Proposed Development
Mayberry Garden Centre, Old Shoreham Road

Flood Risk Assessment and SuDS Assessment
For

Tate Bros Limited

motion

Document Control Sheet

Flood Risk Assessment and SuDS Assessment

Mayberry Garden Centre, Old Shoreham Road, Portslade

Tate Bros Limited

This document has been issued and amended as follows:

Date	Issue	Prepared by	Approved by
12/11/20	Draft	VBH	JM
14/05/21	Final	VBH	NJ

Contents

Appendices

1.0 Introduction

1.1 This Flood Risk Assessment (FRA) and Sustainable Drainage System (SuDS) Assessment has been prepared on behalf of Tate Bros Limited in relation to development proposals at Mayberry Garden Centre, Old Shoreham Rd, Portslade, Brighton BN41 1SP.

1.2 The aim of this report is to satisfy the requirements of the Local Planning Authority, Lead Local Flood Authority (LLFA) and Environment Agency (EA) in relation to development and flood risk. Specific objectives of this FRA are to:

- Assess the proposed development against the requirements of the National Planning Policy Framework (NPPF).
- Assess whether the proposed development has taken appropriate consideration of the risk of flooding from all potential flood sources.
- Detail how the proposed development will be safe with respect to flooding during its lifetime and will not increase the risk of flooding to other sites.
- Produce a Drainage Strategy that will detail how the proposed development will not result in an increase in surface water that could cause flood risk to both the development and the neighbouring sites.

1.3 This report considers the requirements for carrying out an FRA as set out in the NPPF and has been prepared to comply with current EA and Flood Risk policy.

2.0 Site Description

Site Location and Description

2.1 This FRA has been produced by Motion on behalf of Tate Bros Limited to support a planning application for a new car showroom and an extension to the existing Mayberry Garden Centre, Old Shoreham Rd, Portslade, Brighton BN41 1SP. The proposed development site straddles two local authorities, West Sussex County Council (WSCC) and East Sussex County Council (ESCC).

2.2 The proposed 1.8 hectare (ha) development site is currently an existing garden centre and open field which can be described as a combination of greenfield and brownfield development. The site is bordered to the north by old Shoreham Road, to the west by open fields and to the south and east by residential development. The centre of the site is at grid reference 525259 105879. A site location plan is illustrated in Figure 2.1 and can be found in **Appendix A.** A site masterplan can be found in **Appendix B.**

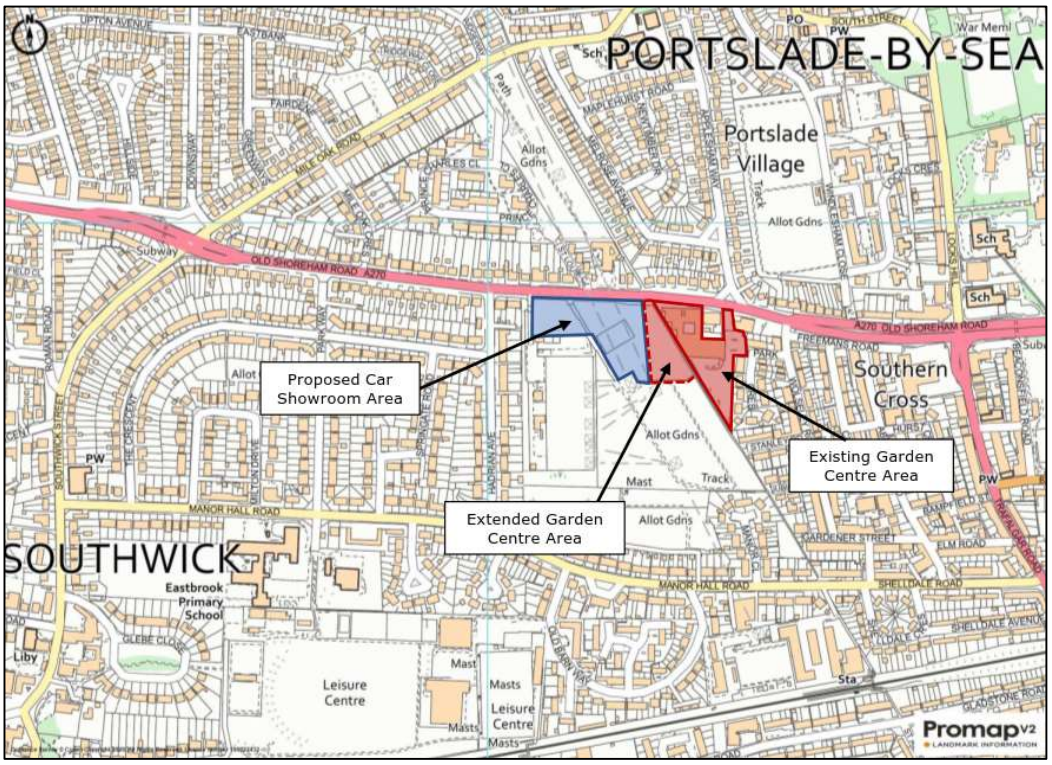


Figure 2.1 Site Location Plan

Topography

2.3 A topographical survey of the existing site was undertaken by Sitech Surveying Services in August 2018, which is provided in **Appendix C** of this report.

2.4 The topography of the site falls from the highest point located at the north eastern corner of the site adjacent to the Old Shoreham Road with an elevation of approximately 21.21 mAOD, towards the south western corner of the site which has an approximate elevation of 18.42 mAOD.

Geology

2.5 The British Geological Survey (BGS) online Geoindex Mapping indicates that the site is underlain by the Tarrant Chalk Member with superficial deposits of Head which is made of clay, silt, sand and gravel.

2.6 Borehole records from the surrounding area have been obtained from the BGS online index, these can be found in **Appendix D.** These Borehole record support the findings of the BGS mapping.

2.1 Infiltration testing was undertaken on site in September 2020. The report can be found in full in **Appendix E.** The results from the infiltration testing support the findings of the BGS mapping and indicate that the soils possess poor to moderate infiltration characteristics. The results from the infiltration tests are summarised in Table 2.1. To comply with building regulations, point discharging infiltration systems (conventional ring or trench soakaways) are required to be constructed a minimum of 5.0m away from proposed or existing buildings. Magic mapping confirms that the site is not underlain by a Source Protection Zone.

Trial Pit	Infiltration Rate (m/s)
TP01	4.5 x 10-6
TP02	6.8 x 10-6
TP03 test 1	2.1 x 10-5
TP03 test 2	1.1 x 10-5
TP04	6.1 x 10-6

Table 2.1 Calculated Infiltration rates

Existing Drainage Regime

2.2 Southern Water records can be found in **Appendix K** and show a 225mm surface water sewer running westerly along Old Shoreham Road along the northern site boundary. There is also a 225mm surface water sewer running close to the north eastern corner of the site. In addition, there is a 200mm foul water sewer running along Old Shoreham Road, and there is an existing 450mm combined sewer running through the middle of the site from east to west.

2.3 The nearest watercourse to the site is the River Adur located approximately 1km south of the site.

2.4 Due to the infiltration testing results, and the fact that there is an existing soakaway located in the Mayberry existing car park, it is assumed that all surface water currently drains via infiltration into the chalk below the site.

Site Visit Photos

2.5 Motion undertook a site visit on the 17th September 2020. The site visit demonstrated that there is an existing highway drainage system on Old Shoreham Road and that the existing Mayberry Car Park drains to lined soakaways. Photos of the lined soakaway can be found in **Appendix M.**

3.0 Legislative and Policy Framework

Flood and Water Management Act

3.1 The Flood and Water Management Act 2010 (FWMA) received Royal Assent on 8th April 2010. The Act was introduced to enforce some of the key proposals set out within UK Government flood and water strategies along with UK Government's response to the Sir Michael Pitt's Review of the summer 2007 floods.

3.2 LLFA's including ESCC and WSCC have a responsibility under the FWMA to develop, maintain, apply and monitor the application of a strategy for local flood risk in their area. Local flood risk is defined as flood risk arising from surface run-off, groundwater and ordinary watercourses (i.e. non main rivers). The EA plays a role in managing the watercourses designated as 'main rivers.

3.3 Relevant to the site, the FWMA will encourage the uptake of SuDS by removing the automatic right to connect to sewers and providing for LLFA to adopt SuDS for new developments.

3.4 The development proposals will adhere to the Act through the provision of SuDS as a fundamental element of the surface water drainage system. Furthermore, the client is committed to work with the relevant stakeholders, such as the EA, ESCC and WSCC (the lead local flood authority), in implementing the requirements of the FWMA where necessary.

National Planning Policy Framework

3.5 The NPPF and the PPG set out the Government's planning policies for England and how these are expected to be applied. This includes ensuring that flood risk is taken into account at all stages of the planning process, avoiding inappropriate development in areas at risk of flooding and directing development away from those areas where risks are highest.

3.6 A site-specific FRA is required for proposals of 1ha or greater in Flood Zone 1, all proposals for development in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the EA). The FRA should identify and assess the risks of all forms of flooding to and from the development and demonstrate how these flood risks will be managed so that the development remains safe throughout its lifetime, taking climate change into account.

The Sequential and Exception Tests

3.7 The NPPF Sequential Test classifies proposed development into one of four Flood Zones, detailed in Table 3.1.

Flood Zone	Annual Probability of Flooding (%)	Corresponding Annual Chance of Flooding (1 in x)
✓ Low Probability	Fluvial <0.1% Tidal <0.1%	>1,000 >1,000
✓ Medium Probability	Fluvial 0.1 – 1.0% Tidal 0.1 – 0.5%	1,000 – 100 1,000 – 200
✓ a) High Probability	Fluvial >1.0% Tidal >0.5%	<100 <200
✓ b) The Functional Floodplain	Fluvial >5.0%* Tidal >5.0%* *Starting point for consideration. LPAs should identify Functional Floodplain, which should not be defined solely by rigid probability parameters.	<20 <20

Table 3.1 Flood Zones

3.8 The NPPF specifies that the suitability of all new development in relation to flood risk should be assessed by applying the Sequential Test to demonstrate that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development proposed. The NPPF provides guidance on the compatibility of each land use classification in relation to each of the Flood Zones as summarised in Table 3.2.

Flood Zone	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception test required	✓	✓
Zone 3a	Exception test required	✓	×	Exception test required	✓
Zone 3b	Exception test required	✓	✓	✓	✓

Key:
✓ Development is appropriate
× Development should not be permitted

Table 3.2 Flood Risk Vulnerability Classification

3.9 The proposed development site is located within an area designated as Flood Zone 1, having a less than 1 in 1000 chance per annum of flooding from rivers or seas. Less vulnerable development (car showroom and a Garden Centre as per the proposals) are shown to be acceptable within this flood zone negating the need for a sequential or exception test.

Lead Local Flood Authority

3.10 As of April 2015, the LLFA became a statutory consultee on all major planning applications. The LLFA is required to assess planning applications in respect of surface water drainage and sustainable drainage systems. The proposed development site straddles both ESCC and WSCC two local authorities. ESCC is the LLFA for Brighton and the wider East Sussex areas and WSCC is the LLFA for Adur and wider West Sussex areas.

Brighton and Hove Council Strategic Flood Risk Assessment/ Adur and Worthing Strategic Flood Risk Assessment

3.11 The Brighton and Hove Council Strategic Flood Risk Assessment (SFRA) has been prepared by consultants JBA Consulting in 2012 and the Adur and Worthing Council SFRA has also been prepared by consultants JBA Consulting in 2012. The SFRA provides a useful source of information and evidence for a variety of stakeholders as part of the planning application process and when making decisions regarding the allocation of sites. The information within the SFRA should be used when putting together Flood Risk Assessments (FRAs) as part of planning applications.

Environment Agency Flood Map

3.12 As part of this FRA a 'Flood Product 4' data request was submitted to the EA. The 'Flood Product 4' provided confirmation of the sites flood zone classification, a detailed flood map, information about historical flooding incidents and EA model output data such as predicted fluvial flood water levels in the vicinity of the site. The response to this Flood Product data request is provided in **Appendix F.**

3.13 The EA Flood Map shows that the entirety of the site is located within Flood Zone 1 (less than 1 in 1000 annual probability of flooding from rivers or the sea).

4.0 Flood Risk

4.1 In this section a number of potential sources of flooding have been considered and the probability of any likely impacts assessed.

Flooding from Rivers and the Sea

4.2 The EA Flood Map shows that the whole of the site is located within Flood Zone 1 (less than 1 in 1000 annual probability of flooding from rivers or the sea).

4.3 The nearest watercourse to the site is the River Adur located approximately 1km south of the site.

It is therefore concluded that the site is at very low risk of flooding from rivers and the sea.

Groundwater Flooding

4.4 Groundwater flooding occurs when water originating in aquifers reaches the surface, typically as a result of high groundwater levels caused by prolonged rainfall. It has been identified using public data provided by the BGS that the site is underlain by the Tarrant Chalk Member with superficial deposits of Head which is made of clay, silt, sand and gravel. The SFRA states that much of the Brighton and Hove district is underlain by chalk and that the highly permeable nature of this bedrock contributes a risk of flooding through emergent groundwater. However, the SFRA has no record of the site or any area close to the site having flooded due to groundwater.

It is therefore concluded that the site is at very low risk of flooding from Groundwater.

Surface Water Flooding

4.5 Flooding from overland flow occurs when intense rainfall is unable to infiltrate into the ground or enter drainage systems resulting in localised flooding in low spots that provide no means of outfall.

4.6 The surface water flood map in **Appendix G** provides information concerning the risk of surface water flooding to the site. The Surface Water Flood Map shows the majority of the site is at 'very low' risk of surface water flooding. However, parts of the site are located within areas of low, medium and high risk of surface water flooding. This is generally where the low grounds levels are located.

It is therefore concluded that the site is at very low to high risk of flooding from surface water.

Flooding from Infrastructure Failure

4.7 In order to control and convey surface water runoff from impermeable surfaces in urban areas, underground surface water sewers or combined sewers (foul and surface water) are often utilised in urban areas. Pipes, culverts etc. have a finite capacity and therefore pose a risk of flooding due to the risk of siltation, blockage or collapse.

4.8 Southern Water records show a 225mm surface water sewer running westerly along Old Shoreham Road along the northern site boundary. There is also a 225mm surface water sewer running close to the north eastern corner of the site. The SFRA has no records of the site flooding due to infrastructure failure.

It is therefore concluded that the site is at low risk of flooding from infrastructure failure.

Flooding from Artificial sources

4.9 The EA provides a map showing the maximum potential flood extent, in the event that all reservoirs with a capacity of greater than 25,000 cubic metres were to fail and release the water they hold. The map shows that the site would not experience flooding in this scenario. There are no other significant artificial waterbodies in proximity of the site.

It is therefore concluded that the site is at low risk of flooding from artificial sources.

5.0 Drainage Strategy

Sustainable Drainage Overview & Hierarchy

5.1 Current planning policy and EA guidance requires developments to employ SuDS (Sustainable Drainage Systems) techniques wherever feasible. Careful design of SuDS features can ensure that the site surface water drainage closely reflects the natural hydrology and hydrogeology of the site.

5.2 SuDS will attenuate and treat surface water run-off quantities at the source (source control) in line with National Planning Policy Framework and EA policies.

5.3 This use of SuDS is needed to replicate the pre-developed Greenfield conditions so as not to increase flood risk to the site or surrounding sites by managing excess run-off at the source.

5.4 Source control systems treat water close to the point of collection, in features such as soakaways, permeable paving and dry swales.

5.5 The key benefits of SuDS are as follows:

- Improving water quality over a conventional piped system by removing pollutants from diffuse pollutant sources (e.g. roads);
- Improving amenity through the provision of open green space and wildlife habitat; and
- Enabling a natural drainage regime which recharges groundwater (where possible).

5.6 SuDS provide a flexible approach to drainage, with a wide range of components from house soakaways to large-scale basins or ponds. The individual techniques should be used where possible in a management train which mimics the natural pre-development pattern of drainage. The Interim Code of Practice for SuDS sets out the hierarchy of techniques. These are:

- Prevention – the use of good site design and housekeeping measures on individual sites to prevent runoff and pollution;
- Source control – control of runoff at or very near its source (such as permeable paving or soakaways for individual houses);
- Site control – management of water from several sub-catchments (including routeing water from roofs and car parks to one large soakaway or infiltration basin for the whole site); and
- Regional control – management of runoff from several sites, typically in a detention pond or wetland.

Greenfield Runoff Rates

5.7 The total area of the site is 1.8 ha. UKSUDS was used to calculate the QBar Greenfield runoff rate for the entire site showing a result of 0.32 l/s or 0.18 l/s/ha. UKSUDS QBar outputs can be found in **Appendix H.**

Proposed Sustainable Drainage Strategy

5.8 The proposed development will have an increase in the amount of hardstanding areas on site from the new development and associated access roads. Therefore, without mitigation there will be an increase in surface water runoff from the site as a result of the development. A drainage strategy has been put in place so that the proposed development does not result in an increase in surface water run-off that could cause potential flood risk to both the development and the neighbouring sites.

5.9 The site is currently Greenfield and Brownfield. The greenfield areas of the site does not have an existing surface water drainage system and surface water run-off from these areas will infiltrate into the ground. The existing developed parts of the site, including the existing Mayberry Garden Centre car park are connected to a drainage system that discharges to lined soakaways Infiltration testing has demonstrated that infiltration techniques are possible on the proposed development site.

5.10 The proposed impermeable area of the site has been calculated as 1.72 ha from the most recent masterplan – Proposed Site Plan, 20034 - Mayberry Development.

5.11 A hydraulic model has been produced using MicroDrainage Source control to represent the proposed drainage. The MicroDrainage model results can be found in **Appendix J** and the Drainage Strategy can be found in **Appendix I**.

5.12 In order to attenuate the additional surface water from the development it is proposed to have permeable paving throughout the parking areas which will also allow surface water to infiltrate into the ground. Surface water run-off from impermeable areas of the site, including the access road and the services areas will drain via a system of gullies or channel drains and will pass through an oil interceptor prior to discharging to lined soakaways. Any surplus surface water that does not infiltrate into the ground below the permable paving will be collected by a system of drains which are connect to lined soakaways.

5.13 The SuDS features will also improve water quality on site as contaminated run-off passing through the permeable paving will be treated to remove silts, sediment and hydrocarbon through the process of filtration. Contaminated run-off from the access road and service areas will be collected by a drainage system which includes gullies with sumps and catchpits that will remove silts, sediments and hydrocarbons by the process of settlement. In addition, run-off from these areas will pass through an oil interceptor to treat run-off prior to discharging to a soakaway. Contaminated run-off discharges from the car wash will be contained in the area of the car wash and will drain to a separate foul system which will discharge to the existing combined sewer.

5.14 The infiltration rates are based on the infiltration testing undertaken site and are detailed in Table 5.1.

Site location	Infiltration Rate (m/s)
North-west element of the site covering carpark and car showroom	6.8 x 10-6
North-west element of the site	2.1 x 10-5
South element of the site	4.5 x 10-6
Garden centre extension	4.5 x 10-6

Table 5.1 modelled Infiltration rates

5.15 An Exceedance Routing Plan for surface water is found in **Appendix K**. This details where surface water would flow to on site and where it would be stored in an extreme event.

