312.7
100 + 45%	0.95	57.846	14.757	0.539	82.3	453.4

- Table 3 below shows the rates and volumes for the proposed attenuated area.

Table 3: Proposed Attenuated Area Brownfield Runoff Rates and Volumes

Return Period	A (Ha)	Peak Runoff Rate (l/s)	Runoff Volume (m ³)
2	0.042	0.8	11.5
30	0.042	0.8	20.4
100	0.042	0.8	24.9
100 + 45%	0.042	0.8	36.1

- Table 4 below compares the runoff rates for the existing unattenuated area with the combined runoff rates of the proposed attenuated and unattenuated area. Table 4 demonstrates that there is a minimum of 5% reduction in the runoff rates.

Table 4: Comparison of Existing and Proposed Runoff Rate

Return Period	Existing Peak Runoff Rate (l/s)	Proposed Peak Runoff Rate (l/s)	% Difference Peak Runoff Rate
2	28.5	27.2	-5%
30	50.2	47.3	-6%
100	61.4	57.6	-6%
100+45%	88.9	83.1	-6%

Hydraulic Design

- 3.4 The Source Control facility in the 'MicroDrainage' software package 'Innovyze' has been used to design the geocellular attenuation tank based on the following parameters:
- Hydrobrake flow control chamber with a maximum discharge rate of 0.8 l/s, based on a minimum orifice size of 50mm as advised by Hydro International Ltd.
 - Total drained of 426m², which is more than the increase in impermeable area for the proposed development (86m²).
 - 1 in 100 year storm return period with a 45% allowance for potential future increases in rainfall intensities associated with climate change.
 - Cv value of 0.95.
 - FEH rainfall point data (2013) GB 469722 106218
- 3.5 The design results for the geocellular attenuation tank are included in *Appendix G*. The results demonstrate that the proposed attenuation tank would have sufficient capacity to store runoff for all rainfall events up to and including the required 1 in 100 year event with 45% allowance for climate change.

Exceedance

- 3.6 If the capacity of the surface water drainage network was exceeded, site levels would allow surface water to be channelled off-site in a south easterly direction. Further to this, the building's finished floor level would be raised above surrounding levels to minimise the risk from overland flows. Exceedance flood flow route arrows have been shown to demonstrate this on the drainage strategy drawing included in *Appendix D*.

Implementation

- 3.7 During construction, it is normal practice for a drainage system to be installed at an early stage in the programme. As such, runoff from the construction site, which can be heavily laden with silt, are likely to restrict flow within the drainage system. Therefore, the following measures will be considered to address this issue:
- A catchpit chamber will be installed upstream of the soakaway to prevent sediments such as soil and mud from transferring into the drainage system downstream. The catchpit is to be regularly inspected throughout construction.
 - Protective coverings will be used to help prevent runoff stripping material stockpiles.
 - Surfaces used as access roads and storage areas during construction will be swept regularly to prevent the accumulation of dust and mud.
 - Should groundwater be encountered in excavations, the water will not be discharged to the drainage systems until the amount of suspended solids has

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been reduced through the controlled use of skips or tanks, which will act as stilling basins.

- To prevent contamination associated with the use of oils and hydrocarbons during construction, the contractor shall ensure that the following precautionary measures are employed during construction:

- Regular maintenance of machinery and plant.
- Use of drip trays.
- Regular checking of machinery and plant for oil leaks.
- Use of correct storage facilities.
- Regular checks for signs of wear and tear on tanks.
- Specific procedures are followed when refuelling.
- Emergency spill kit to be located near refuelling area.
- Regular emptying of bunds.
- Tanks should be located in secure areas to stop vandalism.

3.8 On occupation of the development, it is recommended that each element of the as-built drainage system is maintained by Premier Inn Hotels appointed management company in accordance with the regime set out in the tables below.

Table 5: Below Ground Drainage System - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Remove all litter and debris from external hard landscaped areas and adjacent landscaping, which may pose a risk to the performance of the system.	Monthly.
	Remove build-up of sediment / silt in catch-pits and dispose of oils / petrol residues using safe standard practices.	As required.
	Stabilise and mow adjacent landscaped areas and remove weeds.	
Remedial actions	Repair or rehabilitate inlet and outlets to ensure they are in good condition and operating as designed.	
	Remediate any landscaping, which has raised to within 50mm of the level of adjacent hard landscaping.	
Monitoring	Check of all inlets / outlets for blockages or evidence of physical damage with any necessary remedial action or clearance carried out if required.	On a monthly basis for the first 3 months of operation, thereafter every 6 months & following severe rainfall events.
	Inspect all surfaces for ponding, or silt accumulation. Record areas where water is ponding for more than 48 hours and carry out any remedial work deemed necessary.	After severe storms.

Table 6: Geocellular Storage Tank - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for first 3 months of operation, then every 6 months.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly.
	Where rainfall infiltrates into blocks from above, check surface of filter for blockage by silt, algae or other matter. Remove and replace surface infiltration medium as necessary.	Monthly / after severe storms.
	Remove sediment from pre-treatment structures.	Annually, or as required.
Remedial actions	Repair/rehabilitation of inlets, outlet, overflows and vents.	As required.
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually and after large storms.

Table 7: Flow Control Chamber - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Cleaning off the flow control device of any debris/ sediment.	As required.
Remedial actions	Flow control device repairs.	As required.
	Repair of erosion damage, or damage to chamber.	
Monitoring	Inspection of the chamber for debris and sediment build up.	Monthly for first 3 months, thereafter, every 6 months and following severe storm events.

4. FOUL WATER DRAINAGE STRATEGY

- 4.1 This section of the report outlines an approach for the disposal and management of foul water runoff from the development.
- 4.2 As reported in *Section 2* of this report, foul water generated from the existing development is drained by a traditional network of below ground pipework discharges to the Southern Water foul sewer via a gravity connection. The Southern Water sewer discharges off site in a southeasterly direction. Additionally, a 3m foul sewer easement on either side of the foul sewer has been shown on the Drainage Strategy included in *Appendix D*.

- 4.3 Southern Water have been consulted regarding the existing foul sewer systems ability to accommodate additional foul water flows from the proposed development. The consultation response is currently being prepared and will be appended to this report on receipt. It should be noted that the foul water drainage scheme will be developed in accordance with the findings of Southern Water's assessment to ensure that there is no increase in the risk of sewer flooding to the site or neighbouring properties.
- 4.4 A foul water drainage strategy has been developed for the scheme and is shown on the drainage strategy drawing included in *Appendix D*. In summary, the annexe would be provided with a new foul water drainage system comprising of a traditional gravity network of below ground pipework along the southern and eastern side of the annexe. The proposed network would discharge to the existing Southern Water foul sewer which runs through western side of the development via a gravity connection.

5. CONCLUSIONS

- 5.1 It has been established that whilst the survey shows surface water to drain to soakaways, the site investigation report states that infiltration drainage is unlikely due to the underlying clay ground conditions. Therefore, it is considered appropriate to discharge surface water runoff from the development to the existing Southern Water surface water sewer.
- 5.2 Roof runoff from the proposed annexe equates to 426m², which is more than the increase in impermeable areas for the proposed development, should be controlled to a maximum flow rate of 1.0 l/s based on a flow control device with a minimum orifice size of 50mm prior to discharging to the Southern Water surface water sewer. Therefore, when comparing the existing runoff rates with the proposed, there is a 5-6 % reduction in the runoff rates. This ensures that the proposed surface water flows are less than existing, and the existing surface water drainage system will not be overwhelmed.
- 5.3 Excess flows will be stored and attenuated in a below ground geocellular attenuation tank located south of the proposed annexe. This tank will ensure no flooding occurs onsite for all events up to and including a 1 in 100 year event with a 45% allowance for climate change.
- 5.4 The annexe would be provided with a new foul water drainage system comprising of a traditional gravity network of below ground pipework. This network would discharge to the existing Southern Water foul water sewer which runs on the eastern side of the development via a gravity connection. Southern Water's capacity response is still awaited at the time of this report but will be appended once it becomes available.
- 5.5 It is concluded that it will be possible to dispose of surface & foul water runoff from the development without increasing the level of flood risk to the site or neighbouring properties. Therefore, the scheme can be considered acceptable in terms of drainage strategy and flood risk.

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APPENDIX A
TOPOGRAPHICAL SURVEY

APPENDIX B
SITE INVESTIGATION EXTRACT

7.0 GROUND AND GROUNDWATER CONDITIONS

7.1 Ground Conditions

7.1.1 Summary of Ground Conditions

The ground investigation generally confirms the published geology as detailed below.

7.1.2 Made Ground

Made Ground was encountered at all window sample locations to a maximum depth of 0.60m bgl. Made Ground comprised of a black sandy GRAVEL of crushed aggregate to a maximum depth of 0.25m bgl and yellow sandy GRAVEL containing fine to coarse, angular to rounded flint, membrane, shell and chalk fragments to a maximum depth of 0.60m bgl.

7.1.3 Drift Deposits

Head Deposits

Head deposits were encountered to the south of the site within the locations of WS103 and WS104. The deposits comprised of a soft to firm yellow-orange gravelly CLAY with gravel of fine to medium chalk fragments and rare coarse sized angular flint within WS103 (0.6-base not encountered) and WS104 (0.6-4.0m bgl).

