

Land at Winchester Road, Boorley Green

T +44 (0)3331 882511
info@swh.co.uk

Drainage and Flood Risk Statement December 2024

SO-2977-03-CE-RP-0500

Revision 07

Prepared by: Ian Llewellyn

Revision 01 – 02 July 2024

Revision 02 – 17 July 2024

Revision 03 – 25 July 2024

Revision 04 – 29 November 2024

Revision 05 – 13 December 2024

Revision 06 – March 2025

Revision 07 – February 2026



Structural
Engineering



Civil
Engineering



CDM
Consultants



Sustainability
and BREEAM



Traffic and
Transport



Flood Risk
Assessments



Highway
Engineering



Event
Engineering

1.1 Development

The development proposals comprise of a new residential apartment building and is located on a brownfield site. The proposed apartment building contains 50 retirement units and 2 houses located to the east which both have direct access from Winchester Road. The existing site is located in the grounds of Oak Cottage, Boorley Green. The site is made up of an access off Winchester Road into an existing overgrown hard standing area and a couple of old sheds. The remainder of the site is an open field once used in part as an orchard and with tree stumps and existing trees. The site is flanked on three sides by mature trees and hedgerows and by Winchester Road to the east. Based on the utility information on the topographical survey, there are no existing drainage networks within the existing site, there is an existing Southern Water foul sewer located on the northern side of Winchester Road but no evidence for surface water runs. There are two watercourse ditches to the north either side of an existing public footpath. There is an existing pipe in the north-western corner of the site which connects the two ditches together. The majority of existing rainwater discharges to these existing ditches through natural overland flow and groundwater flow.

1.2 Location

The site is located to the west of Winchester Road, Boorley Green, Hampshire, SO32 2UA. Grid Reference SU 450470 114825 and is approximately 0.910ha in area.

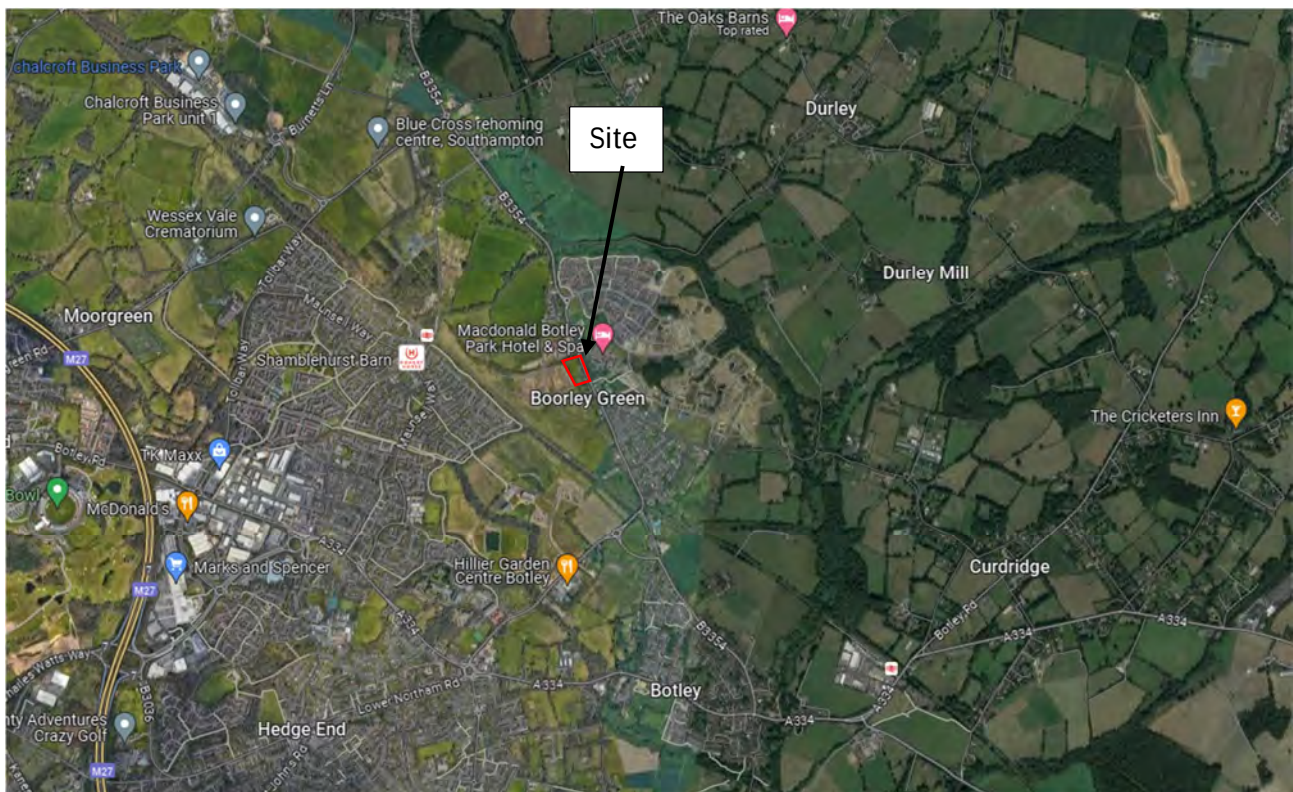


Figure 1 Site location plan (wider area)

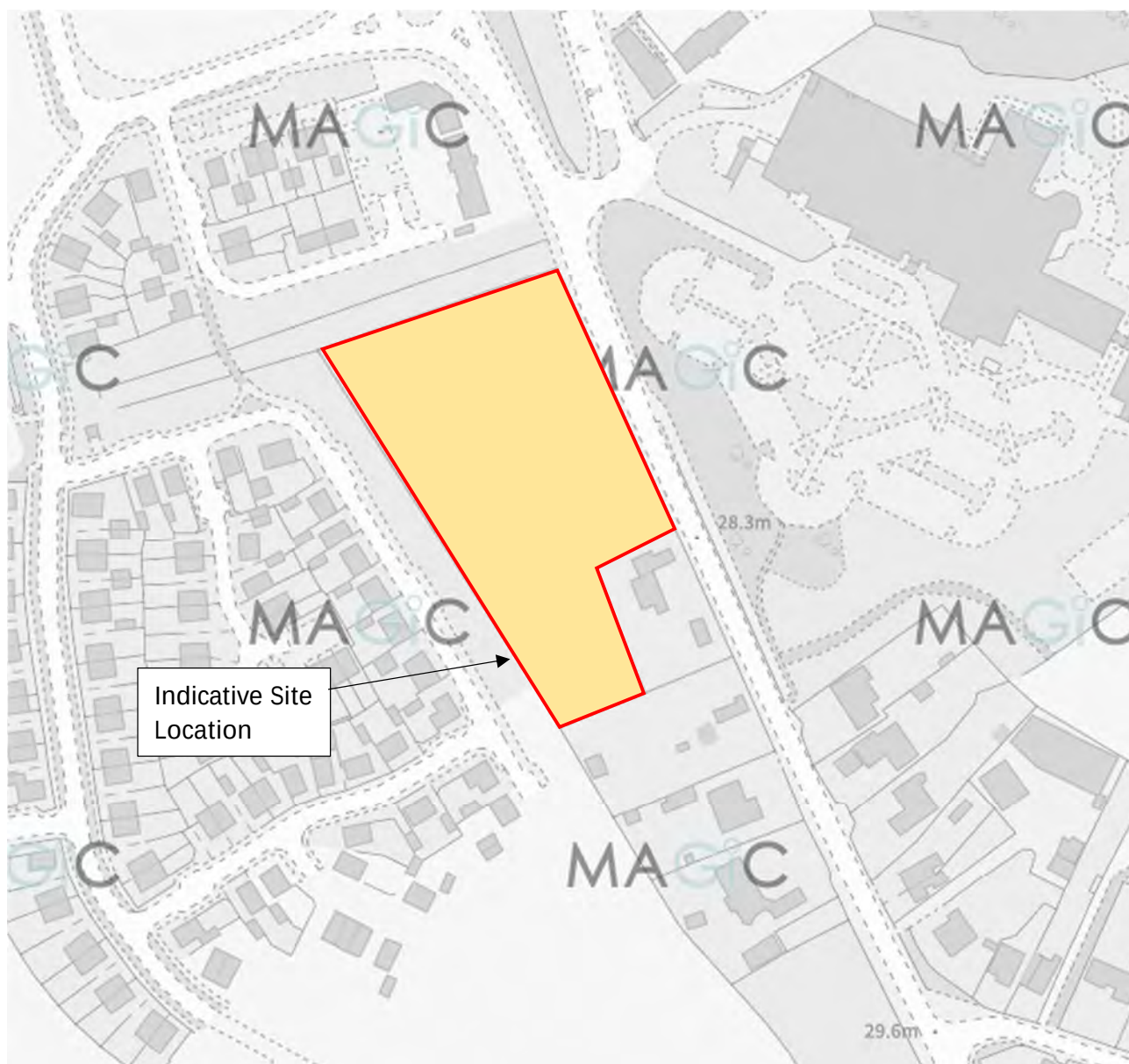


Figure 2 Site location plan (local area)

Winchester Road slopes downwards from the south to north. The existing site is generally flat but is higher in the south at 27.78m AOD to the northwest corner at 27.21m AOD. See Appendix A for the existing topographical survey which covers the site.

1.3 Flooding

The proposed development classed as 'More Vulnerable' scheme under table 2 of the NPPF. The site is located in Flood Zone 1. Sequential test and exception tests are therefore not required.

	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
FZ1					
FZ2		ETR			
FZ3a	ETR		ETR		
FZ3b	ETR				

Green – Development appropriate.

Red- Development not permitted.

ETR – Exception test required to allow development.

This report considers the flood risk to the proposed development and the impact that the development will have in relation to flooding of adjacent areas and watercourses. It also considers any limits relating to flooding that are likely to be imposed to allow the development to be undertaken and recommends Sustainable Urban Drainage systems (SUDS) to control surface water runoff.

This report takes into account outline requirements of NPPF and local policies and is based on information received from the Environment Agency (EA) website, Eastleigh Council and Southern Water – see Appendix C for sewer maps.

Eastleigh Borough Council have a level 1 Local plan strategic flood risk assessment undertaken by Aecom dated 2023 and 2024. The recently adopted Local Plan contains a policy addressing Flood Risk and Sustainable Drainage Systems (Policy DM5). This report shows how the proposal meets the requirements of the Local Plan

2.0 Surface Water Strategy

Ridge undertook a ground condition study site investigation [ref: 5024854-RDG-XX-ST-DOC-C-00GC01] Issued in June 2024 on behalf of McCarthy Stone. BGS borehole data confirms the overlying ground is shallow topsoil and made ground. Underneath is a layer of Wittering Formation bedrock comprising of clay and silt. Five machine excavated infiltration tests were performed in June 2024 within proposed soft landscaping and car parking. These tests were carried out to a depth between 0.65m and 2.25mbgl in accordance with BRE digest 365 standards. Appendix B shows the location of the trial pits and infiltration results.

Groundwater was encountered within the majority of the boreholes and found to be at a depth of 0.8m to 1.7m bgl at an approximate level of 26.50-26.80mAOD. Due to the presence of groundwater and the lack of suitable infiltration results from the site investigation, discharge of surface water via infiltration devices such as swales or basins is not feasible, however the site has an existing ditch along the northern boundary.

This ditch provides drainage from the undeveloped site and has suitable capacity within it to accommodate the proposed controlled discharge from the site.

2.1 Drainage Catchment Areas

For the purposes of this planning report, we have provided an indicative drainage proposal for the whole site split into two areas as follows.

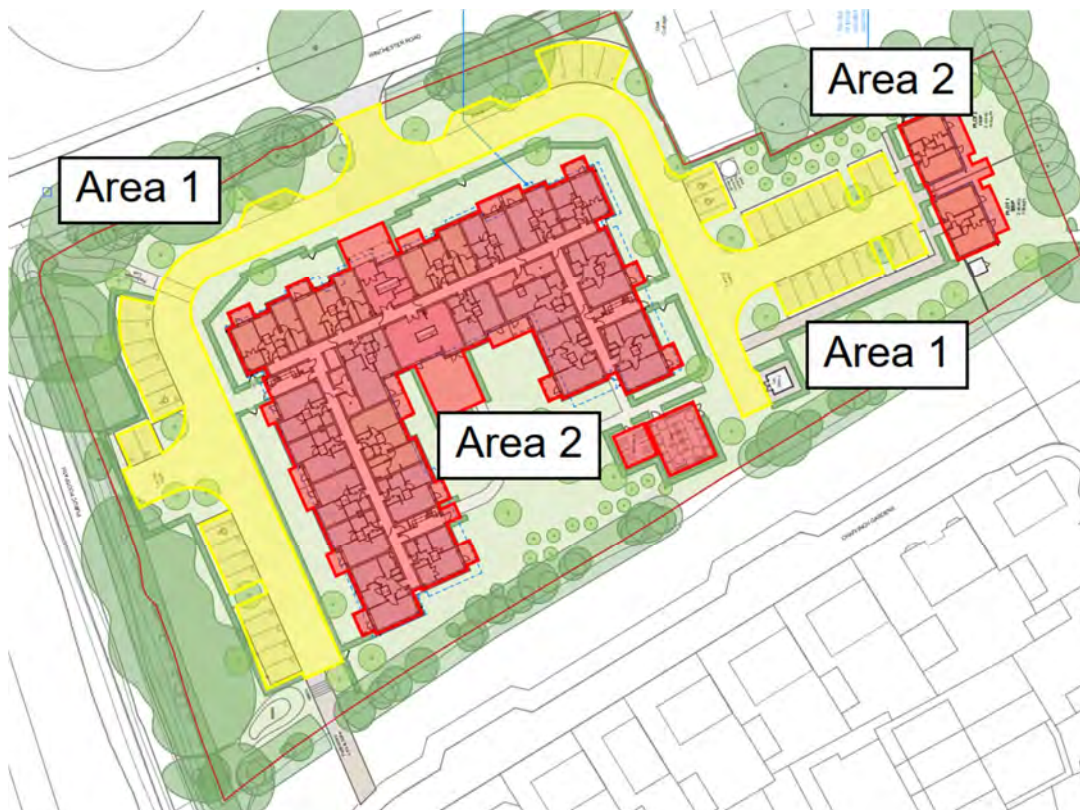


Figure 4 - Site Drainage Areas

2.1.1 Area 1 (yellow)

Area 1 covers the proposed access road and parking spaces for the proposed McCarthy Stone independent retirement living apartment building. The drainage strategy for the car park is for surface water to fall towards the parking spaces or new gullies. Surface water falling towards the parking spaces will infiltrate into the permeable sub-base via the permeable block pavers. Water from the gullies will discharge directly into the permeable sub-base via distribution units. The surface water within the permeable sub-base discharges to the perforated pipe laid at the bottom of the sub-base and this is connected to the attenuation crates and discharges to the existing ditch north of the site boundary via a Hydrobrake chamber controlling the discharge rate to existing greenfield runoff rates. A swale is provided prior to existing ditch to aid water treatment which is discussed in further detail in section 2.5.

Area 1 Access Road and Parking Area	2513 m ²	0.251 ha
--	---------------------	----------

2.1.2 Area 2 (red)

Area 2 covers the proposed impermeable roof area which is based on the main ground floor level plus the two houses located on the southern end of the site. The impermeable roof area drains via rainwater downpipes into a lined cellular crated attenuation tank located under the access road on the northern side of the building. This connects into the Hydrobrake chamber providing a controlled flow as identified from Area 1.

Area 2 Impermeable Roof Area	2068 m ²	0.207 ha
---------------------------------	---------------------	----------

2.2 Existing Surface Water Drainage



The existing site slopes from a high point in the southeast to a low point in the northwest corner. The current site does not consist of any surface water drainage networks except for a shallow depression along the eastern boundary of the site which forms in a ditch along the northern boundary of the site. Beyond the northern boundary there is a public footpath and a more formalised ditch/watercourse flowing in an east-west direction.