6.0 SuDS Maintenance Regime

6.1 This section describes the proposed management and schedules for the maintenance to reduce the risk of the proposed network flooding due to poor maintenance.

Piped Network Maintenance

6.2 The piped network shall be maintained by either Southern Water or an approved maintenance company in accordance with Sewers for Adoption (7th Ed.) and the manufacturers guidance.

6.3 This maintenance schedule should include clearing gullies, removing any large obstructions within the pipes and cleaning catchpits at regular intervals to ensure the correct operation of the sewer network.

Attenuation Storage Tanks and Pond Maintenance

6.4 The proposed SuDS features are to have a routine maintenance schedule that conforms to CIRIA SuDS Manual (C753) 2015 guidance. An approved maintenance company is to adhere to the maintenance schedule provided in Tables 6.1. permeable paving of the CIRIA guidance in order to ensure the correct operation of the drainage.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface).	Once a year, after autumn leaf fall, or reduced frequency as required, based on site specific observations of clogging or manufacturer's recommendations - pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment.
Occasional Maintenance	Stabilise and mow contributing and adjacent areas.	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying.	As required - once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised within 50mm of the level of the paving.	As requires
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to structural performance or a hazard to users, and replace lost jointing material.	As required
	Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for 3 months after installation.

	inspect for evidence of poor operation and/or weed growth - if required, take remedial action.	Three-monthly, 48h after large storms in first 6 months.
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually
	Monitor inspection chambers	Annually

Table 6.1 Operation and maintenance requirements for permeable paving

7.0 Summary and Conclusions

7.1 Motion has been commissioned by Tate Bros Limited to undertake an FRA and SuDS Assessment in support of a planning application for the proposed development proposals at Mayberry Garden City, Old Shoreham Rd, Portslade, Brighton BN41 1SP

7.2 The application site is greater than one hectare (1.8 ha) and is currently a combination of greenfield and brownfield development.

7.3 The EA Flood Maps shows that the entirety of the site is located within Flood Zone 1, having a very low risk of flooding from the rivers or seas.

7.4 The development site is also considered to be at very low risk of flooding from sewers, groundwater and artificial sources.

7.5 The proposed development will increase the amount of hardstanding areas on site due to the new commercial area and associated access road. Therefore, without mitigation there will be an increase in surface water runoff as a result of the development of the site.

7.6 The QBar Greenfield runoff rate for the entire site showing a result of 0.32 l/s or 0.18 l/s/ha.

7.7 A proposed drainage strategy will be put in place that will include; permeable paving with an overflow to lined soakaways, access roads and service areas that drain to an oil interceptor prior to discharging to lined soakaways and contaminated run-off from the car wash area being contained and connected to the combined sewer via a separate foul drainage system.

7.8 The additional surface water run-off from the proposed development impermeable areas will not result in an increase in the pre-development surface water run-off rate from the site, as the proposed drainage system will infiltrate into the ground via permeable paving or lined soakaways. Therefore, there will be no increased flood risk as a result for the development.

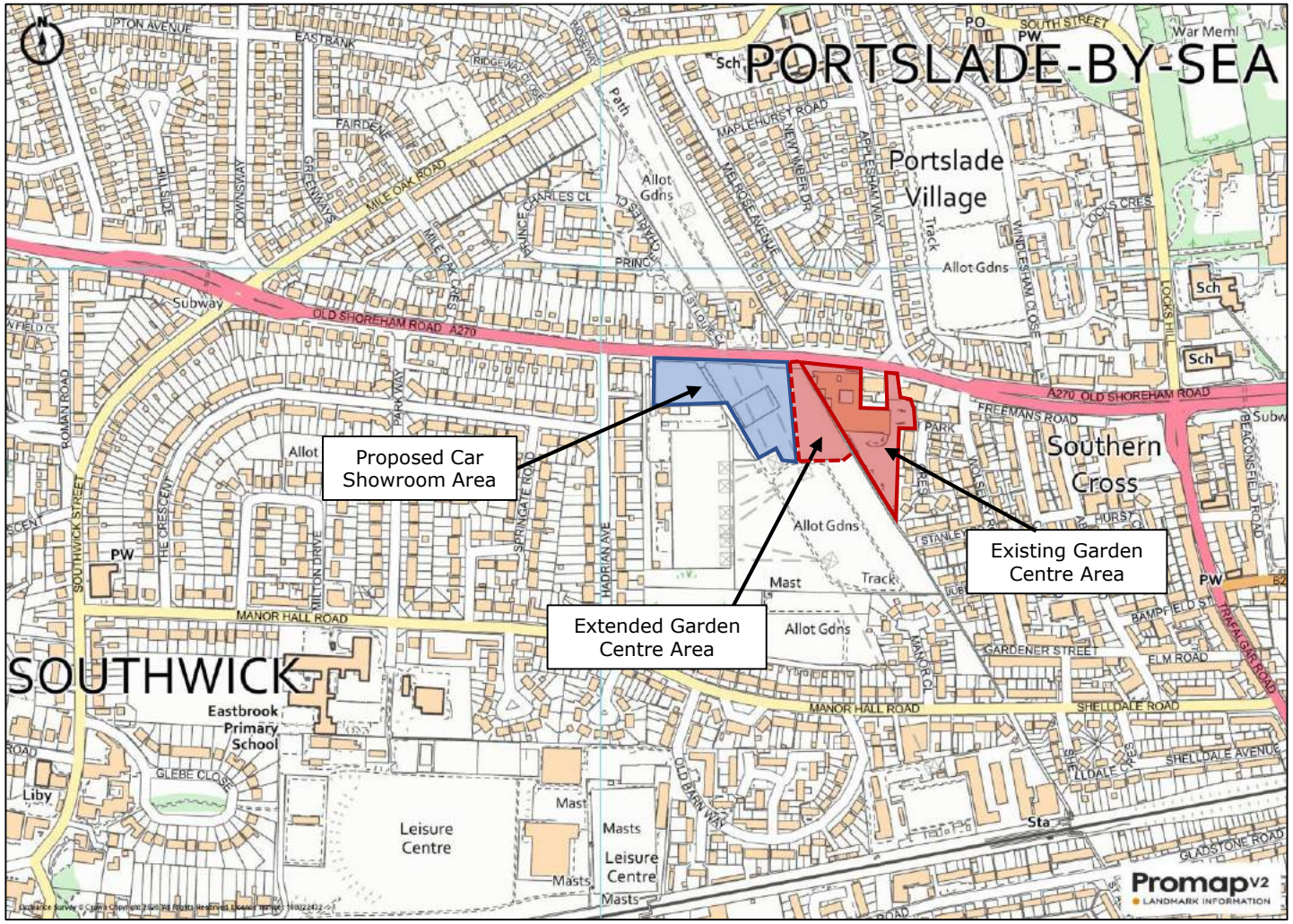
7.9 The SuDS features will also improve water quality on site as contaminated run-off passing through the permeable paving will be treated to remove silts, sediment and hydrocarbon through the process of filtration. Contaminated run-off from the access road and service areas will be collected by a drainage system which includes gullies with sumps and catchpits that will remove silts, sediments and hydrocarbons by the process of settlement. In addition, run-off from these areas with pass through an oil interceptor to treated run-off prior to discharge to soakaway. Contaminated run-off discharges from the car wash will be contained in the area of the car wash and will drain to a separate foul system which will discharge to the existing combined sewer.

7.10 The proposed drainage strategy has been designed to cater for the 1 in 100 + 40% CC event in accordance with the requirements of the LLFA, the EA as well as the NPPF.

7.11 This FRA demonstrates that the flood risk for the proposed development can be managed on site without increasing the risk to any neighbouring developments or downstream areas, and therefore fulfils the requirements of the PPG and NPPF.

Appendix A

Site Location Plan



Site Location Plan: Land at Mayberry Garden Centre, Portslade

Appendix B

Masterplan

NOTES

- DO NOT SCALE OFF THIS DRAWINGEXCEPT FOR PLANNING PURPOSES
- CHECK ALL DIMENSIONS ON SITE BEFORE ANY WORK IS COMMENCED
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- COPYRIGHT OF THIS DRAWING IS RETAINED BY THE ARCHITECT AND IT MUST NOT BE REPRODUCED WITHOUT WRITTEN CONSENT

N

Nursing home
administrative boundary
Shelter
OLD SHOREHAM ROAD
Filling Station
PARK CRESCENT
display area
display area
access gates
new frost protection canopies
03no.
02no.
05no.
08no.
10no.
existing garden centre entrance
external extension to garden centre retail area
car wash
motorhome parking bays
customer parking
El Sub Sta
electrical sub-station
staff parking
goods yard
existing garden centre customer parking
20no.
14no.
30no.
06no.
new badger sett
electrical pylon base
new gated access to allotments
electrical pylon base
Public Right of Way to be diverted - green line denotes existing line of PRoW, red line denotes proposed routing
allotments

this drawing to be read in conjunction with civil engineering drawing package by *Motion*

scale bar - 1:500 @ A1

REV	DATE	BY	AMENDMENT
D	04.09.2020	ec	motorhome customer parking amended
C	03.09.2020	ec	general updates following DTMI
B	17.08.2020	ec	general updates
A	21.07.2020	ec	PRoW/ site plan design amended

folkes architects

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Tates Bro.

JOB TITLE
Proposed Development at
Mayberry Garden Centre
Old Shoreham Road
Portslade
BN41 1SP

DRAWING TITLE
Proposed Site Plan

PRELIMINARY ISSUE

DATE	SCALE	DRAWN BY	CHECKED BY
June 2020	1:500 @ A1	ec	mf

JOB NO.	DRAWING NO.	REVISION
20034	2.01	D

Appendix C

Topographic Survey

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NOTES

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LEGEND

BANKING
BUSHES & HEDGES
MARSH
TREES
NOTE:
GATES
RETAINING WALL
SLOPING MASONRY
FENCE
WALL
BUILDING
BUILDING
GLASS ROOFED
CONTOURS
OVERHEAD WIRES

ABBREVIATIONS (WHERE APPLICABLE)

AIR VALVE	AV	MANHOLE	MH
BED LEVEL	BL	MARKER	MKR
BELISHA BEACON	BB	NOTICE BOARD	NB
BOLLARD	B	NAME PLATE	NP
BRITISH TELECOM BOX	BTB	OVERHEAD WIRES	OHW
BRITISH TELECOM MANHOLE	BTMH	PARKING METER	PM
BRICKWORK	BKWK	RIDGE LEVEL	RID
BUS STOP	BS	ROOF LEVEL	RL
CABLE TV	CATV	SIGHTING SYE	SE
COVER LEVEL	CL	RETAINING WALL	RTW
CABLE MARKER	CM	SLUICE VALVE	SV
CONCRETE POST	CP	STOP COCK	SC
DOWN PIPE	DP	SOFFIT LEVEL	SOF
DROP KERB	DK	SPOT LEVEL	SL
EAVES LEVEL	EA	STRUCTURAL SLAB LEVEL	SSL
ELECTRICITY CABLE PIT	ELCP	STATION	STN
ELECTRICITY CONTROL BOX	ECB	TREE STUMP	ST
ELECTRICITY POLE	EP	TELEGRAPH POLE	TP
EARTH ROD	ER	TELEPHONE CALL BOX	TCB
FIRE HYDRANT	FH	TOP OF KERB	TK
FLOWER BED	FB	TURNSTILE	TS
FOOTPATH	FP	TRAFFIC LIGHT	TL
FLOOR LEVEL	FL	TOP OF WALL	TW
FLAG STAMP	FS	UNDERGROUND	UG
GAS VALVE	GV	UNABLE TO LIFT	UTL
GATE STOP	GS	UNABLE TO SURVEY	UTS
GULLY	G	VENT PIPE	VP
GULLY OUTLET	GO	WATER LEVEL	WL
INSPECTION COVER	IC	WATER METER	WM
INVERT LEVEL	IL	WASH OUT	WO
LAMP POST	LP	WASTE PIPE	WP
LETTER BOX	LB	WATER VALVE	WV

BUILDING

ACCESS HATCH	AH	WINDOW CILL LEVEL	WCL
ARCH HEAD HEIGHT	AHH	WINDOW HEAD LEVEL	WHL
ARCH HEAD LEVEL	AHL	SKYLIGHT	SL
ARCH SPRINGER HEIGHT	ASH	SOIL AND VENT PIPE	SVP
ARCH SPRINGER LEVEL	ASL	THRESHOLD LEVEL	THL
BEAM	BE	WASH BASIN	WB
BEAM HEIGHT	BH	WATER TANK	WT
BEAM HEAD LEVEL	BHL		
BEAM SOFFIT LEVEL	BSL		
COLUMN	Col		
CILL TO HEAD	C-H		
CEILING LEVEL	CL		
DOOR HEAD	DH		
DOOR HEAD LEVEL	DHL		
PIPE ALIGNS	PA		
FLOOR TO CILL	F-C		
FALSE CEILING	FC		
FLOOR TO CEILING HEIGHT	[2.34]		
FINISHED FLOOR LEVEL	FFL		
HOSE REEL	HR		
ROOF LEVEL	RL		
RADIATOR	Rad		
RAIN WATER PIPE	RWP		

FENCES

BARBED WIRE FENCE	BWF
CORRUGATED IRON FENCE	CIF
CLOSE BOARD FENCE	CBF
CHAIN LINK FENCE	CLF
CHESTNUT PALING FENCE	CPF
FENCE POST	FPO
INTERWOVEN FENCE	IWF
IRON RAILING FENCE	IRF
LARCH LAP FENCE	LLF
MISCELLANEOUS FENCING	Misc F
PALISADE FENCE	PF
POST AND CHAIN FENCE	PCF
POST AND RAIL FENCE	PRF
POST AND WIRE	PWF
TUBULAR STEEL RAIL	TSRF
WIRE MESH FENCE (Concrete Post Steel Post/Timber Post)	WMF (C/P/S/T/P)

scale bar - 1:500 @ A1

REV	DATE	BY	AMENDMENT

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JOB TITLE
Proposed Development at
Mayberry Garden Centre
Old Shoreham Road
Portslade
BN41 1SP

DRAWING TITLE
Combined Topographical Survey

PRELIMINARY ISSUE

DATE	SCALE	DRAWN BY
July 2020	1:500 @ A1	LM
		CHECKED BY EC

JOB NO.	DRAWING NO.	REVISION
20034	1.01	

Appendix D

BGS Borehole Records

TQ 20NW/127

DRILLING METHOD: SHELL AND AUGER

CLIENT: ADUR DISTRICT COUNCIL

BOREHOLE LOG

B.H. No. 5

SITE LOCATION: SOUTHVIEW ROAD, SOUTHWICK

O.S. REFERENCE: TQ 343/056 DATE 13143.79

First Water Strike: 3.00

Standing Water Level: 3.10m

ROTARY CORE									
Water Recovery	R.Q.D.	Core Recovery	Penetration Value Blows per 300mm or U.C.S. kN/m²	Sample Type or Test Type	Thickness m/mm	Depth m/mm	Key	Level m	DESCRIPTION & REMARKS
					200	200		8.68	FILL Dense tarmac
					200	400		8.48	FILL
					400	800		8.08	FILL Chalk, clay and angular flint subbase
					1.10				
			(20)			1.90		6.98	CLAY Firm brown silty clay
			13		3.80				SAND Medium dense yellow brown fine sand, turning rust brown silty fine sand below 3.0m.
			13						
						5.70		3.18	
			3						
			6						
			8		4.30				CHALK Soft white putty chalk (Grade VI)
			6			10.00		1.12	

GROUND LEVEL 8.88

KEY

- ▽ STANDARD PENETRATION TEST
- ▼ CONE PENETRATION
- □ UNDISTURBED SAMPLE
- ■ CORE SAMPLE
- O DISTURBED SAMPLE
- OB BULK SAMPLE
- ⊗ WATER SAMPLE
- ⊥ U.C.S. = UNCONFINED COMPRESSION (=2 X COHESION kN/m²)

Bracketed Nos. - Non-Standard Blows for U100

SAMPLE DEPTHS ARE DRAWN TO SCALE

GROUND WATER DEPTHS

DATE	CASING	HOLE	SWL
13.3	3.00	3.00	3.00

REMARKS

ENGINEER

CHISELLING

FROM	G.L.
TO	200mm
HOURS	½ hr

SOUTHERN TESTING LABORATORIES

JOB NO 1222

TQ 20NW/126

DRILLING METHOD: SHELL AND AUGER

CLIENT: ADUR DISTRICT COUNCIL

BOREHOLE LOG

B.H. No. 4

SITE LOCATION: SOUTHVIEW ROAD, SOUTHWICK

O.S. REFERENCE: TQ 343/085 DATE: 1314379.

First Water Strike: 3.40m

Standing Water Level: 3.20m

GROUND LEVEL: 689m

ROTARY CORE: Water Recovery	R.Q.D.	Core Recovery	Penetration Value Blows per 300mm or U.C.S. kN/m²	Sample Type or Test Type	Thickness m/mm	Depth m/mm	Key	Level m	DESCRIPTION & REMARKS
					200	200		6.69	TOPSOIL. Dark grey topsoil
					900				CLAY GRAVEL. Stiff beige very silty clay, with angular flints, ironstained mottling
					300	1.10		5.79	
						1.40		5.49	SAND. Medium dense fine sand with coarse subrounded gravel
			29						
					2.80				SAND. Medium dense pale yellow brown fine sand with trace fine gravel
			14						
						4.20		2.69	
			5						
			10						
					5.80				CHALK. Soft white structureless putty chalk, turning white rubbly partly weathered chalk at 9.00 metres.
			8						
			17			10.00		-3.11	

KEY

- ▽ STANDARD PENETRATION TEST
- ▼ CONE PENETRATION
- □ UNDISTURBED SAMPLE
- ■ CORE SAMPLE
- Bracketed Nos. - Non-Standard Blows for U100
- SAMPLE DEPTHS ARE DRAWN TO SCALE
- ○ DISTURBED SAMPLE
- ○B BULK SAMPLE
- ⊗ WATER SAMPLE
- ⊥ U.C.S. = UNCONFINED COMPRESSION (=2 X COHESION kN/m²)

GROUND WATER DEPTHS

DATE	CASING	HOLE	SWL
13.6	3.40	3.40	3.40

REMARKS

ENGINEER

CHISELLING

FROM			
TO			
HOURS			

SOUTHERN TESTING LABORATORIES

JOB NO. 1222

Appendix E

Infiltration Testing

Land adjacent to Mayberry Garden Centre
Old Shoreham Road
Portslade

In Situ Infiltration Test Report

Report Beneficiary:
Tates Bros.
Paradise Park
Avis Road
Newhaven
BN9 0DH

Project Reference: P14741

Report Reference: R14368

Document Control			
Issue No.	**Status**	**Issue Date**	**Notes**
1	Final	4th September 2020	

Report Section	Prepared By	Approved By
In Situ Infiltration Testing	Rebecca Webb BSc FGS	Steven McSwiney BA mod Geol MSc FGS

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Limitations

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TABLE OF CONTENTS

FIGURES AND APPENDICES

1. INTRODUCTION

Ashdown Site Investigation Ltd was requested to undertake in situ infiltration testing at land adjacent to of Mayberry Garden Centre, Old Shoreham Road, Portslade to assist with the drainage strategy for the proposed development. A copy of the proposed development plan is included in the Appendices to this report.