7.1.4 Solid Geology

Chalk

Chalk was encountered within all the window sample locations except WS103. The chalk was noted to comprise of white, orange mottled CHALK with clayey matrix and occasional black flecks and rare to occasional angular fragments of coarse flint. The base of this stratum was not encountered.

7.1.5 Particle Size Distribution

One particle size distribution test was undertaken on WS102 at 1.80-2.00m, the result is presented below in Table 7.1.

Table 7.1 PSD Summary

Location	Depth (m)	Strata Description
WS102	1.80-2.00m	CHALK: Slightly sandy silty clayey gravel

7.1.6 Soil Consistency

Results of the Standard Penetration Tests, including undrained shear strengths derived from SPTs are included on Table 7.2.

Table 7.2 Standard Penetration Test Results

Boreholes	Depth (m bgl) (i)	Material Field Description	CPT/SPT "N" Value	Corrected "N" Value (N ₁) ₆₀	Terzaghi & Peck Relative Density (Sands)	Eurocode Soil strength	Consistency (BS5930)	Terzaghi & Peck Approximate Undrained Shear Strength (kN/m ²)
WS101	1.0	CHALK*	22	22	N/A	High Strength	N/A	110.90
	2.0	CHALK*	27	25	N/A	High Strength	N/A	123.33
	3.0	CHALK*	33	29	N/A	High Strength	N/A	143.49
	4.0	CHALK*	25	21	N/A	High Strength	N/A	105.61
	5.0	CHALK*	25	21	N/A	High Strength	N/A	103.70
WS102	1.0	CHALK*	24	24	N/A	High Strength	N/A	120.98
	2.0	CHALK*	25	23	N/A	High Strength	N/A	114.19
	3.0	CHALK*	24	21	N/A	High Strength	N/A	104.36
	4.0	CHALK*	12	10	N/A	Medium Strength	N/A	50.69
	5.0	CHALK*	24	20	N/A	High Strength	N/A	99.55
WS103	1.0	CLAY	11	11	N/A	Medium Strength	Firm	55.45
	2.0	CLAY	13	12	N/A	Medium Strength	Firm	59.38
	3.0	CLAY	14	12	N/A	Medium Strength	Firm	60.88
	4.0	CLAY	17	14	N/A	Medium Strength	Firm	71.81
	5.0	CLAY	17	14	N/A	Medium Strength	Firm	70.52
WS104	1.0	CLAY	9	9	N/A	Medium Strength	Soft to Firm	45.37
	2.0	CLAY	13	12	N/A	Medium Strength	Firm	59.38
	3.0	CLAY	12	10	N/A	Medium Strength	Soft to Firm	52.18
	4.0	CHALK*	20	17	N/A	High Strength	N/A	84.49
	5.0	CHALK*	15	12	N/A	Medium Strength	N/A	62.22
WS105	1.0	CHALK*	21	21	N/A	High Strength	N/A	105.86
	2.0	CHALK*	34	31	N/A	Very High Strength	N/A	155.30

9.5 Ground Floor Slabs

Made Ground was identified to a maximum thickness of 0.6m within the development. This combined with the variation in geology beneath the proposed development would potentially lead to differential settlement as a result it is considered that ground bearing floor slabs, whilst viable, would require detailed design to accommodate variability of the formation and account for differential settlement.

Where suspended floor slabs are employed ventilation of the under floor void will be required to address condensation issues. This would also assist in the mitigation of any potential gas ingress issues.

9.6 Pavement Construction

An assessment of the likely California Bearing Ratio (CBR) for the Made Ground has been assessed from the following sources:

- Correlations with undrained shear strength (summarised in Table 7.2) from Black and Lister;
- Correlations with plasticity index (summarised in Table 7.3) from HD25/94; and
- Description of the materials encountered in the exploratory holes.

Based on this it is considered that a CBR of less than 3% may be required to account for variability of the Made Ground. It is, however, recommended that this be re-assessed using on site plate tests of the formation. It is possible that a higher design CBR of 3% may then be achievable.

Based on the plasticity index, the clay and chalk soils are considered frost susceptible. Following excavation the sub formation should be proof rolled and any soft material inspected and removed.

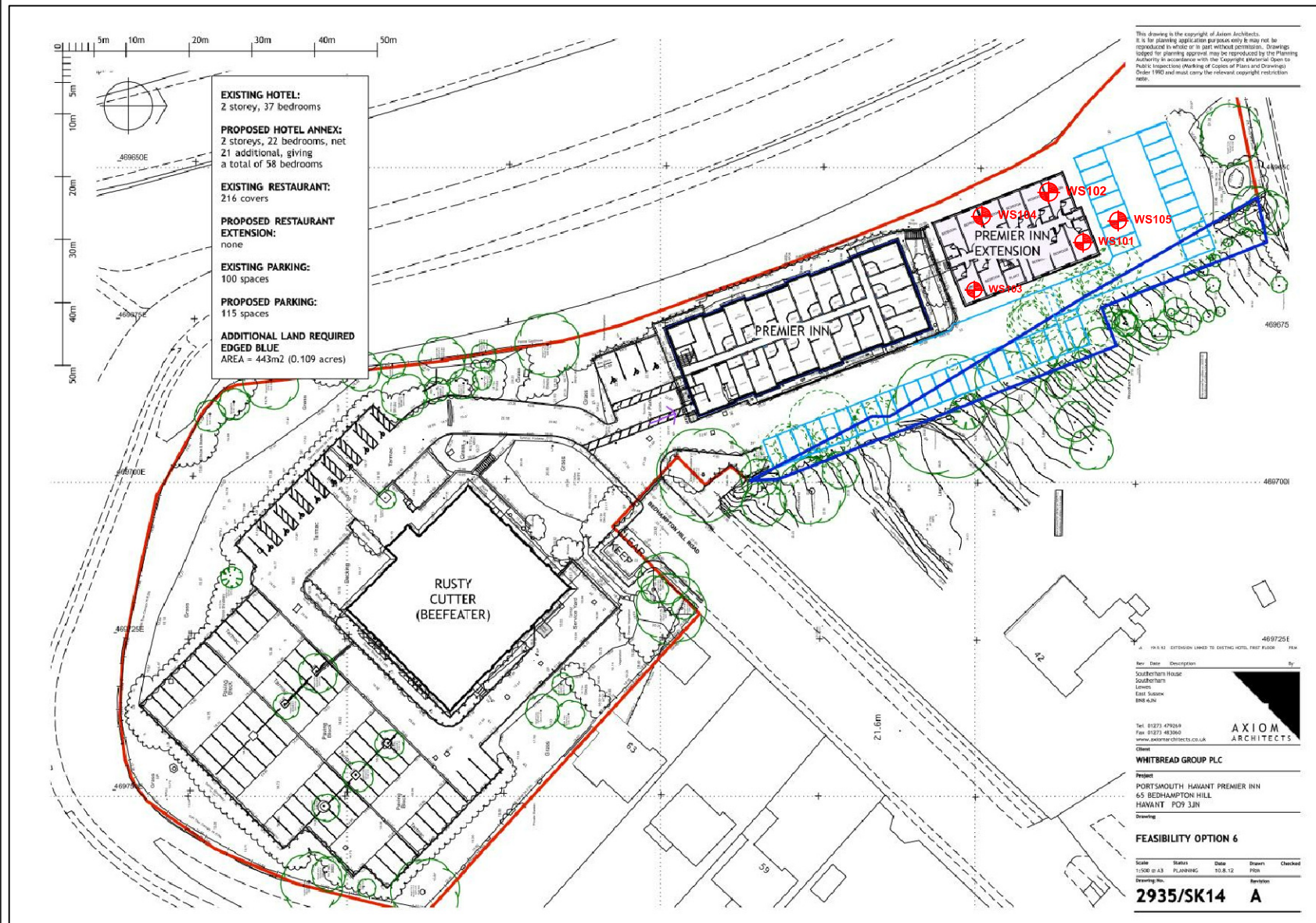
9.7 Drainage

Given the cohesive soils encountered within the natural across the site there is unlikely to be a high degree of soakage potential for drainage systems. Chalk usually has a high permeability but generally the encountered chalk at the site has been bound within a clayey matrix therefore this strata is unlikely to provide a high degree of soakage potential and any SUDS requirement should be met by other methods. The presence of Made Ground across the site and the lithological boundary below the proposed development may result in differential settlement. It is therefore recommended that drain runs are designed using steeper gradients and flexible joints to allow for this.

9.8 Concrete Durability

Based upon the results of the chemical analyses summarised in Table 7.4 it is considered that subsurface concrete can be designed in accordance with Design Sulphate Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1 in accordance with the recommendations provided in BRE Special Digest 1 (2005).

