
Land South of Dukes Road

Drainage Strategy & Flood Risk Assessment

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1 INTRODUCTION

1.1 Scope

- 1.1.1 Lanmor Consulting has been appointed to prepare a drainage strategy for the proposed development on land to the south of Dukes Road, Westergate, Fontwell. This report has been commissioned to advise on the technical feasibility of providing drainage for the proposed development. Figure 1.1 below shows the location of the site.

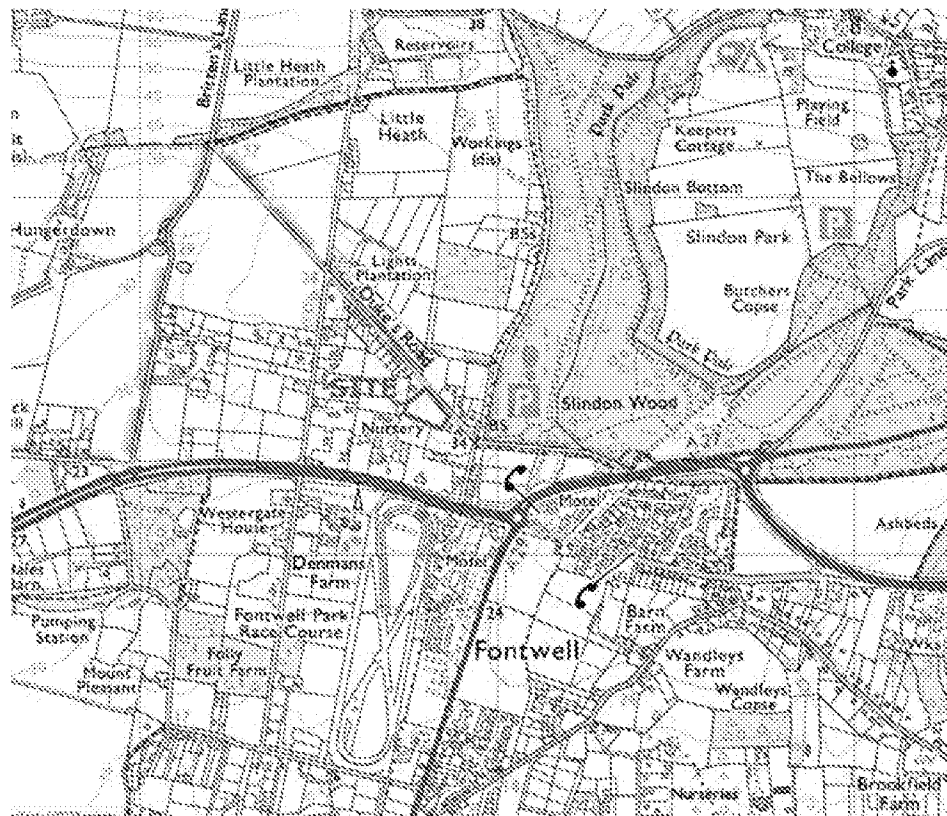


Figure 1.1 – Site Location

- 1.1.2 This report will consider the proposed drainage strategy for the site and flood risk, it will assess the site's current Greenfield runoff rates, suitable methods of discharging the runoff from the development and set the drainage strategy for the proposed development, including discharge rates and any requirements for attenuation.
- 1.1.3 The information and details within this report will be refined, modified and updated as the detailed design is progressed, post planning. The scope of works for this drainage strategy report is outlined below:

- Review available data relating to existing on-site drainage and other drainage networks in the vicinity of the site.
- Review of the site's ground conditions for suitability of SuDS.
- Consider the use of Sustainable Drainage Systems as an option for disposal of surface water runoff from the proposed development.
- Undertake drainage assessments of proposed buildings to establish discharge rates and attenuation requirements to deal with any increased surface water runoff.

2 SITE LOCATION AND DESCRIPTION

2.1 Location

2.1.1 The site is located in a rural area, access to the site will be from Dukes Road. Dukes Road is a rural road with no footways it is lined with residential properties on the southern side to the north and residential properties to the south.

2.1.2 The nearest water course is located approximately 1.5km to the east of the site. The site covers an area of 0.84 hectares and is currently vacant, greenfield. The proposed application seeks approval for construction of 9 residential properties.

2.1.3 The topographical survey of the site is included within Appendix A.

2.2 Proposed Development

2.2.1 The proposed redevelopment will involve the construction of 9 residential properties, consisting of 5 detached houses and two pairs of semi-detached houses. The site plan of the proposed development is included within Appendix A as Drawing L1001.

2.3 Regional Geology

2.3.1 The British Geological Survey indicates that the site has an underlying bedrock of Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation and Portsdown Chalk Formation (undifferentiated) - Chalk. Sedimentary Bedrock formed approximately 72 to 94 million years ago in the Cretaceous Period

2.3.2 Superficial deposits of Head - Gravel, Sand, Silt and Clay formed up to 3 million years ago in the Quaternary Period are recorded overlying the bedrock.

3 DRAINAGE REGIME

3.1 Existing Drainage

- 3.1.1 The site is currently vacant so there is no existing drainage on the site or sewers crossing the site. Regime

3.2 Proposed Surface Water Drainage

- 3.2.1 Sustainable Drainage Systems (SuDS) were considered as part of this assessment for disposal of surface water runoff from the development. The residential units will have a pitch roof, so incorporating a green roof is not possible.
- 3.2.2 Next on the Sustainable Drainage Hierarchy is the use of ground infiltration techniques such as soakaways and infiltration basins etc. The underlying ground consists of head deposits overlying a chalk bedrock, therefore infiltration techniques should be possible for discharge of runoff from the site.
- 3.2.3 It is proposed to use permeable paving for the access road and driveways and soakaways in the rear garden of each property for the runoff from the roofs. For the benefit of this report a conservative infiltration rate 1×10^{-5} has been used design of the SuDs Features employed in the development. Infiltration testing to BRE 365 will be undertaken prior to the detail design stage to confirm the infiltration rate and the size of the SuDS adjusted to suit.
- 3.2.4 The proposed drainage will use permeable paving to the access and driveways to the front of the site. The paving has been designed to accommodate a 1 in 100-year event plus 40% allowance for climate change. An infiltrations rate of 1×10^{-5} has been used to design the paving and the thickness of subbase required to retain the above event has been estimated at 0.30m using the Microdrainage software.

- 3.2.5 Each of the building will have a separate soakaway and again Microdrainage software has been used to estimate the size of soakaway needed to accommodate a 1 in 100 year +40% event. There will 3 different types of houses on the proposed development. The larger property of 150m² will be served by a 2.0m x 9.0m x 0.8m deep soakaways, the remaining detached properties will have a 1.0m x 9.0m x 0.8m deep soakaway and the semi-detached house a 1.0m x 6.0m x 0.8m deep soakaway
- 3.2.6 The full calculations for each infiltration device are included in Appendix B. The proposed soakaways will provide the required attenuation needed for a 1 in 100 year +40% event and ensure no flooding occurs on site.
- 3.2.7 Drawing 221528/DS/01 included in Appendix C and shows an indicative drainage layout for the development. The soakaways will take the form of long crate trench soakaways, a typical example for the soakaway is provided in Figure 3.2 below.

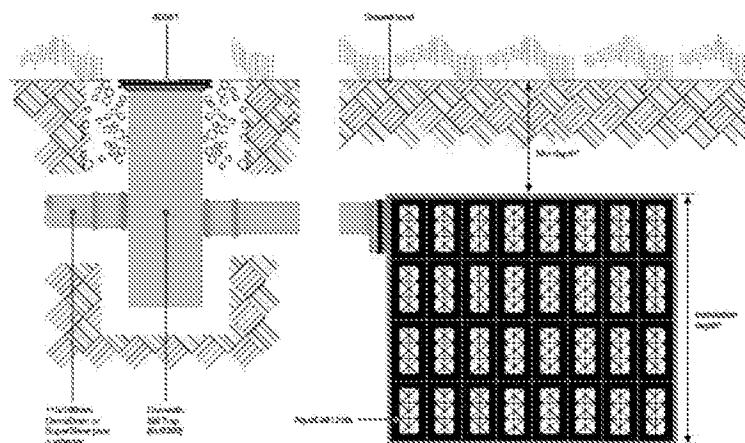


Figure 3.2 – Soakaway Design

4 MANAGING POLLUTION RISK FROM SURFACE WATER

4.1.1 As part of the CIRIA SuDS Manual C753, Section 26 provides guidance regarding methods for managing pollution risks from surface water runoff.

4.1.2 Part of the assessment is to determine which land use classification the proposed development falls under, Table 26.1 of the CIRIA Report C753 reproduced as table 4.1 below sets the approaches to water quality risk management. For this site the Simple Index Approach will be used.

Design method	Hazard characterisation	Risk reduction	
		For surface water	For groundwater
Simple index approach	Simple pollution hazard indices based on land use (eg Table 26.2 or equivalent)	Simple SuDS hazard mitigation indices (eg Table 26.3 or equivalent)	Simple SuDS hazard mitigation indices (eg Table 26.4 or equivalent)
Risk screening	Factors characterising traffic density and extent of infiltration likely to occur (eg Table 26.5 or equivalent)	N/A	Factors characterising unsaturated soil depth and type, and predominant flow type through the soils (eg Table 26.5 or equivalent)
Detailed risk assessment	Site specific information used to define likely pollutants and their significance	More detailed, component specific performance information used to demonstrate that the proposed SuDS components reduce the hazard to acceptable levels	
Process-based treatment modelling	Time series rainfall used with generic pollution characteristics to determine statistical distributions of likely concentrations and loadings in the runoff	Models that represent the treatment processes in the proposed SuDS components give estimates of reductions in event mean discharge concentrations and total annual load reductions delivered by the system	

Table 4.1 – Extract from CIRIA SuDS Manual C753 (Approaches to Water Quality)

4.1.3 Table 26.2 in C753 reproduced as Table 4.2, show the potential hazard associated with different land uses the hazard indices. The development will consist of residential houses, it is concluded that the site should be classed within the sections shown in Table 4.2 below.

4.1.4 The roofs of the residential buildings are considered to have a “very low” pollution hazard, generating 0.2 total suspended solids, 0.2 metals and 0.05 hydrocarbons. The access and parking areas are considered to have a “low” pollution hazard, generating 0.5 total suspended solids, 0.4 metals and 0.4 hydrocarbons.

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.3 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured, industrial sites, trunk roads and motorways ²	High	0.8 ³	0.8 ³	0.9 ³

Table 4.2 – Extract from CIRIA SuDS Manual C753 (Land use classifications)

4.1.5 The proposed development will incorporate permeable paving for storage and soakaway for disposal of runoff from the site. Suitable treatment measures offered by SuDS features are set out in CIRA report.