The specific objectives of the works were to:
a) Establish the expected geology and hydrogeology at the site;
b) Investigate the shallow ground and groundwater conditions at the test locations; and
c) Provide calculated soil infiltration rates to assist others in undertaking design of SUDS.

The scope of the works covered by this report, and the terms and conditions under which they were undertaken, were set out within the offer letter Q9848, dated 23rd June 2020. The instruction to proceed was received on behalf of the client, Tates Bros.

2. SITE CONTEXT

2.1 Site Details

The site comprises an irregular shaped plot of land located to the south of Old Shoreham Road, Portslade and is centred on the approximate Ordnance Survey national grid reference TQ 2521 0583. A site location plan and site plan are presented as Figure 1 and Figure 2, respectively.

2.2 Geological and Hydrogeological Information

2.2.1 Expected Geology and Aquifer Designation

The stratigraphic succession that may be expected to underlie the site is presented in the following table.

Table 1. Expected Strata and Aquifer Designation

Type	Stratum	Aquifer Designation
Superficial	Head	Secondary Undifferentiated Aquifer
	River Terrace Deposits	Secondary B Aquifer
Bedrock	Tarrant Chalk Member	Principal Aquifer

The superficial Head is a polymict deposit generally comprising clay and sandy clay with variable amounts of gravel and cobbles. The lithology of the Head reflects the nature of the parent solid strata; the gravel and cobble fraction comprising chalk and flint. The material is likely to have been disturbed by intense frost action in a periglacial environment. It is usually poorly sorted but may be stratified where it has been subject to solifluction and/or hillwash and soil creep. It may form infill to solution features within the chalk.

The River Terrace Deposits generally comprise well graded sandy fine to coarse gravel. Locally sand or gravel strata may predominate. Lenses of clay, silt and localised peat may be present.

The White Chalk Subgroup comprises a weak, white chalk locally with flint bands together with scattered nodular flints. It may be expected to have a deeply convoluted upper surface as a result of solution weathering. The presence of natural cavities in the chalk is very rare and solution features, if present, can be expected to be infilled with Quaternary deposits such as the Head or River Terrace Deposits.

The infill material may be significantly weaker than the surrounding chalk. Solution features can comprise pipes extending to several metres deep into the chalk or conical depressions and basin shaped structures.

2.2.2 Groundwater Source Protection Zones

The site does not lie within an Environment Agency Source Protection Zone with regard to the protection of the quality of groundwater that is abstracted for potable supply.

3. SITE WORKS

The ground investigation comprised the excavation of four trial pits, designated TP01 to TP04, to depths of between 0.60m and 1.00m using a small mechanical excavator. It is noted that the depth of the trial pits was limited due to the very stiff/dense and gravelly nature of the soils encountered. The fieldwork was carried out on 17th August 2020. The exploratory hole locations are shown on Figure 2.

Falling head soakage testing was carried out within the trial pits in general accordance with BRE guidance[1], other than the pits were filled only once or twice rather than the three times suggested by the digest due to the site work being limited to one day, and the slow draining soils encountered.

Descriptions of the strata encountered and comments on groundwater conditions are shown in the exploratory hole records given in the appendices, together with notes to assist in their interpretation.

[1] Section 3.2.3 of Building Research Establishment (BRE) Digest 365, 2016.

4. GROUND CONDITIONS

4.1 Stratigraphy

4.1.1 Surface Covering

Each of the exploratory holes was excavated through a surface cover of topsoil some 150mm to 300mm in thickness.

4.1.2 Made Ground

Made ground, generally comprising gravelly sandy clay, was recorded to depths of between 0.30m and 0.60m below ground level at three of the four pit locations. The gravel fraction comprised variable quantities of flint, brick, plastic, concrete and charcoal-like material.

4.1.3 Head

Underlying the surfacing/made ground, the investigation progressed into undisturbed gravelly sandy clay deposits which continued to the full depth of investigation.

These soils are considered to represent the Head deposits indicated on the published geological map.

4.2 Groundwater Conditions and Stability

Each of the exploratory holes was recorded to remain dry and stable during the course of excavation, although it is noted that the works were undertaken during a dry summer period.

5. STORMWATER INFILTRATION SYSTEMS

In-situ infiltration testing[2] was carried out in each of the four trial pits.

To calculate the soil infiltration rate in accordance with the BRE digest the water needs to fall to 25% of the initial test depth. The volume of water between 75% and 25% of the initial test depth is then divided by the sum of the average surface area of the sides of the trial pit in contact with the water during the test monitoring period, and its base area. This figure is then divided by the test duration (time taken for the water level to fall between 75% and 25% of the initial test depth) to give the soil infiltration rate in metres per second.

However during a majority of the tests performed, the water level within the test pits did not fall below 25% of the initial test depth due to the slow draining soils encountered and/or time constraints. For the tests that did not achieve a fall in water level between 75% and 25% of the initial test depth, the soil infiltration rate has been calculated by dividing the volume of water lost during the test by the product of the average surface area of the trial pit in contact with water during the test period and the test duration in seconds.

The infiltration rates derived from the tests are summarised in the following table. The head of water that each infiltration calculation is based on is also summarised in the following table.

Table 2. Calculated Infiltration Rates

Exploratory Hole	Test Response Zone Depth (m)		Stratum	Infiltration Rate (f) (m/sec)	Head of Water (% of Ho)
	Top	Bottom			
TP01	0.43	0.75	Made Ground and Head	4.5×10^{-6}	100-56
TP02	0.50	0.80	Made Ground and Head	6.8×10^{-6}	100-47
TP03 Test 1	0.33	0.60	Head	2.1×10^{-5}	75-25
TP03 Test 2	0.30	0.60	Head	1.1×10^{-5}	100-73
TP04	0.45	1.00	Head	6.1×10^{-6}	100-67

The value 'f' is equivalent to the soil infiltration coefficient 'q' quoted in the Construction Industry Research and Information Association (CIRIA) Report 156.

The results from the infiltration tests indicate that the Head soils possess poor to moderate infiltration characteristics. The results from the infiltration tests should be provided to engineers responsible for the design of the drainage system.

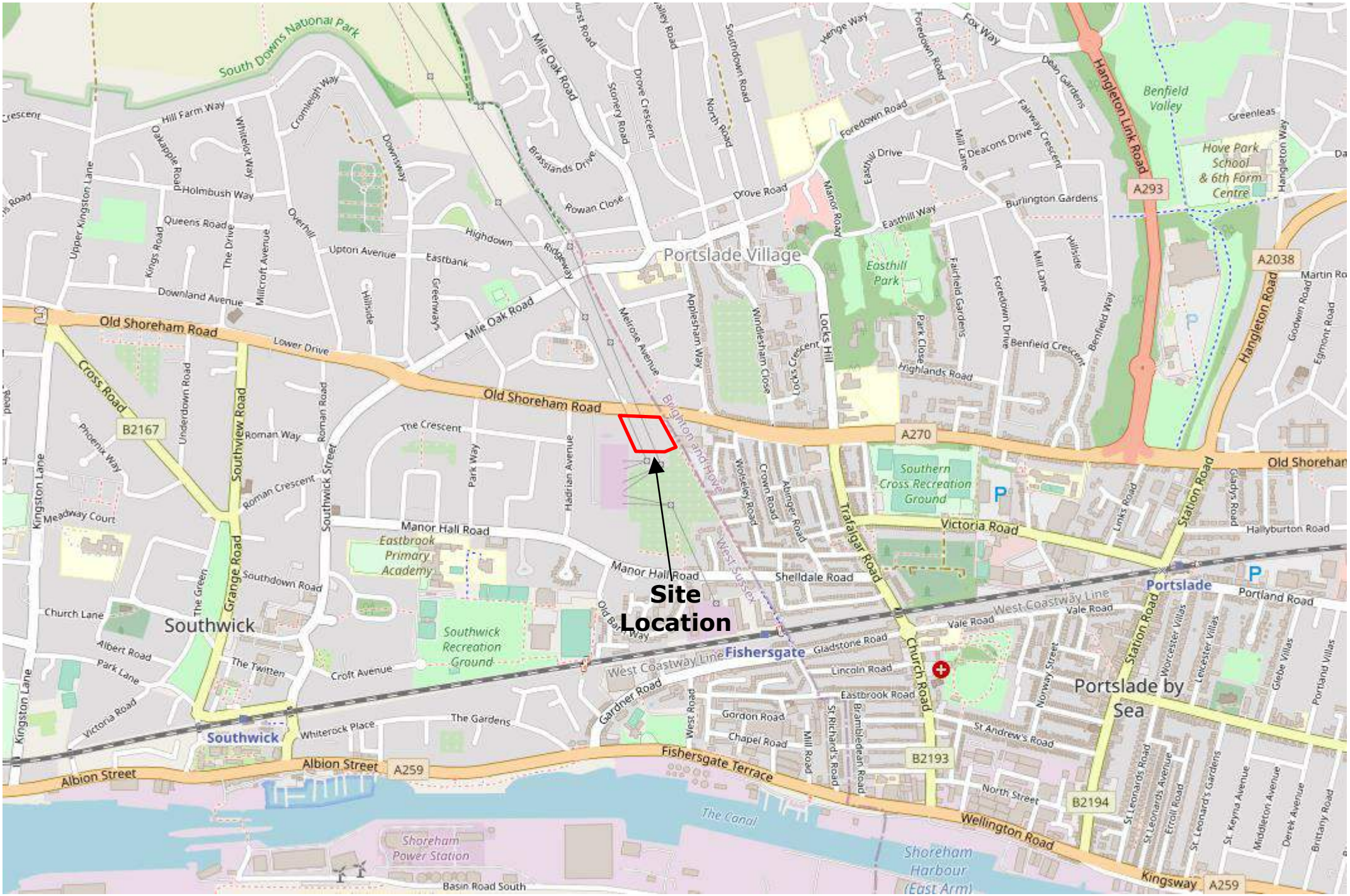
To comply with building regulations[3], point discharging infiltration systems (conventional ring or trench soakaways) are required to be constructed a minimum of 5.0m away from proposed or existing buildings.

Ashdown Site Investigation Ltd.

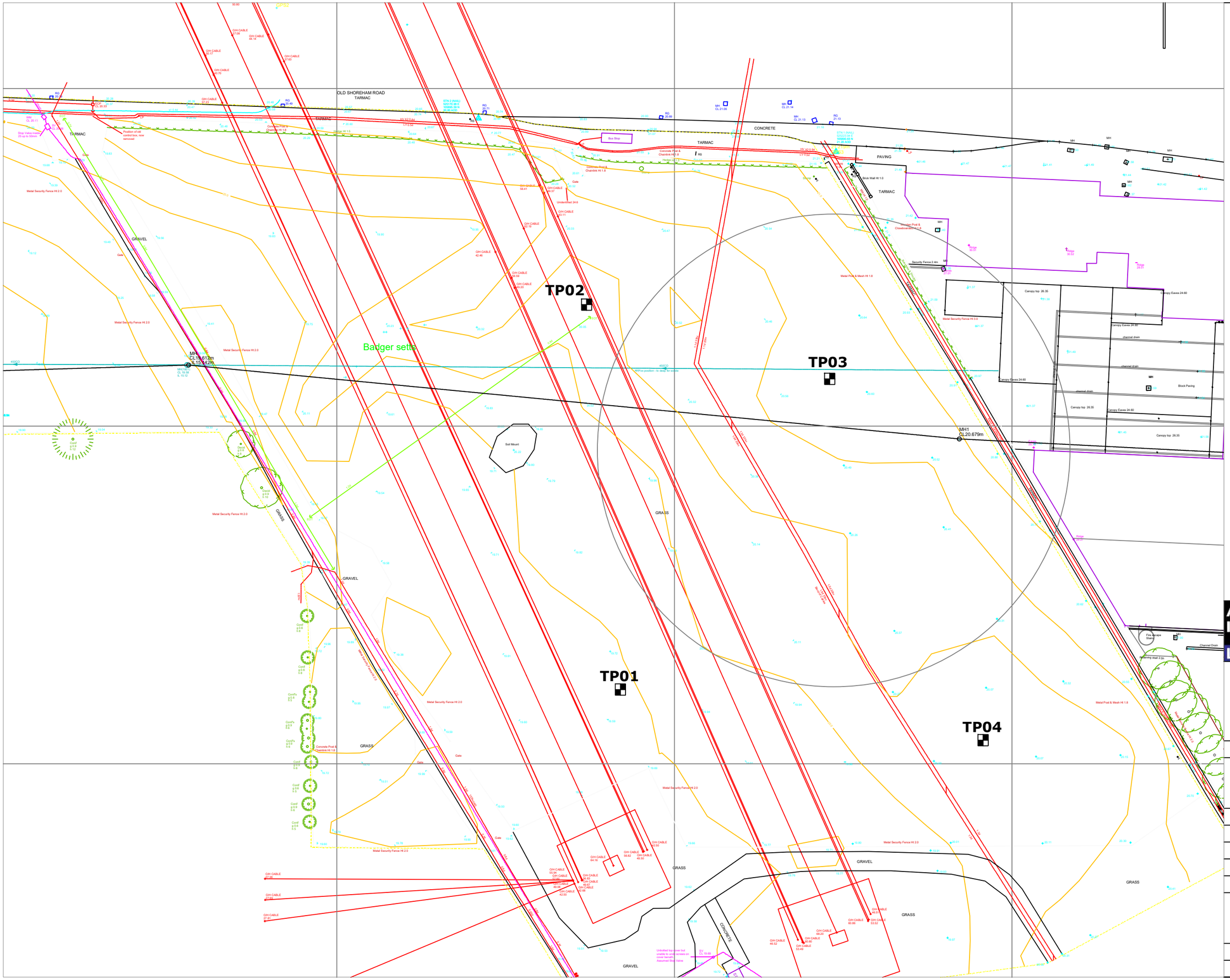
[2] Conducted in general accordance with the requirements of BRE 365, Soakaway Design.
[3] The Building Regulations 2010; Part H; Drainage and Waste Disposal

FIGURES AND APPENDICES

Figure 1 Site Location Plan
Figure 2 Site Plan
Proposed Development Layout
Exploratory Hole Notes
Exploratory Hole Records
Summary of Trial Pit Falling Head Soakage Test Results



ASHDOWN SITE INVESTIGATION LIMITED	Site Location Plan	Site Name	Figure No.	Project Reference
		Land adjacent to Mayberry Garden Centre, Old Shoreham Road, Portslade	1	P14741



N

ASHDOWN SITE INVESTIGATION
L•I•M•I•T•E•D

Unit 3
The Old Grain Store
Ditchling Common Business Park
Ditchling
East Sussex
BN6 8SG
01273 483119
contact@ashdownsi.co.uk

Site:

Land adjacent to Mayberry Garden Centre
Old Shoreham Road
Portslade

Report Ref:

P14741

Figure No.

2

Drawing Title

Site Plan

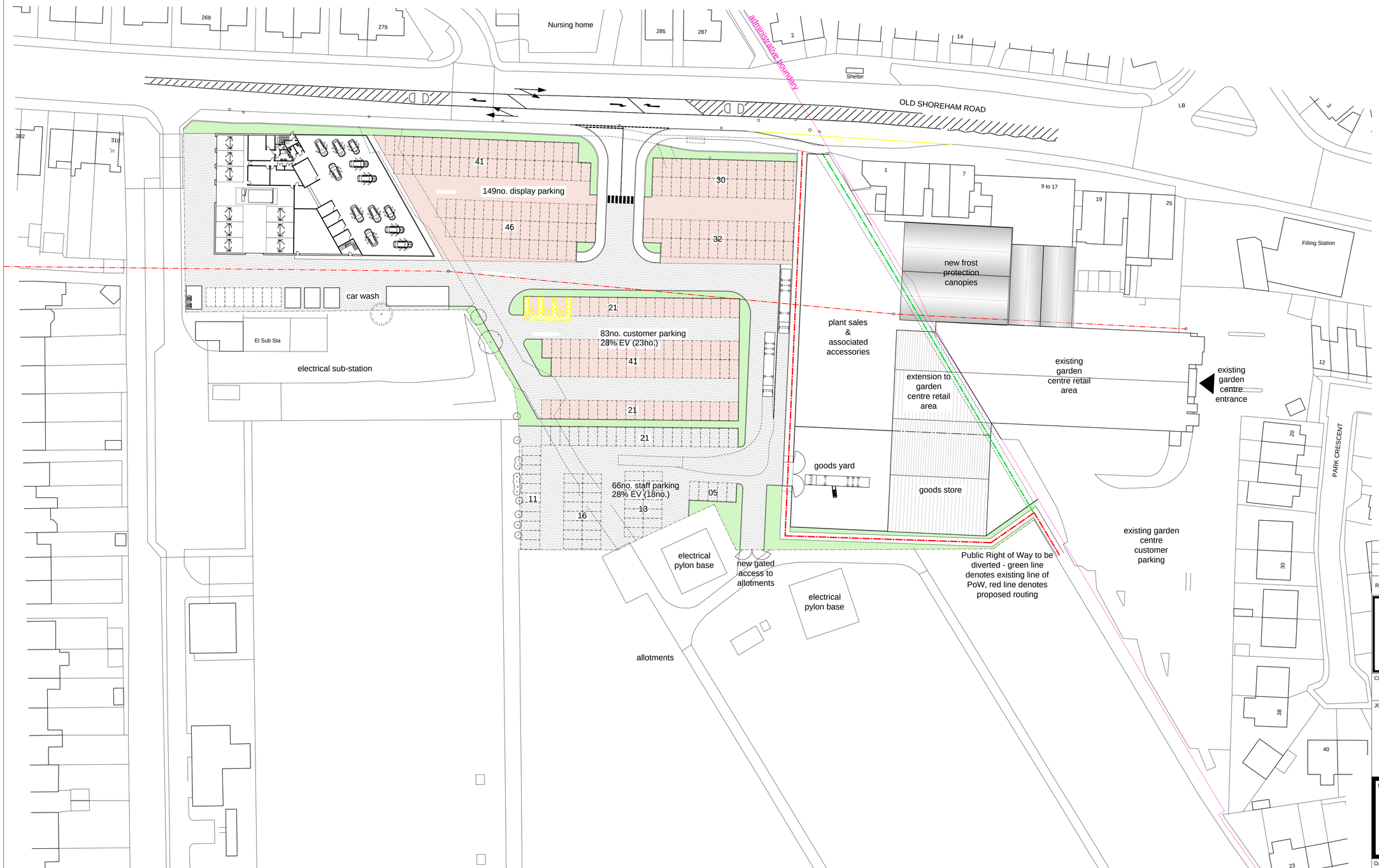
Scale

1:500

N

NOTES

- DO NOT SCALE OFF THIS DRAWING EXCEPT FOR PLANNING PURPOSES
- CHECK ALL DIMENSIONS ON SITE BEFORE ANY WORK IS COMMENCED
- ALL GOODS MATERIALS AND WORKMANSHIP MUST CONFORM WITH CURRENT BUILDING REGULATIONS, BRITISH STANDARDS AND CODES OF PRACTICE
-



this drawing to be read in conjunction with civil engineering drawing package by *Motion*

scale bar - 1:500 @ A1

REV	DATE	BY	AMENDMENT

folkes architects
The Old Forge
6 Church Street
Storrington
West Sussex
RH20 4LA
t. 01903 868629
info@folkesarchitects.co.uk

CLIENT
Tates Bro.