Sulphate and pH was analysed to 2.0m depth at the site but if the client wishes to adopt deeper pile foundations below this depth, it is considered the sulphate and pH at further depth are likely to have similar values due to the presence of chalk throughout the site, however this should be confirmed with additional testing if required. Chalk is formed from the



Reproduced from the Axiom Architects (2012) drawing.
Ref 2935/SK14



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Premier Inn, Havant

Proposed Extension with
Sampling Locations

Job No.: 20385

Figure: 3

Scale: 1:500 @ A3

Drawn: Nov
2012

Window Sample Record

Location Number: WS101

Project Number: 20385

Contract Name: Premier Inn, Havant

Client: Simpson Associates

Consultant: W. Spraggs

Date Started: 19/11/2012

Date Completed: 19/11/2012

Elevation AOD (m): -

Co-ordinates: 469679, 106256

Drilling Equipment: Terrier Rig



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SUBSURFACE PROFILE

SAMPLES AND IN-SITU TESTING

Depth (mbgl)	Legend	Description	Depth of Strata (mbgl)	Type	Depth (mbgl)	SPT (N-Value)
		MADE GROUND Tarmac.				
		MADE GROUND Black sandy GRAVEL. Gravel of fine to coarse flint and crushed aggregate.	0.50	TGV	0.3-0.5	
		MADE GROUND Yellow sandy GRAVEL. Gravel of fine to coarse, angular to rounded flint.	0.70	TGV	0.5-0.7	
1.0		MADE GROUND Yellow sandy GRAVEL. Gravel of fine to coarse, angular to rounded flint.		SPT,TGV	1.0-1.45	(6,5,6,5,5,6) N=22
		MADE GROUND Yellow sandy GRAVEL. Gravel of fine to coarse flint with frequent chalk fragments, rare cobble sized flint and plastic membrane.				
2.0		CHALK Recovered as off-white with black specks weak CHALK with clayey matrix.		T	1.8-2.0	
		CHALK White orange mottled CHALK with clayey matrix and occasional black flecks and rare angular flint.		SPT	2.0-2.45	(6,6,7,7,6,7) N=27
3.0				T	2.8-3.0	
				SPT	3.0-3.45	(9,10,9,9,9,6) N=33
4.0				T	3.8-4.0	
				SPT	4.0-4.45	(10,8,7,6,5,7) N=25
5.0		End of borehole at 5.0m.	5.00	T SPT	4.8-5.0 5.0-5.45	(7,7,7,6,6,6) N=25
6.0						

Key	B. Bulk (Bag) W. Water U100. 100mm Undisturbed U38. 38mm Undisturbed Sample SPT. Standard Penetration Test	D. Disturbed G. Amber Glass Jar / Bottle CPT. Cone Penetration Test U100. Blows (Recovery mm) V. 40ml Glass Vial	T. Plastic Tub N. 'N' Value HV. Hand Shear Vane PID. Photo Ionisation Detector S. Soil
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Notes

Notes: Backfilled with arisings
Services: Prior to excavation the location was scanned with a Cable Avoidance Tool (CAT).
Groundwater: None encountered
Status: Completed

Window Sample Record

Location Number: WS102

Project Number: 20385

Contract Name: Premier Inn, Havant

Client: Simpson Associates

Consultant: W.Spraggs

Date Started: 19/11/2012

Date Completed: 19/11/2012

Elevation AOD (m): -

Co-ordinates: ~469679, 106256

Drilling Equipment: Terrier Rig



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SUBSURFACE PROFILE

SAMPLES AND IN-SITU TESTING

Depth (mbgl)	Legend	Description	Depth of Strata (mbgl)	Type	Depth (mbgl)	SPT (N-Value)
		MADE GROUND Tarmac.	0.25			
		MADE GROUND Black sandy GRAVEL. Gravel of fine to coarse, angular to rounded crushed aggregate.	0.50	TGV	0.3-0.5	
		MADE GROUND Yellow slightly clayey sandy GRAVEL. Gravel of fine to coarse angular to rounded flint, shell fragments and plastic membrane. Sand is coarse.		TGV	0.7-0.9	
1.0				SPT	1.0-1.45	(4,4,5,5,6,8) N=24
2.0		CHALK Recovered as white CHALK of slightly sandy slightly silty clayey gravel. Gravel of coarse angular flint.		T	1.8-2.0	
				SPT	2.0-2.45	(7,8,6,5,7,7) N=25
3.0				T	2.8-3.0	
				SPT	3.0-3.45	(8,6,6,5,6,7) N=24
4.0				T	3.8-4.0	
				SPT	4.0-4.45	(3,2,2,2,3,5) N= 12
5.0			5.00	T	4.8-5.0	
				SPT	5.0-5.45	(3,4,4,7,6,7) N= 24
		End of borehole at 5.0m.				
6.0						

Key

B. Bulk (Bag)
W. Water
U100. 100mm Undisturbed
U38. 38mm Undisturbed Sample
SPT. Standard Penetration Test

D. Disturbed
G. Amber Glass Jar / Bottle
CPT. Cone Penetration Test
U100. Blows (Recovery mm)
V. 40ml Glass Vial

T. Plastic Tub
N. 'N' Value
HV. Hand Shear Vane
PID. Photo Ionisation Detector
S. Soil

Notes

Notes: Backfilled with arisings
Services: Prior to excavation the location was scanned with a Cable Avoidance Tool (CAT).
Groundwater: None encountered
Status: Completed

Window Sample Record

Location Number: **WS103**

Project Number: 20385

Contract Name: Premier Inn, Havant

Client: Simpson Associates

Consultant: W. Spraggs

Date Started: 19/11/2012

Date Completed: 19/11/2012

Elevation AOD (m): -

Co-ordinates: 469679, 106256

Drilling Equipment: Terrier Rig



Environment House
Segensworth Business Centre
Segensworth Road West
Fareham, Hampshire
PO15 5RQ
Tel: 01329 847783 Fax: 01329 845439
www.recltd.co.uk

SUBSURFACE PROFILE

SAMPLES AND IN-SITU TESTING

Depth (mbgl)	Legend	Description	Depth of Strata (mbgl)	Type	Depth (mbgl)	SPT (N-Value)
		MADE GROUND Tarmac.				
		MADE GROUND Black sandy GRAVEL. Gravel of fine to coarse, angular crushed aggregate.	0.60	TGV	0.3-0.5	
		MADE GROUND Yellow sandy GRAVEL. Gravel of fine to coarse rounded to sub-rounded flint, shell fragments and plastic membrane.		TGV	0.7-0.9	
1.0		CLAY Firm yellow to orange slightly sandy gravelly CLAY. Gravel of fine to coarse flint and chalk fragments.		SPT	1.0-1.45	(2,2,2,2,4,3) N= 11
2.0		CLAY Firm yellow to orange gravelly CLAY. Gravel of fine to medium chalk fragments and rare cobble sized flint.		T	1.8-2.0	
				SPT	2.0-2.45	(2,2,3,3,3,4) N= 13
3.0				T	2.8-3.0	
				SPT	3.0-3.45	(3,3,2,3,4,5) N= 14
4.0				T	3.8-4.0	
				SPT	4.0-4.45	(3,3,3,5,4,5) N= 17
5.0		End of borehole at 5.0m.	5.00	T SPT	4.8-5.0 5.0-5.45	(3,2,3,4,5,5) N= 17
6.0						

Key	B. Bulk (Bag) W. Water U100. 100mm Undisturbed U38. 38mm Undisturbed Sample SPT. Standard Penetration Test	D. Disturbed G. Amber Glass Jar / Bottle CPT. Cone Penetration Test U100. Blows (Recovery mm) V. 40ml Glass Vial	T. Plastic Tub N. 'N' Value HV. Hand Shear Vane PID. Photo Ionisation Detector S. Soil
------------	--	--	--

Notes

Notes: Backfilled with arisings
Services: Prior to excavation the location was scanned with a Cable Avoidance Tool (CAT).
Groundwater: None encountered
Status: Completed

Window Sample Record

Location Number: **WS104**

Project Number: 20385

Contract Name: Premier Inn, Havant

Client: Simpson Associates

Consultant: W. Spraggs

Date Started: 19/11/2012

Date Completed: 19/11/2012

Elevation AOD (m): -

Co-ordinates: 469679, 106256

Drilling Equipment: Terrier Rig



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SUBSURFACE PROFILE

SAMPLES AND IN-SITU TESTING

Depth (mbgl)	Legend	Description	Depth of Strata (mbgl)	Type	Depth (mbgl)	SPT (N-Value)
		MADE GROUND Tarmac.				
		MADE GROUND Black sandy GRAVEL. Gravel of fine to coarse, angular crushed aggregate.	0.60	TGV	0.3-0.5	
		MADE GROUND Yellow slightly sandy slightly clayey GRAVEL. Gravel of fine to coarse angular to rounded flint and plastic membrane.	1.00	TGV	0.7-0.9	
1.0				SPT	1.0-1.45	(2,2,2,2,3,2) N=9
		CLAY Soft to firm yellow to orange gravelly CLAY. Gravel of fine to medium chalk fragments with rare angular coarse flint.		T	1.8-2.0	
2.0				SPT	2.0-2.45	(2,3,3,3,3,4) N= 13
		CLAY Firm yellow to orange gravelly CLAY. Gravel of fine to medium chalk fragments with rare angular coarse flint.		T	2.8-3.0	
3.0				SPT	3.0-3.45	(2,3,2,3,3,4) N= 12
			4.00	T	3.8-4.0	
4.0				SPT	4.0-4.45	(4,4,7,6,3,4) N= 20
		CHALK White, orange mottled CHALK with clayey matrix and rare fragments of angular coarse flint.		T	4.8-5.0	
5.0			5.00	SPT	5.0-5.45	(3,3,2,4,5,4) N= 15
		End of borehole at 5.0m.				
6.0						