In the northwest corner of the development site the northern boundary ditch appears to end with a 225mm diameter culverted pipe passing under the public footpath and discharging directly into the adjacent watercourse. The invert level of the pipe has been surveyed and confirmed to be 25.75mAOD. This confirms the pipe is located at the lowest point of the site – see adjacent image.

For developments on greenfield sites surface water runoff it is to be kept at greenfield runoff rates.

The greenfield flows are as follows:

5 l/s/ha = overall site area 0.901ha = 4.51 l/s
 5 l/s/ha = proposed impermeable area 0.458ha = 2.3 l/s
 QBAR flow = 2.4l/s
 1 in 1 year flow = 2.0l/s
 1 in 30 year flow = 5.4l/s
 1 in 100 year flow = 7.6l/s

Existing / Greenfield runoff rates calculations can be found in Appendix D

It is proposed to limit discharge to the existing ditch to just below the Qbar rate at 2.4 l/s

2.3 Drainage Storage

- 2.3.1 The overall drainage network has been assessed with a complex attenuation storage device within Site 3D. The system is set up with a single flow control device limiting the flow off site to the ditch to 2.2 l/s.
- 2.3.2 Attenuation storage is provided by a combination of the deep cellular crate attenuation tank below the car park and the permeable car park sub-base at the higher level.
- 2.3.3 The complex attenuation calculation assumes the attenuation is shared between both devices and the volume of storage is shared according to the water level in the system. Orifice plates are located within the manholes which form the perforated pipe below the car park sub-base and these aid to control the flow and manage the water level across the permeable sub-base attenuation.
- 2.3.4 Calculations demonstrate in a 1 in 100 year event plus climate change allowance the peak water level reaches the top of the permeable sub-base. This is below the car park cover level ensuring there is no ponding and the building is safe.

Open Graded Sub-base

This is open graded sub-base across the extent of the car park designed to comprise an area of 1926m² with a minimum depth of 350mm, resulting in an overall storage capacity of 1920 x 0.35 x 0.3 porosity = 202.2m³.

Cellular System

This is a cellular crate attenuation tank located below the access road with approximately 800mm cover above the crates.

The overall size of the crates are to be 5m x 25m x 0.8m deep to provide an overall storage capacity = 95m³

An indicative drainage layout is provided in Appendix E. Indicative construction details have also been provided within Appendix E which shows the intended road build-up, showing the impermeable layer at the base forming the attenuation, and perforated pipe to aid discharge from the permeable sub-base.

The drainage has been designed using Site 3D Network modelling and is in Appendix F. The systems have been checked for a 1 in 100-year event with 45% climate change allowance and has a half drain period less than 24hrs. The network model confirms a small volume of flooding will occur in a 1 in 100 year event plus climate change however the depth will be very shallow and will not impact upon the proposed building.

2.4 Flotation Assessment

- 2.4.1 Due to the presence of groundwater on site the attenuation crates will need to be surrounded with an impermeable membrane to prevent water ingress and the underside of the permeable sub-base car park will be lined with an impermeable membrane.
- 2.4.2 Groundwater levels vary across the site from 26.42mAOD to 27.26mAOD. These levels were taken in March 2024 after a particularly wet winter and it would be reasonable to assume these would be at or close to the likely peak levels on the site.
- 2.4.3 In proximity to the proposed attenuation tank the peak groundwater level was recorded as 26.75mAOD.

The proposed cellular attenuation storage invert level is 26.00mAOD with top of crates at 26.80mAOD.

For the purposes of design assume a worst case scenario of groundwater level at the top of the cellular crates and an empty storage.

Uplift due to groundwater = $10\text{kN/m}^3 \times 0.8\text{m height} = 8\text{kN/m}^2$

Based on proposed car park construction detail the ground level during the construction works will be 27.610mAOD over the attenuation storage. The build up over the cellular crates will comprise of following

- 110mm base course tarmac – weight = $20\text{kN/m}^3 \times 0.11\text{m height} = 2.2\text{kN/m}^2$
- 350mm permeable sub-base stone – weight = $21\text{kN/m}^3 \times 0.35\text{m height} = 7.35\text{kN/m}^2$
- 400mm soil – weight = $18\text{kN/m}^3 \times 0.4\text{m height} = 7.2\text{kN/m}^2$
- Total weight above tank = 16.75kN/m^2 therefore factor of safety on uplift = 2.09

Groundworks contractor to maintain dewatering on site during the construction of the cellular crates and until the construction running surface is completed.

The invert level of the car park permeable sub-base is typically 27.20mAOD which is generally above the measured groundwater level on site. Should any pockets of ground water be found during the

formation of the car park sub-base, dewatering will be required until the full depth sub-base has been installed which will provide adequate ballast against uplift.

Whilst the invert level of permeable sub-base is above the groundwater level, the depth of the proposed perforated pipe varies, becoming deeper towards the attenuation tank. Lowest invert of the perforated pipe is 26.230mAOD and so there will likely be 1m maximum depth of the perforated pipe below the groundwater level.

Providing the pipe is installed whilst dewatering works are being undertaken, or the pipe is installed filled with water, the perforated pipe can be backfilled with the permeable sub-base material which will provide sufficient weight to prevent uplift.

2.5 Surface Water Quality

Table 26.2 in CIRIA 753 provides classifications for pollution hazard indices for different land uses.

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

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters			
Type of SuDS component	Mitigation indices ¹		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 ²	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond ⁴	0.7 ³	0.7	0.5
Wetland	0.8 ³	0.8	0.8
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Table 26.2 shows the development falls within the low hazard level.

Table 26.3 shows the mitigation indices for systems discharging to surface waters.

Ideally infiltration trenches are the most suitable form of mitigation for low hazard levels. However, due to the constraints of the site, this is not feasible. Roof drainage is collected via catchpits and a Downstream Defender device will be provided prior to the attenuation tank to provide the mitigation for discharge from the building. The access road is graded to permeable surfacing in the parking areas or to gullies which discharge directly into the sub-base, with the permeable sub-base providing the appropriate mitigation indices as set out in Table 26.3.

Where gullies have been located within the access road, these gullies will discharge directly into the permeable sub-base via distribution units. The water will then be treated within the sub-base prior to flowing into the perforated pipe and ultimately off-site via the attenuation tank and flow control device.

Hazard mitigation indices calculations are set out below

Residential car parks

Residential car park pollution hazard (see Table 26.2) – TSS 0.5, Metals 0.4 and Hydrocarbons 0.4

Mitigation – Permeable pavement and sub-base – Mitigation indices (Table 26.3) – TSS 0.7, Metals 0.6 and Hydrocarbons 0.7

Mitigation exceeds the pollution hazard indices therefore the Simple Index Approach is satisfied for the residential road.

Building roof area

Residential roof pollution hazard (see Table 26.2) – TSS 0.3, Metals 0.2 and Hydrocarbons 0.05

Mitigation – Downstream Defender Vortex – Mitigation indices (see proprietary data below) – TSS 0.3, Metals 0.2 and Hydrocarbons 0.2

Model	Downstream Defender® Select Mitigation Indices ^{(a)(b)}		
	Total Suspended Solids (TSS)	Metals	Hydrocarbons (Oils)
Vortex	0.3	0.2	0.2

Mitigation exceeds the pollution hazard indices therefore the Simple Index Approach is satisfied for the building roof area.

In line with Eastleigh Borough Council Local Plan Policy DM6, there is a requirement for additional naturalised treatment to be provided from the proposed development. It is proposed to form a vegetated swale within the north-west corner of the site with the controlled discharge from the Hydrobrake discharging into the swale via a headwall. The outlet from the swale will discharge into the existing ditch and culverted pipe previously identified.

The purpose of the vegetated swale is to provide additional treatment in line with the EBC Local Plan and the swale has been assumed to not provide any benefits with regards the hydraulic design, hence why this feature is not included within the design calculations.

The layout and features of the vegetated swale align with the guidance provided within the SUDs Manual and provide further treatment benefits above the pollution hazard mitigation outlined above.

2.6 Surface Water Maintenance

- 2.6.1 The table below provides information in relation to the required inspections and maintenance for long term management of the surface water strategy. The Maintenance will be provided by a private maintenance company.
- 2.6.2 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.
- 2.6.3 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.
- 2.6.4 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			

Piped Network/Chambers Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any features that are not operating correctly. If required take remedial action	Monthly for three months, then six monthly
	Debris removal from catchment surface / gratings (where may cause risks to performance)	Monthly (and after large storms)
	Remove sediment from trapped sumps, manholes and catchpits.	Annually or as required
Remedial Maintenance	Repair / rehabilitation of gratings, inlets and outlets	As required
Monitoring	Inspect / check all gratings, trapped sumps, manholes and catchpits to ensure that they are in good condition and operating as designed	Annually and after large storm events
Structure Rehabilitation / Repair	Regular Maintenance and Monitoring to identify if repair and / or replacement of features or pipework is required.	As required

Cellular Storage Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any features that are not operating correctly. If required take remedial action	Monthly for three months, then annually.
	Remove debris from catchment surface (where may cause risks to performance)	Monthly
	Remove debris from catchment surface (where may cause risks to performance)	Annually or as required
Remedial Maintenance	Repair / rehabilitate inlets, outlets, 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 storm events
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required
Structure Rehabilitation / Repair	Regular Maintenance and Monitoring to identify if repair and / or replacement of storage units is required.	As required
The SuDS Manual Table 21.3: Operation and maintenance requirements for attenuation storage tanks		

Maintenance of the vegetated swale will comprise of standard grass mowing and vegetation maintenance. This should be undertaken on a regular basis as part of any general mowing and landscaping works as part of the development site – typically every two to four weeks depending on the seasonal weather.

Grass and vegetation should be kept to a maximum length of 4-6 inches to ensure it does not fold over during excessive water flow although the flow is expected to be minimal.

Grass and plant cuttings should be disposed of offsite to remove any potential pollutants.

2.7 Surface Water Exceedance Flows

2.7.1 The proposed surface water drainage system has been designed to accommodate runoff during storm events up to the 1 in 100 annual probability event including climate change. In excess of this it is possible that the design standard for the system will be exceeded.

2.7.2 To ensure that in an exceedance event any flooding does not affect properties or discharge from the development, flows will be managed on site. This will be achieved in the same way as the existing site drains, by following the natural topography on the site, flowing in a south to north direction.

2.7.3 Any exceedance flows will discharge from the permeable sub-base on the northern edge of the site, flowing away from the proposed building and following the natural levels to the existing ditch on the northern edge of the site. Site levels are designed to direct flows away from the buildings and towards areas such as access roads, car parking or formal landscaping where temporarily shallow flooding can occur. The drainage plan shown enclosed in Appendix H has been annotated to show the flood exceedance routes away from the building and towards the north-western corner of the site.

3.0 Potential Flood Risk

3.1 Fluvial Flooding (overtopping of watercourses)

There are no main rivers in the local vicinity of the site. The ordinary watercourse along the northern boundary does not present a fluvial flood risk. Floodplain mapping provided by the Environment Agency (EA) indicates that the site is wholly within Flood Zone 1. Flood zone 1 is defined as comprising 'land assessed as having a less than 1 in 1000 annual probability of river or sea flooding (<0.1%)'. See extract of flood maps in Appendix G.

Site levels range from 28.05 on the north-eastern boundary down to 26.35 in the north-west corner of the site. The EA flood map enclosed in Appendix G demonstrates the site is at low risk of flooding and is located a significant distance from any areas of flood risk.

3.2 Surface Water Flooding

The surface water flood map shows the site is at very low risk of surface water flooding with low risk of surface water flooding occurring in the ditch on the northern boundary which would be expected as the existing natural drainage route for the site. The definitions for each surface water flood risk category are defined in the Table below:

Risk of flooding	Probability
Very low	< 1 in 1000 (0.1%)
Low	1 in 1000 (0.1%) - 1 in 100 (1%).
Medium	1 in 100 (1%) - 1 in 30 (3.3%)
High	>1 in 30 (3.3%)

The surface water velocity map in a low-risk scenario shows there are no overland flow routes near or through the boundary or the site.

The surface water flood depth map shown in Appendix G.

3.3 Groundwater Flooding

The SI carried out for the site recorded groundwater strikes within majority of the sampling locations and further monitoring has been undertaken. This indicated groundwater to generally be found between 0.8m and 1.7m bgl.

The Strategic Flood Risk Assessment produced by Eastleigh Borough Council provides mapping on groundwater mapping for areas susceptible to groundwater flooding. The development site is located in an area considered to have less than 25% chance of groundwater flooding with the BGS mapping stating "limited potential for groundwater flooding to occur".

The proposed development will provide a new positive drainage system to drain the overall site as per the existing natural arrangement. The nature of the new drainage system will

not increase the risk of groundwater flooding and it would be considered the overall risk of groundwater flooding to be low on site and the proposed drainage strategy provides adequate mitigation for the building.

3.4 Reservoir Flooding

Given the lack of any known significant reservoirs within the local area, as expected the EA flood maps show the site is at no risk of reservoir flooding.

3.5 Sewer Flooding

There are foul sewers within the site. There is no risk of sewers flooding.

3.6 Historical Flooding

There are no historical records of flooding at this site.

4.0 Foul Drainage

4.1 The indicative foul sewer drainage strategy comprises of a gravity network which discharges from the ground floor to a foul pumping station located on the eastern side of the building. From the foul pumping station the foul water is pumped to the Southern Water sewer located on Winchester Road as shown on the drainage strategy drawing located in Appendix E:

4.2 Foul Water loads

The indicative gravity fed system is to be designed in accordance with the guidance document: British Water Flows and Loads. The following table provides the required loadings.

Table of Loadings for Sewage Treatment Systems

Per person / activity / day (unless otherwise specified)	FLOW	BOD	Ammonia as N
DOMESTIC DWELLINGS (Grams)	(Litres)	(Grams)	
Standard residential	150	60	8
Mobile home type caravans with full services	150	60	8

4.2.1 Proposed foul sewer calculations are based on the standard residential flow rate indicated in the table above plus the average number of occupants in each unit.

50 apartment units

2 x 3 bed houses

Total occupancy = 50 + (2 x 5) = 60 persons

60 units x 150 litres per day = 9,000 litres per day (9.00m³)

9000 / 24 hours = 375.0 litres per hour

375.00 / 60 minutes = 6.25 litres per minute

6.25 / 60 seconds = 0.104 litres per second

A capacity check enquiry has been submitted to Southern Water on the previous schemes requirements at 0.108l/s for 52 Apartments and 2No. 3 Bed Houses and this has been confirmed as being acceptable.

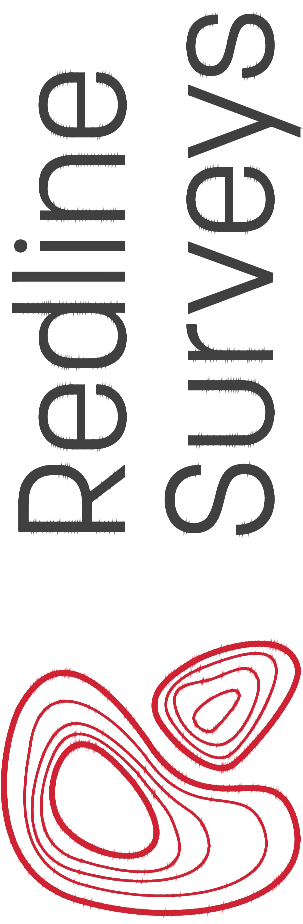
4.2.2 The proposed pump station will need to incorporate storage to accommodate 24 hours of foul flow – 9.0m³.