JOB TITLE
Proposed Development at
Mayberry Garden Centre
Old Shoreham Road
Portslade
BN41 1SP

DRAWING TITLE
Proposed Site Plan

PRELIMINARY ISSUE

DATE	SCALE	DRAWN BY	CHECKED BY
Jan 2020	1:500 @ A1	ec	mf

JOB NO.	DRAWING NO.	REVISION
20003	2.01	

NOTES FOR THE INTERPRETATION OF EXPLORATORY HOLE RECORDS

1 Symbols and abbreviations

Samples

U 'Undisturbed' Sample: - 100mm diameter by 450mm long. The number of blows to drive in the sampling tube is shown after the test index letter in the SPT column.
U_o Sample not obtained
U* Full penetration of sample not obtained
Pi Piston Sample: 'Undisturbed' sample 100mm diameter by 600mm long.
D Disturbed Sample
R Root Sample
B Bulk Disturbed Sample
W Water Sample
J Jar Sample (sample taken in amber glass jar fitted with gas tight lid)
T Tub Sample
Vi Vial Sample

In situ Testing

S Standard penetration test (SPT): Using the split spoon sampler.

C Standard Penetration Test (SPT): using a solid cone instead of the sampler - conducted usually in coarse grained soils or weak rocks.

V Shear Vane Test: Undrained shear strength (cohesion) (kN/m^2) shown within the Vane/Pen Test and N Value column.

H Hand penetrometer Test: Undrained shear strength (cohesion) (kN/m^2) shown within the Vane/Pen Test and N Value column.

P Perth Penetrometer Test: Number of blows for 300mm penetration shown under Vane/Pen Test and N Value column.

Excavation Method

CP Cable Percussion Borehole
WLS Dynamic Sampler Borehole using windowless sampler tubes
WS Dynamic Sampler Borehole using window sampler tubes
TP Trial Pit excavated using mechanic excavator
HDP Trial Pit excavated using hand tools

2 Soil Description

Description and classification of soils has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of soil, Part 1 Identification and description (BS EN ISO 14688-1) and Part 2 Principles of classification (BS EN 14688-2) as well as the BS5930 code of Practice for Ground Investigations.

3 Rock Description

Description and classification of rocks has been carried out using as a general basis the British Standard Geotechnical investigation and testing – Identification and classification of rock, Part 1 Identification and classification (BS EN ISO 14689-1) as well as the BS5930 code of Practice for Ground Investigations. TCR – Total Core Recovery, SCR – Solid Core Recovery, RQD – Rock Quality Designation, NI – Non Intact, If – indicative fracture spacing (min/ave/max), FI – Fracture Index.

4 Chalk Description

Chalk description is based on BS EN ISO 14688, BS EN ISO 14689 and BS5930. The classification of chalk generally follows the guidance offered by the Construction Industry Research and Information Association (CIRIA) C574, 'Engineering in Chalk'. This is based on assessment of chalk density, discontinuity and aperture spacing, and the proportion of intact chalk to silt of chalk.

ASHDOWN SITE INVESTIGATION
L•I•M•I•T•E•D
E-mail: contact@ashdownsi.co.uk
Web: www.ashdownsi.co.uk
Tel: 01273 483119

Site Name: Land adjacent to Mayberry Garden Centre, Old Shoreham Road, Portslade

Job Number: P14741

Start Date: 17/08/2020

End Date: 17/08/2020

Trial Pit Number: **TP01**

Samples and In Situ Testing				Legend	Depth/ Reduced Level	Stratum Description
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result			
					0.00	Topsoil.
					0.15	MADE GROUND: Dark brown slightly gravelly slightly sandy clay. Gravel is subangular to subrounded fine to coarse brick, charcoal-like material and flint.
D	0.60				0.60	Brown gravelly slightly sandy CLAY. Gravel is subangular to rounded fine to coarse flint. (Head)
					0.75	End of trial pit at 0.75m

Remarks

Groundwater: Trial pit dry on completion.

Stability: Trial pit stable on completion.

Notes: No further progress below 0.75m depth - too hard/ dense.

Excavation Method: TP

Pit Length: 1.00m

Pit Width: 0.40m

Made By: BA

ASHDOWN SITE INVESTIGATION
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E-mail: contact@ashdownsi.co.uk
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Tel: 01273 483119

Site Name: Land adjacent to Mayberry Garden Centre, Old Shoreham Road, Portslade

Job Number: P14741

Start Date: 17/08/2020

End Date: 17/08/2020

Trial Pit Number: **TP02**

Samples and In Situ Testing				Legend	Depth/ Reduced Level	Stratum Description
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result			
					0.00	Topsoil.
					0.15	MADE GROUND: Silty sandy gravel of concrete and flint.
					0.35	MADE GROUND: Dark brown slightly gravelly slightly sandy clay. Gravel is subangular to subrounded fine to coarse brick, charcoal-like material and flint.
D	0.70				0.60	Brown gravelly slightly sandy CLAY. Gravel is subangular to rounded fine to coarse flint. (Head)
					0.80	End of trial pit at 0.80m

Remarks

Groundwater: Trial pit dry on completion.

Stability: Trial pit stable on completion.

Notes: No further progress below 0.80m depth - too hard/ dense.

Excavation Method: TP

Pit Length: 1.10m

Pit Width: 0.40m

Made By: BA

ASHDOWN SITE INVESTIGATION
L•I•M•I•T•E•D
E-mail: contact@ashdownsi.co.uk
Web: www.ashdownsi.co.uk
Tel: 01273 483119

Site Name: Land adjacent to Mayberry Garden Centre, Old Shoreham Road, Portslade

Job Number: P14741

Start Date: 17/08/2020

End Date: 17/08/2020

Trial Pit Number: **TP03**

Samples and In Situ Testing				Legend	Depth/ Reduced Level	Stratum Description
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result			
					0.00	Topsoil.
					0.15	MADE GROUND: Dark brown slightly gravelly slightly sandy clay. Gravel is subangular to subrounded fine to coarse flint, brick and plastic.
					0.30	Brown gravelly sandy CLAY. Gravel is angular to subrounded fine to coarse flint. (Head)
D	0.50					
					0.60	End of trial pit at 0.60m

Remarks

Groundwater: Trial pit dry on completion.

Stability: Trial pit stable on completion.

Notes: No further progress below 0.60m depth - too hard/ dense.

Excavation Method: TP

Pit Length: 1.00m

Pit Width: 0.40m

Made By: BA

ASHDOWN SITE INVESTIGATION LIMITED
E-mail: contact@ashdownsi.co.uk
Web: www.ashdownsi.co.uk
Tel: 01273 483119

Site Name: Land adjacent to Mayberry Garden Centre, Old Shoreham Road, Portslade

Job Number: P14741

Start Date: 17/08/2020

End Date: 17/08/2020

Trial Pit Number: **TP04**

Samples and In Situ Testing				Legend	Depth/ Reduced Level	Stratum Description
Sample/ Test Type	Depth From (m)	Depth To (m)	Test Result			
					0.00	Topsoil.
					0.30	Brown slightly gravelly slightly sandy CLAY. Gravel is subangular to subrounded fine to coarse flint. (Head)
D	0.80					
					1.00	End of trial pit at 1.00m

Remarks

Groundwater: Trial pit dry on completion.

Stability: Trial pit stable on completion.

Notes: No further progress below 1.00m depth - too hard/ dense.

Excavation Method: TP

Pit Length: 1.20m

Pit Width: 0.40m

Made By: BA

ASHDOWN SITE INVESTIGATION LIMITED

Site: Land adjacent to Mayberry Garden Centre, Old Shoreham Road, Portslade	Project No: P14741 Sheet No.: 1 of 2

SUMMARY OF TRIAL PIT FALLING HEAD SOAKAGE TEST RESULTS

TP01	
Time (mins)	Depth to water (m bgl)
0	0.43
1	0.43
2	0.44
3	0.44
4	0.44
5	0.45
8	0.45
10	0.45
12	0.45
14	0.46
18	0.46
20	0.46
26	0.46
47	0.48
68	0.50
102	0.52
134	0.54
188	0.57
Pit Length - 1.00m Pit Width - 0.40m Pit Depth - 0.75m bgl	

TP02	
Time (mins)	Depth to water (m bgl)
0	0.50
1	0.50
2	0.50
3	0.50
4	0.50
5	0.51
8	0.51
10	0.52
20	0.56
38	0.59
72	0.62
98	0.64
124	0.65
158	0.66
Pit Length - 1.10m Pit Width - 0.40m Pit Depth - 0.80m bgl	

Remarks: bgl - below ground level.

ASHDOWN SITE INVESTIGATION LIMITED

Site: Land adjacent to Mayberry Garden Centre, Old Shoreham Road, Portslade	Project No: P14741 Sheet No.: 2 of 2

SUMMARY OF TRIAL PIT FALLING HEAD SOAKAGE TEST RESULTS

TP03 (Test 1)	
Time (mins)	Depth to water (m bgl)
0	0.33
2	0.36
3	0.37
4	0.38
5	0.39
7	0.40
10	0.41
15	0.43
19	0.43
25	0.45
45	0.49
66	0.54
Pit Length - 1.00m Pit Width - 0.40m Pit Depth - 0.60m bgl	

TP03 (Test 2)	
Time (mins)	Depth to water (m bgl)
0	0.30
2	0.31
3	0.31
4	0.31
5	0.31
6	0.31
7	0.31
8	0.33
15	0.34
22	0.36
30	0.37
45	0.38
Pit Length - 1.00m Pit Width - 0.40m Pit Depth - 0.60m bgl	

TP04	
Time (mins)	Depth to water (m bgl)
0	0.45
1	0.45
2	0.45
3	0.46
4	0.46
5	0.46
7	0.47
8	0.47
9	0.48
10	0.48
15	0.50
21	0.51
27	0.52
32	0.54
47	0.57
78	0.60
94	0.62
121	0.63
Pit Length - 1.20m Pit Width - 0.40m Pit Depth - 1.00m bgl	

Remarks: bgl - below ground level.

Appendix F

EA Product 4

Flood map for planning

Your reference	Location (easting/northing)	Created
Mayberry	**525259/105879**	**19 Aug 2020 15:23**

Your selected location is in flood zone 1, an area with a low probability of flooding.

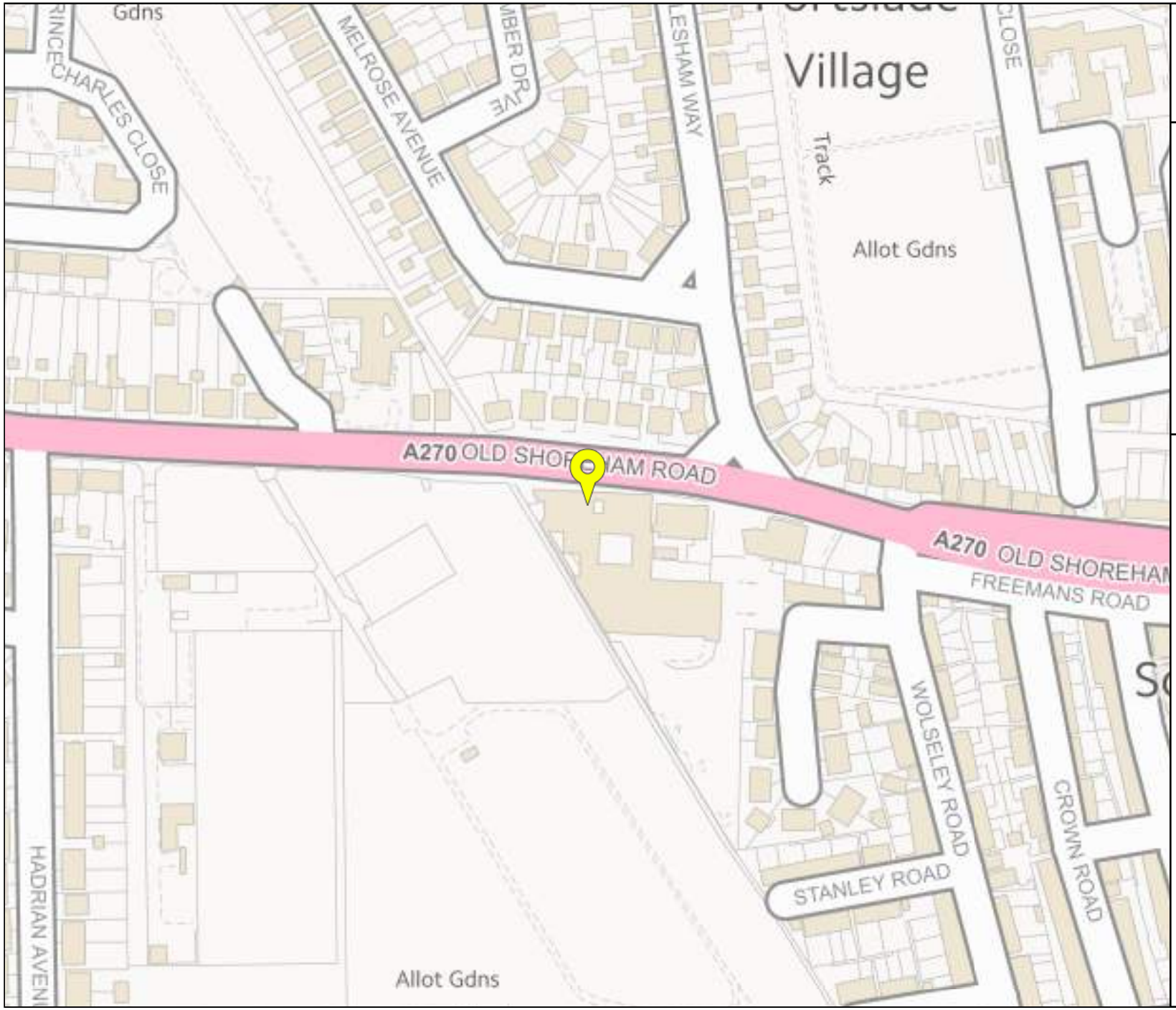
This means:

- you don't need to do a flood risk assessment if your development is smaller than 1 hectare and not affected by other sources of flooding
- you may need to do a flood risk assessment if your development is larger than 1 hectare or affected by other sources of flooding or in an area with critical drainage problems

Notes

The flood map for planning shows river and sea flooding data only. It doesn’t include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
Mayberry

Location (easting/northing)
525259/105879

Scale
1:2500

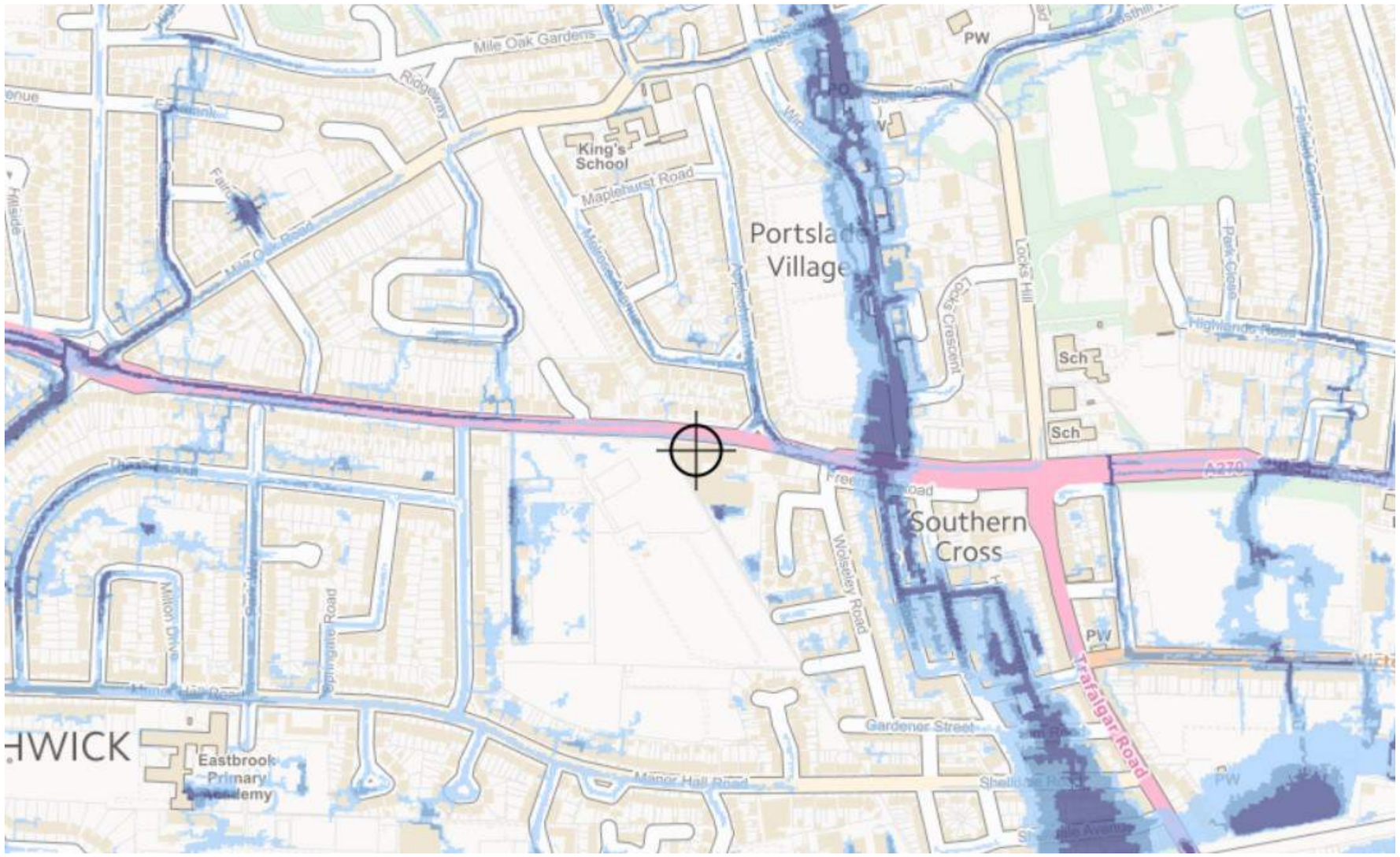
Created
19 Aug 2020 15:23

- Selected point
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Flood storage area

