Land South of Camp Road, Heyford Park (Phase 9)

Flood Risk Assessment Addendum

On behalf of **Dorchester Group**

Project Ref: 43374/4000 | Rev: A | Date: April 2018

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Document Control Sheet

Project Name: **Land South of Camp Road, Heyford Park (Phase 9)**
Project Ref: **43374/4000**
Report Title: **Flood Risk Assessment Addendum**
Doc Ref: **Revision A**
Date: **April 2018**

	Name	Position	Signature	Date
Prepared by:	Lewis Derrick	Graduate Engineer	[redacted]	13.04.2018
Reviewed by:	Andrew Johns	Associate		13.04.2018
Approved by:	Paul Swindale	Equity Director		13.04.2018
For and on behalf of Peter Brett Associates LLP				

Revision	Date	Description	Prepared	Reviewed	Approved
A	13.04.18	Issue for Planning	LD	AJ	PS

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Appendices

1 Introduction

1.1. This note comprises an addendum to the Flood Risk Assessment (FRA) (Revision B, December 2016) previously produced by Peter Brett Associates LLP (PBA) in support of a planning application for residential development at Heyford Park, Heyford, Oxfordshire. The FRA assessed flood risk and surface water drainage requirements related to Phase 9 of the wider Heyford Park development.

1.2. Whilst the FRA for Phase 9 was produced by PBA, the detailed surface water drainage network for Phase 9 was developed by Focus On Design. Hydrock have also produced a FRA and undertaken infiltration testing for the wider Heyford Park development. The Hydrock FRA excludes Phase 9, whilst the infiltration testing includes Phase 9.

1.3. The aim of this addendum is to provide further information to Oxfordshire County Council, as Lead Local Flood Authority (LLFA), in response to their planning comments (dated March 2017). For this addendum, PBA have received the following information related to Phase 9 and the wider Heyford Park development:

- *'Flood Risk Assessment and Drainage Strategy'* HPH-HYD-XX-XX-RP-D-5001 – Issue Number 1 (Hydrock, October 2017)
- *'Desk Study and Ground Investigation'* HPW-HYD-MS-ZZ-RP-G-0001 – Issue Number S2-P1 (Hydrock, February 2017)
- *'Drainage Statement'* (Focus On Design, April 2018)
- *'Drainage Strategy Plan'* 0521/PH9/320 – Revision C (Focus On Design, April 2018)
- *'MicroDrainage'* Files (Focus On Design, April 2018)
  - Surface Water Piped Network
  - Infiltration Basin
  - Permeable Paving Areas
  - Private Soakaway Areas
  - Rain Gardens
  - Swales

2 Oxfordshire County Council Drainage Comments

2.1. The following comments were received from the LLFA regarding the Phase 9 development following review of the 2016 FRA:

'The application drawing No.0521/PH9/320 includes a wide range of SuDs techniques proposed to be used for this development. OCC considers that more technical detail needs to be provided as the above referenced drawing is outline in nature. Examples where extra detail is required are: the sizing of swales; the type of permeable paving to be used; cross sections and long section drawings of the pond swales and permeable paving. ***Reason for objection.***

Para 6.2.4 of the Flood Risk Assessment (FRA) clarifies that the site, based on ground information, is likely to have some infiltration potential and makes reference to the need to establish the potential for the site. The above referenced drawing in the notes section states that this is not yet established. This needs to be investigated by conducting soakage tests on site to a BRE 365 standard. For a full planning application it is typically expected that infiltration potential for a site would be proven by this stage, thereby adding confidence to the drainage strategy. It appears the site drainage design is still based on there being no infiltration. ***Reason for objection.***

There are no micro-drainage calculations supporting the sizing of the surface water piped network and therefore it cannot be clarified whether site service level standards for no flooding from the drainage system are met by the design. There are no micro-drainage calculations for the SUDS elements such as Swales and Permeable Paving provided. ***Reason for objection.***

There appears to be no information supplied with regard to overland flood routing when exceedance of the capacity of the site drainage system occurs. For example, the provision of a flood routeing plan. ***Reason for objection.***

There were is no management / maintenance of SuDS plan provided with the application. Paragraph 6 of the FRA states that further discussion with the local authority will be required to discuss the approach for adoption and future maintenance. With regard to maintenance of the proposed pond, it is not clear whether the proposed slope range will be suitable for maintenance using a mower. ***Reason for objection****.'*

2.2. The information contain within this addendum is in response to these comments.

3 Phase 9 Within Wider Heyford Park Development

3.1. Phase 9 is located in the south-west of the wider Heyford Park development. Flood risk and surface water drainage for Heyford Park was considered as part of the *'Flood Risk Assessment and Drainage Strategy'* provided by Hydrock, however this assessment does not cover Phase 9 itself.

3.2. The *'Surface Water Drainage Strategy Plan'* (drawing number: HPH-HYD-XX-XX-DR-C-2200 Revision P2) appended to the *'Flood Risk Assessment and Drainage Strategy'* indicates that Phase 10 will discharge into the surface water culvert that currently runs through the east of Phase 9.

3.3. Drawing *'0521/PH9/320 Rev C'* indicates that the proposals for Phase 9 include for the diversion of the culvert through the development in line with the proposed masterplan layout, whilst maintaining its existing capacity. Considering that the *'Flood Risk Assessment and Drainage Strategy'* proposes to control discharge from Phase 10 to match the existing greenfield QBAR rate, there will be a net reduction of flows entering the culvert from Phase 10 for the more significant storm conditions. The proposed surface water drainage strategy for Phase 9 as shown in *'0521/PH9/320 Rev C'* will therefore not be compromised by flows entering the site from Phase 10.

4 Infiltration Testing

4.1. Infiltration testing on Phase 9 was undertaken by Hydrock and presented within the *'Desk Study and Ground Investigation'*.

4.2. The *'Drainage Statement'* (Focus On Design, April 2018) provides commentary on the results of the infiltration testing and their implication within the proposed surface water drainage strategy. This statement can be found in **Appendix A**

5 SuDS Technical Detail

5.1. The detailed design of the proposed SuDS components has been undertaken by Focus On Design.

5.2. Details of proposed SuDS components can be found in the *'Drainage Statement'* (Focus On Design, April 2018), whilst the proposed drainage strategy layout is indicated within drawing *'Drainage Strategy Plan'* 0521/PH9/320 – Revision C (Focus On Design, April 2018).

5.3. The sizing of each component has been undertaken by Focus On Design using *'MicroDrainage'* software, the results of which are appended to this addendum.

5.4. The *'Drainage Statement'*, drawing 0521/PH9/320 Rev C and accompanying *'MicroDrainage'* calculations can be found in **Appendix A**

6 Exceedance Flood Routing

6.1. In the event of a rare storm event greater the design level of the proposed surface water drainage strategy, the capacity of the drainage could be temporarily exceeded and drainage inlets could be bypassed creating overland flow.

6.2. It is recommended that all buildings should be provided with internal threshold levels raised 150mm above surrounding ground levels. Overland flows will be managed within the proposed highways and will be directed around buildings towards the Gallos Brook.

6.3. An exceedance flood routing assessment has been undertaken using the proposed highway and plot levels. The results of this are presented within drawing 33374/4001/510 within **Appendix B**

7 Operation and Maintenance

7.1. To ensure the ongoing performance of the surface water drainage system, regular maintenance will be required over its lifetime. Final designs of the drainage system must be designed with a regard for future maintenance. All areas should be easily accessible and safe for operatives without compromising the overall attenuation and landscape requirements.

7.2. Potential options for an adopting maintenance party include an independent management company, Thames Water or Oxfordshire County Council. The adopting party will need to be confirmed as part of the detailed design of the surface water drainage strategy. It is assumed that the pipe network will be offered for adoption to Thames Water, and therefore has been designed in accordance with *Sewers for Adoption* 7th Edition (WRc, 2012). The operation and maintenance of the piped network will be subject to Thames Water's own schedules.

7.3. The proposed SuDS components have been designed in accordance with *The SuDS Manual C753* (CIRIA, 2015). Typically, the maintenance of SuDS components involves removing litter/debris in the system and general landscaping/grass cutting; however, operation and maintenance of the drainage network should be undertaken in accordance with the recommendations within *The SuDS Manual C753*. These recommendations are shown in **Table 7.1 to 7.5** below. Maintenance of the SuDS components would be subject to final agreement with the adopting maintenance party.

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and insider of concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

Table 7.1: Recommended Operation and Maintenance Requirements for Soakaways

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter, debris and trash	Monthly
	Cut grass – for landscaped areas and access routes	Monthly (during growing season) or as required
	Cut grass – meadow grass in and around basin	Half yearly: spring (before nesting season) and autumn
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
Occasional maintenance	Reseed areas of poor vegetation growth	Annually, or as required
	Prune and trim trees and remove cuttings	As required
	Remove sediment from pre-treatment system when 50% full	As required
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realign the rip-rap	As required
	Repair or rehabilitate inlets, outlets and overflows	As required
	Rehabilitate infiltration surface using scarifying and spiking techniques if performance deteriorates	As required
	Relevel uneven surfaces and reinstate design levels	As required
Monitoring	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and pre-treatment systems for silt accumulation; establish appropriate silt removal frequencies	Half yearly
	Inspect infiltration surfaces for compaction and ponding	Monthly

Table 7.2: Recommended Operation and Maintenance Requirements for Infiltration Basins

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

Table 7.3: Recommended Operation and Maintenance Requirements for Swales

Maintenance Schedule	Required Action	Typical Frequency
Regular inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plants for disease infection, poor growth, invasive species etc. and replace as necessary	Quarterly
	Inspect inlets and outlets for blockage	Quarterly
Regular maintenance	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually
Occasional maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required
Remedial actions	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years

Table 7.4: Recommended Operation and Maintenance Requirements for Rain Gardens

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 glyphosphate 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 to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the 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 three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first 6 months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table 7.5: Recommended Operation and Maintenance Requirements for Permeable Pavements

Appendix A Focus On Design Information

1. Drainage Statement
2. Drainage Strategy Plan 0521/PH9/320 – Revision C

MicroDrainage Files:

3. 0521-PH9 Network 1 – Details
4. 0521-PH9 Network 1 – 2 Year Summary
5. 0521-PH9 Network 1 – 30 Year Summary
6. 0521-PH9 Network 1 – 100 Year Plus 30% Summary
7. 0521-PH9 Infiltration Basin
8. 0521-PH9 Permeable Paving PP1
9. 0521-PH9 Permeable Paving PP2
10. 0521-PH9 Permeable Paving PP3
11. 0521-PH9 Permeable Paving PP4
12. 0521-PH9 Permeable Paving PP5
13. 0521-PH9 Permeable Paving PP6
14. 0521-PH9 Permeable Paving PP7
15. 0521-PH9 Permeable Paving PP8
16. 0521-PH9 Permeable Paving PP9
17. 0521-PH9 Permeable Paving PP10
18. 0521-PH9 Permeable Paving PP11
19. 0521-PH9 Permeable Paving PP12
20. 0521-PH9 Permeable Paving PP13
21. 0521-PH9 Permeable Tarmac PT1
22. 0521-PH9 Private Soakaway PS1
23. 0521-PH9 Private Soakaway PS2
24. 0521-PH9 Rain Garden 1A
25. 0521-PH9 Rain Garden 1B
26. 0521-PH9 Rain Garden 2A
27. 0521-PH9 Rain Garden 2B
28. 0521-PH9 Rain Garden 3A
29. 0521-PH9 Rain Garden 3B
30. 0521-PH9 Rain Garden 4A
31. 0521-PH9 Rain Garden 4B
32. 0521-PH9 Rain Garden 5A
33. 0521-PH9 Rain Garden 5B
34. 0521-PH9 Swale East
35. 0521-PH9 Swale West

DRAINAGE STATEMENT - 0521 Heyford Park, Bicester PHASE 9

Foul Drainage

1. Heyford Park is served by an existing private foul sewerage system and treatment works.
2. The existing sewers immediately downstream of Phase 9 have been deemed not to be to an adoptable standard due proximity to existing and proposed buildings and shallow gradients.
3. As such, it will be necessary to provide a pump station to convey the proposed foul sewerage from the site to a previously agreed connection point towards the east of Phase 4.
4. The foul pumping station with Phase 4 has been designed and installed to accept flows from Phase 9 via Harris Road.
5. The proposed foul sewerage systems, including pumping station and rising main are to be adopted by County Water Ltd as part of a Section 104 Agreement.

Surface Water Drainage

1. The natural topography of the site drains towards Gallos Brook, which originates on the southern boundary within the south-eastern corner of the site prior to flowing south.
2. Immediately north of the existing outfall to Gallos Brook is an existing surface water treatment works which serves a 525Ø culvert which crosses the site in a north-south direction.
3. The existing 525Ø culvert transfers flows from the airfield to the north of Camp Road (which runs adjacent to the northern site boundary) and as such we will have to be maintained but diverted to eliminate a significant restraint on the proposed layout and drainage strategy.
4. The existing surface water treatment works shall be removed and replaced with a modern equivalent (Hydro International's Downstream Defender or similar approved) located to eliminate a significant restraint on the proposed layout and drainage strategy.
5. The site is comprised predominantly of limestone with local borehole records showing the geology to be silty clay with much limestone gravel. The underlying geology therefore has the potential to provide infiltration as a means of discharging surface water. Targeted in-situ infiltration testing has been carried out at 3 No locations within the site, The resulting rates were 1.18 x 10-5, 3.28 x 10-4 and 6.86 x 10-5 m/s. The lowest rate of 1.18 x 10-5 m/s has been used in the design of all permeable paving, permeable tarmac, rain gardens, private soakaways and the infiltration basin. 6.86 x 10-5 m/s has been used in the design of the watercourse/swale.
6. The proposed surface water drainage strategy shall consist of a combination of a conventional drainage network and Sustainable Urban Drainage Systems (SUDS) using the natural topography of the site to convey surface water run-off to a strategically placed attenuation basin located adjacent to the existing outfall to Gallos Brook on the southern boundary.

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ON DESIGN

FOCUS
ON DEVELOPMENT

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7. A flow control device shall be placed downstream of the proposed infiltration basin, restricting flows to the greenfield run off rate for the 1 in 100 Year event.
8. The infiltration basin shall comprise of a soft-landscaped feature with banks ranging from 1:5 minimum - 1:4 maximum, and a total volume of 2775m³ providing storage for the 1 in 100 Year event plus 30% climate change with a freeboard allowance of 573mm. The attenuation area will be constructed in 'cut' and graded into existing ground levels.
9. Finished floor levels are to be set a minimum of 600mm above the maximum water level of 120.142.
10. The following SUDS measures are to be incorporated in the proposed surface water drainage strategy:

    - Open Channel Watercourse adjacent to adoptable carriageway - The use of watercourse will provide visual and ecological amenity while assisting in improving the quality of the surface water runoff by filtering out organic matter, silt and hydrocarbons as the water passes through the soft-landscaped channel.
    - Permeable Paving within private roads, driveways and courtyards, tanked with an outfall to the downstream sewers - The use of permeable paving will assist in improving the quality of the surface water runoff by filtering out organic matter, silt and hydrocarbons as the water passes through the geo-textile and stone layers.
    - Rain Gardens within public open space i.e. a 300mm deep depression with a planted filter bed at the base and drain conveying flows through the rain garden towards an outfall to downstream SUDS or sewers - The use of rain gardens will provide visual and ecological amenity while assisting in improving the quality of the surface water runoff by filtering out organic matter, silt and hydrocarbons as the water passes through the filter bed.
    - Water butts - each affordable dwelling will be provided with a water butt attached to a rainwater pipe in rear gardens. This will allow surface water runoff from roof areas to be stored for reuse in the garden.

All adoptable foul and surface water drainage is to be designed in accordance with Sewers for Adoption 7th Edition and the Building Regulations.

09.04.2018

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PHASE 9, HEYFORD PARK, UPPER HEYFORD, BICESTER

DORCHESTER LIVING

N

EXISTING 525Ø CULVERT TO BE DIVERTED THROUGH PROPOSED DEVELOPMENT ENSURING EXISTING CAPACITY IS MAINTAINED

PROPOSED SURFACE WATER SEWERS DESIGNED TO PASS OVER PROPOSED CULVERT DIVERSION WITH SUFFICIENT CLEARANCE

EXISTING TREATMENT WORKS TO BE REMOVED AND 525Ø CULVERT DIVERTED AROUND PROPOSED POND TO EXISTING OUTFALL

FLOW CONTROL CHAMBER RESTRICTING FLOWS TO 12.9l/s

INFILTRATION BASIN VOLUME 2775m3 IMP AREA 3489m2 BANKS 1:5 MIN 573mm FREEBOARD

TREATMENT DEVICE CL121.520 IL119.404(525Ø)

OUTFALL IL119.337(525Ø)

FLOW CONTROL CL120.625 IL119.329(525Ø)

EXG OUTFALL TO GALLOS BROOK IL118.596(525Ø)

CL120.925 IL119.325(525Ø)

CL120.731 IL119.325(525Ø)

CL122.776 IL121.326(450Ø)

CL122.844 IL121.209(450Ø)

CL122.991 IL121.175(450Ø)

CL122.859 IL119.931(525Ø) IL119.931(600Ø)

CL123.100 IL120.090(225Ø) IL119.790(525Ø)

CL122.983 IL119.562(525Ø) TBC

CL123.135 IL119.515(525Ø)

CL121.996 IL119.427(525Ø) TBC

CL122.200 IL120.710(225Ø)

CL122.150 IL120.394(525Ø) IL120.319(600Ø)

CL121.700 IL120.540(375Ø) IL120.540(525Ø)

CL122.733 IL121.509(225Ø)

CL122.950 IL120.150(600Ø)

CL123.651 IL120.053(600Ø)

CL123.485 IL120.027(600Ø)

CL123.249 IL120.212(525Ø)

CL123.083 IL121.040(225Ø) IL120.815(450Ø) IL120.251(525Ø)

CL122.949 IL120.025(600Ø)

CL123.510 IL119.916(600Ø)

CL123.985 IL119.653(750Ø)

CL122.794 IL119.613(750Ø)

CL122.494 IL119.481(750Ø)

CL122.818 IL121.050(600Ø)

G1148 -

BCP

STORE

Pump Station

REVISION/S:

A. 2017-07-03 UPDATED TO SUIT LATEST SITE LAYOUT. DRAINAGE STRATEGY REVIEWED FOLLOWING RECEIPT OF LATEST INFILTRATION TESTING RESULTS. RWW
B. 2017-12-12 UPDATED TO SUIT LATEST SITE LAYOUT. RWW
C. 2018-04-09 WATERCOURSE INFILTRATION RATE UPDATED, FP13 CHANGED TO 400MM. JAK

DRAINAGE STATEMENT

Foul Drainage

1. Heyford Park is served by an existing private foul sewerage system and treatment works.
2. The existing sewers immediately downstream of Phase 9 have been deemed not to be to an adoptable standard due proximity to existing and proposed buildings and shallow gradients. As such, it will be necessary to provide a pump station to convey the proposed foul sewerage from the site to a previously agreed connection point towards the east of Phase 4.
3. The foul pumping station with Phase 4 has been designed and installed to accept flows from Phase 9 via Harris Road.
4. The proposed foul sewerage systems, including pumping station and rising main are to be adopted by County Water Ltd as part of a Section 104 Agreement.

Surface Water Drainage

1. The natural topography of the site drains towards Gallos Brook, which originates on the southern boundary within the south-eastern corner of the site prior to flowing south.
2. Immediately north of the existing outfall to Gallos Brook is an existing surface water treatment works which serves a 525Ø culvert which crosses the site in a north-south direction.
3. The existing 525Ø culvert transfers flows from the airfield to the north of Camp Road (which runs adjacent to the northern site boundary) and as such we will have to be maintained but diverted to eliminate a significant restraint on the proposed layout and drainage strategy.
4. The existing surface water treatment works shall be removed and replaced with a modern equivalent (Hydro International's Downstream Defender or similar approved) located to eliminate a significant restraint on the proposed layout and drainage strategy.
5. The site is comprised predominantly of limestone with local borehole records showing the geology to be silty clay with much limestone gravel. The underlying geology therefore has the potential to provide infiltration as a means of discharging surface water. Targeted in-situ infiltration testing has been carried out at 3 No locations within the site, The resulting rates were 1.18 x 10-5, 3.28 x 10-4 and 6.86 x 10-5 m/s. The lowest rate of 1.18 x 10-5 m/s has been used in the design of all permeable paving, permeable tarmac, rain gardens, private soakaways and the infiltration basin. 6.86 x 10-5 m/s has been used in the design of the watercourse/swale.
6. The proposed surface water drainage strategy shall consist of a combination of a conventional drainage network and Sustainable Urban Drainage Systems (SUDS) using the natural topography of the site to convey surface water run-off to a strategically placed attenuation basin located adjacent to the existing outfall to Gallos Brook on the southern boundary. A flow control device shall be placed downstream of the proposed infiltration basin, restricting flows to the greenfield run off rate for the 1 in 100 Year event.
7. The infiltration basin shall comprise of a soft-landscaped feature with banks ranging from 1:5 minimum - 1:4 maximum, and a total volume of 2775m³ providing storage for the 1 in 100 Year event plus 30% climate change with a freeboard allowance of 573mm. The attenuation area will be constructed in 'cut' and graded into existing ground levels.
8. Finished floor levels are to be set a minimum of 600mm above the maximum water level of 120.142.
9. The following SUDS measures are to be incorporated in the proposed surface water drainage strategy:
10.
- Open Channel Watercourse adjacent to adoptable carriageway - The use of watercourse will provide visual and ecological amenity while assisting in improving the quality of the surface water runoff by filtering out organic matter, silt and hydrocarbons as the water passes through the soft-landscaped channel.
- Permeable Paving within private roads, driveways and courtyards, tanked with an outfall to the downstream sewers - The use of permeable paving will assist in improving the quality of the surface water runoff by filtering out organic matter, silt and hydrocarbons as the water passes through the geo-textile and stone layers.
- Rain Gardens within public open space i.e. a 300mm deep depression with a planted filter bed at the base and drain conveying flows through the rain garden towards an outfall to downstream SUDS or sewers - The use of rain gardens will provide visual and ecological amenity while assisting in improving the quality of the surface water runoff by filtering out organic matter, silt and hydrocarbons as the water passes through the filter bed.
- Water butts - each affordable dwelling will be provided with a water butt attached to a rainwater pipe in rear gardens. This will allow surface water runoff from roof areas to be stored for reuse in the garden.

All adoptable foul and surface water drainage is to be designed in accordance with Sewers for Adoption 7th Edition and the Building Regulations.