Appendix A

Existing Topographical Survey



McCarthy & Stone



callum@redlinesurveys.co.uk
mobile: 07956 017 168

steve@redlinesurveys.co.uk
mobile: 07557 332 421

info@redlinesurveys.co.uk
www.redlinesurveys.co.uk

Client:
McCarthy & Stone

Survey at:
Winchester Road
Boorley Green
SO32 2DH

Plot 1. 24-09
Date: 19/01/2024
Rev Date: 08/11/2024
Scale 1 : 500 A1
Desc: Topographical
Survey

Comp by: T. Garde
Surveyed by: T. Garde

All data has been recorded
using a Trimble R12i GPS system

All levels relative to OSBM

the contents of this
drawing are copyright

Symbols & Linetypes

Manhole types Gully Lamp post Telegraph Pole Electric Pole Gas Cover Water Cover Electric Cover British Telecom	Building Wall Kerb Drop Kerb Footpath Ridge Step Fence
Traverse Station Sign Tree Hedge Overhead Wire	

Appendix B

Site Investigation report

Floor	1B	2B	Total
GF	12	8	20
1F	13	9	22

Legend



Windowless Sample Locations



Ground Water Monitoring Locations



Shallow BRE365 Infiltration Test



Deep BRE365 Infiltration Test



Plate Loading Tests for CBR's



20-25m Borehole Locations
(TBC if required)

RE-
FOR
MAT

Soakaway Test Results & Soil Infiltration Rate

Site: Boorley Green

Project: 5018440

Hole ID: SFT01



Test 1

Date: 25/3/2024

Time in minutes	Depth in metres to water surface	Depth in metres of water	Percentage of water depth at start
0.00	0.170	0.48	100.0%
0.25	0.170	0.48	100.0%
0.50	0.170	0.48	100.0%
0.73	0.170	0.48	100.0%
1.00	0.170	0.48	100.0%
1.50	0.170	0.48	100.0%
2.00	0.170	0.48	100.0%
2.50	0.170	0.48	100.0%
3.00	0.170	0.48	100.0%
3.50	0.180	0.47	97.9%
4.00	0.180	0.47	97.9%
4.50	0.180	0.47	97.9%
5.00	0.180	0.47	97.9%
6.00	0.180	0.47	97.9%
7.00	0.180	0.47	97.9%
8.00	0.180	0.47	97.9%
9.00	0.180	0.47	97.9%
10.00	0.180	0.47	97.9%
15.00	0.180	0.47	97.9%
20.00	0.180	0.47	97.9%
30.00	0.190	0.46	95.8%
40.00	0.190	0.46	95.8%
50.00	0.200	0.45	93.8%
60.00	0.210	0.44	91.7%
90.00	0.230	0.42	87.5%
120.00	0.250	0.40	83.3%
180.00	0.290	0.36	75.0%
240.00	0.320	0.33	68.8%
10.00	0.940	-0.29	-60.4%

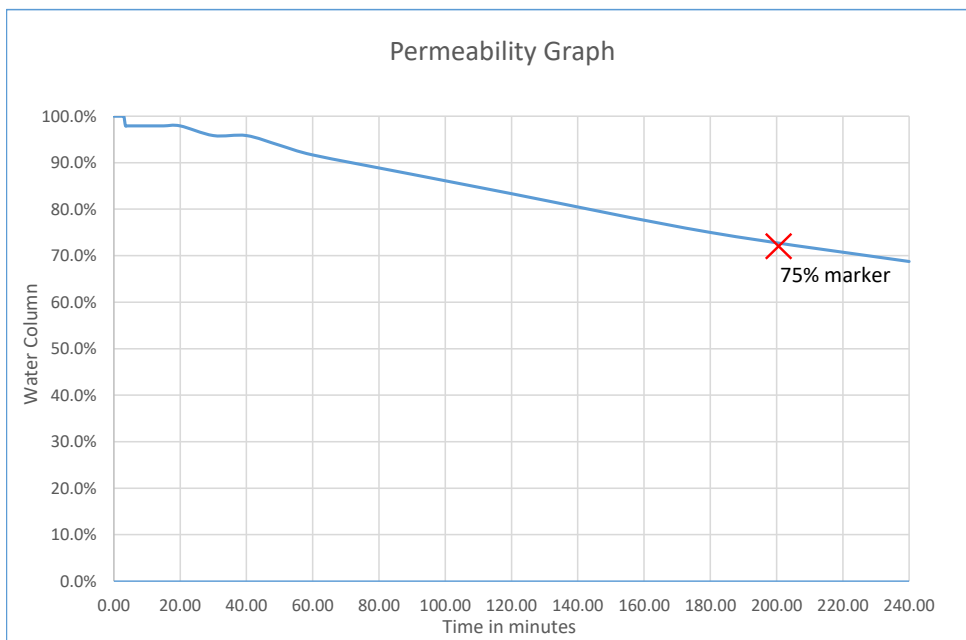
Notes: Testing non-compliant with BRE Digest 365 due to access restrictions to the proposed test areas.

Pit Size		Time in mins	
Length	1.65	180	75%
Width	0.35		25%
Depth	0.65		

invalid 25% and/or 75% times

Infiltration Rate from 75%-25%

not valid m/s





Test 2

Time in minutes	Depth in metres to water surface	Depth in metres of water	Percentage of water depth at start
0.00	0.170	0.48	100.0%
0.25	0.170	0.48	100.0%
0.50	0.170	0.48	100.0%
0.73	0.170	0.48	100.0%
1.00	0.170	0.48	100.0%
1.50	0.170	0.48	100.0%
2.00	0.170	0.48	100.0%
2.50	0.170	0.48	100.0%
3.00	0.170	0.48	100.0%
3.50	0.170	0.48	100.0%
4.00	0.170	0.48	100.0%
4.50	0.170	0.48	100.0%
5.00	0.170	0.48	100.0%
6.00	0.170	0.48	100.0%
7.00	0.170	0.48	100.0%
8.00	0.170	0.48	100.0%
9.00	0.170	0.48	100.0%
10.00	0.170	0.48	100.0%
15.00	0.180	0.47	97.9%
20.00	0.180	0.47	97.9%
30.00	0.180	0.47	97.9%
40.00	0.190	0.46	95.8%
50.00	0.190	0.46	95.8%
60.00	0.190	0.46	95.8%
90.00	0.210	0.44	91.7%
17.00	0.890	-0.24	-50.0%

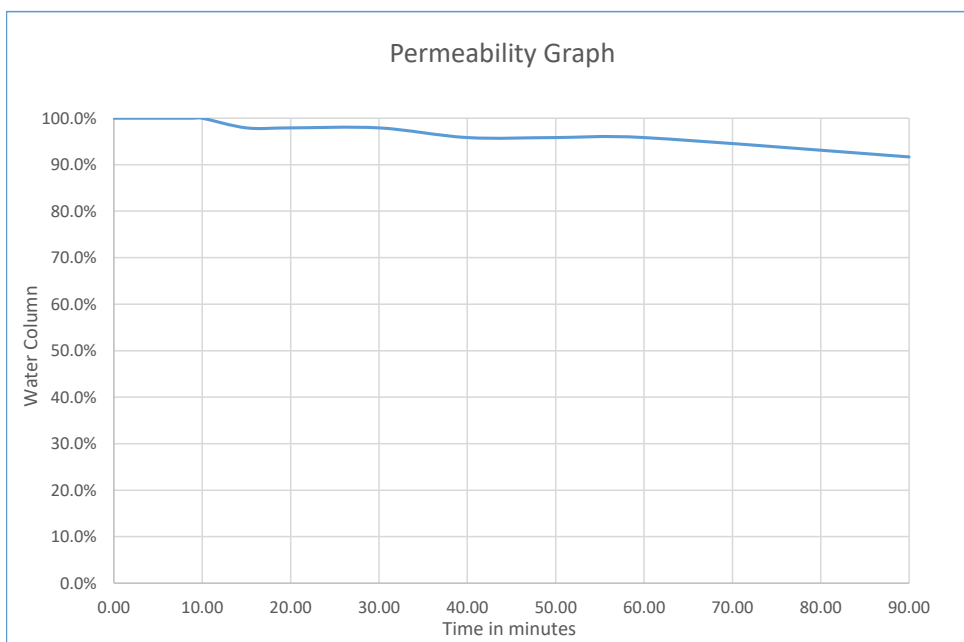
Notes: Testing non-compliant with BRE Digest 365 due to access restrictions to the proposed test areas.

Pit Size		Time in mins	
Length	1.65		75%
Width	0.35		25%
Depth	0.65		

Infiltration Rate

from 75%-25%

not valid m/s



Soakaway Test Results & Soil Infiltration Rate

Site: Boorley Green

Project: 5018440

Hole ID: SFT02-01

Date:25/3/2024



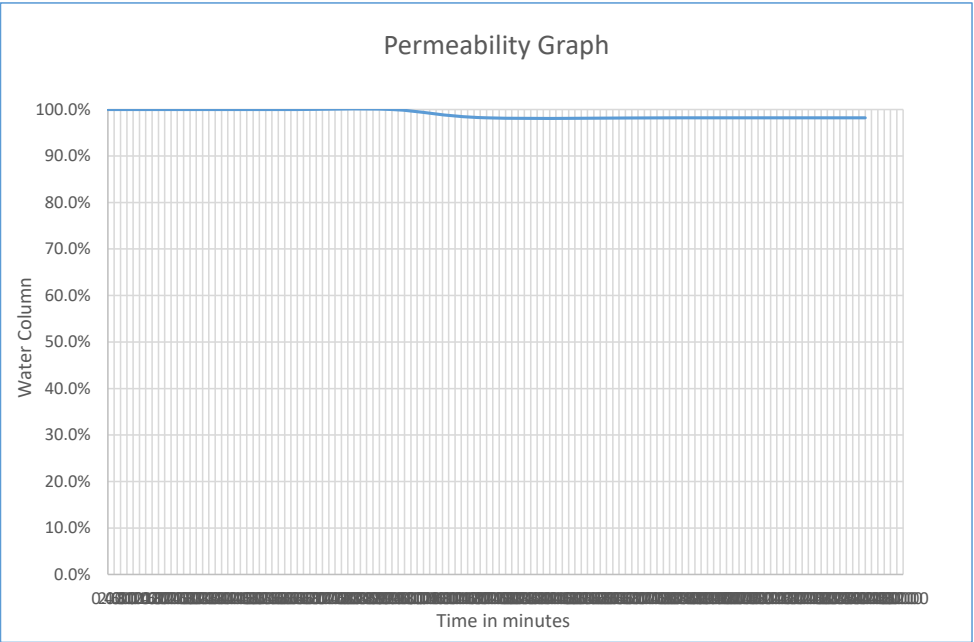
Test 1

Time in minutes	Depth in metres to water surface	Depth in metres of water	Percentage of water depth at start
0.00	0.260	0.56	100.0%
0.25	0.260	0.56	100.0%
0.50	0.260	0.56	100.0%
0.73	0.260	0.56	100.0%
1.00	0.260	0.56	100.0%
1.50	0.260	0.56	100.0%
2.00	0.260	0.56	100.0%
2.50	0.260	0.56	100.0%
3.00	0.260	0.56	100.0%
3.50	0.260	0.56	100.0%
4.00	0.260	0.56	100.0%
4.50	0.260	0.56	100.0%
5.00	0.260	0.56	100.0%
6.00	0.260	0.56	100.0%
7.00	0.260	0.56	100.0%
8.00	0.260	0.56	100.0%
9.00	0.260	0.56	100.0%
10.00	0.260	0.56	100.0%
15.00	0.260	0.56	100.0%
20.00	0.260	0.56	100.0%
30.00	0.260	0.56	100.0%
40.00	0.260	0.56	100.0%
50.00	0.260	0.56	100.0%
60.00	0.260	0.56	100.0%
90.00	0.260	0.56	100.0%
120.00	0.270	0.55	98.2%
180.00	0.270	0.55	98.2%
240.00	0.270	0.55	98.2%
25.00	0.880	-0.06	-10.7%

Notes: Testing non-compliant with BRE Digest 365 due to access restrictions to the proposed test areas.

Pit Size		Time in mins	
Length	0.35		75%
Width	0.35		25%
Depth	0.82		

Infiltration Rate from75%-25% not valid m/s



Soakaway Test Results & Soil Infiltration Rate

Site: Boorley Green

Project: 5018440

Hole ID: SFT03-01

Date: 25/3/2024



Test 1

Time in minutes	Depth in metres to water surface	Depth in metres of water	Percentage of water depth at start
0.00	0.190	0.46	100.0%
0.25	0.190	0.46	100.0%
0.50	0.190	0.46	100.0%
0.73	0.190	0.46	100.0%
1.00	0.190	0.46	100.0%
1.50	0.190	0.46	100.0%
2.00	0.190	0.46	100.0%
2.50	0.190	0.46	100.0%
3.00	0.190	0.46	100.0%
3.50	0.190	0.46	100.0%
4.00	0.190	0.46	100.0%
4.50	0.190	0.46	100.0%
5.00	0.190	0.46	100.0%
6.00	0.190	0.46	100.0%
7.00	0.190	0.46	100.0%
8.00	0.190	0.46	100.0%
9.00	0.190	0.46	100.0%
10.00	0.190	0.46	100.0%
15.00	0.190	0.46	100.0%
20.00	0.190	0.46	100.0%
30.00	0.190	0.46	100.0%
40.00	0.190	0.46	100.0%
50.00	0.190	0.46	100.0%
60.00	0.200	0.45	97.8%
90.00	0.220	0.43	93.5%
120.00	0.220	0.43	93.5%
180.00	0.230	0.42	91.3%
240.00	0.250	0.40	87.0%
13.00	0.820	-0.17	-37.0%

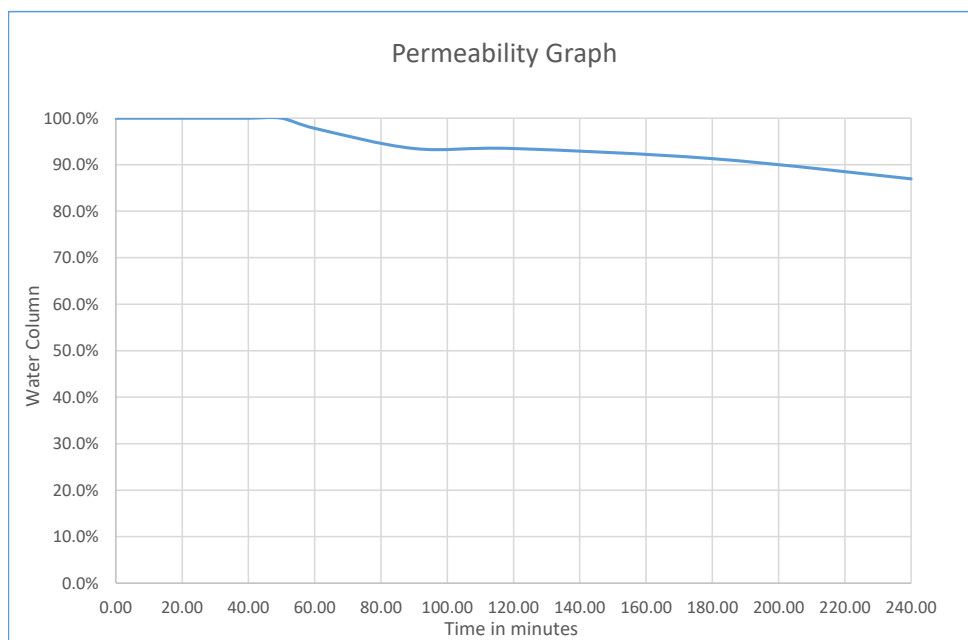
Notes: Testing non-compliant with BRE Digest 365 due to access restrictions to the proposed test areas.