Key

B. Bulk (Bag)
W. Water
U100. 100mm Undisturbed
U38. 38mm Undisturbed Sample
SPT. Standard Penetration Test

D. Disturbed
G. Amber Glass Jar / Bottle
CPT. Cone Penetration Test
U100. Blows (Recovery mm)
V. 40ml Glass Vial

T. Plastic Tub
N. 'N' Value
HV. Hand Shear Vane
PID. Photo Ionisation Detector
S. Soil

Notes

Notes: Backfilled with arisings
Services: Prior to excavation the location was scanned with a Cable Avoidance Tool (CAT).
Groundwater: None encountered
Status: Completed

Window Sample Record

Location Number: WS105

Project Number: 20385

Contract Name: Premier Inn, Havant

Client: Simpson Associates

Consultant: W. Spraggs

Date Started: 19/11/2012

Date Completed: 19/11/2012

Elevation AOD (m): -

Co-ordinates: 469679, 106256

Drilling Equipment: Terrier Rig



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SUBSURFACE PROFILE

SAMPLES AND IN-SITU TESTING

Depth (mbgl)	Legend	Description	Depth of Strata (mbgl)	Type	Depth (mbgl)	SPT (N-Value)
		MADE GROUND Tarmac.	0.25	TGV	0.3-0.5	
		MADE GROUND Black sandy GRAVEL. Gravel of fine to coarse crushed aggregate.	0.50	TGV	0.7-0.9	
1.0		MADE GROUND Yellow sandy GRAVEL. Gravel of fine to coarse rounded to sub-rounded flint with occasional chalk fragments and plastic membrane.		SPT	1.0-1.45	(4,6,4,6,5,6) N= 21
		CHALK Recovered as white, orange mottled CHALK with clayey matrix and occasional coarse angular flint.	2.00	T SPT	1.8-2.0 2.0-2.45	(10,10,9,7,8,10) N= 34
2.0		Borehole terminated at 2.0m with no sample recovered.				
3.0						
4.0						
5.0						
6.0						

Key	B. Bulk (Bag) W. Water U100. 100mm Undisturbed U38. 38mm Undisturbed Sample SPT. Standard Penetration Test	D. Disturbed G. Amber Glass Jar / Bottle CPT. Cone Penetration Test U100. Blows (Recovery mm) V. 40ml Glass Vial	T. Plastic Tub N. 'N' Value HV. Hand Shear Vane PID. Photo Ionisation Detector S. Soil
------------	--	--	--

Notes

Notes: Backfilled with arisings. Borehole was terminated at 2.0m due unable to recover sample within Chalk.

Services: Prior to excavation the location was scanned with a Cable Avoidance Tool (CAT).

Groundwater: None encountered

Status: Completed

APPENDIX C
PROPOSED SITE PLAN

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- Notes:**
- Proposed Parking: 137
- Proposed Annexe: GEA -1275m²
GIA - 1146m²
- Proposed Rooms: 88
- Paving:
Buff Concrete Paver



1 PROPOSED SITE PLAN
Scale: 1:550

Rev	Date	Description	By	Chk
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**AXIOM
ARCHITECTS**

Barn A Addlepool Business Centre Clyst St George Exeter EX3 0NR
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Client
WHITBREAD GROUP PLC

Project
PORTSMOUTH HAVANT PREMIER INN
65 BEDHAMPTON HILL
HAVANT PO9 3JN

Drawing
PROPOSED SITE PLAN

Scale	Date	Drawn	Checked
1:550@A3	26/09/24	IB	RW
Drawing No.	Revision		

6261-PL- 010

Status
PLANNING

APPENDIX D
DRAINAGE STRATEGY



DRAINAGE STRATEGY
LEGEND

- SW Drain to be removed
- FW Drain to be removed
- Roof area draining to proposed attenuation tank
- Denotes extent of proposed attenuation tank
- Denotes extent of 3m of foul & surface water sewer easement
- Surface water drain
- Foul water drain
- Surface water inspection chamber
- Foul water inspection chamber
- Surface water catchpit manhole
- Surface water flow control chamber
- Exceedance flood flow route
- Site Boundary