0 20 40 60m

Appendix G

Surface Water Flood Maps


Mile Oak Gardens
Ridgeway
King's School
Maplehurst Road
Mile Oak Road
Portslade Village
Lockyer's Hill
Cooks Crescent
Park Close
Highlands Road
Sch
Sch
A270
Freeman Road
Southern Cross
Wolseley Road
PW
Trafalgar Road
Gardener Street
Shelldale Avenue
Eastbrook Primary Academy
Manor Hall Road
Springate Road
Milton Drive
HWICK

Appendix H

QBar Calculations

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	victoria berg-holdo
Site name:	Mayberry
Site location:	Mayberry

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	50.83894° N
Longitude:	0.22263° W
Reference:	3324445467
Date:	Aug 24 2020 16:53

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 1

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	1	1
HOST class:	N/A	N/A
SPR/SPRHOST:	0.1	0.1

Hydrological characteristics

	Default	Edited
SAAR (mm):	742	742
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

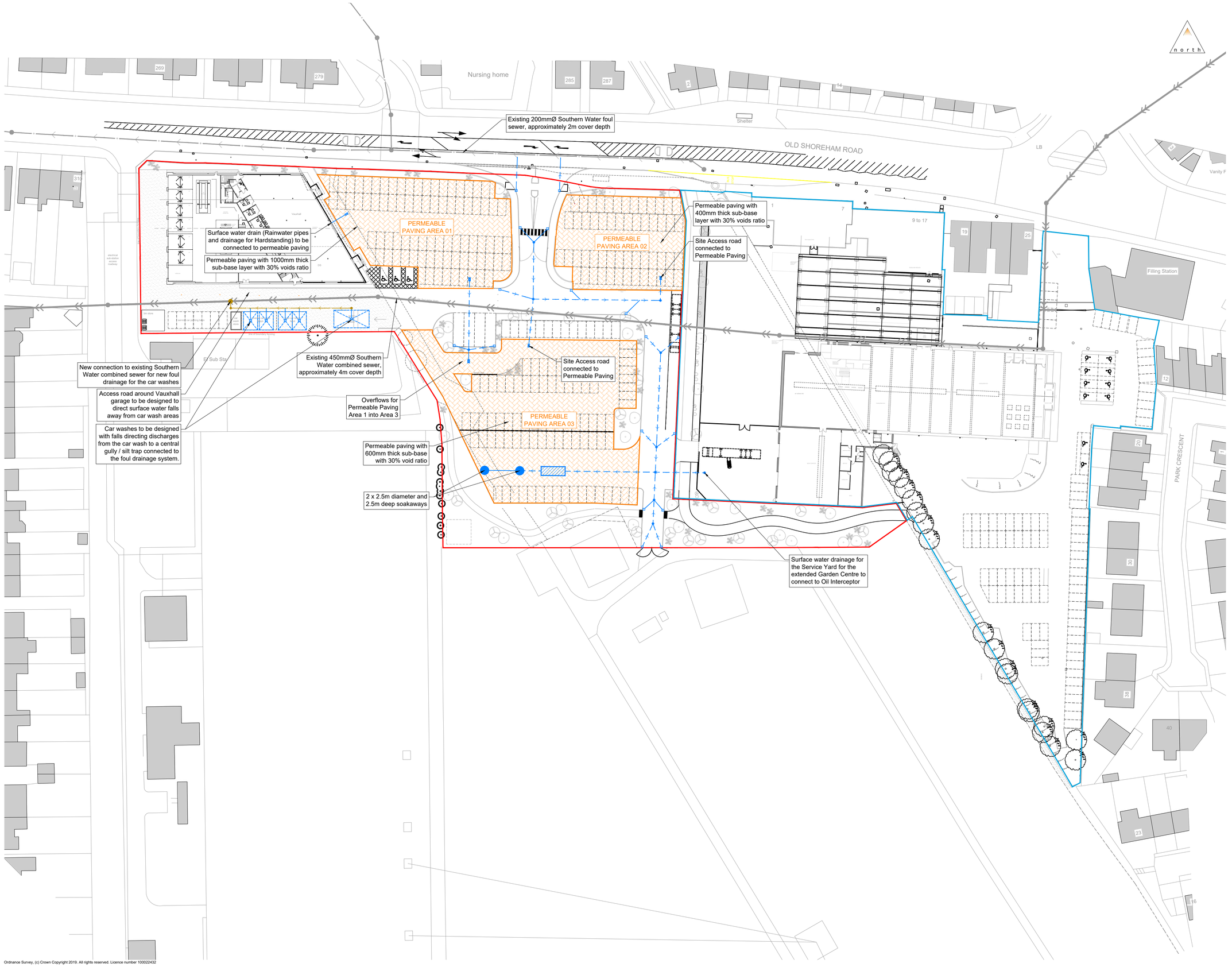
Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	0.18	0.18
1 in 1 year (l/s):	0.15	0.15
1 in 30 years (l/s):	0.41	0.41
1 in 100 year (l/s):	0.57	0.57
1 in 200 years (l/s):	0.67	0.67

Appendix I

Drainage Strategy



Legend

- Planning Boundary - Proposed Vauxhall Car Dealership
- Planning Boundary - Expanded Mayberry Garden Centre
- Permeable Paving Area
- Oil Interceptor
- Gully and pipe connection
- Surface water drain with 600mmØ Inspection chamber
- Permeable paving diffuser unit
- 2500mmØ soakaway, 2.5m deep
- Foul drain
- Existing Southern Water 450mmØ Combined Sewer
- Existing Southern Water 200mmØ Foul Sewer

A	First Issue	MH	VBH	JM	21/10/2020
Revision Notes:		Drn	Chk	App	Date

Drawing Status:

FOR PLANNING
NOT FOR CONSTRUCTION

motion

84 North Street
Guildford
Surrey
GU1 4AU

T: 01483 531 300

Cargo Works
1-2 Hatfields
London
SE1 9PG

T: 020 8065 5208

www.motion.co.uk

Client:
Tate Bros Limited

Project:
Mayberry Garden Centre

Title:
Surface Water Drainage Strategy

Scale: 1:500	Size: A1	Date: 26-10-2020
Drawn:SM	Chk'd: VBH	Appr'd:JM

Drawing: 1907047-0500-01

Revision: A

N:\Projects\Bsport 1907047\Drawings\1907047-0500-01 A Surface Water Drainage Strategy.dwg

Appendix J

MicroDrainage Model results

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 182 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	19.790	0.190	4.4	45.7	O K
30 min Summer	19.851	0.251	4.5	60.2	O K
60 min Summer	19.905	0.305	4.6	73.2	O K
120 min Summer	19.938	0.338	4.6	81.1	O K
180 min Summer	19.940	0.340	4.6	81.5	O K
240 min Summer	19.934	0.334	4.6	80.2	O K
360 min Summer	19.920	0.320	4.6	76.7	O K
480 min Summer	19.903	0.303	4.6	72.7	O K
600 min Summer	19.886	0.286	4.5	68.5	O K
720 min Summer	19.868	0.268	4.5	64.4	O K
960 min Summer	19.835	0.235	4.5	56.4	O K
1440 min Summer	19.775	0.175	4.4	42.1	O K
2160 min Summer	19.708	0.108	4.3	26.0	O K
2880 min Summer	19.667	0.067	4.3	16.0	O K
4320 min Summer	19.643	0.043	3.6	10.3	O K
5760 min Summer	19.635	0.035	3.0	8.3	O K
7200 min Summer	19.629	0.029	2.5	7.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	126.795	0.0	24
30 min Summer	85.223	0.0	38
60 min Summer	54.663	0.0	66
120 min Summer	33.842	0.0	122
180 min Summer	25.180	0.0	158
240 min Summer	20.266	0.0	188
360 min Summer	14.905	0.0	256
480 min Summer	11.976	0.0	324
600 min Summer	10.097	0.0	392
720 min Summer	8.779	0.0	460
960 min Summer	7.033	0.0	592
1440 min Summer	5.136	0.0	844
2160 min Summer	3.742	0.0	1196
2880 min Summer	2.985	0.0	1528
4320 min Summer	2.167	0.0	2208
5760 min Summer	1.725	0.0	2936
7200 min Summer	1.444	0.0	3672

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
8640 min Summer	19.625	0.025	2.2	6.1	O K
10080 min Summer	19.623	0.023	1.9	5.4	O K
15 min Winter	19.815	0.215	4.5	51.6	O K
30 min Winter	19.884	0.284	4.5	68.2	O K
60 min Winter	19.948	0.348	4.6	83.4	O K
120 min Winter	19.991	0.391	4.7	93.7	O K
180 min Winter	19.996	0.396	4.7	94.9	O K
240 min Winter	19.987	0.387	4.7	92.8	O K
360 min Winter	19.967	0.367	4.6	88.0	O K
480 min Winter	19.942	0.342	4.6	82.0	O K
600 min Winter	19.915	0.315	4.6	75.6	O K
720 min Winter	19.888	0.288	4.5	69.1	O K
960 min Winter	19.837	0.237	4.5	56.8	O K
1440 min Winter	19.748	0.148	4.4	35.4	O K
2160 min Winter	19.661	0.061	4.3	14.7	O K
2880 min Winter	19.643	0.043	3.7	10.4	O K
4320 min Winter	19.632	0.032	2.7	7.6	O K
5760 min Winter	19.625	0.025	2.2	6.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
8640 min Summer	1.250	0.0	4408
10080 min Summer	1.106	0.0	5112
15 min Winter	126.795	0.0	25
30 min Winter	85.223	0.0	38
60 min Winter	54.663	0.0	66
120 min Winter	33.842	0.0	120
180 min Winter	25.180	0.0	174
240 min Winter	20.266	0.0	202
360 min Winter	14.905	0.0	276
480 min Winter	11.976	0.0	352
600 min Winter	10.097	0.0	426
720 min Winter	8.779	0.0	498
960 min Winter	7.033	0.0	636
1440 min Winter	5.136	0.0	886
2160 min Winter	3.742	0.0	1188
2880 min Winter	2.985	0.0	1484
4320 min Winter	2.167	0.0	2204
5760 min Winter	1.725	0.0	2936

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
7200 min Winter	19.621	0.021	1.8	5.1	O K
8640 min Winter	19.618	0.018	1.6	4.4	O K
10080 min Winter	19.616	0.016	1.4	3.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
7200 min Winter	1.444	0.0	3648
8640 min Winter	1.250	0.0	4408
10080 min Winter	1.106	0.0	5160

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.300	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.212

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.071	4	8	0.071	8	12	0.071

Model Details

Storage is Online Cover Level (m) 20.600

Cellular Storage Structure

Invert Level (m) 19.600 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.03780 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.07560

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	800.0	800.0	0.410	0.0	845.8
0.400	800.0	845.3			

Summary of Results for 30 year Return Period

Half Drain Time : 37 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	19.687	0.087	8.5	20.9	O K
30 min Summer	19.709	0.109	8.5	26.1	O K
60 min Summer	19.719	0.119	8.5	28.5	O K
120 min Summer	19.715	0.115	8.5	27.6	O K
180 min Summer	19.704	0.104	8.5	25.0	O K
240 min Summer	19.692	0.092	8.5	22.1	O K
360 min Summer	19.671	0.071	8.4	17.1	O K
480 min Summer	19.657	0.057	8.4	13.6	O K
600 min Summer	19.648	0.048	8.1	11.6	O K
720 min Summer	19.644	0.044	7.4	10.5	O K
960 min Summer	19.637	0.037	6.2	8.8	O K
1440 min Summer	19.628	0.028	4.8	6.8	O K
2160 min Summer	19.621	0.021	3.6	5.1	O K
2880 min Summer	19.617	0.017	2.9	4.2	O K
4320 min Summer	19.613	0.013	2.1	3.1	O K
5760 min Summer	19.610	0.010	1.7	2.5	O K
7200 min Summer	19.609	0.009	1.5	2.1	O K
8640 min Summer	19.608	0.008	1.3	1.8	O K
10080 min Summer	19.607	0.007	1.1	1.6	O K
15 min Winter	19.699	0.099	8.5	23.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	69.989	0.0	21
30 min Summer	46.589	0.0	32
60 min Summer	29.711	0.0	50
120 min Summer	18.391	0.0	84
180 min Summer	13.733	0.0	116
240 min Summer	11.106	0.0	148
360 min Summer	8.222	0.0	208
480 min Summer	6.637	0.0	266
600 min Summer	5.618	0.0	322
720 min Summer	4.900	0.0	382
960 min Summer	3.947	0.0	502
1440 min Summer	2.906	0.0	742
2160 min Summer	2.136	0.0	1104
2880 min Summer	1.716	0.0	1472
4320 min Summer	1.259	0.0	2204
5760 min Summer	1.009	0.0	2936
7200 min Summer	0.850	0.0	3568
8640 min Summer	0.739	0.0	4352
10080 min Summer	0.657	0.0	4976
15 min Winter	69.989	0.0	22

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	19.725	0.125	8.5	29.9	O K
60 min Winter	19.735	0.135	8.5	32.5	O K
120 min Winter	19.726	0.126	8.5	30.2	O K
180 min Winter	19.707	0.107	8.5	25.7	O K
240 min Winter	19.688	0.088	8.5	21.1	O K
360 min Winter	19.658	0.058	8.4	13.9	O K
480 min Winter	19.646	0.046	7.7	11.0	O K
600 min Winter	19.640	0.040	6.7	9.5	O K
720 min Winter	19.635	0.035	5.9	8.4	O K
960 min Winter	19.629	0.029	4.8	6.8	O K
1440 min Winter	19.621	0.021	3.6	5.1	O K
2160 min Winter	19.616	0.016	2.7	3.8	O K
2880 min Winter	19.613	0.013	2.1	3.0	O K
4320 min Winter	19.609	0.009	1.6	2.2	O K
5760 min Winter	19.608	0.008	1.3	1.8	O K
7200 min Winter	19.606	0.006	1.1	1.5	O K
8640 min Winter	19.606	0.006	1.0	1.3	O K
10080 min Winter	19.605	0.005	0.9	1.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	46.589	0.0	33
60 min Winter	29.711	0.0	54
120 min Winter	18.391	0.0	90
180 min Winter	13.733	0.0	124
240 min Winter	11.106	0.0	158
360 min Winter	8.222	0.0	212
480 min Winter	6.637	0.0	266
600 min Winter	5.618	0.0	324
720 min Winter	4.900	0.0	386
960 min Winter	3.947	0.0	502
1440 min Winter	2.906	0.0	748
2160 min Winter	2.136	0.0	1108
2880 min Winter	1.716	0.0	1460
4320 min Winter	1.259	0.0	2212
5760 min Winter	1.009	0.0	2968
7200 min Winter	0.850	0.0	3680
8640 min Winter	0.739	0.0	4264
10080 min Winter	0.657	0.0	5248

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.300	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.212

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.071	4	8	0.071	8	12	0.071

Model Details

Storage is Online Cover Level (m) 20.600

Cellular Storage Structure

Invert Level (m) 19.600 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.07560 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.03780

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	800.0	800.0	0.410	0.0	845.8
0.400	800.0	845.3			

Summary of Results for 1 year Return Period

Half Drain Time : 18 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	19.633	0.033	5.6	7.9	O K
30 min Summer	19.639	0.039	6.5	9.3	O K
60 min Summer	19.641	0.041	6.9	9.8	O K
120 min Summer	19.639	0.039	6.6	9.4	O K
180 min Summer	19.636	0.036	6.1	8.6	O K
240 min Summer	19.633	0.033	5.6	8.0	O K
360 min Summer	19.629	0.029	4.8	6.9	O K
480 min Summer	19.625	0.025	4.3	6.0	O K
600 min Summer	19.623	0.023	3.8	5.4	O K
720 min Summer	19.621	0.021	3.5	5.0	O K
960 min Summer	19.618	0.018	3.0	4.2	O K
1440 min Summer	19.614	0.014	2.3	3.4	O K
2160 min Summer	19.611	0.011	1.8	2.6	O K
2880 min Summer	19.609	0.009	1.6	2.2	O K
4320 min Summer	19.607	0.007	1.2	1.7	O K
5760 min Summer	19.606	0.006	1.0	1.3	O K
7200 min Summer	19.605	0.005	0.9	1.2	O K
8640 min Summer	19.604	0.004	0.7	1.1	O K
10080 min Summer	19.604	0.004	0.7	1.0	O K
15 min Winter	19.637	0.037	6.2	8.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	28.571	0.0	20
30 min Summer	18.968	0.0	29
60 min Summer	12.298	0.0	44
120 min Summer	7.830	0.0	76
180 min Summer	5.988	0.0	108
240 min Summer	4.947	0.0	138
360 min Summer	3.749	0.0	200
480 min Summer	3.073	0.0	260
600 min Summer	2.634	0.0	320
720 min Summer	2.323	0.0	382
960 min Summer	1.905	0.0	502
1440 min Summer	1.441	0.0	744
2160 min Summer	1.090	0.0	1108
2880 min Summer	0.893	0.0	1472
4320 min Summer	0.676	0.0	2204
5760 min Summer	0.555	0.0	2936
7200 min Summer	0.476	0.0	3656
8640 min Summer	0.419	0.0	4408
10080 min Summer	0.376	0.0	5112
15 min Winter	28.571	0.0	20

Summary of Results for 1 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	19.643	0.043	7.2	10.2	O K
60 min Winter	19.644	0.044	7.4	10.5	O K
120 min Winter	19.639	0.039	6.6	9.4	O K
180 min Winter	19.634	0.034	5.8	8.2	O K
240 min Winter	19.630	0.030	5.1	7.3	O K
360 min Winter	19.625	0.025	4.2	6.0	O K
480 min Winter	19.621	0.021	3.6	5.1	O K
600 min Winter	19.619	0.019	3.2	4.4	O K
720 min Winter	19.617	0.017	2.8	4.0	O K
960 min Winter	19.614	0.014	2.3	3.3	O K
1440 min Winter	19.611	0.011	1.8	2.5	O K
2160 min Winter	19.608	0.008	1.4	1.9	O K
2880 min Winter	19.607	0.007	1.1	1.6	O K
4320 min Winter	19.605	0.005	0.9	1.2	O K
5760 min Winter	19.604	0.004	0.7	1.0	O K
7200 min Winter	19.604	0.004	0.6	0.8	O K
8640 min Winter	19.603	0.003	0.5	0.7	O K
10080 min Winter	19.603	0.003	0.5	0.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	18.968	0.0	29
60 min Winter	12.298	0.0	46
120 min Winter	7.830	0.0	80
180 min Winter	5.988	0.0	112
240 min Winter	4.947	0.0	144
360 min Winter	3.749	0.0	206
480 min Winter	3.073	0.0	264
600 min Winter	2.634	0.0	324
720 min Winter	2.323	0.0	392
960 min Winter	1.905	0.0	508
1440 min Winter	1.441	0.0	742
2160 min Winter	1.090	0.0	1112
2880 min Winter	0.893	0.0	1472
4320 min Winter	0.676	0.0	2140
5760 min Winter	0.555	0.0	2912
7200 min Winter	0.476	0.0	3728
8640 min Winter	0.419	0.0	4392
10080 min Winter	0.376	0.0	5240