LEGEND

DRAINAGE STRATEGY

EXISTING SURFACE WATER SEWER		EXISTING FOUL WATER SEWER	
PROPOSED SURFACE WATER SEWER		PROPOSED FOUL WATER SEWER	
PROPOSED FOUL RISING MAIN		AREAS DRAINING TO PERMEABLE BLOCK PAVING (INFILTRATION)	
AREAS DRAINING TO INFILTRATION BASIN (INFILTRATION RESTRICTED BECHANGE TO EXISTING WATERCOURSE)		AREAS DRAINING TO RAIN GARDEN (INFILTRATION)	
AREAS DRAINING TO PERMEABLE MACADAM (INFILTRATION)		AREAS DRAINING TO PRIVATE SOAKAWAY	
AREAS DRAINING TO PROPOSED WATERCOURSE (INFILTRATION)		PERMEABLE BLOCK PAVING	
PRIVATE SOAKAWAY		INFILTRATION BASIN	

DRAINAGE STRATEGY PLAN

SCALE: 1:500 @ A0

DATE: OCT 2016
DRAWN: JIL

DRAWING TITLE: DRAINAGE STRATEGY PLAN
DRAWING NO: 0521/PHY/320 C

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 0521-PH9-NETWORK 1.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.400	Minimum Backdrop Height (m)	0.075
Maximum Rainfall (mm/hr)	100	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for 0521-PH9-NETWORK 1.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	53.163	0.328	162.1	0.133	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	13.581	0.110	123.5	0.034	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	41.049	0.772	53.2	0.102	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	36.299	0.116	312.9	0.091	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	23.544	0.075	313.9	0.059	0.00	0.0	0.600	o	375	Pipe/Conduit	
3.000	54.227	0.523	103.7	0.135	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	37.120	0.096	386.7	0.093	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.004	74.922	0.195	384.2	0.187	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	65.52	5.87	122.507	0.133	0.0	0.0	0.0	1.02	40.7	23.6
2.000	69.14	5.19	123.061	0.034	0.0	0.0	0.0	1.18	46.7	6.4
2.001	67.03	5.57	122.951	0.136	0.0	0.0	0.0	1.80	71.5	24.7
1.001	62.26	6.55	122.104	0.360	0.0	0.0	0.0	0.88	62.4	60.7
1.002	60.58	6.94	121.913	0.419	0.0	0.0	0.0	1.02	112.3	68.7
3.000	66.35	5.70	122.511	0.135	0.0	0.0	0.0	1.28	51.0	24.3
1.003	58.16	7.54	121.763	0.647	0.0	0.0	0.0	1.03	163.5	101.9
1.004	53.91	8.75	121.667	0.834	0.0	0.0	0.0	1.03	164.0	121.8

Network Design Table for 0521-PH9-NETWORK 1.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
4.000	34.484	0.491	70.2	0.086	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	53.049	0.106	500.5	0.132	0.00	0.0	0.600	o	525	Pipe/Conduit	
5.000	48.256	1.119	43.1	0.120	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.006	84.704	0.169	501.2	0.211	0.00	0.0	0.600	o	525	Pipe/Conduit	
6.000	48.256	1.288	37.5	0.120	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.007	54.199	0.638	85.0	0.135	0.00	0.0	0.600	o	525	Pipe/Conduit	
7.000	59.303	0.355	167.1	0.148	5.00	0.0	0.600	o	225	Pipe/Conduit	
8.000	12.892	0.077	167.4	0.032	5.00	0.0	0.600	o	225	Pipe/Conduit	
8.001	41.146	0.830	49.6	0.103	0.00	0.0	0.600	o	225	Pipe/Conduit	
7.001	47.752	0.153	312.1	0.119	0.00	0.0	0.600	o	375	Pipe/Conduit	
7.002	9.875	0.694	14.2	0.025	0.00	0.0	0.600	o	375	Pipe/Conduit	
9.000	45.380	0.118	384.6	0.113	5.00	0.0	0.600	o	450	Pipe/Conduit	
9.001	12.961	0.034	381.2	0.032	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
4.000	68.15	5.37	122.197	0.086	0.0	0.0	0.0	1.56	62.1	15.9
1.005	51.27	9.64	121.397	1.052	0.0	0.0	0.0	0.99	215.3	146.1
5.000	67.96	5.40	122.719	0.120	0.0	0.0	0.0	2.00	79.4	22.1
1.006	47.63	11.06	121.291	1.383	0.0	0.0	0.0	0.99	215.1	178.4
6.000	68.11	5.38	122.719	0.120	0.0	0.0	0.0	2.14	85.2	22.1
1.007	46.77	11.43	121.122	1.638	0.0	0.0	0.0	2.43	526.3	207.5
7.000	64.95	5.98	122.236	0.148	0.0	0.0	0.0	1.01	40.1	26.0
8.000	69.02	5.21	122.788	0.032	0.0	0.0	0.0	1.01	40.1	6.0
8.001	66.99	5.58	122.711	0.135	0.0	0.0	0.0	1.86	74.0	24.5
7.001	61.33	6.76	121.731	0.402	0.0	0.0	0.0	1.02	112.7	66.8
7.002	61.19	6.79	121.578	0.427	0.0	0.0	0.0	4.82	532.9	70.8
9.000	66.19	5.73	121.326	0.113	0.0	0.0	0.0	1.03	163.9	20.3
9.001	65.13	5.94	121.208	0.145	0.0	0.0	0.0	1.04	164.6	25.6

Network Design Table for 0521-PH9-NETWORK 1.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
9.002	44.897	0.117	383.7	0.112	0.00	0.0	0.600	o	450	Pipe/Conduit	
9.003	93.601	0.243	385.2	0.234	0.00	0.0	0.600	o	450	Pipe/Conduit	
10.000	59.724	0.468	127.6	0.149	5.00	0.0	0.600	o	225	Pipe/Conduit	
9.004	19.651	0.039	503.9	0.049	0.00	0.0	0.600	o	525	Pipe/Conduit	
9.005	42.052	0.084	500.6	0.105	0.00	0.0	0.600	o	525	Pipe/Conduit	
7.003	12.965	0.026	498.7	0.032	0.00	0.0	0.600	o	525	Pipe/Conduit	
11.000	59.972	1.010	59.4	0.150	5.00	0.0	0.600	o	225	Pipe/Conduit	
7.004	55.713	0.111	501.9	0.139	0.00	0.0	0.600	o	525	Pipe/Conduit	
7.005	55.713	0.112	497.4	0.139	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.008	20.245	0.040	506.1	0.051	0.00	0.0	0.600	o	750	Pipe/Conduit	
1.009	28.374	0.057	497.8	0.071	0.00	0.0	0.600	o	750	Pipe/Conduit	
1.010	19.220	0.038	505.8	0.048	0.00	0.0	0.600	o	750	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
9.002	61.74	6.67	121.174	0.257	0.0	0.0	0.0	1.03	164.1	43.0
9.003	55.80	8.18	121.057	0.491	0.0	0.0	0.0	1.03	163.8	74.2
10.000	65.54	5.86	121.508	0.149	0.0	0.0	0.0	1.16	46.0	26.4
9.004	54.68	8.51	120.251	0.689	0.0	0.0	0.0	0.99	214.5	102.0
9.005	52.47	9.22	120.212	0.794	0.0	0.0	0.0	0.99	215.2	112.8
7.003	51.84	9.43	120.128	1.253	0.0	0.0	0.0	1.00	215.7	175.9
11.000	66.96	5.59	122.537	0.150	0.0	0.0	0.0	1.70	67.6	27.2
7.004	49.31	10.37	120.102	1.542	0.0	0.0	0.0	0.99	214.9	205.9
7.005	47.06	11.30	119.991	1.681	0.0	0.0	0.0	1.00	215.9	214.3
1.008	46.16	11.70	119.654	3.370	0.0	0.0	0.0	1.24	546.5	421.3
1.009	45.35	12.08	119.614	3.441	0.0	0.0	0.0	1.25	551.1	422.6
1.010	44.82	12.34	119.557	3.489	0.0	0.0	0.0	1.24	546.7	423.5

Free Flowing Outfall Details for 0521-PH9-NETWORK 1.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.010	12	122.494	119.519	0.000	0	0

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 0521-PH9-NETWORK 1.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.400	Minimum Backdrop Height (m)	0.075
Maximum Rainfall (mm/hr)	100	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Free Flowing Outfall Details for 0521-PH9-NETWORK 1.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.010	12	122.494	119.519	0.000	0	0

Simulation Criteria for 0521-PH9-NETWORK 1.SWS

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.400		

Summary of Critical Results by Maximum Level (Rank 1) for 0521-PH9-NETWORK 1.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2
Climate Change (%)	0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	2	+0%					122.635
2.000	13	15 Winter	2	+0%					123.119
2.001	14	15 Winter	2	+0%					123.039
1.001	2	15 Winter	2	+0%					122.346
1.002	3	15 Winter	2	+0%					122.138
3.000	15	15 Winter	2	+0%					122.624
1.003	4	15 Winter	2	+0%					122.048
1.004	5	15 Winter	2	+0%					121.964
4.000	16	15 Winter	2	+0%					122.276
1.005	6	15 Winter	2	+0%					121.742
5.000	17	15 Winter	2	+0%					122.801
1.006	7	15 Winter	2	+0%					121.645
6.000	18	15 Winter	2	+0%					122.798
1.007	8	15 Winter	2	+0%					121.338
7.000	19	15 Winter	2	+0%					122.375
8.000	25	15 Winter	2	+0%					122.850
8.001	26	15 Winter	2	+0%					122.796
7.001	20	15 Winter	2	+0%					121.946
7.002	21	15 Winter	2	+0%					121.693

Summary of Critical Results by Maximum Level (Rank 1) for 0521-PH9-NETWORK 1.SWS

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	-0.097	0.000	0.59		23.1	OK	
2.000	13	-0.167	0.000	0.15		6.1	OK	
2.001	14	-0.137	0.000	0.32		21.5	OK	
1.001	2	-0.058	0.000	0.98		56.7	OK	
1.002	3	-0.150	0.000	0.66		63.7	OK	
3.000	15	-0.112	0.000	0.49		23.9	OK	
1.003	4	-0.165	0.000	0.66		95.3	OK	
1.004	5	-0.153	0.000	0.74		113.5	OK	
4.000	16	-0.146	0.000	0.26		15.2	OK	
1.005	6	-0.180	0.000	0.68		130.7	OK	
5.000	17	-0.143	0.000	0.28		21.2	OK	
1.006	7	-0.171	0.000	0.76		152.9	OK	
6.000	18	-0.146	0.000	0.26		21.3	OK	
1.007	8	-0.309	0.000	0.36		168.3	OK	
7.000	19	-0.086	0.000	0.66		25.6	OK	
8.000	25	-0.163	0.000	0.17		5.7	OK	
8.001	26	-0.140	0.000	0.30		21.3	OK	
7.001	20	-0.160	0.000	0.61		62.9	OK	
7.002	21	-0.260	0.000	0.20		66.5	OK	

Summary of Critical Results by Maximum Level (Rank 1) for 0521-PH9-NETWORK 1.SWS

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
9.000	27	15 Winter	2	+0%					121.443
9.001	28	15 Winter	2	+0%					121.369
9.002	29	15 Winter	2	+0%					121.343
9.003	30	15 Winter	2	+0%					121.267
10.000	33	15 Winter	2	+0%					121.635
9.004	31	15 Winter	2	+0%					120.776
9.005	32	15 Winter	2	+0%	2/15 Winter				120.746
7.003	22	15 Winter	2	+0%					120.653
11.000	34	15 Winter	2	+0%					122.638
7.004	23	15 Winter	2	+0%					120.548
7.005	24	15 Winter	2	+0%					120.417
1.008	9	15 Winter	2	+0%					120.310
1.009	10	15 Winter	2	+0%					120.251
1.010	11	15 Winter	2	+0%					120.195

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
9.000	27	-0.333	0.000	0.13		19.5	OK	
9.001	28	-0.289	0.000	0.21		23.3	OK	
9.002	29	-0.281	0.000	0.25		37.5	OK	
9.003	30	-0.240	0.000	0.44		68.7	OK	
10.000	33	-0.098	0.000	0.61		26.9	OK	
9.004	31	0.000	0.000	0.64		94.7	OK	
9.005	32	0.009	0.000	0.55		103.0	SURCHARGED	
7.003	22	0.000	0.000	1.39		164.4	OK	
11.000	34	-0.124	0.000	0.41		26.9	OK	
7.004	23	-0.079	0.000	0.96		186.6	OK	
7.005	24	-0.099	0.000	0.98		189.9	OK	
1.008	9	-0.094	0.000	0.99		343.6	OK	
1.009	10	-0.113	0.000	0.81		341.1	OK	
1.010	11	-0.112	0.000	1.00		333.4	OK	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 0521-PH9-NETWORK 1.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.400	Minimum Backdrop Height (m)	0.075
Maximum Rainfall (mm/hr)	100	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Free Flowing Outfall Details for 0521-PH9-NETWORK 1.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.010	12	122.494	119.519	0.000	0	0

Simulation Criteria for 0521-PH9-NETWORK 1.SWS

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.400		

Summary of Critical Results by Maximum Level (Rank 1) for 0521-PH9-NETWORK 1.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	30
Climate Change (%)	0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	30	+0%	30/15 Summer				123.186
2.000	13	15 Winter	30	+0%					123.151
2.001	14	15 Winter	30	+0%					123.125
1.001	2	15 Winter	30	+0%	30/15 Summer				122.917
1.002	3	15 Winter	30	+0%	30/15 Summer				122.638
3.000	15	15 Winter	30	+0%	30/15 Winter				122.813
1.003	4	15 Winter	30	+0%	30/15 Summer				122.552
1.004	5	15 Winter	30	+0%	30/15 Summer				122.440
4.000	16	15 Winter	30	+0%					122.311
1.005	6	15 Winter	30	+0%	30/15 Summer				122.127
5.000	17	15 Winter	30	+0%					122.838
1.006	7	15 Winter	30	+0%	30/15 Summer				121.972
6.000	18	15 Winter	30	+0%					122.833
1.007	8	15 Winter	30	+0%					121.428
7.000	19	15 Winter	30	+0%	30/15 Summer				122.697
8.000	25	15 Winter	30	+0%					122.882
8.001	26	15 Winter	30	+0%					122.849
7.001	20	15 Winter	30	+0%	30/15 Summer				122.172
7.002	21	15 Winter	30	+0%					121.744

Summary of Critical Results by Maximum Level (Rank 1) for 0521-PH9-NETWORK 1.SWS

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	0.454	0.000	0.92		35.8	SURCHARGED	
2.000	13	-0.135	0.000	0.29		11.6	OK	
2.001	14	-0.051	0.000	0.71		48.2	OK	
1.001	2	0.513	0.000	1.67		96.3	SURCHARGED	
1.002	3	0.350	0.000	1.10		106.5	SURCHARGED	
3.000	15	0.077	0.000	0.87		42.7	SURCHARGED	
1.003	4	0.339	0.000	1.10		158.9	SURCHARGED	
1.004	5	0.323	0.000	1.23		188.1	SURCHARGED	
4.000	16	-0.111	0.000	0.49		28.9	OK	
1.005	6	0.205	0.000	1.17		225.8	SURCHARGED	
5.000	17	-0.106	0.000	0.53		40.2	OK	
1.006	7	0.156	0.000	1.33		266.4	SURCHARGED	
6.000	18	-0.111	0.000	0.50		40.4	OK	
1.007	8	-0.219	0.000	0.64		302.3	OK	
7.000	19	0.236	0.000	1.18		45.8	SURCHARGED	
8.000	25	-0.131	0.000	0.32		10.9	OK	
8.001	26	-0.087	0.000	0.68		48.0	OK	
7.001	20	0.066	0.000	1.19		124.2	SURCHARGED	
7.002	21	-0.209	0.000	0.40		131.2	OK	

Summary of Critical Results by Maximum Level (Rank 1) for 0521-PH9-NETWORK 1.SWS

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
9.000	27	15 Winter	30	+0%					121.629
9.001	28	15 Winter	30	+0%					121.613
9.002	29	15 Winter	30	+0%					121.595
9.003	30	15 Winter	30	+0%	30/15 Winter				121.522
10.000	33	15 Winter	30	+0%	30/15 Summer				121.811
9.004	31	15 Winter	30	+0%	30/15 Summer				121.477
9.005	32	15 Winter	30	+0%	30/15 Summer				121.437
7.003	22	15 Winter	30	+0%	30/15 Summer				121.389
11.000	34	15 Winter	30	+0%					122.689
7.004	23	15 Winter	30	+0%	30/15 Summer				121.270
7.005	24	15 Winter	30	+0%	30/15 Summer				121.023
1.008	9	15 Winter	30	+0%	30/15 Summer				120.721
1.009	10	15 Winter	30	+0%	30/15 Summer				120.560
1.010	11	15 Winter	30	+0%	30/15 Summer				120.396

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
9.000	27	-0.147	0.000	0.25		36.8	OK	
9.001	28	-0.045	0.000	0.40		43.5	OK	
9.002	29	-0.029	0.000	0.50		73.1	OK	
9.003	30	0.015	0.000	0.83		128.2	SURCHARGED	
10.000	33	0.078	0.000	1.07		47.3	SURCHARGED	
9.004	31	0.701	0.000	1.07		157.5	SURCHARGED	
9.005	32	0.700	0.000	0.86		162.4	SURCHARGED	
7.003	22	0.736	0.000	2.16		256.2	SURCHARGED	
11.000	34	-0.073	0.000	0.78		51.1	OK	
7.004	23	0.643	0.000	1.64		317.0	SURCHARGED	
7.005	24	0.507	0.000	1.69		328.8	SURCHARGED	
1.008	9	0.317	0.000	1.81		627.5	SURCHARGED	
1.009	10	0.196	0.000	1.50		631.3	SURCHARGED	
1.010	11	0.089	0.000	1.90		632.0	SURCHARGED	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 0521-PH9-NETWORK 1.SWS

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.400	Minimum Backdrop Height (m)	0.075
Maximum Rainfall (mm/hr)	100	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Free Flowing Outfall Details for 0521-PH9-NETWORK 1.SWS

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.010	12	122.494	119.519	0.000	0	0

Simulation Criteria for 0521-PH9-NETWORK 1.SWS

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.400		

Summary of Critical Results by Maximum Level (Rank 1) for 0521-PH9-NETWORK 1.SWS

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.400
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	100
Climate Change (%)	30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	15 Winter	100	+30%	100/15 Summer	100/15 Summer		
2.000	13	15 Winter	100	+30%	100/15 Summer			
2.001	14	15 Winter	100	+30%	100/15 Summer	100/15 Winter		
1.001	2	15 Winter	100	+30%	100/15 Summer	100/15 Summer		
1.002	3	15 Summer	100	+30%	100/15 Summer			
3.000	15	15 Winter	100	+30%	100/15 Summer	100/15 Summer		
1.003	4	15 Winter	100	+30%	100/15 Summer	100/15 Summer		
1.004	5	15 Winter	100	+30%	100/15 Summer	100/15 Winter		
4.000	16	15 Winter	100	+30%	100/15 Summer			
1.005	6	15 Winter	100	+30%	100/15 Summer			
5.000	17	15 Winter	100	+30%	100/15 Summer			
1.006	7	30 Winter	100	+30%	100/15 Summer			
6.000	18	15 Winter	100	+30%				
1.007	8	30 Winter	100	+30%	100/15 Summer			
7.000	19	15 Winter	100	+30%	100/15 Summer	100/15 Winter		
8.000	25	15 Winter	100	+30%	100/15 Summer			
8.001	26	15 Winter	100	+30%	100/15 Summer			
7.001	20	15 Winter	100	+30%	100/15 Summer			
7.002	21	15 Winter	100	+30%	100/15 Summer			

Summary of Critical Results by Maximum Level (Rank 1) for 0521-PH9-NETWORK 1.SWS

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	1	124.044	1.312	11.842	1.73		67.5	FLOOD	4
2.000	13	124.542	1.256	0.000	0.42		17.0	FLOOD RISK	
2.001	14	124.477	1.301	0.661	0.78		53.2	FLOOD	1
1.001	2	124.002	1.598	1.906	1.82		105.1	FLOOD	2
1.002	3	123.698	1.410	0.000	1.31		125.9	FLOOD RISK	
3.000	15	124.038	1.302	2.416	1.02		50.1	FLOOD	4
1.003	4	123.558	1.345	3.700	1.49		214.8	FLOOD	3
1.004	5	123.404	1.287	1.040	1.63		249.8	FLOOD	2
4.000	16	123.117	0.695	0.000	0.69		40.1	SURCHARGED	
1.005	6	122.952	1.030	0.000	1.69		326.9	SURCHARGED	
5.000	17	123.227	0.283	0.000	0.80		61.1	SURCHARGED	
1.006	7	122.683	0.867	0.000	2.06		413.6	SURCHARGED	
6.000	18	122.880	-0.064	0.000	0.84		68.3	OK	
1.007	8	121.982	0.335	0.000	1.02		482.4	SURCHARGED	
7.000	19	123.763	1.302	1.775	1.66		64.2	FLOOD	1
8.000	25	123.600	0.587	0.000	0.42		14.4	SURCHARGED	
8.001	26	123.582	0.646	0.000	0.94		66.4	SURCHARGED	
7.001	20	123.267	1.161	0.000	1.63		169.2	SURCHARGED	
7.002	21	123.006	1.053	0.000	0.47		153.1	SURCHARGED	

Summary of Critical Results by Maximum Level (Rank 1) for 0521-PH9-NETWORK 1.SWS

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
9.000	27	15 Winter	100	+30%	100/15 Summer	100/15 Summer		
9.001	28	15 Winter	100	+30%	100/15 Summer	100/15 Winter		
9.002	29	15 Winter	100	+30%	100/15 Summer			
9.003	30	15 Winter	100	+30%	100/15 Summer	100/15 Winter		
10.000	33	15 Winter	100	+30%	100/15 Summer	100/15 Summer		
9.004	31	15 Winter	100	+30%	100/15 Summer			
9.005	32	15 Winter	100	+30%	100/15 Summer			
7.003	22	15 Winter	100	+30%	100/15 Summer			
11.000	34	15 Winter	100	+30%	100/15 Summer			
7.004	23	15 Winter	100	+30%	100/15 Summer			
7.005	24	15 Winter	100	+30%	100/15 Summer			
1.008	9	30 Winter	100	+30%	100/15 Summer			
1.009	10	30 Winter	100	+30%	100/15 Summer			
1.010	11	30 Winter	100	+30%	100/15 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
9.000	27	122.794	1.018	18.340	0.56		82.6	FLOOD	4
9.001	28	122.844	1.186	0.790	0.98		106.1	FLOOD	1
9.002	29	122.874	1.250	0.000	0.71		104.9	FLOOD RISK	
9.003	30	122.825	1.318	9.603	0.94		145.6	FLOOD	2
10.000	33	122.714	0.981	12.346	1.42		63.0	FLOOD	4
9.004	31	122.854	2.078	0.000	1.44		212.7	FLOOD RISK	
9.005	32	122.826	2.089	0.000	1.14		214.4	SURCHARGED	
7.003	22	122.745	2.092	0.000	3.13		370.9	SURCHARGED	
11.000	34	123.410	0.648	0.000	1.15		75.0	SURCHARGED	
7.004	23	122.520	1.893	0.000	2.33		451.2	SURCHARGED	
7.005	24	121.949	1.433	0.000	2.41		469.2	SURCHARGED	
1.008	9	121.344	0.940	0.000	2.71		937.8	SURCHARGED	
1.009	10	120.983	0.619	0.000	2.26		952.3	SURCHARGED	
1.010	11	120.609	0.302	0.000	2.87		957.5	SURCHARGED	