4.1.6 Table 26.3 of C753 reproduced below as Table 4.3 sets out the mitigation indices provided by SuDS features for discharge to surface waters.

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

Table 4.3 – Extract from CIRIA SuDS Manual C753 (Mitigation Indices to Surface Water)

4.1.7 The permeable paving will provide mitigation of 0.7 for total suspended solids, 0.6 for metals and 0.7 for hydrocarbons. These are all greater than the pollution hazard indices identified in table 4.2 above.

4.1.8 Table 26.4 of C753 reproduced as Table 4.4 sets out the mitigation indices provided by SuDS features for discharge to groundwaters. The disposal of runoff will be via a soakaway which have a gravel bed and surround and will provide a level of treatment for total suspended solids of 0.4, 0.4 for metals and 0.4 for hydrocarbons, all in excess of the indices in Table 4.2.

TABLE 26.4 Indicative SuDS mitigation indices for discharges to groundwater			
Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates ¹	TSS	Metals	Hydrocarbons
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.6 ⁴	0.5	0.6
A soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.4 ⁴	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, ie graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20 mm gravel) underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.4 ⁴	0.4	0.3
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential ² of at least 300 mm in depth ³	0.2 ⁴	0.8	0.5
Proprietary treatment systems ^{5, 6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

Table 4.4 – Extract from CIRIA SuDS Manual C753 (Mitigation Indices to Groundwater)

4.1.9 The above assessment has demonstrated that the proposed SuDS features will provide a suitable level of treatment appropriate to the type of development proposed.

5 SUDS MANAGEMENT & MAINTENANCE

- 5.1.1 Regular inspection of 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 of blockages, high pressure water jets can be used to clear the gullies and pipes to ensure they are functioning correctly, this should be undertaken by certified trained professionals.
- 5.1.2 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”.
- 5.1.3 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.
- 5.1.4 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.
- 5.1.5 Following completion of the development, each property will be responsible for the maintenance on their soakaway in the rear garden. The permeable paving will be maintained along with all the communal areas by the management company that will be set by the developer upon completion of the development.
- 5.1.6 The following maintenance regime is recommend for the SuDS features in the development and should be adjusted suit site requirements flowing the initial inspections if required.

Inspection, Manhole, Catchpit Chambers and Pipes

- 5.1.7 The appropriate health and safety equipment must be used when accessing manholes. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained.
- 5.1.8 Pipes are intended to be the main conveyance across the development. They are intended to be dry except for during rainfall events. These have been designed to be self-cleaning where possible for smaller diameter pipes, and for larger diameters the risk is reduced due to the overall pipe size.
- 5.1.9 For the Inspection, Manhole, Catchpit Chambers and Pipes, the following maintenance will be required.

Manhole / Pipe Maintenance Schedule		
	Required Action	Typical Frequency
Regular maintenance	Inspect for evidence of poor operation via water level in chambers. If required, take remedial action.	3-monthly, 48 hours after large storms.
	Check and remove large vegetation growth near pipe runs.	Monthly or as required
	Remove sediment from structures.	Annually or as required
Remedial Actions	Rod through poorly performing runs as initial remediation.	As required
	If continued poor performance jet and CCTV survey poorly performing runs.	As required
Monitoring	Inspect/check all inlets, outlets, to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of pipe manholes for sediment build-up and remove if necessary	Every 5 years or as required

Table 5.1 – Manhole, Catchpit and Pipes Maintenance

Drainage Channels and Gullies

5.1.10 For the Inspection, drainage channel and gullies, the following maintenance will be required.

Channel and Gully Maintenance Schedule		
	Required Action	Typical Frequency
Regular maintenance	Litter and debris removal	Monthly or as required
	Check and remove large vegetation growth near channel runs	Monthly or as required
	Inspect for evidence of poor operation and/or weed growth. If required, take remedial action. Inspect silt accumulation rates and establish appropriate brushing frequencies. Silt can also be caused by adjacent landscaping areas which should be reprofiled to provide a flat area or berm adjacent to the paving	3-monthly, 48 hours after large storms
Remedial Actions	Inspect access/outlet boxes and rod through poorly performing channels and outlets as initial remediation.	As required
Monitoring	Inspect/check all inlets, outlets, to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of gullies for sediment build-up and remove if necessary	Every year or as required

Table 5.2 – Channel and Gully Maintenance

Permeable Paving

5.1.11 For permeable paving areas, the following maintenance is recommended.

Permeable Paving Maintenance Schedule		
	Required Action	Typical Frequency
Regular maintenance	Remove debris and leaves etc.	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.
	Stabilise and mow contributing and adjacent areas	As required
Occasional maintenance	Removal of weeds	As required- once per year on less frequently used pavements
	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 Actions	Remedial work to any depressions, rutting etc	As required
	Rehabilitation of surface and upper substructure	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 frequencies for rehabilitation	Annually
	Monitor inspection chambers	Annually

Table 5.3 – Permeable Paving Maintenance Schedule

Soakaways

5.1.12 For the soakaways, the following maintenance is recommended.

Soakaway Maintenance Schedule		
	Required Action	Typical Frequency
Regular maintenance	Inspect for sediment debris in pre-treatment components and floor of inspection tube / chamber and inside soakaway	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 / chamber and inside soakaway	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 5.4 – Soakaway Maintenance

6 FLOOD RISK TO SITE

6.1 Fluvial Flood Risk

- 6.1.1 The proposed site is within Flood Zone 1, this is defined as land assessed as having a less than 0.1% probability of river flooding in any year. Figure 6.1 below shows an extract from the EA flood map.

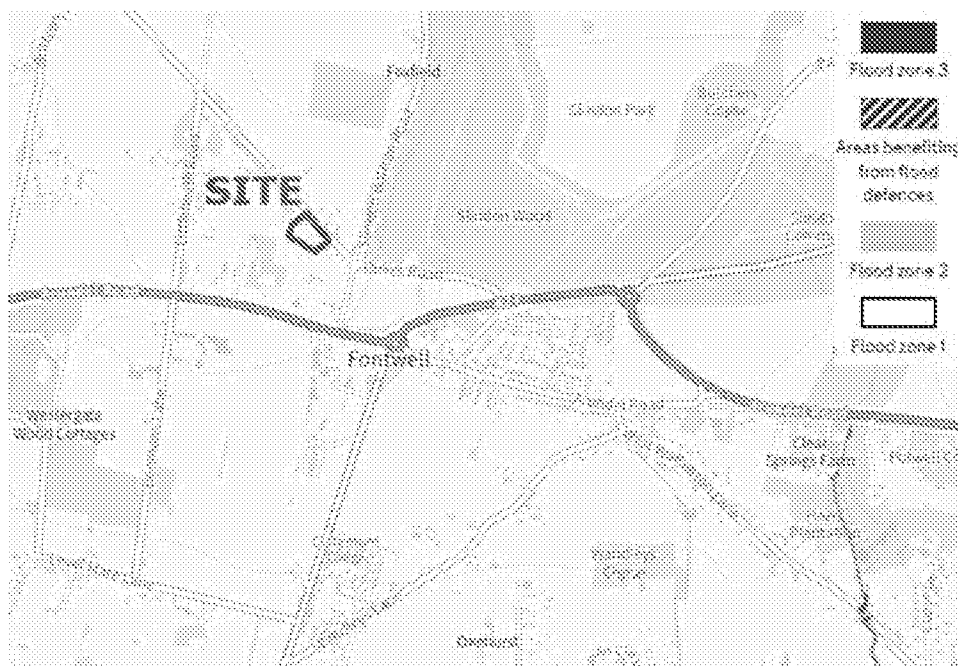


Figure 6.1 – EA Flood Map

- 6.1.2 The dark blue hatched areas show the extent of flood zone 3 and the light blue areas flood zone 2, the unhatched areas indicated flood zone 1. The above figure shows the site is some distance from flood zones 2 and 3.

6.2 Surface Water Flood Risk

- 6.2.1 The Surface Water flood information on the Environment Agency's website is the best available information at a national level. The flood data indicates that the site is not in an area at risk of surface water flooding with a probability of 1.0%. Due to this, it is possible to provide a safe, dry access to and from the site during an extreme flooding event. The Figure 6.2 below extracted from the EA surface water flood map shows that the site is at very low risk of flooding.

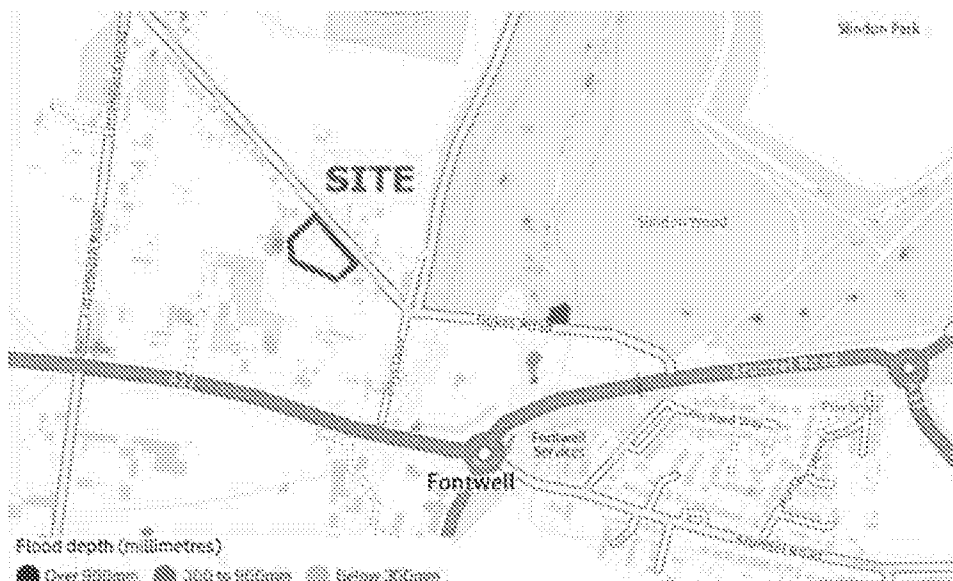


Figure 6.2 – EA Surface Water Flood Map

6.3 Flood Probability and Climate Change

6.3.1 Past, present and future emissions of greenhouse gases are expected to cause significant global climate change during this century – the nature of climate change at regional level will vary. The NPPF recommends that FRA's should consider the future flood levels and the impact climate change may have on rising sea levels, increased rainfall etc.