Pit Size		Time in mins	
Length	0.35		75%
Width	0.35		25%
Depth	0.65		

Infiltration Rate

from 75%-25%

not valid m/s



Soakaway Test Results & Soil Infiltration Rate

Site: Boorley Green

Project: 5018440

Hole ID: SF203

Date: 25/3/2024



Test 1

Time in minutes	Depth in metres to water surface	Depth in metres of water	Percentage of water depth at start
0.00	0.190	0.46	100.0%
0.25	0.190	0.46	100.0%
0.50	0.190	0.46	100.0%
0.73	0.190	0.46	100.0%
1.00	0.190	0.46	100.0%
1.50	0.190	0.46	100.0%
2.00	0.190	0.46	100.0%
2.50	0.190	0.46	100.0%
3.00	0.190	0.46	100.0%
3.50	0.190	0.46	100.0%
4.00	0.190	0.46	100.0%
4.50	0.190	0.46	100.0%
5.00	0.190	0.46	100.0%
6.00	0.190	0.46	100.0%
7.00	0.190	0.46	100.0%
8.00	0.190	0.46	100.0%
9.00	0.190	0.46	100.0%
10.00	0.190	0.46	100.0%
15.00	0.190	0.46	100.0%
20.00	0.200	0.45	97.8%
30.00	0.200	0.45	97.8%
40.00	0.200	0.45	97.8%
50.00	0.200	0.45	97.8%
60.00	0.210	0.44	95.7%
90.00	0.220	0.43	93.5%
120.00	0.230	0.42	91.3%
120.00	0.650	0.00	0.0%

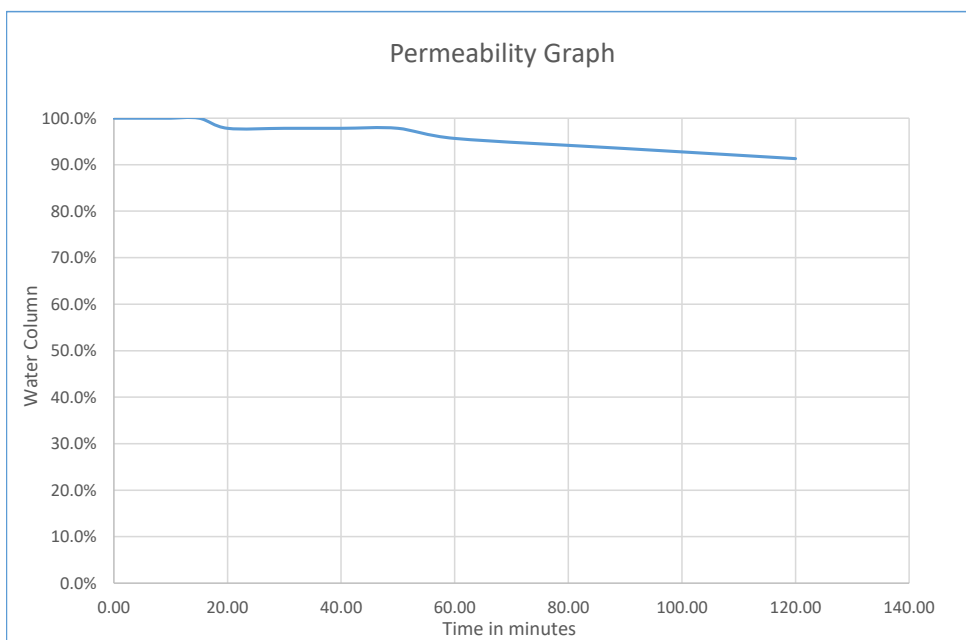
Notes: Testing non-compliant with BRE Digest 365 due to access restrictions to the proposed test areas.

Pit Size		Time in mins	
Length	0.35		75%
Width	0.35		25%
Depth	0.65		

Infiltration Rate

from 75%-25%

not valid m/s



Soakaway Test Results & Soil Infiltration Rate

Site: Boorley Green

Project: 5018440

Hole ID: DFT01

Date: 25/3/2024



Test 1

Time in minutes	Depth in metres to water surface	Depth in metres of water	Percentage of water depth at start
0.00	1.050	1.25	100.0%
0.25	1.050	1.25	100.0%
0.50	1.040	1.26	100.8%
0.73	1.040	1.26	100.8%
1.00	1.040	1.26	100.8%
1.50	1.040	1.26	100.8%
2.00	1.030	1.27	101.6%
2.50	1.030	1.27	101.6%
3.00	1.030	1.27	101.6%
3.50	1.030	1.27	101.6%
4.00	1.030	1.27	101.6%
4.50	1.030	1.27	101.6%
5.00	1.020	1.28	102.4%
6.00	1.020	1.28	102.4%
7.00	1.020	1.28	102.4%
8.00	1.020	1.28	102.4%
9.00	1.020	1.28	102.4%
10.00	1.020	1.28	102.4%
15.00	1.020	1.28	102.4%
20.00	1.010	1.29	103.2%
30.00	1.010	1.29	103.2%
40.00	1.000	1.30	104.0%
50.00	0.990	1.31	104.8%
60.00	0.970	1.33	106.4%
90.00	0.940	1.36	108.8%
120.00	0.920	1.38	110.4%
120.00	2.300	0.00	0.0%

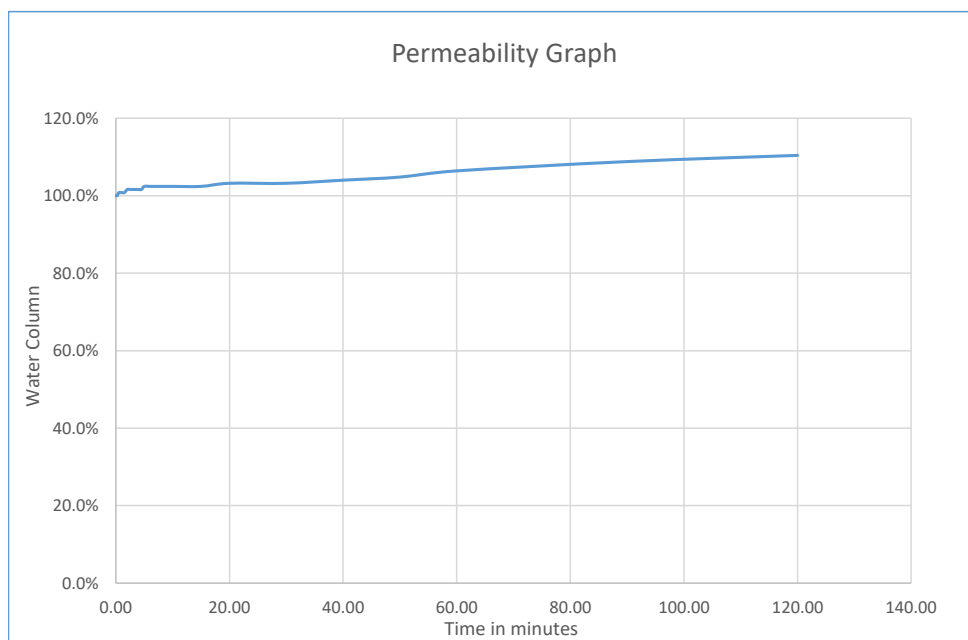
Notes: Testing non-compliant with BRE Digest 365 due to access restrictions to the proposed test areas.

Pit Size		Time in mins	
Length	0.35		75%
Width	0.35		25%
Depth	2.30		

Infiltration Rate

from 75%-25%

not valid m/s



Soakaway Test Results & Soil Infiltration Rate

Site: Boorley Green

Project: 5018440

Hole ID: DFT02

Date: 25/3/2024



Test 1

Time in minutes	Depth in metres to water surface	Depth in metres of water	Percentage of water depth at start
0.00	1.000	0.80	100.0%
0.25	1.000	0.80	100.0%
0.50	1.000	0.80	100.0%
0.73	1.000	0.80	100.0%
1.00	1.000	0.80	100.0%
1.50	0.980	0.82	102.5%
2.00	0.980	0.82	102.5%
2.50	0.970	0.83	103.8%
3.00	0.970	0.83	103.8%
3.50	0.970	0.83	103.8%
4.00	0.970	0.83	103.8%
4.50	0.970	0.83	103.8%
5.00	0.970	0.83	103.8%
6.00	0.970	0.83	103.8%
7.00	0.970	0.83	103.8%
8.00	0.970	0.83	103.8%
9.00	0.970	0.83	103.8%
10.00	0.970	0.83	103.8%
15.00	0.960	0.84	105.0%
20.00	0.950	0.85	106.3%
30.00	0.930	0.87	108.8%
40.00	0.910	0.89	111.3%
50.00	0.890	0.91	113.8%
60.00	0.880	0.92	115.0%
90.00	0.860	0.94	117.5%
120.00	0.830	0.97	121.3%
180.00	0.790	1.01	126.3%
240.00	0.740	1.06	132.5%
10.00	0.630	1.17	146.3%

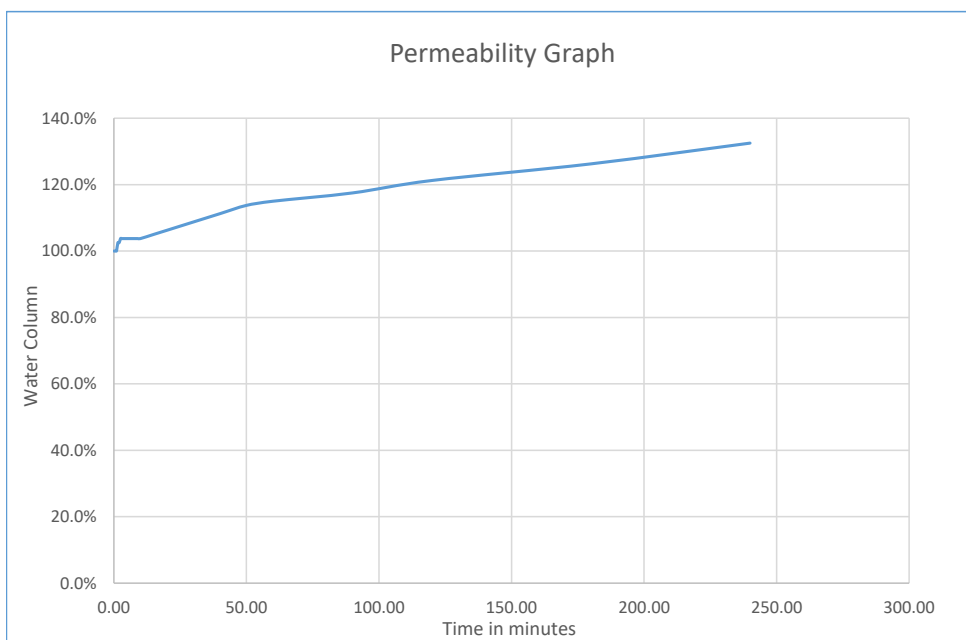
Notes: Testing non-compliant with BRE Digest 365 due to access restrictions to the proposed test areas. Collapsed from 2m. Water level before fill .1m

Pit Size		Time in mins	
Length	0.35		75%
Width	0.35		25%
Depth	1.80		

Infiltration Rate

from 75%-25%

not valid m/s



Appendix C

Sewer maps

115103



SU5014NW

N C



Southern
Water

4500690

SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
0500X	22.57	20.6	150	VC	CIRC																		
0550X	22.46	20.97	225	VC	CIRC																		
0555X	24.1	22.9	300	CP	CIRC																		
5601X	28.56	25.71	150	VC	CIRC																		
5602X	28.22	25.51	100	VC	CIRC																		
560PX	28.28	25.43	125	GRC	CIRC																		
5701X	27.85	26.19	150	VC	CIRC																		
5801X	27.63	26.6	150	VC	CIRC																		
5802X	28.02	26.8	150	VC	CIRC																		
6501X	31.06	29.23	150	VC	CIRC																		
6503X	31.2	29.41	150	VC	CIRC																		
650DX	31.15	29.63	150	VC	CIRC																		
6601X	29.55	27.57	150	VC	CIRC																		
6602X	29.59	27.79	150	VC	CIRC																		
6603X	30.94	29.19	150	VC	CIRC																		
6651X	29.73	29.11	150	CP	CIRC																		
6652X	30.24	29.52	150	CP	CIRC																		
6653X	30.86	30.05	150	CP	CIRC																		
6654X	31.54		150	CP	CIRC																		
6655X	32.18		150	CP	CIRC																		
665DX			150	CP	CIRC																		
7501X	33.99	32.23	150	VC	CIRC	*																	
7501Y	33.99	32.39	150	VC	CIRC	*																	
7502X	33.94		150	VC	CIRC																		
7551X	32.38	31.42	150	VC	CIRC																		
7601X	33.27	31.39	150	VC	CIRC																		
8501X	29.4	27.7	150	VC	CIRC																		
8551X	24.36	23.74	150	CP	CIRC																		

LINE STYLES / COLOURS	
Brown	Foul
	Foul Syphon Sewer
	Foul Vacuum Main
	Foul Rising Main
Red	Combined
	Combined Syphon Sewer
	Combined Rising Main
Orange	Lateral Drain
	Building Over Agreement Area
Dark Blue	Treated Effluent
Purple	Sludge
	Sewer Catchment
	Section 104 Area
Light Blue	Surface Water
	Surface Water Rising Main
Yellow	Private
Green	Access Shaft
	Decommissioned

MATERIALS	
AK	Alkathene
BAC	Bonded Asbestos Cement
BRC	Brick (Common)
BRE	Brick (Engineering)
CC	Concrete Box Culvert
CI	Cast Iron
CO	Concrete (In-Situ)
CP	Concrete (Pre-Cast)
CSB	Concrete Segments (bolted)
CSU	Concrete Segments (unbolted)
DI	Ductile Iron
GRC	Glass Reinforced Concrete
GRP	Glass Reinforced Plastic
MAC	Masonry in regular Courses
MAR	Masonry in random Courses
PE	Polyethylene
PF	Pitch Fibre
PP	Polypropylene
PVC	Polyvinyl Chloride
RPM	Reinforced Plastic Matrix
SI	Spun Iron
ST	Steel
VC	Verified Clay
XXX	Other
ZZZ	Unknown

LEGEND - SEWERS	
	Manhole (SW)
	Manhole (F&C)
	Lamp hole (SW)
	Lamp hole (F&C)
	Pumping Station (SW)
	Pumping Station (F&C)
	Side entry manhole (SW)
	Side entry Manhole (F&C)
	Blind shaft (SW)
	Blind shaft (F&C)
	Ejector station (SW)
	Ejector station (F&C)
	Watertight door (SW)
	Watertight door (F&C)
	Flushing ch. Min-e (SW)
	Flushing ch. Min-e (F&C)
	Flushing ch. No-e (SW)
	Flushing ch. No-e (F&C)
	Demarcation Chamber

	Washout (SW)
	Washout (F&C)
	Rodding Eye (SW)
	Rodding Eye (F&C)
	Gauging point (SW)
	Gauging point (F&C)
	Intercept chamber (SW)
	Intercept chamber (F&C)
	Storm Tank (SW)
	Storm Tank (F&C)
	Vortex chamber (SW)
	Vortex chamber (F&C)
	Label ellipse
	Dummy/S24 manhole
	Outfall
	Penstock chamber
	Damboards
	Storm Overflow
	Backdrop manhole

	Other (s)
	Other
	Change in sewer (s)
	Change in sewer
	Reflex valve
	Flap valve
	Cascade
	Anode
	Valve
	Closed Valve
	Air Valve
	Hatch box (SW)
	Hatch box (F&C)
	Direction arrow
	Emptying valve
	Catchpit
	Soakaway
	Inlet
	Balancing Pond

	Wastewater treatment works
	Marine treatment works
	Outfall headworks
	Vent
	Vent column
	Tidal storage tank
	Blank end
	Head of Public Sewer
	Micro Pumping Station
SHAPES (S)	
A	Arched
B	Barrel
C	Circular
E	Egg
H	Horseshoe
R	Rectangular
S	Square
T	Trapezoidal
U	U Shape
X	Other

NODE REFERENCING SYSTEM	
1st digit:	hundred metre easting identifier
2nd digit:	hundred metre northing identifier
3rd digit:	sewer type identifier
4th digit:	next sequential node

Drawn by:

yadavsa

Title:

287084_Oak Cottage, Winchester

Date:

29/03/2018



Appendix D

Existing Site / Greenfield runoff rates

Scott-White & Hookins		Page 1
42 West Street London House Carshalton SM5 2PR		
Date 23/07/2024 16:35 File	Designed by wintempl Checked by	
Micro Drainage Source Control 2020.1.3		
ICP SUDS Mean Annual Flood Input Return Period (years) 100 Soil 0.450 Area (ha) 0.465 Urban 0.000 SAAR (mm) 800 Region Number Region 7 Results 1/s QBAR Rural 2.4 QBAR Urban 2.4 Q100 years 7.6 Q1 year 2.0 Q30 years 5.4 Q100 years 7.6		
©1982-2020 Innovyze		

Appendix E

Indicative Proposed Drainage Layout



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.
- This drawing is based on HGP Architects site layout plan SO-2977-02-AC-010 - dated February 2024.
- Tree constraints taken from survey provided by Keen Consulting dated January 2024.
- Topographical survey provided by Redline Surveys dated January 2024.