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 510 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	119.825	0.488	15.2	12.9	27.9	811.4	O K
30 min Summer	119.945	0.608	17.0	12.9	29.4	1055.2	O K
60 min Summer	120.054	0.717	18.6	12.9	30.5	1290.9	O K
120 min Summer	120.143	0.806	20.0	12.9	30.9	1493.1	O K
180 min Summer	120.178	0.841	20.5	12.9	31.1	1577.7	O K
240 min Summer	120.192	0.855	20.7	12.9	31.4	1610.8	O K
360 min Summer	120.194	0.857	20.8	12.9	31.4	1616.8	O K
480 min Summer	120.186	0.849	20.6	12.9	31.3	1595.5	O K
600 min Summer	120.175	0.838	20.5	12.9	31.0	1570.2	O K
720 min Summer	120.163	0.826	20.3	12.9	31.0	1541.5	O K
960 min Summer	120.137	0.800	19.9	12.9	30.9	1480.1	O K
1440 min Summer	120.082	0.745	19.0	12.9	30.7	1352.9	O K
2160 min Summer	120.002	0.665	17.8	12.9	30.0	1176.7	O K
2880 min Summer	119.930	0.593	16.7	12.9	29.2	1023.4	O K
4320 min Summer	119.805	0.468	14.9	12.9	27.7	773.3	O K
5760 min Summer	119.705	0.368	13.4	12.9	26.3	586.4	O K
7200 min Summer	119.627	0.290	12.3	12.7	25.0	450.4	O K
8640 min Summer	119.569	0.232	11.5	12.4	23.8	352.5	O K
10080 min Summer	119.527	0.190	10.9	11.9	22.8	284.3	O K
15 min Winter	119.875	0.538	15.9	12.9	28.6	911.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	128.285	0.0	838.5	26
30 min Summer	84.226	0.0	1101.3	40
60 min Summer	52.662	0.0	1377.3	68
120 min Summer	31.800	0.0	1663.5	126
180 min Summer	23.353	0.0	1832.5	186
240 min Summer	18.644	0.0	1950.8	244
360 min Summer	13.543	0.0	2125.6	360
480 min Summer	10.792	0.0	2258.6	418
600 min Summer	9.043	0.0	2365.6	480
720 min Summer	7.823	0.0	2455.7	542
960 min Summer	6.219	0.0	2602.9	672
1440 min Summer	4.493	0.0	2821.2	944
2160 min Summer	3.241	0.0	3052.6	1348
2880 min Summer	2.568	0.0	3224.9	1736
4320 min Summer	1.847	0.0	3479.7	2508
5760 min Summer	1.461	0.0	3668.9	3224
7200 min Summer	1.217	0.0	3820.7	3896
8640 min Summer	1.048	0.0	3948.0	4584
10080 min Summer	0.923	0.0	4057.8	5248
15 min Winter	128.285	0.0	939.2	26

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	120.007	0.670	17.9	12.9	30.1	1186.4	O K
60 min Winter	120.126	0.789	19.7	12.9	30.9	1455.0	O K
120 min Winter	120.225	0.888	21.2	12.9	32.1	1690.8	O K
180 min Winter	120.266	0.929	21.9	12.9	33.0	1792.8	O K
240 min Winter	120.283	0.946	22.2	12.9	33.3	1837.5	O K
360 min Winter	120.292	0.955	22.3	12.9	33.5	1859.8	O K
480 min Winter	120.285	0.948	22.2	12.9	33.4	1840.6	O K
600 min Winter	120.269	0.932	21.9	12.9	33.0	1802.1	O K
720 min Winter	120.256	0.919	21.7	12.9	32.8	1769.6	O K
960 min Winter	120.226	0.889	21.3	12.9	32.1	1692.9	O K
1440 min Winter	120.152	0.815	20.1	12.9	31.0	1515.4	O K
2160 min Winter	120.037	0.700	18.4	12.9	30.3	1253.3	O K
2880 min Winter	119.933	0.596	16.8	12.9	29.2	1028.8	O K
4320 min Winter	119.756	0.419	14.2	12.9	27.0	679.9	O K
5760 min Winter	119.623	0.286	12.2	12.7	24.9	443.5	O K
7200 min Winter	119.535	0.198	11.0	12.0	23.0	297.3	O K
8640 min Winter	119.492	0.155	10.4	10.4	20.8	230.0	O K
10080 min Winter	119.468	0.131	10.0	8.5	18.6	191.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	1233.5	40
60 min Winter	52.662	0.0	1542.7	68
120 min Winter	31.800	0.0	1863.3	126
180 min Winter	23.353	0.0	2052.5	182
240 min Winter	18.644	0.0	2185.0	240
360 min Winter	13.543	0.0	2380.8	352
480 min Winter	10.792	0.0	2529.7	458
600 min Winter	9.043	0.0	2649.6	506
720 min Winter	7.823	0.0	2750.5	570
960 min Winter	6.219	0.0	2915.3	726
1440 min Winter	4.493	0.0	3159.8	1028
2160 min Winter	3.241	0.0	3418.9	1456
2880 min Winter	2.568	0.0	3612.0	1852
4320 min Winter	1.847	0.0	3897.3	2600
5760 min Winter	1.461	0.0	4109.3	3296
7200 min Winter	1.217	0.0	4279.3	3904
8640 min Winter	1.048	0.0	4421.8	4576
10080 min Winter	0.923	0.0	4544.8	5248

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 3.489

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.560	4	8	2.054	8	12	0.860	12	16	0.014

Time Area Diagram

Total Area (ha) 0.000

Time From:	(mins) To:	Area (ha)
0	4	0.000

Model Details

Storage is Online Cover Level (m) 120.620

Infiltration Basin Structure

Invert Level (m) 119.337 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.04248 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.04248

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1397.6	1.283	3031.7

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0159-1290-1283-1290
Design Head (m)	1.283
Design Flow (l/s)	12.9
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	159
Invert Level (m)	119.337
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.283	12.9
Flush-Flo™	0.380	12.9
Kick-Flo®	0.834	10.5
Mean Flow over Head Range	-	11.1

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.7	1.200	12.5	3.000	19.3	7.000	29.0
0.200	12.0	1.400	13.4	3.500	20.8	7.500	30.0
0.300	12.8	1.600	14.3	4.000	22.2	8.000	30.9
0.400	12.9	1.800	15.1	4.500	23.4	8.500	31.8
0.500	12.7	2.000	15.9	5.000	24.7	9.000	32.7
0.600	12.5	2.200	16.7	5.500	25.8	9.500	33.6
0.800	11.0	2.400	17.4	6.000	26.9		
1.000	11.5	2.600	18.0	6.500	28.0		

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 136 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	0.158	0.158	1.2	10.0	Flood Risk
30 min Summer	0.208	0.208	1.2	13.2	Flood Risk
60 min Summer	0.248	0.248	1.2	15.7	Flood Risk
120 min Summer	0.265	0.265	1.2	16.8	Flood Risk
180 min Summer	0.262	0.262	1.2	16.6	Flood Risk
240 min Summer	0.254	0.254	1.2	16.1	Flood Risk
360 min Summer	0.234	0.234	1.2	14.8	Flood Risk
480 min Summer	0.213	0.213	1.2	13.5	Flood Risk
600 min Summer	0.193	0.193	1.2	12.2	Flood Risk
720 min Summer	0.174	0.174	1.2	11.0	Flood Risk
960 min Summer	0.140	0.140	1.2	8.9	Flood Risk
1440 min Summer	0.088	0.088	1.2	5.6	Flood Risk
2160 min Summer	0.050	0.050	1.2	3.2	Flood Risk
2880 min Summer	0.041	0.041	1.0	2.6	O K
4320 min Summer	0.030	0.030	0.8	1.9	O K
5760 min Summer	0.024	0.024	0.6	1.5	O K
7200 min Summer	0.020	0.020	0.5	1.3	O K
8640 min Summer	0.017	0.017	0.4	1.1	O K
10080 min Summer	0.015	0.015	0.4	1.0	O K
15 min Winter	0.181	0.181	1.2	11.5	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	128.285	0.0	24
30 min Summer	84.226	0.0	37
60 min Summer	52.662	0.0	64
120 min Summer	31.800	0.0	114
180 min Summer	23.353	0.0	144
240 min Summer	18.644	0.0	176
360 min Summer	13.543	0.0	244
480 min Summer	10.792	0.0	312
600 min Summer	9.043	0.0	378
720 min Summer	7.823	0.0	442
960 min Summer	6.219	0.0	568
1440 min Summer	4.493	0.0	798
2160 min Summer	3.241	0.0	1112
2880 min Summer	2.568	0.0	1476
4320 min Summer	1.847	0.0	2204
5760 min Summer	1.461	0.0	2936
7200 min Summer	1.217	0.0	3672
8640 min Summer	1.048	0.0	4368
10080 min Summer	0.923	0.0	5128
15 min Winter	128.285	0.0	24

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.238	0.238	1.2	15.1	Flood Risk
60 min Winter	0.284	0.284	1.2	18.0	Flood Risk
120 min Winter	0.308	0.308	1.2	19.5	Flood Risk
180 min Winter	0.302	0.302	1.2	19.1	Flood Risk
240 min Winter	0.291	0.291	1.2	18.4	Flood Risk
360 min Winter	0.262	0.262	1.2	16.6	Flood Risk
480 min Winter	0.231	0.231	1.2	14.6	Flood Risk
600 min Winter	0.200	0.200	1.2	12.7	Flood Risk
720 min Winter	0.171	0.171	1.2	10.8	Flood Risk
960 min Winter	0.120	0.120	1.2	7.6	Flood Risk
1440 min Winter	0.054	0.054	1.2	3.5	Flood Risk
2160 min Winter	0.038	0.038	1.0	2.4	O K
2880 min Winter	0.030	0.030	0.8	1.9	O K
4320 min Winter	0.022	0.022	0.5	1.4	O K
5760 min Winter	0.017	0.017	0.4	1.1	O K
7200 min Winter	0.015	0.015	0.4	0.9	O K
8640 min Winter	0.012	0.012	0.3	0.8	O K
10080 min Winter	0.011	0.011	0.3	0.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	38
60 min Winter	52.662	0.0	64
120 min Winter	31.800	0.0	118
180 min Winter	23.353	0.0	156
240 min Winter	18.644	0.0	190
360 min Winter	13.543	0.0	266
480 min Winter	10.792	0.0	338
600 min Winter	9.043	0.0	408
720 min Winter	7.823	0.0	474
960 min Winter	6.219	0.0	596
1440 min Winter	4.493	0.0	786
2160 min Winter	3.241	0.0	1124
2880 min Winter	2.568	0.0	1496
4320 min Winter	1.847	0.0	2216
5760 min Winter	1.461	0.0	2944
7200 min Winter	1.217	0.0	3664
8640 min Winter	1.048	0.0	4416
10080 min Winter	0.923	0.0	5152

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.051

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

Time Area Diagram

Total Area (ha) 0.000

Time From:	(mins) To:	Area (ha)
0	4	0.000

Model Details

Storage is Online Cover Level (m) 0.350

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.04248	Width (m)	6.6
Membrane Percolation (mm/hr)	1000	Length (m)	32.0
Max Percolation (l/s)	58.7	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	0.000	Membrane Depth (m)	0

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 157 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	0.179	0.179	2.5	22.8	Flood Risk
30 min Summer	0.235	0.235	2.5	30.0	Flood Risk
60 min Summer	0.281	0.281	2.5	35.9	Flood Risk
120 min Summer	0.303	0.303	2.5	38.7	Flood Risk
180 min Summer	0.300	0.300	2.5	38.3	Flood Risk
240 min Summer	0.292	0.292	2.5	37.3	Flood Risk
360 min Summer	0.271	0.271	2.5	34.7	Flood Risk
480 min Summer	0.250	0.250	2.5	32.0	Flood Risk
600 min Summer	0.229	0.229	2.5	29.3	Flood Risk
720 min Summer	0.209	0.209	2.5	26.8	Flood Risk
960 min Summer	0.172	0.172	2.5	22.0	Flood Risk
1440 min Summer	0.113	0.113	2.5	14.4	Flood Risk
2160 min Summer	0.061	0.061	2.5	7.7	O K
2880 min Summer	0.045	0.045	2.3	5.8	O K
4320 min Summer	0.033	0.033	1.7	4.2	O K
5760 min Summer	0.027	0.027	1.3	3.4	O K
7200 min Summer	0.022	0.022	1.1	2.8	O K
8640 min Summer	0.019	0.019	1.0	2.4	O K
10080 min Summer	0.017	0.017	0.8	2.1	O K
15 min Winter	0.204	0.204	2.5	26.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	128.285	0.0	24
30 min Summer	84.226	0.0	38
60 min Summer	52.662	0.0	66
120 min Summer	31.800	0.0	120
180 min Summer	23.353	0.0	150
240 min Summer	18.644	0.0	182
360 min Summer	13.543	0.0	248
480 min Summer	10.792	0.0	316
600 min Summer	9.043	0.0	384
720 min Summer	7.823	0.0	450
960 min Summer	6.219	0.0	576
1440 min Summer	4.493	0.0	814
2160 min Summer	3.241	0.0	1136
2880 min Summer	2.568	0.0	1476
4320 min Summer	1.847	0.0	2204
5760 min Summer	1.461	0.0	2936
7200 min Summer	1.217	0.0	3632
8640 min Summer	1.048	0.0	4352
10080 min Summer	0.923	0.0	5136
15 min Winter	128.285	0.0	25

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.268	0.268	2.5	34.2	Flood Risk
60 min Winter	0.322	0.322	2.5	41.1	Flood Risk
120 min Winter	0.352	0.352	2.5	45.0	Flood Risk
180 min Winter	0.348	0.348	2.5	44.5	Flood Risk
240 min Winter	0.336	0.336	2.5	43.0	Flood Risk
360 min Winter	0.308	0.308	2.5	39.4	Flood Risk
480 min Winter	0.277	0.277	2.5	35.3	Flood Risk
600 min Winter	0.245	0.245	2.5	31.3	Flood Risk
720 min Winter	0.214	0.214	2.5	27.3	Flood Risk
960 min Winter	0.158	0.158	2.5	20.2	Flood Risk
1440 min Winter	0.075	0.075	2.5	9.6	Flood Risk
2160 min Winter	0.042	0.042	2.1	5.4	O K
2880 min Winter	0.034	0.034	1.7	4.3	O K
4320 min Winter	0.024	0.024	1.2	3.1	O K
5760 min Winter	0.019	0.019	1.0	2.4	O K
7200 min Winter	0.016	0.016	0.8	2.0	O K
8640 min Winter	0.014	0.014	0.7	1.7	O K
10080 min Winter	0.012	0.012	0.6	1.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	38
60 min Winter	52.662	0.0	66
120 min Winter	31.800	0.0	120
180 min Winter	23.353	0.0	172
240 min Winter	18.644	0.0	194
360 min Winter	13.543	0.0	270
480 min Winter	10.792	0.0	344
600 min Winter	9.043	0.0	416
720 min Winter	7.823	0.0	484
960 min Winter	6.219	0.0	612
1440 min Winter	4.493	0.0	826
2160 min Winter	3.241	0.0	1128
2880 min Winter	2.568	0.0	1476
4320 min Winter	1.847	0.0	2208
5760 min Winter	1.461	0.0	2936
7200 min Winter	1.217	0.0	3656
8640 min Winter	1.048	0.0	4304
10080 min Winter	0.923	0.0	5008

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.114

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.038	4	8	0.038	8	12	0.038

Time Area Diagram

Total Area (ha) 0.000

Time From:	(mins) To:	Area (ha)
0	4	0.000

Model Details

Storage is Online Cover Level (m) 0.375

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.04248	Width (m)	7.5
Membrane Percolation (mm/hr)	1000	Length (m)	56.8
Max Percolation (l/s)	118.3	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	0.000	Membrane Depth (m)	0

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 142 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	0.164	0.164	2.7	22.5	Flood Risk
30 min Summer	0.215	0.215	2.7	29.6	Flood Risk
60 min Summer	0.257	0.257	2.7	35.3	Flood Risk
120 min Summer	0.275	0.275	2.7	37.8	Flood Risk
180 min Summer	0.272	0.272	2.7	37.4	Flood Risk
240 min Summer	0.264	0.264	2.7	36.3	Flood Risk
360 min Summer	0.244	0.244	2.7	33.5	Flood Risk
480 min Summer	0.223	0.223	2.7	30.7	Flood Risk
600 min Summer	0.203	0.203	2.7	27.9	Flood Risk
720 min Summer	0.183	0.183	2.7	25.2	Flood Risk
960 min Summer	0.148	0.148	2.7	20.4	Flood Risk
1440 min Summer	0.094	0.094	2.7	13.0	Flood Risk
2160 min Summer	0.052	0.052	2.7	7.2	Flood Risk
2880 min Summer	0.042	0.042	2.3	5.8	O K
4320 min Summer	0.031	0.031	1.7	4.2	O K
5760 min Summer	0.025	0.025	1.3	3.4	O K
7200 min Summer	0.021	0.021	1.1	2.8	O K
8640 min Summer	0.018	0.018	1.0	2.4	O K
10080 min Summer	0.016	0.016	0.9	2.1	O K
15 min Winter	0.187	0.187	2.7	25.7	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	128.285	0.0	24
30 min Summer	84.226	0.0	37
60 min Summer	52.662	0.0	64
120 min Summer	31.800	0.0	116
180 min Summer	23.353	0.0	146
240 min Summer	18.644	0.0	178
360 min Summer	13.543	0.0	246
480 min Summer	10.792	0.0	312
600 min Summer	9.043	0.0	380
720 min Summer	7.823	0.0	444
960 min Summer	6.219	0.0	570
1440 min Summer	4.493	0.0	802
2160 min Summer	3.241	0.0	1124
2880 min Summer	2.568	0.0	1476
4320 min Summer	1.847	0.0	2208
5760 min Summer	1.461	0.0	2936
7200 min Summer	1.217	0.0	3672
8640 min Summer	1.048	0.0	4336
10080 min Summer	0.923	0.0	5072
15 min Winter	128.285	0.0	24

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.245	0.245	2.7	33.8	Flood Risk
60 min Winter	0.294	0.294	2.7	40.5	Flood Risk
120 min Winter	0.319	0.319	2.7	44.0	Flood Risk
180 min Winter	0.314	0.314	2.7	43.2	Flood Risk
240 min Winter	0.303	0.303	2.7	41.7	Flood Risk
360 min Winter	0.274	0.274	2.7	37.7	Flood Risk
480 min Winter	0.243	0.243	2.7	33.4	Flood Risk
600 min Winter	0.212	0.212	2.7	29.2	Flood Risk
720 min Winter	0.182	0.182	2.7	25.1	Flood Risk
960 min Winter	0.130	0.130	2.7	17.8	Flood Risk
1440 min Winter	0.059	0.059	2.7	8.1	Flood Risk
2160 min Winter	0.039	0.039	2.1	5.4	O K
2880 min Winter	0.031	0.031	1.7	4.3	O K
4320 min Winter	0.023	0.023	1.2	3.1	O K
5760 min Winter	0.018	0.018	1.0	2.5	O K
7200 min Winter	0.015	0.015	0.8	2.0	O K
8640 min Winter	0.013	0.013	0.7	1.7	O K
10080 min Winter	0.011	0.011	0.6	1.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	38
60 min Winter	52.662	0.0	64
120 min Winter	31.800	0.0	120
180 min Winter	23.353	0.0	166
240 min Winter	18.644	0.0	192
360 min Winter	13.543	0.0	268
480 min Winter	10.792	0.0	340
600 min Winter	9.043	0.0	410
720 min Winter	7.823	0.0	476
960 min Winter	6.219	0.0	600
1440 min Winter	4.493	0.0	798
2160 min Winter	3.241	0.0	1124
2880 min Winter	2.568	0.0	1480
4320 min Winter	1.847	0.0	2184
5760 min Winter	1.461	0.0	2944
7200 min Winter	1.217	0.0	3680
8640 min Winter	1.048	0.0	4328
10080 min Winter	0.923	0.0	5080

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.114

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.038	4	8	0.038	8	12	0.038

Time Area Diagram

Total Area (ha) 0.000

Time From:	(mins) To:	Area (ha)
0	4	0.000

Model Details

Storage is Online Cover Level (m) 0.350

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.04248	Width (m)	8.3
Membrane Percolation (mm/hr)	1000	Length (m)	55.3
Max Percolation (l/s)	127.5	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	0.000	Membrane Depth (m)	0

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 175 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	0.204	0.204	1.9	19.6	Flood Risk
30 min Summer	0.269	0.269	1.9	25.7	Flood Risk
60 min Summer	0.323	0.323	1.9	30.9	Flood Risk
120 min Summer	0.352	0.352	1.9	33.7	Flood Risk
180 min Summer	0.350	0.350	1.9	33.5	Flood Risk
240 min Summer	0.341	0.341	1.9	32.7	Flood Risk
360 min Summer	0.321	0.321	1.9	30.7	Flood Risk
480 min Summer	0.299	0.299	1.9	28.6	Flood Risk
600 min Summer	0.277	0.277	1.9	26.6	Flood Risk
720 min Summer	0.256	0.256	1.9	24.5	Flood Risk
960 min Summer	0.217	0.217	1.9	20.8	Flood Risk
1440 min Summer	0.150	0.150	1.9	14.3	O K
2160 min Summer	0.082	0.082	1.9	7.9	O K
2880 min Summer	0.051	0.051	1.9	4.9	O K
4320 min Summer	0.037	0.037	1.4	3.6	O K
5760 min Summer	0.030	0.030	1.1	2.9	O K
7200 min Summer	0.025	0.025	0.9	2.4	O K
8640 min Summer	0.022	0.022	0.8	2.1	O K
10080 min Summer	0.019	0.019	0.7	1.8	O K
15 min Winter	0.233	0.233	1.9	22.3	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	128.285	0.0	25
30 min Summer	84.226	0.0	38
60 min Summer	52.662	0.0	66
120 min Summer	31.800	0.0	122
180 min Summer	23.353	0.0	158
240 min Summer	18.644	0.0	190
360 min Summer	13.543	0.0	254
480 min Summer	10.792	0.0	322
600 min Summer	9.043	0.0	390
720 min Summer	7.823	0.0	456
960 min Summer	6.219	0.0	586
1440 min Summer	4.493	0.0	832
2160 min Summer	3.241	0.0	1168
2880 min Summer	2.568	0.0	1476
4320 min Summer	1.847	0.0	2208
5760 min Summer	1.461	0.0	2936
7200 min Summer	1.217	0.0	3672
8640 min Summer	1.048	0.0	4400
10080 min Summer	0.923	0.0	5120
15 min Winter	128.285	0.0	25