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.300	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.212

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.071	4	8	0.071	8	12	0.071

Model Details

Storage is Online Cover Level (m) 20.600

Cellular Storage Structure

Invert Level (m) 19.600 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.07560 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.03780

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	800.0	800.0	0.410	0.0	845.8
0.400	800.0	845.3			

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 1178 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	19.766	0.166	1.7	81.8	O K
30 min Summer	19.823	0.223	1.7	109.5	O K
60 min Summer	19.882	0.282	1.7	138.9	O K
120 min Summer	19.942	0.342	1.8	168.1	O K
180 min Summer	19.973	0.373	1.8	183.6	O K
240 min Summer	19.992	0.392	1.8	192.9	O K
360 min Summer	20.015	0.415	1.8	204.4	O K
480 min Summer	20.028	0.428	1.8	210.6	O K
600 min Summer	20.034	0.434	1.8	213.6	O K
720 min Summer	20.036	0.436	1.8	214.6	O K
960 min Summer	20.033	0.433	1.8	212.9	O K
1440 min Summer	20.020	0.420	1.8	206.4	O K
2160 min Summer	19.997	0.397	1.8	195.4	O K
2880 min Summer	19.974	0.374	1.8	184.0	O K
4320 min Summer	19.929	0.329	1.7	161.8	O K
5760 min Summer	19.886	0.286	1.7	141.0	O K
7200 min Summer	19.848	0.248	1.7	121.8	O K
8640 min Summer	19.813	0.213	1.7	104.6	O K
10080 min Summer	19.781	0.181	1.7	89.2	O K
15 min Winter	19.787	0.187	1.7	91.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	126.795	0.0	26
30 min Summer	85.223	0.0	41
60 min Summer	54.663	0.0	70
120 min Summer	33.842	0.0	130
180 min Summer	25.180	0.0	188
240 min Summer	20.266	0.0	248
360 min Summer	14.905	0.0	366
480 min Summer	11.976	0.0	484
600 min Summer	10.097	0.0	604
720 min Summer	8.779	0.0	722
960 min Summer	7.033	0.0	918
1440 min Summer	5.136	0.0	1142
2160 min Summer	3.742	0.0	1524
2880 min Summer	2.985	0.0	1936
4320 min Summer	2.167	0.0	2764
5760 min Summer	1.725	0.0	3528
7200 min Summer	1.444	0.0	4328
8640 min Summer	1.250	0.0	5096
10080 min Summer	1.106	0.0	5760
15 min Winter	126.795	0.0	26

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	19.850	0.250	1.7	123.0	O K
60 min Winter	19.917	0.317	1.7	156.1	O K
120 min Winter	19.985	0.385	1.8	189.5	O K
180 min Winter	20.022	0.422	1.8	207.5	O K
240 min Winter	20.044	0.444	1.8	218.6	O K
360 min Winter	20.073	0.473	1.8	232.7	O K
480 min Winter	20.090	0.490	1.8	240.9	O K
600 min Winter	20.099	0.499	1.8	245.6	O K
720 min Winter	20.435	0.835	1.8	248.0	Flood Risk
960 min Winter	20.600	1.000	1.8	248.4	FLOOD
1440 min Winter	20.089	0.489	1.8	240.4	O K
2160 min Winter	20.059	0.459	1.8	225.8	O K
2880 min Winter	20.026	0.426	1.8	209.6	O K
4320 min Winter	19.958	0.358	1.8	176.1	O K
5760 min Winter	19.893	0.293	1.7	144.3	O K
7200 min Winter	19.835	0.235	1.7	115.4	O K
8640 min Winter	19.783	0.183	1.7	90.1	O K
10080 min Winter	19.739	0.139	1.7	68.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	85.223	0.0	41
60 min Winter	54.663	0.0	70
120 min Winter	33.842	0.0	128
180 min Winter	25.180	0.0	186
240 min Winter	20.266	0.0	244
360 min Winter	14.905	0.0	360
480 min Winter	11.976	0.0	476
600 min Winter	10.097	0.0	590
720 min Winter	8.779	0.0	702
960 min Winter	7.033	0.8	924
1440 min Winter	5.136	0.0	1328
2160 min Winter	3.742	0.0	1648
2880 min Winter	2.985	0.0	2108
4320 min Winter	2.167	0.0	2988
5760 min Winter	1.725	0.0	3816
7200 min Winter	1.444	0.0	4616
8640 min Winter	1.250	0.0	5360
10080 min Winter	1.106	0.0	6048

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.300	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.352

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.117	4	8	0.117	8	12	0.117

Model Details

Storage is Online Cover Level (m) 20.600

Cellular Storage Structure

Invert Level (m) 19.600 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00720 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.01440

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	1640.0	1640.0	0.510	0.0	1721.8
0.500	1640.0	1721.0			

Summary of Results for 30 year Return Period

Half Drain Time : 594 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	19.691	0.091	1.7	44.6	O K
30 min Summer	19.720	0.120	1.7	58.9	O K
60 min Summer	19.750	0.150	1.7	73.7	O K
120 min Summer	19.779	0.179	1.7	87.9	O K
180 min Summer	19.793	0.193	1.7	95.0	O K
240 min Summer	19.801	0.201	1.7	98.9	O K
360 min Summer	19.809	0.209	1.7	102.7	O K
480 min Summer	19.810	0.210	1.7	103.5	O K
600 min Summer	19.810	0.210	1.7	103.4	O K
720 min Summer	19.809	0.209	1.7	103.0	O K
960 min Summer	19.806	0.206	1.7	101.4	O K
1440 min Summer	19.796	0.196	1.7	96.4	O K
2160 min Summer	19.778	0.178	1.7	87.6	O K
2880 min Summer	19.760	0.160	1.7	78.7	O K
4320 min Summer	19.727	0.127	1.7	62.5	O K
5760 min Summer	19.700	0.100	1.7	49.0	O K
7200 min Summer	19.678	0.078	1.7	38.5	O K
8640 min Summer	19.663	0.063	1.7	30.8	O K
10080 min Summer	19.652	0.052	1.7	25.8	O K
15 min Winter	19.702	0.102	1.7	50.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	69.989	0.0	26
30 min Summer	46.589	0.0	40
60 min Summer	29.711	0.0	70
120 min Summer	18.391	0.0	128
180 min Summer	13.733	0.0	186
240 min Summer	11.106	0.0	244
360 min Summer	8.222	0.0	362
480 min Summer	6.637	0.0	456
600 min Summer	5.618	0.0	510
720 min Summer	4.900	0.0	572
960 min Summer	3.947	0.0	700
1440 min Summer	2.906	0.0	972
2160 min Summer	2.136	0.0	1384
2880 min Summer	1.716	0.0	1788
4320 min Summer	1.259	0.0	2552
5760 min Summer	1.009	0.0	3280
7200 min Summer	0.850	0.0	3960
8640 min Summer	0.739	0.0	4592
10080 min Summer	0.657	0.0	5248
15 min Winter	69.989	0.0	26

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	19.735	0.135	1.7	66.2	O K
60 min Winter	19.769	0.169	1.7	83.0	O K
120 min Winter	19.802	0.202	1.7	99.4	O K
180 min Winter	19.819	0.219	1.7	107.8	O K
240 min Winter	19.829	0.229	1.7	112.7	O K
360 min Winter	19.840	0.240	1.7	117.9	O K
480 min Winter	19.843	0.243	1.7	119.8	O K
600 min Winter	19.843	0.243	1.7	119.7	O K
720 min Winter	19.841	0.241	1.7	118.6	O K
960 min Winter	19.836	0.236	1.7	116.1	O K
1440 min Winter	19.821	0.221	1.7	108.7	O K
2160 min Winter	19.793	0.193	1.7	95.1	O K
2880 min Winter	19.765	0.165	1.7	81.2	O K
4320 min Winter	19.715	0.115	1.7	56.4	O K
5760 min Winter	19.676	0.076	1.7	37.2	O K
7200 min Winter	19.652	0.052	1.7	25.5	O K
8640 min Winter	19.645	0.045	1.5	22.1	O K
10080 min Winter	19.640	0.040	1.3	19.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	46.589	0.0	40
60 min Winter	29.711	0.0	68
120 min Winter	18.391	0.0	126
180 min Winter	13.733	0.0	182
240 min Winter	11.106	0.0	240
360 min Winter	8.222	0.0	354
480 min Winter	6.637	0.0	464
600 min Winter	5.618	0.0	570
720 min Winter	4.900	0.0	666
960 min Winter	3.947	0.0	752
1440 min Winter	2.906	0.0	1058
2160 min Winter	2.136	0.0	1500
2880 min Winter	1.716	0.0	1916
4320 min Winter	1.259	0.0	2684
5760 min Winter	1.009	0.0	3352
7200 min Winter	0.850	0.0	3888
8640 min Winter	0.739	0.0	4576
10080 min Winter	0.657	0.0	5248

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.300	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.352

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.117	4	8	0.117	8	12	0.117

Model Details

Storage is Online Cover Level (m) 20.600

Cellular Storage Structure

Invert Level (m) 19.600 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00720 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.01440

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	1640.0	1640.0	0.510	0.0	1721.8
0.500	1640.0	1721.0			

Summary of Results for 1 year Return Period

Half Drain Time : 243 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	19.636	0.036	1.2	17.9	O K
30 min Summer	19.647	0.047	1.6	23.2	O K
60 min Summer	19.658	0.058	1.7	28.8	O K
120 min Summer	19.669	0.069	1.7	34.0	O K
180 min Summer	19.674	0.074	1.7	36.4	O K
240 min Summer	19.677	0.077	1.7	38.0	O K
360 min Summer	19.680	0.080	1.7	39.6	O K
480 min Summer	19.682	0.082	1.7	40.1	O K
600 min Summer	19.682	0.082	1.7	40.1	O K
720 min Summer	19.681	0.081	1.7	39.9	O K
960 min Summer	19.679	0.079	1.7	38.8	O K
1440 min Summer	19.673	0.073	1.7	35.8	O K
2160 min Summer	19.663	0.063	1.7	30.9	O K
2880 min Summer	19.655	0.055	1.7	26.9	O K
4320 min Summer	19.645	0.045	1.5	22.4	O K
5760 min Summer	19.640	0.040	1.3	19.6	O K
7200 min Summer	19.636	0.036	1.2	17.6	O K
8640 min Summer	19.632	0.032	1.1	15.9	O K
10080 min Summer	19.630	0.030	1.0	14.5	O K
15 min Winter	19.641	0.041	1.3	20.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	28.571	0.0	25
30 min Summer	18.968	0.0	38
60 min Summer	12.298	0.0	66
120 min Summer	7.830	0.0	122
180 min Summer	5.988	0.0	166
240 min Summer	4.947	0.0	198
360 min Summer	3.749	0.0	264
480 min Summer	3.073	0.0	334
600 min Summer	2.634	0.0	404
720 min Summer	2.323	0.0	472
960 min Summer	1.905	0.0	608
1440 min Summer	1.441	0.0	872
2160 min Summer	1.090	0.0	1252
2880 min Summer	0.893	0.0	1596
4320 min Summer	0.676	0.0	2300
5760 min Summer	0.555	0.0	3056
7200 min Summer	0.476	0.0	3752
8640 min Summer	0.419	0.0	4496
10080 min Summer	0.376	0.0	5240
15 min Winter	28.571	0.0	25

Summary of Results for 1 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	19.653	0.053	1.7	26.1	O K
60 min Winter	19.666	0.066	1.7	32.6	O K
120 min Winter	19.679	0.079	1.7	38.8	O K
180 min Winter	19.685	0.085	1.7	41.8	O K
240 min Winter	19.688	0.088	1.7	43.4	O K
360 min Winter	19.691	0.091	1.7	44.7	O K
480 min Winter	19.691	0.091	1.7	44.9	O K
600 min Winter	19.690	0.090	1.7	44.5	O K
720 min Winter	19.689	0.089	1.7	43.7	O K
960 min Winter	19.684	0.084	1.7	41.4	O K
1440 min Winter	19.673	0.073	1.7	35.9	O K
2160 min Winter	19.657	0.057	1.7	28.3	O K
2880 min Winter	19.648	0.048	1.6	23.7	O K
4320 min Winter	19.639	0.039	1.3	19.1	O K
5760 min Winter	19.633	0.033	1.1	16.1	O K
7200 min Winter	19.629	0.029	1.0	14.1	O K
8640 min Winter	19.626	0.026	0.9	12.5	O K
10080 min Winter	19.623	0.023	0.8	11.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	18.968	0.0	38
60 min Winter	12.298	0.0	66
120 min Winter	7.830	0.0	122
180 min Winter	5.988	0.0	176
240 min Winter	4.947	0.0	228
360 min Winter	3.749	0.0	284
480 min Winter	3.073	0.0	362
600 min Winter	2.634	0.0	440
720 min Winter	2.323	0.0	514
960 min Winter	1.905	0.0	660
1440 min Winter	1.441	0.0	932
2160 min Winter	1.090	0.0	1300
2880 min Winter	0.893	0.0	1620
4320 min Winter	0.676	0.0	2376
5760 min Winter	0.555	0.0	3112
7200 min Winter	0.476	0.0	3816
8640 min Winter	0.419	0.0	4568
10080 min Winter	0.376	0.0	5240

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.300	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.352

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.117	4	8	0.117	8	12	0.117

Model Details

Storage is Online Cover Level (m) 20.600

Cellular Storage Structure

Invert Level (m) 19.600 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00720 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.01440

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	1640.0	1640.0	0.510	0.0	1721.8
0.500	1640.0	1721.0			

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 1287 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	18.334	0.334	2.2	121.2	O K
30 min Summer	18.447	0.447	2.3	162.3	O K
60 min Summer	18.567	0.567	2.3	205.8	O K
120 min Summer	18.687	0.687	2.4	249.3	O K
180 min Summer	18.751	0.751	2.4	272.4	O K
240 min Summer	18.789	0.789	2.4	286.5	O K
360 min Summer	18.837	0.837	2.5	304.0	O K
480 min Summer	18.864	0.864	2.5	313.6	O K
600 min Summer	18.878	0.878	2.5	318.6	O K
720 min Summer	18.883	0.883	2.5	320.5	O K
960 min Summer	18.878	0.878	2.5	318.6	O K
1440 min Summer	18.849	0.849	2.5	308.3	O K
2160 min Summer	18.804	0.804	2.4	292.0	O K
2880 min Summer	18.762	0.762	2.4	276.6	O K
4320 min Summer	18.681	0.681	2.4	247.3	O K
5760 min Summer	18.605	0.605	2.3	219.4	O K
7200 min Summer	18.533	0.533	2.3	193.4	O K
8640 min Summer	18.468	0.468	2.3	169.7	O K
10080 min Summer	18.407	0.407	2.2	147.9	O K
15 min Winter	18.375	0.375	2.2	136.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	126.795	0.0	26
30 min Summer	85.223	0.0	41
60 min Summer	54.663	0.0	70
120 min Summer	33.842	0.0	130
180 min Summer	25.180	0.0	188
240 min Summer	20.266	0.0	248
360 min Summer	14.905	0.0	366
480 min Summer	11.976	0.0	484
600 min Summer	10.097	0.0	604
720 min Summer	8.779	0.0	722
960 min Summer	7.033	0.0	958
1440 min Summer	5.136	0.0	1178
2160 min Summer	3.742	0.0	1560
2880 min Summer	2.985	0.0	1964
4320 min Summer	2.167	0.0	2776
5760 min Summer	1.725	0.0	3584
7200 min Summer	1.444	0.0	4392
8640 min Summer	1.250	0.0	5184
10080 min Summer	1.106	0.0	5944
15 min Winter	126.795	0.0	26

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	18.502	0.502	2.3	182.2	O K
60 min Winter	18.637	0.637	2.4	231.4	O K
120 min Winter	18.774	0.774	2.4	281.1	O K
180 min Winter	18.849	0.849	2.5	308.0	O K
240 min Winter	18.894	0.894	2.5	324.7	O K
360 min Winter	18.954	0.954	2.5	346.2	O K
480 min Winter	18.989	0.989	2.5	358.9	O K
600 min Winter	20.251	2.251	2.5	366.4	FLOOD
720 min Winter	20.255	2.255	2.5	370.4	FLOOD
960 min Winter	20.257	2.257	2.5	372.1	FLOOD
1440 min Winter	18.996	0.996	2.5	361.6	O K
2160 min Winter	18.937	0.937	2.5	340.3	O K
2880 min Winter	18.878	0.878	2.5	318.9	O K
4320 min Winter	18.758	0.758	2.4	275.2	O K
5760 min Winter	18.642	0.642	2.4	233.0	O K
7200 min Winter	18.534	0.534	2.3	193.9	O K
8640 min Winter	18.437	0.437	2.3	158.8	O K
10080 min Winter	18.351	0.351	2.2	127.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	85.223	0.0	41
60 min Winter	54.663	0.0	70
120 min Winter	33.842	0.0	128
180 min Winter	25.180	0.0	186
240 min Winter	20.266	0.0	244
360 min Winter	14.905	0.0	360
480 min Winter	11.976	0.0	476
600 min Winter	10.097	2.1	590
720 min Winter	8.779	6.2	704
960 min Winter	7.033	7.9	928
1440 min Winter	5.136	0.0	1344
2160 min Winter	3.742	0.0	1668
2880 min Winter	2.985	0.0	2136
4320 min Winter	2.167	0.0	3032
5760 min Winter	1.725	0.0	3872
7200 min Winter	1.444	0.0	4688
8640 min Winter	1.250	0.0	5456
10080 min Winter	1.106	0.0	6256

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.300	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.521

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.174	4	8	0.174	8	12	0.174

Model Details

Storage is Online Cover Level (m) 20.250

Cellular Storage Structure

Invert Level (m) 18.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.01224 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.02448

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	1210.0	1210.0	1.010	0.0	1349.8
1.000	1210.0	1349.1			