DRAINAGE

- Any information given on this drawing regarding existing services is believed to be correct. The contractor must check this information and determine the nature and location of other existing services from the various statutory authorities before commencing excavation works.
- Drainage works to be constructed in accordance with BS EN 752 and Approved Document H
- All soft spots and unacceptable material encountered in drainage excavations is to be removed and replaced with granular material to the requirements of the building control officer.
- Pipes to be installed to manufacturers recommendations.
- Pipes under buildings to be laid to a fall of 1:60 minimum unless noted otherwise. Internal level of pipes to be 4.20m (50mm below blinding + 90° bend). Refer to structural detail drawings for detailed slab construction make-up layers and levels.
- Plastic plain wall pipes to be PVC-U to BS EN 1401-1, class SN4, with flexible joints. Kitemark certified. Structured wall plastic pipes to be to WIS 04-35-01, Kitemark certified
- Clay pipes to be vitrified clay to BS EN 295-1, with flexible joints, Kitemark certified. Clayware pipes must be extra strength classification protected in accordance with the specified details.
- Concrete pipes to be precast concrete to BS 5911-1 and BS EN 1916, with flexible joints.
- Bedding of pipes to be in accordance with approved document H1.
- Rocker pipes with flexible joints are to be provided at a distance of 150mm and 750mm from the face of construction to manholes, where pipes pass above, below or through ground beams or foundations; at gully connections and soil stack ends.
- Manhole access covers are to be located at the outgoing side of manholes.
- Cover levels are to be fixed on site to suit finished levels. Covers and frames to BS EN124, Grade D to be used in areas subject to heavy vehicular loading. Grade C in areas subject to light vehicular loading and Grade B to be used elsewhere.
- All external pipes to be 150Ø unless noted otherwise.
- All internal pipes to be 100Ø unless noted otherwise.
- Manhole positions coordinates are indicated on the SWH manhole schedule 0502 and to be confirmed by SWH prior to setting out on site.
- Access points to be located at base of all rwp and svps.
- All gullies to be trapped
- Positions of SVP's and RWP's should be read in conjunction with Architects drawings.

PRELIMINARY - NOT FOR CONSTRUCTION

P12	Stage 3 - Revised Architects layout 26.02.26	RD	GM	IL	27.02.26
P11	Stage 3 - Revised Architects layout 05.02.26	RD	GM	IL	10.02.26
P10	Stage 3 - Revised Architects layout 20.01.26	RD	GM	IL	23.01.26
P09	Stage 3 - Revised Landscape's layout 17.02.25	RD	GM	IL	03.03.25
P08	Stage 3 - Revised Landscape architects layout	RD	BC	IL	12.12.24
P07	Stage 3 - Outfall location amended following discussions	RD	NC	IL	28.11.24
P06	Stage 3 - Revised site layout	RD	BC	IL	25.07.24
P05	Stage 3 - Revised site boundary	RD	BC	IL	17.07.24
P04	Stage 3 - Drainage updated to suit site layout	RD	BC	IL	02.07.24
P03	Updated to suit client requirements	RD	TK	TK	11.03.24
P02	Preliminary issue - Foul sewer outfall via Oak Cottage omitted.	TK	TK	TK	26.02.24
Rev.	Amendment	Drn.	Chkd.	Appd.	Date

Winchester Road, Boorley Green

Drainage Strategy Layout

Client

MCCARTHY STONE
Life, well lived

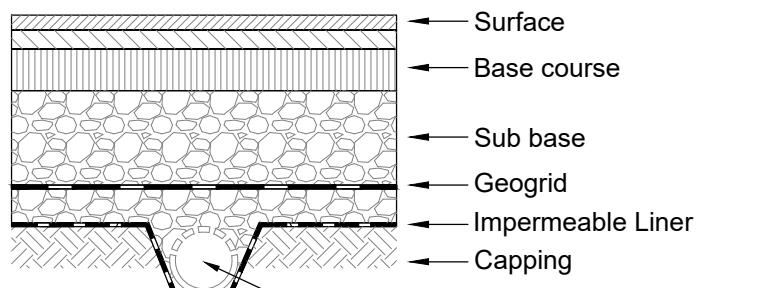
Scott White and Hookins
Structural Engineering Civil Engineering Sustainability and BREEAM CDM Consultancy

Suite 3, New Kings Court, Tollgate, Chandlers Ford, Eastleigh SO23 3LG
T: +44 (0)1902 844855 W: www.swh.co.uk E: info@swh.co.uk

Scale at A1 - 1:250

SO-2977-03-CE-0500 - P12

DO NOT SCALE FROM THIS DRAWING



Surface Course
40mm HRA35/14F Surf 40/60 to BS EN 13108-4

Binder Course
50mm AC20 dense bin 40/60 to BS EN 13108-1

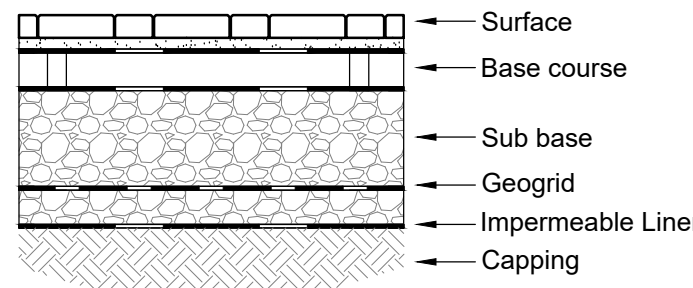
Base Course
110mm AC32 dense base 40/60 to BS EN 13108-1

Sub-base
350mm min granular sub-base lined open graded 10mm - 63mm clean angular crushed stone to clause 803 of highway agency specification, rolled and consolidated in accordance with clause 802 of Highway England's specification. Thickness based on minimum requirements for hydraulic design, refer to drainage layout and landscaper level drawings. Provide 600mm wide Triax TX 160 centered over perforated pipes in pipe locations. Impermeable Liner below sub base.

Capping
6F2 material to be laid on top of existing site levels based on values in table to CBR plate testing. Detail to be read in conjunction with highway specification notes, existing site level plan.

Impermeable Asphalt Parking Bay Aisle

(1:20)



Paving Course
200 x 100 x 60mm Concrete paving blocks to Architects details.

Laying Course
30mm thickness of well compacted sharp sand (maximum 3% silt and clay by weight, not more than 10% retained on 5mm sieve) to BS 882. Provide Treetex T300 Geotextile separation fabric below laying course.

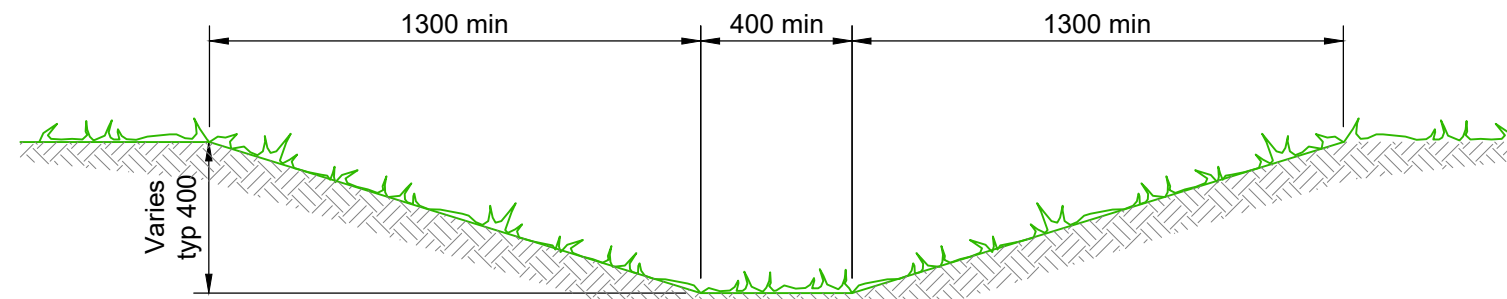
Base Course
110mm AC32 dense base 40/60 to BS EN 13108-1
100/150 Pen paving grade bitumen Inbitex
Geotextile separation fabric above running course. 75mmØ @ 2000crs
cored holes filled with laying course material

Sub-base
350mm min granular sub-base lined open graded 10mm - 63mm clean angular crushed stone to clause 803 of highway agency specification, rolled and consolidated in accordance with clause 802 of Highway England's specification. Thickness based on minimum requirements for hydraulic design, refer to drainage layout and landscaper level drawings. Provide 600mm wide Triax TX 160 centered over perforated pipes in pipe locations. Impermeable Liner below sub base.

Capping
6F2 material to be laid on top of existing site levels based on values in table to CBR plate testing. Detail to be read in conjunction with highway specification notes, existing site level plan.

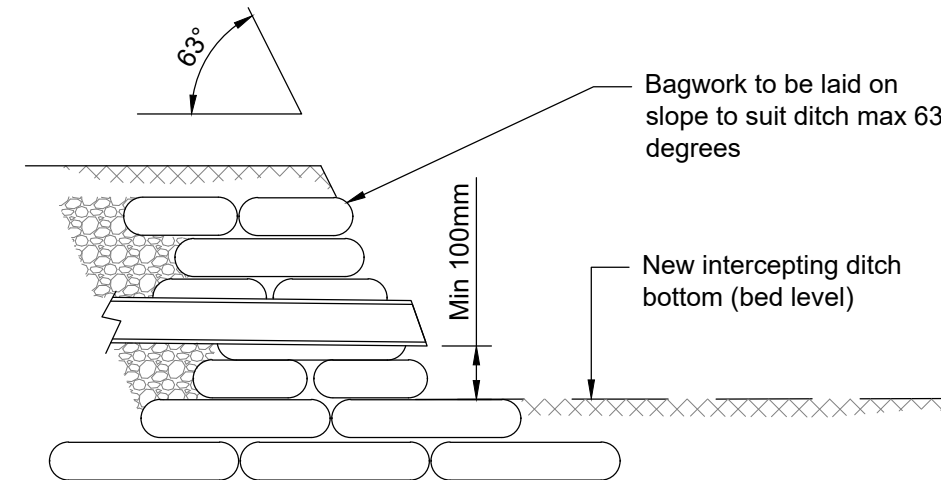
Permeable Block paved parking bays and pedestrian areas

(1:20)



Section Through Swale

(1:20)



NOTES

1. Dimensions are in millimeters unless otherwise stated
2. Bag sizes nominally 500x300x120
3. Bags to be hessian and filled with ST4 concrete
4. 12mm dia, mild steel dowel bars to be driven diagonally and vertically through bags to secure the courses, bars cut to suit location and are to pass through not less than 4 bags. min length 450mm
5. All ST mix concrete to be specification for Highway Works, clause 2602
6. Standard size of headwall, is 1 meters long by 0.9 meters high. Adjust to suit ditch.

Bagwork Headwall

(1:20)

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 and Landscape 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.
- Refer to Terraforma Landscape Architects drawings for external works details.

PRELIMINARY - NOT FOR CONSTRUCTION

P01	Preliminary Issue	RD	GM	IL	11.12.24
Rev.	Amendment	Drn.	Chkd.	Appd.	Date

Project

Winchester Road, Boorley Green

Drawing

External Works Details

Client

McCARTHY STONE
Life, well lived

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 - 1:20

SO-2977-03-CE-0610 - P01

Appendix F

Site3D Calculations

Network Details

Manhole Schedule

Manhole	Catchment Area (ha)	Diameter (m)	Type	CL (m)	IL (m)	Depth To Soffit (m)	Easting (m)	Northing (m)
SWIC1	0.053	1.350	Type C	27.620	27.073	0.397	450482.812	114765.978
SWIC2	0.011	1.350	Type C	27.845	27.000	0.695	450456.193	114784.677
SWIC3	0.031	1.350	Type C	27.675	26.888	0.637	450471.670	114791.448
SWIC4	0.027	1.350	Type C	27.720	26.664	0.906	450501.113	114807.378
SWIC5	0.023	1.350	Type C	27.650	26.448	1.052	450487.564	114836.883
SWIC6	0.026	1.350	Type C	27.653	26.200	1.303	450472.044	114870.680
SWIC7	0.010	1.350	Type C	27.050	26.111	0.789	450444.441	114873.469
SWIC8	0.000	1.350	Type C	26.927	26.024	0.753	450447.569	114860.708
SWIC9	0.090	1.350	Type C	27.800	26.665	0.985	450460.383	114828.472
SWIC10	0.022	1.350	Type C	27.750	26.750	0.850	450490.849	114817.579
SWIC11	0.014	1.350	Type C	27.900	26.500	1.250	450482.047	114837.676
SWIC12	0.006	1.350	Type C	27.317	26.393	0.699	450475.598	114852.435
SWIC13	0.017	1.350	Type C	27.780	26.291	1.264	450468.391	114866.012
SWIC14	0.029	1.350	Type C	27.800	26.294	1.356	450426.636	114847.909
SWIC15	0.000	1.350	Type C	27.800	26.120	1.530	450445.759	114856.200
TANK IN	0.032	1.350	Type C	26.940	26.000	0.790	450444.330	114859.219
TANK OUT	0.000	1.350	Type C	26.787	26.000	0.637	450423.994	114850.411
SWIC16	0.000	1.350	Type C	27.580	25.983	1.447	450420.635	114848.682
HEADWALL	0.000	0.000	Type C	26.200	25.800	0.250	450398.403	114864.642

Pipe Schedule

Pipe Number	US Manhole	US IL (m)	DS Manhole	DS IL (m)	Shape	Dimension (m)	Length (m)	Gradient (1:x)	Roughness (mm)	US Depth To Soffit (m)	DS Depth To Soffit (m)
1.000	SWIC1	27.073	SWIC3	26.888	Circ	0.15mØ	27.800	150.0	0.600	0.397	0.637
2.000	SWIC2	27.000	SWIC3	26.888	Circ	0.15mØ	16.893	150.0	0.600	0.695	0.637
1.001	SWIC3	26.888	SWIC4	26.664	Circ	0.15mØ	33.477	150.0	0.600	0.637	0.906
1.002	SWIC4	26.664	SWIC5	26.448	Circ	0.15mØ	32.467	150.0	0.600	0.906	1.052
1.003	SWIC5	26.448	SWIC6	26.200	Circ	0.15mØ	37.190	150.0	0.600	1.052	1.303
1.004	SWIC6	26.200	SWIC8	26.024	Circ	0.15mØ	26.429	150.0	0.600	1.303	0.753
3.000	SWIC7	26.111	SWIC8	26.024	Circ	0.15mØ	13.139	150.0	0.600	0.789	0.753
1.005	SWIC8	26.024	TANK IN	26.000	Circ	0.15mØ	3.564	150.0	0.600	0.753	0.790
4.000	SWIC9	26.665	SWIC11	26.500	Circ	0.15mØ	23.537	142.7	0.600	0.985	1.250
5.000	SWIC10	26.750	SWIC11	26.500	Circ	0.15mØ	21.940	87.8	0.600	0.850	1.250
4.001	SWIC11	26.500	SWIC12	26.393	Circ	0.225mØ	16.106	150.0	0.600	1.175	0.699
4.002	SWIC12	26.393	SWIC13	26.291	Circ	0.225mØ	15.371	150.6	0.600	0.699	1.264
4.003	SWIC13	26.293	SWIC15	26.120	Circ	0.225mØ	24.668	142.3	0.600	1.262	1.455
6.000	SWIC14	26.294	SWIC15	26.120	Circ	0.15mØ	20.843	119.8	0.600	1.356	1.530
4.004	SWIC15	26.120	TANK IN	26.000	Circ	0.225mØ	3.340	27.8	0.600	1.455	0.715
1.006	TANK IN	26.000	TANK OUT	26.000	Circ	0.15mØ	22.162		0.600	0.790	0.637
1.007	TANK OUT	26.000	SWIC16	25.983	Circ	0.15mØ	3.778	215.9	0.600	0.637	1.447
1.008	SWIC16	25.983	HEADWALL	25.800	Circ	0.15mØ	27.368	150.0	0.600	1.447	0.250