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.306	0.306	1.9	29.3	Flood Risk
60 min Winter	0.369	0.369	1.9	35.3	Flood Risk
120 min Winter	0.408	0.408	1.9	39.0	Flood Risk
180 min Winter	0.408	0.408	1.9	39.1	Flood Risk
240 min Winter	0.395	0.395	1.9	37.9	Flood Risk
360 min Winter	0.368	0.368	1.9	35.2	Flood Risk
480 min Winter	0.336	0.336	1.9	32.2	Flood Risk
600 min Winter	0.303	0.303	1.9	29.1	Flood Risk
720 min Winter	0.271	0.271	1.9	26.0	Flood Risk
960 min Winter	0.211	0.211	1.9	20.2	Flood Risk
1440 min Winter	0.113	0.113	1.9	10.8	O K
2160 min Winter	0.048	0.048	1.8	4.6	O K
2880 min Winter	0.038	0.038	1.4	3.6	O K
4320 min Winter	0.027	0.027	1.0	2.6	O K
5760 min Winter	0.022	0.022	0.8	2.1	O K
7200 min Winter	0.018	0.018	0.7	1.7	O K
8640 min Winter	0.016	0.016	0.6	1.5	O K
10080 min Winter	0.014	0.014	0.5	1.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	38
60 min Winter	52.662	0.0	66
120 min Winter	31.800	0.0	120
180 min Winter	23.353	0.0	176
240 min Winter	18.644	0.0	204
360 min Winter	13.543	0.0	276
480 min Winter	10.792	0.0	352
600 min Winter	9.043	0.0	424
720 min Winter	7.823	0.0	494
960 min Winter	6.219	0.0	628
1440 min Winter	4.493	0.0	862
2160 min Winter	3.241	0.0	1120
2880 min Winter	2.568	0.0	1496
4320 min Winter	1.847	0.0	2212
5760 min Winter	1.461	0.0	2936
7200 min Winter	1.217	0.0	3672
8640 min Winter	1.048	0.0	4376
10080 min Winter	0.923	0.0	5136

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.096

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.032	4	8	0.032	8	12	0.032

Model Details

Storage is Online Cover Level (m) 0.450

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.04248	Width (m)	10.3
Membrane Percolation (mm/hr)	1000	Length (m)	31.0
Max Percolation (l/s)	88.7	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	0.000	Membrane Depth (m)	0

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 120 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	0.142	0.142	2.2	16.2	Flood Risk
30 min Summer	0.187	0.187	2.2	21.3	Flood Risk
60 min Summer	0.222	0.222	2.2	25.4	Flood Risk
120 min Summer	0.235	0.235	2.2	26.9	Flood Risk
180 min Summer	0.232	0.232	2.2	26.5	Flood Risk
240 min Summer	0.224	0.224	2.2	25.6	Flood Risk
360 min Summer	0.204	0.204	2.2	23.4	Flood Risk
480 min Summer	0.184	0.184	2.2	21.1	Flood Risk
600 min Summer	0.165	0.165	2.2	18.9	Flood Risk
720 min Summer	0.147	0.147	2.2	16.8	Flood Risk
960 min Summer	0.116	0.116	2.2	13.2	Flood Risk
1440 min Summer	0.071	0.071	2.2	8.1	Flood Risk
2160 min Summer	0.046	0.046	2.1	5.2	Flood Risk
2880 min Summer	0.037	0.037	1.7	4.2	Flood Risk
4320 min Summer	0.027	0.027	1.2	3.1	Flood Risk
5760 min Summer	0.022	0.022	1.0	2.5	Flood Risk
7200 min Summer	0.018	0.018	0.8	2.1	Flood Risk
8640 min Summer	0.016	0.016	0.7	1.8	Flood Risk
10080 min Summer	0.014	0.014	0.6	1.6	Flood Risk
15 min Winter	0.163	0.163	2.2	18.6	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	128.285	0.0	24
30 min Summer	84.226	0.0	37
60 min Summer	52.662	0.0	64
120 min Summer	31.800	0.0	108
180 min Summer	23.353	0.0	140
240 min Summer	18.644	0.0	172
360 min Summer	13.543	0.0	240
480 min Summer	10.792	0.0	308
600 min Summer	9.043	0.0	372
720 min Summer	7.823	0.0	436
960 min Summer	6.219	0.0	558
1440 min Summer	4.493	0.0	784
2160 min Summer	3.241	0.0	1112
2880 min Summer	2.568	0.0	1476
4320 min Summer	1.847	0.0	2208
5760 min Summer	1.461	0.0	2936
7200 min Summer	1.217	0.0	3672
8640 min Summer	1.048	0.0	4368
10080 min Summer	0.923	0.0	5136
15 min Winter	128.285	0.0	24

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.213	0.213	2.2	24.4	Flood Risk
60 min Winter	0.255	0.255	2.2	29.1	Flood Risk
120 min Winter	0.273	0.273	2.2	31.2	Flood Risk
180 min Winter	0.266	0.266	2.2	30.5	Flood Risk
240 min Winter	0.255	0.255	2.2	29.2	Flood Risk
360 min Winter	0.226	0.226	2.2	25.9	Flood Risk
480 min Winter	0.196	0.196	2.2	22.4	Flood Risk
600 min Winter	0.166	0.166	2.2	19.0	Flood Risk
720 min Winter	0.139	0.139	2.2	15.9	Flood Risk
960 min Winter	0.093	0.093	2.2	10.6	Flood Risk
1440 min Winter	0.048	0.048	2.1	5.4	Flood Risk
2160 min Winter	0.035	0.035	1.6	4.0	Flood Risk
2880 min Winter	0.028	0.028	1.2	3.2	Flood Risk
4320 min Winter	0.020	0.020	0.9	2.3	Flood Risk
5760 min Winter	0.016	0.016	0.7	1.8	Flood Risk
7200 min Winter	0.013	0.013	0.6	1.5	Flood Risk
8640 min Winter	0.011	0.011	0.5	1.3	Flood Risk
10080 min Winter	0.010	0.010	0.5	1.1	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	37
60 min Winter	52.662	0.0	64
120 min Winter	31.800	0.0	118
180 min Winter	23.353	0.0	150
240 min Winter	18.644	0.0	186
360 min Winter	13.543	0.0	262
480 min Winter	10.792	0.0	332
600 min Winter	9.043	0.0	400
720 min Winter	7.823	0.0	464
960 min Winter	6.219	0.0	580
1440 min Winter	4.493	0.0	760
2160 min Winter	3.241	0.0	1128
2880 min Winter	2.568	0.0	1476
4320 min Winter	1.847	0.0	2204
5760 min Winter	1.461	0.0	2944
7200 min Winter	1.217	0.0	3568
8640 min Winter	1.048	0.0	4200
10080 min Winter	0.923	0.0	5144

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.084

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.028	4	8	0.028	8	12	0.028

Model Details

Storage is Online Cover Level (m) 0.300

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.04248	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	38.1
Max Percolation (l/s)	105.8	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	0.000	Membrane Depth (m)	0

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 181 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	0.210	0.210	1.4	14.7	Flood Risk
30 min Summer	0.276	0.276	1.4	19.4	Flood Risk
60 min Summer	0.331	0.331	1.4	23.3	Flood Risk
120 min Summer	0.362	0.362	1.4	25.4	Flood Risk
180 min Summer	0.361	0.361	1.4	25.3	Flood Risk
240 min Summer	0.352	0.352	1.4	24.7	Flood Risk
360 min Summer	0.331	0.331	1.4	23.3	Flood Risk
480 min Summer	0.309	0.309	1.4	21.7	Flood Risk
600 min Summer	0.288	0.288	1.4	20.2	Flood Risk
720 min Summer	0.266	0.266	1.4	18.7	Flood Risk
960 min Summer	0.226	0.226	1.4	15.9	Flood Risk
1440 min Summer	0.158	0.158	1.4	11.1	Flood Risk
2160 min Summer	0.088	0.088	1.4	6.2	O K
2880 min Summer	0.053	0.053	1.4	3.7	O K
4320 min Summer	0.038	0.038	1.1	2.7	O K
5760 min Summer	0.031	0.031	0.8	2.1	O K
7200 min Summer	0.026	0.026	0.7	1.8	O K
8640 min Summer	0.022	0.022	0.6	1.5	O K
10080 min Summer	0.019	0.019	0.5	1.4	O K
15 min Winter	0.239	0.239	1.4	16.8	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	128.285	0.0	25
30 min Summer	84.226	0.0	38
60 min Summer	52.662	0.0	66
120 min Summer	31.800	0.0	122
180 min Summer	23.353	0.0	160
240 min Summer	18.644	0.0	192
360 min Summer	13.543	0.0	256
480 min Summer	10.792	0.0	324
600 min Summer	9.043	0.0	392
720 min Summer	7.823	0.0	458
960 min Summer	6.219	0.0	588
1440 min Summer	4.493	0.0	836
2160 min Summer	3.241	0.0	1172
2880 min Summer	2.568	0.0	1480
4320 min Summer	1.847	0.0	2204
5760 min Summer	1.461	0.0	2936
7200 min Summer	1.217	0.0	3656
8640 min Summer	1.048	0.0	4400
10080 min Summer	0.923	0.0	5136
15 min Winter	128.285	0.0	25

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.314	0.314	1.4	22.0	Flood Risk
60 min Winter	0.379	0.379	1.4	26.6	Flood Risk
120 min Winter	0.419	0.419	1.4	29.4	Flood Risk
180 min Winter	0.421	0.421	1.4	29.6	Flood Risk
240 min Winter	0.408	0.408	1.4	28.7	Flood Risk
360 min Winter	0.381	0.381	1.4	26.7	Flood Risk
480 min Winter	0.349	0.349	1.4	24.5	Flood Risk
600 min Winter	0.316	0.316	1.4	22.2	Flood Risk
720 min Winter	0.284	0.284	1.4	19.9	Flood Risk
960 min Winter	0.223	0.223	1.4	15.6	Flood Risk
1440 min Winter	0.122	0.122	1.4	8.6	O K
2160 min Winter	0.049	0.049	1.3	3.4	O K
2880 min Winter	0.039	0.039	1.1	2.7	O K
4320 min Winter	0.028	0.028	0.8	2.0	O K
5760 min Winter	0.022	0.022	0.6	1.5	O K
7200 min Winter	0.019	0.019	0.5	1.3	O K
8640 min Winter	0.016	0.016	0.4	1.1	O K
10080 min Winter	0.014	0.014	0.4	1.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	38
60 min Winter	52.662	0.0	66
120 min Winter	31.800	0.0	122
180 min Winter	23.353	0.0	176
240 min Winter	18.644	0.0	218
360 min Winter	13.543	0.0	278
480 min Winter	10.792	0.0	354
600 min Winter	9.043	0.0	426
720 min Winter	7.823	0.0	498
960 min Winter	6.219	0.0	632
1440 min Winter	4.493	0.0	868
2160 min Winter	3.241	0.0	1124
2880 min Winter	2.568	0.0	1480
4320 min Winter	1.847	0.0	2200
5760 min Winter	1.461	0.0	2896
7200 min Winter	1.217	0.0	3656
8640 min Winter	1.048	0.0	4408
10080 min Winter	0.923	0.0	5144

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.072

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.024	4	8	0.024	8	12	0.024

Model Details

Storage is Online Cover Level (m) 0.450

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.04248	Width (m)	6.5
Membrane Percolation (mm/hr)	1000	Length (m)	36.0
Max Percolation (l/s)	65.0	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	0.000	Membrane Depth (m)	0

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 192 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	0.220	0.220	0.8	9.3	Flood Risk
30 min Summer	0.289	0.289	0.8	12.2	Flood Risk
60 min Summer	0.348	0.348	0.8	14.6	Flood Risk
120 min Summer	0.382	0.382	0.8	16.1	Flood Risk
180 min Summer	0.381	0.381	0.8	16.0	Flood Risk
240 min Summer	0.372	0.372	0.8	15.7	Flood Risk
360 min Summer	0.351	0.351	0.8	14.8	Flood Risk
480 min Summer	0.329	0.329	0.8	13.8	Flood Risk
600 min Summer	0.307	0.307	0.8	12.9	Flood Risk
720 min Summer	0.285	0.285	0.8	12.0	Flood Risk
960 min Summer	0.245	0.245	0.8	10.3	Flood Risk
1440 min Summer	0.174	0.174	0.8	7.3	Flood Risk
2160 min Summer	0.098	0.098	0.8	4.1	O K
2880 min Summer	0.058	0.058	0.8	2.4	O K
4320 min Summer	0.040	0.040	0.7	1.7	O K
5760 min Summer	0.032	0.032	0.5	1.3	O K
7200 min Summer	0.027	0.027	0.4	1.1	O K
8640 min Summer	0.023	0.023	0.4	1.0	O K
10080 min Summer	0.020	0.020	0.3	0.8	O K
15 min Winter	0.251	0.251	0.8	10.6	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	128.285	0.0	25
30 min Summer	84.226	0.0	38
60 min Summer	52.662	0.0	66
120 min Summer	31.800	0.0	122
180 min Summer	23.353	0.0	164
240 min Summer	18.644	0.0	194
360 min Summer	13.543	0.0	258
480 min Summer	10.792	0.0	326
600 min Summer	9.043	0.0	394
720 min Summer	7.823	0.0	462
960 min Summer	6.219	0.0	592
1440 min Summer	4.493	0.0	842
2160 min Summer	3.241	0.0	1180
2880 min Summer	2.568	0.0	1504
4320 min Summer	1.847	0.0	2208
5760 min Summer	1.461	0.0	2936
7200 min Summer	1.217	0.0	3664
8640 min Summer	1.048	0.0	4408
10080 min Summer	0.923	0.0	5112
15 min Winter	128.285	0.0	25

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.329	0.329	0.8	13.8	Flood Risk
60 min Winter	0.397	0.397	0.8	16.7	Flood Risk
120 min Winter	0.441	0.441	0.8	18.6	Flood Risk
180 min Winter	0.445	0.445	0.8	18.7	Flood Risk
240 min Winter	0.433	0.433	0.8	18.2	Flood Risk
360 min Winter	0.404	0.404	0.8	17.0	Flood Risk
480 min Winter	0.373	0.373	0.8	15.7	Flood Risk
600 min Winter	0.340	0.340	0.8	14.3	Flood Risk
720 min Winter	0.307	0.307	0.8	12.9	Flood Risk
960 min Winter	0.245	0.245	0.8	10.3	Flood Risk
1440 min Winter	0.140	0.140	0.8	5.9	O K
2160 min Winter	0.051	0.051	0.8	2.2	O K
2880 min Winter	0.041	0.041	0.7	1.7	O K
4320 min Winter	0.029	0.029	0.5	1.2	O K
5760 min Winter	0.023	0.023	0.4	1.0	O K
7200 min Winter	0.019	0.019	0.3	0.8	O K
8640 min Winter	0.017	0.017	0.3	0.7	O K
10080 min Winter	0.015	0.015	0.2	0.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	38
60 min Winter	52.662	0.0	66
120 min Winter	31.800	0.0	122
180 min Winter	23.353	0.0	176
240 min Winter	18.644	0.0	226
360 min Winter	13.543	0.0	280
480 min Winter	10.792	0.0	356
600 min Winter	9.043	0.0	430
720 min Winter	7.823	0.0	500
960 min Winter	6.219	0.0	636
1440 min Winter	4.493	0.0	880
2160 min Winter	3.241	0.0	1136
2880 min Winter	2.568	0.0	1484
4320 min Winter	1.847	0.0	2204
5760 min Winter	1.461	0.0	2888
7200 min Winter	1.217	0.0	3584
8640 min Winter	1.048	0.0	4416
10080 min Winter	0.923	0.0	5176

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.045

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.015	4	8	0.015	8	12	0.015

Model Details

Storage is Online Cover Level (m) 0.450

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.04248	Width (m)	5.4
Membrane Percolation (mm/hr)	1000	Length (m)	26.0
Max Percolation (l/s)	39.0	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	0.000	Membrane Depth (m)	0

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 69 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	0.083	0.083	1.9	7.8	Flood Risk
30 min Summer	0.109	0.109	1.9	10.3	Flood Risk
60 min Summer	0.127	0.127	1.9	12.0	Flood Risk
120 min Summer	0.132	0.132	1.9	12.5	Flood Risk
180 min Summer	0.128	0.128	1.9	12.1	Flood Risk
240 min Summer	0.121	0.121	1.9	11.4	Flood Risk
360 min Summer	0.104	0.104	1.9	9.9	Flood Risk
480 min Summer	0.089	0.089	1.9	8.4	Flood Risk
600 min Summer	0.076	0.076	1.9	7.2	Flood Risk
720 min Summer	0.065	0.065	1.9	6.1	Flood Risk
960 min Summer	0.050	0.050	1.9	4.8	Flood Risk
1440 min Summer	0.039	0.039	1.4	3.7	Flood Risk
2160 min Summer	0.029	0.029	1.1	2.8	Flood Risk
2880 min Summer	0.024	0.024	0.9	2.3	Flood Risk
4320 min Summer	0.018	0.018	0.7	1.7	Flood Risk
5760 min Summer	0.014	0.014	0.5	1.3	Flood Risk
7200 min Summer	0.012	0.012	0.4	1.1	Flood Risk
8640 min Summer	0.010	0.010	0.4	0.9	Flood Risk
10080 min Summer	0.009	0.009	0.3	0.8	Flood Risk
15 min Winter	0.096	0.096	1.9	9.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	128.285	0.0	23
30 min Summer	84.226	0.0	35
60 min Summer	52.662	0.0	60
120 min Summer	31.800	0.0	92
180 min Summer	23.353	0.0	126
240 min Summer	18.644	0.0	160
360 min Summer	13.543	0.0	226
480 min Summer	10.792	0.0	288
600 min Summer	9.043	0.0	348
720 min Summer	7.823	0.0	404
960 min Summer	6.219	0.0	512
1440 min Summer	4.493	0.0	754
2160 min Summer	3.241	0.0	1112
2880 min Summer	2.568	0.0	1476
4320 min Summer	1.847	0.0	2204
5760 min Summer	1.461	0.0	2928
7200 min Summer	1.217	0.0	3608
8640 min Summer	1.048	0.0	4368
10080 min Summer	0.923	0.0	5136
15 min Winter	128.285	0.0	23

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.126	0.126	1.9	11.9	Flood Risk
60 min Winter	0.147	0.147	1.9	13.9	Flood Risk
120 min Winter	0.151	0.151	1.9	14.2	Flood Risk
180 min Winter	0.143	0.143	1.9	13.5	Flood Risk
240 min Winter	0.131	0.131	1.9	12.4	Flood Risk
360 min Winter	0.105	0.105	1.9	9.9	Flood Risk
480 min Winter	0.082	0.082	1.9	7.7	Flood Risk
600 min Winter	0.063	0.063	1.9	6.0	Flood Risk
720 min Winter	0.051	0.051	1.9	4.8	Flood Risk
960 min Winter	0.042	0.042	1.6	3.9	Flood Risk
1440 min Winter	0.031	0.031	1.1	2.9	Flood Risk
2160 min Winter	0.023	0.023	0.8	2.1	Flood Risk
2880 min Winter	0.018	0.018	0.7	1.7	Flood Risk
4320 min Winter	0.013	0.013	0.5	1.2	Flood Risk
5760 min Winter	0.010	0.010	0.4	0.9	Flood Risk
7200 min Winter	0.009	0.009	0.3	0.8	Flood Risk
8640 min Winter	0.007	0.007	0.3	0.7	Flood Risk
10080 min Winter	0.006	0.006	0.2	0.6	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	35
60 min Winter	52.662	0.0	60
120 min Winter	31.800	0.0	100
180 min Winter	23.353	0.0	136
240 min Winter	18.644	0.0	172
360 min Winter	13.543	0.0	240
480 min Winter	10.792	0.0	302
600 min Winter	9.043	0.0	358
720 min Winter	7.823	0.0	402
960 min Winter	6.219	0.0	520
1440 min Winter	4.493	0.0	762
2160 min Winter	3.241	0.0	1124
2880 min Winter	2.568	0.0	1500
4320 min Winter	1.847	0.0	2212
5760 min Winter	1.461	0.0	2896
7200 min Winter	1.217	0.0	3672
8640 min Winter	1.048	0.0	4344
10080 min Winter	0.923	0.0	5152

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.045

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.015	4	8	0.015	8	12	0.015

Model Details

Storage is Online Cover Level (m) 0.200

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.04248	Width (m)	13.7
Membrane Percolation (mm/hr)	1000	Length (m)	23.0
Max Percolation (l/s)	87.5	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	0.000	Membrane Depth (m)	0

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 69 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	0.083	0.083	1.9	7.8	Flood Risk
30 min Summer	0.109	0.109	1.9	10.3	Flood Risk
60 min Summer	0.127	0.127	1.9	12.0	Flood Risk
120 min Summer	0.132	0.132	1.9	12.5	Flood Risk
180 min Summer	0.128	0.128	1.9	12.1	Flood Risk
240 min Summer	0.121	0.121	1.9	11.4	Flood Risk
360 min Summer	0.104	0.104	1.9	9.9	Flood Risk
480 min Summer	0.089	0.089	1.9	8.4	Flood Risk
600 min Summer	0.076	0.076	1.9	7.2	Flood Risk
720 min Summer	0.065	0.065	1.9	6.1	Flood Risk
960 min Summer	0.050	0.050	1.9	4.8	Flood Risk
1440 min Summer	0.039	0.039	1.4	3.7	Flood Risk
2160 min Summer	0.029	0.029	1.1	2.8	Flood Risk
2880 min Summer	0.024	0.024	0.9	2.3	Flood Risk
4320 min Summer	0.018	0.018	0.7	1.7	Flood Risk
5760 min Summer	0.014	0.014	0.5	1.3	Flood Risk
7200 min Summer	0.012	0.012	0.4	1.1	Flood Risk
8640 min Summer	0.010	0.010	0.4	0.9	Flood Risk
10080 min Summer	0.009	0.009	0.3	0.8	Flood Risk
15 min Winter	0.096	0.096	1.9	9.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	128.285	0.0	23
30 min Summer	84.226	0.0	35
60 min Summer	52.662	0.0	60
120 min Summer	31.800	0.0	92
180 min Summer	23.353	0.0	126
240 min Summer	18.644	0.0	160
360 min Summer	13.543	0.0	226
480 min Summer	10.792	0.0	288
600 min Summer	9.043	0.0	348
720 min Summer	7.823	0.0	404
960 min Summer	6.219	0.0	512
1440 min Summer	4.493	0.0	754
2160 min Summer	3.241	0.0	1112
2880 min Summer	2.568	0.0	1476
4320 min Summer	1.847	0.0	2204
5760 min Summer	1.461	0.0	2928
7200 min Summer	1.217	0.0	3608
8640 min Summer	1.048	0.0	4368
10080 min Summer	0.923	0.0	5136
15 min Winter	128.285	0.0	23