DRAINAGE STRATEGY
1:200

P1	FIRST ISSUE	DN	04.11.24
MK	REVISION	BY	DATE

DRAWING STATUS

PRELIMINARY

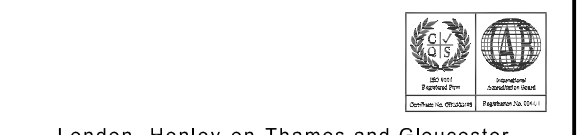
DRAWING TITLE

DRAINAGE STRATEGY

PROJECT

PORTSMOUTH HAVANT
PREMIER INN
BEDHAMPTON HILL
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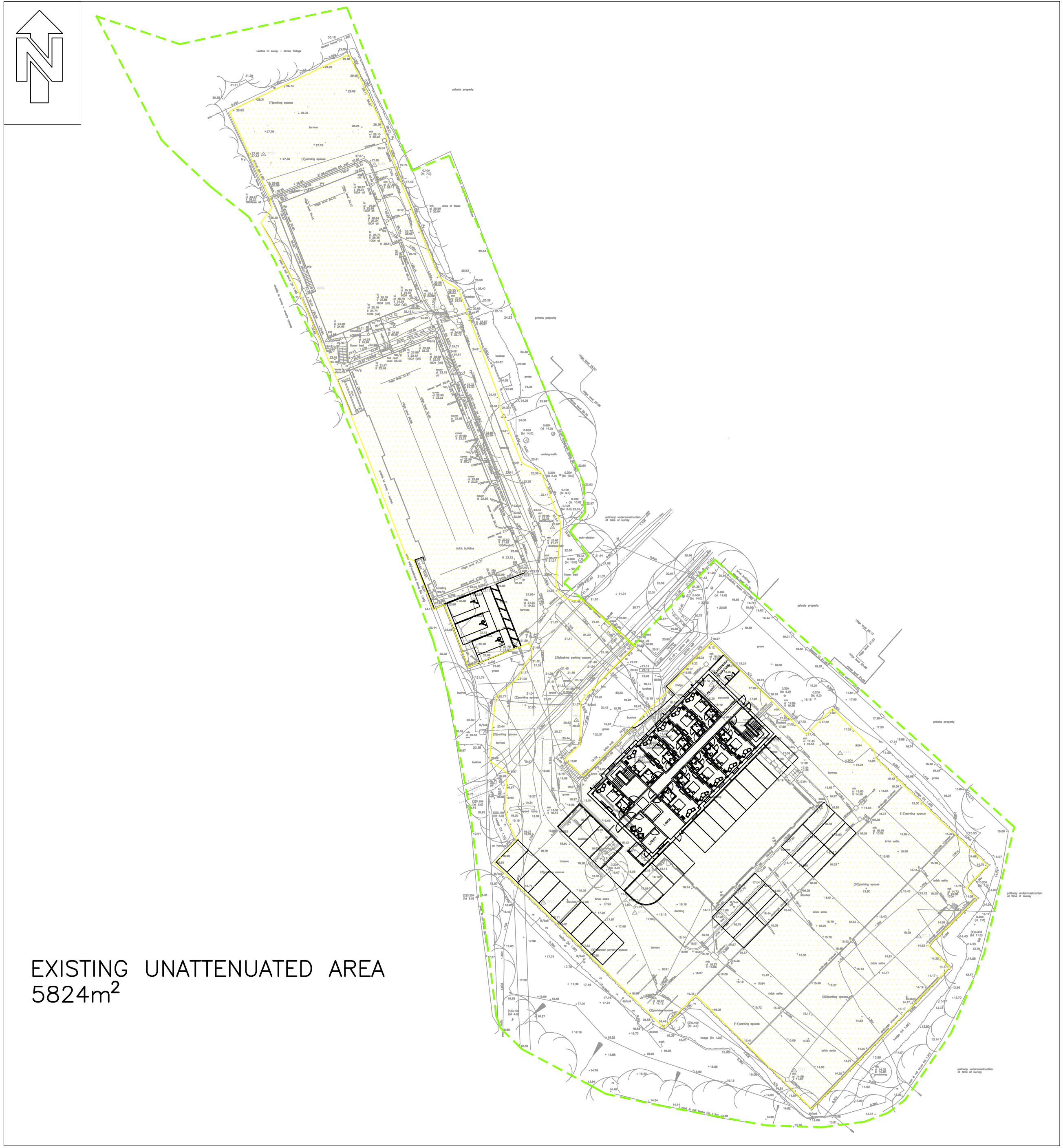
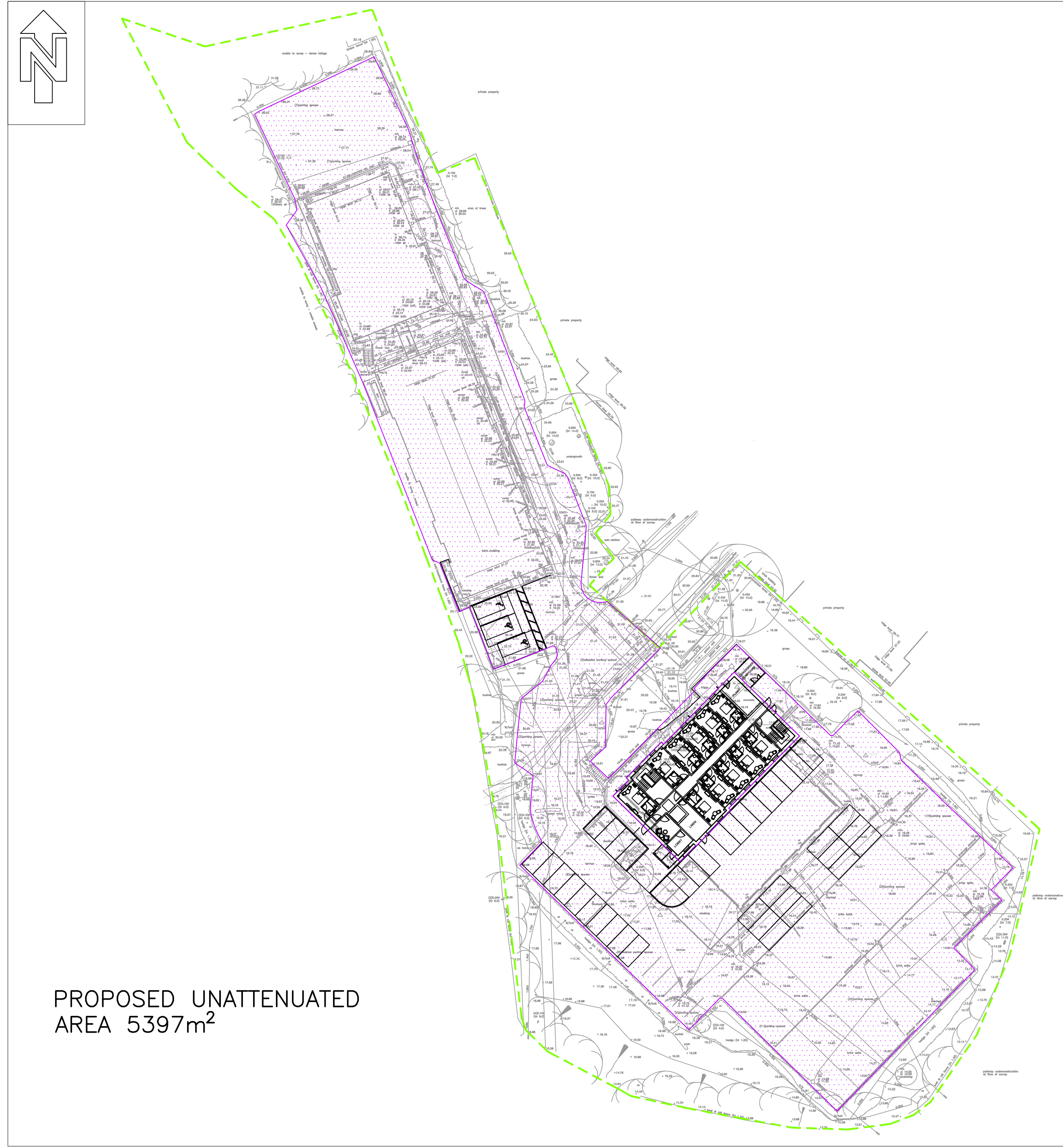
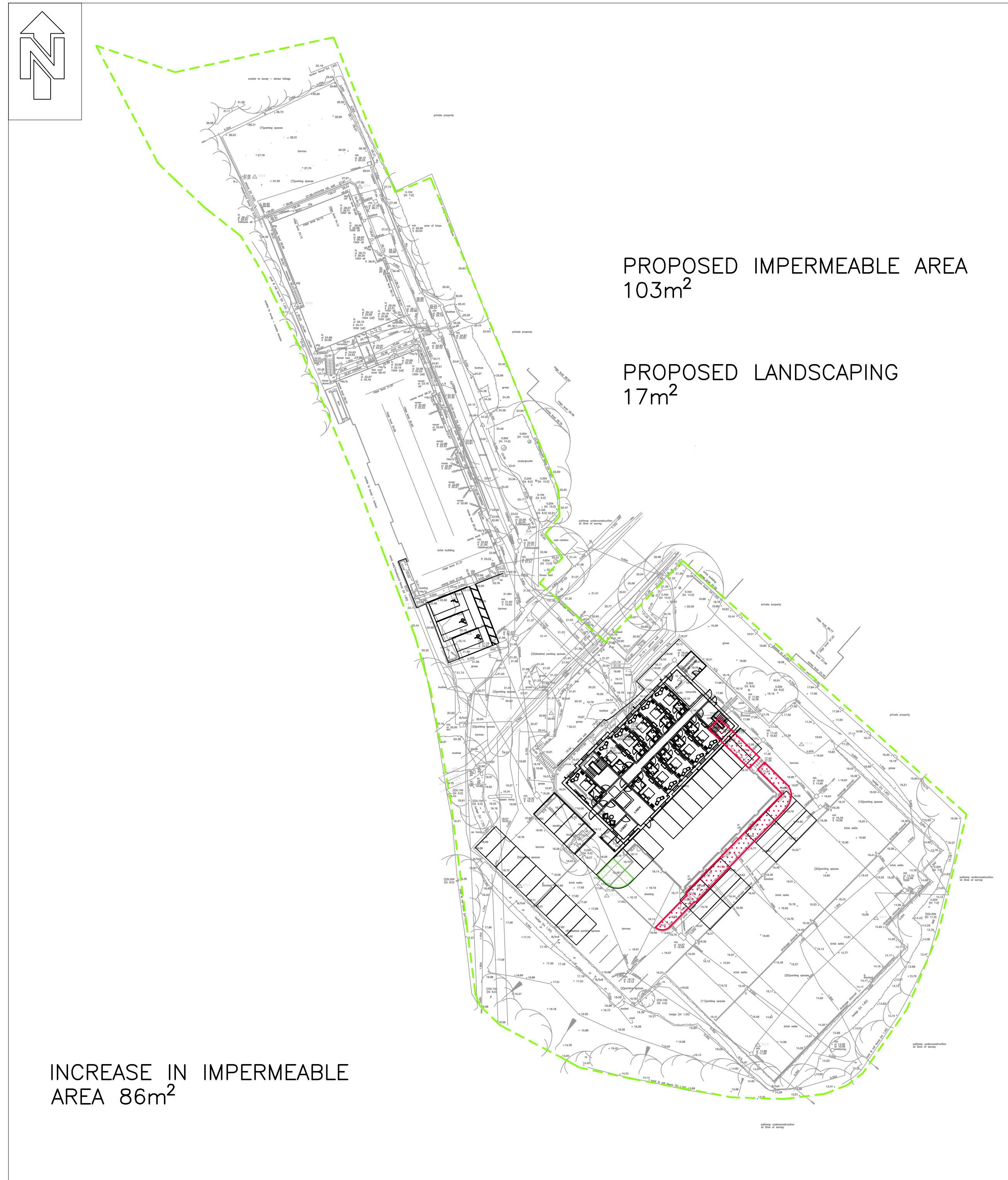
Drawn DN	Ch'd PB	Scales SHOWN	Date NOV '24
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Purpose of Issue

PLANNING

Project Number P24-0399	Drawing Number SK01	Revision P1
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APPENDIX E
AREAS LAYOUT



P1	FIRST ISSUE	DN	04/11/24
MC	REVISION	BY	DATE
DRAWING STATUS			
PRELIMINARY			
DRAWING TITLE			
AREAS LAYOUT			
PROJECT			
PORTSMOUTH HAVANT PREMIER INN BEDHAMPTON HILL HAVANT PO9 3JN			
 8 Friday Street Henley-on-Thames Oxfordshire, RG8 1AH T: 01491 538 221 E: mail@simpsoning.com W: www.simpsoning.com			
London, Henley-on-Thames and Gloucester			
Drawn DN	Chkd PB	Scales SHOWN	Date NOV '24
Purpose of Issue PLANNING			
Project Number P24-0399	Drawing Number SK02	Revision P1	

APPENDIX F
BROWNFIELD RUNOFF CALCULATIONS

P24-0399 - PI Portsmouth Havant - Modified Rational Method Runoff Calculations

Peak Runoff Rate = 2.78 x Volume Runoff Coefficient (Cv) x Area (A) x Peak Rainfall Intensity (I_{peak})

Runoff Volume = 2.78 x Volume Runoff Coefficient (Cv) x Area (A) x Peak Rainfall Intensity (I_{avg}) x Storm Duration

(Pre Development)

Return Period	Cv	I _(peak) (mm)	I _(ave) (mm)	A (Ha)	Peak Runoff Rate (l/s)	Runoff Volume (m ³)	Rainfall Data
2	0.95	18.519	4.724	0.582	28.5	156.8	FEH
30	0.95	32.652	8.330	0.582	50.2	276.5	FEH
100	0.95	39.894	10.177	0.582	61.4	337.8	FEH
100+45%	0.95	57.846	14.757	0.582	88.9	489.5	FEH

(Post Development)

Return Period	Cv	I _(peak) (mm)	I _(ave) (mm)	A (Ha)	Peak Runoff Rate (l/s)	Runoff Volume (m ³)	Rainfall Data
2	0.95	18.519	4.724	0.539	26.4	145.1	FEH
30	0.95	32.652	8.330	0.539	46.5	255.9	FEH
100	0.95	39.894	10.177	0.539	56.8	312.7	FEH
100+45%	0.95	57.846	14.757	0.539	82.3	453.4	FEH

APPENDIX G
MICRODRAINAGE ATTENUATION TANK DESIGN RESULTS

Simpson Associates

Page 1

1 Market Place Mews
Henley-on-Thames
RG9 2AH

Date 04/11/2024 16:43
File Attenuation Tank 100yr ...

