

TECHNICAL NOTE

Drainage Calculations

Dappers Lane, Angmering

1.0 Introduction

- 1.1 Lanmor Consulting Ltd has been appointed by CountyOak Homes Ltd to prepare drainage calculations for the proposed development at Dappers Lane, Angmering, West Sussex, BN16 4EN. The development proposals include for the construction of 6 new residential dwellings comprising of different tenure, with the existing house to be retained. A new access road is to be constructed along with a new parking area for the existing house.

2.0 Existing Site Conditions

- 2.1 The application site is approximately 0.61 ha in size and is currently occupied by a detached residential dwelling, along with open grassland for horses and small stables. The site is located on the edge of a primarily residential area, with the addition of an industrial area to the east and further grassland beyond. Figure 2.1 below shows the location of the site.

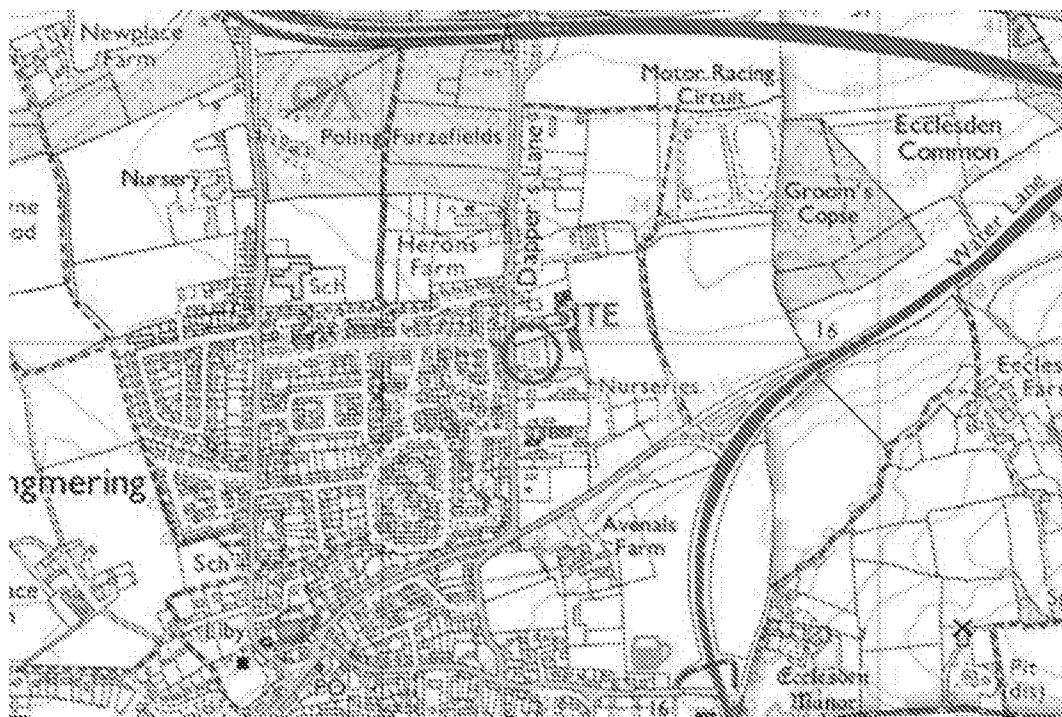


Figure 2.1 – Location Plan

- 2.2 The British Geological Survey records for the site indicate that the bedrock is underlain by London Clay Formation, containing clay, silt and sand. This sedimentary bedrock formed approximately 48 to 56 million years ago in the Palaeogene Period. Superficial deposits have also been recorded as consisting of clay, silt, sand and gravel.
- 2.3 A site investigation was undertaken on the 4th December 2018, conducted by Constructive Evaluation Limited, with the purpose being to establish the highest annual groundwater levels, calculate infiltration rates and determine more accurate records of geology.
- 2.4 As part of the investigation, 3 no. windowless sample boreholes (WS1, WS2 and WS3) were completed to a maximum depth of 2.50mbgl. Furthermore, 1 no. machine excavated trial pit (TP1) was completed to allow for a soakaway infiltration test. The trial pit was undertaken in accordance with BRE365. The following strata conditions were encountered in Table 2.1 below.

Stratum	Depth Range Encountered	Strata Description
Topsoil	Ground level to max 0.20m	Dark brown slightly sandy Silt with abundant roots and rootlets, and occasional gravels of flint
Made Ground	Exclusive to TP1 from 0.15m to 0.30mbgl	Brown silty slightly gravelly Clay, with gravels of flint and rarely concrete. Abundant roots and rootlets were also recorded
Silty CLAY / Clayey SILT	0.15m to 0.75mbgl	Soft to firm dark brown sometimes brown mottled silty CLAY / clayey SILT, with abundant roots and rootlets, and occasional gravels of flint
Head Deposit	0.30m to 2.00mbgl	Predominantly dense light brown and light grey slightly silty slightly sandy GRAVEL of flint, with rare cobbles and boulders of flint
London Clay	Exclusive to WS2 from 1.60m to 2.50mbgl	Firm to stiff brown mottled grey silty CLAY, with occasional gravels of flint and rare rootlets

Table 2.1 – Strata Conditions

3.0 Existing Drainage

- 3.1 Southern Water asset records were acquired as part of the drainage investigation. The records show that there is no existing drainage network along Dappers Lane for either surface water or foul water. A copy of the Southern Water asset mapping is provided in Appendix A.

4.0 Proposed Drainage

Foul Water

- 4.1 A new network of foul pipes and manholes are to be installed on site to serve the proposed development. This network will connect to a Klargester BioFicient 6 Domestic facility, before discharging to the existing culvert located along the western boundary of the site.

- 4.2 The culvert is present due to a ditch which runs along the western boundary of the site, adjacent to Dappers Lane. Therefore, the discharge to the culvert will be subject to the approval of the local drainage authority and an Environmental Permit from the EA.

Surface Water

- 4.3 With regards to discharge of surface water runoff from the development, the SuDS hierarchy has been considered when designing the drainage strategy for the site. As the proposed dwellings will incorporate sloping roofs, the use of green roofs will not be possible.
- 4.4 Rainwater harvesting was also considered to reuse surface water runoff within the dwellings. These systems require a separate network of pipework within the property, tanks and pumps to store the rainwater and distribute it throughout. To implement a rainwater harvesting systems on the site was considered impractical and also an excessive cost for the development.
- 4.5 In addition, for these systems to be successfully implemented there must be sufficient demand for water reuse otherwise this may lead to water quality issues. Furthermore, rainwater harvesting tanks should not be included in the assessment of attenuation required to store runoff from a development as there is no guarantee that the tank will be sufficiently empty to receive another storm.
- 4.6 Should the rainwater harvesting tank be full at the start of the storm, it will not be able to receive any more runoff, therefore additional storage of a similar size would be required to cater for all storm events and the rainwater harvesting tank will provide no benefit in terms of attenuation. For those reasons, and the excessive cost of providing the system, this method has been discounted.
- 4.7 A site investigation was undertaken, as mentioned previously, which provided information regarding infiltration rates. The results can be found below in Table 4.1.

Test Hole ID	Test	PI Depth (m)	Time at 25% (min)	Time at 75% (min)	Permeability Coefficient (m/s)	Drainage Condition
TP1	1	0.90	0.35	1.90	8.96×10^{-4}	Good
	2	0.90	1.10	3.20	5.50×10^{-4}	Good
	3	0.90	0.80	2.70	5.13×10^{-4}	Good

Table 4.1 – Infiltration results

- 4.8 The results found the ground to have good drainage conditions and that it would be possible to implement infiltration techniques into the proposed drainage strategy for surface water run-off. Therefore, the proposed drainage regime for surface water run-off will implement the use of permeable paving for all driveways. Runoff from the roofs will drain to the sub-base of either the paving or patios, whilst the new access road will adopt the use of a filter drain to discharge surface water to ground.

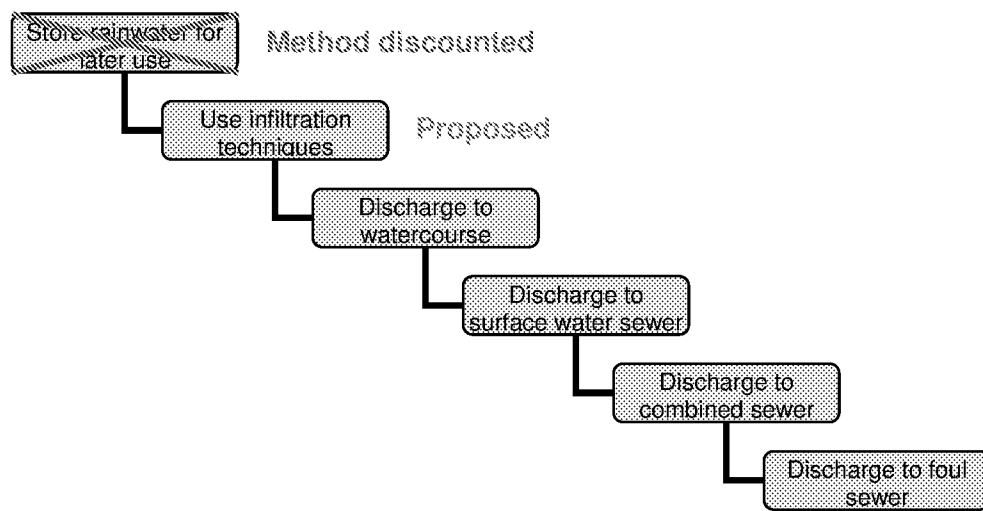


Figure 6.1 – SuDS Hierarchy

- 4.9 As mentioned, the use of infiltration techniques has been implemented into the design for discharging the surface water run-off. For both the proposed permeable paving areas and the filter drain, the infiltration rate of 5.13×10^{-4} m/s (1.8468 m/h) has been used. To ensure no flooding occurs on site, MicroDrainage calculations have been produced for the 1 in 100 year return period plus 40% climate change.

- 4.10 MicroDrainage calculations for both the driveways, patios and the filter drain can be found in Appendix C of this report. The maximum depth of water in the driveways is 182mm in the 225mm sub-base, and in the patios is 61mm in the 150mm sub-base. The water level rises above the top of Filter Drain 2 by 46mm but does not cause flooding.

5.0 Surface Water Drainage Maintenance

- 5.1 Regularly inspecting the surface water drainage network for blockages and clearing unwanted debris / silt from the system should improve the performance of the surface water network and decrease the need for future repairs. In the event that road gullies become blocked, high pressure water jets can be used to clear the gully and ensure they are functioning correctly, this should be undertaken by certified trained professionals.

- 5.2 The level and frequency of maintenance required on site is dependent on the type of facility. The type of maintenance will fall into one of three categories “regular maintenance”, “occasional maintenance” and “remedial maintenance”. Regular maintenance of the drainage and SuDS features will include, inspections, removal of litter / debris and sweeping of the surfaces. Occasional maintenance will include removal of sediment etc. and remedial maintenance may include structural repairs and infiltration reconditioning if required.
- 5.3 The drainage and SuDS elements, after an initial inspection following construction, should be inspected on a monthly basis for the first 12 months and after large storms, thereafter the following maintenance regime should be applied and adjusted if the 12 month monitoring process has identified any issues. For specialist pieces of equipment such as the treatment plant, maintenance brochures will be provided by the manufacturers. These will set out the frequency of inspections and correct methods of cleaning etc. that should be followed. It is recommended that once installed the facility should be inspected monthly for the first three months and thereafter at six monthly intervals or as advised in the maintenance brochure.
- 5.4 The foul and surface water drainage, including the treatment plant and SuDS will remain private under the ownership of a management company, who will also be responsible for all communal areas of the site including the access road. It will be their responsibility to maintain the foul and surface water drainage in accordance with these recommendations.
- 5.5 For Permeable Paving Areas, the following maintenance is recommended:

Permeable Paving 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 surfaces 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 glyphosate 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 50 mm 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	Inspect for evidence of poor operation and/or weed growth - if required, take remedial action.	Three-monthly, 48 hours after large storms in the first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

5.6 For the filter drain, the following maintenance is recommended:

Filter Drain Maintenance Schedule		
	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris from filter drain surface, access chambers and pre-treatment devices.	Monthly
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage.	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies.	Six Monthly
	Remove Sediment from pre-treatment devices	As required
Occasional maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods.	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium.	Five yearly, or as required
	Clear perforated pipework of blockages.	

Replacement at end of Design Life

- 5.7 Both the permeable paving and the filter drain use a granular material to store the runoff while allowing it to drain into the ground below. For the driveways and part of the filter drain this is then covered by the road construction. As part of the ongoing maintenance this material will be inspected to determine if it is still functioning as intended. At the end of the manufactures recommended design life the material will be assessed to determine if it needs replacing.
- 5.8 When it does need replacing, for the driveways this will mean the full reconstruction of the pavement. Given that the design life of the pavement is expected to be beyond 25 years it is likely that the surfacing will also require replacement in this timescale. Therefore, the remedial works will provide a completely new pavement structure restoring the permeability and the aesthetics of the driveway.
- 5.9 For the filter drain that is adjacent to the turning head, the gravel material can simply be excavated and replaced. Care will need to be taken not to damage the access manholes or surrounding structures, and the permeable pipe should be relayed at the same level.
- 5.10 For the filter drain under the access road this will require a trench slot to be excavated through the pavement construction which will need to be reinstated following the renewal of the gravel material as per the above.

Maintenance of Ditch and Culvert

- 5.11 There is an existing watercourse passing along the boundary between the site and Dappers Lane which has been culverted under the existing access into the site. The ditch and the culvert will be in the ownership and responsibility of the maintenance company. The following maintenance regime is recommended for the ditch.

Ditch Maintenance Schedule		
	Required Action	Typical Frequency
Regular maintenance	Remove letter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required

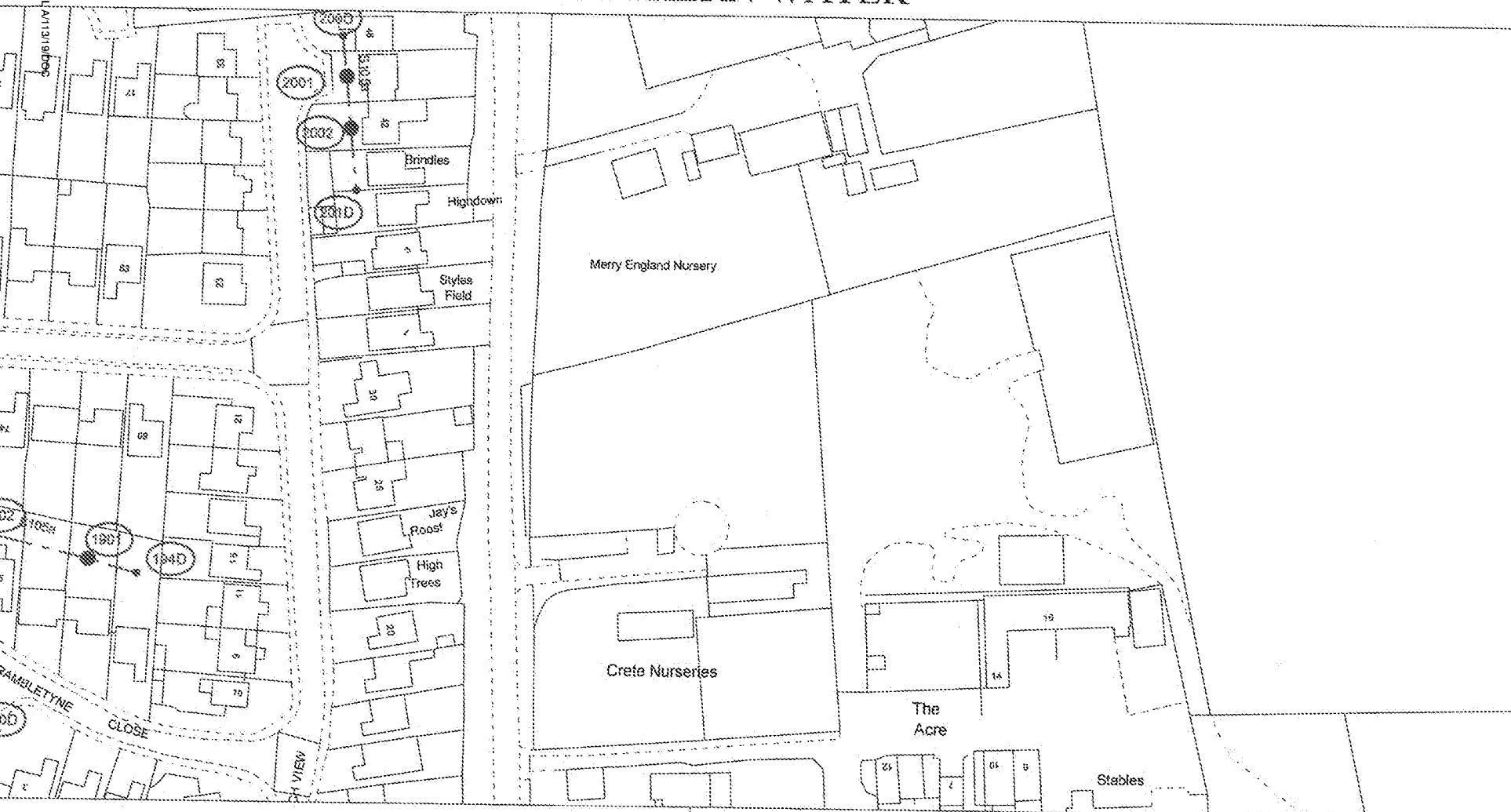
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surface for ponding, compaction, silt accumulation, records areas where water is ponding for > 48 hours	Monthly, 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

- 5.12 A CCTV survey of the culvert is required prior to construction to confirm the exact route and depth of the pipe. Following construction another survey should be completed to ensure the pipe is clear of any debris that might have entered during the construction phase.
- 5.13 Following completion, it is recommended that a visual inspection of the pipe and the area around it is undertaken annually, or as required. In addition, every 10 years a detailed inspection of the pipe via CCTV camera to determine if any remedial works are required.

APPENDIX A

Southern Water Asset Mapping

SOUTHERN WATER



ous of pipes shown on this plan are believed to be correct, but Water Services Ltd accept no responsibility in the event of . The actual positions should be determined on site.

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EF: TQ0704NW

Scale: 1:1250



Printed By: SB

Date: 26-3-2019

Crete Nursery Dappers Lane

Requested By:

ENCI BAC pipes are constructed of Bonded Adhesive Cement

PNQ: Unknown (UNK) materials may include Bonded Asbestos Cement



Southern
Water

APPENDIX B

Soil Investigation



Date: 04/04/2019
Our Ref: 18.1157

Crete Nurseries,
Dappers Lane,
Angmering,
West Sussex,
BN16 4EN

Dear Ms. Frampton, on behalf of Country Oak Homes Ltd

RE: Winter Groundwater Monitoring and Soil Infiltration Rates at Crete Nurseries

Introduction

I write further to the completion of soakaway/soil infiltration testing and winter groundwater monitoring carried out at Crete Nurseries, Dappers Lane, Angmering, West Sussex, BN16 4EN (hereafter referred to as the 'site'), as instructed by yourself, and Country Oak Homes Ltd – the client (EQ12972, September 2018).