Outfall Details

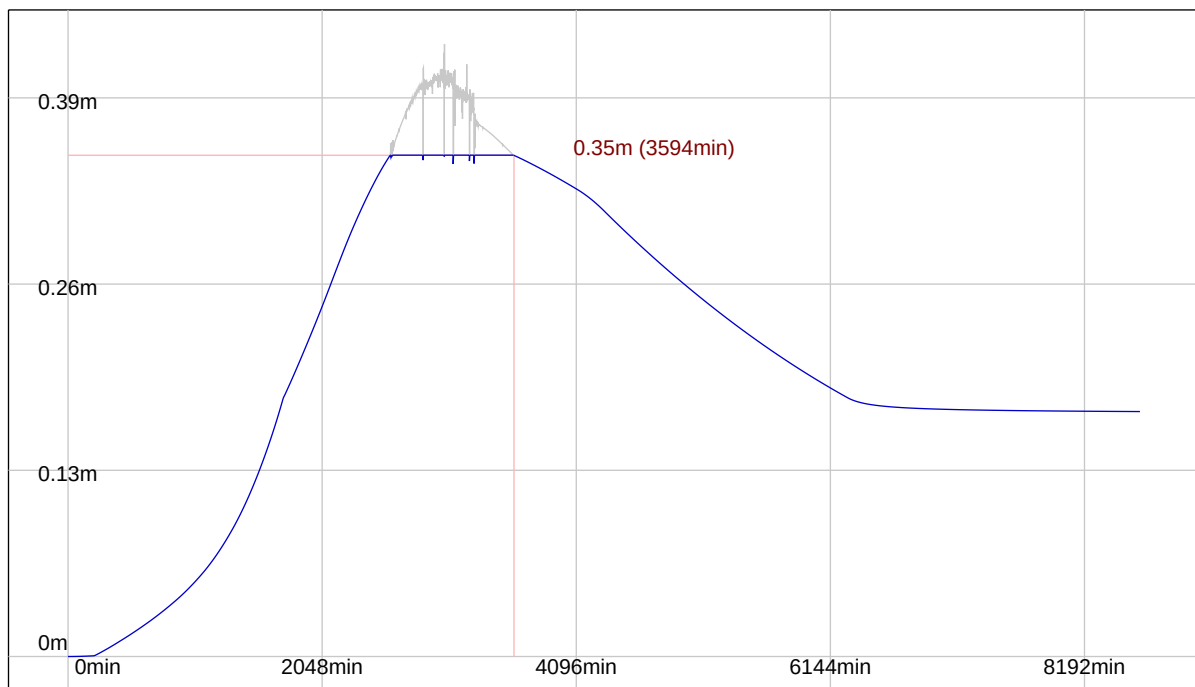
Outfall Manhole HEADWALL : Free Discharge

Flow Control Details

Tank Structure at Manhole SWIC2

Tank Invert (m)	Tank Height (m)	Porosity Ratio (%)	Area (m2)	Effective Area (m2) Area x Porosity Ratio	Max Storage (m3) Effective Area x Height	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
27.000	0.350	100.00	187.079	187.079	65.478	0.00000000	0.00000000	2.00

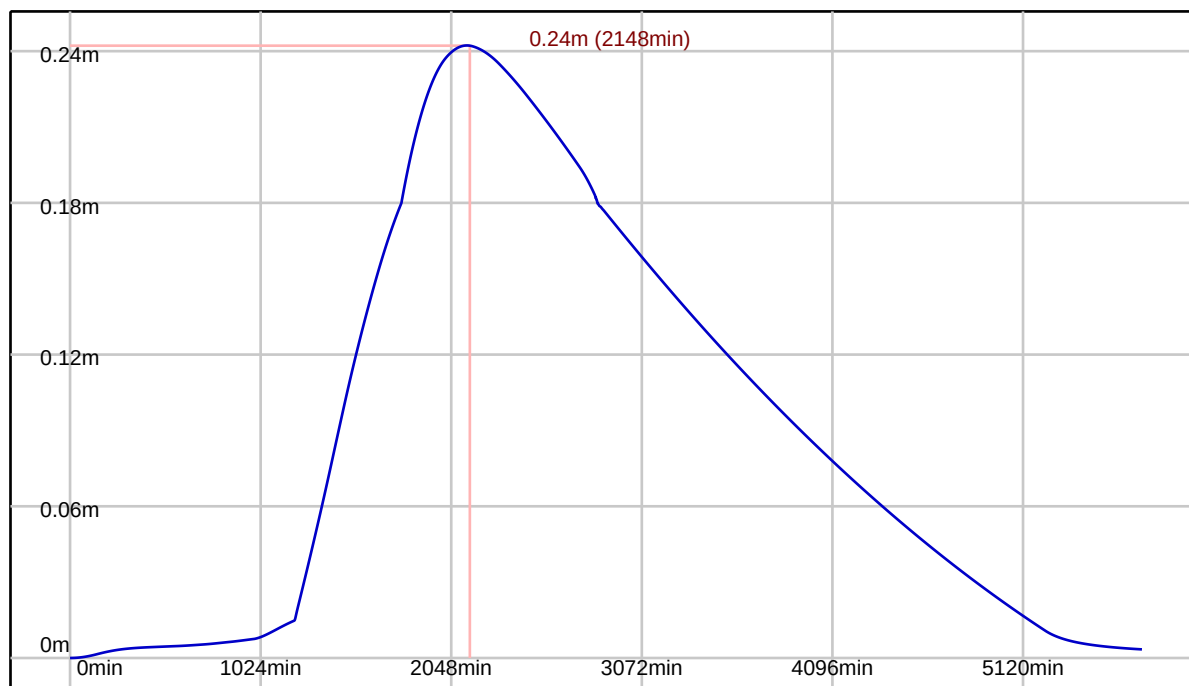
Tank at SWIC2 (100Yr+45% 4320Min Winter)



Tank Structure at Manhole SWIC4

Tank Invert (m)	Tank Height (m)	Porosity Ratio (%)	Area (m2)	Effective Area (m2) Area x Porosity Ratio	Max Storage (m3) Effective Area x Height	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
26.664	0.350	100.00	138.460	138.460	48.461	0.00000000	0.00000000	2.00

Tank at SWIC4 (100Yr+45% 2880Min Winter)



Controls within Manhole SWIC5

Orifice Control

Invert Offset (m)	Orifice Diameter (m)	Discharge Coeff
0.000	0.029	0.600

Controls within Manhole SWIC6

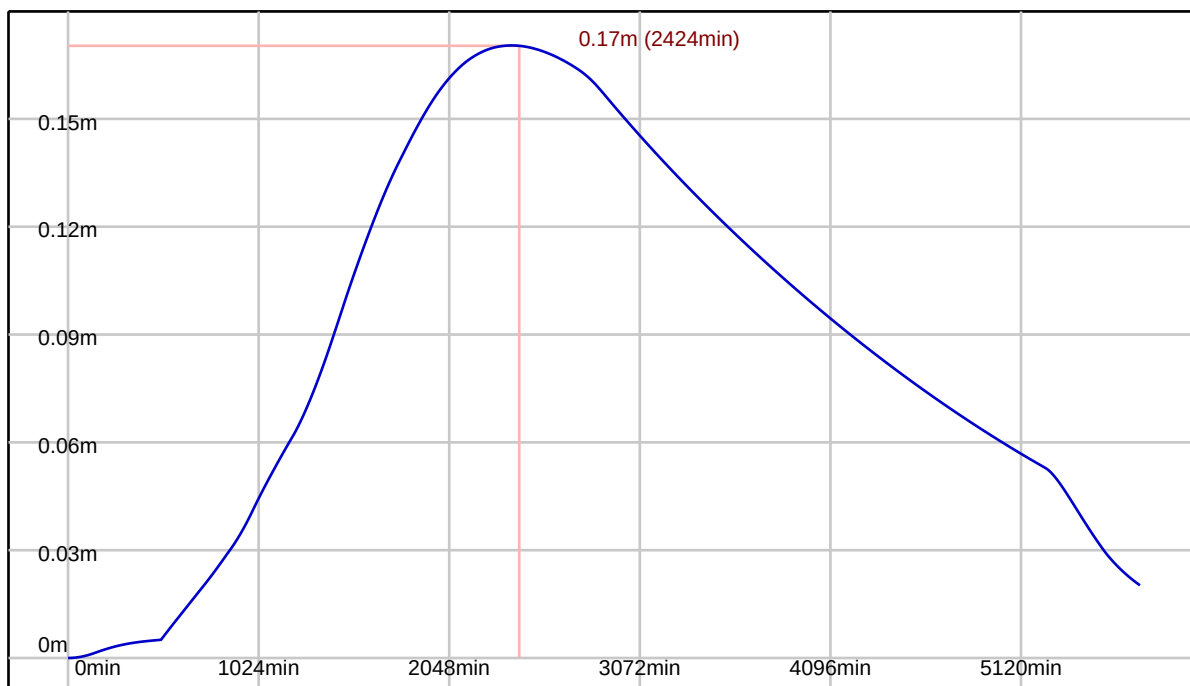
Orifice Control

Invert Offset (m)	Orifice Diameter (m)	Discharge Coeff
0.000	0.029	0.600

Tank Structure at Manhole SWIC6

Tank Invert (m)	Tank Height (m)	Porosity Ratio (%)	Area (m2)	Effective Area (m2) Area x Porosity Ratio	Max Storage (m3) Effective Area x Height	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
26.200	0.350	100.00	142.846	142.846	49.996	0.00000000	0.00000000	2.00

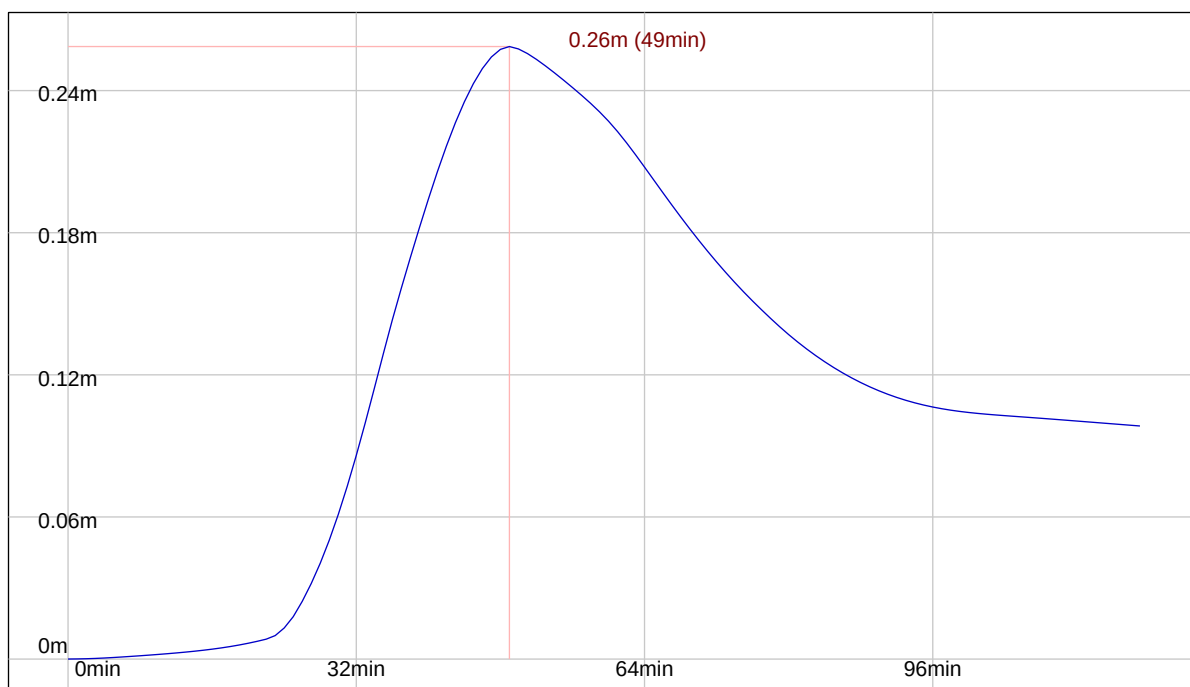
Tank at SWIC6 (100Yr+45% 2880Min Winter)



Tank Structure at Manhole SWIC7

Tank Invert (m)	Tank Height (m)	Porosity Ratio (%)	Area (m2)	Effective Area (m2) Area x Porosity Ratio	Max Storage (m3) Effective Area x Height	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
26.111	0.350	100.00	118.830	118.830	41.591	0.00000000	0.00000000	2.00

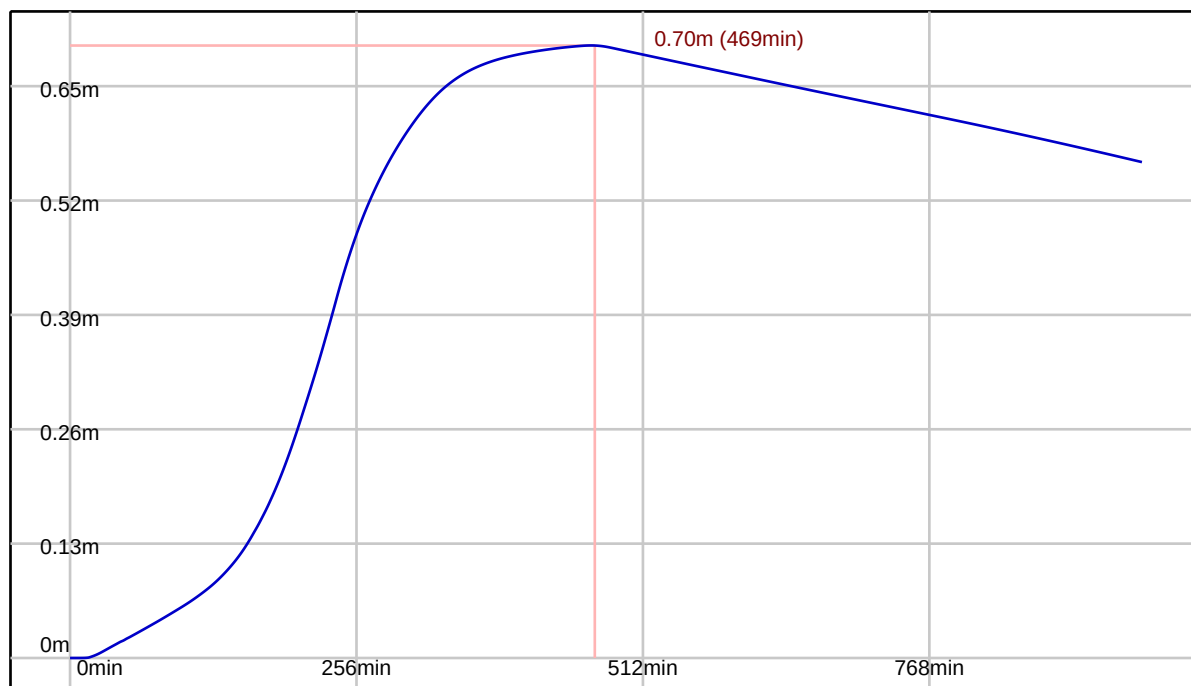
Tank at SWIC7 (100Yr+45% 60Min Winter)