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.126	0.126	1.9	11.9	Flood Risk
60 min Winter	0.147	0.147	1.9	13.9	Flood Risk
120 min Winter	0.151	0.151	1.9	14.2	Flood Risk
180 min Winter	0.143	0.143	1.9	13.5	Flood Risk
240 min Winter	0.131	0.131	1.9	12.4	Flood Risk
360 min Winter	0.105	0.105	1.9	9.9	Flood Risk
480 min Winter	0.082	0.082	1.9	7.7	Flood Risk
600 min Winter	0.063	0.063	1.9	6.0	Flood Risk
720 min Winter	0.051	0.051	1.9	4.8	Flood Risk
960 min Winter	0.042	0.042	1.6	3.9	Flood Risk
1440 min Winter	0.031	0.031	1.1	2.9	Flood Risk
2160 min Winter	0.023	0.023	0.8	2.1	Flood Risk
2880 min Winter	0.018	0.018	0.7	1.7	Flood Risk
4320 min Winter	0.013	0.013	0.5	1.2	Flood Risk
5760 min Winter	0.010	0.010	0.4	0.9	Flood Risk
7200 min Winter	0.009	0.009	0.3	0.8	Flood Risk
8640 min Winter	0.007	0.007	0.3	0.7	Flood Risk
10080 min Winter	0.006	0.006	0.2	0.6	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	35
60 min Winter	52.662	0.0	60
120 min Winter	31.800	0.0	100
180 min Winter	23.353	0.0	136
240 min Winter	18.644	0.0	172
360 min Winter	13.543	0.0	240
480 min Winter	10.792	0.0	302
600 min Winter	9.043	0.0	358
720 min Winter	7.823	0.0	402
960 min Winter	6.219	0.0	520
1440 min Winter	4.493	0.0	762
2160 min Winter	3.241	0.0	1124
2880 min Winter	2.568	0.0	1500
4320 min Winter	1.847	0.0	2212
5760 min Winter	1.461	0.0	2896
7200 min Winter	1.217	0.0	3672
8640 min Winter	1.048	0.0	4344
10080 min Winter	0.923	0.0	5152

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.045

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.015	4	8	0.015	8	12	0.015

Model Details

Storage is Online Cover Level (m) 0.200

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.04248	Width (m)	13.7
Membrane Percolation (mm/hr)	1000	Length (m)	23.0
Max Percolation (l/s)	87.5	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	0.000	Membrane Depth (m)	0

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 71 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	0.085	0.085	1.8	7.9	Flood Risk
30 min Summer	0.112	0.112	1.8	10.4	Flood Risk
60 min Summer	0.131	0.131	1.8	12.1	Flood Risk
120 min Summer	0.136	0.136	1.8	12.6	Flood Risk
180 min Summer	0.132	0.132	1.8	12.2	Flood Risk
240 min Summer	0.125	0.125	1.8	11.5	Flood Risk
360 min Summer	0.108	0.108	1.8	10.0	Flood Risk
480 min Summer	0.092	0.092	1.8	8.6	Flood Risk
600 min Summer	0.079	0.079	1.8	7.3	Flood Risk
720 min Summer	0.067	0.067	1.8	6.2	Flood Risk
960 min Summer	0.052	0.052	1.8	4.8	Flood Risk
1440 min Summer	0.040	0.040	1.4	3.7	Flood Risk
2160 min Summer	0.030	0.030	1.1	2.8	Flood Risk
2880 min Summer	0.025	0.025	0.9	2.3	Flood Risk
4320 min Summer	0.018	0.018	0.7	1.7	Flood Risk
5760 min Summer	0.014	0.014	0.5	1.3	Flood Risk
7200 min Summer	0.012	0.012	0.4	1.1	Flood Risk
8640 min Summer	0.010	0.010	0.4	0.9	Flood Risk
10080 min Summer	0.009	0.009	0.3	0.8	Flood Risk
15 min Winter	0.098	0.098	1.8	9.1	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	128.285	0.0	23
30 min Summer	84.226	0.0	35
60 min Summer	52.662	0.0	60
120 min Summer	31.800	0.0	92
180 min Summer	23.353	0.0	126
240 min Summer	18.644	0.0	160
360 min Summer	13.543	0.0	226
480 min Summer	10.792	0.0	288
600 min Summer	9.043	0.0	348
720 min Summer	7.823	0.0	406
960 min Summer	6.219	0.0	514
1440 min Summer	4.493	0.0	754
2160 min Summer	3.241	0.0	1112
2880 min Summer	2.568	0.0	1472
4320 min Summer	1.847	0.0	2204
5760 min Summer	1.461	0.0	2936
7200 min Summer	1.217	0.0	3672
8640 min Summer	1.048	0.0	4400
10080 min Summer	0.923	0.0	5064
15 min Winter	128.285	0.0	23

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.129	0.129	1.8	11.9	Flood Risk
60 min Winter	0.151	0.151	1.8	14.0	Flood Risk
120 min Winter	0.155	0.155	1.8	14.4	Flood Risk
180 min Winter	0.148	0.148	1.8	13.7	Flood Risk
240 min Winter	0.136	0.136	1.8	12.5	Flood Risk
360 min Winter	0.110	0.110	1.8	10.1	Flood Risk
480 min Winter	0.086	0.086	1.8	7.9	Flood Risk
600 min Winter	0.066	0.066	1.8	6.1	Flood Risk
720 min Winter	0.053	0.053	1.8	4.9	Flood Risk
960 min Winter	0.042	0.042	1.5	3.9	Flood Risk
1440 min Winter	0.032	0.032	1.2	2.9	Flood Risk
2160 min Winter	0.023	0.023	0.8	2.1	Flood Risk
2880 min Winter	0.018	0.018	0.7	1.7	Flood Risk
4320 min Winter	0.013	0.013	0.5	1.2	Flood Risk
5760 min Winter	0.010	0.010	0.4	1.0	Flood Risk
7200 min Winter	0.009	0.009	0.3	0.8	Flood Risk
8640 min Winter	0.007	0.007	0.3	0.7	Flood Risk
10080 min Winter	0.007	0.007	0.2	0.6	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	36
60 min Winter	52.662	0.0	62
120 min Winter	31.800	0.0	100
180 min Winter	23.353	0.0	138
240 min Winter	18.644	0.0	174
360 min Winter	13.543	0.0	242
480 min Winter	10.792	0.0	304
600 min Winter	9.043	0.0	360
720 min Winter	7.823	0.0	406
960 min Winter	6.219	0.0	522
1440 min Winter	4.493	0.0	760
2160 min Winter	3.241	0.0	1124
2880 min Winter	2.568	0.0	1480
4320 min Winter	1.847	0.0	2168
5760 min Winter	1.461	0.0	2952
7200 min Winter	1.217	0.0	3664
8640 min Winter	1.048	0.0	4488
10080 min Winter	0.923	0.0	5200

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.045

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.015	4	8	0.015	8	12	0.015

Model Details

Storage is Online Cover Level (m) 0.200

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.04248	Width (m)	13.4
Membrane Percolation (mm/hr)	1000	Length (m)	23.0
Max Percolation (l/s)	85.6	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	0.000	Membrane Depth (m)	0

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 71 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	0.085	0.085	1.8	7.9	Flood Risk
30 min Summer	0.112	0.112	1.8	10.4	Flood Risk
60 min Summer	0.131	0.131	1.8	12.1	Flood Risk
120 min Summer	0.136	0.136	1.8	12.6	Flood Risk
180 min Summer	0.132	0.132	1.8	12.2	Flood Risk
240 min Summer	0.125	0.125	1.8	11.5	Flood Risk
360 min Summer	0.108	0.108	1.8	10.0	Flood Risk
480 min Summer	0.092	0.092	1.8	8.6	Flood Risk
600 min Summer	0.079	0.079	1.8	7.3	Flood Risk
720 min Summer	0.067	0.067	1.8	6.2	Flood Risk
960 min Summer	0.052	0.052	1.8	4.8	Flood Risk
1440 min Summer	0.040	0.040	1.4	3.7	Flood Risk
2160 min Summer	0.030	0.030	1.1	2.8	Flood Risk
2880 min Summer	0.025	0.025	0.9	2.3	Flood Risk
4320 min Summer	0.018	0.018	0.7	1.7	Flood Risk
5760 min Summer	0.014	0.014	0.5	1.3	Flood Risk
7200 min Summer	0.012	0.012	0.4	1.1	Flood Risk
8640 min Summer	0.010	0.010	0.4	0.9	Flood Risk
10080 min Summer	0.009	0.009	0.3	0.8	Flood Risk
15 min Winter	0.098	0.098	1.8	9.1	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	128.285	0.0	23
30 min Summer	84.226	0.0	35
60 min Summer	52.662	0.0	60
120 min Summer	31.800	0.0	92
180 min Summer	23.353	0.0	126
240 min Summer	18.644	0.0	160
360 min Summer	13.543	0.0	226
480 min Summer	10.792	0.0	288
600 min Summer	9.043	0.0	348
720 min Summer	7.823	0.0	406
960 min Summer	6.219	0.0	514
1440 min Summer	4.493	0.0	754
2160 min Summer	3.241	0.0	1112
2880 min Summer	2.568	0.0	1472
4320 min Summer	1.847	0.0	2204
5760 min Summer	1.461	0.0	2936
7200 min Summer	1.217	0.0	3672
8640 min Summer	1.048	0.0	4400
10080 min Summer	0.923	0.0	5064
15 min Winter	128.285	0.0	23

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.129	0.129	1.8	11.9	Flood Risk
60 min Winter	0.151	0.151	1.8	14.0	Flood Risk
120 min Winter	0.155	0.155	1.8	14.4	Flood Risk
180 min Winter	0.148	0.148	1.8	13.7	Flood Risk
240 min Winter	0.136	0.136	1.8	12.5	Flood Risk
360 min Winter	0.110	0.110	1.8	10.1	Flood Risk
480 min Winter	0.086	0.086	1.8	7.9	Flood Risk
600 min Winter	0.066	0.066	1.8	6.1	Flood Risk
720 min Winter	0.053	0.053	1.8	4.9	Flood Risk
960 min Winter	0.042	0.042	1.5	3.9	Flood Risk
1440 min Winter	0.032	0.032	1.2	2.9	Flood Risk
2160 min Winter	0.023	0.023	0.8	2.1	Flood Risk
2880 min Winter	0.018	0.018	0.7	1.7	Flood Risk
4320 min Winter	0.013	0.013	0.5	1.2	Flood Risk
5760 min Winter	0.010	0.010	0.4	1.0	Flood Risk
7200 min Winter	0.009	0.009	0.3	0.8	Flood Risk
8640 min Winter	0.007	0.007	0.3	0.7	Flood Risk
10080 min Winter	0.007	0.007	0.2	0.6	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	36
60 min Winter	52.662	0.0	62
120 min Winter	31.800	0.0	100
180 min Winter	23.353	0.0	138
240 min Winter	18.644	0.0	174
360 min Winter	13.543	0.0	242
480 min Winter	10.792	0.0	304
600 min Winter	9.043	0.0	360
720 min Winter	7.823	0.0	406
960 min Winter	6.219	0.0	522
1440 min Winter	4.493	0.0	760
2160 min Winter	3.241	0.0	1124
2880 min Winter	2.568	0.0	1480
4320 min Winter	1.847	0.0	2168
5760 min Winter	1.461	0.0	2952
7200 min Winter	1.217	0.0	3664
8640 min Winter	1.048	0.0	4488
10080 min Winter	0.923	0.0	5200

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.045

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.015	4	8	0.015	8	12	0.015

Model Details

Storage is Online Cover Level (m) 0.200

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.04248	Width (m)	13.4
Membrane Percolation (mm/hr)	1000	Length (m)	23.0
Max Percolation (l/s)	85.6	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	0.000	Membrane Depth (m)	0

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 138 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	0.160	0.160	0.8	6.5	Flood Risk
30 min Summer	0.210	0.210	0.8	8.5	Flood Risk
60 min Summer	0.250	0.250	0.8	10.2	Flood Risk
120 min Summer	0.267	0.267	0.8	10.9	Flood Risk
180 min Summer	0.264	0.264	0.8	10.8	Flood Risk
240 min Summer	0.256	0.256	0.8	10.4	Flood Risk
360 min Summer	0.236	0.236	0.8	9.6	Flood Risk
480 min Summer	0.216	0.216	0.8	8.8	Flood Risk
600 min Summer	0.196	0.196	0.8	8.0	Flood Risk
720 min Summer	0.176	0.176	0.8	7.2	Flood Risk
960 min Summer	0.142	0.142	0.8	5.8	Flood Risk
1440 min Summer	0.089	0.089	0.8	3.6	Flood Risk
2160 min Summer	0.050	0.050	0.8	2.1	Flood Risk
2880 min Summer	0.041	0.041	0.7	1.7	O K
4320 min Summer	0.030	0.030	0.5	1.2	O K
5760 min Summer	0.024	0.024	0.4	1.0	O K
7200 min Summer	0.020	0.020	0.3	0.8	O K
8640 min Summer	0.017	0.017	0.3	0.7	O K
10080 min Summer	0.015	0.015	0.2	0.6	O K
15 min Winter	0.182	0.182	0.8	7.4	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	128.285	0.0	24
30 min Summer	84.226	0.0	37
60 min Summer	52.662	0.0	64
120 min Summer	31.800	0.0	114
180 min Summer	23.353	0.0	144
240 min Summer	18.644	0.0	176
360 min Summer	13.543	0.0	244
480 min Summer	10.792	0.0	312
600 min Summer	9.043	0.0	378
720 min Summer	7.823	0.0	442
960 min Summer	6.219	0.0	568
1440 min Summer	4.493	0.0	798
2160 min Summer	3.241	0.0	1112
2880 min Summer	2.568	0.0	1476
4320 min Summer	1.847	0.0	2204
5760 min Summer	1.461	0.0	2936
7200 min Summer	1.217	0.0	3640
8640 min Summer	1.048	0.0	4400
10080 min Summer	0.923	0.0	5024
15 min Winter	128.285	0.0	24

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.240	0.240	0.8	9.8	Flood Risk
60 min Winter	0.287	0.287	0.8	11.7	Flood Risk
120 min Winter	0.311	0.311	0.8	12.7	Flood Risk
180 min Winter	0.305	0.305	0.8	12.4	Flood Risk
240 min Winter	0.294	0.294	0.8	12.0	Flood Risk
360 min Winter	0.265	0.265	0.8	10.8	Flood Risk
480 min Winter	0.234	0.234	0.8	9.5	Flood Risk
600 min Winter	0.203	0.203	0.8	8.3	Flood Risk
720 min Winter	0.174	0.174	0.8	7.1	Flood Risk
960 min Winter	0.122	0.122	0.8	5.0	Flood Risk
1440 min Winter	0.056	0.056	0.8	2.3	Flood Risk
2160 min Winter	0.039	0.039	0.6	1.6	O K
2880 min Winter	0.031	0.031	0.5	1.2	O K
4320 min Winter	0.022	0.022	0.4	0.9	O K
5760 min Winter	0.018	0.018	0.3	0.7	O K
7200 min Winter	0.015	0.015	0.2	0.6	O K
8640 min Winter	0.013	0.013	0.2	0.5	O K
10080 min Winter	0.011	0.011	0.2	0.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	38
60 min Winter	52.662	0.0	64
120 min Winter	31.800	0.0	120
180 min Winter	23.353	0.0	158
240 min Winter	18.644	0.0	190
360 min Winter	13.543	0.0	266
480 min Winter	10.792	0.0	338
600 min Winter	9.043	0.0	408
720 min Winter	7.823	0.0	474
960 min Winter	6.219	0.0	596
1440 min Winter	4.493	0.0	788
2160 min Winter	3.241	0.0	1120
2880 min Winter	2.568	0.0	1476
4320 min Winter	1.847	0.0	2184
5760 min Winter	1.461	0.0	2912
7200 min Winter	1.217	0.0	3672
8640 min Winter	1.048	0.0	4384
10080 min Winter	0.923	0.0	5240

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.033

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.011	4	8	0.011	8	12	0.011

Time Area Diagram

Total Area (ha) 0.000

Time From:	(mins) To:	Area (ha)
0	4	0.000

Model Details

Storage is Online Cover Level (m) 0.350

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.04248	Width (m)	6.4
Membrane Percolation (mm/hr)	1000	Length (m)	21.2
Max Percolation (l/s)	37.7	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	0.000	Membrane Depth (m)	0

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 163 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	0.184	0.184	0.9	8.4	Flood Risk
30 min Summer	0.242	0.242	0.9	11.1	Flood Risk
60 min Summer	0.289	0.289	0.9	13.3	Flood Risk
120 min Summer	0.313	0.313	0.9	14.4	Flood Risk
180 min Summer	0.310	0.310	0.9	14.2	Flood Risk
240 min Summer	0.302	0.302	0.9	13.9	Flood Risk
360 min Summer	0.282	0.282	0.9	12.9	Flood Risk
480 min Summer	0.260	0.260	0.9	11.9	Flood Risk
600 min Summer	0.239	0.239	0.9	11.0	Flood Risk
720 min Summer	0.219	0.219	0.9	10.0	Flood Risk
960 min Summer	0.181	0.181	0.9	8.3	Flood Risk
1440 min Summer	0.120	0.120	0.9	5.5	Flood Risk
2160 min Summer	0.065	0.065	0.9	3.0	O K
2880 min Summer	0.046	0.046	0.8	2.1	O K
4320 min Summer	0.034	0.034	0.6	1.6	O K
5760 min Summer	0.027	0.027	0.5	1.2	O K
7200 min Summer	0.023	0.023	0.4	1.0	O K
8640 min Summer	0.020	0.020	0.4	0.9	O K
10080 min Summer	0.017	0.017	0.3	0.8	O K
15 min Winter	0.210	0.210	0.9	9.6	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	128.285	0.0	24
30 min Summer	84.226	0.0	38
60 min Summer	52.662	0.0	66
120 min Summer	31.800	0.0	120
180 min Summer	23.353	0.0	152
240 min Summer	18.644	0.0	184
360 min Summer	13.543	0.0	250
480 min Summer	10.792	0.0	318
600 min Summer	9.043	0.0	384
720 min Summer	7.823	0.0	450
960 min Summer	6.219	0.0	578
1440 min Summer	4.493	0.0	816
2160 min Summer	3.241	0.0	1148
2880 min Summer	2.568	0.0	1476
4320 min Summer	1.847	0.0	2204
5760 min Summer	1.461	0.0	2936
7200 min Summer	1.217	0.0	3672
8640 min Summer	1.048	0.0	4368
10080 min Summer	0.923	0.0	5032
15 min Winter	128.285	0.0	25

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.276	0.276	0.9	12.7	Flood Risk
60 min Winter	0.331	0.331	0.9	15.2	Flood Risk
120 min Winter	0.363	0.363	0.9	16.7	Flood Risk
180 min Winter	0.361	0.361	0.9	16.6	Flood Risk
240 min Winter	0.349	0.349	0.9	16.0	Flood Risk
360 min Winter	0.320	0.320	0.9	14.7	Flood Risk
480 min Winter	0.289	0.289	0.9	13.3	Flood Risk
600 min Winter	0.257	0.257	0.9	11.8	Flood Risk
720 min Winter	0.226	0.226	0.9	10.4	Flood Risk
960 min Winter	0.169	0.169	0.9	7.7	Flood Risk
1440 min Winter	0.082	0.082	0.9	3.8	O K
2160 min Winter	0.044	0.044	0.8	2.0	O K
2880 min Winter	0.035	0.035	0.6	1.6	O K
4320 min Winter	0.025	0.025	0.5	1.1	O K
5760 min Winter	0.020	0.020	0.4	0.9	O K
7200 min Winter	0.017	0.017	0.3	0.8	O K
8640 min Winter	0.014	0.014	0.3	0.6	O K
10080 min Winter	0.013	0.013	0.2	0.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	38
60 min Winter	52.662	0.0	66
120 min Winter	31.800	0.0	120
180 min Winter	23.353	0.0	172
240 min Winter	18.644	0.0	196
360 min Winter	13.543	0.0	272
480 min Winter	10.792	0.0	346
600 min Winter	9.043	0.0	418
720 min Winter	7.823	0.0	486
960 min Winter	6.219	0.0	616
1440 min Winter	4.493	0.0	836
2160 min Winter	3.241	0.0	1124
2880 min Winter	2.568	0.0	1476
4320 min Winter	1.847	0.0	2200
5760 min Winter	1.461	0.0	2936
7200 min Winter	1.217	0.0	3656
8640 min Winter	1.048	0.0	4376
10080 min Winter	0.923	0.0	5152

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.042

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.014	4	8	0.014	8	12	0.014

Time Area Diagram

Total Area (ha) 0.000

Time From:	(mins) To:	Area (ha)
0	4	0.000

Model Details

Storage is Online Cover Level (m) 0.400

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.04248	Width (m)	7.5
Membrane Percolation (mm/hr)	1000	Length (m)	20.4
Max Percolation (l/s)	42.5	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	0.000	Membrane Depth (m)	0

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 136 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	0.158	0.158	10.4	83.7	Flood Risk
30 min Summer	0.208	0.208	10.4	110.0	Flood Risk
60 min Summer	0.248	0.248	10.4	131.3	Flood Risk
120 min Summer	0.265	0.265	10.4	140.2	Flood Risk
180 min Summer	0.262	0.262	10.4	138.5	Flood Risk
240 min Summer	0.253	0.253	10.4	134.2	Flood Risk
360 min Summer	0.234	0.234	10.4	123.7	Flood Risk
480 min Summer	0.213	0.213	10.4	112.8	Flood Risk
600 min Summer	0.193	0.193	10.4	102.2	Flood Risk
720 min Summer	0.174	0.174	10.4	92.1	Flood Risk
960 min Summer	0.140	0.140	10.4	73.9	Flood Risk
1440 min Summer	0.088	0.088	10.4	46.5	Flood Risk
2160 min Summer	0.050	0.050	10.4	26.5	Flood Risk
2880 min Summer	0.041	0.041	8.5	21.5	O K
4320 min Summer	0.030	0.030	6.2	15.9	O K
5760 min Summer	0.024	0.024	4.9	12.6	O K
7200 min Summer	0.020	0.020	4.2	10.6	O K
8640 min Summer	0.017	0.017	3.6	9.0	O K
10080 min Summer	0.015	0.015	3.2	8.0	O K
15 min Winter	0.181	0.181	10.4	95.7	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	128.285	0.0	24
30 min Summer	84.226	0.0	37
60 min Summer	52.662	0.0	64
120 min Summer	31.800	0.0	114
180 min Summer	23.353	0.0	144
240 min Summer	18.644	0.0	176
360 min Summer	13.543	0.0	244
480 min Summer	10.792	0.0	312
600 min Summer	9.043	0.0	378
720 min Summer	7.823	0.0	442
960 min Summer	6.219	0.0	568
1440 min Summer	4.493	0.0	798
2160 min Summer	3.241	0.0	1112
2880 min Summer	2.568	0.0	1476
4320 min Summer	1.847	0.0	2208
5760 min Summer	1.461	0.0	2936
7200 min Summer	1.217	0.0	3672
8640 min Summer	1.048	0.0	4336
10080 min Summer	0.923	0.0	5112
15 min Winter	128.285	0.0	24