Designed by deanne.netto
Checked by

Micro Drainage

Source Control 2019.1

Summary of Results for 2 year Return Period

Half Drain Time : 63 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	16.313	0.053	0.0	0.7	0.7	3.3	O K
30 min Summer	16.324	0.064	0.0	0.8	0.8	3.9	O K
60 min Summer	16.330	0.070	0.0	0.8	0.8	4.4	O K
120 min Summer	16.341	0.081	0.0	0.8	0.8	5.0	O K
180 min Summer	16.344	0.084	0.0	0.8	0.8	5.2	O K
240 min Summer	16.344	0.084	0.0	0.8	0.8	5.2	O K
360 min Summer	16.339	0.079	0.0	0.8	0.8	4.9	O K
480 min Summer	16.333	0.073	0.0	0.8	0.8	4.5	O K
600 min Summer	16.327	0.067	0.0	0.8	0.8	4.1	O K
720 min Summer	16.321	0.061	0.0	0.8	0.8	3.8	O K
960 min Summer	16.313	0.053	0.0	0.7	0.7	3.3	O K
1440 min Summer	16.302	0.042	0.0	0.6	0.6	2.6	O K
2160 min Summer	16.293	0.033	0.0	0.5	0.5	2.1	O K
2880 min Summer	16.288	0.028	0.0	0.4	0.4	1.8	O K
4320 min Summer	16.283	0.023	0.0	0.3	0.3	1.4	O K
5760 min Summer	16.280	0.020	0.0	0.3	0.3	1.2	O K
7200 min Summer	16.278	0.018	0.0	0.3	0.3	1.1	O K
8640 min Summer	16.277	0.017	0.0	0.2	0.2	1.0	O K
10080 min Summer	16.276	0.016	0.0	0.2	0.2	1.0	O K
15 min Winter	16.313	0.053	0.0	0.7	0.7	3.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	35.874	0.0	3.6	17
30 min Summer	23.245	0.0	4.7	31
60 min Summer	14.561	0.0	5.9	50
120 min Summer	9.703	0.0	7.9	84
180 min Summer	7.515	0.0	9.2	120
240 min Summer	6.224	0.0	10.1	154
360 min Summer	4.724	0.0	11.5	220
480 min Summer	3.859	0.0	12.6	284
600 min Summer	3.287	0.0	13.4	346
720 min Summer	2.877	0.0	14.1	406
960 min Summer	2.322	0.0	15.1	528
1440 min Summer	1.710	0.0	16.7	766
2160 min Summer	1.264	0.0	18.6	1124
2880 min Summer	1.028	0.0	20.1	1496
4320 min Summer	0.782	0.0	23.0	2208
5760 min Summer	0.655	0.0	25.7	2936
7200 min Summer	0.579	0.0	28.3	3672
8640 min Summer	0.528	0.0	31.1	4400
10080 min Summer	0.493	0.0	33.8	5120
15 min Winter	35.874	0.0	3.6	17

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Simpson Associates							Page 2
1 Market Place Mews Henley-on-Thames RG9 2AH							
Date 04/11/2024 16:43 File Attenuation Tank 100yr ...				Designed by deanne.netto Checked by			
Micro Drainage				Source Control 2019.1			
Summary of Results for 2 year Return Period							
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	16.324	0.064	0.0	0.8	0.8	3.9	O K
60 min Winter	16.330	0.070	0.0	0.8	0.8	4.3	O K
120 min Winter	16.339	0.079	0.0	0.8	0.8	4.9	O K
180 min Winter	16.340	0.080	0.0	0.8	0.8	4.9	O K
240 min Winter	16.337	0.077	0.0	0.8	0.8	4.8	O K
360 min Winter	16.329	0.069	0.0	0.8	0.8	4.2	O K
480 min Winter	16.320	0.060	0.0	0.8	0.8	3.7	O K
600 min Winter	16.314	0.054	0.0	0.7	0.7	3.3	O K
720 min Winter	16.309	0.049	0.0	0.7	0.7	3.0	O K
960 min Winter	16.301	0.041	0.0	0.6	0.6	2.5	O K
1440 min Winter	16.291	0.031	0.0	0.5	0.5	1.9	O K
2160 min Winter	16.284	0.024	0.0	0.4	0.4	1.5	O K
2880 min Winter	16.280	0.020	0.0	0.3	0.3	1.2	O K
4320 min Winter	16.276	0.016	0.0	0.2	0.2	1.0	O K
5760 min Winter	16.274	0.014	0.0	0.2	0.2	0.8	O K
7200 min Winter	16.272	0.012	0.0	0.2	0.2	0.7	O K
8640 min Winter	16.271	0.011	0.0	0.2	0.2	0.7	O K
10080 min Winter	16.270	0.010	0.0	0.1	0.1	0.6	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
30 min Winter	23.245	0.0	4.7	30			
60 min Winter	14.561	0.0	5.9	50			
120 min Winter	9.703	0.0	7.9	90			
180 min Winter	7.515	0.0	9.2	128			
240 min Winter	6.224	0.0	10.1	164			
360 min Winter	4.724	0.0	11.5	232			
480 min Winter	3.859	0.0	12.6	292			
600 min Winter	3.287	0.0	13.4	356			
720 min Winter	2.877	0.0	14.1	418			
960 min Winter	2.322	0.0	15.1	540			
1440 min Winter	1.710	0.0	16.7	778			
2160 min Winter	1.264	0.0	18.6	1128			
2880 min Winter	1.028	0.0	20.1	1500			
4320 min Winter	0.782	0.0	23.0	2248			
5760 min Winter	0.655	0.0	25.7	2968			
7200 min Winter	0.579	0.0	28.3	3744			
8640 min Winter	0.528	0.0	31.0	4416			
10080 min Winter	0.493	0.0	33.8	5024			
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1 Market Place Mews Henley-on-Thames RG9 2AH		
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Model Details

Storage is Online Cover Level (m) 17.560

Cellular Storage Structure

Invert Level (m) 16.260 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	65.0	65.0	0.401	0.0	87.8
0.400	65.0	87.8			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0050-8000-0380-8000
Design Head (m) 0.380
Design Flow (l/s) 0.8
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 50
Invert Level (m) 16.250
Minimum Outlet Pipe Diameter (mm) 75
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.380	0.8
Flush-Flo™	0.111	0.8
Kick-Flo®	0.259	0.7
Mean Flow over Head Range	-	0.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.8	1.200	1.3	3.000	2.0	7.000	3.1
0.200	0.8	1.400	1.4	3.500	2.2	7.500	3.2
0.300	0.7	1.600	1.5	4.000	2.3	8.000	3.3
0.400	0.8	1.800	1.6	4.500	2.5	8.500	3.4
0.500	0.9	2.000	1.7	5.000	2.6	9.000	3.5
0.600	1.0	2.200	1.8	5.500	2.7	9.500	3.6
0.800	1.1	2.400	1.8	6.000	2.8		
1.000	1.2	2.600	1.9	6.500	3.0		