6.3.2 This FRA has considered changes in flood water levels due to climate change. The flood modelling undertaken by the EA includes an increase for climate change allowances. When the climate change allowances are factored in, the site is still in Flood Zone 1 and some distance from Zones 2 & 3. The increase in flood levels, resulting from climate change, will have no impact of the proposed development.

6.4 Impacts of Flooding

6.4.1 The site is situated in a Flood Zone 1 area, which is a significant distance from Flood Zones 2 and 3. The site has a probability of flooding of less than 0.1% (1 in 1000 years) and there is no history of the site being subject to fluvial flooding or from any other source.

6.4.2 The proposed development is located above the flood level for an event with a probability of 1.0% plus CC or greater. Given the site is above the flood level, it will not affect the flow of flood waters or displace any food volumes associated with an event of 1.0% AEP + CC or greater.

6.4.3 According to EA Flood Maps and the SFRA, the site is assessed as having a less than 0.1% probability of flooding. The site is a significant distance from the nearest fluvial flooding sources and hasn't been affected by flooding in the past. Therefore, a flood event will have no impact on the proposed development and will not cause any damage to the buildings or present a risk to residents in the development.

6.4.4 Since the site is not in Flood Zones 2 and 3, the proposed development is not prone to flooding with a probability of 1.0% or greater, thus, a safe access can always be provided to and from the site. Overall, the residual risk is considered minimal as the site is located within Flood Zone 1.

6.5 Sequential Test

6.5.1 The principal of the sequential test is to assess locations and prioritise developments to areas at less risk of flooding. National Planning Policy Framework suggests that Regional Planning Bodies and Local Planning Authorities should ensure their regional spatial strategies include a broad consideration of flood risk.

6.5.2 Within the Technical Guidance to the National Planning Policy Framework, Table 6.1 extract from the guidance categorises each type of development into a flood risk vulnerability. The proposed development is considered 'More Vulnerable' and is located in Flood Zone 1 so meets the sequeneutla test to allocate developments to low risk flood areas and does not require the application of the exception test.

Flood Risk Vulnerability classification (see Table D2)		Essential Infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone (see Table D.1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
	Zone 3b 'Functional Floodplain'	Exception Test required	✓	✗	✗	✗

Key:

✓ Development is appropriate

✗ Development should not be permitted

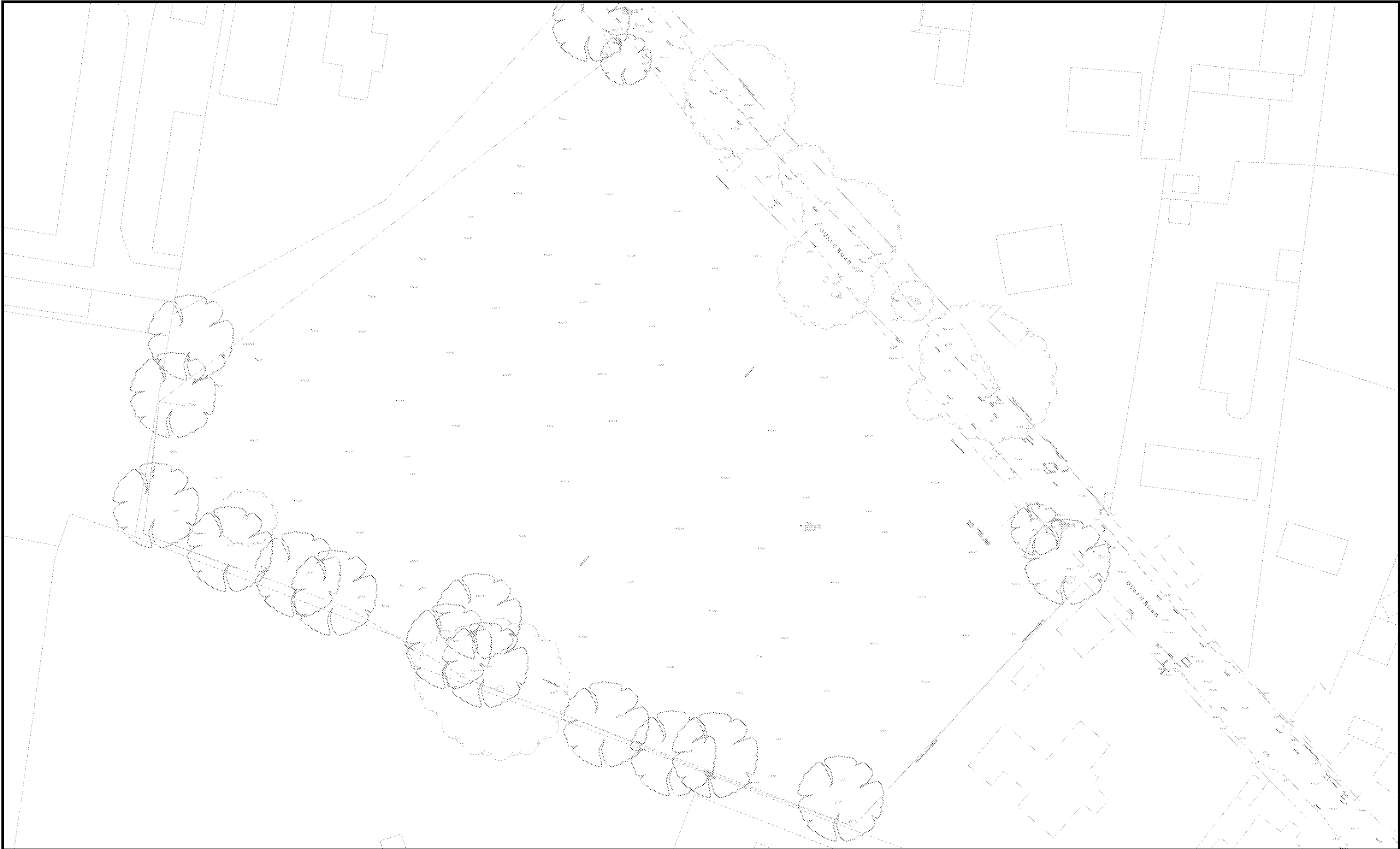
Table 6.1 – Flood Risk Vulnerability and Flood Zone 'Compatibility'

7 SUMMARY AND CONCLUSION

- 7.1.1 This application seeks consent for a new development consisting of 9 residential dwellings at The Land South of Dukes Road. The site is within Flood Zone 1 so therefore it will not be subject to flooding from an extreme event with a probability of 0.1% or greater. The site will not present a restriction to the flow of flood waters or result in a loss of storage volumes and it will not suffer damage as a result of flooding, even when increases in flood levels due to climate change are factored in.
- 7.1.2 The proposed development will not be subject to flooding as it is in a very low flood risk area from all sources of flooding. The extent of fluvial flooding in the area has been assessed and allowances for climate change factored in and the site is still in a very low flood risk area (Zone 1). It is therefore considered that the site will be safe and free from flood waters for all events with a probability of 1.0% or greater.
- 7.1.3 As part of the assessment, SuDS was considered for the discharge of surface water runoff from the proposed buildings, amenity and parking areas. The proposed drainage strategy for the development is to use soakaways to discharge the runoff from the development. Attenuation will be provided on site within the soakaway to accommodate events with a probability of 1.0% plus 40% allowance for climate change.
- 7.1.4 This statement clearly demonstrates that the proposed development can be served in terms of discharge of foul and surface water runoff from the site without increasing the risk of flooding in the area. Given the above we can see no reason to preclude development on this site on the grounds of flooding or there being insufficient capacity to deal with the runoff from the proposed development.

APPENDIX A

Topographical Survey



Land South of Dukes Road
Westergate
Topographical Survey



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SCALE 1:500

DRAWN BY JR

PRJ No. 221528

DWG No. 221528/TP/01

Drawing L1001 – Site Plan



1 Proposed Site Layout
Scale: 1:500

0 10 20 30 40 50 M

DISCLAIMER					PROGRESS / ARCHITECTURE					Project Title Land South of Dukes Road, Westergate		Drawing Title Proposed Site Layout		Drawing Status Preliminary	
Drawings based on survey information provided by others. Use figured dimensions only. Verify all dimensions on site. Drawing should be read in conjunction with information from all other design consultants and contractors. All drawings in digital format are for reference only, paper copies are available on request. Copyright to these drawings and the designs shown therein are retained by Progress Architecture Ltd.					Waterside House 20 Riverside Way Uxbridge UB8 2YF info@progressarchitecture.co.uk					Project Number 062		Date 01 March 2022		Scale / North Point	
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APPENDIX B