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.237	0.237	10.4	125.7	Flood Risk
60 min Winter	0.284	0.284	10.4	150.5	Flood Risk
120 min Winter	0.308	0.308	10.4	163.0	Flood Risk
180 min Winter	0.302	0.302	10.4	159.8	Flood Risk
240 min Winter	0.291	0.291	10.4	153.9	Flood Risk
360 min Winter	0.262	0.262	10.4	138.7	Flood Risk
480 min Winter	0.231	0.231	10.4	122.2	Flood Risk
600 min Winter	0.200	0.200	10.4	105.9	Flood Risk
720 min Winter	0.171	0.171	10.4	90.5	Flood Risk
960 min Winter	0.120	0.120	10.4	63.4	Flood Risk
1440 min Winter	0.054	0.054	10.4	28.8	Flood Risk
2160 min Winter	0.038	0.038	8.0	20.2	O K
2880 min Winter	0.030	0.030	6.3	16.1	O K
4320 min Winter	0.022	0.022	4.5	11.6	O K
5760 min Winter	0.017	0.017	3.6	9.1	O K
7200 min Winter	0.014	0.014	3.0	7.7	O K
8640 min Winter	0.012	0.012	2.6	6.6	O K
10080 min Winter	0.011	0.011	2.2	5.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	38
60 min Winter	52.662	0.0	64
120 min Winter	31.800	0.0	118
180 min Winter	23.353	0.0	156
240 min Winter	18.644	0.0	190
360 min Winter	13.543	0.0	266
480 min Winter	10.792	0.0	338
600 min Winter	9.043	0.0	408
720 min Winter	7.823	0.0	474
960 min Winter	6.219	0.0	596
1440 min Winter	4.493	0.0	786
2160 min Winter	3.241	0.0	1124
2880 min Winter	2.568	0.0	1496
4320 min Winter	1.847	0.0	2212
5760 min Winter	1.461	0.0	2944
7200 min Winter	1.217	0.0	3680
8640 min Winter	1.048	0.0	4416
10080 min Winter	0.923	0.0	5152

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.426

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.142	4	8	0.142	8	12	0.142

Model Details

Storage is Online Cover Level (m) 0.350

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.04248	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	353.0
Max Percolation (l/s)	490.3	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	0.000	Membrane Depth (m)	0

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 428 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	0.162	0.162	0.3	6.9	Flood Risk
30 min Summer	0.210	0.210	0.3	9.0	Flood Risk
60 min Summer	0.256	0.256	0.3	10.9	Flood Risk
120 min Summer	0.293	0.293	0.3	12.5	Flood Risk
180 min Summer	0.307	0.307	0.3	13.1	Flood Risk
240 min Summer	0.311	0.311	0.3	13.3	Flood Risk
360 min Summer	0.307	0.307	0.3	13.1	Flood Risk
480 min Summer	0.301	0.301	0.3	12.9	Flood Risk
600 min Summer	0.294	0.294	0.3	12.6	Flood Risk
720 min Summer	0.286	0.286	0.3	12.2	Flood Risk
960 min Summer	0.271	0.271	0.3	11.6	Flood Risk
1440 min Summer	0.241	0.241	0.3	10.3	Flood Risk
2160 min Summer	0.199	0.199	0.3	8.5	Flood Risk
2880 min Summer	0.164	0.164	0.3	7.0	Flood Risk
4320 min Summer	0.108	0.108	0.3	4.6	Flood Risk
5760 min Summer	0.071	0.071	0.3	3.0	O K
7200 min Summer	0.051	0.051	0.3	2.2	O K
8640 min Summer	0.045	0.045	0.2	1.9	O K
10080 min Summer	0.040	0.040	0.2	1.7	O K
15 min Winter	0.182	0.182	0.3	7.8	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	128.285	0.0	26
30 min Summer	84.226	0.0	40
60 min Summer	52.662	0.0	68
120 min Summer	31.800	0.0	126
180 min Summer	23.353	0.0	184
240 min Summer	18.644	0.0	242
360 min Summer	13.543	0.0	330
480 min Summer	10.792	0.0	388
600 min Summer	9.043	0.0	450
720 min Summer	7.823	0.0	514
960 min Summer	6.219	0.0	652
1440 min Summer	4.493	0.0	924
2160 min Summer	3.241	0.0	1320
2880 min Summer	2.568	0.0	1704
4320 min Summer	1.847	0.0	2424
5760 min Summer	1.461	0.0	3064
7200 min Summer	1.217	0.0	3688
8640 min Summer	1.048	0.0	4416
10080 min Summer	0.923	0.0	5144
15 min Winter	128.285	0.0	26

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.236	0.236	0.3	10.1	Flood Risk
60 min Winter	0.289	0.289	0.3	12.3	Flood Risk
120 min Winter	0.333	0.333	0.3	14.2	Flood Risk
180 min Winter	0.351	0.351	0.3	15.0	Flood Risk
240 min Winter	0.357	0.357	0.3	15.3	Flood Risk
360 min Winter	0.356	0.356	0.3	15.2	Flood Risk
480 min Winter	0.348	0.348	0.3	14.9	Flood Risk
600 min Winter	0.338	0.338	0.3	14.5	Flood Risk
720 min Winter	0.329	0.329	0.3	14.0	Flood Risk
960 min Winter	0.307	0.307	0.3	13.1	Flood Risk
1440 min Winter	0.263	0.263	0.3	11.2	Flood Risk
2160 min Winter	0.201	0.201	0.3	8.6	Flood Risk
2880 min Winter	0.149	0.149	0.3	6.4	Flood Risk
4320 min Winter	0.073	0.073	0.3	3.1	O K
5760 min Winter	0.046	0.046	0.3	2.0	O K
7200 min Winter	0.039	0.039	0.2	1.7	O K
8640 min Winter	0.034	0.034	0.2	1.4	O K
10080 min Winter	0.030	0.030	0.2	1.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	40
60 min Winter	52.662	0.0	68
120 min Winter	31.800	0.0	124
180 min Winter	23.353	0.0	182
240 min Winter	18.644	0.0	238
360 min Winter	13.543	0.0	348
480 min Winter	10.792	0.0	446
600 min Winter	9.043	0.0	478
720 min Winter	7.823	0.0	554
960 min Winter	6.219	0.0	708
1440 min Winter	4.493	0.0	1002
2160 min Winter	3.241	0.0	1412
2880 min Winter	2.568	0.0	1796
4320 min Winter	1.847	0.0	2464
5760 min Winter	1.461	0.0	3000
7200 min Winter	1.217	0.0	3744
8640 min Winter	1.048	0.0	4408
10080 min Winter	0.923	0.0	5144

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.030

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.010	4	8	0.010	8	12	0.010

Time Area Diagram

Total Area (ha) 0.000

Time From:	(mins) To:	Area (ha)
0	4	0.000

Model Details

Storage is Online Cover Level (m) 0.400

Cellular Storage Structure

Invert Level (m) 0.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.04248 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.04248

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	45.0	45.0	0.400	45.0	55.7

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 566 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	0.329	0.329	0.1	2.3	O K
30 min Summer	0.428	0.428	0.1	3.0	O K
60 min Summer	0.524	0.524	0.1	3.7	Flood Risk
120 min Summer	0.608	0.608	0.1	4.3	Flood Risk
180 min Summer	0.643	0.643	0.1	4.6	Flood Risk
240 min Summer	0.659	0.659	0.1	4.7	Flood Risk
360 min Summer	0.665	0.665	0.1	4.7	Flood Risk
480 min Summer	0.659	0.659	0.1	4.7	Flood Risk
600 min Summer	0.651	0.651	0.1	4.6	Flood Risk
720 min Summer	0.642	0.642	0.1	4.6	Flood Risk
960 min Summer	0.621	0.621	0.1	4.4	Flood Risk
1440 min Summer	0.578	0.578	0.1	4.1	Flood Risk
2160 min Summer	0.519	0.519	0.1	3.7	Flood Risk
2880 min Summer	0.466	0.466	0.1	3.3	O K
4320 min Summer	0.376	0.376	0.1	2.7	O K
5760 min Summer	0.303	0.303	0.1	2.2	O K
7200 min Summer	0.244	0.244	0.1	1.7	O K
8640 min Summer	0.195	0.195	0.1	1.4	O K
10080 min Summer	0.154	0.154	0.1	1.1	O K
15 min Winter	0.369	0.369	0.1	2.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	128.285	0.0	22
30 min Summer	84.226	0.0	37
60 min Summer	52.662	0.0	66
120 min Summer	31.800	0.0	124
180 min Summer	23.353	0.0	184
240 min Summer	18.644	0.0	242
360 min Summer	13.543	0.0	360
480 min Summer	10.792	0.0	422
600 min Summer	9.043	0.0	482
720 min Summer	7.823	0.0	546
960 min Summer	6.219	0.0	678
1440 min Summer	4.493	0.0	954
2160 min Summer	3.241	0.0	1364
2880 min Summer	2.568	0.0	1764
4320 min Summer	1.847	0.0	2552
5760 min Summer	1.461	0.0	3296
7200 min Summer	1.217	0.0	4040
8640 min Summer	1.048	0.0	4760
10080 min Summer	0.923	0.0	5448
15 min Winter	128.285	0.0	22

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.481	0.481	0.1	3.4	O K
60 min Winter	0.590	0.590	0.1	4.2	Flood Risk
120 min Winter	0.687	0.687	0.1	4.9	Flood Risk
180 min Winter	0.730	0.730	0.1	5.2	Flood Risk
240 min Winter	0.750	0.750	0.1	5.3	Flood Risk
360 min Winter	0.763	0.763	0.1	5.4	Flood Risk
480 min Winter	0.759	0.759	0.1	5.4	Flood Risk
600 min Winter	0.747	0.747	0.1	5.3	Flood Risk
720 min Winter	0.736	0.736	0.1	5.2	Flood Risk
960 min Winter	0.711	0.711	0.1	5.1	Flood Risk
1440 min Winter	0.652	0.652	0.1	4.6	Flood Risk
2160 min Winter	0.567	0.567	0.1	4.0	Flood Risk
2880 min Winter	0.490	0.490	0.1	3.5	O K
4320 min Winter	0.364	0.364	0.1	2.6	O K
5760 min Winter	0.266	0.266	0.1	1.9	O K
7200 min Winter	0.189	0.189	0.1	1.3	O K
8640 min Winter	0.128	0.128	0.1	0.9	O K
10080 min Winter	0.082	0.082	0.0	0.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	37
60 min Winter	52.662	0.0	66
120 min Winter	31.800	0.0	122
180 min Winter	23.353	0.0	180
240 min Winter	18.644	0.0	238
360 min Winter	13.543	0.0	350
480 min Winter	10.792	0.0	456
600 min Winter	9.043	0.0	546
720 min Winter	7.823	0.0	572
960 min Winter	6.219	0.0	724
1440 min Winter	4.493	0.0	1030
2160 min Winter	3.241	0.0	1472
2880 min Winter	2.568	0.0	1904
4320 min Winter	1.847	0.0	2720
5760 min Winter	1.461	0.0	3464
7200 min Winter	1.217	0.0	4184
8640 min Winter	1.048	0.0	4920
10080 min Winter	0.923	0.0	5544

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.010

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.005	4	8	0.005

Time Area Diagram

Total Area (ha) 0.000

Time From:	(mins) To:	Area (ha)
0	4	0.000

Model Details

Storage is Online Cover Level (m) 0.800

Cellular Storage Structure

Invert Level (m) 0.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.04248 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.04248

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	7.5	7.5	0.800	7.5	16.3

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 128 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	0.047	0.047	0.6	4.9	Flood Risk
30 min Summer	0.058	0.058	0.7	6.2	Flood Risk
60 min Summer	0.067	0.067	0.7	7.2	Flood Risk
120 min Summer	0.071	0.071	0.7	7.6	Flood Risk
180 min Summer	0.071	0.071	0.7	7.6	Flood Risk
240 min Summer	0.070	0.070	0.7	7.5	Flood Risk
360 min Summer	0.066	0.066	0.7	7.1	Flood Risk
480 min Summer	0.062	0.062	0.7	6.6	Flood Risk
600 min Summer	0.058	0.058	0.7	6.2	Flood Risk
720 min Summer	0.055	0.055	0.7	5.7	Flood Risk
960 min Summer	0.049	0.049	0.6	5.1	Flood Risk
1440 min Summer	0.041	0.041	0.5	4.2	Flood Risk
2160 min Summer	0.034	0.034	0.4	3.4	Flood Risk
2880 min Summer	0.029	0.029	0.4	2.9	Flood Risk
4320 min Summer	0.022	0.022	0.3	2.2	Flood Risk
5760 min Summer	0.018	0.018	0.2	1.8	Flood Risk
7200 min Summer	0.016	0.016	0.2	1.5	Flood Risk
8640 min Summer	0.014	0.014	0.2	1.3	Flood Risk
10080 min Summer	0.012	0.012	0.2	1.2	Flood Risk
15 min Winter	0.052	0.052	0.7	5.5	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	128.285	0.0	21
30 min Summer	84.226	0.0	34
60 min Summer	52.662	0.0	62
120 min Summer	31.800	0.0	98
180 min Summer	23.353	0.0	130
240 min Summer	18.644	0.0	164
360 min Summer	13.543	0.0	232
480 min Summer	10.792	0.0	298
600 min Summer	9.043	0.0	362
720 min Summer	7.823	0.0	426
960 min Summer	6.219	0.0	548
1440 min Summer	4.493	0.0	794
2160 min Summer	3.241	0.0	1156
2880 min Summer	2.568	0.0	1528
4320 min Summer	1.847	0.0	2248
5760 min Summer	1.461	0.0	2952
7200 min Summer	1.217	0.0	3680
8640 min Summer	1.048	0.0	4408
10080 min Summer	0.923	0.0	5144
15 min Winter	128.285	0.0	21

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.065	0.065	0.7	7.0	Flood Risk
60 min Winter	0.075	0.075	0.7	8.1	Flood Risk
120 min Winter	0.079	0.079	0.7	8.6	Flood Risk
180 min Winter	0.079	0.079	0.7	8.6	Flood Risk
240 min Winter	0.077	0.077	0.7	8.3	Flood Risk
360 min Winter	0.071	0.071	0.7	7.6	Flood Risk
480 min Winter	0.065	0.065	0.7	6.9	Flood Risk
600 min Winter	0.059	0.059	0.7	6.2	Flood Risk
720 min Winter	0.054	0.054	0.7	5.6	Flood Risk
960 min Winter	0.047	0.047	0.6	4.8	Flood Risk
1440 min Winter	0.037	0.037	0.5	3.8	Flood Risk
2160 min Winter	0.029	0.029	0.4	2.9	Flood Risk
2880 min Winter	0.024	0.024	0.3	2.4	Flood Risk
4320 min Winter	0.018	0.018	0.2	1.7	Flood Risk
5760 min Winter	0.014	0.014	0.2	1.4	Flood Risk
7200 min Winter	0.012	0.012	0.2	1.1	Flood Risk
8640 min Winter	0.010	0.010	0.1	1.0	Flood Risk
10080 min Winter	0.009	0.009	0.1	0.9	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	34
60 min Winter	52.662	0.0	62
120 min Winter	31.800	0.0	110
180 min Winter	23.353	0.0	140
240 min Winter	18.644	0.0	178
360 min Winter	13.543	0.0	252
480 min Winter	10.792	0.0	320
600 min Winter	9.043	0.0	386
720 min Winter	7.823	0.0	448
960 min Winter	6.219	0.0	570
1440 min Winter	4.493	0.0	822
2160 min Winter	3.241	0.0	1192
2880 min Winter	2.568	0.0	1552
4320 min Winter	1.847	0.0	2260
5760 min Winter	1.461	0.0	2944
7200 min Winter	1.217	0.0	3744
8640 min Winter	1.048	0.0	4440
10080 min Winter	0.923	0.0	5136

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.022

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.011	4	8	0.011

Model Details

Storage is Online Cover Level (m) 0.300

Swale Structure

Infiltration Coefficient Base (m/hr)	0.04248	Length (m)	37.2
Infiltration Coefficient Side (m/hr)	0.04248	Side Slope (1:X)	4.0
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	0.000	Cap Infiltration Depth (m)	0.000
Base Width (m)	2.6		

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 128 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	0.047	0.047	0.6	4.9	Flood Risk
30 min Summer	0.058	0.058	0.7	6.2	Flood Risk
60 min Summer	0.067	0.067	0.7	7.2	Flood Risk
120 min Summer	0.071	0.071	0.7	7.6	Flood Risk
180 min Summer	0.071	0.071	0.7	7.6	Flood Risk
240 min Summer	0.070	0.070	0.7	7.5	Flood Risk
360 min Summer	0.066	0.066	0.7	7.1	Flood Risk
480 min Summer	0.062	0.062	0.7	6.6	Flood Risk
600 min Summer	0.058	0.058	0.7	6.2	Flood Risk
720 min Summer	0.055	0.055	0.7	5.7	Flood Risk
960 min Summer	0.049	0.049	0.6	5.1	Flood Risk
1440 min Summer	0.041	0.041	0.5	4.2	Flood Risk
2160 min Summer	0.034	0.034	0.4	3.4	Flood Risk
2880 min Summer	0.029	0.029	0.4	2.9	Flood Risk
4320 min Summer	0.022	0.022	0.3	2.2	Flood Risk
5760 min Summer	0.018	0.018	0.2	1.8	Flood Risk
7200 min Summer	0.016	0.016	0.2	1.5	Flood Risk
8640 min Summer	0.014	0.014	0.2	1.3	Flood Risk
10080 min Summer	0.012	0.012	0.2	1.2	Flood Risk
15 min Winter	0.052	0.052	0.7	5.5	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	128.285	0.0	21
30 min Summer	84.226	0.0	34
60 min Summer	52.662	0.0	62
120 min Summer	31.800	0.0	98
180 min Summer	23.353	0.0	130
240 min Summer	18.644	0.0	164
360 min Summer	13.543	0.0	232
480 min Summer	10.792	0.0	298
600 min Summer	9.043	0.0	362
720 min Summer	7.823	0.0	426
960 min Summer	6.219	0.0	548
1440 min Summer	4.493	0.0	794
2160 min Summer	3.241	0.0	1156
2880 min Summer	2.568	0.0	1528
4320 min Summer	1.847	0.0	2248
5760 min Summer	1.461	0.0	2952
7200 min Summer	1.217	0.0	3680
8640 min Summer	1.048	0.0	4408
10080 min Summer	0.923	0.0	5144
15 min Winter	128.285	0.0	21

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
30 min Winter	0.065	0.065	0.7	7.0	Flood Risk
60 min Winter	0.075	0.075	0.7	8.1	Flood Risk
120 min Winter	0.079	0.079	0.7	8.6	Flood Risk
180 min Winter	0.079	0.079	0.7	8.6	Flood Risk
240 min Winter	0.077	0.077	0.7	8.3	Flood Risk
360 min Winter	0.071	0.071	0.7	7.6	Flood Risk
480 min Winter	0.065	0.065	0.7	6.9	Flood Risk
600 min Winter	0.059	0.059	0.7	6.2	Flood Risk
720 min Winter	0.054	0.054	0.7	5.6	Flood Risk
960 min Winter	0.047	0.047	0.6	4.8	Flood Risk
1440 min Winter	0.037	0.037	0.5	3.8	Flood Risk
2160 min Winter	0.029	0.029	0.4	2.9	Flood Risk
2880 min Winter	0.024	0.024	0.3	2.4	Flood Risk
4320 min Winter	0.018	0.018	0.2	1.7	Flood Risk
5760 min Winter	0.014	0.014	0.2	1.4	Flood Risk
7200 min Winter	0.012	0.012	0.2	1.1	Flood Risk
8640 min Winter	0.010	0.010	0.1	1.0	Flood Risk
10080 min Winter	0.009	0.009	0.1	0.9	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
30 min Winter	84.226	0.0	34
60 min Winter	52.662	0.0	62
120 min Winter	31.800	0.0	110
180 min Winter	23.353	0.0	140
240 min Winter	18.644	0.0	178
360 min Winter	13.543	0.0	252
480 min Winter	10.792	0.0	320
600 min Winter	9.043	0.0	386
720 min Winter	7.823	0.0	448
960 min Winter	6.219	0.0	570
1440 min Winter	4.493	0.0	822
2160 min Winter	3.241	0.0	1192
2880 min Winter	2.568	0.0	1552
4320 min Winter	1.847	0.0	2260
5760 min Winter	1.461	0.0	2944
7200 min Winter	1.217	0.0	3744
8640 min Winter	1.048	0.0	4440
10080 min Winter	0.923	0.0	5136

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.022

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.011	4	8	0.011

Model Details

Storage is Online Cover Level (m) 0.300

Swale Structure

Infiltration Coefficient Base (m/hr)	0.04248	Length (m)	37.2
Infiltration Coefficient Side (m/hr)	0.04248	Side Slope (1:X)	4.0
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	0.000	Cap Infiltration Depth (m)	0.000
Base Width (m)	2.6		

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 160 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	0.066	0.066	0.7	7.6	Flood Risk
30 min Summer	0.082	0.082	0.8	9.7	Flood Risk
60 min Summer	0.095	0.095	0.8	11.5	Flood Risk
120 min Summer	0.102	0.102	0.8	12.4	Flood Risk
180 min Summer	0.103	0.103	0.8	12.5	Flood Risk
240 min Summer	0.102	0.102	0.8	12.4	Flood Risk
360 min Summer	0.098	0.098	0.8	11.9	Flood Risk
480 min Summer	0.094	0.094	0.8	11.3	Flood Risk
600 min Summer	0.089	0.089	0.8	10.6	Flood Risk
720 min Summer	0.084	0.084	0.8	10.0	Flood Risk
960 min Summer	0.075	0.075	0.8	8.9	Flood Risk
1440 min Summer	0.061	0.061	0.7	7.0	Flood Risk
2160 min Summer	0.047	0.047	0.7	5.4	Flood Risk
2880 min Summer	0.040	0.040	0.6	4.5	Flood Risk
4320 min Summer	0.031	0.031	0.5	3.5	Flood Risk
5760 min Summer	0.026	0.026	0.4	2.8	Flood Risk
7200 min Summer	0.022	0.022	0.3	2.4	Flood Risk
8640 min Summer	0.019	0.019	0.3	2.1	Flood Risk
10080 min Summer	0.017	0.017	0.2	1.9	Flood Risk
15 min Winter	0.073	0.073	0.8	8.6	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	128.285	0.0	21
30 min Summer	84.226	0.0	35
60 min Summer	52.662	0.0	62
120 min Summer	31.800	0.0	114
180 min Summer	23.353	0.0	144
240 min Summer	18.644	0.0	176
360 min Summer	13.543	0.0	244
480 min Summer	10.792	0.0	312
600 min Summer	9.043	0.0	378
720 min Summer	7.823	0.0	444
960 min Summer	6.219	0.0	572
1440 min Summer	4.493	0.0	812
2160 min Summer	3.241	0.0	1168
2880 min Summer	2.568	0.0	1528
4320 min Summer	1.847	0.0	2252
5760 min Summer	1.461	0.0	2952
7200 min Summer	1.217	0.0	3680
8640 min Summer	1.048	0.0	4408
10080 min Summer	0.923	0.0	5144
15 min Winter	128.285	0.0	21