This letter report provides copies of the test data, observations made during works and stratigraphic logs.

The site currently comprises a two-storey residential dwelling with front and rear garden, together with horse stables with an associated paddock and training ground. The entire site area is approximately 0.58Ha. Access can be afforded via a private driveway directly off from Dappers Lane.

The area highlighted for the investigation specifically includes the horse paddock making up approximately 0.29Ha. The paddock is entirely laid to soft-standing as turfed grass.

Scope

The scope of works were undertaken in respect of Condition 9.0 within the associated planning application (Ref: A/178/17/OUT), and after correspondence between Constructive Evaluation Ltd and the Client.

The purposes of this investigation were to establish highest annual groundwater levels as well as to calculate infiltration rate values in order to ascertain drainage characteristics of the underlying soils for soakaway design.

Fieldworks

The following site works were completed over a single day operation on 4th December 2018, supervised by an Engineer from CE. The investigation was undertaken in relation to statutory guidance BS5930: 1999 *Code of Practice for Site Investigations (Amendment 3: 2015)*, and in general accordance with BRE365; approved methods by ADC (Arun District Council). A site plan with indicative locations of the tests is enclosed.

- Prior to excavations taking place a Cable Avoidance Tool (CAT) was used to check for the position of any underlying electrical services; accessible manhole covers were lifted to confirm the direction of underlying drainage.
- 3no. windowless sample boreholes (WS1, WS2 and WS3) were completed through the base of their respective starter trial pits, to a maximum depth of 2.50mbgl (metres below ground level), using a tracked dynamic sampling rig. On completion all three boreholes were installed with groundwater monitoring wells, constructed with 50mm diameter HDPE plain and slotted pipe. A filter pack of washed gravel was placed in each well annulus to approximately just above the screen section, and the annulus sealed with bentonite. The monitoring wells were finished with a secure raised steel barrel cover.
- 1no. machine excavated trial pit (TP1) was completed to allow for a soakaway infiltration test, in accordance with BRE365, to provide information for soakaway design. The pit was excavated using an 8 tonne excavator to a depth of approximately 0.90mbgl, with dimensions approximately consistent from top to bottom. Following which the pit was rapidly filled with potable water. Measurements were taken to monitor the drop in water level over time. On completion the trial pit was backfilled with arisings and reinstated at the surface (as best as practically possible) in respect of existing conditions.
- All intrusive locations were logged and any visual or olfactory evidence of contamination noted in accordance with current protocol.
- Following installation, monitoring wells were developed on 12th December 2018 using either disposable bailers. Development enabled the removal of materials that may have entered the well during drilling and installation. Additionally, the development allows settlement of the gravel surround and ensures free flow of liquids through the well screen. Development continued until at least three well volumes had been removed.

A site plan indicating intrusive positions is enclosed.

Ground Conditions

The following strata conditions were encountered during both stages of works:

Stratum	Depth Range Encountered	Detail Description
Topsoil	Ground level to max 0.20m	Dark brown slightly sandy Silt with abundant roots and rootlets, and occasional gravels of flint
Made Ground	Exclusive to TP1 from 0.15m to 0.30mbgl	Brown silty slightly gravelly Clay, with gravels of flint and rarely concrete. Abundant roots and rootlets were also recorded
Silty CLAY / Clayey SILT	0.15m to 0.75mbgl	Soft to firm dark brown sometimes brown mottled silty CLAY / clayey SILT, with abundant roots and rootlets, and occasional gravels of flint
Head Deposit	0.30m to 2.00mbgl	Predominantly dense light brown and light grey slightly silty slightly sandy GRAVEL of flint, with rare cobbles and boulders of flint
London Clay	Exclusive to WS2 from 1.60m to 2.50mbgl	Firm to stiff brown mottled grey silty CLAY, with occasional gravels of flint and rare rootlets

During intrusive works groundwater was encountered ranging depths of 0.50m to 1.80mbgl, and shallowest within WS3. A winter groundwater monitoring regime was completed cooperatively by CE and the client over the winter of 2018-2019. This is detailed in subsequent report sections. Other than the anthropogenic material recorded within the Made Ground soils, no other visual and olfactory evidence of contamination was encountered.

Groundwater Monitoring

A total of 25no groundwater gauging rounds were completed within the winter period of October to March, the first reading being taken upon installation of standpipes on 10th December 2018, and the last on the 29th March 2019. Readings were taken monthly from December to January, then approximately twice per week between January and March. All gauge rounds involved the dipping of wells with an interceptor probe.

In general, groundwater levels in all locations were found to slightly decline between December and mid-January (from 0.66-1.61mbgl to 0.89-1.67mbgl), then rise relatively rapidly until early February (0.43-1.48mbgl). Levels were noted to relatively rapidly decline again until the end of February (0.94-1.68mbgl). At the beginning of March, levels were seen to steeply rise once more for the first week (up to 0.67-1.51mbgl), then remain relatively consistent until mid-March, before gradually declining to levels akin to those observed at the end of February (1.04-1.69mbgl).

Highest (shallowest) groundwater levels were almost ubiquitously observed in standpipe WS3 (north east corner of site), with a minimum depth recorded as 0.43mbgl on 10th February 2019.

Levels in WS2 (north west corner of site) were recorded as generally 0.20-0.40m lower than those in WS3, and recorded the lowest (deepest) groundwater level in the northern section of the site as 1.13mbgl on 20th January 2019.

Lowest (deepest) groundwater depths were consistently recorded within WS1 (south west corner of site), with a minimum of 1.48mbgl on 7th – 10th February 2019 and maximum of 1.69mbgl on 27th – 29th March 2019.

There is a drainage ditch noted running along the western boundary of the site; this considered likely to have an influence on groundwater levels across the site, and may explain shallowest groundwater depths having been recorded in the north east of the site (WS3).

Soil Infiltration Testing

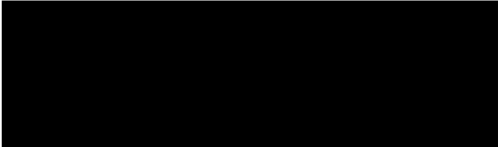
Infiltration testing in general accordance with BRE 365 was conducted in location TP1, the test comprised the excavation of the trial pit to a depth of 0.90mbgl, the squaring of the excavation sides and the subsequent rapid filling of the pits using potable water. The subsequent fall in water level within each pit was monitored over a nominal period. The soil infiltration rate is calculated by the rate of outflow from 75% to 25% effective fill depth. The table below summarises the results.

Trial Hole ID	Test	Pit Depth (m)	Time at 75% (mins)	Time at 25% (mins)	Permeability Coefficient (m/s)	Drainage Conditions
TP1	1	0.90	0.35	1.90	8.96×10^{-4}	Good
	2	0.90	1.10	3.20	5.50×10^{-4}	Good
	3	0.90	0.80	2.70	5.13×10^{-4}	Good

The infiltration results calculated from the tests completed indicate an initial rate of 8.96×10^{-4} m/s. During subsequent second and third tests (saturated conditions), rates of 5.50×10^{-4} m/s to 5.13×10^{-4} m/s are calculated. The results calculated correspond to low end of 'good' drainage conditions, or alternatively clean sands and gravel mixtures (Ref: Soil Mechanics in Engineering practice by Karl Terzaghi, Ralph B. Peck and Gholamreza Mesri; Table 14.1 Permeability and drainage characteristics of soils (after casagrande and Fadum 1940)).

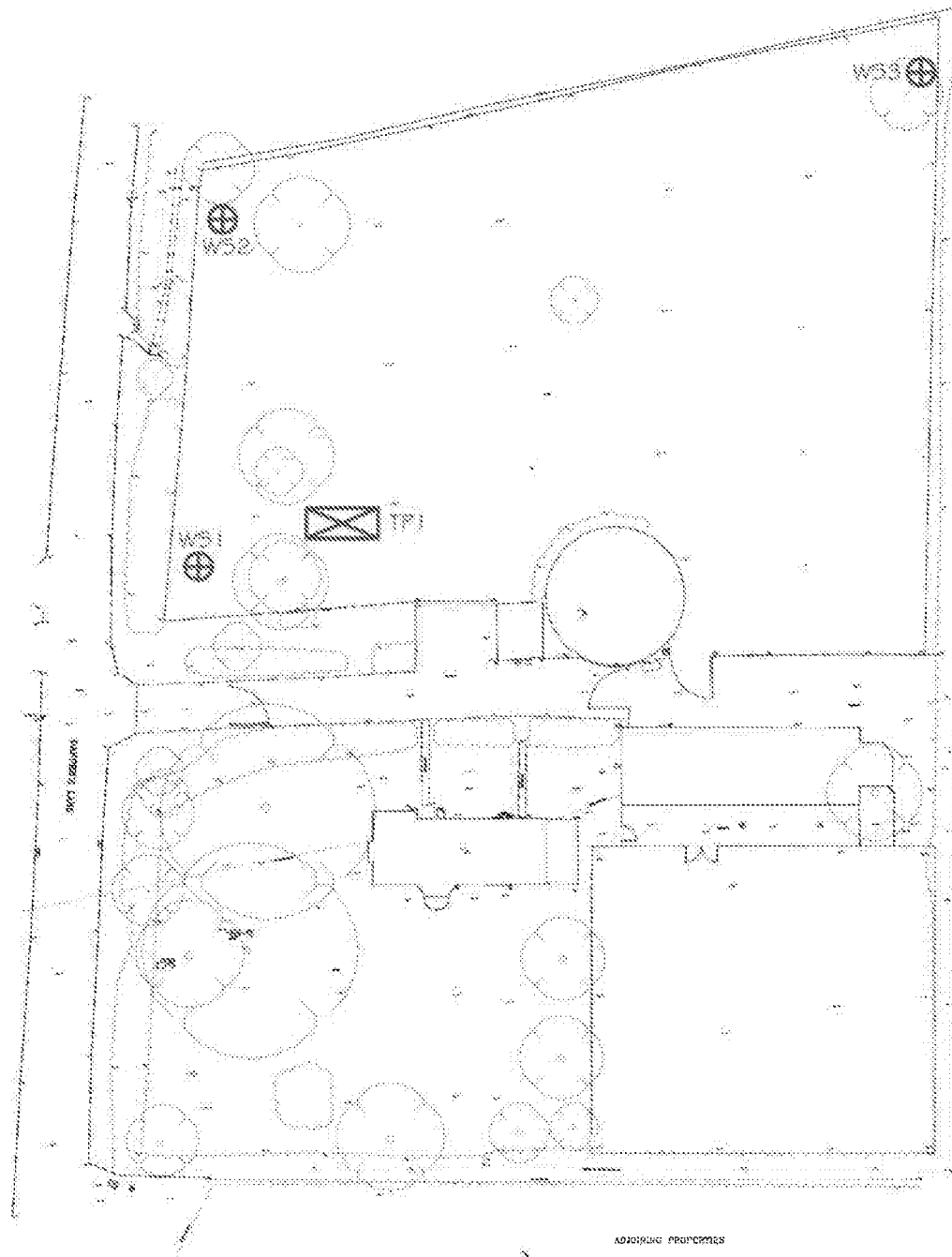
I trust the above information is sufficient for your requirements in this matter, should you have any queries please do not hesitate to contact the undersigned.

Kind regards,
Spencer Robinson BSc


Graduate Geo-Environmental Scientist

Constructive Evaluation Limited

Enclosed: Site Plan
 Groundwater Gauging Results
 Infiltration Testing Records
 Soil Logs



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1. Do not scale from this drawing
 2. Use Aegist dimensions only
 3. All dimensions must be checked in sets prior to commencement of work.
 4. Where applicable this drawing is to be read in conjunction with other consultants drawings.
 5. This drawing is the copyright of Constructive Evolution Ltd.

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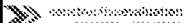
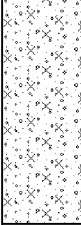
evaluation
Tel: 01243 533399 Fax: 01243 531000
email: info@theconstructivegroup.com

☒ **CHIEF**

Project: **CPRE WARRIORS**

Grading	Score
THE INVESTIGATION PLAN	NTS

date DEC 16	drawn BY	checked
drawing number	1A.1157	revision

				Trial Pit Log			Trialpit No TP1 Sheet 1 of 1		
Project Name: Crete Nurseries				Project No. 18.1157		Co-ords: - Level:		Date 04/12/2018	
Location: Dappers Lane, Angmering, BN16 4EN						Dimensions (m): Depth 0.90 1.5 		Scale 1:20 Logged RG	
Client: Mrs Claire Frampton / Country Oak Homes Ltd									
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.40	B		0.15 0.30 0.90		  	Turfed grass over TOPSOIL: Dark brown slightly sandy Silt. Sand is fine and medium. Abundant roots and rootlets. Occasional sub-angular and sub-rounded fine and medium Gravel of flint. MADE GROUND: Brown silty slightly gravelly Clay. Gravel is sub-angular to rounded fine and medium flint. Abundant roots and rootlets. Rare angular to sub-rounded medium Gravel of concrete. Light brown speckled light grey slightly silty slightly sandy angular to sub-rounded fine to coarse GRAVEL of flint. Sand is fine to coarse. Occasional cobbles of flint. Rare boulders of flint. (HEAD DEPOSIT). End of pit at 0.90 m		
Remarks: CAT scanned prior to excavation. Groundwater not encountered. Stability: Somewhat unstable from 0.30m to 0.90mbgl. 									



Borehole Log

Borehole No.

WS1

Sheet 1 of 1

Project Name: Crete Nurseries

Project No.
18.1157

Co-ords:

Hole Type
WLS

Location: Dappers Lane, Angmering, BN16 4EN

Level:

Scale
1:20

Client: Mrs Claire Frampton / Country Oak Homes Ltd

Dates: 04/12/2018

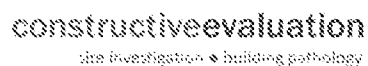
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Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20			Turfed grass over TOPSOIL: Dark brown slightly sandy Silt. Sand is fine and medium. Abundant roots and rootlets.	
					0.70			Soft to firm dark brown and brown mottled silty CLAY / clayey SILT. Abundant roots and rootlets. Occasional sub-angular and sub-rounded fine and medium Gravel of flint.	
		1.00 1.00	D SPT	N=32 (8,7/9,9,6,8)	1.10			Dense light brown speckled light grey slightly silty slightly sandy angular to sub-rounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (HEAD DEPOSIT).	1
					1.70			Dense light grey sandy angular to sub-rounded fine to coarse GRAVEL of flint. Sand is medium and coarse. (HEAD DEPOSIT).	
		2.00 2.00	D SPT	N=45 (7,9/11,11,11,12)	2.00			Dense brown silty slightly sandy angular to sub-rounded fine to coarse GRAVEL of flint. Sand is fine to coarse. Locally clayey. (HEAD DEPOSIT).	2
								End of Borehole at 2.000m	3
									4

Remarks

CAT scanned prior to excavation. Buried service clearance pit hand-dug to ~1.00mbgl. Borehole advanced using a tracked dynamic windowless drilling rig. Groundwater strike at 1.80m, rising to 1.70mbgl after a period of 20 minutes.





Borehole No.

WS2

Sheet 1 of 1

Project Name: Crete Nurseries

Project No.	18.1157
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Co-ords:

Hole Type
WLS

Location: Dappers Lane, Angmering, BN16 4EN

Level:

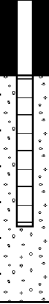
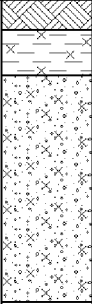
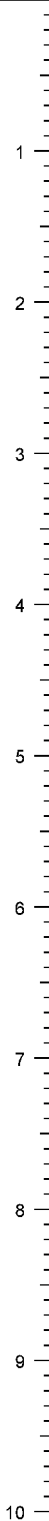
Scale
1:20

Client: Mrs Claire Frampton / Country Oak Homes Ltd

Dates: 04/12/2018

Logged By
RG

Remarks	
CAT scanned prior to excavation. Buried service clearance pit hand-dug to ~1.00mbgl. Borehole advanced using a tracked dynamic windowless drilling rig. Groundwater seepage at 0.90mbgl.	

 constructiveevaluation site investigation • building pathology				Borehole Log				Borehole No. WS3 Sheet 1 of 1	
Project Name: Crete Nurseries				Project No. 18.1157		Co-ords:		Hole Type WLS	
Location: Dappers Lane, Angmering, BN16 4EN				Level:		Scale 1:50			
Client: Mrs Claire Frampton / Country Oak Homes Ltd				Dates: 04/12/2018		Logged By RG			
Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.20			Turfed grass over TOPSOIL: Dark brown slightly sandy Silt. Sand is fine and medium. Abundant roots and rootlets. Occasional sub-angular and sub-rounded fine and medium Gravel of flint. Firm dark brown silty CLAY. Abundant roots and rootlets. Dense to very dense light brown speckled light grey slightly silty slightly sandy angular to sub-rounded fine to coarse GRAVEL of flint. Sand is fine to coarse. (HEAD DEPOSIT).	
					0.50				
		1.00	D	N=50 (2,9/50 for 260mm)					
		1.00	SPT						
		1.50	D						
		2.00	D	N=37 (1,4/8,7,9,13)	2.00				
		2.00	SPT						
End of Borehole at 2.000m									
Remarks CAT scanned prior to excavation. Buried service clearance pit hand-dug to ~1.00mbgl. Borehole advanced using a tracked dynamic windowless drilling rig. Groundwater strike at 0.80m, rising to 0.50mbgl after a period of 20 minutes.									
									