Microdrainage Calculations

Lanmor Consulting Ltd				Page 1																																																																																																																																																																																					
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<u>Summary of Results for 100 year Return Period (+40%)</u> Half Drain Time : 39 minutes. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>34.678</td><td>0.178</td><td>7.1</td><td>18.9</td><td>O K</td></tr><tr><td>30 min Summer</td><td>34.703</td><td>0.203</td><td>8.1</td><td>24.8</td><td>Flood Risk</td></tr><tr><td>60 min Summer</td><td>34.719</td><td>0.219</td><td>8.8</td><td>28.8</td><td>Flood Risk</td></tr><tr><td>120 min Summer</td><td>34.724</td><td>0.224</td><td>9.0</td><td>30.1</td><td>Flood Risk</td></tr><tr><td>180 min Summer</td><td>34.719</td><td>0.219</td><td>8.8</td><td>28.6</td><td>Flood Risk</td></tr><tr><td>240 min Summer</td><td>34.710</td><td>0.210</td><td>8.4</td><td>26.5</td><td>Flood Risk</td></tr><tr><td>360 min Summer</td><td>34.694</td><td>0.194</td><td>7.8</td><td>22.6</td><td>O K</td></tr><tr><td>480 min Summer</td><td>34.680</td><td>0.180</td><td>7.2</td><td>19.4</td><td>O K</td></tr><tr><td>600 min Summer</td><td>34.668</td><td>0.168</td><td>6.7</td><td>16.8</td><td>O K</td></tr><tr><td>720 min Summer</td><td>34.657</td><td>0.157</td><td>6.3</td><td>14.7</td><td>O K</td></tr><tr><td>960 min Summer</td><td>34.639</td><td>0.139</td><td>5.6</td><td>11.6</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>34.613</td><td>0.113</td><td>4.5</td><td>7.7</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>34.589</td><td>0.089</td><td>3.5</td><td>4.7</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>34.573</td><td>0.073</td><td>2.9</td><td>3.2</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>34.554</td><td>0.054</td><td>2.2</td><td>1.8</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>34.547</td><td>0.047</td><td>1.7</td><td>1.3</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>34.543</td><td>0.043</td><td>1.5</td><td>1.1</td><td>O K</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr></thead><tbody><tr><td>15 min Summer</td><td>125.126</td><td>0.0</td><td>17</td></tr><tr><td>30 min Summer</td><td>84.645</td><td>0.0</td><td>29</td></tr><tr><td>60 min Summer</td><td>54.663</td><td>0.0</td><td>44</td></tr><tr><td>120 min Summer</td><td>34.055</td><td>0.0</td><td>80</td></tr><tr><td>180 min Summer</td><td>25.414</td><td>0.0</td><td>112</td></tr><tr><td>240 min Summer</td><td>20.485</td><td>0.0</td><td>146</td></tr><tr><td>360 min Summer</td><td>15.127</td><td>0.0</td><td>210</td></tr><tr><td>480 min Summer</td><td>12.181</td><td>0.0</td><td>272</td></tr><tr><td>600 min Summer</td><td>10.288</td><td>0.0</td><td>332</td></tr><tr><td>720 min Summer</td><td>8.956</td><td>0.0</td><td>392</td></tr><tr><td>960 min Summer</td><td>7.190</td><td>0.0</td><td>512</td></tr><tr><td>1440 min Summer</td><td>5.265</td><td>0.0</td><td>750</td></tr><tr><td>2160 min Summer</td><td>3.846</td><td>0.0</td><td>1104</td></tr><tr><td>2880 min Summer</td><td>3.073</td><td>0.0</td><td>1468</td></tr><tr><td>4320 min Summer</td><td>2.236</td><td>0.0</td><td>2200</td></tr><tr><td>5760 min Summer</td><td>1.782</td><td>0.0</td><td>2928</td></tr><tr><td>7200 min Summer</td><td>1.496</td><td>0.0</td><td>3624</td></tr></tbody></table>						Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	34.678	0.178	7.1	18.9	O K	30 min Summer	34.703	0.203	8.1	24.8	Flood Risk	60 min Summer	34.719	0.219	8.8	28.8	Flood Risk	120 min Summer	34.724	0.224	9.0	30.1	Flood Risk	180 min Summer	34.719	0.219	8.8	28.6	Flood Risk	240 min Summer	34.710	0.210	8.4	26.5	Flood Risk	360 min Summer	34.694	0.194	7.8	22.6	O K	480 min Summer	34.680	0.180	7.2	19.4	O K	600 min Summer	34.668	0.168	6.7	16.8	O K	720 min Summer	34.657	0.157	6.3	14.7	O K	960 min Summer	34.639	0.139	5.6	11.6	O K	1440 min Summer	34.613	0.113	4.5	7.7	O K	2160 min Summer	34.589	0.089	3.5	4.7	O K	2880 min Summer	34.573	0.073	2.9	3.2	O K	4320 min Summer	34.554	0.054	2.2	1.8	O K	5760 min Summer	34.547	0.047	1.7	1.3	O K	7200 min Summer	34.543	0.043	1.5	1.1	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	125.126	0.0	17	30 min Summer	84.645	0.0	29	60 min Summer	54.663	0.0	44	120 min Summer	34.055	0.0	80	180 min Summer	25.414	0.0	112	240 min Summer	20.485	0.0	146	360 min Summer	15.127	0.0	210	480 min Summer	12.181	0.0	272	600 min Summer	10.288	0.0	332	720 min Summer	8.956	0.0	392	960 min Summer	7.190	0.0	512	1440 min Summer	5.265	0.0	750	2160 min Summer	3.846	0.0	1104	2880 min Summer	3.073	0.0	1468	4320 min Summer	2.236	0.0	2200	5760 min Summer	1.782	0.0	2928	7200 min Summer	1.496	0.0	3624
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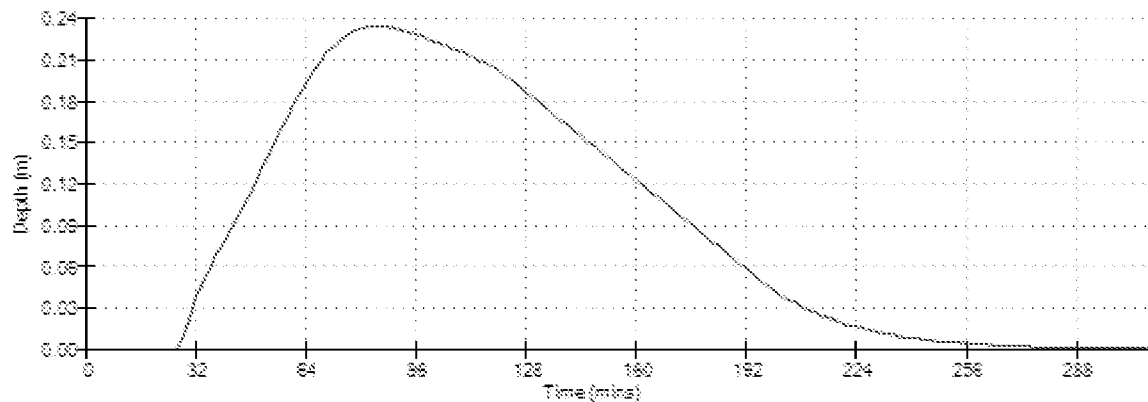
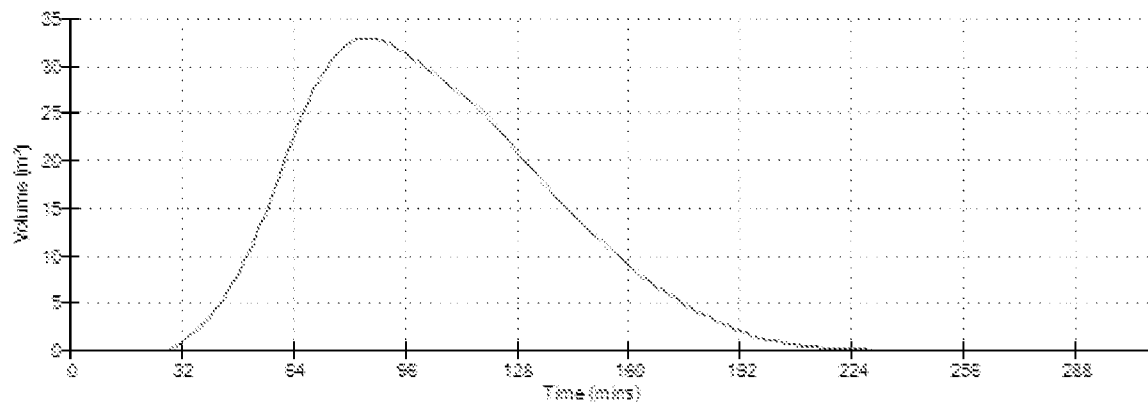
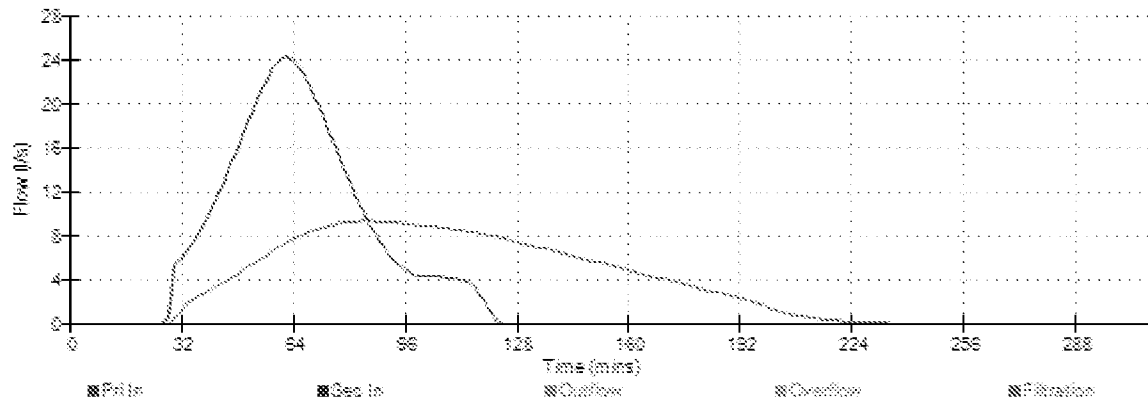
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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW					
Date 11/03/2022 15:58 File PERMEABLE PAVING CALCULA...		Designed by Joe Checked by			
XP Solutions		Source Control 2015.1			
Summary of Results for 100 year Return Period (+40%)					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
8640 min Summer	34.540	0.040	1.3	0.9	O K
10080 min Summer	34.537	0.037	1.1	0.8	O K
15 min Winter	34.692	0.192	7.7	22.0	O K
30 min Winter	34.719	0.219	8.8	28.8	Flood Risk
60 min Winter	34.734	0.234	9.4	32.8	Flood Risk
120 min Winter	34.734	0.234	9.4	32.8	Flood Risk
180 min Winter	34.725	0.225	9.0	30.2	Flood Risk
240 min Winter	34.712	0.212	8.5	27.0	Flood Risk
360 min Winter	34.689	0.189	7.6	21.5	O K
480 min Winter	34.670	0.170	6.8	17.3	O K
600 min Winter	34.654	0.154	6.2	14.2	O K
720 min Winter	34.640	0.140	5.6	11.8	O K
960 min Winter	34.619	0.119	4.7	8.4	O K
1440 min Winter	34.591	0.091	3.6	4.9	O K
2160 min Winter	34.568	0.068	2.7	2.7	O K
2880 min Winter	34.554	0.054	2.2	1.8	O K
4320 min Winter	34.544	0.044	1.6	1.2	O K
5760 min Winter	34.540	0.040	1.3	0.9	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
8640 min Summer	1.297	0.0	4288		
10080 min Summer	1.150	0.0	5136		
15 min Winter	125.126	0.0	17		
30 min Winter	84.645	0.0	30		
60 min Winter	54.663	0.0	48		
120 min Winter	34.855	0.0	86		
180 min Winter	25.414	0.0	120		
240 min Winter	20.485	0.0	156		
360 min Winter	15.127	0.0	220		
480 min Winter	12.181	0.0	282		
600 min Winter	10.288	0.0	344		
720 min Winter	8.956	0.0	404		
960 min Winter	7.190	0.0	522		
1440 min Winter	5.265	0.0	754		
2160 min Winter	3.846	0.0	1104		
2880 min Winter	3.073	0.0	1468		
4320 min Winter	2.236	0.0	2200		
5760 min Winter	1.782	0.0	2928		
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XP Solutions		Source Control 2015.1																								
<u>Model Details</u> Storage is Online Cover Level (m) 35.000 <u>Porous Car Park Structure</u> <table> <tr> <td>Infiltration Coefficient Base (m/hr)</td> <td>0.03600</td> <td>Width (m)</td> <td>20.0</td> </tr> <tr> <td>Membrane Percolation (mm/hr)</td> <td>1000</td> <td>Length (m)</td> <td>60.0</td> </tr> <tr> <td>Max Percolation (l/s)</td> <td>333.3</td> <td>Slope (1:X)</td> <td>200.0</td> </tr> <tr> <td>Safety Factor</td> <td>1.0</td> <td>Depression Storage (mm)</td> <td>5</td> </tr> <tr> <td>Porosity</td> <td>0.30</td> <td>Evaporation (mm/day)</td> <td>3</td> </tr> <tr> <td>Invert Level (m)</td> <td>34.500</td> <td>Cap Volume Depth (m)</td> <td>0.300</td> </tr> </table>			Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	20.0	Membrane Percolation (mm/hr)	1000	Length (m)	60.0	Max Percolation (l/s)	333.3	Slope (1:X)	200.0	Safety Factor	1.0	Depression Storage (mm)	5	Porosity	0.30	Evaporation (mm/day)	3	Invert Level (m)	34.500	Cap Volume Depth (m)	0.300
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Event: 120 min Winter