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.092	0.092	0.8	11.0	Flood Risk
60 min Winter	0.107	0.107	0.8	13.1	Flood Risk
120 min Winter	0.115	0.115	0.8	14.2	Flood Risk
180 min Winter	0.115	0.115	0.8	14.2	Flood Risk
240 min Winter	0.113	0.113	0.8	14.0	Flood Risk
360 min Winter	0.108	0.108	0.8	13.2	Flood Risk
480 min Winter	0.101	0.101	0.8	12.3	Flood Risk
600 min Winter	0.094	0.094	0.8	11.3	Flood Risk
720 min Winter	0.087	0.087	0.8	10.4	Flood Risk
960 min Winter	0.074	0.074	0.8	8.7	Flood Risk
1440 min Winter	0.054	0.054	0.7	6.1	Flood Risk
2160 min Winter	0.041	0.041	0.6	4.6	Flood Risk
2880 min Winter	0.034	0.034	0.5	3.7	Flood Risk
4320 min Winter	0.025	0.025	0.4	2.8	Flood Risk
5760 min Winter	0.020	0.020	0.3	2.2	Flood Risk
7200 min Winter	0.017	0.017	0.2	1.8	Flood Risk
8640 min Winter	0.015	0.015	0.2	1.6	Flood Risk
10080 min Winter	0.013	0.013	0.2	1.4	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	35
60 min Winter	52.662	0.0	62
120 min Winter	31.800	0.0	118
180 min Winter	23.353	0.0	154
240 min Winter	18.644	0.0	188
360 min Winter	13.543	0.0	264
480 min Winter	10.792	0.0	338
600 min Winter	9.043	0.0	410
720 min Winter	7.823	0.0	478
960 min Winter	6.219	0.0	608
1440 min Winter	4.493	0.0	838
2160 min Winter	3.241	0.0	1192
2880 min Winter	2.568	0.0	1556
4320 min Winter	1.847	0.0	2292
5760 min Winter	1.461	0.0	3008
7200 min Winter	1.217	0.0	3680
8640 min Winter	1.048	0.0	4464
10080 min Winter	0.923	0.0	5144

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.034

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

Model Details

Storage is Online Cover Level (m) 0.300

Swale Structure

Infiltration Coefficient Base (m/hr)	0.04248	Length (m)	35.7
Infiltration Coefficient Side (m/hr)	0.04248	Side Slope (1:X)	4.0
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	0.000	Cap Infiltration Depth (m)	0.000
Base Width (m)	3.0		

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 185 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	0.077	0.077	0.8	9.0	Flood Risk
30 min Summer	0.096	0.096	0.8	11.6	Flood Risk
60 min Summer	0.112	0.112	0.8	13.8	Flood Risk
120 min Summer	0.121	0.121	0.8	15.0	Flood Risk
180 min Summer	0.122	0.122	0.8	15.1	Flood Risk
240 min Summer	0.121	0.121	0.8	15.0	Flood Risk
360 min Summer	0.117	0.117	0.8	14.5	Flood Risk
480 min Summer	0.113	0.113	0.8	13.9	Flood Risk
600 min Summer	0.108	0.108	0.8	13.2	Flood Risk
720 min Summer	0.103	0.103	0.8	12.5	Flood Risk
960 min Summer	0.093	0.093	0.8	11.2	Flood Risk
1440 min Summer	0.076	0.076	0.8	9.0	Flood Risk
2160 min Summer	0.057	0.057	0.7	6.6	Flood Risk
2880 min Summer	0.047	0.047	0.7	5.4	Flood Risk
4320 min Summer	0.037	0.037	0.5	4.1	Flood Risk
5760 min Summer	0.030	0.030	0.4	3.4	Flood Risk
7200 min Summer	0.026	0.026	0.4	2.9	Flood Risk
8640 min Summer	0.023	0.023	0.3	2.5	Flood Risk
10080 min Summer	0.020	0.020	0.3	2.2	Flood Risk
15 min Winter	0.085	0.085	0.8	10.2	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	128.285	0.0	21
30 min Summer	84.226	0.0	35
60 min Summer	52.662	0.0	64
120 min Summer	31.800	0.0	120
180 min Summer	23.353	0.0	152
240 min Summer	18.644	0.0	182
360 min Summer	13.543	0.0	250
480 min Summer	10.792	0.0	318
600 min Summer	9.043	0.0	386
720 min Summer	7.823	0.0	454
960 min Summer	6.219	0.0	584
1440 min Summer	4.493	0.0	836
2160 min Summer	3.241	0.0	1188
2880 min Summer	2.568	0.0	1528
4320 min Summer	1.847	0.0	2252
5760 min Summer	1.461	0.0	2952
7200 min Summer	1.217	0.0	3680
8640 min Summer	1.048	0.0	4408
10080 min Summer	0.923	0.0	5144
15 min Winter	128.285	0.0	21

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.107	0.107	0.8	13.1	Flood Risk
60 min Winter	0.125	0.125	0.9	15.6	Flood Risk
120 min Winter	0.136	0.136	0.9	17.2	Flood Risk
180 min Winter	0.137	0.137	0.9	17.3	Flood Risk
240 min Winter	0.135	0.135	0.9	17.0	Flood Risk
360 min Winter	0.130	0.130	0.9	16.3	Flood Risk
480 min Winter	0.123	0.123	0.9	15.3	Flood Risk
600 min Winter	0.115	0.115	0.8	14.3	Flood Risk
720 min Winter	0.108	0.108	0.8	13.2	Flood Risk
960 min Winter	0.094	0.094	0.8	11.3	Flood Risk
1440 min Winter	0.069	0.069	0.8	8.1	Flood Risk
2160 min Winter	0.048	0.048	0.7	5.5	Flood Risk
2880 min Winter	0.039	0.039	0.6	4.4	Flood Risk
4320 min Winter	0.029	0.029	0.4	3.2	Flood Risk
5760 min Winter	0.023	0.023	0.3	2.6	Flood Risk
7200 min Winter	0.020	0.020	0.3	2.2	Flood Risk
8640 min Winter	0.017	0.017	0.2	1.9	Flood Risk
10080 min Winter	0.015	0.015	0.2	1.6	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	35
60 min Winter	52.662	0.0	62
120 min Winter	31.800	0.0	118
180 min Winter	23.353	0.0	170
240 min Winter	18.644	0.0	194
360 min Winter	13.543	0.0	270
480 min Winter	10.792	0.0	346
600 min Winter	9.043	0.0	418
720 min Winter	7.823	0.0	488
960 min Winter	6.219	0.0	624
1440 min Winter	4.493	0.0	870
2160 min Winter	3.241	0.0	1192
2880 min Winter	2.568	0.0	1560
4320 min Winter	1.847	0.0	2288
5760 min Winter	1.461	0.0	3000
7200 min Winter	1.217	0.0	3680
8640 min Winter	1.048	0.0	4400
10080 min Winter	0.923	0.0	5112

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.040

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.020	4	8	0.020

Model Details

Storage is Online Cover Level (m) 0.300

Swale Structure

Infiltration Coefficient Base (m/hr)	0.04248	Length (m)	35.7
Infiltration Coefficient Side (m/hr)	0.04248	Side Slope (1:X)	4.0
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	0.000	Cap Infiltration Depth (m)	0.000
Base Width (m)	3.0		

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 120 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	0.049	0.049	0.7	5.3	Flood Risk
30 min Summer	0.062	0.062	0.7	6.8	Flood Risk
60 min Summer	0.071	0.071	0.7	7.9	Flood Risk
120 min Summer	0.075	0.075	0.7	8.4	Flood Risk
180 min Summer	0.075	0.075	0.7	8.4	Flood Risk
240 min Summer	0.074	0.074	0.7	8.3	Flood Risk
360 min Summer	0.071	0.071	0.7	7.8	Flood Risk
480 min Summer	0.067	0.067	0.7	7.4	Flood Risk
600 min Summer	0.062	0.062	0.7	6.9	Flood Risk
720 min Summer	0.059	0.059	0.7	6.4	Flood Risk
960 min Summer	0.052	0.052	0.7	5.6	Flood Risk
1440 min Summer	0.044	0.044	0.6	4.7	Flood Risk
2160 min Summer	0.036	0.036	0.5	3.8	Flood Risk
2880 min Summer	0.030	0.030	0.4	3.2	Flood Risk
4320 min Summer	0.023	0.023	0.3	2.5	Flood Risk
5760 min Summer	0.019	0.019	0.3	2.0	Flood Risk
7200 min Summer	0.016	0.016	0.2	1.7	Flood Risk
8640 min Summer	0.014	0.014	0.2	1.5	Flood Risk
10080 min Summer	0.013	0.013	0.2	1.3	Flood Risk
15 min Winter	0.055	0.055	0.7	6.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	128.285	0.0	21
30 min Summer	84.226	0.0	34
60 min Summer	52.662	0.0	62
120 min Summer	31.800	0.0	100
180 min Summer	23.353	0.0	132
240 min Summer	18.644	0.0	166
360 min Summer	13.543	0.0	234
480 min Summer	10.792	0.0	300
600 min Summer	9.043	0.0	366
720 min Summer	7.823	0.0	430
960 min Summer	6.219	0.0	550
1440 min Summer	4.493	0.0	794
2160 min Summer	3.241	0.0	1156
2880 min Summer	2.568	0.0	1528
4320 min Summer	1.847	0.0	2252
5760 min Summer	1.461	0.0	2952
7200 min Summer	1.217	0.0	3680
8640 min Summer	1.048	0.0	4416
10080 min Summer	0.923	0.0	5144
15 min Winter	128.285	0.0	21

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.069	0.069	0.7	7.6	Flood Risk
60 min Winter	0.080	0.080	0.7	9.0	Flood Risk
120 min Winter	0.085	0.085	0.7	9.5	Flood Risk
180 min Winter	0.084	0.084	0.7	9.5	Flood Risk
240 min Winter	0.082	0.082	0.7	9.2	Flood Risk
360 min Winter	0.076	0.076	0.7	8.5	Flood Risk
480 min Winter	0.070	0.070	0.7	7.7	Flood Risk
600 min Winter	0.064	0.064	0.7	7.0	Flood Risk
720 min Winter	0.058	0.058	0.7	6.3	Flood Risk
960 min Winter	0.049	0.049	0.7	5.3	Flood Risk
1440 min Winter	0.040	0.040	0.5	4.2	Flood Risk
2160 min Winter	0.031	0.031	0.4	3.2	Flood Risk
2880 min Winter	0.025	0.025	0.3	2.6	Flood Risk
4320 min Winter	0.019	0.019	0.3	1.9	Flood Risk
5760 min Winter	0.015	0.015	0.2	1.5	Flood Risk
7200 min Winter	0.013	0.013	0.2	1.3	Flood Risk
8640 min Winter	0.011	0.011	0.1	1.1	Flood Risk
10080 min Winter	0.010	0.010	0.1	1.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	34
60 min Winter	52.662	0.0	62
120 min Winter	31.800	0.0	114
180 min Winter	23.353	0.0	142
240 min Winter	18.644	0.0	180
360 min Winter	13.543	0.0	254
480 min Winter	10.792	0.0	324
600 min Winter	9.043	0.0	390
720 min Winter	7.823	0.0	454
960 min Winter	6.219	0.0	570
1440 min Winter	4.493	0.0	822
2160 min Winter	3.241	0.0	1188
2880 min Winter	2.568	0.0	1536
4320 min Winter	1.847	0.0	2252
5760 min Winter	1.461	0.0	3000
7200 min Winter	1.217	0.0	3688
8640 min Winter	1.048	0.0	4416
10080 min Winter	0.923	0.0	5136

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.024

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.012	4	8	0.012

Model Details

Storage is Online Cover Level (m) 0.300

Swale Structure

Infiltration Coefficient Base (m/hr)	0.04248	Length (m)	32.8
Infiltration Coefficient Side (m/hr)	0.04248	Side Slope (1:X)	4.0
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	0.000	Cap Infiltration Depth (m)	0.000
Base Width (m)	3.1		

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 120 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	0.049	0.049	0.7	5.3	Flood Risk
30 min Summer	0.062	0.062	0.7	6.8	Flood Risk
60 min Summer	0.071	0.071	0.7	7.9	Flood Risk
120 min Summer	0.075	0.075	0.7	8.4	Flood Risk
180 min Summer	0.075	0.075	0.7	8.4	Flood Risk
240 min Summer	0.074	0.074	0.7	8.3	Flood Risk
360 min Summer	0.071	0.071	0.7	7.8	Flood Risk
480 min Summer	0.067	0.067	0.7	7.4	Flood Risk
600 min Summer	0.062	0.062	0.7	6.9	Flood Risk
720 min Summer	0.059	0.059	0.7	6.4	Flood Risk
960 min Summer	0.052	0.052	0.7	5.6	Flood Risk
1440 min Summer	0.044	0.044	0.6	4.7	Flood Risk
2160 min Summer	0.036	0.036	0.5	3.8	Flood Risk
2880 min Summer	0.030	0.030	0.4	3.2	Flood Risk
4320 min Summer	0.023	0.023	0.3	2.5	Flood Risk
5760 min Summer	0.019	0.019	0.3	2.0	Flood Risk
7200 min Summer	0.016	0.016	0.2	1.7	Flood Risk
8640 min Summer	0.014	0.014	0.2	1.5	Flood Risk
10080 min Summer	0.013	0.013	0.2	1.3	Flood Risk
15 min Winter	0.055	0.055	0.7	6.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	128.285	0.0	21
30 min Summer	84.226	0.0	34
60 min Summer	52.662	0.0	62
120 min Summer	31.800	0.0	100
180 min Summer	23.353	0.0	132
240 min Summer	18.644	0.0	166
360 min Summer	13.543	0.0	234
480 min Summer	10.792	0.0	300
600 min Summer	9.043	0.0	366
720 min Summer	7.823	0.0	430
960 min Summer	6.219	0.0	550
1440 min Summer	4.493	0.0	794
2160 min Summer	3.241	0.0	1156
2880 min Summer	2.568	0.0	1528
4320 min Summer	1.847	0.0	2252
5760 min Summer	1.461	0.0	2952
7200 min Summer	1.217	0.0	3680
8640 min Summer	1.048	0.0	4416
10080 min Summer	0.923	0.0	5144
15 min Winter	128.285	0.0	21

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.069	0.069	0.7	7.6	Flood Risk
60 min Winter	0.080	0.080	0.7	9.0	Flood Risk
120 min Winter	0.085	0.085	0.7	9.5	Flood Risk
180 min Winter	0.084	0.084	0.7	9.5	Flood Risk
240 min Winter	0.082	0.082	0.7	9.2	Flood Risk
360 min Winter	0.076	0.076	0.7	8.5	Flood Risk
480 min Winter	0.070	0.070	0.7	7.7	Flood Risk
600 min Winter	0.064	0.064	0.7	7.0	Flood Risk
720 min Winter	0.058	0.058	0.7	6.3	Flood Risk
960 min Winter	0.049	0.049	0.7	5.3	Flood Risk
1440 min Winter	0.040	0.040	0.5	4.2	Flood Risk
2160 min Winter	0.031	0.031	0.4	3.2	Flood Risk
2880 min Winter	0.025	0.025	0.3	2.6	Flood Risk
4320 min Winter	0.019	0.019	0.3	1.9	Flood Risk
5760 min Winter	0.015	0.015	0.2	1.5	Flood Risk
7200 min Winter	0.013	0.013	0.2	1.3	Flood Risk
8640 min Winter	0.011	0.011	0.1	1.1	Flood Risk
10080 min Winter	0.010	0.010	0.1	1.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	34
60 min Winter	52.662	0.0	62
120 min Winter	31.800	0.0	114
180 min Winter	23.353	0.0	142
240 min Winter	18.644	0.0	180
360 min Winter	13.543	0.0	254
480 min Winter	10.792	0.0	324
600 min Winter	9.043	0.0	390
720 min Winter	7.823	0.0	454
960 min Winter	6.219	0.0	570
1440 min Winter	4.493	0.0	822
2160 min Winter	3.241	0.0	1188
2880 min Winter	2.568	0.0	1536
4320 min Winter	1.847	0.0	2252
5760 min Winter	1.461	0.0	3000
7200 min Winter	1.217	0.0	3688
8640 min Winter	1.048	0.0	4416
10080 min Winter	0.923	0.0	5136

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.024

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.012	4	8	0.012

Model Details

Storage is Online Cover Level (m) 0.300

Swale Structure

Infiltration Coefficient Base (m/hr)	0.04248	Length (m)	32.8
Infiltration Coefficient Side (m/hr)	0.04248	Side Slope (1:X)	4.0
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	0.000	Cap Infiltration Depth (m)	0.000
Base Width (m)	3.1		

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 149 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	0.066	0.066	0.5	4.5	Flood Risk
30 min Summer	0.082	0.082	0.5	5.7	Flood Risk
60 min Summer	0.094	0.094	0.5	6.7	Flood Risk
120 min Summer	0.100	0.100	0.5	7.2	Flood Risk
180 min Summer	0.101	0.101	0.5	7.3	Flood Risk
240 min Summer	0.100	0.100	0.5	7.2	Flood Risk
360 min Summer	0.096	0.096	0.5	6.8	Flood Risk
480 min Summer	0.092	0.092	0.5	6.5	Flood Risk
600 min Summer	0.087	0.087	0.5	6.1	Flood Risk
720 min Summer	0.082	0.082	0.5	5.7	Flood Risk
960 min Summer	0.074	0.074	0.5	5.1	Flood Risk
1440 min Summer	0.060	0.060	0.4	4.0	Flood Risk
2160 min Summer	0.047	0.047	0.4	3.1	Flood Risk
2880 min Summer	0.040	0.040	0.3	2.6	Flood Risk
4320 min Summer	0.031	0.031	0.3	2.0	Flood Risk
5760 min Summer	0.026	0.026	0.2	1.6	Flood Risk
7200 min Summer	0.022	0.022	0.2	1.4	Flood Risk
8640 min Summer	0.019	0.019	0.2	1.2	Flood Risk
10080 min Summer	0.017	0.017	0.1	1.0	Flood Risk
15 min Winter	0.074	0.074	0.5	5.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	128.285	0.0	21
30 min Summer	84.226	0.0	35
60 min Summer	52.662	0.0	62
120 min Summer	31.800	0.0	110
180 min Summer	23.353	0.0	140
240 min Summer	18.644	0.0	172
360 min Summer	13.543	0.0	240
480 min Summer	10.792	0.0	308
600 min Summer	9.043	0.0	376
720 min Summer	7.823	0.0	442
960 min Summer	6.219	0.0	570
1440 min Summer	4.493	0.0	812
2160 min Summer	3.241	0.0	1164
2880 min Summer	2.568	0.0	1528
4320 min Summer	1.847	0.0	2248
5760 min Summer	1.461	0.0	2944
7200 min Summer	1.217	0.0	3680
8640 min Summer	1.048	0.0	4408
10080 min Summer	0.923	0.0	5144
15 min Winter	128.285	0.0	21

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.091	0.091	0.5	6.4	Flood Risk
60 min Winter	0.105	0.105	0.5	7.6	Flood Risk
120 min Winter	0.112	0.112	0.5	8.3	Flood Risk
180 min Winter	0.112	0.112	0.5	8.2	Flood Risk
240 min Winter	0.110	0.110	0.5	8.1	Flood Risk
360 min Winter	0.104	0.104	0.5	7.6	Flood Risk
480 min Winter	0.098	0.098	0.5	7.0	Flood Risk
600 min Winter	0.091	0.091	0.5	6.4	Flood Risk
720 min Winter	0.084	0.084	0.5	5.9	Flood Risk
960 min Winter	0.072	0.072	0.5	4.9	Flood Risk
1440 min Winter	0.053	0.053	0.4	3.5	Flood Risk
2160 min Winter	0.041	0.041	0.3	2.6	Flood Risk
2880 min Winter	0.033	0.033	0.3	2.1	Flood Risk
4320 min Winter	0.025	0.025	0.2	1.5	Flood Risk
5760 min Winter	0.020	0.020	0.2	1.2	Flood Risk
7200 min Winter	0.017	0.017	0.1	1.0	Flood Risk
8640 min Winter	0.014	0.014	0.1	0.9	Flood Risk
10080 min Winter	0.013	0.013	0.1	0.8	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	35
60 min Winter	52.662	0.0	62
120 min Winter	31.800	0.0	116
180 min Winter	23.353	0.0	148
240 min Winter	18.644	0.0	186
360 min Winter	13.543	0.0	262
480 min Winter	10.792	0.0	334
600 min Winter	9.043	0.0	404
720 min Winter	7.823	0.0	474
960 min Winter	6.219	0.0	602
1440 min Winter	4.493	0.0	836
2160 min Winter	3.241	0.0	1188
2880 min Winter	2.568	0.0	1556
4320 min Winter	1.847	0.0	2252
5760 min Winter	1.461	0.0	3000
7200 min Winter	1.217	0.0	3672
8640 min Winter	1.048	0.0	4488
10080 min Winter	0.923	0.0	5096

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.020

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.010	4	8	0.010

Model Details

Storage is Online Cover Level (m) 0.300

Swale Structure

Infiltration Coefficient Base (m/hr)	0.04248	Length (m)	32.7
Infiltration Coefficient Side (m/hr)	0.04248	Side Slope (1:X)	4.0
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	0.000	Cap Infiltration Depth (m)	0.000
Base Width (m)	1.8		

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 149 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	0.066	0.066	0.5	4.5	Flood Risk
30 min Summer	0.082	0.082	0.5	5.7	Flood Risk
60 min Summer	0.094	0.094	0.5	6.7	Flood Risk
120 min Summer	0.100	0.100	0.5	7.2	Flood Risk
180 min Summer	0.101	0.101	0.5	7.3	Flood Risk
240 min Summer	0.100	0.100	0.5	7.2	Flood Risk
360 min Summer	0.096	0.096	0.5	6.8	Flood Risk
480 min Summer	0.092	0.092	0.5	6.5	Flood Risk
600 min Summer	0.087	0.087	0.5	6.1	Flood Risk
720 min Summer	0.082	0.082	0.5	5.7	Flood Risk
960 min Summer	0.074	0.074	0.5	5.1	Flood Risk
1440 min Summer	0.060	0.060	0.4	4.0	Flood Risk
2160 min Summer	0.047	0.047	0.4	3.1	Flood Risk
2880 min Summer	0.040	0.040	0.3	2.6	Flood Risk
4320 min Summer	0.031	0.031	0.3	2.0	Flood Risk
5760 min Summer	0.026	0.026	0.2	1.6	Flood Risk
7200 min Summer	0.022	0.022	0.2	1.4	Flood Risk
8640 min Summer	0.019	0.019	0.2	1.2	Flood Risk
10080 min Summer	0.017	0.017	0.1	1.0	Flood Risk
15 min Winter	0.074	0.074	0.5	5.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	128.285	0.0	21
30 min Summer	84.226	0.0	35
60 min Summer	52.662	0.0	62
120 min Summer	31.800	0.0	110
180 min Summer	23.353	0.0	140
240 min Summer	18.644	0.0	172
360 min Summer	13.543	0.0	240
480 min Summer	10.792	0.0	308
600 min Summer	9.043	0.0	376
720 min Summer	7.823	0.0	442
960 min Summer	6.219	0.0	570
1440 min Summer	4.493	0.0	812
2160 min Summer	3.241	0.0	1164
2880 min Summer	2.568	0.0	1528
4320 min Summer	1.847	0.0	2248
5760 min Summer	1.461	0.0	2944
7200 min Summer	1.217	0.0	3680
8640 min Summer	1.048	0.0	4408
10080 min Summer	0.923	0.0	5144
15 min Winter	128.285	0.0	21