APPENDIX C

MicroDrainage Calculations

Lanmor Consulting Ltd		Page 1
Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW	Dappers Lane Angmering	
Date July 2019 File Cascade.casx	Designed by RS Checked by KBL	
XP Solutions	Source Control 2015.1	

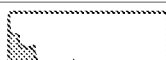
Cascade Summary of Results for FILTER DRAIN 1.srcx

Upstream Outflow To Overflow To
Structures
 (None) (None) FILTER DRAIN 2.srcx

Half Drain Time : 7 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	10.704	0.924	4.4	6.6	11.0	2.0	Flood Risk
30 min Summer	10.691	0.911	4.3	6.1	10.4	2.0	Flood Risk
60 min Summer	10.659	0.879	4.2	4.1	8.3	1.9	O K
120 min Summer	10.582	0.802	3.9	0.4	4.3	1.8	O K
180 min Summer	10.420	0.640	3.3	0.0	3.3	1.4	O K
240 min Summer	10.291	0.511	2.8	0.0	2.8	1.2	O K
360 min Summer	10.129	0.349	2.2	0.0	2.2	0.8	O K
480 min Summer	10.027	0.247	1.8	0.0	1.8	0.6	O K
600 min Summer	9.954	0.174	1.6	0.0	1.6	0.4	O K
720 min Summer	9.907	0.127	1.4	0.0	1.4	0.3	O K
960 min Summer	9.847	0.067	1.2	0.0	1.2	0.1	O K
1440 min Summer	9.819	0.039	0.9	0.0	0.9	0.1	O K
2160 min Summer	9.809	0.029	0.6	0.0	0.6	0.1	O K
2880 min Summer	9.803	0.023	0.5	0.0	0.5	0.0	O K
4320 min Summer	9.797	0.017	0.4	0.0	0.4	0.0	O K
5760 min Summer	9.793	0.013	0.3	0.0	0.3	0.0	O K
7200 min Summer	9.791	0.011	0.2	0.0	0.2	0.0	O K
8640 min Summer	9.790	0.010	0.2	0.0	0.2	0.0	O K
10080 min Summer	9.789	0.009	0.2	0.0	0.2	0.0	O K
15 min Winter	10.711	0.931	4.4	6.9	11.3	2.0	Flood Risk
30 min Winter	10.677	0.897	4.3	5.2	9.5	2.0	O K
60 min Winter	10.631	0.851	4.1	2.5	6.6	1.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
15 min Summer	129.682	0.0	0.9	11
30 min Summer	87.133	0.0	1.1	18
60 min Summer	55.837	0.0	0.8	34
120 min Summer	34.509	0.0	0.1	66
180 min Summer	25.637	0.0	0.0	98
240 min Summer	20.604	0.0	0.0	128
360 min Summer	15.169	0.0	0.0	188
480 min Summer	12.185	0.0	0.0	248
600 min Summer	10.272	0.0	0.0	310
720 min Summer	8.930	0.0	0.0	370
960 min Summer	7.152	0.0	0.0	490
1440 min Summer	5.221	0.0	0.0	720
2160 min Summer	3.803	0.0	0.0	1088
2880 min Summer	3.033	0.0	0.0	1460
4320 min Summer	2.201	0.0	0.0	2164
5760 min Summer	1.751	0.0	0.0	2904
7200 min Summer	1.466	0.0	0.0	3664
8640 min Summer	1.270	0.0	0.0	4248
10080 min Summer	1.124	0.0	0.0	5088
15 min Winter	129.682	0.0	1.3	11
30 min Winter	87.133	0.0	1.4	18
60 min Winter	55.837	0.0	0.8	34

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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW	Dappers Lane Angmering	
Date July 2019 File Cascade.casx	Designed by RS Checked by KBL	
XP Solutions Source Control 2015.1		

Cascade Summary of Results for FILTER DRAIN 1.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Overflow (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
120 min Winter	10.484	0.704	3.5	0.0	3.5	1.6	O K
180 min Winter	10.284	0.504	2.8	0.0	2.8	1.1	O K
240 min Winter	10.154	0.374	2.3	0.0	2.3	0.9	O K
360 min Winter	10.002	0.222	1.7	0.0	1.7	0.5	O K
480 min Winter	9.912	0.132	1.4	0.0	1.4	0.3	O K
600 min Winter	9.859	0.079	1.2	0.0	1.2	0.2	O K
720 min Winter	9.828	0.048	1.1	0.0	1.1	0.1	O K
960 min Winter	9.819	0.039	0.8	0.0	0.8	0.1	O K
1440 min Winter	9.808	0.028	0.6	0.0	0.6	0.1	O K
2160 min Winter	9.801	0.021	0.5	0.0	0.5	0.0	O K
2880 min Winter	9.797	0.017	0.4	0.0	0.4	0.0	O K
4320 min Winter	9.792	0.012	0.3	0.0	0.3	0.0	O K
5760 min Winter	9.790	0.010	0.2	0.0	0.2	0.0	O K
7200 min Winter	9.788	0.008	0.2	0.0	0.2	0.0	O K
8640 min Winter	9.787	0.007	0.2	0.0	0.2	0.0	O K
10080 min Winter	9.786	0.006	0.1	0.0	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Overflow Volume (m³)	Time-Peak (mins)
120 min Winter	34.509	0.0	0.0	70
180 min Winter	25.637	0.0	0.0	100
240 min Winter	20.604	0.0	0.0	130
360 min Winter	15.169	0.0	0.0	190
480 min Winter	12.185	0.0	0.0	252
600 min Winter	10.272	0.0	0.0	310
720 min Winter	8.930	0.0	0.0	366
960 min Winter	7.152	0.0	0.0	482
1440 min Winter	5.221	0.0	0.0	732
2160 min Winter	3.803	0.0	0.0	1084
2880 min Winter	3.033	0.0	0.0	1464
4320 min Winter	2.201	0.0	0.0	2216
5760 min Winter	1.751	0.0	0.0	2824
7200 min Winter	1.466	0.0	0.0	3528
8640 min Winter	1.270	0.0	0.0	4328
10080 min Winter	1.124	0.0	0.0	5016

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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW	Dappers Lane Angmering	
Date July 2019 File Cascade.casx	Designed by RS Checked by KBL	
XP Solutions Source Control 2015.1		

Cascade Rainfall Details for FILTER DRAIN 1.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.020

Time (mins)	Area
From:	To: (ha)

0	4 0.020
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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW	Dappers Lane Angmering	
Date July 2019 File Cascade.casx	Designed by RS Checked by KBL	
XP Solutions	Source Control 2015.1	

Cascade Model Details for FILTER DRAIN 1.srcx

Storage is Online Cover Level (m) 10.980

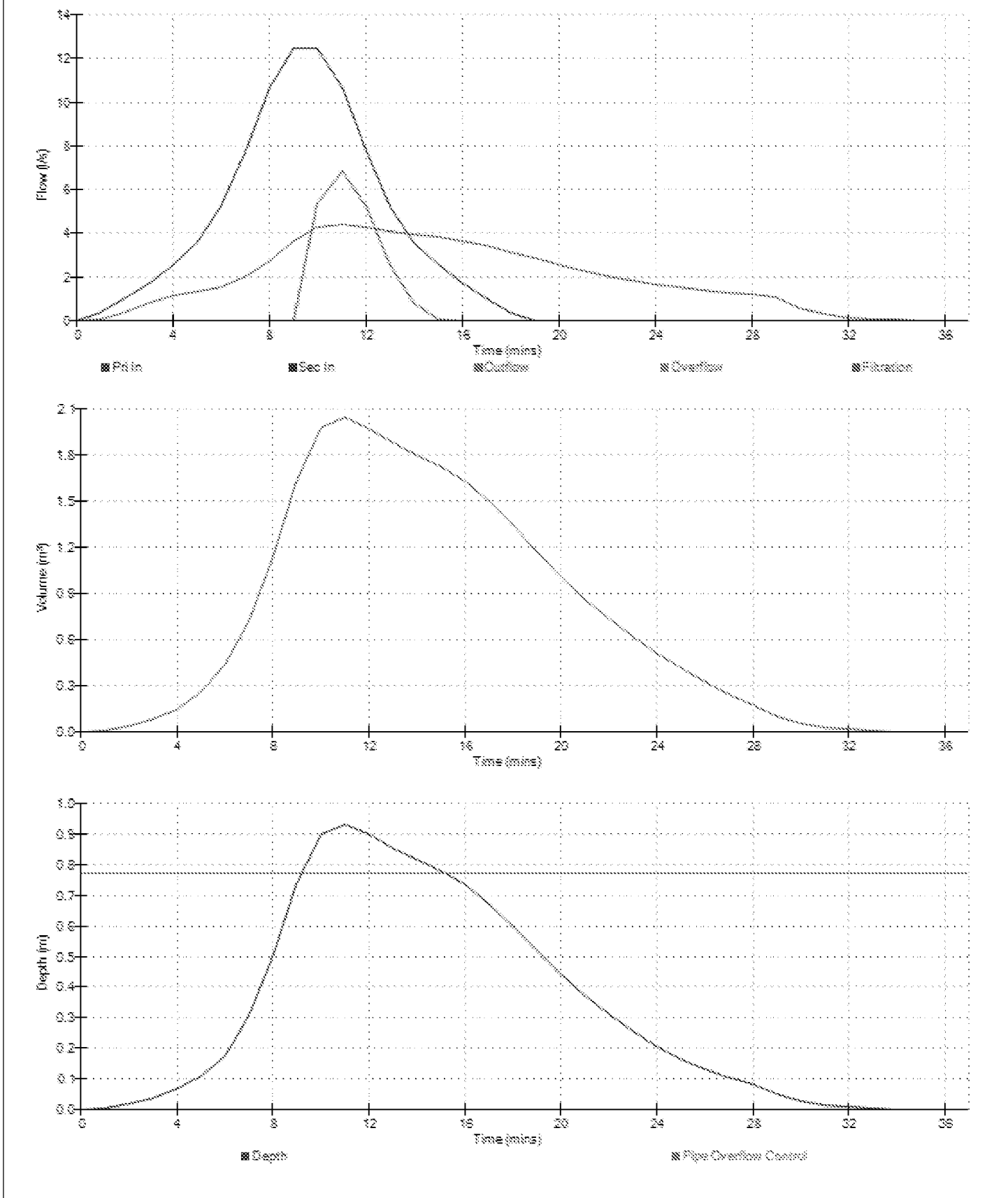
Filter Drain Structure

Infiltration Coefficient Base (m/hr)	1.84680	Trench Length (m)	14.1
Infiltration Coefficient Side (m/hr)	1.84680	Pipe Diameter (m)	0.100
Safety Factor	4.0	Pipe Depth above Invert (m)	0.075
Porosity	0.30	Slope (1:X)	0.0
Invert Level (m)	9.780	Cap Volume Depth (m)	0.000
Trench Width (m)	0.5	Cap Infiltration Depth (m)	0.000

Pipe Overflow Control

Diameter (m)	0.100	Roughness k (mm)	0.600	Upstream Invert Level (m)	10.553
Slope (1:X)	9.0	Entry Loss Coefficient	0.500		
Length (m)	5.995	Coefficient of Contraction	0.600		

Cascade Event: 15 min Winter for FILTER DRAIN 1.srcx



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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW	Dappers Lane Angmering	
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XP Solutions	Source Control 2015.1	

Cascade Summary of Results for FILTER DRAIN 2.srcx

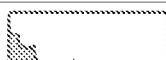
Upstream Outflow To Overflow To
Structures

FILTER DRAIN 1.srcx (None) (None)

Half Drain Time : 5 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	9.849	0.772	6.2	2.4	O K
30 min Summer	9.877	0.800	6.5	2.6	O K
60 min Summer	9.784	0.707	5.6	2.1	O K
120 min Summer	9.603	0.526	3.6	1.2	O K
180 min Summer	9.530	0.453	2.9	0.9	O K
240 min Summer	9.480	0.403	2.4	0.7	O K
360 min Summer	9.414	0.337	1.9	0.5	O K
480 min Summer	9.370	0.293	1.5	0.4	O K
600 min Summer	9.338	0.261	1.3	0.3	O K
720 min Summer	9.313	0.236	1.2	0.2	O K
960 min Summer	9.277	0.200	0.9	0.2	O K
1440 min Summer	9.234	0.157	0.7	0.1	O K
2160 min Summer	9.198	0.121	0.5	0.1	O K
2880 min Summer	9.177	0.100	0.4	0.0	O K
4320 min Summer	9.152	0.075	0.3	0.0	O K
5760 min Summer	9.138	0.061	0.2	0.0	O K
7200 min Summer	9.130	0.053	0.2	0.0	O K
8640 min Summer	9.125	0.048	0.2	0.0	O K
10080 min Summer	9.122	0.045	0.2	0.0	O K
15 min Winter	9.923	0.846	6.3	2.9	O K
30 min Winter	9.905	0.828	6.7	2.8	O K
60 min Winter	9.749	0.672	5.2	1.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	129.682	0.0	13
30 min Summer	87.133	0.0	21
60 min Summer	55.837	0.0	36
120 min Summer	34.509	0.0	68
180 min Summer	25.637	0.0	96
240 min Summer	20.604	0.0	126
360 min Summer	15.169	0.0	186
480 min Summer	12.185	0.0	246
600 min Summer	10.272	0.0	306
720 min Summer	8.930	0.0	368
960 min Summer	7.152	0.0	490
1440 min Summer	5.221	0.0	734
2160 min Summer	3.803	0.0	1100
2880 min Summer	3.033	0.0	1460
4320 min Summer	2.201	0.0	2180
5760 min Summer	1.751	0.0	2936
7200 min Summer	1.466	0.0	3672
8640 min Summer	1.270	0.0	4288
10080 min Summer	1.124	0.0	5056
15 min Winter	129.682	0.0	13
30 min Winter	87.133	0.0	21
60 min Winter	55.837	0.0	38

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Date July 2019 File Cascade.casx	Designed by RS Checked by KBL	
XP Solutions Source Control 2015.1		

Cascade Summary of Results for FILTER DRAIN 2.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
120 min Winter	9.545	0.468	3.0	0.9	O K
180 min Winter	9.469	0.392	2.3	0.7	O K
240 min Winter	9.417	0.340	1.9	0.5	O K
360 min Winter	9.352	0.275	1.4	0.3	O K
480 min Winter	9.312	0.235	1.1	0.2	O K
600 min Winter	9.283	0.206	1.0	0.2	O K
720 min Winter	9.262	0.185	0.8	0.1	O K
960 min Winter	9.232	0.155	0.7	0.1	O K
1440 min Winter	9.197	0.120	0.5	0.1	O K
2160 min Winter	9.169	0.092	0.4	0.0	O K
2880 min Winter	9.152	0.075	0.3	0.0	O K
4320 min Winter	9.133	0.056	0.2	0.0	O K
5760 min Winter	9.125	0.048	0.2	0.0	O K
7200 min Winter	9.121	0.044	0.1	0.0	O K
8640 min Winter	9.118	0.041	0.1	0.0	O K
10080 min Winter	9.115	0.038	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
120 min Winter	34.509	0.0	68
180 min Winter	25.637	0.0	98
240 min Winter	20.604	0.0	128
360 min Winter	15.169	0.0	188
480 min Winter	12.185	0.0	246
600 min Winter	10.272	0.0	308
720 min Winter	8.930	0.0	366
960 min Winter	7.152	0.0	482
1440 min Winter	5.221	0.0	716
2160 min Winter	3.803	0.0	1080
2880 min Winter	3.033	0.0	1444
4320 min Winter	2.201	0.0	2176
5760 min Winter	1.751	0.0	2832
7200 min Winter	1.466	0.0	3576
8640 min Winter	1.270	0.0	4352
10080 min Winter	1.124	0.0	4968

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Date July 2019 File Cascade.casx	Designed by RS Checked by KBL	
XP Solutions	Source Control 2015.1	

Cascade Rainfall Details for FILTER DRAIN 2.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.016

Time (mins)	Area
From:	To: (ha)

0	4 0.016
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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW	Dappers Lane Angmering	
Date July 2019 File Cascade.casx	Designed by RS Checked by KBL	
XP Solutions Source Control 2015.1		

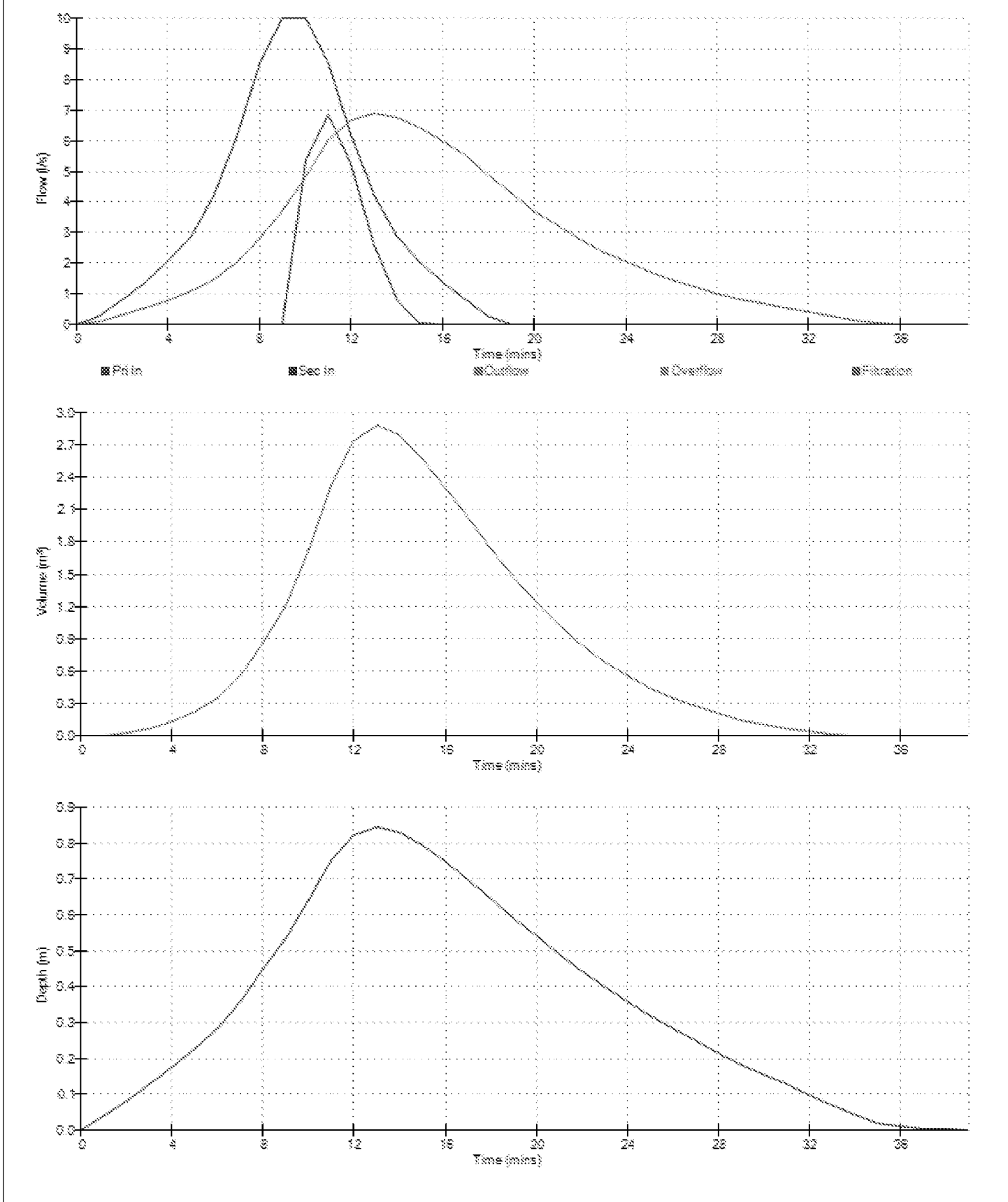
Cascade Model Details for FILTER DRAIN 2.srcx