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<u>Summary of Results for 30 year Return Period</u> Half Drain Time : 132 minutes.							
Storm Event	Max Level	Max Depth	Max Infiltration	Max Control	Max Σ Outflow	Max Volume	Status
	(m)	(m)	(l/s)	(l/s)	(l/s)	(m³)	
15 min Summer	16.380	0.120	0.0	0.8	0.8	7.4	O K
30 min Summer	16.413	0.153	0.0	0.8	0.8	9.4	O K
60 min Summer	16.441	0.181	0.0	0.8	0.8	11.2	O K
120 min Summer	16.449	0.189	0.0	0.8	0.8	11.7	O K
180 min Summer	16.448	0.188	0.0	0.8	0.8	11.6	O K
240 min Summer	16.444	0.184	0.0	0.8	0.8	11.4	O K
360 min Summer	16.434	0.174	0.0	0.8	0.8	10.7	O K
480 min Summer	16.421	0.161	0.0	0.8	0.8	10.0	O K
600 min Summer	16.409	0.149	0.0	0.8	0.8	9.2	O K
720 min Summer	16.396	0.136	0.0	0.8	0.8	8.4	O K
960 min Summer	16.374	0.114	0.0	0.8	0.8	7.0	O K
1440 min Summer	16.341	0.081	0.0	0.8	0.8	5.0	O K
2160 min Summer	16.317	0.057	0.0	0.7	0.7	3.5	O K
2880 min Summer	16.306	0.046	0.0	0.6	0.6	2.8	O K
4320 min Summer	16.295	0.035	0.0	0.5	0.5	2.1	O K
5760 min Summer	16.289	0.029	0.0	0.4	0.4	1.8	O K
7200 min Summer	16.286	0.026	0.0	0.4	0.4	1.6	O K
8640 min Summer	16.284	0.024	0.0	0.3	0.3	1.5	O K
10080 min Summer	16.282	0.022	0.0	0.3	0.3	1.4	O K
15 min Winter	16.380	0.120	0.0	0.8	0.8	7.4	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
15 min Summer	78.091	0.0	7.9	18			
30 min Summer	51.388	0.0	10.5	32			
60 min Summer	32.396	0.0	13.2	62			
120 min Summer	19.305	0.0	15.7	114			
180 min Summer	14.201	0.0	17.4	144			
240 min Summer	11.397	0.0	18.6	174			
360 min Summer	8.330	0.0	20.4	242			
480 min Summer	6.650	0.0	21.7	310			
600 min Summer	5.577	0.0	22.7	376			
720 min Summer	4.825	0.0	23.6	442			
960 min Summer	3.833	0.0	25.0	568			
1440 min Summer	2.771	0.0	27.1	796			
2160 min Summer	2.011	0.0	29.5	1144			
2880 min Summer	1.613	0.0	31.6	1500			
4320 min Summer	1.201	0.0	35.3	2204			
5760 min Summer	0.988	0.0	38.7	2936			
7200 min Summer	0.861	0.0	42.2	3672			
8640 min Summer	0.776	0.0	45.6	4400			
10080 min Summer	0.717	0.0	49.2	5120			
15 min Winter	78.091	0.0	7.9	18			
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Micro Drainage

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	16.413	0.153		0.0	0.8	9.5	O K
60 min Winter	16.441	0.181		0.0	0.8	11.2	O K
120 min Winter	16.450	0.190		0.0	0.8	11.7	O K
180 min Winter	16.446	0.186		0.0	0.8	11.5	O K
240 min Winter	16.440	0.180		0.0	0.8	11.1	O K
360 min Winter	16.424	0.164		0.0	0.8	10.1	O K
480 min Winter	16.405	0.145		0.0	0.8	9.0	O K
600 min Winter	16.387	0.127		0.0	0.8	7.9	O K
720 min Winter	16.370	0.110		0.0	0.8	6.8	O K
960 min Winter	16.343	0.083		0.0	0.8	5.1	O K
1440 min Winter	16.314	0.054		0.0	0.7	3.3	O K
2160 min Winter	16.298	0.038		0.0	0.6	2.4	O K
2880 min Winter	16.291	0.031		0.0	0.5	1.9	O K
4320 min Winter	16.284	0.024		0.0	0.3	1.5	O K
5760 min Winter	16.280	0.020		0.0	0.3	1.2	O K
7200 min Winter	16.278	0.018		0.0	0.3	1.1	O K
8640 min Winter	16.276	0.016		0.0	0.2	1.0	O K
10080 min Winter	16.275	0.015		0.0	0.2	0.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	51.388	0.0	10.5	32
60 min Winter	32.396	0.0	13.2	60
120 min Winter	19.305	0.0	15.7	116
180 min Winter	14.201	0.0	17.4	146
240 min Winter	11.397	0.0	18.6	184
360 min Winter	8.330	0.0	20.4	258
480 min Winter	6.650	0.0	21.7	330
600 min Winter	5.577	0.0	22.8	398
720 min Winter	4.825	0.0	23.6	462
960 min Winter	3.833	0.0	25.0	578
1440 min Winter	2.771	0.0	27.1	794
2160 min Winter	2.011	0.0	29.5	1148
2880 min Winter	1.613	0.0	31.6	1500
4320 min Winter	1.201	0.0	35.3	2192
5760 min Winter	0.988	0.0	38.7	2944
7200 min Winter	0.861	0.0	42.2	3656
8640 min Winter	0.776	0.0	45.6	4416
10080 min Winter	0.717	0.0	49.2	5136

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Model Details

Storage is Online Cover Level (m) 17.560

Cellular Storage Structure

Invert Level (m) 16.260 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	65.0	65.0	0.401	0.0	87.8
0.400	65.0	87.8			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0050-8000-0380-8000
Design Head (m) 0.380
Design Flow (l/s) 0.8
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 50
Invert Level (m) 16.250
Minimum Outlet Pipe Diameter (mm) 75
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.380	0.8
Flush-Flo™	0.111	0.8
Kick-Flo®	0.259	0.7
Mean Flow over Head Range	-	0.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.8	1.200	1.3	3.000	2.0	7.000	3.1
0.200	0.8	1.400	1.4	3.500	2.2	7.500	3.2
0.300	0.7	1.600	1.5	4.000	2.3	8.000	3.3
0.400	0.8	1.800	1.6	4.500	2.5	8.500	3.4
0.500	0.9	2.000	1.7	5.000	2.6	9.000	3.5
0.600	1.0	2.200	1.8	5.500	2.7	9.500	3.6
0.800	1.1	2.400	1.8	6.000	2.8		
1.000	1.2	2.600	1.9	6.500	3.0		

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Micro Drainage

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Summary of Results for 100 year Return Period

Half Drain Time : 168 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	16.413	0.153	0.0	0.8	0.8	9.4	O K
30 min Summer	16.458	0.198	0.0	0.8	0.8	12.2	O K
60 min Summer	16.500	0.240	0.0	0.8	0.8	14.8	O K
120 min Summer	16.513	0.253	0.0	0.8	0.8	15.6	O K
180 min Summer	16.511	0.251	0.0	0.8	0.8	15.5	O K
240 min Summer	16.504	0.244	0.0	0.8	0.8	15.1	O K
360 min Summer	16.490	0.230	0.0	0.8	0.8	14.2	O K
480 min Summer	16.475	0.215	0.0	0.8	0.8	13.3	O K
600 min Summer	16.461	0.201	0.0	0.8	0.8	12.4	O K
720 min Summer	16.446	0.186	0.0	0.8	0.8	11.5	O K
960 min Summer	16.420	0.160	0.0	0.8	0.8	9.9	O K
1440 min Summer	16.376	0.116	0.0	0.8	0.8	7.2	O K
2160 min Summer	16.336	0.076	0.0	0.8	0.8	4.7	O K
2880 min Summer	16.317	0.057	0.0	0.7	0.7	3.5	O K
4320 min Summer	16.302	0.042	0.0	0.6	0.6	2.6	O K
5760 min Summer	16.294	0.034	0.0	0.5	0.5	2.1	O K
7200 min Summer	16.290	0.030	0.0	0.4	0.4	1.8	O K
8640 min Summer	16.287	0.027	0.0	0.4	0.4	1.7	O K
10080 min Summer	16.285	0.025	0.0	0.4	0.4	1.5	O K
15 min Winter	16.413	0.153	0.0	0.8	0.8	9.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	98.237	0.0	10.0	18
30 min Summer	65.259	0.0	13.3	33
60 min Summer	41.419	0.0	16.9	62
120 min Summer	24.132	0.0	19.7	120
180 min Summer	17.585	0.0	21.6	174
240 min Summer	14.032	0.0	22.9	198
360 min Summer	10.177	0.0	24.9	258
480 min Summer	8.091	0.0	26.4	324
600 min Summer	6.767	0.0	27.6	390
720 min Summer	5.844	0.0	28.6	456
960 min Summer	4.634	0.0	30.3	586
1440 min Summer	3.337	0.0	32.7	824
2160 min Summer	2.410	0.0	35.4	1168
2880 min Summer	1.924	0.0	37.7	1500
4320 min Summer	1.419	0.0	41.7	2208
5760 min Summer	1.158	0.0	45.4	2936
7200 min Summer	1.001	0.0	49.0	3672
8640 min Summer	0.897	0.0	52.7	4400
10080 min Summer	0.824	0.0	56.5	5120
15 min Winter	98.237	0.0	10.0	18