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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW		Dukes Road Plot 1			
Date 11/03/2022 11:18 File Plot 1 Soakaway.srcx		Designed by JR Checked by			
XP Solutions		Source Control 2015.1			
Summary of Results for 100 year Return Period (+40%)					
Half Drain Time : 868 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	33.175	0.275	0.1	4.7	O K
30 min Summer	33.274	0.374	0.1	6.4	O K
60 min Summer	33.383	0.483	0.1	8.3	O K
120 min Summer	33.493	0.593	0.1	10.1	O K
180 min Summer	33.550	0.650	0.1	11.1	O K
240 min Summer	33.586	0.686	0.2	11.7	O K
360 min Summer	33.630	0.730	0.2	12.5	O K
480 min Summer	33.652	0.752	0.2	12.9	O K
600 min Summer	33.663	0.763	0.2	13.0	O K
720 min Summer	33.672	0.772	0.2	13.2	O K
960 min Summer	33.684	0.784	0.2	13.4	O K
1440 min Summer	33.692	0.792	0.2	13.5	O K
2160 min Summer	33.683	0.783	0.2	13.4	O K
2880 min Summer	33.663	0.763	0.2	13.0	O K
4320 min Summer	33.614	0.714	0.2	12.2	O K
5760 min Summer	33.569	0.669	0.1	11.4	O K
7200 min Summer	33.528	0.628	0.1	10.7	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	126.521	0.0	19		
30 min Summer	86.489	0.0	34		
60 min Summer	56.422	0.0	64		
120 min Summer	35.422	0.0	122		
180 min Summer	26.491	0.0	182		
240 min Summer	21.442	0.0	242		
360 min Summer	15.918	0.0	360		
480 min Summer	12.861	0.0	480		
600 min Summer	10.890	0.0	538		
720 min Summer	9.499	0.0	598		
960 min Summer	7.649	0.0	714		
1440 min Summer	5.623	0.0	882		
2160 min Summer	4.123	0.0	1388		
2880 min Summer	3.303	0.0	1812		
4320 min Summer	2.412	0.0	2596		
5760 min Summer	1.933	0.0	3400		
7200 min Summer	1.628	0.0	4176		
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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW		Dukes Road Plot 1			
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Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
8640 min Summer	33.491	0.591	0.1	10.1	○ K
10080 min Summer	33.460	0.560	0.1	9.6	○ K
15 min Winter	33.175	0.275	0.1	4.7	○ K
30 min Winter	33.274	0.374	0.1	6.4	○ K
60 min Winter	33.383	0.483	0.1	8.3	○ K
120 min Winter	33.493	0.593	0.1	10.1	○ K
180 min Winter	33.551	0.651	0.1	11.1	○ K
240 min Winter	33.587	0.687	0.2	11.8	○ K
360 min Winter	33.633	0.733	0.2	12.5	○ K
480 min Winter	33.657	0.757	0.2	12.9	○ K
600 min Winter	33.669	0.769	0.2	13.2	○ K
720 min Winter	33.675	0.775	0.2	13.2	○ K
960 min Winter	33.684	0.784	0.2	13.4	○ K
1440 min Winter	33.683	0.783	0.2	13.4	○ K
2160 min Winter	33.659	0.759	0.2	13.0	○ K
2880 min Winter	33.625	0.725	0.2	12.4	○ K
4320 min Winter	33.558	0.658	0.1	11.2	○ K
5760 min Winter	33.499	0.599	0.1	10.2	○ K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
8640 min Summer	1.415	0.0	4928		
10080 min Summer	1.257	0.0	5648		
15 min Winter	126.521	0.0	19		
30 min Winter	86.489	0.0	33		
60 min Winter	56.422	0.0	62		
120 min Winter	35.422	0.0	120		
180 min Winter	26.491	0.0	180		
240 min Winter	21.442	0.0	238		
360 min Winter	15.918	0.0	350		
480 min Winter	12.861	0.0	462		
600 min Winter	10.890	0.0	566		
720 min Winter	9.499	0.0	658		
960 min Winter	7.649	0.0	742		
1440 min Winter	5.623	0.0	1052		
2160 min Winter	4.123	0.0	1496		
2880 min Winter	3.303	0.0	1932		
4320 min Winter	2.412	0.0	2768		
5760 min Winter	1.933	0.0	3576		
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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW	Dukes Road Plot 1	
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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
7200 min Winter	33.449	0.549	0.1	9.4	○ K
8640 min Winter	33.407	0.507	0.1	8.7	○ K
10080 min Winter	33.371	0.471	0.1	8.1	○ K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
7200 min Winter	1.628	0.0	4328
8640 min Winter	1.415	0.0	5104
10080 min Winter	1.257	0.0	5856

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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW	Dukes Road Plot 1																															
Date 11/03/2022 11:18 File Plot 1 Soakaway.srcx	Designed by JR Checked by																															
XP Solutions																																
Source Control 2015.1																																
<u>Rainfall Details</u> <table> <tr> <td>Rainfall Model</td> <td>FSR</td> <td>Winter Storms</td> <td>Yes</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> <td>Cv (Summer)</td> <td>1.000</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> <td>Cv (Winter)</td> <td>1.000</td> </tr> <tr> <td>M5-60 (mm)</td> <td>19.900</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.316</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+40</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.015 <table> <tr> <td>Time (mins)</td> <td>Area</td> </tr> <tr> <td>From: To:</td> <td>(ha)</td> </tr> <tr> <td>0</td> <td>4 0.015</td> </tr> </table>			Rainfall Model	FSR	Winter Storms	Yes	Return Period (years)	100	Cv (Summer)	1.000	Region	England and Wales	Cv (Winter)	1.000	M5-60 (mm)	19.900	Shortest Storm (mins)	15	Ratio R	0.316	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+40	Time (mins)	Area	From: To:	(ha)	0	4 0.015
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Time (mins)	Area																															
From: To:	(ha)																															
0	4 0.015																															
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Model Details

Storage is Online Cover Level (m) 34.500

Cellular Storage Structure

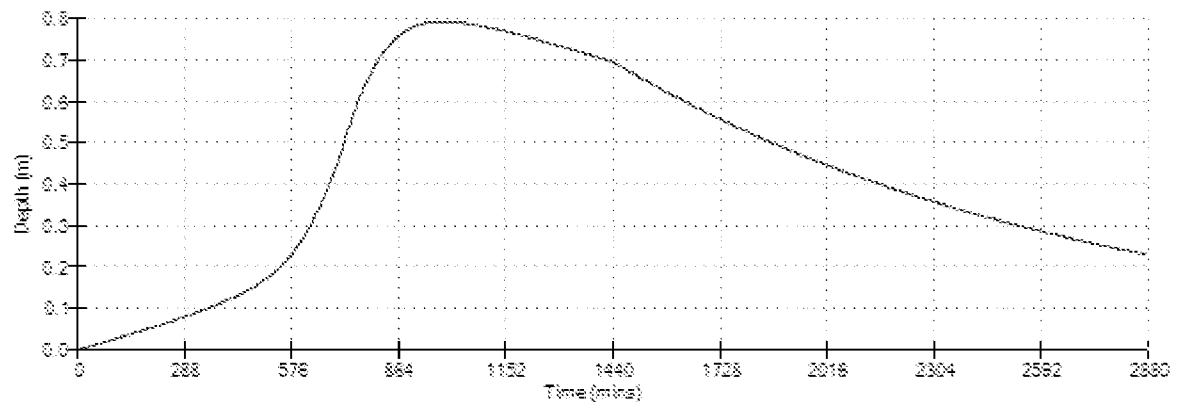
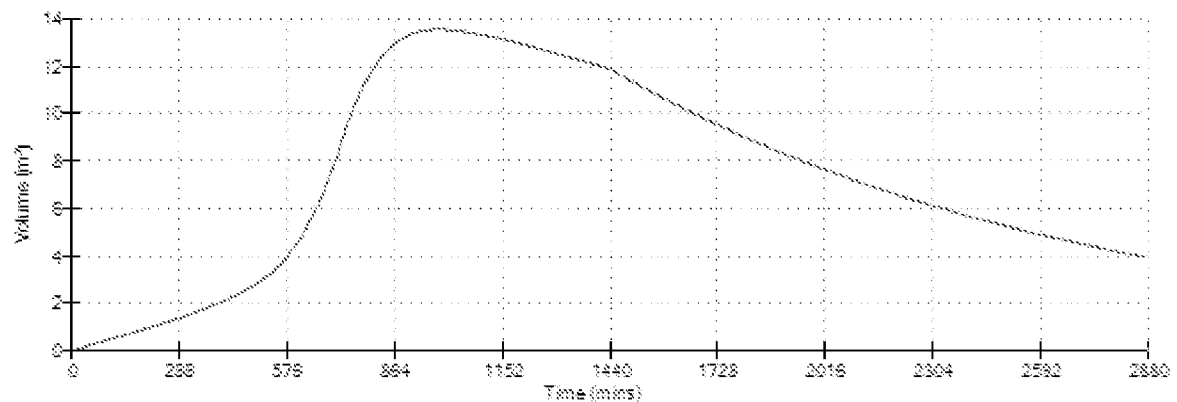
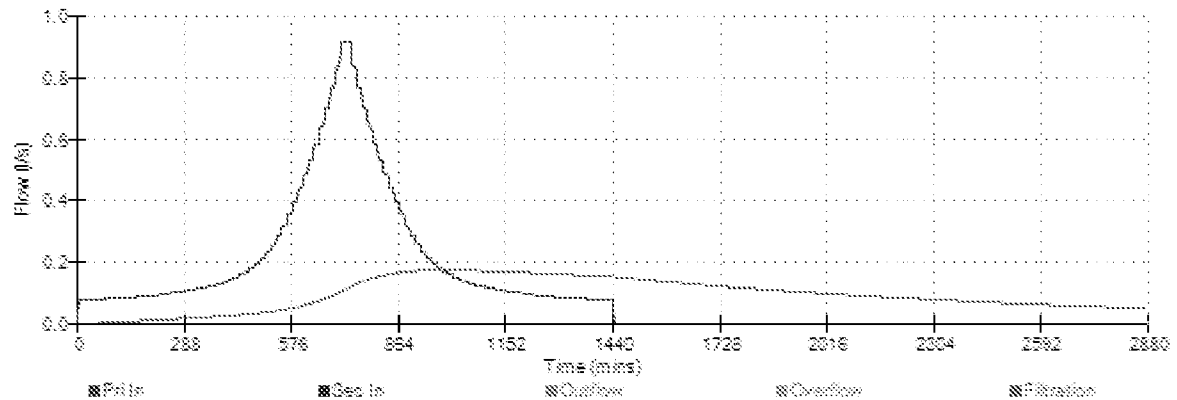
Invert Level (m) 32.900 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.03600