Storage is Online Cover Level (m) 10.328

Filter Drain Structure

Infiltration Coefficient Base (m/hr)	1.84680	Trench Length (m)	35.8
Infiltration Coefficient Side (m/hr)	1.84680	Pipe Diameter (m)	0.100
Safety Factor	4.0	Pipe Depth above Invert (m)	0.075
Porosity	0.30	Slope (1:X)	51.0
Invert Level (m)	9.077	Cap Volume Depth (m)	0.800
Trench Width (m)	0.5	Cap Infiltration Depth (m)	0.800

Cascade Event: 15 min Winter for FILTER DRAIN 2.srcx



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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW	Dappers Lane Angmering	
Date July 2019 File PLOT 1 DRIVEWAY.SRCX	Designed by RS Checked by KBL	
XP Solutions		Source Control 2015.1

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

Half Drain Time : 2 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.732	0.157	5.1	0.9	Flood Risk
30 min Summer	10.730	0.155	5.0	0.9	Flood Risk
60 min Summer	10.706	0.131	4.3	0.7	Flood Risk
120 min Summer	10.673	0.098	3.2	0.4	Flood Risk
180 min Summer	10.653	0.078	2.6	0.2	Flood Risk
240 min Summer	10.640	0.065	2.1	0.2	Flood Risk
360 min Summer	10.625	0.050	1.6	0.1	Flood Risk
480 min Summer	10.620	0.045	1.3	0.1	Flood Risk
600 min Summer	10.616	0.041	1.1	0.1	Flood Risk
720 min Summer	10.613	0.038	1.0	0.1	Flood Risk
960 min Summer	10.609	0.034	0.8	0.0	Flood Risk
1440 min Summer	10.604	0.029	0.6	0.0	Flood Risk
2160 min Summer	10.600	0.025	0.4	0.0	Flood Risk
2880 min Summer	10.597	0.022	0.3	0.0	O K
4320 min Summer	10.594	0.019	0.2	0.0	O K
5760 min Summer	10.592	0.017	0.2	0.0	O K
7200 min Summer	10.591	0.016	0.2	0.0	O K
8640 min Summer	10.590	0.015	0.1	0.0	O K
10080 min Summer	10.589	0.014	0.1	0.0	O K
15 min Winter	10.733	0.164	5.4	1.0	Flood Risk
30 min Winter	10.726	0.151	4.9	0.9	Flood Risk
60 min Winter	10.692	0.117	3.8	0.5	Flood Risk
120 min Winter	10.654	0.079	2.6	0.2	Flood Risk
180 min Winter	10.635	0.060	1.9	0.1	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	129.682	0.0	12
30 min Summer	87.133	0.0	19
60 min Summer	55.837	0.0	34
120 min Summer	34.509	0.0	64
180 min Summer	25.637	0.0	94
240 min Summer	20.604	0.0	124
360 min Summer	15.169	0.0	184
480 min Summer	12.185	0.0	244
600 min Summer	10.272	0.0	302
720 min Summer	8.930	0.0	366
960 min Summer	7.152	0.0	480
1440 min Summer	5.221	0.0	736
2160 min Summer	3.803	0.0	1076
2880 min Summer	3.033	0.0	1444
4320 min Summer	2.201	0.0	2136
5760 min Summer	1.751	0.0	2904
7200 min Summer	1.466	0.0	3616
8640 min Summer	1.270	0.0	4256
10080 min Summer	1.124	0.0	4968
15 min Winter	129.682	0.0	12
30 min Winter	87.133	0.0	20
60 min Winter	55.837	0.0	36
120 min Winter	34.509	0.0	64
180 min Winter	25.637	0.0	94

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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW	Dappers Lane Angmering	
Date July 2019 File PLOT 1 DRIVEWAY.SRCX	Designed by RS Checked by KBL	
XP Solutions	Source Control 2015.1	

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	10.624	0.049	1.6	0.1	Flood Risk
360 min Winter	10.617	0.042	1.2	0.1	Flood Risk
480 min Winter	10.613	0.038	0.9	0.1	Flood Risk
600 min Winter	10.610	0.035	0.8	0.0	Flood Risk
720 min Winter	10.608	0.033	0.7	0.0	Flood Risk
960 min Winter	10.604	0.029	0.6	0.0	Flood Risk
1440 min Winter	10.600	0.025	0.4	0.0	O K
2160 min Winter	10.596	0.021	0.3	0.0	O K
2880 min Winter	10.594	0.019	0.2	0.0	O K
4320 min Winter	10.591	0.016	0.2	0.0	O K
5760 min Winter	10.590	0.015	0.1	0.0	O K
7200 min Winter	10.588	0.013	0.1	0.0	O K
8640 min Winter	10.587	0.012	0.1	0.0	O K
10080 min Winter	10.587	0.012	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	20.604	0.0	122
360 min Winter	15.169	0.0	180
480 min Winter	12.185	0.0	246
600 min Winter	10.272	0.0	298
720 min Winter	8.930	0.0	366
960 min Winter	7.152	0.0	478
1440 min Winter	5.221	0.0	714
2160 min Winter	3.803	0.0	1100
2880 min Winter	3.033	0.0	1492
4320 min Winter	2.201	0.0	2236
5760 min Winter	1.751	0.0	2992
7200 min Winter	1.466	0.0	3736
8640 min Winter	1.270	0.0	4280
10080 min Winter	1.124	0.0	5312

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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW	Dappers Lane Angmering	
Date July 2019 File PLOT 1 DRIVEWAY.SRCX	Designed by RS Checked by KBL	
XP Solutions		Source Control 2015.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.013

Time (mins)	Area
From:	To: (ha)

0	4 0.013
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Date July 2019 File PLOT 1 DRIVEWAY.SRCX	Designed by RS Checked by KBL	
XP Solutions	Source Control 2015.1	

Model Details

Storage is Online Cover Level (m) 10.900

Complex Structure

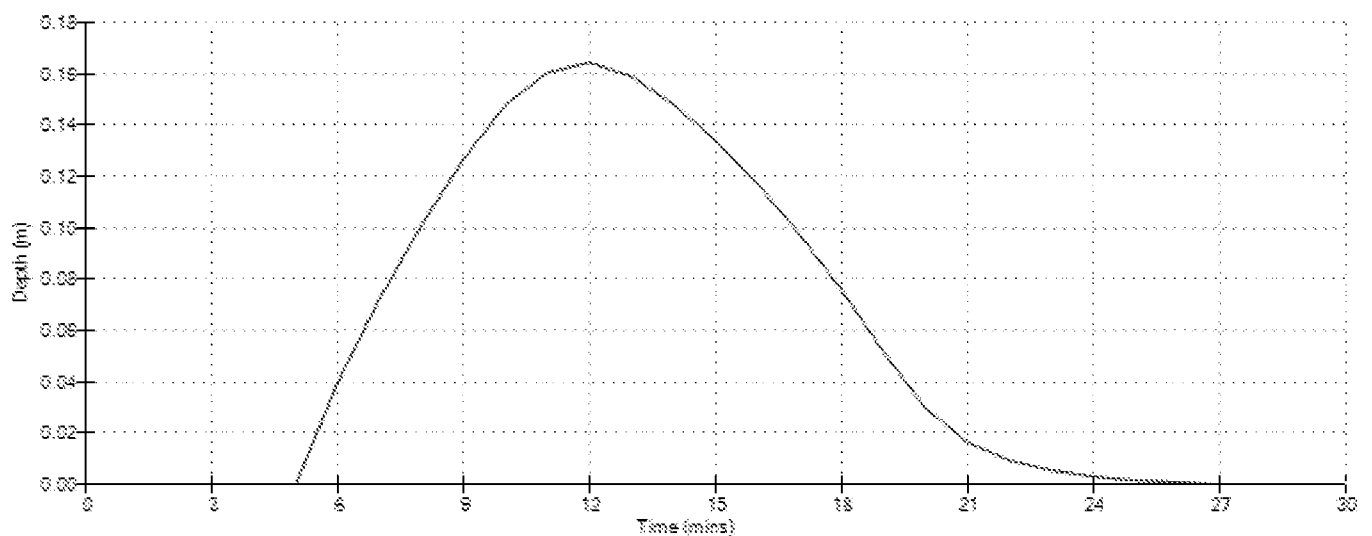
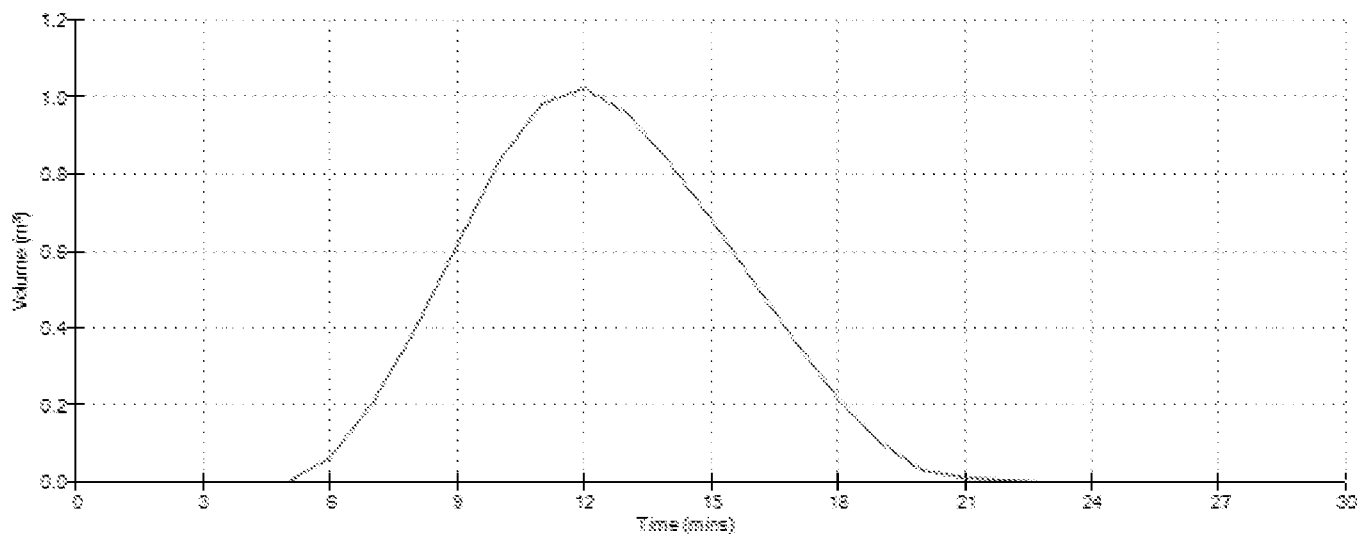
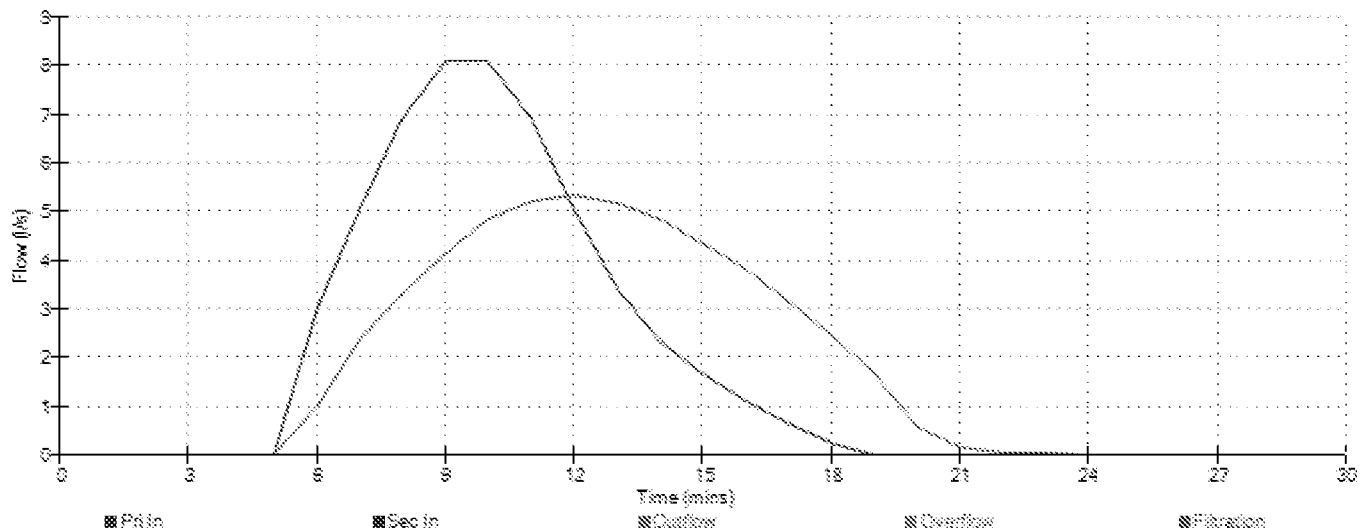
Porous Car Park

Infiltration Coefficient Base (m/hr)	1.84680	Width (m)	7.7
Membrane Percolation (mm/hr)	1000	Length (m)	8.4
Max Percolation (l/s)	18.0	Slope (1:X)	33.0
Safety Factor	4.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	10.575	Cap Volume Depth (m)	0.225

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	7.7
Membrane Percolation (mm/hr)	1000	Length (m)	1.5
Max Percolation (l/s)	3.2	Slope (1:X)	33.0
Safety Factor	4.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	10.830	Cap Volume Depth (m)	0.225

Event: 15 min Winter



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

Half Drain Time : 2 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.823	0.143	4.5	0.7	Flood Risk
30 min Summer	10.821	0.141	4.4	0.7	Flood Risk
60 min Summer	10.798	0.118	3.7	0.5	Flood Risk
120 min Summer	10.768	0.088	2.7	0.3	Flood Risk
180 min Summer	10.750	0.070	2.2	0.2	Flood Risk
240 min Summer	10.737	0.057	1.8	0.1	Flood Risk
360 min Summer	10.727	0.047	1.4	0.1	Flood Risk
480 min Summer	10.722	0.042	1.1	0.1	Flood Risk
600 min Summer	10.719	0.039	0.9	0.1	Flood Risk
720 min Summer	10.716	0.036	0.8	0.0	Flood Risk
960 min Summer	10.712	0.032	0.7	0.0	Flood Risk
1440 min Summer	10.708	0.028	0.5	0.0	Flood Risk
2160 min Summer	10.704	0.024	0.4	0.0	O K
2880 min Summer	10.701	0.021	0.3	0.0	O K
4320 min Summer	10.698	0.018	0.2	0.0	O K
5760 min Summer	10.696	0.016	0.2	0.0	O K
7200 min Summer	10.695	0.015	0.1	0.0	O K
8640 min Summer	10.694	0.014	0.1	0.0	O K
10080 min Summer	10.693	0.013	0.1	0.0	O K
15 min Winter	10.822	0.142	4.7	0.8	Flood Risk
30 min Winter	10.816	0.136	4.3	0.7	Flood Risk
60 min Winter	10.784	0.104	3.3	0.4	Flood Risk
120 min Winter	10.750	0.070	2.2	0.2	Flood Risk
180 min Winter	10.733	0.053	1.7	0.1	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	129.682	0.0	12
30 min Summer	87.133	0.0	19
60 min Summer	55.837	0.0	34
120 min Summer	34.509	0.0	64
180 min Summer	25.637	0.0	94
240 min Summer	20.604	0.0	124
360 min Summer	15.169	0.0	182
480 min Summer	12.185	0.0	244
600 min Summer	10.272	0.0	302
720 min Summer	8.930	0.0	360
960 min Summer	7.152	0.0	478
1440 min Summer	5.221	0.0	714
2160 min Summer	3.803	0.0	1100
2880 min Summer	3.033	0.0	1468
4320 min Summer	2.201	0.0	2192
5760 min Summer	1.751	0.0	2848
7200 min Summer	1.466	0.0	3544
8640 min Summer	1.270	0.0	4360
10080 min Summer	1.124	0.0	5096
15 min Winter	129.682	0.0	12
30 min Winter	87.133	0.0	20
60 min Winter	55.837	0.0	34
120 min Winter	34.509	0.0	64
180 min Winter	25.637	0.0	94

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	10.726	0.046	1.3	0.1	Flood Risk
360 min Winter	10.720	0.040	1.0	0.1	Flood Risk
480 min Winter	10.716	0.036	0.8	0.0	Flood Risk
600 min Winter	10.713	0.033	0.7	0.0	Flood Risk
720 min Winter	10.711	0.031	0.6	0.0	Flood Risk
960 min Winter	10.707	0.027	0.5	0.0	Flood Risk
1440 min Winter	10.703	0.023	0.3	0.0	O K
2160 min Winter	10.700	0.020	0.2	0.0	O K
2880 min Winter	10.698	0.018	0.2	0.0	O K
4320 min Winter	10.695	0.015	0.1	0.0	O K
5760 min Winter	10.694	0.014	0.1	0.0	O K
7200 min Winter	10.693	0.013	0.1	0.0	O K
8640 min Winter	10.692	0.012	0.1	0.0	O K
10080 min Winter	10.691	0.011	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	20.604	0.0	124
360 min Winter	15.169	0.0	184
480 min Winter	12.185	0.0	244
600 min Winter	10.272	0.0	306
720 min Winter	8.930	0.0	360
960 min Winter	7.152	0.0	482
1440 min Winter	5.221	0.0	726
2160 min Winter	3.803	0.0	1044
2880 min Winter	3.033	0.0	1468
4320 min Winter	2.201	0.0	2132
5760 min Winter	1.751	0.0	2904
7200 min Winter	1.466	0.0	3680
8640 min Winter	1.270	0.0	4352
10080 min Winter	1.124	0.0	4960

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.011

Time (mins)	Area
From:	To: (ha)

0	4 0.011
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XP Solutions		Source Control 2015.1