Summary of Results for 30 year Return Period

Half Drain Time : 695 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	18.182	0.182	2.1	66.0	O K
30 min Summer	18.240	0.240	2.1	87.3	O K
60 min Summer	18.301	0.301	2.2	109.3	O K
120 min Summer	18.359	0.359	2.2	130.5	O K
180 min Summer	18.389	0.389	2.2	141.2	O K
240 min Summer	18.406	0.406	2.2	147.2	O K
360 min Summer	18.422	0.422	2.2	153.3	O K
480 min Summer	18.427	0.427	2.2	154.9	O K
600 min Summer	18.425	0.425	2.2	154.4	O K
720 min Summer	18.423	0.423	2.2	153.4	O K
960 min Summer	18.415	0.415	2.2	150.5	O K
1440 min Summer	18.395	0.395	2.2	143.4	O K
2160 min Summer	18.363	0.363	2.2	131.6	O K
2880 min Summer	18.330	0.330	2.2	119.8	O K
4320 min Summer	18.268	0.268	2.2	97.3	O K
5760 min Summer	18.213	0.213	2.1	77.3	O K
7200 min Summer	18.166	0.166	2.1	60.2	O K
8640 min Summer	18.128	0.128	2.1	46.5	O K
10080 min Summer	18.098	0.098	2.1	35.6	O K
15 min Winter	18.204	0.204	2.1	74.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	69.989	0.0	26
30 min Summer	46.589	0.0	40
60 min Summer	29.711	0.0	70
120 min Summer	18.391	0.0	128
180 min Summer	13.733	0.0	186
240 min Summer	11.106	0.0	246
360 min Summer	8.222	0.0	362
480 min Summer	6.637	0.0	480
600 min Summer	5.618	0.0	554
720 min Summer	4.900	0.0	608
960 min Summer	3.947	0.0	732
1440 min Summer	2.906	0.0	1000
2160 min Summer	2.136	0.0	1412
2880 min Summer	1.716	0.0	1820
4320 min Summer	1.259	0.0	2600
5760 min Summer	1.009	0.0	3352
7200 min Summer	0.850	0.0	4048
8640 min Summer	0.739	0.0	4760
10080 min Summer	0.657	0.0	5448
15 min Winter	69.989	0.0	26

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	18.270	0.270	2.2	98.2	O K
60 min Winter	18.339	0.339	2.2	123.2	O K
120 min Winter	18.407	0.407	2.2	147.7	O K
180 min Winter	18.442	0.442	2.2	160.5	O K
240 min Winter	18.463	0.463	2.2	168.1	O K
360 min Winter	18.486	0.486	2.2	176.4	O K
480 min Winter	18.495	0.495	2.2	179.8	O K
600 min Winter	18.497	0.497	2.3	180.4	O K
720 min Winter	18.494	0.494	2.2	179.3	O K
960 min Winter	18.482	0.482	2.2	174.8	O K
1440 min Winter	18.455	0.455	2.2	165.1	O K
2160 min Winter	18.405	0.405	2.2	147.1	O K
2880 min Winter	18.354	0.354	2.2	128.6	O K
4320 min Winter	18.258	0.258	2.1	93.8	O K
5760 min Winter	18.176	0.176	2.1	64.0	O K
7200 min Winter	18.111	0.111	2.1	40.4	O K
8640 min Winter	18.066	0.066	2.1	24.0	O K
10080 min Winter	18.049	0.049	2.0	17.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	46.589	0.0	40
60 min Winter	29.711	0.0	68
120 min Winter	18.391	0.0	126
180 min Winter	13.733	0.0	184
240 min Winter	11.106	0.0	242
360 min Winter	8.222	0.0	356
480 min Winter	6.637	0.0	468
600 min Winter	5.618	0.0	578
720 min Winter	4.900	0.0	682
960 min Winter	3.947	0.0	782
1440 min Winter	2.906	0.0	1084
2160 min Winter	2.136	0.0	1540
2880 min Winter	1.716	0.0	1968
4320 min Winter	1.259	0.0	2776
5760 min Winter	1.009	0.0	3520
7200 min Winter	0.850	0.0	4184
8640 min Winter	0.739	0.0	4752
10080 min Winter	0.657	0.0	5144

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.300	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.521

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.174	4	8	0.174	8	12	0.174

Model Details

Storage is Online Cover Level (m) 20.250

Cellular Storage Structure

Invert Level (m) 18.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.01224 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.02448

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	1210.0	1200.0	1.010	0.0	1325.4
1.000	1210.0	1324.7			

Summary of Results for 1 year Return Period

Half Drain Time : 264 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	18.072	0.072	2.1	26.1	O K
30 min Summer	18.094	0.094	2.1	34.0	O K
60 min Summer	18.117	0.117	2.1	42.5	O K
120 min Summer	18.139	0.139	2.1	50.4	O K
180 min Summer	18.149	0.149	2.1	54.0	O K
240 min Summer	18.154	0.154	2.1	55.9	O K
360 min Summer	18.159	0.159	2.1	57.6	O K
480 min Summer	18.160	0.160	2.1	57.9	O K
600 min Summer	18.159	0.159	2.1	57.7	O K
720 min Summer	18.157	0.157	2.1	57.0	O K
960 min Summer	18.152	0.152	2.1	55.1	O K
1440 min Summer	18.138	0.138	2.1	50.2	O K
2160 min Summer	18.117	0.117	2.1	42.5	O K
2880 min Summer	18.098	0.098	2.1	35.5	O K
4320 min Summer	18.069	0.069	2.1	24.9	O K
5760 min Summer	18.052	0.052	2.1	18.8	O K
7200 min Summer	18.045	0.045	1.9	16.4	O K
8640 min Summer	18.041	0.041	1.7	14.7	O K
10080 min Summer	18.037	0.037	1.5	13.4	O K
15 min Winter	18.081	0.081	2.1	29.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	28.571	0.0	25
30 min Summer	18.968	0.0	38
60 min Summer	12.298	0.0	66
120 min Summer	7.830	0.0	124
180 min Summer	5.988	0.0	180
240 min Summer	4.947	0.0	212
360 min Summer	3.749	0.0	278
480 min Summer	3.073	0.0	344
600 min Summer	2.634	0.0	414
720 min Summer	2.323	0.0	484
960 min Summer	1.905	0.0	622
1440 min Summer	1.441	0.0	892
2160 min Summer	1.090	0.0	1280
2880 min Summer	0.893	0.0	1648
4320 min Summer	0.676	0.0	2340
5760 min Summer	0.555	0.0	3000
7200 min Summer	0.476	0.0	3680
8640 min Summer	0.419	0.0	4416
10080 min Summer	0.376	0.0	5144
15 min Winter	28.571	0.0	25

Summary of Results for 1 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	18.106	0.106	2.1	38.4	O K
60 min Winter	18.133	0.133	2.1	48.1	O K
120 min Winter	18.158	0.158	2.1	57.5	O K
180 min Winter	18.171	0.171	2.1	62.0	O K
240 min Winter	18.178	0.178	2.1	64.5	O K
360 min Winter	18.181	0.181	2.1	65.7	O K
480 min Winter	18.181	0.181	2.1	65.9	O K
600 min Winter	18.179	0.179	2.1	65.1	O K
720 min Winter	18.176	0.176	2.1	63.7	O K
960 min Winter	18.166	0.166	2.1	60.2	O K
1440 min Winter	18.142	0.142	2.1	51.7	O K
2160 min Winter	18.108	0.108	2.1	39.1	O K
2880 min Winter	18.078	0.078	2.1	28.5	O K
4320 min Winter	18.048	0.048	2.0	17.4	O K
5760 min Winter	18.040	0.040	1.7	14.5	O K
7200 min Winter	18.035	0.035	1.4	12.5	O K
8640 min Winter	18.031	0.031	1.3	11.1	O K
10080 min Winter	18.028	0.028	1.2	10.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	18.968	0.0	39
60 min Winter	12.298	0.0	66
120 min Winter	7.830	0.0	122
180 min Winter	5.988	0.0	178
240 min Winter	4.947	0.0	232
360 min Winter	3.749	0.0	296
480 min Winter	3.073	0.0	372
600 min Winter	2.634	0.0	450
720 min Winter	2.323	0.0	528
960 min Winter	1.905	0.0	678
1440 min Winter	1.441	0.0	960
2160 min Winter	1.090	0.0	1352
2880 min Winter	0.893	0.0	1704
4320 min Winter	0.676	0.0	2292
5760 min Winter	0.555	0.0	3000
7200 min Winter	0.476	0.0	3688
8640 min Winter	0.419	0.0	4416
10080 min Winter	0.376	0.0	5136

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.300	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.521

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.174	4	8	0.174	8	12	0.174

Model Details

Storage is Online Cover Level (m) 20.250

Cellular Storage Structure

Invert Level (m) 18.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.01224 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.02448

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	1210.0	1210.0	1.010	0.0	1349.8
1.000	1210.0	1349.1			

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 1325 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	19.077	1.077	0.1	11.7	O K
30 min Summer	19.441	1.441	0.2	15.7	O K
60 min Summer	19.831	1.831	0.2	20.0	O K
120 min Summer	20.224	2.224	0.2	24.3	Flood Risk
180 min Summer	20.436	2.436	0.3	26.6	Flood Risk
240 min Summer	20.501	2.501	0.3	28.0	FLOOD
360 min Summer	20.503	2.503	0.3	29.9	FLOOD
480 min Summer	20.504	2.504	0.3	31.0	FLOOD
600 min Summer	20.504	2.504	0.3	31.6	FLOOD
720 min Summer	20.505	2.505	0.3	32.0	FLOOD
960 min Summer	20.505	2.505	0.3	32.3	FLOOD
1440 min Summer	20.505	2.505	0.3	32.3	FLOOD
2160 min Summer	20.505	2.505	0.3	31.8	FLOOD
2880 min Summer	20.504	2.504	0.3	30.9	FLOOD
4320 min Summer	20.501	2.501	0.3	28.7	FLOOD
5760 min Summer	20.445	2.445	0.3	26.7	Flood Risk
7200 min Summer	20.283	2.283	0.3	24.9	Flood Risk
8640 min Summer	20.143	2.143	0.2	23.4	O K
10080 min Summer	20.019	2.019	0.2	22.0	O K
15 min Winter	19.207	1.207	0.2	13.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	126.795	0.0	27
30 min Summer	85.223	0.0	41
60 min Summer	54.663	0.0	70
120 min Summer	33.842	0.0	130
180 min Summer	25.180	0.0	188
240 min Summer	20.266	0.7	248
360 min Summer	14.905	2.6	366
480 min Summer	11.976	3.7	484
600 min Summer	10.097	4.4	602
720 min Summer	8.779	4.7	720
960 min Summer	7.033	5.0	866
1440 min Summer	5.136	5.0	1110
2160 min Summer	3.742	4.5	1496
2880 min Summer	2.985	3.6	1908
4320 min Summer	2.167	1.4	2724
5760 min Summer	1.725	0.0	3512
7200 min Summer	1.444	0.0	4320
8640 min Summer	1.250	0.0	5096
10080 min Summer	1.106	0.0	5856
15 min Winter	126.795	0.0	26

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	19.615	1.615	0.2	17.6	O K
60 min Winter	20.053	2.053	0.2	22.4	O K
120 min Winter	20.497	2.497	0.3	27.2	Flood Risk
180 min Winter	20.503	2.503	0.3	29.9	FLOOD
240 min Winter	20.504	2.504	0.3	31.6	FLOOD
360 min Winter	20.507	2.507	0.3	33.9	FLOOD
480 min Winter	20.508	2.508	0.3	35.3	FLOOD
600 min Winter	20.509	2.509	0.3	36.2	FLOOD
720 min Winter	20.509	2.509	0.3	36.7	FLOOD
960 min Winter	20.510	2.510	0.3	37.2	FLOOD
1440 min Winter	20.510	2.510	0.3	36.9	FLOOD
2160 min Winter	20.509	2.509	0.3	36.1	FLOOD
2880 min Winter	20.507	2.507	0.3	34.6	FLOOD
4320 min Winter	20.504	2.504	0.3	31.2	FLOOD
5760 min Winter	20.501	2.501	0.3	28.0	FLOOD
7200 min Winter	20.343	2.343	0.3	25.6	Flood Risk
8640 min Winter	20.154	2.154	0.2	23.5	O K
10080 min Winter	19.991	1.991	0.2	21.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	85.223	0.0	41
60 min Winter	54.663	0.0	70
120 min Winter	33.842	0.0	128
180 min Winter	25.180	2.6	186
240 min Winter	20.266	4.3	244
360 min Winter	14.905	6.6	360
480 min Winter	11.976	8.0	474
600 min Winter	10.097	8.9	588
720 min Winter	8.779	9.4	702
960 min Winter	7.033	9.9	922
1440 min Winter	5.136	9.7	1190
2160 min Winter	3.742	8.8	1628
2880 min Winter	2.985	7.4	2080
4320 min Winter	2.167	4.0	2944
5760 min Winter	1.725	0.7	3752
7200 min Winter	1.444	0.0	4544
8640 min Winter	1.250	0.0	5360
10080 min Winter	1.106	0.0	6152

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.300	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.050

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.017	4	8	0.017	8	12	0.017

Model Details

Storage is Online Cover Level (m) 20.500

Lined Soakaway Structure

Infiltration Coefficient Base (m/hr)	0.01095	Ring Diameter (m)	1.50
Infiltration Coefficient Side (m/hr)	0.02196	Pit Multiplier	2.5
Safety Factor	2.0	Number Required	2
Porosity	0.30	Cap Volume Depth (m)	0.000
Invert Level (m)	18.000	Cap Infiltration Depth (m)	0.000

Summary of Results for 30 year Return Period

Half Drain Time : 1278 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	18.423	0.423	0.1	6.5	O K
30 min Summer	18.561	0.561	0.1	8.6	O K
60 min Summer	18.709	0.709	0.1	10.8	O K
120 min Summer	18.861	0.861	0.1	13.2	O K
180 min Summer	18.948	0.948	0.1	14.5	O K
240 min Summer	19.004	1.004	0.1	15.4	O K
360 min Summer	19.078	1.078	0.1	16.5	O K
480 min Summer	19.123	1.123	0.1	17.2	O K
600 min Summer	19.150	1.150	0.1	17.6	O K
720 min Summer	19.166	1.166	0.1	17.9	O K
960 min Summer	19.178	1.178	0.2	18.0	O K
1440 min Summer	19.187	1.187	0.2	18.2	O K
2160 min Summer	19.176	1.176	0.2	18.0	O K
2880 min Summer	19.151	1.151	0.1	17.6	O K
4320 min Summer	19.086	1.086	0.1	16.6	O K
5760 min Summer	19.020	1.020	0.1	15.6	O K
7200 min Summer	18.959	0.959	0.1	14.7	O K
8640 min Summer	18.905	0.905	0.1	13.9	O K
10080 min Summer	18.856	0.856	0.1	13.1	O K
15 min Winter	18.474	0.474	0.1	7.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	69.989	0.0	27
30 min Summer	46.589	0.0	41
60 min Summer	29.711	0.0	70
120 min Summer	18.391	0.0	130
180 min Summer	13.733	0.0	188
240 min Summer	11.106	0.0	248
360 min Summer	8.222	0.0	366
480 min Summer	6.637	0.0	484
600 min Summer	5.618	0.0	602
720 min Summer	4.900	0.0	722
960 min Summer	3.947	0.0	878
1440 min Summer	2.906	0.0	1114
2160 min Summer	2.136	0.0	1512
2880 min Summer	1.716	0.0	1932
4320 min Summer	1.259	0.0	2768
5760 min Summer	1.009	0.0	3576
7200 min Summer	0.850	0.0	4392
8640 min Summer	0.739	0.0	5192
10080 min Summer	0.657	0.0	5952
15 min Winter	69.989	0.0	26

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	18.629	0.629	0.1	9.6	O K
60 min Winter	18.795	0.795	0.1	12.2	O K
120 min Winter	18.968	0.968	0.1	14.8	O K
180 min Winter	19.067	1.067	0.1	16.3	O K
240 min Winter	19.132	1.132	0.1	17.3	O K
360 min Winter	19.218	1.218	0.2	18.6	O K
480 min Winter	19.271	1.271	0.2	19.5	O K
600 min Winter	19.306	1.306	0.2	20.0	O K
720 min Winter	19.327	1.327	0.2	20.3	O K
960 min Winter	19.348	1.348	0.2	20.6	O K
1440 min Winter	19.349	1.349	0.2	20.7	O K
2160 min Winter	19.331	1.331	0.2	20.4	O K
2880 min Winter	19.292	1.292	0.2	19.8	O K
4320 min Winter	19.195	1.195	0.2	18.3	O K
5760 min Winter	19.096	1.096	0.1	16.8	O K
7200 min Winter	19.007	1.007	0.1	15.4	O K
8640 min Winter	18.930	0.930	0.1	14.2	O K
10080 min Winter	18.861	0.861	0.1	13.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	46.589	0.0	41
60 min Winter	29.711	0.0	70
120 min Winter	18.391	0.0	128
180 min Winter	13.733	0.0	186
240 min Winter	11.106	0.0	244
360 min Winter	8.222	0.0	358
480 min Winter	6.637	0.0	474
600 min Winter	5.618	0.0	588
720 min Winter	4.900	0.0	698
960 min Winter	3.947	0.0	914
1440 min Winter	2.906	0.0	1148
2160 min Winter	2.136	0.0	1608
2880 min Winter	1.716	0.0	2076
4320 min Winter	1.259	0.0	2952
5760 min Winter	1.009	0.0	3816
7200 min Winter	0.850	0.0	4680
8640 min Winter	0.739	0.0	5464
10080 min Winter	0.657	0.0	6264

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.300	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.050

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.017	4	8	0.017	8	12	0.017

Model Details

Storage is Online Cover Level (m) 20.500

Lined Soakaway Structure

Infiltration Coefficient Base (m/hr)	0.01095	Ring Diameter (m)	2.50
Infiltration Coefficient Side (m/hr)	0.02196	Pit Multiplier	1.5
Safety Factor	2.0	Number Required	2
Porosity	0.30	Cap Volume Depth (m)	0.000
Invert Level (m)	18.000	Cap Infiltration Depth (m)	0.000

Summary of Results for 1 year Return Period

Half Drain Time : 922 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	18.171	0.171	0.1	2.6	O K
30 min Summer	18.226	0.226	0.1	3.5	O K
60 min Summer	18.289	0.289	0.1	4.4	O K
120 min Summer	18.358	0.358	0.1	5.5	O K
180 min Summer	18.400	0.400	0.1	6.1	O K
240 min Summer	18.430	0.430	0.1	6.6	O K
360 min Summer	18.467	0.467	0.1	7.1	O K
480 min Summer	18.487	0.487	0.1	7.5	O K
600 min Summer	18.500	0.500	0.1	7.7	O K
720 min Summer	18.508	0.508	0.1	7.8	O K
960 min Summer	18.519	0.519	0.1	7.9	O K
1440 min Summer	18.530	0.530	0.1	8.1	O K
2160 min Summer	18.529	0.529	0.1	8.1	O K
2880 min Summer	18.519	0.519	0.1	7.9	O K
4320 min Summer	18.493	0.493	0.1	7.6	O K
5760 min Summer	18.465	0.465	0.1	7.1	O K
7200 min Summer	18.438	0.438	0.1	6.7	O K
8640 min Summer	18.409	0.409	0.1	6.3	O K
10080 min Summer	18.382	0.382	0.1	5.8	O K
15 min Winter	18.192	0.192	0.1	2.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	28.571	0.0	26
30 min Summer	18.968	0.0	41
60 min Summer	12.298	0.0	70
120 min Summer	7.830	0.0	128
180 min Summer	5.988	0.0	188
240 min Summer	4.947	0.0	246
360 min Summer	3.749	0.0	364
480 min Summer	3.073	0.0	482
600 min Summer	2.634	0.0	600
720 min Summer	2.323	0.0	656
960 min Summer	1.905	0.0	774
1440 min Summer	1.441	0.0	1038
2160 min Summer	1.090	0.0	1456
2880 min Summer	0.893	0.0	1876
4320 min Summer	0.676	0.0	2688
5760 min Summer	0.555	0.0	3520
7200 min Summer	0.476	0.0	4320
8640 min Summer	0.419	0.0	5096
10080 min Summer	0.376	0.0	5856
15 min Winter	28.571	0.0	26