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.091	0.091	0.5	6.4	Flood Risk
60 min Winter	0.105	0.105	0.5	7.6	Flood Risk
120 min Winter	0.112	0.112	0.5	8.3	Flood Risk
180 min Winter	0.112	0.112	0.5	8.2	Flood Risk
240 min Winter	0.110	0.110	0.5	8.1	Flood Risk
360 min Winter	0.104	0.104	0.5	7.6	Flood Risk
480 min Winter	0.098	0.098	0.5	7.0	Flood Risk
600 min Winter	0.091	0.091	0.5	6.4	Flood Risk
720 min Winter	0.084	0.084	0.5	5.9	Flood Risk
960 min Winter	0.072	0.072	0.5	4.9	Flood Risk
1440 min Winter	0.053	0.053	0.4	3.5	Flood Risk
2160 min Winter	0.041	0.041	0.3	2.6	Flood Risk
2880 min Winter	0.033	0.033	0.3	2.1	Flood Risk
4320 min Winter	0.025	0.025	0.2	1.5	Flood Risk
5760 min Winter	0.020	0.020	0.2	1.2	Flood Risk
7200 min Winter	0.017	0.017	0.1	1.0	Flood Risk
8640 min Winter	0.014	0.014	0.1	0.9	Flood Risk
10080 min Winter	0.013	0.013	0.1	0.8	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	35
60 min Winter	52.662	0.0	62
120 min Winter	31.800	0.0	116
180 min Winter	23.353	0.0	148
240 min Winter	18.644	0.0	186
360 min Winter	13.543	0.0	262
480 min Winter	10.792	0.0	334
600 min Winter	9.043	0.0	404
720 min Winter	7.823	0.0	474
960 min Winter	6.219	0.0	602
1440 min Winter	4.493	0.0	836
2160 min Winter	3.241	0.0	1188
2880 min Winter	2.568	0.0	1556
4320 min Winter	1.847	0.0	2252
5760 min Winter	1.461	0.0	3000
7200 min Winter	1.217	0.0	3672
8640 min Winter	1.048	0.0	4488
10080 min Winter	0.923	0.0	5096

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.020

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.010	4	8	0.010

Model Details

Storage is Online Cover Level (m) 0.300

Swale Structure

Infiltration Coefficient Base (m/hr)	0.04248	Length (m)	32.7
Infiltration Coefficient Side (m/hr)	0.04248	Side Slope (1:X)	4.0
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	0.000	Cap Infiltration Depth (m)	0.000
Base Width (m)	1.8		

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 92 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	0.023	0.023	0.6	4.4	Flood Risk
30 min Summer	0.029	0.029	0.7	5.6	Flood Risk
60 min Summer	0.032	0.032	0.8	6.3	Flood Risk
120 min Summer	0.034	0.034	0.8	6.7	Flood Risk
180 min Summer	0.034	0.034	0.8	6.7	Flood Risk
240 min Summer	0.033	0.033	0.8	6.5	Flood Risk
360 min Summer	0.032	0.032	0.8	6.2	Flood Risk
480 min Summer	0.030	0.030	0.7	5.8	Flood Risk
600 min Summer	0.028	0.028	0.7	5.5	Flood Risk
720 min Summer	0.027	0.027	0.7	5.2	Flood Risk
960 min Summer	0.024	0.024	0.6	4.6	Flood Risk
1440 min Summer	0.020	0.020	0.5	3.9	Flood Risk
2160 min Summer	0.016	0.016	0.4	3.1	Flood Risk
2880 min Summer	0.014	0.014	0.3	2.7	Flood Risk
4320 min Summer	0.011	0.011	0.3	2.0	Flood Risk
5760 min Summer	0.009	0.009	0.2	1.7	Flood Risk
7200 min Summer	0.008	0.008	0.2	1.4	Flood Risk
8640 min Summer	0.007	0.007	0.2	1.2	Flood Risk
10080 min Summer	0.006	0.006	0.1	1.1	Flood Risk
15 min Winter	0.026	0.026	0.6	5.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	128.285	0.0	21
30 min Summer	84.226	0.0	33
60 min Summer	52.662	0.0	58
120 min Summer	31.800	0.0	90
180 min Summer	23.353	0.0	124
240 min Summer	18.644	0.0	158
360 min Summer	13.543	0.0	224
480 min Summer	10.792	0.0	292
600 min Summer	9.043	0.0	356
720 min Summer	7.823	0.0	420
960 min Summer	6.219	0.0	544
1440 min Summer	4.493	0.0	794
2160 min Summer	3.241	0.0	1164
2880 min Summer	2.568	0.0	1528
4320 min Summer	1.847	0.0	2248
5760 min Summer	1.461	0.0	2992
7200 min Summer	1.217	0.0	3672
8640 min Summer	1.048	0.0	4408
10080 min Summer	0.923	0.0	5144
15 min Winter	128.285	0.0	21

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.032	0.032	0.8	6.3	Flood Risk
60 min Winter	0.036	0.036	0.9	7.1	Flood Risk
120 min Winter	0.038	0.038	0.9	7.4	Flood Risk
180 min Winter	0.037	0.037	0.9	7.3	Flood Risk
240 min Winter	0.036	0.036	0.9	7.0	Flood Risk
360 min Winter	0.033	0.033	0.8	6.5	Flood Risk
480 min Winter	0.031	0.031	0.8	5.9	Flood Risk
600 min Winter	0.028	0.028	0.7	5.5	Flood Risk
720 min Winter	0.026	0.026	0.6	5.1	Flood Risk
960 min Winter	0.023	0.023	0.6	4.4	Flood Risk
1440 min Winter	0.018	0.018	0.5	3.5	Flood Risk
2160 min Winter	0.014	0.014	0.4	2.7	Flood Risk
2880 min Winter	0.012	0.012	0.3	2.2	Flood Risk
4320 min Winter	0.009	0.009	0.2	1.6	Flood Risk
5760 min Winter	0.007	0.007	0.2	1.3	Flood Risk
7200 min Winter	0.006	0.006	0.1	1.1	Flood Risk
8640 min Winter	0.005	0.005	0.1	0.9	Flood Risk
10080 min Winter	0.004	0.004	0.1	0.8	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	33
60 min Winter	52.662	0.0	60
120 min Winter	31.800	0.0	94
180 min Winter	23.353	0.0	132
240 min Winter	18.644	0.0	168
360 min Winter	13.543	0.0	240
480 min Winter	10.792	0.0	308
600 min Winter	9.043	0.0	374
720 min Winter	7.823	0.0	440
960 min Winter	6.219	0.0	570
1440 min Winter	4.493	0.0	820
2160 min Winter	3.241	0.0	1172
2880 min Winter	2.568	0.0	1528
4320 min Winter	1.847	0.0	2232
5760 min Winter	1.461	0.0	3008
7200 min Winter	1.217	0.0	3680
8640 min Winter	1.048	0.0	4472
10080 min Winter	0.923	0.0	5344

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.020

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.010	4	8	0.010

Model Details

Storage is Online Cover Level (m) 0.300

Swale Structure

Infiltration Coefficient Base (m/hr)	0.04248	Length (m)	50.9
Infiltration Coefficient Side (m/hr)	0.04248	Side Slope (1:X)	4.0
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	0.000	Cap Infiltration Depth (m)	0.000
Base Width (m)	3.7		

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 92 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	0.023	0.023	0.6	4.4	Flood Risk
30 min Summer	0.029	0.029	0.7	5.6	Flood Risk
60 min Summer	0.032	0.032	0.8	6.3	Flood Risk
120 min Summer	0.034	0.034	0.8	6.7	Flood Risk
180 min Summer	0.034	0.034	0.8	6.7	Flood Risk
240 min Summer	0.033	0.033	0.8	6.5	Flood Risk
360 min Summer	0.032	0.032	0.8	6.2	Flood Risk
480 min Summer	0.030	0.030	0.7	5.8	Flood Risk
600 min Summer	0.028	0.028	0.7	5.5	Flood Risk
720 min Summer	0.027	0.027	0.7	5.2	Flood Risk
960 min Summer	0.024	0.024	0.6	4.6	Flood Risk
1440 min Summer	0.020	0.020	0.5	3.9	Flood Risk
2160 min Summer	0.016	0.016	0.4	3.1	Flood Risk
2880 min Summer	0.014	0.014	0.3	2.7	Flood Risk
4320 min Summer	0.011	0.011	0.3	2.0	Flood Risk
5760 min Summer	0.009	0.009	0.2	1.7	Flood Risk
7200 min Summer	0.008	0.008	0.2	1.4	Flood Risk
8640 min Summer	0.007	0.007	0.2	1.2	Flood Risk
10080 min Summer	0.006	0.006	0.1	1.1	Flood Risk
15 min Winter	0.026	0.026	0.6	5.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	128.285	0.0	21
30 min Summer	84.226	0.0	33
60 min Summer	52.662	0.0	58
120 min Summer	31.800	0.0	90
180 min Summer	23.353	0.0	124
240 min Summer	18.644	0.0	158
360 min Summer	13.543	0.0	224
480 min Summer	10.792	0.0	292
600 min Summer	9.043	0.0	356
720 min Summer	7.823	0.0	420
960 min Summer	6.219	0.0	544
1440 min Summer	4.493	0.0	794
2160 min Summer	3.241	0.0	1164
2880 min Summer	2.568	0.0	1528
4320 min Summer	1.847	0.0	2248
5760 min Summer	1.461	0.0	2992
7200 min Summer	1.217	0.0	3672
8640 min Summer	1.048	0.0	4408
10080 min Summer	0.923	0.0	5144
15 min Winter	128.285	0.0	21

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.032	0.032	0.8	6.3	Flood Risk
60 min Winter	0.036	0.036	0.9	7.1	Flood Risk
120 min Winter	0.038	0.038	0.9	7.4	Flood Risk
180 min Winter	0.037	0.037	0.9	7.3	Flood Risk
240 min Winter	0.036	0.036	0.9	7.0	Flood Risk
360 min Winter	0.033	0.033	0.8	6.5	Flood Risk
480 min Winter	0.031	0.031	0.8	5.9	Flood Risk
600 min Winter	0.028	0.028	0.7	5.5	Flood Risk
720 min Winter	0.026	0.026	0.6	5.1	Flood Risk
960 min Winter	0.023	0.023	0.6	4.4	Flood Risk
1440 min Winter	0.018	0.018	0.5	3.5	Flood Risk
2160 min Winter	0.014	0.014	0.4	2.7	Flood Risk
2880 min Winter	0.012	0.012	0.3	2.2	Flood Risk
4320 min Winter	0.009	0.009	0.2	1.6	Flood Risk
5760 min Winter	0.007	0.007	0.2	1.3	Flood Risk
7200 min Winter	0.006	0.006	0.1	1.1	Flood Risk
8640 min Winter	0.005	0.005	0.1	0.9	Flood Risk
10080 min Winter	0.004	0.004	0.1	0.8	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	33
60 min Winter	52.662	0.0	60
120 min Winter	31.800	0.0	94
180 min Winter	23.353	0.0	132
240 min Winter	18.644	0.0	168
360 min Winter	13.543	0.0	240
480 min Winter	10.792	0.0	308
600 min Winter	9.043	0.0	374
720 min Winter	7.823	0.0	440
960 min Winter	6.219	0.0	570
1440 min Winter	4.493	0.0	820
2160 min Winter	3.241	0.0	1172
2880 min Winter	2.568	0.0	1528
4320 min Winter	1.847	0.0	2232
5760 min Winter	1.461	0.0	3008
7200 min Winter	1.217	0.0	3680
8640 min Winter	1.048	0.0	4472
10080 min Winter	0.923	0.0	5344

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.020

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.010	4	8	0.010

Model Details

Storage is Online Cover Level (m) 0.300

Swale Structure

Infiltration Coefficient Base (m/hr)	0.04248	Length (m)	50.9
Infiltration Coefficient Side (m/hr)	0.04248	Side Slope (1:X)	4.0
Safety Factor	2.0	Slope (1:X)	0.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	0.000	Cap Infiltration Depth (m)	0.000
Base Width (m)	3.7		

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 93 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	0.658	0.658	4.2	29.0	Flood Risk
30 min Summer	0.726	0.726	4.8	36.4	Flood Risk
60 min Summer	0.767	0.767	5.3	41.5	Flood Risk
120 min Summer	0.780	0.780	5.4	43.2	Flood Risk
180 min Summer	0.775	0.775	5.4	42.6	Flood Risk
240 min Summer	0.765	0.765	5.2	41.2	Flood Risk
360 min Summer	0.740	0.740	5.0	38.1	Flood Risk
480 min Summer	0.715	0.715	4.7	35.2	Flood Risk
600 min Summer	0.691	0.691	4.5	32.5	Flood Risk
720 min Summer	0.670	0.670	4.3	30.2	Flood Risk
960 min Summer	0.631	0.631	3.9	26.3	Flood Risk
1440 min Summer	0.568	0.568	3.3	20.6	O K
2160 min Summer	0.498	0.498	2.8	15.3	O K
2880 min Summer	0.446	0.446	2.4	11.9	O K
4320 min Summer	0.373	0.373	1.8	8.0	O K
5760 min Summer	0.324	0.324	1.5	5.8	O K
7200 min Summer	0.287	0.287	1.3	4.5	O K
8640 min Summer	0.259	0.259	1.1	3.6	O K
10080 min Summer	0.236	0.236	1.0	2.9	O K
15 min Winter	0.692	0.692	4.5	32.6	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	128.285	0.0	23
30 min Summer	84.226	0.0	36
60 min Summer	52.662	0.0	60
120 min Summer	31.800	0.0	92
180 min Summer	23.353	0.0	126
240 min Summer	18.644	0.0	162
360 min Summer	13.543	0.0	230
480 min Summer	10.792	0.0	296
600 min Summer	9.043	0.0	360
720 min Summer	7.823	0.0	426
960 min Summer	6.219	0.0	550
1440 min Summer	4.493	0.0	796
2160 min Summer	3.241	0.0	1156
2880 min Summer	2.568	0.0	1524
4320 min Summer	1.847	0.0	2248
5760 min Summer	1.461	0.0	2944
7200 min Summer	1.217	0.0	3680
8640 min Summer	1.048	0.0	4408
10080 min Summer	0.923	0.0	5136
15 min Winter	128.285	0.0	24

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.764	0.764	5.2	41.1	Flood Risk
60 min Winter	0.809	0.809	5.7	47.1	Flood Risk
120 min Winter	0.820	0.820	5.8	48.6	Flood Risk
180 min Winter	0.811	0.811	5.7	47.4	Flood Risk
240 min Winter	0.795	0.795	5.6	45.2	Flood Risk
360 min Winter	0.760	0.760	5.2	40.6	Flood Risk
480 min Winter	0.725	0.725	4.8	36.4	Flood Risk
600 min Winter	0.693	0.693	4.5	32.7	Flood Risk
720 min Winter	0.664	0.664	4.2	29.5	Flood Risk
960 min Winter	0.612	0.612	3.7	24.5	Flood Risk
1440 min Winter	0.532	0.532	3.0	17.7	O K
2160 min Winter	0.447	0.447	2.4	12.0	O K
2880 min Winter	0.388	0.388	1.9	8.7	O K
4320 min Winter	0.311	0.311	1.4	5.3	O K
5760 min Winter	0.262	0.262	1.2	3.7	O K
7200 min Winter	0.228	0.228	1.0	2.7	O K
8640 min Winter	0.203	0.203	0.8	2.1	O K
10080 min Winter	0.183	0.183	0.7	1.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	36
60 min Winter	52.662	0.0	60
120 min Winter	31.800	0.0	98
180 min Winter	23.353	0.0	136
240 min Winter	18.644	0.0	174
360 min Winter	13.543	0.0	244
480 min Winter	10.792	0.0	314
600 min Winter	9.043	0.0	380
720 min Winter	7.823	0.0	446
960 min Winter	6.219	0.0	574
1440 min Winter	4.493	0.0	822
2160 min Winter	3.241	0.0	1180
2880 min Winter	2.568	0.0	1536
4320 min Winter	1.847	0.0	2252
5760 min Winter	1.461	0.0	2952
7200 min Winter	1.217	0.0	3680
8640 min Winter	1.048	0.0	4408
10080 min Winter	0.923	0.0	5136

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.135

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.045	4	8	0.045	8	12	0.045

Model Details

Storage is Online Cover Level (m) 0.900

Swale Structure

Infiltration Coefficient Base (m/hr)	0.24696	Length (m)	97.0
Infiltration Coefficient Side (m/hr)	0.24696	Side Slope (1:X)	1.0
Safety Factor	2.0	Slope (1:X)	100.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	0.000	Cap Infiltration Depth (m)	0.000
Base Width (m)	0.9		

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 97 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m^3)	Status
15 min Summer	0.689	0.689	4.5	32.3	Flood Risk
30 min Summer	0.761	0.761	5.2	40.7	Flood Risk
60 min Summer	0.805	0.805	5.7	46.5	Flood Risk
120 min Summer	0.819	0.819	5.8	48.5	Flood Risk
180 min Summer	0.815	0.815	5.8	47.9	Flood Risk
240 min Summer	0.805	0.805	5.7	46.5	Flood Risk
360 min Summer	0.780	0.780	5.4	43.1	Flood Risk
480 min Summer	0.755	0.755	5.1	39.9	Flood Risk
600 min Summer	0.731	0.731	4.9	37.0	Flood Risk
720 min Summer	0.708	0.708	4.7	34.4	Flood Risk
960 min Summer	0.669	0.669	4.3	30.1	Flood Risk
1440 min Summer	0.604	0.604	3.7	23.8	Flood Risk
2160 min Summer	0.532	0.532	3.0	17.7	O K
2880 min Summer	0.478	0.478	2.6	13.9	O K
4320 min Summer	0.401	0.401	2.0	9.4	O K
5760 min Summer	0.349	0.349	1.7	6.9	O K
7200 min Summer	0.310	0.310	1.4	5.3	O K
8640 min Summer	0.280	0.280	1.3	4.3	O K
10080 min Summer	0.256	0.256	1.1	3.5	O K
15 min Winter	0.725	0.725	4.8	36.4	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m^3)	Time-Peak (mins)
15 min Summer	128.285	0.0	24
30 min Summer	84.226	0.0	36
60 min Summer	52.662	0.0	60
120 min Summer	31.800	0.0	94
180 min Summer	23.353	0.0	128
240 min Summer	18.644	0.0	162
360 min Summer	13.543	0.0	230
480 min Summer	10.792	0.0	296
600 min Summer	9.043	0.0	362
720 min Summer	7.823	0.0	426
960 min Summer	6.219	0.0	552
1440 min Summer	4.493	0.0	798
2160 min Summer	3.241	0.0	1160
2880 min Summer	2.568	0.0	1528
4320 min Summer	1.847	0.0	2248
5760 min Summer	1.461	0.0	2944
7200 min Summer	1.217	0.0	3680
8640 min Summer	1.048	0.0	4408
10080 min Summer	0.923	0.0	5144
15 min Winter	128.285	0.0	24

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	0.800	0.800	5.6	45.9	Flood Risk
60 min Winter	0.848	0.848	6.2	52.7	Flood Risk
120 min Winter	0.861	0.861	6.3	54.7	Flood Risk
180 min Winter	0.853	0.853	6.2	53.4	Flood Risk
240 min Winter	0.837	0.837	6.0	51.1	Flood Risk
360 min Winter	0.802	0.802	5.6	46.1	Flood Risk
480 min Winter	0.767	0.767	5.3	41.5	Flood Risk
600 min Winter	0.734	0.734	4.9	37.4	Flood Risk
720 min Winter	0.704	0.704	4.6	33.9	Flood Risk
960 min Winter	0.651	0.651	4.1	28.2	Flood Risk
1440 min Winter	0.568	0.568	3.3	20.6	O K
2160 min Winter	0.479	0.479	2.6	14.0	O K
2880 min Winter	0.417	0.417	2.2	10.3	O K
4320 min Winter	0.336	0.336	1.6	6.3	O K
5760 min Winter	0.284	0.284	1.3	4.4	O K
7200 min Winter	0.248	0.248	1.1	3.3	O K
8640 min Winter	0.221	0.221	0.9	2.5	O K
10080 min Winter	0.199	0.199	0.8	2.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	84.226	0.0	36
60 min Winter	52.662	0.0	62
120 min Winter	31.800	0.0	98
180 min Winter	23.353	0.0	136
240 min Winter	18.644	0.0	174
360 min Winter	13.543	0.0	246
480 min Winter	10.792	0.0	316
600 min Winter	9.043	0.0	382
720 min Winter	7.823	0.0	448
960 min Winter	6.219	0.0	576
1440 min Winter	4.493	0.0	824
2160 min Winter	3.241	0.0	1192
2880 min Winter	2.568	0.0	1540
4320 min Winter	1.847	0.0	2252
5760 min Winter	1.461	0.0	2952
7200 min Winter	1.217	0.0	3680
8640 min Winter	1.048	0.0	4408
10080 min Winter	0.923	0.0	5144

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.150

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.050	4	8	0.050	8	12	0.050

Model Details

Storage is Online Cover Level (m) 0.900

Swale Structure

Infiltration Coefficient Base (m/hr)	0.24696	Length (m)	85.0
Infiltration Coefficient Side (m/hr)	0.24696	Side Slope (1:X)	1.0
Safety Factor	2.0	Slope (1:X)	100.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	0.000	Cap Infiltration Depth (m)	0.000
Base Width (m)	0.9		

Appendix B Exceedance Flow Routing

1. 33374/4000/510 – Exceedance Flow Routing

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER ENGINEER'S DRAWINGS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. DO NOT SCALE FROM THIS DRAWING.
4. ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM (AOD).
5. EXCEEDANCE FLOW ROUTING ASSESSMENT BASED ON SURFACE WATER DRAINAGE DESIGN AS SHOWN IN FOCUS ON DESIGN DRAWING 0521PH9/020 B AND HIGHWAY LEVELS PROVIDED BY FOCUS ON DESIGN CAD FILE 0521-PH9 ENGINEERING BASE.

KEY:

SURFACE WATER EXCEEDANCE FLOW ROUTE

EXISTING 525ø CULVERT TO BE DIVERTED THROUGH PROPOSED DEVELOPMENT ENSURING EXISTING CAPACITY IS MAINTAINED

PROPOSED SURFACE WATER SEWERS DESIGNED TO PASS OVER PROPOSED CULVERT DIVERSION WITH SUFFICIENT CLEARANCE

EXISTING TREATMENT WORKS TO BE REMOVED AND 525ø CULVERT DIVERTED AROUND PROPOSED POND TO EXISTING OUTFALL

FLOW CONTROL CHAMBER RESTRICTING FLOWS TO 12.9l/s

Mark	Revision	Date	Drawn	Chkd	Appd

SCALING NOTE: Do not scale from this drawing. If in doubts, ask.
UTILITIES NOTE: The position of any existing public or private sewers, utility services, plant or apparatus shown on this drawing is believed to be correct, but no warranty to this is expressed or implied. Other such plant or apparatus may also be present but not shown. The Contractor is therefore advised to undertake their own investigation where the presence of any existing sewers, services, plant or apparatus may affect their operations.

Drawing Issue Status

FOR PLANNING

HEYFORD PARK
PHASE 9

EXCEEDANCE FLOW ROUTE

Client

DORCHESTER GROUP

Date of 1st Issue	Designed	Drawn
23.03.2018	-	LD
AO Scale	Checked	Approved
1:500	AJ	PS

Drawing Number: 33374/4000/510

Revision: -

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