Model Details

Storage is Online Cover Level (m) 11.005

Complex Structure

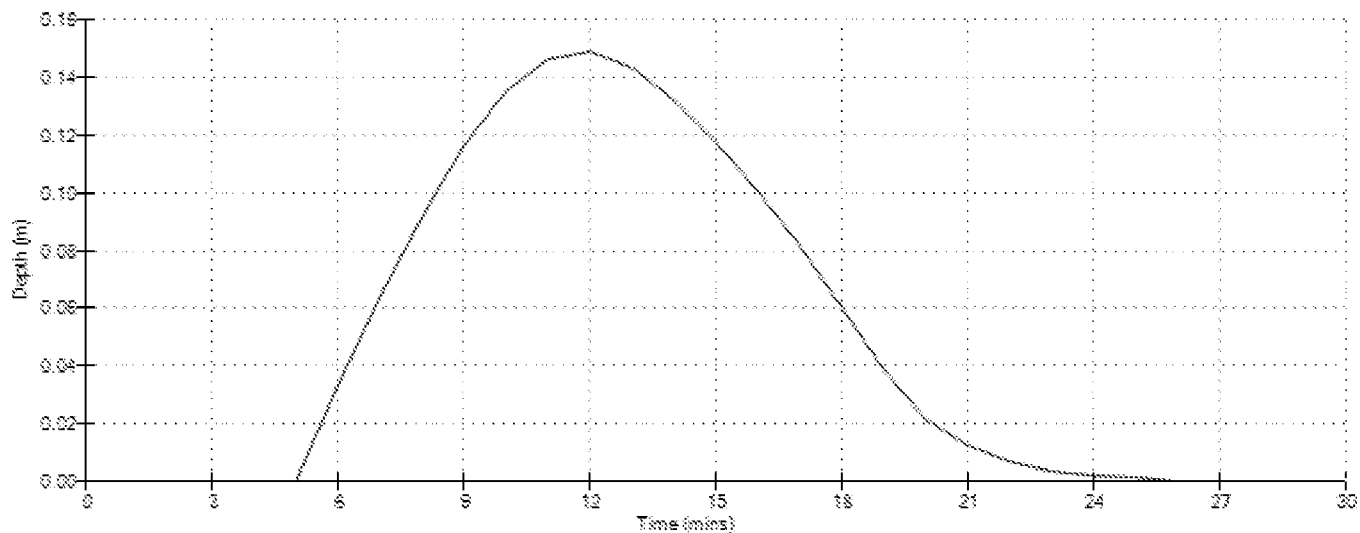
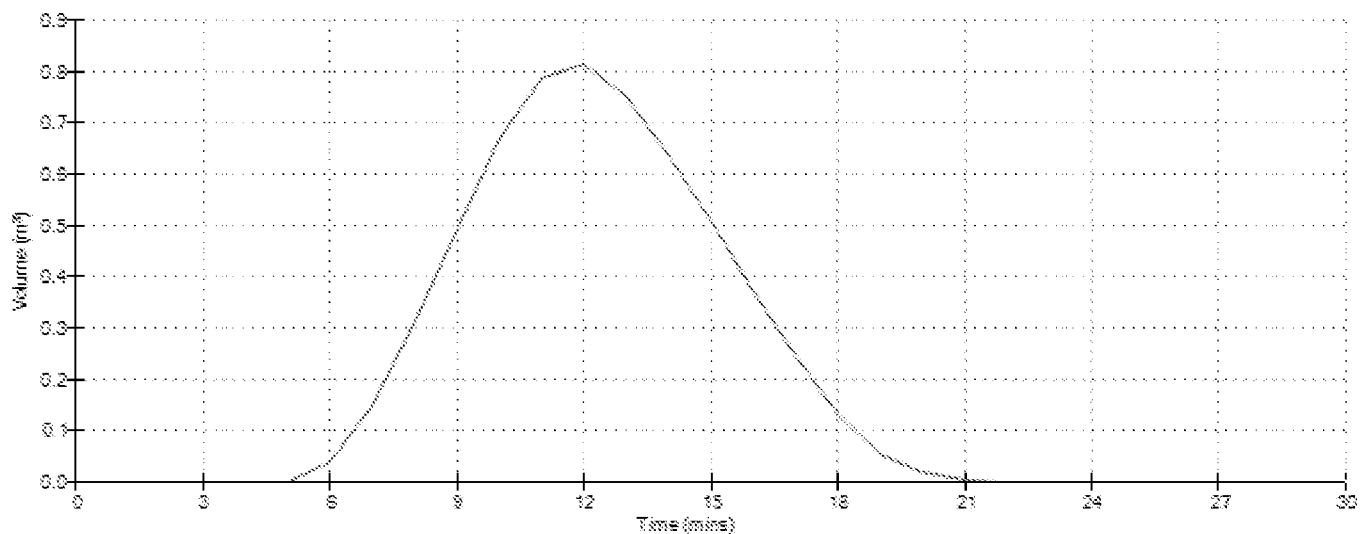
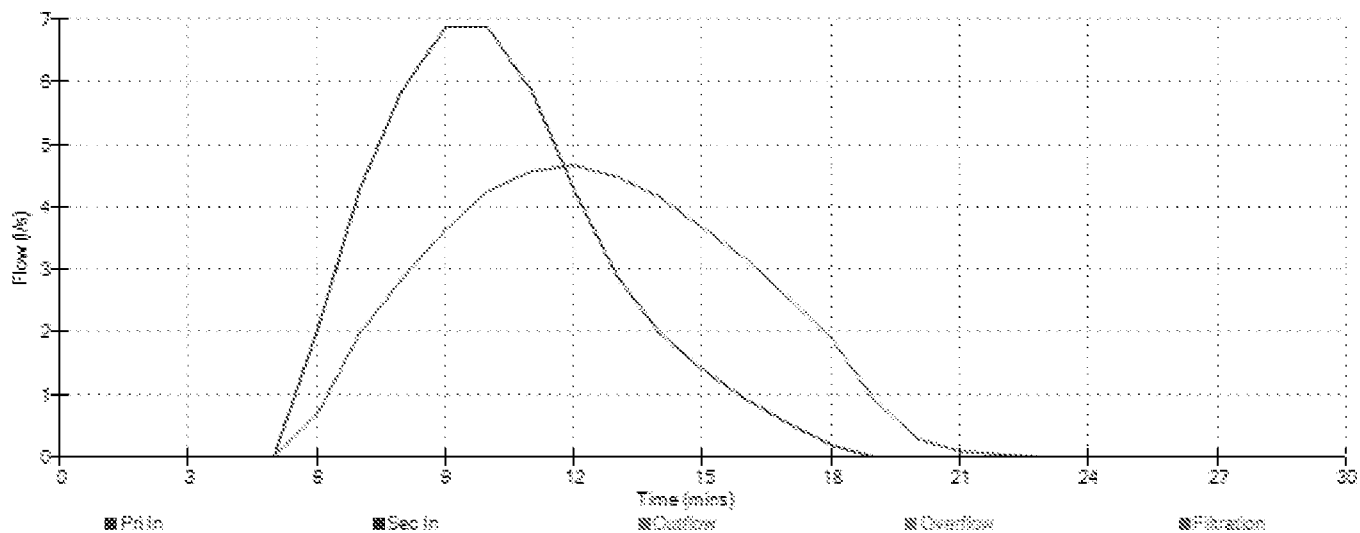
Porous Car Park

Infiltration Coefficient Base (m/hr)	1.84680	Width (m)	7.4
Membrane Percolation (mm/hr)	1000	Length (m)	8.1
Max Percolation (l/s)	16.7	Slope (1:X)	33.0
Safety Factor	4.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	10.680	Cap Volume Depth (m)	0.225

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	7.4
Membrane Percolation (mm/hr)	1000	Length (m)	1.5
Max Percolation (l/s)	3.1	Slope (1:X)	33.0
Safety Factor	4.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	10.925	Cap Volume Depth (m)	0.225

Event: 15 min Winter



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

Half Drain Time : 2 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.923	0.128	4.6	0.7	Flood Risk
30 min Summer	10.921	0.126	4.6	0.7	Flood Risk
60 min Summer	10.900	0.105	3.8	0.5	Flood Risk
120 min Summer	10.872	0.077	2.8	0.2	Flood Risk
180 min Summer	10.856	0.061	2.2	0.2	Flood Risk
240 min Summer	10.845	0.050	1.8	0.1	Flood Risk
360 min Summer	10.838	0.043	1.4	0.1	Flood Risk
480 min Summer	10.834	0.039	1.1	0.1	Flood Risk
600 min Summer	10.831	0.036	0.9	0.1	Flood Risk
720 min Summer	10.828	0.033	0.8	0.0	Flood Risk
960 min Summer	10.825	0.030	0.6	0.0	Flood Risk
1440 min Summer	10.821	0.026	0.5	0.0	Flood Risk
2160 min Summer	10.817	0.022	0.3	0.0	O K
2880 min Summer	10.815	0.020	0.3	0.0	O K
4320 min Summer	10.812	0.017	0.2	0.0	O K
5760 min Summer	10.810	0.015	0.2	0.0	O K
7200 min Summer	10.809	0.014	0.1	0.0	O K
8640 min Summer	10.808	0.013	0.1	0.0	O K
10080 min Summer	10.807	0.012	0.1	0.0	O K
15 min Winter	10.928	0.133	4.8	0.7	Flood Risk
30 min Winter	10.916	0.121	4.4	0.6	Flood Risk
60 min Winter	10.886	0.091	3.3	0.4	Flood Risk
120 min Winter	10.856	0.061	2.2	0.2	Flood Risk
180 min Winter	10.843	0.048	1.7	0.1	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	129.682	0.0	11
30 min Summer	87.133	0.0	19
60 min Summer	55.837	0.0	34
120 min Summer	34.509	0.0	64
180 min Summer	25.637	0.0	94
240 min Summer	20.604	0.0	122
360 min Summer	15.169	0.0	182
480 min Summer	12.185	0.0	244
600 min Summer	10.272	0.0	302
720 min Summer	8.930	0.0	360
960 min Summer	7.152	0.0	488
1440 min Summer	5.221	0.0	714
2160 min Summer	3.803	0.0	1084
2880 min Summer	3.033	0.0	1460
4320 min Summer	2.201	0.0	2140
5760 min Summer	1.751	0.0	2840
7200 min Summer	1.466	0.0	3536
8640 min Summer	1.270	0.0	4312
10080 min Summer	1.124	0.0	5072
15 min Winter	129.682	0.0	12
30 min Winter	87.133	0.0	20
60 min Winter	55.837	0.0	34
120 min Winter	34.509	0.0	64
180 min Winter	25.637	0.0	92

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	10.838	0.043	1.3	0.1	Flood Risk
360 min Winter	10.832	0.037	1.0	0.1	Flood Risk
480 min Winter	10.828	0.033	0.8	0.0	Flood Risk
600 min Winter	10.826	0.031	0.7	0.0	Flood Risk
720 min Winter	10.823	0.028	0.6	0.0	Flood Risk
960 min Winter	10.820	0.025	0.5	0.0	Flood Risk
1440 min Winter	10.817	0.022	0.3	0.0	O K
2160 min Winter	10.814	0.019	0.3	0.0	O K
2880 min Winter	10.812	0.017	0.2	0.0	O K
4320 min Winter	10.809	0.014	0.1	0.0	O K
5760 min Winter	10.808	0.013	0.1	0.0	O K
7200 min Winter	10.807	0.012	0.1	0.0	O K
8640 min Winter	10.806	0.011	0.1	0.0	O K
10080 min Winter	10.805	0.010	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	20.604	0.0	124
360 min Winter	15.169	0.0	182
480 min Winter	12.185	0.0	250
600 min Winter	10.272	0.0	304
720 min Winter	8.930	0.0	358
960 min Winter	7.152	0.0	474
1440 min Winter	5.221	0.0	714
2160 min Winter	3.803	0.0	1056
2880 min Winter	3.033	0.0	1448
4320 min Winter	2.201	0.0	2100
5760 min Winter	1.751	0.0	2920
7200 min Winter	1.466	0.0	3576
8640 min Winter	1.270	0.0	4208
10080 min Winter	1.124	0.0	4968

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.011

Time (mins)	Area
From:	To: (ha)

0	4 0.011
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XP Solutions		Source Control 2015.1

Model Details

Storage is Online Cover Level (m) 11.120

Complex Structure

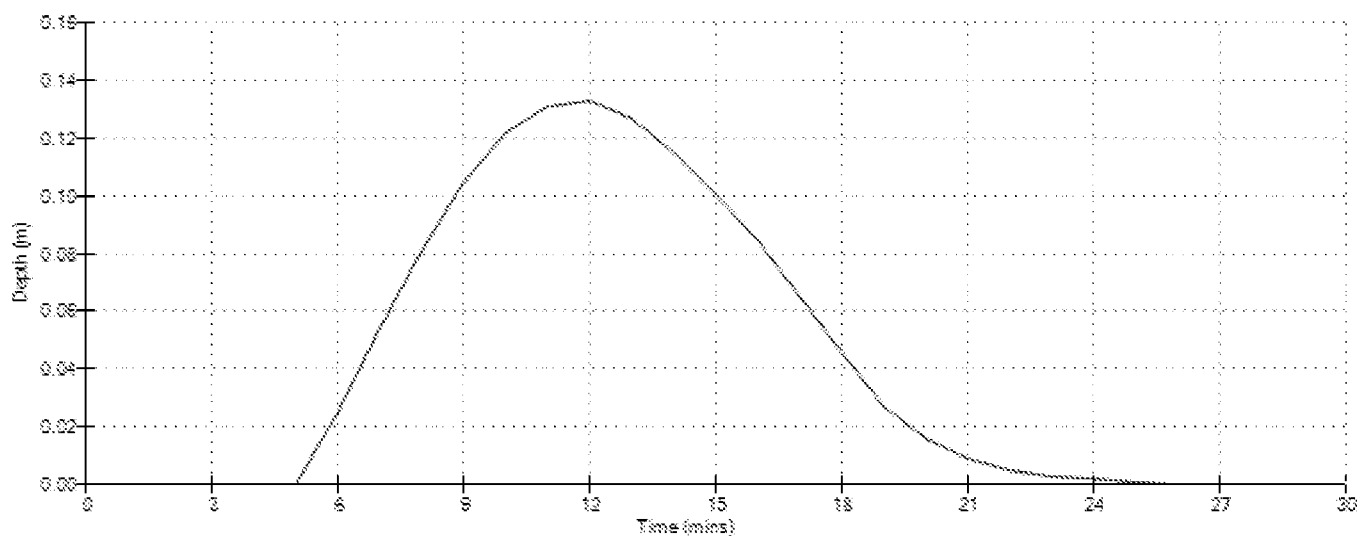
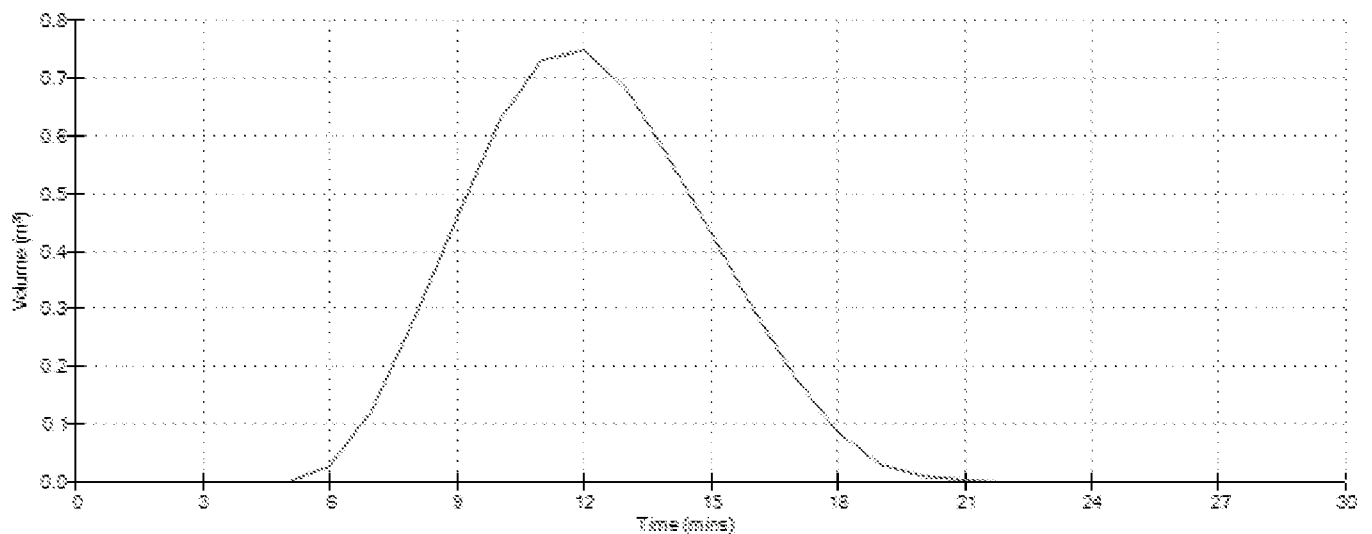
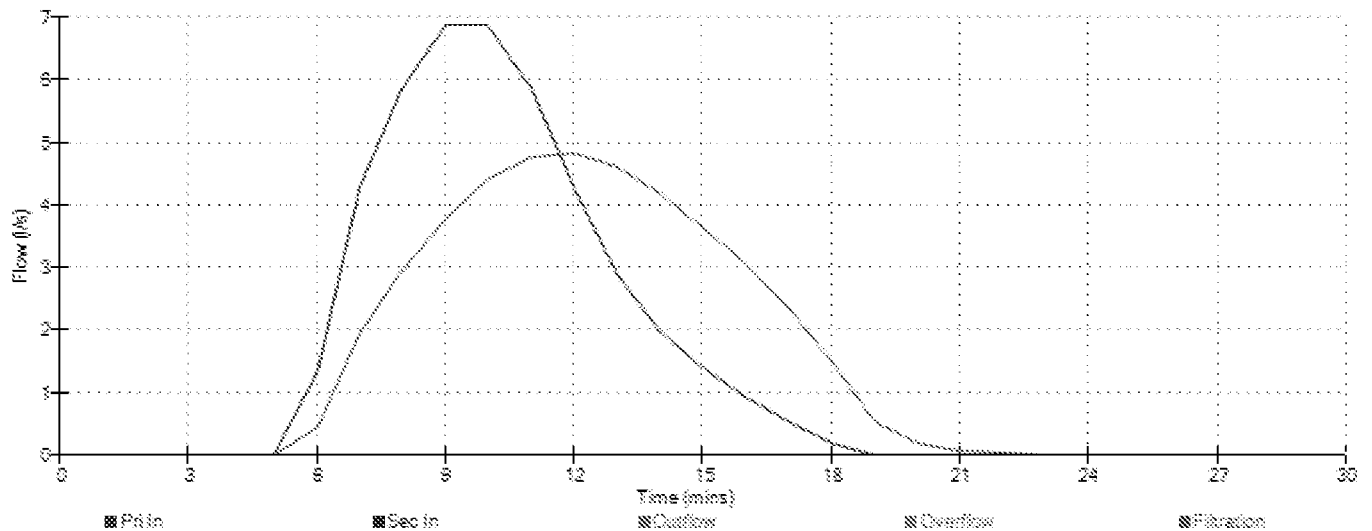
Porous Car Park