Tank Structure at Manhole TANK OUT

Tank Invert (m)	Tank Height (m)	Porosity Ratio (%)	Area (m2)	Effective Area (m2) Area x Porosity Ratio	Max Storage (m3) Effective Area x Height	Infil Base (m/hr)	Infil Side (m/hr)	Safety Factor
26.000	0.800	95.00	137.050	130.198	104.158	0.00000000	0.00000000	2.00

Tank at TANK OUT (100Yr+45% 480Min Winter)

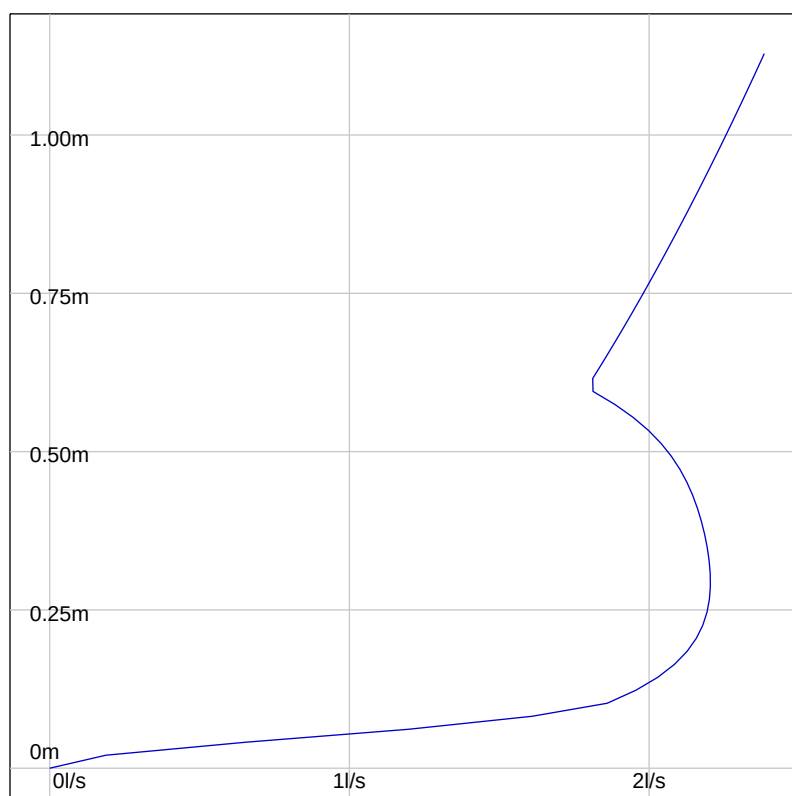


Controls within Manhole SWIC16

Hydro-Brake® Optimum Control at Manhole SWIC16

Model Ref	Design Depth (m)	Design Flow (l/s)	Depth Above Invert (m)	FF Head (m)	FF Flow (l/s)	KF Head (m)	KF Flow (l/s)
SHE-0071-2200-0950-2200	0.950	2.200	0.000	0.294	2.205	0.600	1.791

Hydro-Brake® Optimum Control at SWIC16



Simulation Settings

FEH2022 (point): Filename=FEH_Point_Descriptors_450470_114820_v5_1_0.xml

Summer (Cv: 0.75), Winter (Cv: 0.84)

Global Time of Entry: 5.0 mins

Durations (mins): 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Periods (yrs) + Climate Change: (1, +0%), (30, +0%), (100, +45%)

Simulated Rainfall Events

Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %	Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %
1Yr 15Min Winter	18.057	0.00	1.87	30Yr 720Min Winter	4.549	0.00	0.95
1Yr 15Min Summer	18.057	0.00	1.44	30Yr 960Min Summer	3.636	0.00	0.91
1Yr 30Min Winter	11.809	0.00	3.17	30Yr 960Min Winter	3.636	0.00	0.85
1Yr 30Min Summer	11.809	0.00	2.72	30Yr 1440Min Summer	2.666	0.00	0.82
1Yr 60Min Winter	7.424	0.00	3.69	30Yr 1440Min Winter	2.666	0.00	0.74
1Yr 60Min Summer	7.424	0.00	3.85	30Yr 2160Min Summer	1.973	0.00	0.76
1Yr 120Min Winter	5.554	0.00	2.69	30Yr 2160Min Winter	1.973	0.00	0.69
1Yr 120Min Summer	5.554	0.00	2.92	30Yr 2880Min Summer	1.603	0.00	0.72
1Yr 180Min Summer	4.538	0.00	2.52	30Yr 2880Min Winter	1.603	0.00	0.64
1Yr 180Min Winter	4.538	0.00	2.33	30Yr 4320Min Summer	1.213	0.00	0.64
1Yr 240Min Summer	3.773	0.00	2.34	30Yr 4320Min Winter	1.213	0.00	0.57
1Yr 240Min Winter	3.773	0.00	2.17	30Yr 5760Min Summer	1.007	0.00	0.58
1Yr 360Min Summer	2.966	0.00	2.11	30Yr 5760Min Winter	1.007	0.00	0.51
1Yr 360Min Winter	2.966	0.00	1.96	30Yr 7200Min Summer	0.880	0.00	0.49
1Yr 480Min Summer	2.492	0.00	1.95	30Yr 7200Min Winter	0.880	0.00	0.39
1Yr 480Min Winter	2.492	0.00	1.83	30Yr 8640Min Summer	0.793	0.00	0.26
1Yr 600Min Summer	2.153	0.00	1.86	30Yr 8640Min Winter	0.793	0.00	0.42
1Yr 600Min Winter	2.153	0.00	1.73	30Yr 10080Min Summer	0.729	0.00	0.42
1Yr 720Min Summer	1.904	0.00	1.80	30Yr 10080Min Winter	0.729	0.00	0.39
1Yr 720Min Winter	1.904	0.00	1.67	100Yr+45% 15Min Summer	140.638	0.00	2.29
1Yr 960Min Summer	1.580	0.00	1.69	100Yr+45% 15Min Winter	140.638	0.00	2.29
1Yr 960Min Winter	1.580	0.00	1.57	100Yr+45% 30Min Summer	94.425	0.00	2.53
1Yr 1440Min Winter	1.216	0.00	1.44	100Yr+45% 30Min Winter	94.425	0.00	2.57
1Yr 1440Min Summer	1.216	0.00	1.52	100Yr+45% 60Min Summer	60.553	0.00	2.54
1Yr 2160Min Winter	0.939	0.00	1.33	100Yr+45% 60Min Winter	60.553	0.00	2.56
1Yr 2160Min Summer	0.939	0.00	1.37	100Yr+45% 120Min Summer	34.409	0.00	2.30
1Yr 2880Min Summer	0.787	0.00	1.19	100Yr+45% 120Min Winter	34.409	0.00	2.29
1Yr 2880Min Winter	0.787	0.00	1.19	100Yr+45% 180Min Summer	24.410	0.00	2.12
1Yr 4320Min Summer	0.619	0.00	1.14	100Yr+45% 180Min Winter	24.410	0.00	2.14
1Yr 4320Min Winter	0.619	0.00	1.10	100Yr+45% 240Min Summer	19.488	0.00	1.97
1Yr 5760Min Summer	0.526	0.00	1.09	100Yr+45% 240Min Winter	19.488	0.00	2.01
1Yr 5760Min Winter	0.526	0.00	0.99	100Yr+45% 360Min Summer	14.003	0.00	1.73
1Yr 7200Min Summer	0.467	0.00	1.06	100Yr+45% 360Min Winter	14.003	0.00	1.79
1Yr 7200Min Winter	0.467	0.00	0.93	100Yr+45% 480Min Summer	11.072	0.00	1.48
1Yr 8640Min Summer	0.426	0.00	0.99	100Yr+45% 480Min Winter	11.072	0.00	1.60
1Yr 8640Min Winter	0.426	0.00	0.86	100Yr+45% 600Min Summer	9.268	0.00	1.22
1Yr 10080Min Winter	0.396	0.00	0.82	100Yr+45% 600Min Winter	9.268	0.00	1.42
1Yr 10080Min Summer	0.396	0.00	0.52	100Yr+45% 720Min Summer	8.027	0.00	0.95
30Yr 15Min Summer	77.802	0.00	2.38	100Yr+45% 720Min Winter	8.027	0.00	1.23
30Yr 15Min Winter	77.802	0.00	2.42	100Yr+45% 960Min Summer	6.397	0.00	0.68
30Yr 30Min Summer	51.811	0.00	2.33	100Yr+45% 960Min Winter	6.397	0.00	0.78
30Yr 30Min Winter	51.811	0.00	2.37	100Yr+45% 1440Min Summer	4.663	0.00	0.58
30Yr 60Min Summer	32.926	0.00	2.26	100Yr+45% 1440Min Winter	4.663	0.00	0.56
30Yr 60Min Winter	32.926	0.00	2.34	100Yr+45% 2160Min Summer	3.426	0.00	0.48
30Yr 120Min Summer	19.057	0.00	1.85	100Yr+45% 2160Min Winter	3.426	0.00	0.46
30Yr 120Min Winter	19.057	0.00	1.98	100Yr+45% 2880Min Summer	2.763	0.00	0.41
30Yr 180Min Summer	13.682	0.00	1.57	100Yr+45% 2880Min Winter	2.763	0.00	0.41
30Yr 180Min Winter	13.682	0.00	1.66	100Yr+45% 4320Min Summer	2.065	0.00	0.06
30Yr 240Min Summer	10.930	0.00	1.37	100Yr+45% 4320Min Winter	2.065	0.00	0.74
30Yr 240Min Winter	10.930	0.00	1.42	100Yr+45% 5760Min Summer	1.698	0.00	0.65
30Yr 360Min Summer	7.895	0.00	1.18	100Yr+45% 5760Min Winter	1.698	0.00	1.97
30Yr 360Min Winter	7.895	0.00	1.09	100Yr+45% 7200Min Summer	1.472	0.00	0.92
30Yr 480Min Summer	6.267	0.00	1.11	100Yr+45% 7200Min Winter	1.472	0.00	0.88
30Yr 480Min Winter	6.267	0.00	1.04	100Yr+45% 8640Min Summer	1.319	0.00	1.06
30Yr 600Min Summer	5.251	0.00	1.04	100Yr+45% 8640Min Winter	1.319	0.00	1.73

Simulated Rainfall Events

Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %	Storm	Average Intensity (mm/hr)	Runoff Continuity %	Flow Continuity %
30Yr 600Min Winter	5.251	0.00	0.99	100Yr+45% 10080Min Winter	1.209	0.00	1.41
30Yr 720Min Summer	4.549	0.00	0.99	100Yr+45% 10080Min Summer	1.209	0.00	1.22

Simulation Results

Return Period Yrs: 1.0

Climate Change %: 0

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
SWIC1	10080 min Winter	5887	27.180	0.107	0.098		OK
SWIC2	10080 min Winter	5884	27.180	0.180	0.021		Surcharged
SWIC3	10080 min Winter	5882	27.180	0.292	0.178		Surcharged
SWIC4	240 min Winter	155	27.182	0.012	0.350		Surcharged
SWIC5	180 min Winter	113	27.183	0.735	0.553		Surcharged
SWIC6	10080 min Winter	6241	27.143	0.040	0.282		Surcharged
SWIC7	240 min Winter	160	26.506	0.006	0.113		Surcharged
SWIC8	15 min Summer	11	26.219	0.196	0.020		Surcharged
SWIC9	15 min Winter	8	26.739	0.074	7.466		OK
SWIC10	15 min Winter	8	26.781	0.031	1.862		OK
SWIC11	15 min Winter	9	26.574	0.074	10.052		OK
SWIC12	15 min Winter	9	26.469	0.077	10.711		OK
SWIC13	15 min Winter	9	26.375	0.085	12.090		OK
SWIC14	15 min Winter	8	26.333	0.039	2.435		OK
SWIC15	15 min Winter	11	26.205	0.085	11.671		OK
TANK IN	15 min Winter	11	26.249	0.249	22.844		Surcharged
TANK OUT	360 min Winter	251	26.120	0.120	1.828		OK
SWIC16	360 min Winter	251	26.120	0.137	1.842		OK
HEADWALL	360 min Winter	251	25.836	0.036	1.842		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	10080 min Winter	5887	SWIC1	SWIC3	0.129	0.031	0.118	0.008	OK
2.000	5760 min Winter	6330	SWIC2	SWIC3	0.150	0.005	0.080	0.006	Surcharged
1.001	240 min Winter	155	SWIC3	SWIC4	0.081	0.000	0.000	0.000	OK
1.002	240 min Winter	155	SWIC4	SWIC5	0.081	0.027	0.262	0.018	OK
1.003	10080 min Winter	6241	SWIC5	SWIC6	0.095	0.024	0.271	0.019	OK
1.004	30 min Winter	31	SWIC6	SWIC8	0.076	0.019	0.028	0.002	OK
3.000	30 min Winter	30	SWIC7	SWIC8	0.077	0.028	0.041	0.003	OK
1.005	15 min Summer	12	SWIC8	TANK IN	0.150	0.467	8.257	0.572	Surcharged
4.000	15 min Winter	8	SWIC9	SWIC11	0.074	0.843	7.328	0.495	OK
5.000	15 min Winter	9	SWIC10	SWIC11	0.053	0.328	1.808	0.095	OK
4.001	15 min Winter	9	SWIC11	SWIC12	0.076	0.870	10.220	0.242	OK
4.002	15 min Winter	9	SWIC12	SWIC13	0.081	0.838	10.789	0.256	OK
4.003	15 min Winter	10	SWIC13	SWIC15	0.081	1.146	12.021	0.277	OK
6.000	15 min Winter	10	SWIC14	SWIC15	0.059	0.531	2.369	0.146	OK
4.004	15 min Winter	11	SWIC15	TANK IN	0.155	0.802	23.264	0.235	OK
1.006	360 min Winter	247	TANK IN	TANK OUT	0.121	0.504	3.676		OK
1.007	360 min Winter	251	TANK OUT	SWIC16	0.128	0.164	1.843	0.154	OK
1.008	360 min Winter	251	SWIC16	HEADWALL	0.036	0.567	1.842	0.128	OK