Summary of Results for 1 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	18.253	0.253	0.1	3.9	O K
60 min Winter	18.324	0.324	0.1	5.0	O K
120 min Winter	18.403	0.403	0.1	6.2	O K
180 min Winter	18.452	0.452	0.1	6.9	O K
240 min Winter	18.487	0.487	0.1	7.5	O K
360 min Winter	18.530	0.530	0.1	8.1	O K
480 min Winter	18.556	0.556	0.1	8.5	O K
600 min Winter	18.573	0.573	0.1	8.8	O K
720 min Winter	18.584	0.584	0.1	8.9	O K
960 min Winter	18.594	0.594	0.1	9.1	O K
1440 min Winter	18.605	0.605	0.1	9.3	O K
2160 min Winter	18.597	0.597	0.1	9.1	O K
2880 min Winter	18.578	0.578	0.1	8.9	O K
4320 min Winter	18.532	0.532	0.1	8.1	O K
5760 min Winter	18.485	0.485	0.1	7.4	O K
7200 min Winter	18.441	0.441	0.1	6.8	O K
8640 min Winter	18.398	0.398	0.1	6.1	O K
10080 min Winter	18.359	0.359	0.1	5.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	18.968	0.0	40
60 min Winter	12.298	0.0	70
120 min Winter	7.830	0.0	126
180 min Winter	5.988	0.0	184
240 min Winter	4.947	0.0	242
360 min Winter	3.749	0.0	356
480 min Winter	3.073	0.0	470
600 min Winter	2.634	0.0	580
720 min Winter	2.323	0.0	688
960 min Winter	1.905	0.0	876
1440 min Winter	1.441	0.0	1102
2160 min Winter	1.090	0.0	1564
2880 min Winter	0.893	0.0	2020
4320 min Winter	0.676	0.0	2900
5760 min Winter	0.555	0.0	3752
7200 min Winter	0.476	0.0	4552
8640 min Winter	0.419	0.0	5368
10080 min Winter	0.376	0.0	6160

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.300	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.050

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.017	4	8	0.017	8	12	0.017

Model Details

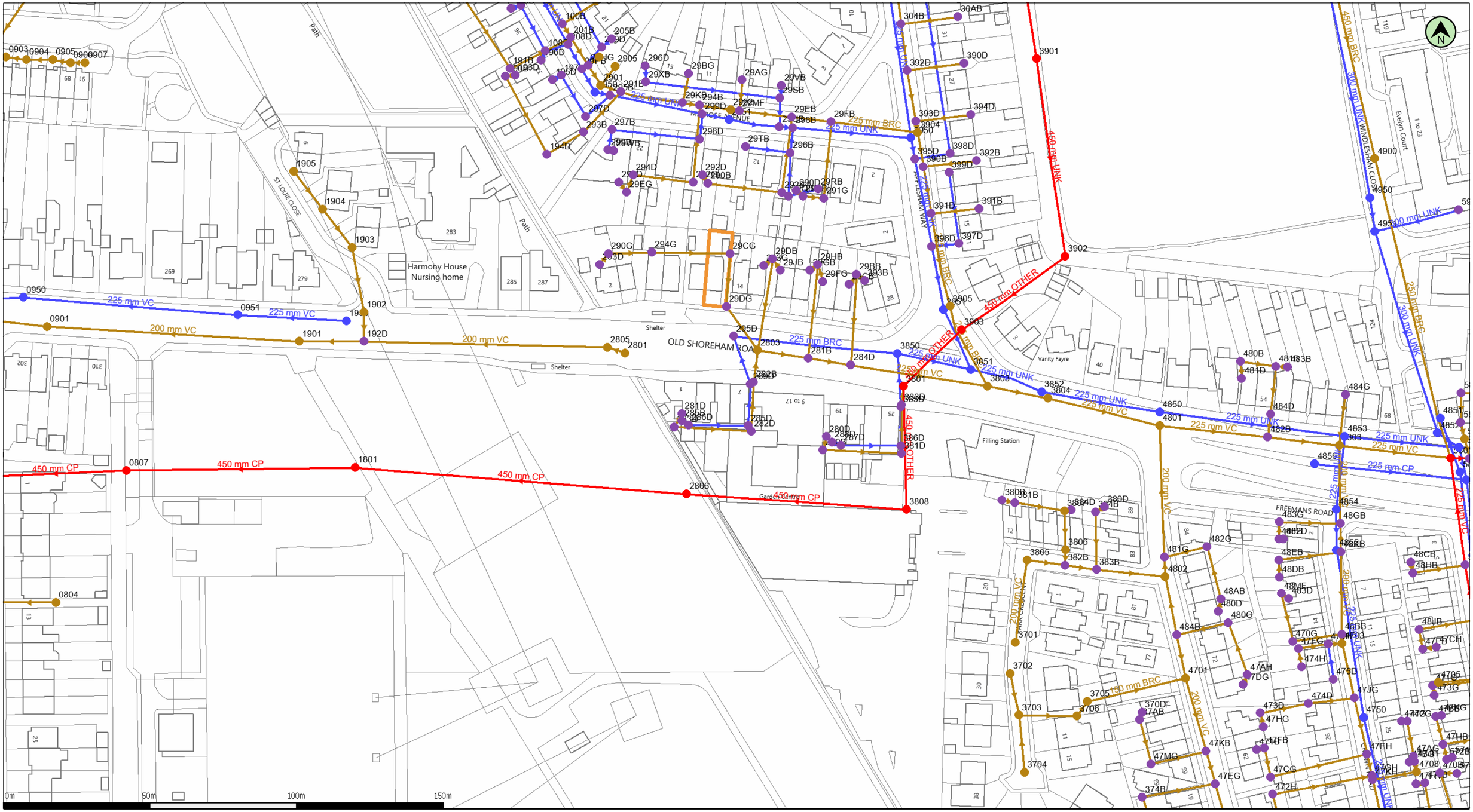
Storage is Online Cover Level (m) 20.500

Lined Soakaway Structure

Infiltration Coefficient Base (m/hr)	0.01095	Ring Diameter (m)	2.50
Infiltration Coefficient Side (m/hr)	0.02196	Pit Multiplier	1.5
Safety Factor	2.0	Number Required	2
Porosity	0.30	Cap Volume Depth (m)	0.000
Invert Level (m)	18.000	Cap Infiltration Depth (m)	0.000

Appendix K

Southern Water records



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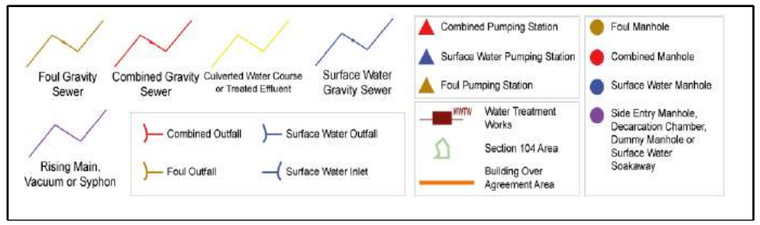
WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.



vholdo@motion.co.uk

Mayberry

WATER for LIFE from Southern Water

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0807	C	19.60	15.52	
1801	C	20.41	15.99	
2806	C	21.32	16.66	
3801	C	21.85	0.00	
3808	C	21.65	0.00	
3901	C	21.91	17.50	
3902	C	0.00	0.00	
3903	C	0.00	0.00	
5801	C	19.00	15.56	
581D	C	0.00	0.00	
582D	C	0.00	0.00	
0703	F	0.00	0.00	
0801	F	0.00	0.00	
0804	F	0.00	0.00	
0901	F	19.50	16.70	
0903	F	23.60	22.37	
0904	F	22.55	21.35	
0905	F	23.57	22.49	
0906	F	23.60	22.60	
0907	F	23.66	22.64	
100B	F	0.00	0.00	
1901	F	20.47	17.57	
1902	F	20.95	19.20	
1903	F	21.29	20.33	
1904	F	21.75	20.94	
1905	F	22.15	21.44	
190B	F	0.00	0.00	
191B	F	0.00	0.00	
192D	F	17.75	0.00	
193D	F	0.00	0.00	
194D	F	0.00	0.00	
201B	F	0.00	0.00	
2801	F	21.18	0.00	
2803	F	21.66	19.18	
2805	F	21.07	18.44	
280B	F	0.00	0.00	
280D	F	0.00	0.00	
281B	F	0.00	0.00	
281D	F	0.00	0.00	
282B	F	0.00	0.00	
282D	F	0.00	0.00	
283D	F	0.00	0.00	
284D	F	0.00	0.00	
2901	F	0.00	0.00	
2902	F	0.00	0.00	
2905	F	0.00	0.00	
290B	F	0.00	0.00	
290D	F	0.00	0.00	
290G	F	0.00	0.00	
291B	F	0.00	0.00	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
291D	F	0.00	0.00	
291G	F	0.00	0.00	
292B	F	0.00	0.00	
292D	F	0.00	0.00	
292G	F	0.00	0.00	
293B	F	0.00	0.00	
293D	F	0.00	0.00	
293G	F	0.00	0.00	
294B	F	0.00	0.00	
294D	F	0.00	0.00	
294G	F	0.00	0.00	
29AB	F	0.00	0.00	
29AG	F	0.00	0.00	
29BB	F	0.00	0.00	
29BG	F	0.00	0.00	
29CB	F	0.00	0.00	
29CG	F	0.00	0.00	
29DB	F	0.00	0.00	
29DG	F	0.00	0.00	
29EB	F	0.00	0.00	
29EG	F	0.00	0.00	
29FB	F	0.00	0.00	
29FG	F	0.00	0.00	
29GB	F	0.00	0.00	
29HB	F	0.00	0.00	
29HG	F	0.00	0.00	
29JB	F	0.00	0.00	
29KB	F	0.00	0.00	
29MF	F	0.00	0.00	
304B	F	0.00	0.00	
30AB	F	0.00	0.00	
3701	F	0.00	0.00	
3702	F	0.00	0.00	
3703	F	0.00	0.00	
3704	F	0.00	0.00	
3705	F	0.00	0.00	
3706	F	0.00	0.00	
370D	F	0.00	0.00	
374B	F	0.00	0.00	
37AB	F	0.00	0.00	
3803	F	21.78	0.00	
3804	F	0.00	0.00	
3805	F	0.00	0.00	
3806	F	0.00	0.00	
3807	F	0.00	0.00	
380B	F	0.00	0.00	
380D	F	0.00	0.00	
381B	F	0.00	0.00	
381D	F	0.00	0.00	
382B	F	0.00	0.00	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
383B	F	0.00	0.00	
383D	F	0.00	0.00	
384B	F	0.00	0.00	
384D	F	0.00	0.00	
3904	F	0.00	0.00	
3905	F	0.00	0.00	
390B	F	0.00	0.00	
390D	F	0.00	0.00	
391B	F	0.00	0.00	
391D	F	0.00	0.00	
392B	F	0.00	0.00	
392D	F	0.00	0.00	
393B	F	0.00	0.00	
393D	F	0.00	0.00	
394D	F	0.00	0.00	
4701	F	0.00	0.00	
4703	F	0.00	0.00	
4705	F	0.00	0.00	
4708	F	0.00	0.00	
470B	F	0.00	0.00	
470G	F	0.00	0.00	
471B	F	0.00	0.00	
471G	F	0.00	0.00	
471H	F	0.00	0.00	
472G	F	0.00	0.00	
472H	F	0.00	0.00	
473D	F	0.00	0.00	
473G	F	0.00	0.00	
474D	F	0.00	0.00	
474G	F	0.00	0.00	
474H	F	0.00	0.00	
47AG	F	0.00	0.00	
47AH	F	0.00	0.00	
47BB	F	0.00	0.00	
47BG	F	0.00	0.00	
47CG	F	0.00	0.00	
47CH	F	0.00	0.00	
47DG	F	0.00	0.00	
47EB	F	0.00	0.00	
47EG	F	0.00	0.00	
47EH	F	0.00	0.00	
47FB	F	0.00	0.00	
47FG	F	0.00	0.00	
47FH	F	0.00	0.00	
47GH	F	0.00	0.00	
47HB	F	0.00	0.00	
47HG	F	0.00	0.00	
47JB	F	0.00	0.00	
47JG	F	0.00	0.00	
47JH	F	0.00	0.00	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
47KB	F	0.00	0.00	
47KG	F	0.00	0.00	
47KH	F	0.00	0.00	
47MG	F	0.00	0.00	
4801	F	19.92	0.00	
4802	F	0.00	0.00	
4803	F	18.37	0.00	
480B	F	0.00	0.00	
480D	F	0.00	0.00	
480G	F	0.00	0.00	
481B	F	0.00	0.00	
481D	F	0.00	0.00	
481G	F	0.00	0.00	
482B	F	0.00	0.00	
482D	F	0.00	0.00	
482G	F	0.00	0.00	
483B	F	0.00	0.00	
483D	F	0.00	0.00	
483G	F	0.00	0.00	
484B	F	0.00	0.00	
484D	F	0.00	0.00	
484G	F	0.00	0.00	
48AB	F	0.00	0.00	
48BB	F	0.00	0.00	
48CB	F	0.00	0.00	
48DB	F	0.00	0.00	
48EB	F	0.00	0.00	
48FB	F	0.00	0.00	
48GB	F	0.00	0.00	
48HB	F	0.00	0.00	
48JB	F	0.00	0.00	
48KB	F	0.00	0.00	
48MF	F	0.00	0.00	
4900	F	0.00	0.00	
571B	F	0.00	0.00	
572B	F	0.00	0.00	
574D	F	0.00	0.00	
5802	F	0.00	0.00	
58CB	F	0.00	0.00	
58DB	F	0.00	0.00	
0950	S	19.44	17.64	
0951	S	19.89	18.15	
108B	S	0.00	0.00	
108D	S	0.00	0.00	
109D	S	0.00	0.00	
1950	S	20.42	18.73	
195D	S	0.00	0.00	
196D	S	0.00	0.00	
197D	S	0.00	0.00	
205B	S	0.00	0.00	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
208D	S	0.00	0.00	
209D	S	0.00	0.00	
285B	S	0.00	0.00	
285D	S	0.00	0.00	
286D	S	0.00	0.00	
287D	S	0.00	0.00	
288D	S	0.00	0.00	
289D	S	0.00	0.00	
2950	S	24.06	22.63	
2951	S	22.81	21.09	
295B	S	0.00	0.00	
295D	S	0.00	0.00	
296B	S	0.00	0.00	
296D	S	0.00	0.00	
297B	S	0.00	0.00	
297D	S	0.00	0.00	
298B	S	0.00	0.00	
298D	S	0.00	0.00	
299B	S	0.00	0.00	
299D	S	0.00	0.00	
29PB	S	0.00	0.00	
29QB	S	0.00	0.00	
29RB	S	0.00	0.00	
29SB	S	0.00	0.00	
29TB	S	0.00	0.00	
29UB	S	0.00	0.00	
29VB	S	0.00	0.00	
29WB	S	0.00	0.00	
29XB	S	0.00	0.00	
3850	S	21.85	19.93	
3851	S	21.66	0.00	
3852	S	21.22	19.53	
385D	S	0.00	0.00	
386D	S	0.00	0.00	
3950	S	22.29	0.00	
3951	S	21.94	20.31	
395D	S	0.00	0.00	
396D	S	0.00	0.00	
397D	S	0.00	0.00	
398D	S	0.00	0.00	
399D	S	0.00	0.00	
4750	S	16.00	14.77	
475D	S	0.00	0.00	
4850	S	19.89	17.93	
4851	S	0.00	0.00	
4852	S	18.78	0.00	
4853	S	18.31	0.00	
4854	S	18.62	17.38	
4855	S	19.92	16.54	
4856	S	18.64	16.64	

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
4950	S	18.27	16.91	
4951	S	18.22	16.04	
5852	S	19.03	0.00	
5853	S	19.22	0.00	
5854	S	19.08	0.00	
595D	S	0.00	0.00	

Appendix L

Exceedance Plan

Legend

- Exceedance Route - Direction of Flow
- Exceedance Route - Storage Area

Revision Notes:	Drn	Chk	App	Date
A First Issue	MH	VBH	JM	12/11/2020

Drawing Status:

FOR PLANNING
NOT FOR CONSTRUCTION

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Client:
Tate Bros Limited

Project:
Mayberry Garden Centre

Title:
Surface Water Drainage Strategy
Exceedance Flow Route

Scale: 1:500	Size: A1	Date: 12-11-2020
Drawn:MH	Chk'd: VBH	Appr'd:JM

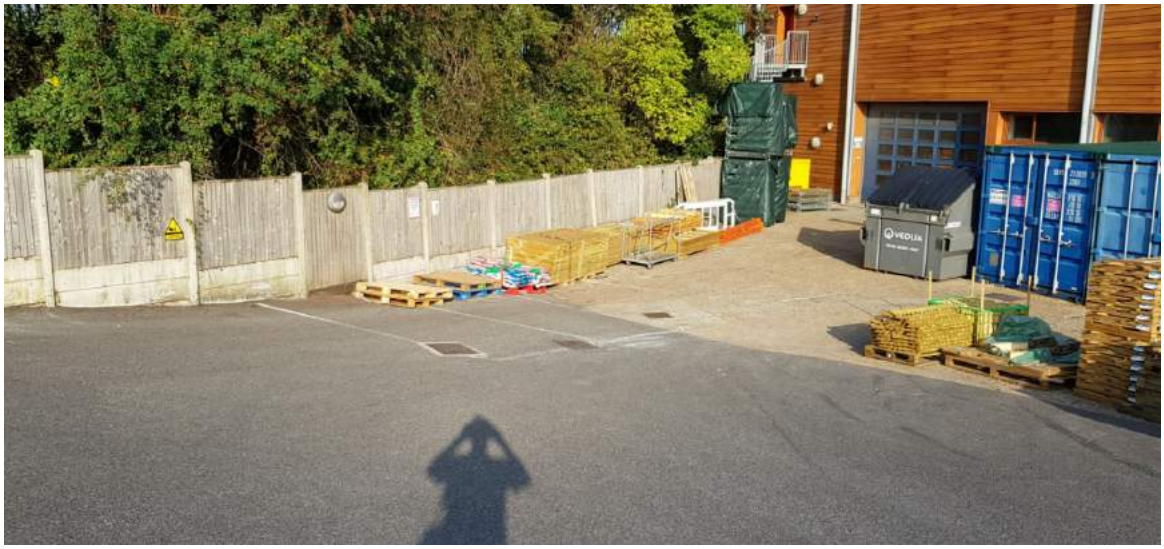
Drawing: 1907047-0500-02

Revision: A

N:\Projects\dsport 1907047\Drawings\1907047-0500-02 A Exceedance Plan..dwg

Appendix M

Site Photos


VEOLIA