Infiltration Coefficient Base (m/hr)	1.84680	Width (m)	7.4
Membrane Percolation (mm/hr)	1000	Length (m)	9.2
Max Percolation (l/s)	18.9	Slope (1:X)	38.2
Safety Factor	4.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	10.795	Cap Volume Depth (m)	0.225

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	7.4
Membrane Percolation (mm/hr)	1000	Length (m)	1.5
Max Percolation (l/s)	3.1	Slope (1:X)	38.2
Safety Factor	4.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.035	Cap Volume Depth (m)	0.225

Event: 15 min Winter



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

Half Drain Time : 2 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	11.110	0.155	4.4	0.8	Flood Risk
30 min Summer	11.107	0.152	4.3	0.8	Flood Risk
60 min Summer	11.083	0.128	3.6	0.5	Flood Risk
120 min Summer	11.051	0.096	2.7	0.3	Flood Risk
180 min Summer	11.032	0.077	2.2	0.2	Flood Risk
240 min Summer	11.018	0.063	1.8	0.1	Flood Risk
360 min Summer	11.004	0.049	1.4	0.1	Flood Risk
480 min Summer	10.999	0.044	1.1	0.1	Flood Risk
600 min Summer	10.996	0.041	0.9	0.1	Flood Risk
720 min Summer	10.993	0.038	0.8	0.0	Flood Risk
960 min Summer	10.989	0.034	0.6	0.0	Flood Risk
1440 min Summer	10.984	0.029	0.5	0.0	Flood Risk
2160 min Summer	10.980	0.025	0.3	0.0	O K
2880 min Summer	10.977	0.022	0.3	0.0	O K
4320 min Summer	10.974	0.019	0.2	0.0	O K
5760 min Summer	10.972	0.017	0.2	0.0	O K
7200 min Summer	10.971	0.016	0.1	0.0	O K
8640 min Summer	10.970	0.015	0.1	0.0	O K
10080 min Summer	10.969	0.014	0.1	0.0	O K
15 min Winter	11.117	0.162	4.6	0.9	Flood Risk
30 min Winter	11.103	0.148	4.2	0.7	Flood Risk
60 min Winter	11.069	0.114	3.2	0.4	Flood Risk
120 min Winter	11.032	0.077	2.2	0.2	Flood Risk
180 min Winter	11.013	0.058	1.6	0.1	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	129.682	0.0	12
30 min Summer	87.133	0.0	19
60 min Summer	55.837	0.0	34
120 min Summer	34.509	0.0	64
180 min Summer	25.637	0.0	94
240 min Summer	20.604	0.0	124
360 min Summer	15.169	0.0	182
480 min Summer	12.185	0.0	242
600 min Summer	10.272	0.0	304
720 min Summer	8.930	0.0	362
960 min Summer	7.152	0.0	482
1440 min Summer	5.221	0.0	720
2160 min Summer	3.803	0.0	1088
2880 min Summer	3.033	0.0	1420
4320 min Summer	2.201	0.0	2156
5760 min Summer	1.751	0.0	2888
7200 min Summer	1.466	0.0	3672
8640 min Summer	1.270	0.0	4392
10080 min Summer	1.124	0.0	5128
15 min Winter	129.682	0.0	12
30 min Winter	87.133	0.0	20
60 min Winter	55.837	0.0	36
120 min Winter	34.509	0.0	64
180 min Winter	25.637	0.0	94

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	11.004	0.049	1.3	0.1	Flood Risk
360 min Winter	10.997	0.042	1.0	0.1	Flood Risk
480 min Winter	10.993	0.038	0.8	0.0	Flood Risk
600 min Winter	10.990	0.035	0.7	0.0	Flood Risk
720 min Winter	10.987	0.032	0.6	0.0	Flood Risk
960 min Winter	10.984	0.029	0.5	0.0	Flood Risk
1440 min Winter	10.980	0.025	0.3	0.0	O K
2160 min Winter	10.976	0.021	0.3	0.0	O K
2880 min Winter	10.974	0.019	0.2	0.0	O K
4320 min Winter	10.971	0.016	0.1	0.0	O K
5760 min Winter	10.969	0.014	0.1	0.0	O K
7200 min Winter	10.968	0.013	0.1	0.0	O K
8640 min Winter	10.967	0.012	0.1	0.0	O K
10080 min Winter	10.967	0.012	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	20.604	0.0	126
360 min Winter	15.169	0.0	182
480 min Winter	12.185	0.0	242
600 min Winter	10.272	0.0	302
720 min Winter	8.930	0.0	368
960 min Winter	7.152	0.0	476
1440 min Winter	5.221	0.0	728
2160 min Winter	3.803	0.0	1104
2880 min Winter	3.033	0.0	1464
4320 min Winter	2.201	0.0	2136
5760 min Winter	1.751	0.0	2848
7200 min Winter	1.466	0.0	3672
8640 min Winter	1.270	0.0	4480
10080 min Winter	1.124	0.0	4960

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XP Solutions		Source Control 2015.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.011

Time (mins)	Area
From:	To: (ha)

0	4 0.011
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XP Solutions	Source Control 2015.1	

Model Details

Storage is Online Cover Level (m) 11.280

Complex Structure

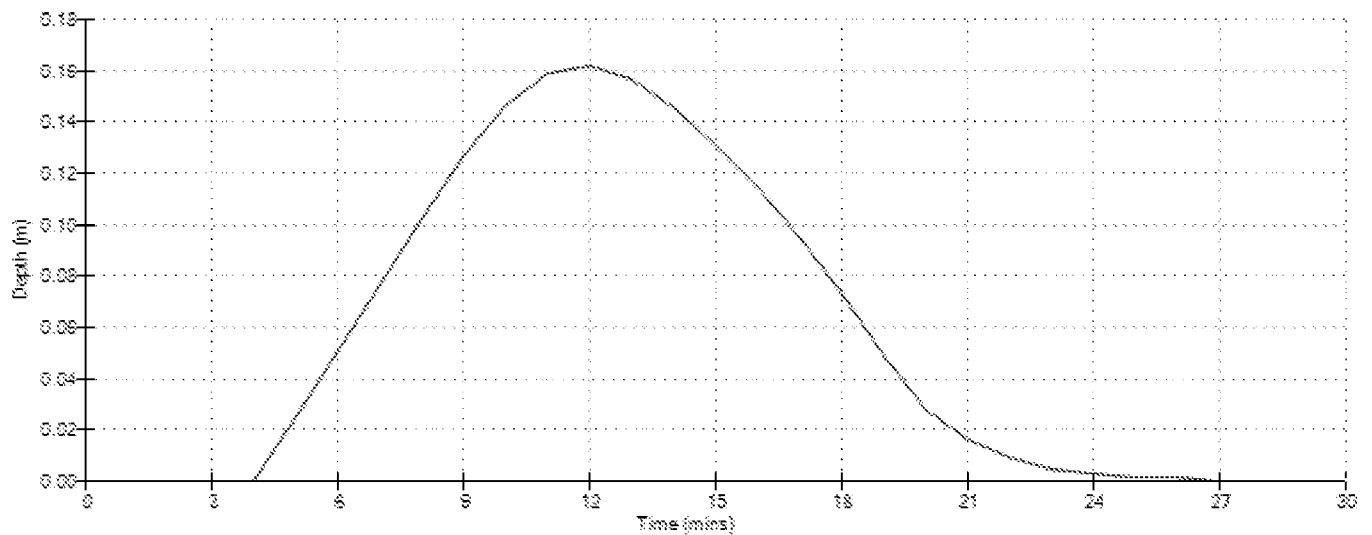
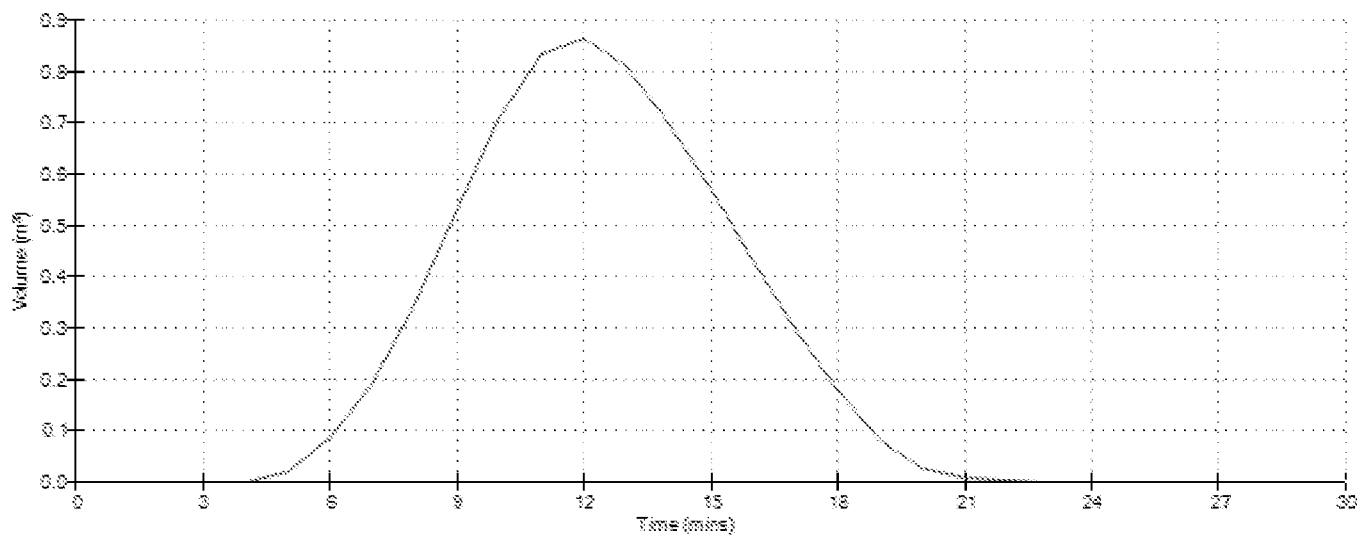
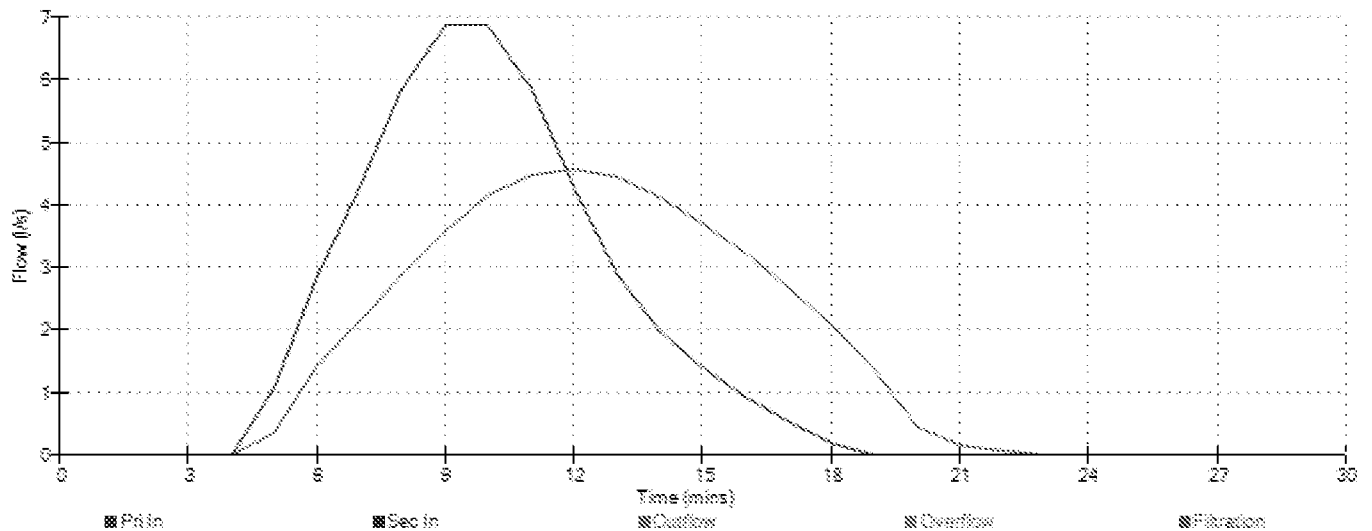
Porous Car Park

Infiltration Coefficient Base (m/hr)	1.84680	Width (m)	7.7
Membrane Percolation (mm/hr)	1000	Length (m)	4.8
Max Percolation (l/s)	10.3	Slope (1:X)	28.6
Safety Factor	4.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	10.955	Cap Volume Depth (m)	0.225

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	7.7
Membrane Percolation (mm/hr)	1000	Length (m)	1.5
Max Percolation (l/s)	3.2	Slope (1:X)	28.6
Safety Factor	4.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.125	Cap Volume Depth (m)	0.225

Event: 15 min Winter



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

Half Drain Time : 2 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.618	0.113	4.8	0.9	Flood Risk
30 min Summer	10.616	0.111	4.8	0.9	Flood Risk
60 min Summer	10.598	0.093	4.0	0.6	Flood Risk
120 min Summer	10.574	0.069	3.0	0.4	Flood Risk
180 min Summer	10.560	0.055	2.4	0.3	Flood Risk
240 min Summer	10.553	0.048	2.0	0.2	Flood Risk
360 min Summer	10.546	0.041	1.5	0.2	O K
480 min Summer	10.542	0.037	1.2	0.1	O K
600 min Summer	10.539	0.034	1.0	0.1	O K
720 min Summer	10.537	0.032	0.9	0.1	O K
960 min Summer	10.534	0.029	0.7	0.1	O K
1440 min Summer	10.530	0.025	0.5	0.1	O K
2160 min Summer	10.526	0.021	0.4	0.1	O K
2880 min Summer	10.524	0.019	0.3	0.0	O K
4320 min Summer	10.521	0.016	0.2	0.0	O K
5760 min Summer	10.519	0.014	0.2	0.0	O K
7200 min Summer	10.518	0.013	0.2	0.0	O K
8640 min Summer	10.517	0.012	0.1	0.0	O K
10080 min Summer	10.517	0.012	0.1	0.0	O K
15 min Winter	10.623	0.118	5.1	1.0	Flood Risk
30 min Winter	10.613	0.108	4.6	0.8	Flood Risk
60 min Winter	10.587	0.082	3.5	0.5	Flood Risk
120 min Winter	10.560	0.055	2.4	0.3	Flood Risk
180 min Winter	10.551	0.046	1.8	0.2	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	129.682	0.0	12
30 min Summer	87.133	0.0	19
60 min Summer	55.837	0.0	34
120 min Summer	34.509	0.0	64
180 min Summer	25.637	0.0	94
240 min Summer	20.604	0.0	124
360 min Summer	15.169	0.0	184
480 min Summer	12.185	0.0	242
600 min Summer	10.272	0.0	302
720 min Summer	8.930	0.0	366
960 min Summer	7.152	0.0	488
1440 min Summer	5.221	0.0	724
2160 min Summer	3.803	0.0	1100
2880 min Summer	3.033	0.0	1452
4320 min Summer	2.201	0.0	2192
5760 min Summer	1.751	0.0	2936
7200 min Summer	1.466	0.0	3608
8640 min Summer	1.270	0.0	4384
10080 min Summer	1.124	0.0	4960
15 min Winter	129.682	0.0	12
30 min Winter	87.133	0.0	20
60 min Winter	55.837	0.0	36
120 min Winter	34.509	0.0	64
180 min Winter	25.637	0.0	94

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	10.546	0.041	1.5	0.2	O K
360 min Winter	10.540	0.035	1.1	0.1	O K
480 min Winter	10.537	0.032	0.9	0.1	O K
600 min Winter	10.534	0.029	0.7	0.1	O K
720 min Winter	10.532	0.027	0.6	0.1	O K
960 min Winter	10.529	0.024	0.5	0.1	O K
1440 min Winter	10.526	0.021	0.4	0.0	O K
2160 min Winter	10.523	0.018	0.3	0.0	O K
2880 min Winter	10.521	0.016	0.2	0.0	O K
4320 min Winter	10.519	0.014	0.2	0.0	O K
5760 min Winter	10.517	0.012	0.1	0.0	O K
7200 min Winter	10.516	0.011	0.1	0.0	O K
8640 min Winter	10.515	0.010	0.1	0.0	O K
10080 min Winter	10.515	0.010	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	20.604	0.0	124
360 min Winter	15.169	0.0	188
480 min Winter	12.185	0.0	240
600 min Winter	10.272	0.0	304
720 min Winter	8.930	0.0	366
960 min Winter	7.152	0.0	480
1440 min Winter	5.221	0.0	712
2160 min Winter	3.803	0.0	1064
2880 min Winter	3.033	0.0	1456
4320 min Winter	2.201	0.0	2104
5760 min Winter	1.751	0.0	2784
7200 min Winter	1.466	0.0	3560
8640 min Winter	1.270	0.0	4320
10080 min Winter	1.124	0.0	5136

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.012

Time (mins)	Area
From:	To: (ha)