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	18.0	18.0	0.801	0.0	35.6
0.800	18.0	35.6			

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Event: 1440 min Summer



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Date 11/03/2022 11:45 File PLOT 2 SOAKAWAY.SRCX	Designed by JR Checked by	
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Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 483 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	33.192	0.292	0.1	2.5	O K
30 min Summer	33.295	0.395	0.1	3.4	O K
60 min Summer	33.405	0.505	0.1	4.3	O K
120 min Summer	33.509	0.609	0.1	5.2	O K
180 min Summer	33.555	0.655	0.1	5.6	O K
240 min Summer	33.579	0.679	0.1	5.8	O K
360 min Summer	33.603	0.703	0.1	6.0	O K
480 min Summer	33.617	0.717	0.1	6.1	O K
600 min Summer	33.625	0.725	0.1	6.2	O K
720 min Summer	33.630	0.730	0.1	6.2	O K
960 min Summer	33.631	0.731	0.1	6.2	O K
1440 min Summer	33.615	0.715	0.1	6.1	O K
2160 min Summer	33.578	0.678	0.1	5.8	O K
2880 min Summer	33.538	0.638	0.1	5.5	O K
4320 min Summer	33.467	0.567	0.1	4.9	O K
5760 min Summer	33.412	0.512	0.1	4.4	O K
7200 min Summer	33.368	0.468	0.1	4.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	126.521	0.0	19
30 min Summer	86.489	0.0	33
60 min Summer	56.422	0.0	64
120 min Summer	35.422	0.0	122
180 min Summer	26.491	0.0	182
240 min Summer	21.442	0.0	240
360 min Summer	15.918	0.0	310
480 min Summer	12.861	0.0	372
600 min Summer	10.890	0.0	434
720 min Summer	9.499	0.0	500
960 min Summer	7.649	0.0	636
1440 min Summer	5.623	0.0	910
2160 min Summer	4.123	0.0	1316
2880 min Summer	3.303	0.0	1704
4320 min Summer	2.412	0.0	2468
5760 min Summer	1.933	0.0	3232
7200 min Summer	1.628	0.0	3968

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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
8640 min Summer	33.332	0.432	0.1	3.7	○ K
10080 min Summer	33.302	0.402	0.1	3.4	○ K
15 min Winter	33.192	0.292	0.1	2.5	○ K
30 min Winter	33.295	0.395	0.1	3.4	○ K
60 min Winter	33.406	0.506	0.1	4.3	○ K
120 min Winter	33.510	0.610	0.1	5.2	○ K
180 min Winter	33.558	0.658	0.1	5.6	○ K
240 min Winter	33.583	0.683	0.1	5.8	○ K
360 min Winter	33.607	0.707	0.1	6.0	○ K
480 min Winter	33.617	0.717	0.1	6.1	○ K
600 min Winter	33.623	0.723	0.1	6.2	○ K
720 min Winter	33.624	0.724	0.1	6.2	○ K
960 min Winter	33.616	0.716	0.1	6.1	○ K
1440 min Winter	33.585	0.685	0.1	5.9	○ K
2160 min Winter	33.529	0.629	0.1	5.4	○ K
2880 min Winter	33.477	0.577	0.1	4.9	○ K
4320 min Winter	33.392	0.492	0.1	4.2	○ K
5760 min Winter	33.330	0.430	0.1	3.7	○ K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
8640 min Summer	1.415	0.0	4680		
10080 min Summer	1.257	0.0	5448		
15 min Winter	126.521	0.0	19		
30 min Winter	86.489	0.0	33		
60 min Winter	56.422	0.0	62		
120 min Winter	35.422	0.0	120		
180 min Winter	26.491	0.0	176		
240 min Winter	21.442	0.0	232		
360 min Winter	15.918	0.0	338		
480 min Winter	12.861	0.0	380		
600 min Winter	10.890	0.0	456		
720 min Winter	9.499	0.0	534		
960 min Winter	7.649	0.0	684		
1440 min Winter	5.623	0.0	980		
2160 min Winter	4.123	0.0	1404		
2880 min Winter	3.303	0.0	1812		
4320 min Winter	2.412	0.0	2592		
5760 min Winter	1.933	0.0	3352		
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<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
7200 min Winter	33.282	0.382	0.1	3.3	○ K
8640 min Winter	33.244	0.344	0.1	2.9	○ K
10080 min Winter	33.214	0.314	0.1	2.7	○ K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
7200 min Winter	1.628	0.0	4112		
8640 min Winter	1.415	0.0	4848		
10080 min Winter	1.257	0.0	5552		
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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	19.900	Shortest Storm (mins)	15
Ratio R	0.316	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.008

Time (mins)	Area
From: To:	(ha)
0 4	0.008

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XP Solutions Source Control 2015.1		

Model Details

Storage is Online Cover Level (m) 34.500

Cellular Storage Structure

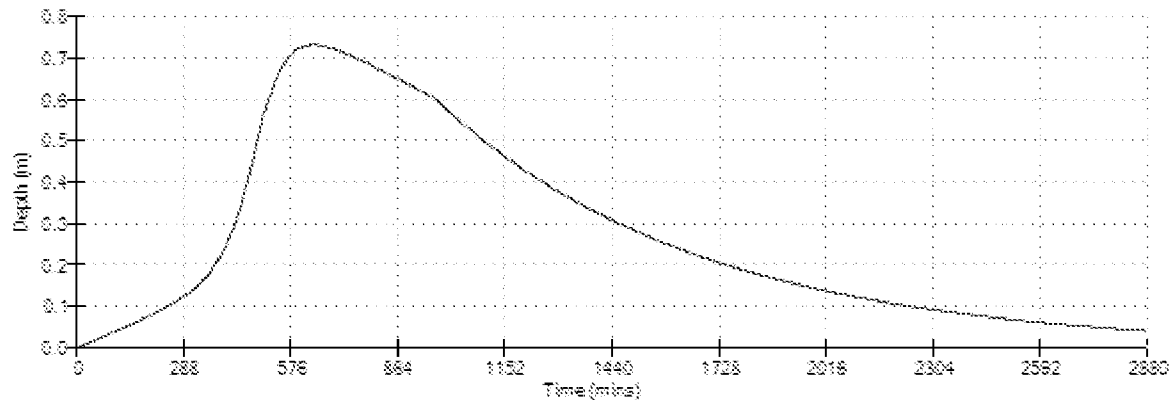
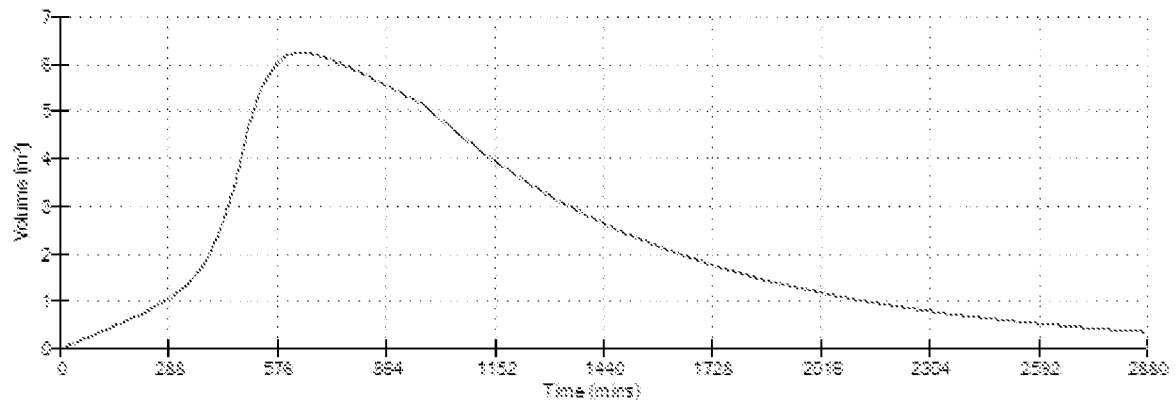
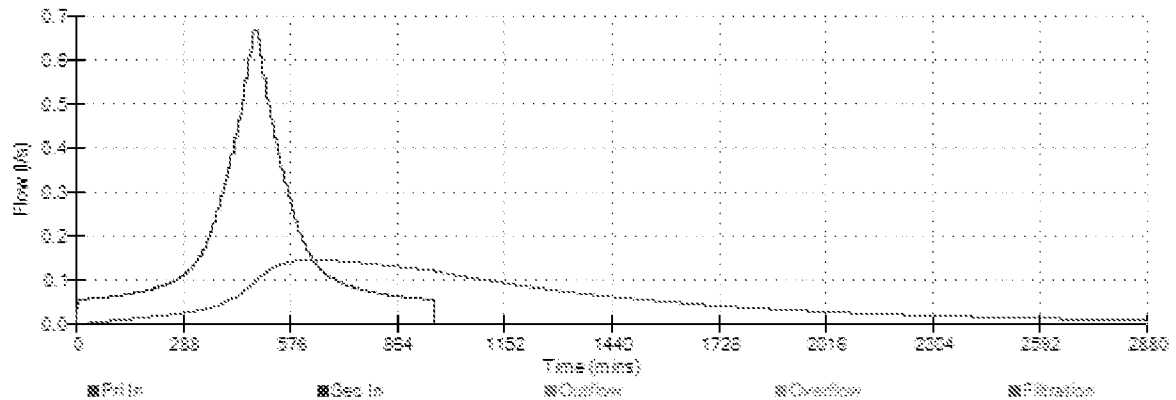
Invert Level (m) 32.900 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.03600