Return Period Yrs: 30.0

Climate Change %: 0

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
SWIC1	15 min Winter	9	27.566	0.493	17.878		Flood Risk
SWIC2	5760 min Winter	3880	27.242	0.242	0.031		Surcharged
SWIC3	15 min Winter	10	27.320	0.433	25.445		Surcharged
SWIC4	5760 min Winter	3885	27.242	0.072	0.340		Surcharged
SWIC5	30 min Winter	17	27.284	0.837	6.141		Surcharged
SWIC6	7200 min Winter	4809	27.189	0.086	0.469		Surcharged
SWIC7	30 min Winter	26	26.578	0.078	1.025		Surcharged
SWIC8	15 min Winter	12	26.739	0.715	15.233		Flood Risk
SWIC9	15 min Winter	10	27.420	0.755	25.480		Surcharged
SWIC10	15 min Winter	11	26.987	0.237	4.689		Surcharged
SWIC11	15 min Winter	11	26.974	0.474	30.109		Surcharged
SWIC12	15 min Winter	11	26.926	0.533	30.834		Surcharged
SWIC13	15 min Winter	11	26.876	0.586	33.546		Surcharged
SWIC14	15 min Winter	11	26.801	0.507	6.131		Surcharged
SWIC15	15 min Winter	11	26.781	0.661	38.549		Surcharged
TANK IN	15 min Winter	11	26.764	0.764	44.373		Flood Risk
TANK OUT	240 min Winter	229	26.420	0.420	2.180		Surcharged
SWIC16	240 min Winter	229	26.419	0.436	2.170		Surcharged
HEADWALL	720 min Summer	568	25.839	0.039	2.204		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	15 min Winter	9	SWIC1	SWIC3	0.150	0.953	16.843	1.167	Surcharged
2.000	120 min Winter	130	SWIC2	SWIC3	0.150	0.029	0.508	0.035	Surcharged
1.001	5760 min Winter	3885	SWIC3	SWIC4	0.111	0.028	0.281	0.019	OK
1.002	5760 min Winter	4252	SWIC4	SWIC5	0.111	0.028	0.351	0.024	OK
1.003	7200 min Winter	4808	SWIC5	SWIC6	0.118	0.029	0.404	0.028	OK
1.004	2160 min Winter	1700	SWIC6	SWIC8	0.081	0.482	0.461	0.032	OK
3.000	30 min Winter	31	SWIC7	SWIC8	0.114	0.733	9.496	0.658	OK
1.005	960 min Summer	478	SWIC8	TANK IN	0.150	0.785	13.866	0.961	Surcharged
4.000	15 min Winter	9	SWIC9	SWIC11	0.150	1.504	26.580	1.795	Surcharged
5.000	15 min Winter	10	SWIC10	SWIC11	0.150	0.576	7.892	0.417	Surcharged
4.001	15 min Winter	8	SWIC11	SWIC12	0.225	1.142	33.884	0.801	OK
4.002	15 min Winter	8	SWIC12	SWIC13	0.225	1.080	31.363	0.743	OK
4.003	15 min Winter	12	SWIC13	SWIC15	0.225	1.248	32.739	0.754	OK
6.000	15 min Winter	9	SWIC14	SWIC15	0.150	0.663	7.449	0.460	Surcharged
4.004	15 min Winter	12	SWIC15	TANK IN	0.225	0.967	38.432	0.388	OK
1.006	30 min Winter	23	TANK IN	TANK OUT	0.150	1.804	28.768		Surcharged
1.007	60 min Winter	42	TANK OUT	SWIC16	0.150	0.334	2.404	0.201	Surcharged
1.008	720 min Summer	568	SWIC16	HEADWALL	0.039	0.597	2.204	0.153	OK

Return Period Yrs: 100.0

Climate Change %: 45

Manholes

Manhole	Critical Storm	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Flood (m3)	Status
SWIC1	15 min Winter	8	27.620	0.547	34.154	3.898	Flood
SWIC2	4320 min Winter	3034	27.428	0.428	0.051		Surcharged
SWIC3	15 min Winter	9	27.417	0.530	34.282		Flood Risk
SWIC4	2880 min Winter	2133	27.412	0.242	0.558		Surcharged
SWIC5	15 min Winter	9	27.459	1.011	14.253		Flood Risk
SWIC6	2880 min Winter	2385	27.273	0.170	0.693		Surcharged
SWIC7	60 min Winter	49	26.759	0.259	0.688		Surcharged
SWIC8	15 min Winter	9	26.894	0.871	20.754		Flood Risk
SWIC9	15 min Winter	9	27.800	1.135	54.869	6.447	Flood
SWIC10	15 min Winter	11	27.444	0.694	8.452		Surcharged
SWIC11	15 min Winter	11	27.385	0.885	38.627		Surcharged
SWIC12	15 min Winter	11	27.296	0.903	41.733		Flood Risk
SWIC13	15 min Winter	11	27.198	0.908	48.476		Surcharged
SWIC14	15 min Winter	10	27.152	0.858	14.997		Surcharged
SWIC15	15 min Winter	10	26.988	0.868	63.669		Surcharged
TANK IN	15 min Winter	10	26.940	0.940	79.776	4.682	Flood
TANK OUT	480 min Winter	466	26.696	0.696	1.878		Surcharged
SWIC16	480 min Winter	466	26.696	0.713	1.891		Surcharged
HEADWALL	5760 min Summer	3650	25.839	0.039	2.204		Outfall

Conduits

Pipe No.	Critical Storm	Peak (mins)	US Manhole	DS Manhole	Flow Depth (m)	Max Velocity (m/s)	Max Flow (l/s)	Flow / Capacity	Status
1.000	60 min Summer	34	SWIC1	SWIC3	0.150	1.014	17.923	1.242	Surcharged
2.000	60 min Winter	87	SWIC2	SWIC3	0.150	0.046	0.817	0.057	Surcharged
1.001	4320 min Winter	2865	SWIC3	SWIC4	0.150	0.148	2.622	0.182	Surcharged
1.002	960 min Winter	962	SWIC4	SWIC5	0.150	0.034	0.608	0.042	Surcharged
1.003	4320 min Winter	2868	SWIC5	SWIC6	0.150	0.040	0.715	0.050	Surcharged
1.004	2880 min Winter	2385	SWIC6	SWIC8	0.082	0.504	0.693	0.048	OK
3.000	30 min Winter	41	SWIC7	SWIC8	0.150	0.828	14.333	0.993	Surcharged
1.005	4320 min Winter	2850	SWIC8	TANK IN	0.150	2.970	49.854	3.455	Surcharged
4.000	15 min Winter	7	SWIC9	SWIC11	0.150	1.943	34.330	2.319	Surcharged
5.000	15 min Winter	7	SWIC10	SWIC11	0.150	0.724	10.516	0.555	Surcharged
4.001	15 min Winter	11	SWIC11	SWIC12	0.225	1.153	39.362	0.931	OK
4.002	15 min Winter	11	SWIC12	SWIC13	0.225	1.082	42.203	1.000	OK
4.003	15 min Winter	11	SWIC13	SWIC15	0.225	1.234	49.059	1.129	OK
6.000	15 min Winter	10	SWIC14	SWIC15	0.150	0.908	16.048	0.992	Surcharged
4.004	4320 min Winter	2850	SWIC15	TANK IN	0.225	4.084	160.050	1.618	OK
1.006	30 min Summer	20	TANK IN	TANK OUT	0.150	2.051	34.070		Surcharged
1.007	4320 min Summer	3259	TANK OUT	SWIC16	0.150	0.261	4.620	0.385	Surcharged
1.008	5760 min Summer	3650	SWIC16	HEADWALL	0.039	0.597	2.204	0.153	OK

Appendix G

Flood Map Extracts

Flood Map for Planning

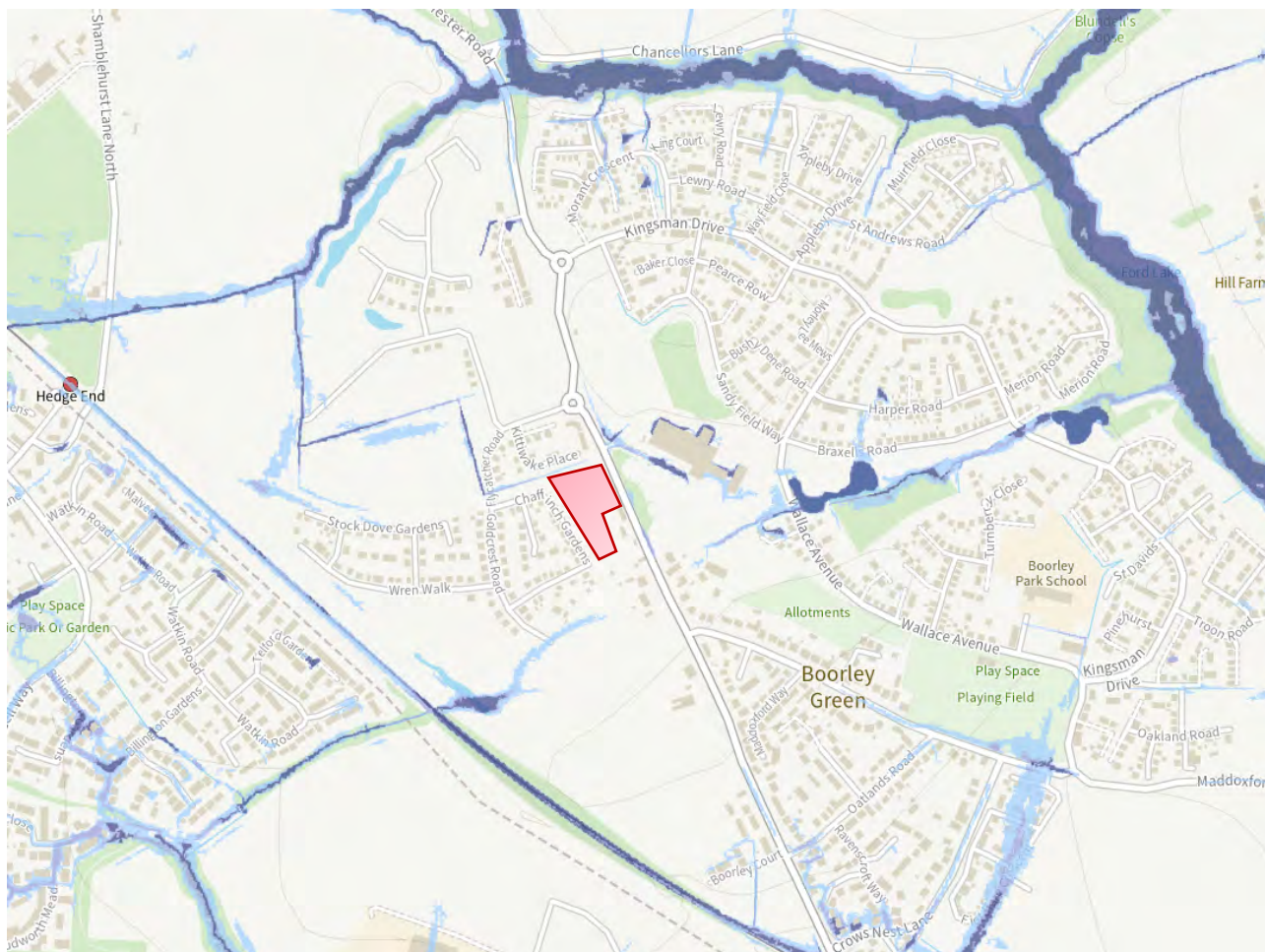


Low Probability (Flood Zone 1) means that each year this area has a chance of flooding of less than 0.1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

Medium Probability (Flood Zone 2) means that each year this area has a chance of flooding of between 0.1% and 1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

High Probability (Flood Zone 3) means that each year this area has a chance of flooding of greater than 1%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

Surface Water Flooding



Flood Map – Surface Water

Flood risk from surface water

Very low risk means that each year this area has a chance of flooding of less than 0.1%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

Low risk means that each year this area has a chance of flooding of between 0.1% and 1%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

Medium risk means that each year this area has a chance of flooding of between 1% and 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

High risk means that each year this area has a chance of flooding of greater than 3.3%. Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding.

Appendix H

Flood Exceedance Routes



Key

Site Boundary

+21.500

Building finished floor level

Existing FW manhole, Plastic Inspection Chamber

Proposed SW manhole, Plastic Inspection Chamber

Proposed FW manhole, Plastic Inspection Chamber

Existing SW sewer

Proposed SW sewer pipe

Proposed SW connection

Proposed SW Pumped Rising Main

Existing FW sewer

Proposed FW gravity sewer

Proposed FW connection

Proposed FW Pumped Rising Main

RE

SW Rodding Eye

g

Road gully to discharge to perforated pipe

du

Surface water discharge to sub-base via distribution unit

rwp

Rainwater downpipe

RE

FW Rodding Eye

Pg

Internal Gully with 100Ø Outlet

svp/ss

Soil Vent Pipe / Stub Stack

+ 27.620

Proposed level

Open graded 10mm to 63mm crushed angular stone sub-base with 30% void space for attenuation under access road

Open graded 10mm to 63mm crushed angular stone sub-base with 30% void space for attenuation under parking spaces.

Block paving - Vehicular entrance access

Permeable Asphalt footpath, No dig construction within RPA

Asphalt footpath

Concrete flag paving - Patio

Black paving - Pedestrian

Compacted limestone chippings to growing gardens with pin kerb edge

Gravel strip

Linear drainage slot drain channel at communal threshold

Linear drainage channel at edge of balcony connected to drainage network.

10mm gap applied to channel in patio slab area.

Flood Exceedance route

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.

This drawing is based on HGP Architects site layout plan SO-2977-02-AC-010 - dated February 2024.

Tree constraints taken from survey provided by Keen Consulting dated January 2024.

Topographical survey provided by Redline Surveys dated January 2024.

DRAINAGE

Any information given on this drawing regarding existing services is believed to be correct. The contractor must check this information and determine the nature and location of other existing services from the various statutory authorities before commencing excavation works.

Drainage works to be constructed in accordance with BS EN 752 and Approved Document H

All soft spots and unacceptable material encountered in drainage excavations is to be removed and replaced with granular material to the requirements of the building control officer.

Pipes to be installed to manufacturers recommendations.

Pipes under buildings to be laid to a fall of 1:60 minimum unless noted otherwise. Internal level of pipes to be 4.20m (50mm below blinding + 90° bend). Refer to structural detail drawings for detailed slab construction make-up layers and levels.

Plastic plain wall pipes to be PVC-U to BS EN 1401-1, class SN4, with flexible joints, Kitemark certified. Structured wall plastic pipes to be to WIS 04-35-01, Kitemark certified

Clay pipes to be vitrified clay to BS EN 295-1, with flexible joints, Kitemark certified. Clayware pipes must be extra strength classification protected in accordance with the specified details.

Concrete pipes to be precast concrete to BS 5911-1 and BS EN 1916, with flexible joints.

Bedding of pipes to be in accordance with approved document H1.

Rocker pipes with flexible joints are to be provided at a distance of 150mm and 750mm from the face of construction to manholes, where pipes pass above, below or through ground beams or foundations; at gully connections and soil stack ends.

Manhole access covers are to be located at the outgoing side of manholes.

Cover levels are to be fixed on site to suit finished levels. Covers and frames to BS EN124, Grade D to be used in areas subject to heavy vehicular loading, Grade C in areas subject to light vehicular loading and Grade B to be used elsewhere.

All external pipes to be 150Ø unless noted otherwise.

All internal pipes to be 100Ø unless noted otherwise.

Manhole positions coordinates are indicated on the SWH manhole schedule 0502 and to be confirmed by SWH prior to setting out on site.

Access points to be located at base of all rwp and svps.

All gullies to be trapped

Positions of SVP's and RWP's should be read in conjunction with Architects drawings.

PRELIMINARY - NOT FOR CONSTRUCTION						
P12	Stage 3 - Revised Architects layout 26.02.26	RD	GM	IL	27.02.26	
P11	Stage 3 - Revised Architects layout 05.02.26	RD	GM	IL	10.02.26	
P10	Stage 3 - Revised Architects layout 20.01.26	RD	GM	IL	23.01.26	
P09	Stage 3 - Revised Landscape's layout 17.02.25	RD	GM	IL	03.03.25	
P08	Stage 3 - Revised Landscape architects layout	RD	BC	IL	12.12.24	
P07	Stage 3 - Outfall location amended following discussions	RD	NC	IL	28.11.24	
P06	Stage 3 - Revised site layout	RD	BC	IL	25.07.24	
P05	Stage 3 - Revised site boundary	RD	BC	IL	17.07.24	
P04	Stage 3 - Drainage updated to suit site layout	RD	BC	IL	02.07.24	
P03	Updated to suit client requirements	RD	TK	TK	11.03.24	
P02	Preliminary issue - Foul sewer outfall via Oak Cottage omitted.	TK	TK	TK	26.02.24	
Rev.	Amendment	Drn.	Chkd.	Appd.	Date	

Winchester Road, Boorley Green

Drawing

Drainage Strategy Layout

Client

McCarthy Stone

Life, well lived

Scott White and Hookins

Structural Engineering

Civil Engineering

Sustainability and BREEAM

CDM Consultancy

Suite 3, New Kings Court, Tollgate, Chandlers Ford, Eastleigh SO23 3LG

T: +44 (0)1902 844855 W: www.swh.co.uk E: info@swh.co.uk

Scale at A1 - 1:250

SO-2977-03-CE-0500 - P12