0	4	0.012
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Model Details

Storage is Online Cover Level (m) 10.850

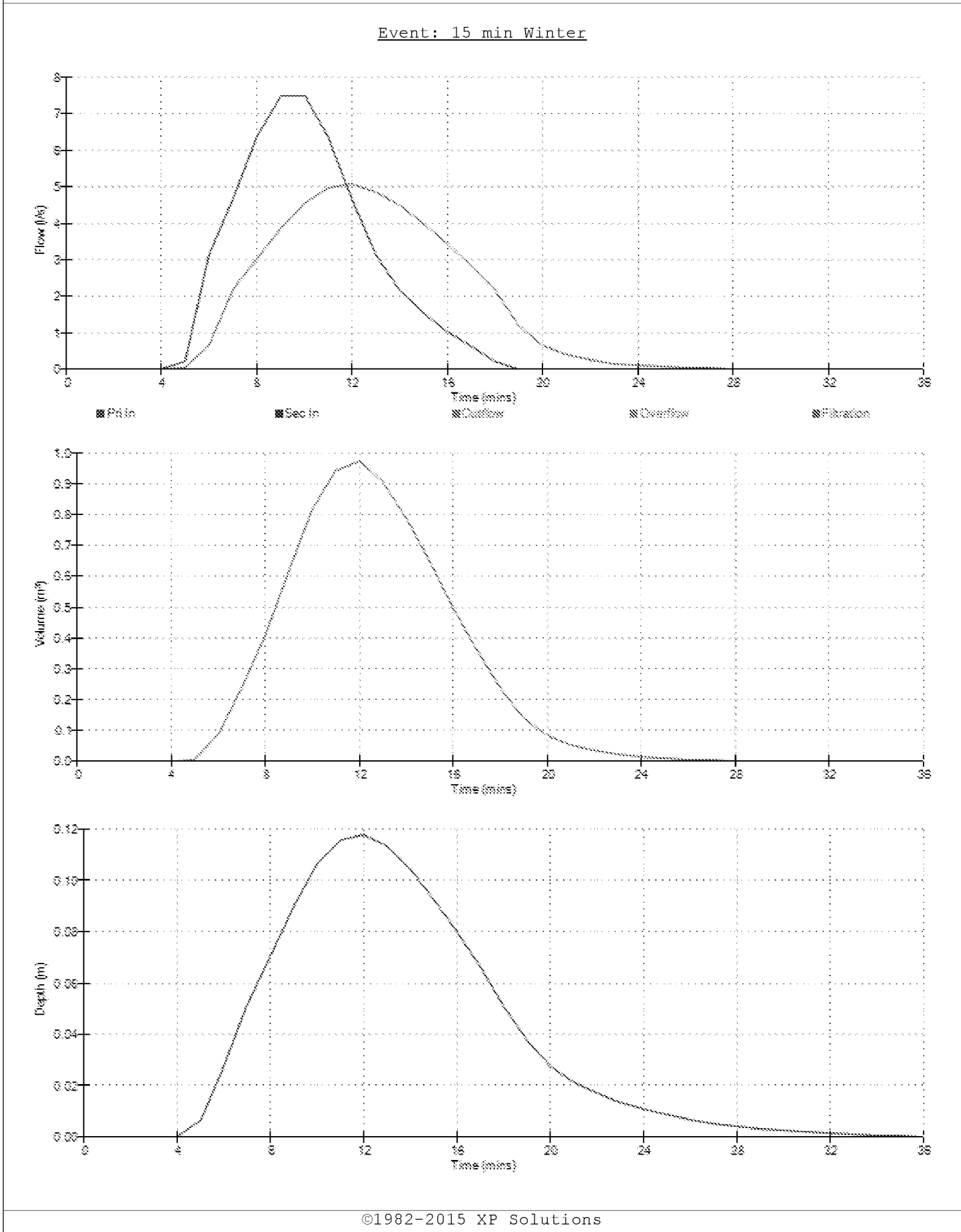
Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	1.84680	Width (m)	5.7
Membrane Percolation (mm/hr)	1000	Length (m)	9.7
Max Percolation (l/s)	15.4	Slope (1:X)	58.8
Safety Factor	4.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	10.505	Cap Volume Depth (m)	0.225

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.7
Membrane Percolation (mm/hr)	1000	Length (m)	1.5
Max Percolation (l/s)	2.4	Slope (1:X)	75.0
Safety Factor	4.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	10.505	Cap Volume Depth (m)	0.225



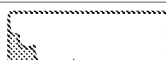
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XP Solutions	Source Control 2015.1	

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

Half Drain Time : 5 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.678	0.173	2.7	1.0	Flood Risk
30 min Summer	10.682	0.177	2.8	1.0	Flood Risk
60 min Summer	10.663	0.158	2.5	0.8	Flood Risk
120 min Summer	10.630	0.125	2.0	0.6	Flood Risk
180 min Summer	10.607	0.102	1.6	0.4	Flood Risk
240 min Summer	10.592	0.087	1.4	0.3	Flood Risk
360 min Summer	10.572	0.067	1.1	0.2	Flood Risk
480 min Summer	10.560	0.055	0.9	0.2	Flood Risk
600 min Summer	10.554	0.049	0.8	0.1	Flood Risk
720 min Summer	10.550	0.045	0.6	0.1	Flood Risk
960 min Summer	10.546	0.041	0.5	0.1	O K
1440 min Summer	10.540	0.035	0.4	0.1	O K
2160 min Summer	10.535	0.030	0.3	0.1	O K
2880 min Summer	10.532	0.027	0.2	0.1	O K
4320 min Summer	10.528	0.023	0.2	0.0	O K
5760 min Summer	10.525	0.020	0.1	0.0	O K
7200 min Summer	10.524	0.019	0.1	0.0	O K
8640 min Summer	10.522	0.017	0.1	0.0	O K
10080 min Summer	10.521	0.016	0.1	0.0	O K
15 min Winter	10.687	0.182	2.9	1.1	Flood Risk
30 min Winter	10.684	0.179	2.8	1.0	Flood Risk
60 min Winter	10.653	0.148	2.4	0.8	Flood Risk
120 min Winter	10.612	0.107	1.7	0.5	Flood Risk
180 min Winter	10.588	0.083	1.3	0.3	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	129.682	0.0	12
30 min Summer	87.133	0.0	20
60 min Summer	55.837	0.0	36
120 min Summer	34.509	0.0	66
180 min Summer	25.637	0.0	96
240 min Summer	20.604	0.0	126
360 min Summer	15.169	0.0	186
480 min Summer	12.185	0.0	246
600 min Summer	10.272	0.0	302
720 min Summer	8.930	0.0	366
960 min Summer	7.152	0.0	488
1440 min Summer	5.221	0.0	714
2160 min Summer	3.803	0.0	1072
2880 min Summer	3.033	0.0	1468
4320 min Summer	2.201	0.0	2200
5760 min Summer	1.751	0.0	2912
7200 min Summer	1.466	0.0	3664
8640 min Summer	1.270	0.0	4352
10080 min Summer	1.124	0.0	4960
15 min Winter	129.682	0.0	13
30 min Winter	87.133	0.0	21
60 min Winter	55.837	0.0	36
120 min Winter	34.509	0.0	68
180 min Winter	25.637	0.0	96

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	10.573	0.068	1.1	0.2	Flood Risk
360 min Winter	10.555	0.050	0.8	0.2	Flood Risk
480 min Winter	10.550	0.045	0.6	0.1	Flood Risk
600 min Winter	10.547	0.042	0.6	0.1	O K
720 min Winter	10.544	0.039	0.5	0.1	O K
960 min Winter	10.540	0.035	0.4	0.1	O K
1440 min Winter	10.535	0.030	0.3	0.1	O K
2160 min Winter	10.530	0.025	0.2	0.1	O K
2880 min Winter	10.528	0.023	0.2	0.0	O K
4320 min Winter	10.524	0.019	0.1	0.0	O K
5760 min Winter	10.522	0.017	0.1	0.0	O K
7200 min Winter	10.521	0.016	0.1	0.0	O K
8640 min Winter	10.520	0.015	0.1	0.0	O K
10080 min Winter	10.519	0.014	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	20.604	0.0	126
360 min Winter	15.169	0.0	186
480 min Winter	12.185	0.0	246
600 min Winter	10.272	0.0	302
720 min Winter	8.930	0.0	362
960 min Winter	7.152	0.0	486
1440 min Winter	5.221	0.0	732
2160 min Winter	3.803	0.0	1084
2880 min Winter	3.033	0.0	1432
4320 min Winter	2.201	0.0	2152
5760 min Winter	1.751	0.0	2896
7200 min Winter	1.466	0.0	3568
8640 min Winter	1.270	0.0	4208
10080 min Winter	1.124	0.0	5128

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XP Solutions		Source Control 2015.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.009

Time (mins)	Area
From:	To: (ha)

0	4 0.009
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XP Solutions		Source Control 2015.1

Model Details

Storage is Online Cover Level (m) 10.850

Complex Structure

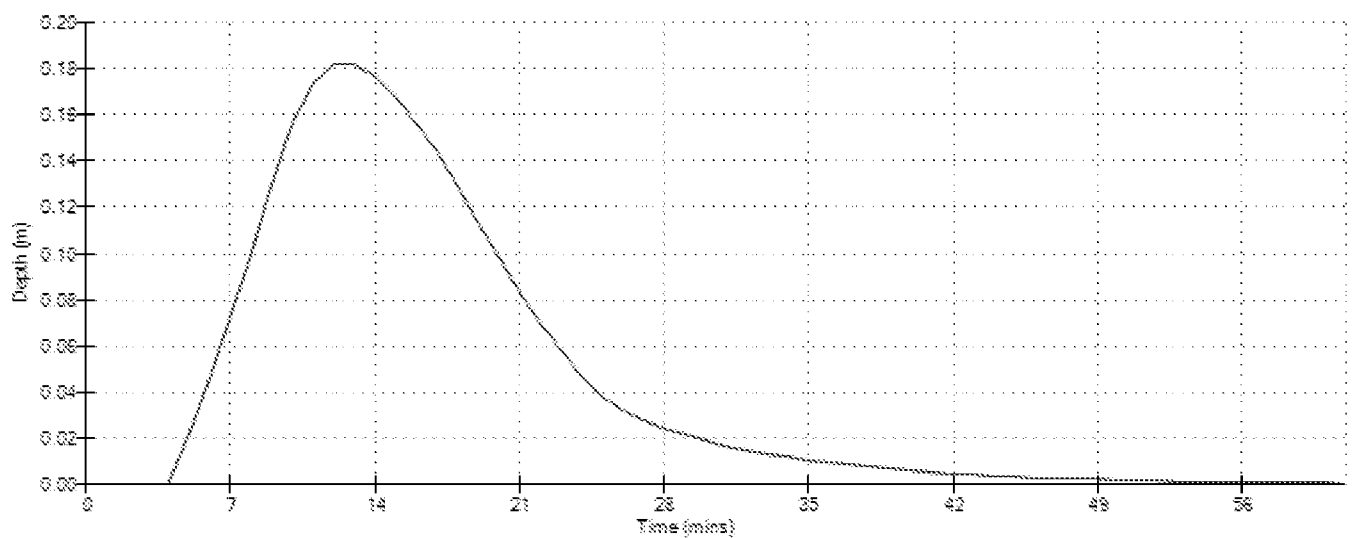
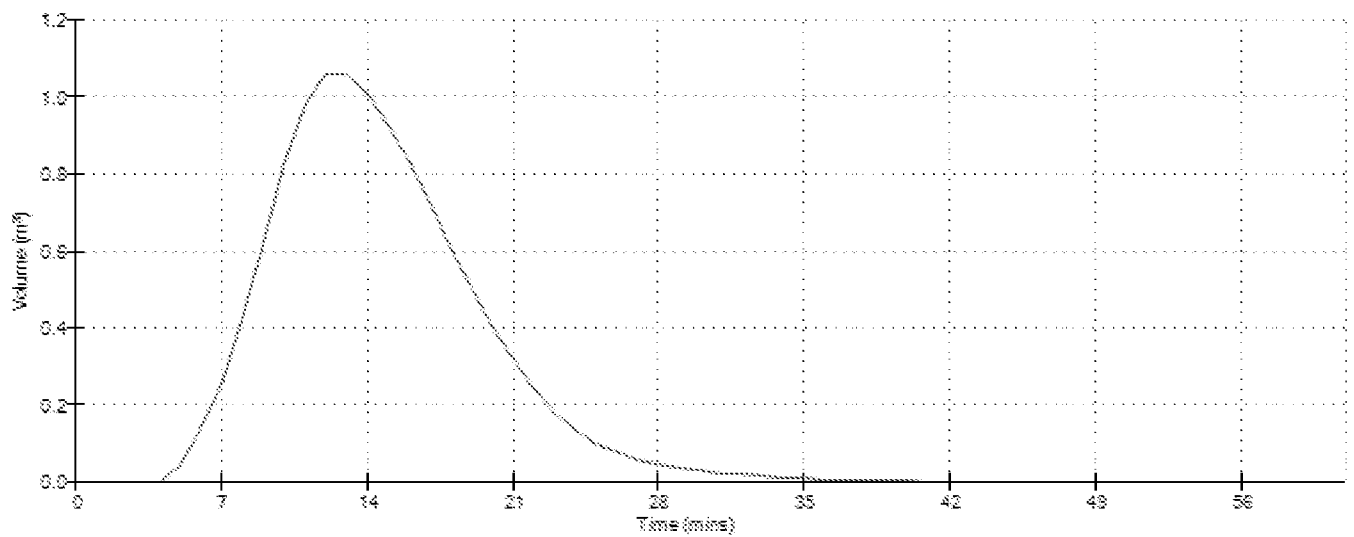
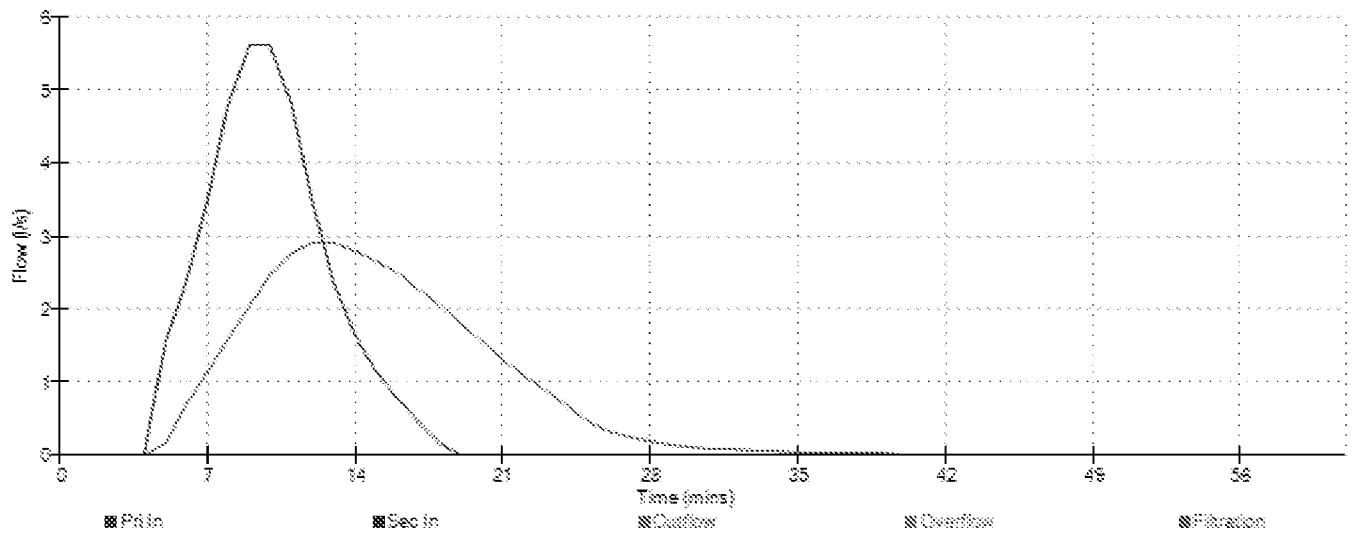
Porous Car Park

Infiltration Coefficient Base (m/hr)	1.84680	Width (m)	5.7
Membrane Percolation (mm/hr)	1000	Length (m)	4.0
Max Percolation (l/s)	6.3	Slope (1:X)	21.7
Safety Factor	4.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	10.505	Cap Volume Depth (m)	0.225

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.7
Membrane Percolation (mm/hr)	1000	Length (m)	1.5
Max Percolation (l/s)	2.4	Slope (1:X)	75.0
Safety Factor	4.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	10.505	Cap Volume Depth (m)	0.225

Event: 15 min Winter



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XP Solutions	Source Control 2015.1	

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

Half Drain Time : 1 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.965	0.055	2.5	0.2	Flood Risk
30 min Summer	10.960	0.050	2.5	0.2	Flood Risk
60 min Summer	10.950	0.040	1.9	0.1	Flood Risk
120 min Summer	10.943	0.033	1.3	0.1	Flood Risk
180 min Summer	10.939	0.029	1.0	0.1	Flood Risk
240 min Summer	10.936	0.026	0.8	0.0	Flood Risk
360 min Summer	10.933	0.023	0.6	0.0	Flood Risk
480 min Summer	10.930	0.020	0.5	0.0	Flood Risk
600 min Summer	10.929	0.019	0.4	0.0	Flood Risk
720 min Summer	10.928	0.018	0.4	0.0	Flood Risk
960 min Summer	10.926	0.016	0.3	0.0	Flood Risk
1440 min Summer	10.923	0.013	0.2	0.0	Flood Risk
2160 min Summer	10.922	0.012	0.2	0.0	Flood Risk
2880 min Summer	10.920	0.010	0.1	0.0	Flood Risk
4320 min Summer	10.919	0.009	0.1	0.0	Flood Risk
5760 min Summer	10.918	0.008	0.1	0.0	Flood Risk
7200 min Summer	10.917	0.007	0.1	0.0	Flood Risk
8640 min Summer	10.917	0.007	0.1	0.0	Flood Risk
10080 min Summer	10.916	0.006	0.0	0.0	Flood Risk
15 min Winter	10.966	0.056	2.5	0.2	Flood Risk
30 min Winter	10.955	0.045	2.3	0.1	Flood Risk
60 min Winter	10.946	0.036	1.6	0.1	Flood Risk
120 min Winter	10.939	0.029	1.0	0.1	Flood Risk
180 min Winter	10.935	0.025	0.8	0.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	129.682	0.0	11
30 min Summer	87.133	0.0	18
60 min Summer	55.837	0.0	34
120 min Summer	34.509	0.0	62
180 min Summer	25.637	0.0	94
240 min Summer	20.604	0.0	124
360 min Summer	15.169	0.0	184
480 min Summer	12.185	0.0	244
600 min Summer	10.272	0.0	306
720 min Summer	8.930	0.0	368
960 min Summer	7.152	0.0	488
1440 min Summer	5.221	0.0	712
2160 min Summer	3.803	0.0	1076
2880 min Summer	3.033	0.0	1456
4320 min Summer	2.201	0.0	2192
5760 min Summer	1.751	0.0	2856
7200 min Summer	1.466	0.0	3592
8640 min Summer	1.270	0.0	4552
10080 min Summer	1.124	0.0	5128
15 min Winter	129.682	0.0	11
30 min Winter	87.133	0.0	18
60 min Winter	55.837	0.0	34
120 min Winter	34.509	0.0	64
180 min Winter	25.637	0.0	92

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XP Solutions		Source Control 2015.1

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	10.932	0.022	0.6	0.0	Flood Risk
360 min Winter	10.929	0.019	0.4	0.0	Flood Risk
480 min Winter	10.927	0.017	0.4	0.0	Flood Risk
600 min Winter	10.926	0.016	0.3	0.0	Flood Risk
720 min Winter	10.925	0.015	0.3	0.0	Flood Risk
960 min Winter	10.923	0.013	0.2	0.0	Flood Risk
1440 min Winter	10.921	0.011	0.2	0.0	Flood Risk
2160 min Winter	10.920	0.010	0.1	0.0	Flood Risk
2880 min Winter	10.919	0.009	0.1	0.0	Flood Risk
4320 min Winter	10.918	0.008	0.1	0.0	Flood Risk
5760 min Winter	10.917	0.007	0.1	0.0	Flood Risk
7200 min Winter	10.916	0.006	0.0	0.0	Flood Risk
8640 min Winter	10.916	0.006	0.0	0.0	Flood Risk
10080 min Winter	10.916	0.006	0.0	0.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	20.604	0.0	126
360 min Winter	15.169	0.0	180
480 min Winter	12.185	0.0	248
600 min Winter	10.272	0.0	304
720 min Winter	8.930	0.0	372
960 min Winter	7.152	0.0	490
1440 min Winter	5.221	0.0	710
2160 min Winter	3.803	0.0	1120
2880 min Winter	3.033	0.0	1424
4320 min Winter	2.201	0.0	2128
5760 min Winter	1.751	0.0	3000
7200 min Winter	1.466	0.0	3640
8640 min Winter	1.270	0.0	4128
10080 min Winter	1.124	0.0	5008