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	9.0	9.0	0.801	0.0	25.0
0.800	9.0	25.0			

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Event: 960 min Summer



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<u>Summary of Results for 100 year Return Period (+40%)</u> Half Drain Time : 469 minutes. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>33.228</td><td>0.328</td><td>0.0</td><td>1.9</td><td>O K</td></tr><tr><td>30 min Summer</td><td>33.344</td><td>0.444</td><td>0.1</td><td>2.5</td><td>O K</td></tr><tr><td>60 min Summer</td><td>33.467</td><td>0.567</td><td>0.1</td><td>3.2</td><td>O K</td></tr><tr><td>120 min Summer</td><td>33.582</td><td>0.682</td><td>0.1</td><td>3.9</td><td>O K</td></tr><tr><td>180 min Summer</td><td>33.633</td><td>0.733</td><td>0.1</td><td>4.2</td><td>O K</td></tr><tr><td>240 min Summer</td><td>33.658</td><td>0.758</td><td>0.1</td><td>4.3</td><td>O K</td></tr><tr><td>360 min Summer</td><td>33.683</td><td>0.783</td><td>0.1</td><td>4.5</td><td>O K</td></tr><tr><td>480 min Summer</td><td>33.698</td><td>0.798</td><td>0.1</td><td>4.6</td><td>O K</td></tr><tr><td>600 min Summer</td><td>33.743</td><td>0.843</td><td>0.1</td><td>4.6</td><td>O K</td></tr><tr><td>720 min Summer</td><td>33.759</td><td>0.866</td><td>0.1</td><td>4.6</td><td>O K</td></tr><tr><td>960 min Summer</td><td>33.766</td><td>0.866</td><td>0.1</td><td>4.6</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>33.692</td><td>0.792</td><td>0.1</td><td>4.5</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>33.647</td><td>0.747</td><td>0.1</td><td>4.3</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>33.601</td><td>0.701</td><td>0.1</td><td>4.0</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>33.521</td><td>0.621</td><td>0.1</td><td>3.5</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>33.459</td><td>0.559</td><td>0.1</td><td>3.2</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>33.410</td><td>0.510</td><td>0.1</td><td>2.9</td><td>O K</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr></thead><tbody><tr><td>15 min Summer</td><td>126.521</td><td>0.0</td><td>19</td></tr><tr><td>30 min Summer</td><td>86.489</td><td>0.0</td><td>33</td></tr><tr><td>60 min Summer</td><td>56.422</td><td>0.0</td><td>62</td></tr><tr><td>120 min Summer</td><td>35.422</td><td>0.0</td><td>122</td></tr><tr><td>180 min Summer</td><td>26.491</td><td>0.0</td><td>182</td></tr><tr><td>240 min Summer</td><td>21.442</td><td>0.0</td><td>240</td></tr><tr><td>360 min Summer</td><td>15.918</td><td>0.0</td><td>306</td></tr><tr><td>480 min Summer</td><td>12.861</td><td>0.0</td><td>364</td></tr><tr><td>600 min Summer</td><td>10.890</td><td>0.0</td><td>430</td></tr><tr><td>720 min Summer</td><td>9.459</td><td>0.0</td><td>498</td></tr><tr><td>960 min Summer</td><td>7.649</td><td>0.0</td><td>636</td></tr><tr><td>1440 min Summer</td><td>5.623</td><td>0.0</td><td>908</td></tr><tr><td>2160 min Summer</td><td>4.123</td><td>0.0</td><td>1300</td></tr><tr><td>2880 min Summer</td><td>3.303</td><td>0.0</td><td>1700</td></tr><tr><td>4320 min Summer</td><td>2.412</td><td>0.0</td><td>2464</td></tr><tr><td>5760 min Summer</td><td>1.933</td><td>0.0</td><td>3224</td></tr><tr><td>7200 min Summer</td><td>1.628</td><td>0.0</td><td>3960</td></tr></tbody></table>						Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	33.228	0.328	0.0	1.9	O K	30 min Summer	33.344	0.444	0.1	2.5	O K	60 min Summer	33.467	0.567	0.1	3.2	O K	120 min Summer	33.582	0.682	0.1	3.9	O K	180 min Summer	33.633	0.733	0.1	4.2	O K	240 min Summer	33.658	0.758	0.1	4.3	O K	360 min Summer	33.683	0.783	0.1	4.5	O K	480 min Summer	33.698	0.798	0.1	4.6	O K	600 min Summer	33.743	0.843	0.1	4.6	O K	720 min Summer	33.759	0.866	0.1	4.6	O K	960 min Summer	33.766	0.866	0.1	4.6	O K	1440 min Summer	33.692	0.792	0.1	4.5	O K	2160 min Summer	33.647	0.747	0.1	4.3	O K	2880 min Summer	33.601	0.701	0.1	4.0	O K	4320 min Summer	33.521	0.621	0.1	3.5	O K	5760 min Summer	33.459	0.559	0.1	3.2	O K	7200 min Summer	33.410	0.510	0.1	2.9	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	126.521	0.0	19	30 min Summer	86.489	0.0	33	60 min Summer	56.422	0.0	62	120 min Summer	35.422	0.0	122	180 min Summer	26.491	0.0	182	240 min Summer	21.442	0.0	240	360 min Summer	15.918	0.0	306	480 min Summer	12.861	0.0	364	600 min Summer	10.890	0.0	430	720 min Summer	9.459	0.0	498	960 min Summer	7.649	0.0	636	1440 min Summer	5.623	0.0	908	2160 min Summer	4.123	0.0	1300	2880 min Summer	3.303	0.0	1700	4320 min Summer	2.412	0.0	2464	5760 min Summer	1.933	0.0	3224	7200 min Summer	1.628	0.0	3960
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status																																																																																																																																																																																				
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4320 min Summer	33.521	0.621	0.1	3.5	O K																																																																																																																																																																																				
5760 min Summer	33.459	0.559	0.1	3.2	O K																																																																																																																																																																																				
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1440 min Summer	5.623	0.0	908																																																																																																																																																																																						
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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW		Dukes Road Plot 3			
Date 11/03/2022 12:00 File PLOT 3 SOAKAWAY.SRCX		Designed by JR Checked by			
XP Solutions		Source Control 2015.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
8640 min Summer	33.370	0.470	0.1	2.7	○ K
10080 min Summer	33.337	0.437	0.1	2.5	○ K
15 min Winter	33.228	0.328	0.0	1.9	○ K
30 min Winter	33.344	0.444	0.1	2.5	○ K
60 min Winter	33.468	0.568	0.1	3.2	○ K
120 min Winter	33.584	0.684	0.1	3.9	○ K
180 min Winter	33.636	0.736	0.1	4.2	○ K
240 min Winter	33.663	0.763	0.1	4.3	○ K
360 min Winter	33.687	0.787	0.1	4.5	○ K
480 min Winter	33.698	0.798	0.1	4.6	○ K
600 min Winter	33.722	0.822	0.1	4.6	○ K
720 min Winter	33.720	0.820	0.1	4.6	○ K
960 min Winter	33.693	0.793	0.1	4.5	○ K
1440 min Winter	33.655	0.755	0.1	4.3	○ K
2160 min Winter	33.591	0.691	0.1	3.9	○ K
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Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
8640 min Summer	1.415	0.0	4672		
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30 min Winter	86.489	0.0	33		
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600 min Winter	10.890	0.0	452		
720 min Winter	9.499	0.0	530		
960 min Winter	7.649	0.0	682		
1440 min Winter	5.623	0.0	968		
2160 min Winter	4.123	0.0	1388		
2880 min Winter	3.303	0.0	1788		
4320 min Winter	2.412	0.0	2592		
5760 min Winter	1.933	0.0	3344		
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XP Solutions Source Control 2015.1		

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	19.900	Shortest Storm (mins)	15
Ratio R	0.316	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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XP Solutions		Source Control 2015.1