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Micro Drainage

Summary of Results for 100 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	16.458	0.198	0.0	0.8	0.8	12.2	O K
60 min Winter	16.500	0.240	0.0	0.8	0.8	14.8	O K
120 min Winter	16.513	0.253	0.0	0.8	0.8	15.6	O K
180 min Winter	16.511	0.251	0.0	0.8	0.8	15.5	O K
240 min Winter	16.502	0.242	0.0	0.8	0.8	14.9	O K
360 min Winter	16.483	0.223	0.0	0.8	0.8	13.8	O K
480 min Winter	16.462	0.202	0.0	0.8	0.8	12.5	O K
600 min Winter	16.441	0.181	0.0	0.8	0.8	11.2	O K
720 min Winter	16.420	0.160	0.0	0.8	0.8	9.9	O K
960 min Winter	16.384	0.124	0.0	0.8	0.8	7.6	O K
1440 min Winter	16.333	0.073	0.0	0.8	0.8	4.5	O K
2160 min Winter	16.308	0.048	0.0	0.7	0.7	2.9	O K
2880 min Winter	16.297	0.037	0.0	0.5	0.5	2.3	O K
4320 min Winter	16.288	0.028	0.0	0.4	0.4	1.7	O K
5760 min Winter	16.283	0.023	0.0	0.3	0.3	1.4	O K
7200 min Winter	16.280	0.020	0.0	0.3	0.3	1.2	O K
8640 min Winter	16.278	0.018	0.0	0.3	0.3	1.1	O K
10080 min Winter	16.277	0.017	0.0	0.2	0.2	1.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	65.259	0.0	13.3	32
60 min Winter	41.419	0.0	16.9	62
120 min Winter	24.132	0.0	19.7	118
180 min Winter	17.585	0.0	21.5	172
240 min Winter	14.032	0.0	22.9	218
360 min Winter	10.177	0.0	24.9	272
480 min Winter	8.091	0.0	26.4	344
600 min Winter	6.767	0.0	27.6	416
720 min Winter	5.844	0.0	28.6	484
960 min Winter	4.634	0.0	30.3	608
1440 min Winter	3.337	0.0	32.7	824
2160 min Winter	2.410	0.0	35.4	1148
2880 min Winter	1.924	0.0	37.7	1500
4320 min Winter	1.419	0.0	41.7	2244
5760 min Winter	1.158	0.0	45.4	2944
7200 min Winter	1.001	0.0	49.0	3656
8640 min Winter	0.897	0.0	52.7	4384
10080 min Winter	0.824	0.0	56.5	5144

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Model Details

Storage is Online Cover Level (m) 17.560

Cellular Storage Structure

Invert Level (m) 16.260 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	65.0	65.0	0.401	0.0	87.8
0.400	65.0	87.8			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0050-8000-0380-8000
Design Head (m) 0.380
Design Flow (l/s) 0.8
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 50
Invert Level (m) 16.250
Minimum Outlet Pipe Diameter (mm) 75
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.380	0.8
Flush-Flo™	0.111	0.8
Kick-Flo®	0.259	0.7
Mean Flow over Head Range	-	0.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.8	1.200	1.3	3.000	2.0	7.000	3.1
0.200	0.8	1.400	1.4	3.500	2.2	7.500	3.2
0.300	0.7	1.600	1.5	4.000	2.3	8.000	3.3
0.400	0.8	1.800	1.6	4.500	2.5	8.500	3.4
0.500	0.9	2.000	1.7	5.000	2.6	9.000	3.5
0.600	1.0	2.200	1.8	5.500	2.7	9.500	3.6
0.800	1.1	2.400	1.8	6.000	2.8		
1.000	1.2	2.600	1.9	6.500	3.0		

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Summary of Results for 100 year Return Period (+45%)

Half Drain Time : 259 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	16.486	0.226	0.0	0.8	0.8	13.9	O K
30 min Summer	16.555	0.295	0.0	0.8	0.8	18.2	O K
60 min Summer	16.620	0.360	0.0	0.8	0.8	22.2	O K
120 min Summer	16.647	0.387	0.0	0.8	0.8	23.9	O K
180 min Summer	16.652	0.392	0.0	0.8	0.8	24.2	O K
240 min Summer	16.648	0.388	0.0	0.8	0.8	23.9	O K
360 min Summer	16.635	0.375	0.0	0.8	0.8	23.1	O K
480 min Summer	16.620	0.360	0.0	0.8	0.8	22.3	O K
600 min Summer	16.606	0.346	0.0	0.8	0.8	21.4	O K
720 min Summer	16.592	0.332	0.0	0.8	0.8	20.5	O K
960 min Summer	16.564	0.304	0.0	0.8	0.8	18.8	O K
1440 min Summer	16.509	0.249	0.0	0.8	0.8	15.4	O K
2160 min Summer	16.434	0.174	0.0	0.8	0.8	10.7	O K
2880 min Summer	16.383	0.123	0.0	0.8	0.8	7.6	O K
4320 min Summer	16.329	0.069	0.0	0.8	0.8	4.3	O K
5760 min Summer	16.313	0.053	0.0	0.7	0.7	3.3	O K
7200 min Summer	16.305	0.045	0.0	0.6	0.6	2.8	O K
8640 min Summer	16.300	0.040	0.0	0.6	0.6	2.5	O K
10080 min Summer	16.296	0.036	0.0	0.5	0.5	2.2	O K
15 min Winter	16.486	0.226	0.0	0.8	0.8	13.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	142.444	0.0	14.5	18
30 min Summer	94.625	0.0	19.3	33
60 min Summer	60.058	0.0	24.5	62
120 min Summer	34.991	0.0	28.6	122
180 min Summer	25.498	0.0	31.2	180
240 min Summer	20.346	0.0	33.2	226
360 min Summer	14.757	0.0	36.1	284
480 min Summer	11.732	0.0	38.3	348
600 min Summer	9.811	0.0	40.0	416
720 min Summer	8.474	0.0	41.5	486
960 min Summer	6.720	0.0	43.9	626
1440 min Summer	4.838	0.0	47.4	898
2160 min Summer	3.495	0.0	51.4	1256
2880 min Summer	2.790	0.0	54.7	1588
4320 min Summer	2.057	0.0	60.5	2252
5760 min Summer	1.678	0.0	65.8	2944
7200 min Summer	1.452	0.0	71.1	3672
8640 min Summer	1.301	0.0	76.5	4408
10080 min Summer	1.194	0.0	81.9	5136
15 min Winter	142.444	0.0	14.5	18

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Summary of Results for 100 year Return Period (+45%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	16.555	0.295	0.0	0.8	0.8	18.2	O K
60 min Winter	16.620	0.360	0.0	0.8	0.8	22.3	O K
120 min Winter	16.649	0.389	0.0	0.8	0.8	24.0	O K
180 min Winter	16.655	0.395	0.0	0.8	0.8	24.4	O K
240 min Winter	16.651	0.391	0.0	0.8	0.8	24.2	O K
360 min Winter	16.634	0.374	0.0	0.8	0.8	23.1	O K
480 min Winter	16.616	0.356	0.0	0.8	0.8	22.0	O K
600 min Winter	16.597	0.337	0.0	0.8	0.8	20.8	O K
720 min Winter	16.577	0.317	0.0	0.8	0.8	19.5	O K
960 min Winter	16.536	0.276	0.0	0.8	0.8	17.0	O K
1440 min Winter	16.447	0.187	0.0	0.8	0.8	11.6	O K
2160 min Winter	16.358	0.098	0.0	0.8	0.8	6.1	O K
2880 min Winter	16.319	0.059	0.0	0.8	0.8	3.7	O K
4320 min Winter	16.301	0.041	0.0	0.6	0.6	2.5	O K
5760 min Winter	16.293	0.033	0.0	0.5	0.5	2.0	O K
7200 min Winter	16.288	0.028	0.0	0.4	0.4	1.7	O K
8640 min Winter	16.286	0.026	0.0	0.4	0.4	1.6	O K
10080 min Winter	16.284	0.024	0.0	0.3	0.3	1.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	94.625	0.0	19.3	33
60 min Winter	60.058	0.0	24.5	62
120 min Winter	34.991	0.0	28.6	118
180 min Winter	25.498	0.0	31.2	176
240 min Winter	20.346	0.0	33.2	230
360 min Winter	14.757	0.0	36.1	290
480 min Winter	11.732	0.0	38.3	366
600 min Winter	9.811	0.0	40.0	444
720 min Winter	8.474	0.0	41.5	520
960 min Winter	6.720	0.0	43.9	674
1440 min Winter	4.838	0.0	47.4	926
2160 min Winter	3.495	0.0	51.4	1256
2880 min Winter	2.790	0.0	54.7	1528
4320 min Winter	2.057	0.0	60.5	2244
5760 min Winter	1.678	0.0	65.8	2968
7200 min Winter	1.452	0.0	71.1	3672
8640 min Winter	1.301	0.0	76.5	4392
10080 min Winter	1.194	0.0	81.9	5072

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Simpson Associates		Page 4
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Model Details

Storage is Online Cover Level (m) 17.560

Cellular Storage Structure

Invert Level (m) 16.260 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	65.0	65.0	0.401	0.0	87.8
0.400	65.0	87.8			

Hydro-Brake® Optimum Outflow Control

Unit Reference MD-SHE-0050-8000-0380-8000
Design Head (m) 0.380
Design Flow (l/s) 0.8
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 50
Invert Level (m) 16.250
Minimum Outlet Pipe Diameter (mm) 75
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.380	0.8
Flush-Flo™	0.111	0.8
Kick-Flo®	0.259	0.7
Mean Flow over Head Range	-	0.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	0.8	1.200	1.3	3.000	2.0	7.000	3.1
0.200	0.8	1.400	1.4	3.500	2.2	7.500	3.2
0.300	0.7	1.600	1.5	4.000	2.3	8.000	3.3
0.400	0.8	1.800	1.6	4.500	2.5	8.500	3.4
0.500	0.9	2.000	1.7	5.000	2.6	9.000	3.5
0.600	1.0	2.200	1.8	5.500	2.7	9.500	3.6
0.800	1.1	2.400	1.8	6.000	2.8		
1.000	1.2	2.600	1.9	6.500	3.0		

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