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XP Solutions	Source Control 2015.1	

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.005

Time (mins)	Area
From:	To: (ha)

0	4 0.005
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Model Details

Storage is Online Cover Level (m) 11.140

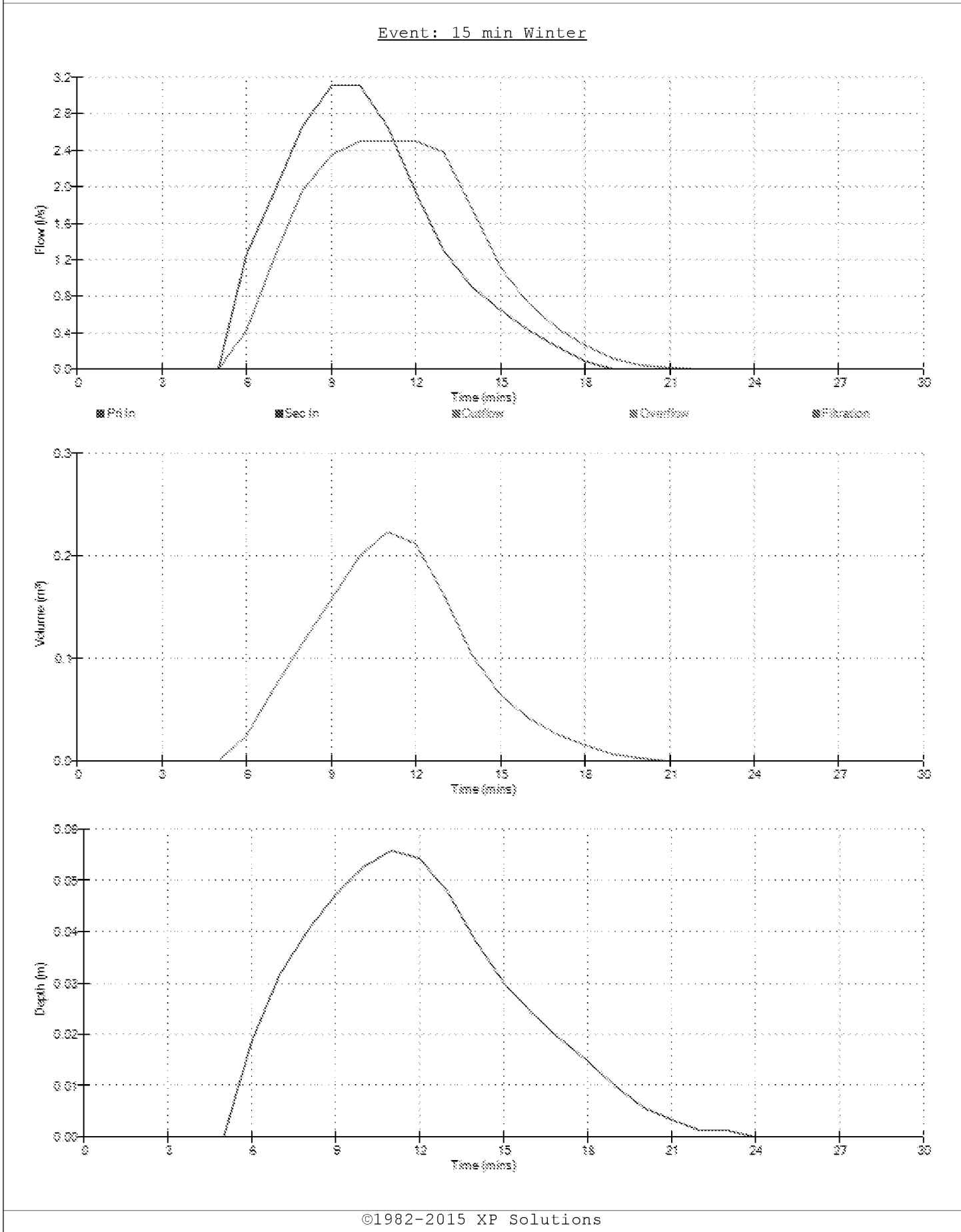
Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	1.84680	Width (m)	5.9
Membrane Percolation (mm/hr)	1000	Length (m)	3.3
Max Percolation (l/s)	5.4	Slope (1:X)	80.0
Safety Factor	4.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	10.910	Cap Volume Depth (m)	0.150

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.9
Membrane Percolation (mm/hr)	1000	Length (m)	1.5
Max Percolation (l/s)	2.5	Slope (1:X)	80.0
Safety Factor	4.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	10.950	Cap Volume Depth (m)	0.150



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

Half Drain Time : 1 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	11.069	0.059	2.8	0.3	Flood Risk
30 min Summer	11.063	0.053	2.8	0.2	Flood Risk
60 min Summer	11.051	0.041	2.3	0.1	Flood Risk
120 min Summer	11.044	0.034	1.6	0.1	Flood Risk
180 min Summer	11.040	0.030	1.2	0.1	Flood Risk
240 min Summer	11.037	0.027	1.0	0.1	Flood Risk
360 min Summer	11.034	0.024	0.8	0.0	Flood Risk
480 min Summer	11.031	0.021	0.6	0.0	Flood Risk
600 min Summer	11.029	0.019	0.5	0.0	Flood Risk
720 min Summer	11.028	0.018	0.5	0.0	Flood Risk
960 min Summer	11.026	0.016	0.4	0.0	Flood Risk
1440 min Summer	11.024	0.014	0.3	0.0	Flood Risk
2160 min Summer	11.022	0.012	0.2	0.0	Flood Risk
2880 min Summer	11.021	0.011	0.2	0.0	Flood Risk
4320 min Summer	11.019	0.009	0.1	0.0	Flood Risk
5760 min Summer	11.019	0.009	0.1	0.0	Flood Risk
7200 min Summer	11.018	0.008	0.1	0.0	Flood Risk
8640 min Summer	11.017	0.007	0.1	0.0	Flood Risk
10080 min Summer	11.017	0.007	0.1	0.0	Flood Risk
15 min Winter	11.071	0.061	2.8	0.3	Flood Risk
30 min Winter	11.058	0.048	2.7	0.2	Flood Risk
60 min Winter	11.047	0.037	1.9	0.1	Flood Risk
120 min Winter	11.040	0.030	1.2	0.1	Flood Risk
180 min Winter	11.036	0.026	0.9	0.1	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	129.682	0.0	11
30 min Summer	87.133	0.0	19
60 min Summer	55.837	0.0	34
120 min Summer	34.509	0.0	62
180 min Summer	25.637	0.0	92
240 min Summer	20.604	0.0	122
360 min Summer	15.169	0.0	182
480 min Summer	12.185	0.0	246
600 min Summer	10.272	0.0	306
720 min Summer	8.930	0.0	358
960 min Summer	7.152	0.0	486
1440 min Summer	5.221	0.0	734
2160 min Summer	3.803	0.0	1080
2880 min Summer	3.033	0.0	1436
4320 min Summer	2.201	0.0	2196
5760 min Summer	1.751	0.0	2880
7200 min Summer	1.466	0.0	3592
8640 min Summer	1.270	0.0	4432
10080 min Summer	1.124	0.0	5080
15 min Winter	129.682	0.0	11
30 min Winter	87.133	0.0	18
60 min Winter	55.837	0.0	34
120 min Winter	34.509	0.0	64
180 min Winter	25.637	0.0	94

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	11.033	0.023	0.7	0.0	Flood Risk
360 min Winter	11.030	0.020	0.6	0.0	Flood Risk
480 min Winter	11.028	0.018	0.4	0.0	Flood Risk
600 min Winter	11.027	0.017	0.4	0.0	Flood Risk
720 min Winter	11.025	0.015	0.3	0.0	Flood Risk
960 min Winter	11.024	0.014	0.3	0.0	Flood Risk
1440 min Winter	11.022	0.012	0.2	0.0	Flood Risk
2160 min Winter	11.020	0.010	0.1	0.0	Flood Risk
2880 min Winter	11.019	0.009	0.1	0.0	Flood Risk
4320 min Winter	11.018	0.008	0.1	0.0	Flood Risk
5760 min Winter	11.017	0.007	0.1	0.0	Flood Risk
7200 min Winter	11.017	0.007	0.1	0.0	Flood Risk
8640 min Winter	11.016	0.006	0.1	0.0	Flood Risk
10080 min Winter	11.016	0.006	0.0	0.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	20.604	0.0	126
360 min Winter	15.169	0.0	180
480 min Winter	12.185	0.0	248
600 min Winter	10.272	0.0	296
720 min Winter	8.930	0.0	374
960 min Winter	7.152	0.0	480
1440 min Winter	5.221	0.0	714
2160 min Winter	3.803	0.0	1136
2880 min Winter	3.033	0.0	1448
4320 min Winter	2.201	0.0	2196
5760 min Winter	1.751	0.0	2816
7200 min Winter	1.466	0.0	3616
8640 min Winter	1.270	0.0	4560
10080 min Winter	1.124	0.0	4592

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.006

Time (mins)	Area
From:	To: (ha)

0	4 0.006
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Model Details

Storage is Online Cover Level (m) 11.240

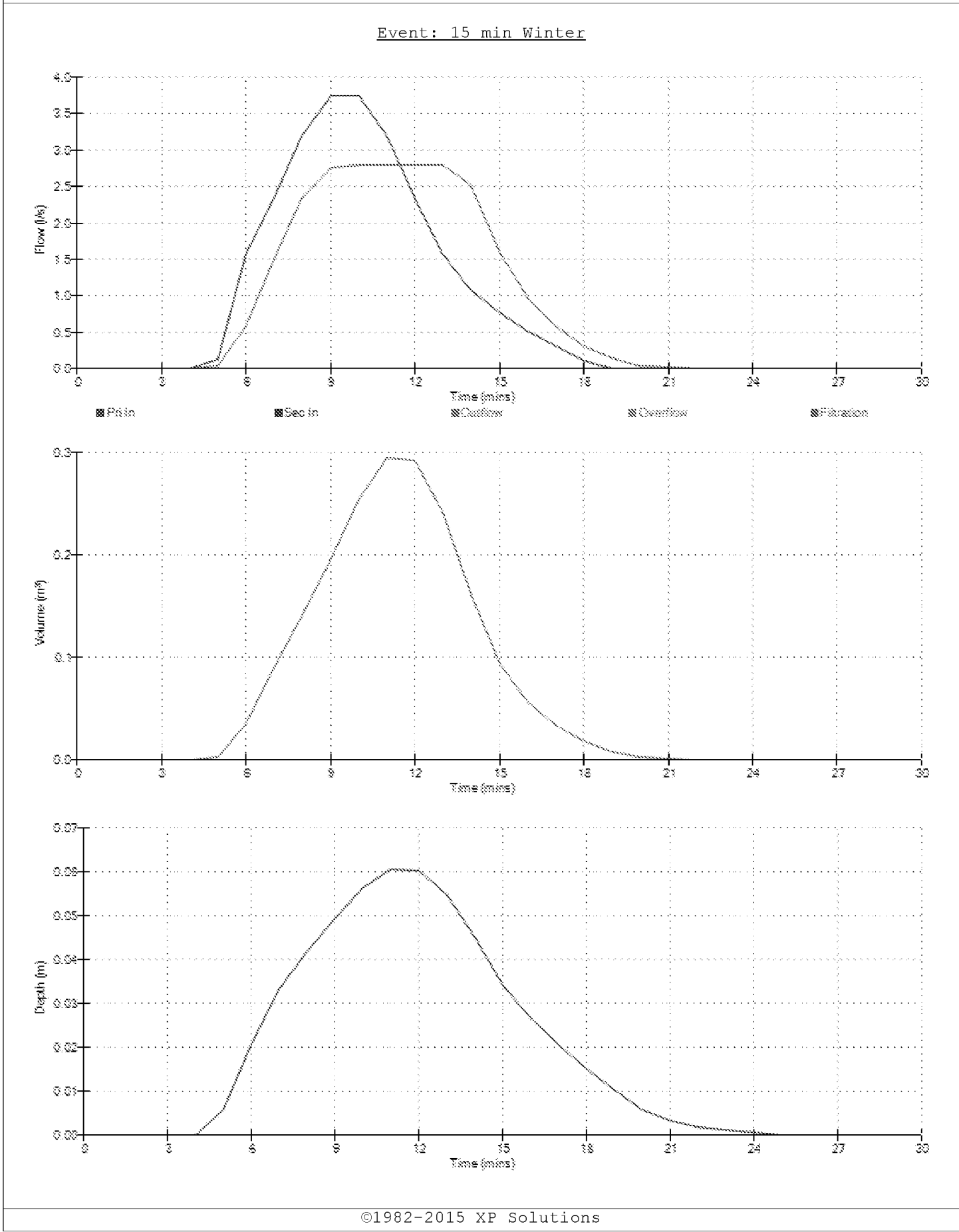
Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	1.84680	Width (m)	6.6
Membrane Percolation (mm/hr)	1000	Length (m)	3.3
Max Percolation (l/s)	6.1	Slope (1:X)	80.0
Safety Factor	4.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.010	Cap Volume Depth (m)	0.150

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.6
Membrane Percolation (mm/hr)	1000	Length (m)	1.5
Max Percolation (l/s)	2.8	Slope (1:X)	80.0
Safety Factor	4.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	11.050	Cap Volume Depth (m)	0.150



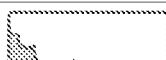
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XP Solutions	Source Control 2015.1	

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

Half Drain Time : 2 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	10.629	0.049	1.8	0.2	Flood Risk
30 min Summer	10.627	0.047	1.7	0.2	Flood Risk
60 min Summer	10.619	0.039	1.4	0.2	Flood Risk
120 min Summer	10.608	0.028	1.0	0.1	Flood Risk
180 min Summer	10.602	0.022	0.8	0.1	Flood Risk
240 min Summer	10.599	0.019	0.7	0.0	Flood Risk
360 min Summer	10.597	0.017	0.5	0.0	Flood Risk
480 min Summer	10.595	0.015	0.4	0.0	Flood Risk
600 min Summer	10.594	0.014	0.3	0.0	Flood Risk
720 min Summer	10.593	0.013	0.3	0.0	Flood Risk
960 min Summer	10.592	0.012	0.2	0.0	Flood Risk
1440 min Summer	10.590	0.010	0.2	0.0	Flood Risk
2160 min Summer	10.588	0.008	0.1	0.0	Flood Risk
2880 min Summer	10.588	0.008	0.1	0.0	Flood Risk
4320 min Summer	10.587	0.007	0.1	0.0	Flood Risk
5760 min Summer	10.586	0.006	0.1	0.0	Flood Risk
7200 min Summer	10.586	0.006	0.1	0.0	Flood Risk
8640 min Summer	10.585	0.005	0.0	0.0	Flood Risk
10080 min Summer	10.585	0.005	0.0	0.0	Flood Risk
15 min Winter	10.630	0.050	1.8	0.3	Flood Risk
30 min Winter	10.625	0.045	1.6	0.2	Flood Risk
60 min Winter	10.613	0.033	1.2	0.1	Flood Risk
120 min Winter	10.602	0.022	0.8	0.1	Flood Risk
180 min Winter	10.598	0.018	0.6	0.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	129.682	0.0	11
30 min Summer	87.133	0.0	19
60 min Summer	55.837	0.0	34
120 min Summer	34.509	0.0	64
180 min Summer	25.637	0.0	94
240 min Summer	20.604	0.0	122
360 min Summer	15.169	0.0	182
480 min Summer	12.185	0.0	242
600 min Summer	10.272	0.0	302
720 min Summer	8.930	0.0	368
960 min Summer	7.152	0.0	488
1440 min Summer	5.221	0.0	730
2160 min Summer	3.803	0.0	1100
2880 min Summer	3.033	0.0	1452
4320 min Summer	2.201	0.0	2188
5760 min Summer	1.751	0.0	2904
7200 min Summer	1.466	0.0	3648
8640 min Summer	1.270	0.0	4392
10080 min Summer	1.124	0.0	5096
15 min Winter	129.682	0.0	12
30 min Winter	87.133	0.0	19
60 min Winter	55.837	0.0	34
120 min Winter	34.509	0.0	64
180 min Winter	25.637	0.0	92

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

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
240 min Winter	10.596	0.016	0.5	0.0	Flood Risk
360 min Winter	10.594	0.014	0.4	0.0	Flood Risk
480 min Winter	10.593	0.013	0.3	0.0	Flood Risk
600 min Winter	10.592	0.012	0.2	0.0	Flood Risk
720 min Winter	10.591	0.011	0.2	0.0	Flood Risk
960 min Winter	10.590	0.010	0.2	0.0	Flood Risk
1440 min Winter	10.588	0.008	0.1	0.0	Flood Risk
2160 min Winter	10.587	0.007	0.1	0.0	Flood Risk
2880 min Winter	10.587	0.007	0.1	0.0	Flood Risk
4320 min Winter	10.586	0.006	0.1	0.0	Flood Risk
5760 min Winter	10.585	0.005	0.0	0.0	Flood Risk
7200 min Winter	10.585	0.005	0.0	0.0	Flood Risk
8640 min Winter	10.584	0.004	0.0	0.0	Flood Risk
10080 min Winter	10.584	0.004	0.0	0.0	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
240 min Winter	20.604	0.0	126
360 min Winter	15.169	0.0	192
480 min Winter	12.185	0.0	244
600 min Winter	10.272	0.0	302
720 min Winter	8.930	0.0	368
960 min Winter	7.152	0.0	476
1440 min Winter	5.221	0.0	726
2160 min Winter	3.803	0.0	1028
2880 min Winter	3.033	0.0	1368
4320 min Winter	2.201	0.0	2160
5760 min Winter	1.751	0.0	3008
7200 min Winter	1.466	0.0	3336
8640 min Winter	1.270	0.0	4568
10080 min Winter	1.124	0.0	5096

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.700	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.004

Time (mins)	Area
From:	To: (ha)

0	4 0.004
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XP Solutions	Source Control 2015.1	

Model Details

Storage is Online Cover Level (m) 10.810

Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	1.84680	Width (m)	9.4
Membrane Percolation (mm/hr)	1000	Length (m)	1.5
Max Percolation (l/s)	3.9	Slope (1:X)	75.0
Safety Factor	4.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	10.580	Cap Volume Depth (m)	0.150

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	9.4
Membrane Percolation (mm/hr)	1000	Length (m)	1.5
Max Percolation (l/s)	3.9	Slope (1:X)	75.0
Safety Factor	4.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	10.600	Cap Volume Depth (m)	0.150