Model Details

Storage is Online Cover Level (m) 34.500

Cellular Storage Structure

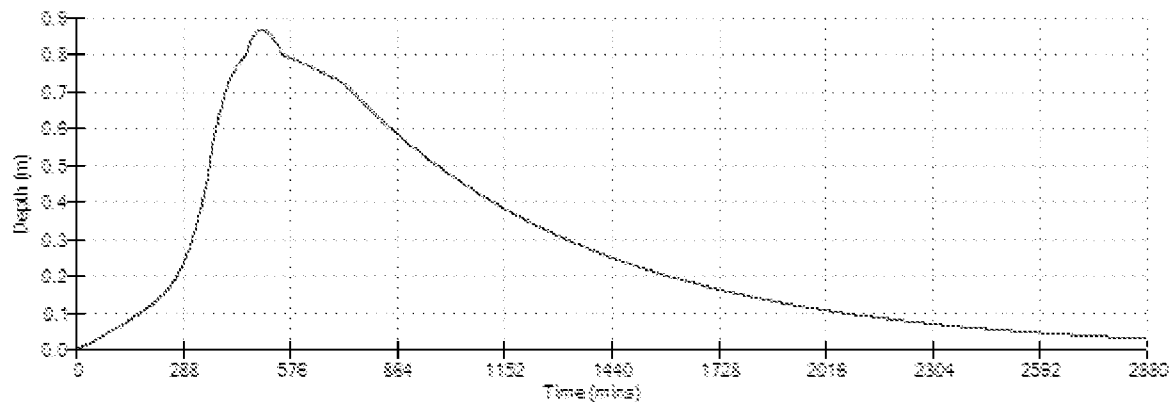
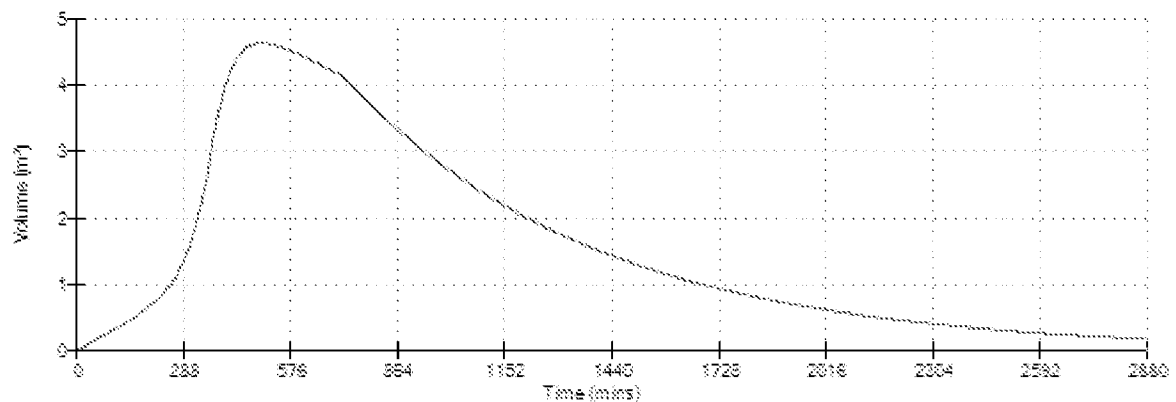
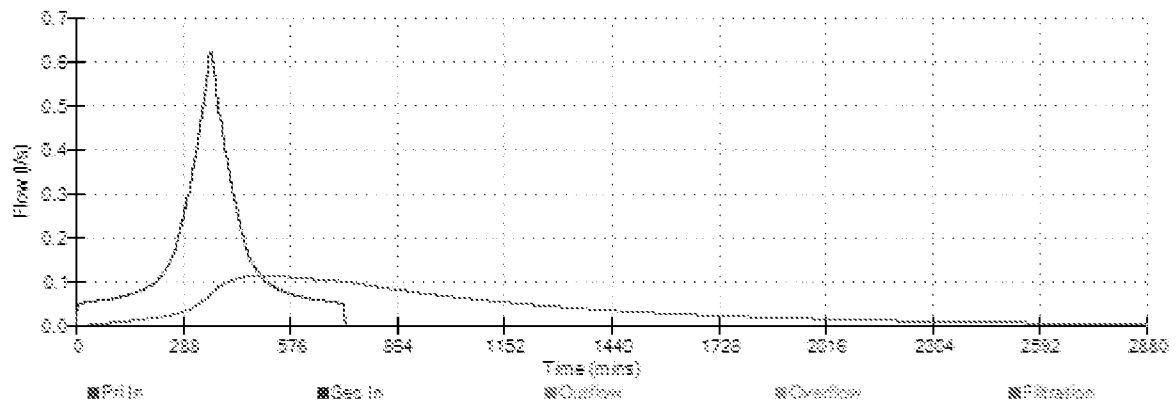
Invert Level (m) 32.900 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.03600

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	6.0	6.0	0.801	0.0	17.2
0.800	6.0	17.2			

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Event: 720 min Summer



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Summary of Results for 100 year Return Period (+40%) Half Drain Time : 469 minutes. <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>33.228</td><td>0.328</td><td>0.0</td><td>1.9</td><td>O K</td></tr><tr><td>30 min Summer</td><td>33.344</td><td>0.444</td><td>0.1</td><td>2.5</td><td>O K</td></tr><tr><td>60 min Summer</td><td>33.467</td><td>0.567</td><td>0.1</td><td>3.2</td><td>O K</td></tr><tr><td>120 min Summer</td><td>33.582</td><td>0.682</td><td>0.1</td><td>3.9</td><td>O K</td></tr><tr><td>180 min Summer</td><td>33.633</td><td>0.733</td><td>0.1</td><td>4.2</td><td>O K</td></tr><tr><td>240 min Summer</td><td>33.658</td><td>0.758</td><td>0.1</td><td>4.3</td><td>O K</td></tr><tr><td>360 min Summer</td><td>33.683</td><td>0.783</td><td>0.1</td><td>4.5</td><td>O K</td></tr><tr><td>480 min Summer</td><td>33.698</td><td>0.798</td><td>0.1</td><td>4.6</td><td>O K</td></tr><tr><td>600 min Summer</td><td>33.743</td><td>0.843</td><td>0.1</td><td>4.6</td><td>O K</td></tr><tr><td>720 min Summer</td><td>33.759</td><td>0.866</td><td>0.1</td><td>4.6</td><td>O K</td></tr><tr><td>960 min Summer</td><td>33.766</td><td>0.866</td><td>0.1</td><td>4.6</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>33.692</td><td>0.792</td><td>0.1</td><td>4.5</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>33.647</td><td>0.747</td><td>0.1</td><td>4.3</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>33.601</td><td>0.701</td><td>0.1</td><td>4.0</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>33.521</td><td>0.621</td><td>0.1</td><td>3.5</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>33.459</td><td>0.559</td><td>0.1</td><td>3.2</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>33.410</td><td>0.510</td><td>0.1</td><td>2.9</td><td>O K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>126.521</td><td>0.0</td><td>19</td></tr><tr><td>30 min Summer</td><td>86.489</td><td>0.0</td><td>33</td></tr><tr><td>60 min Summer</td><td>56.422</td><td>0.0</td><td>62</td></tr><tr><td>120 min Summer</td><td>35.422</td><td>0.0</td><td>122</td></tr><tr><td>180 min Summer</td><td>26.491</td><td>0.0</td><td>182</td></tr><tr><td>240 min Summer</td><td>21.442</td><td>0.0</td><td>240</td></tr><tr><td>360 min Summer</td><td>15.918</td><td>0.0</td><td>306</td></tr><tr><td>480 min Summer</td><td>12.861</td><td>0.0</td><td>364</td></tr><tr><td>600 min Summer</td><td>10.890</td><td>0.0</td><td>430</td></tr><tr><td>720 min Summer</td><td>9.459</td><td>0.0</td><td>498</td></tr><tr><td>960 min Summer</td><td>7.649</td><td>0.0</td><td>636</td></tr><tr><td>1440 min Summer</td><td>5.623</td><td>0.0</td><td>908</td></tr><tr><td>2160 min Summer</td><td>4.123</td><td>0.0</td><td>1300</td></tr><tr><td>2880 min Summer</td><td>3.303</td><td>0.0</td><td>1700</td></tr><tr><td>4320 min Summer</td><td>2.412</td><td>0.0</td><td>2464</td></tr><tr><td>5760 min Summer</td><td>1.933</td><td>0.0</td><td>3224</td></tr><tr><td>7200 min Summer</td><td>1.628</td><td>0.0</td><td>3960</td></tr></table>						Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	33.228	0.328	0.0	1.9	O K	30 min Summer	33.344	0.444	0.1	2.5	O K	60 min Summer	33.467	0.567	0.1	3.2	O K	120 min Summer	33.582	0.682	0.1	3.9	O K	180 min Summer	33.633	0.733	0.1	4.2	O K	240 min Summer	33.658	0.758	0.1	4.3	O K	360 min Summer	33.683	0.783	0.1	4.5	O K	480 min Summer	33.698	0.798	0.1	4.6	O K	600 min Summer	33.743	0.843	0.1	4.6	O K	720 min Summer	33.759	0.866	0.1	4.6	O K	960 min Summer	33.766	0.866	0.1	4.6	O K	1440 min Summer	33.692	0.792	0.1	4.5	O K	2160 min Summer	33.647	0.747	0.1	4.3	O K	2880 min Summer	33.601	0.701	0.1	4.0	O K	4320 min Summer	33.521	0.621	0.1	3.5	O K	5760 min Summer	33.459	0.559	0.1	3.2	O K	7200 min Summer	33.410	0.510	0.1	2.9	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	126.521	0.0	19	30 min Summer	86.489	0.0	33	60 min Summer	56.422	0.0	62	120 min Summer	35.422	0.0	122	180 min Summer	26.491	0.0	182	240 min Summer	21.442	0.0	240	360 min Summer	15.918	0.0	306	480 min Summer	12.861	0.0	364	600 min Summer	10.890	0.0	430	720 min Summer	9.459	0.0	498	960 min Summer	7.649	0.0	636	1440 min Summer	5.623	0.0	908	2160 min Summer	4.123	0.0	1300	2880 min Summer	3.303	0.0	1700	4320 min Summer	2.412	0.0	2464	5760 min Summer	1.933	0.0	3224	7200 min Summer	1.628	0.0	3960
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2160 min Winter	4.123	0.0	1388		
2880 min Winter	3.303	0.0	1788		
4320 min Winter	2.412	0.0	2592		
5760 min Winter	1.933	0.0	3344		
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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW	Dukes Road Plot 4																																		
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Rainfall Details <table><tr><td>Rainfall Model</td><td>FSR</td><td>Winter Storms</td><td>Yes</td></tr><tr><td>Return Period (years)</td><td>100</td><td>Cv (Summer)</td><td>1.000</td></tr><tr><td>Region</td><td>England and Wales</td><td>Cv (Winter)</td><td>1.000</td></tr><tr><td>M5-60 (mm)</td><td>19.900</td><td>Shortest Storm (mins)</td><td>15</td></tr><tr><td>Ratio R</td><td>0.316</td><td>Longest Storm (mins)</td><td>10080</td></tr><tr><td>Summer Storms</td><td>Yes</td><td>Climate Change %</td><td>+40</td></tr></table> Time Area Diagram Total Area (ha) 0.006 <table><tr><td>Time</td><td>(mins)</td><td>Area</td></tr><tr><td>From:</td><td>To:</td><td>(ha)</td></tr><tr><td>0</td><td>4</td><td>0.006</td></tr></table>			Rainfall Model	FSR	Winter Storms	Yes	Return Period (years)	100	Cv (Summer)	1.000	Region	England and Wales	Cv (Winter)	1.000	M5-60 (mm)	19.900	Shortest Storm (mins)	15	Ratio R	0.316	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+40	Time	(mins)	Area	From:	To:	(ha)	0	4	0.006
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From:	To:	(ha)																																	
0	4	0.006																																	
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XP Solutions Source Control 2015.1		

Model Details

Storage is Online Cover Level (m) 34.500

Cellular Storage Structure

Invert Level (m) 32.900 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.03600

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	6.0	6.0	0.801	0.0	17.2
0.800	6.0	17.2			

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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW		Dukes Road Plot 5																																																																																																																																																																																							
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<u>Summary of Results for 100 year Return Period (+40%)</u> Half Drain Time : 469 minutes. <table><thead><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr></thead><tbody><tr><td>15 min Summer</td><td>33.228</td><td>0.328</td><td>0.0</td><td>1.9</td><td>O K</td></tr><tr><td>30 min Summer</td><td>33.344</td><td>0.444</td><td>0.1</td><td>2.5</td><td>O K</td></tr><tr><td>60 min Summer</td><td>33.467</td><td>0.567</td><td>0.1</td><td>3.2</td><td>O K</td></tr><tr><td>120 min Summer</td><td>33.582</td><td>0.682</td><td>0.1</td><td>3.9</td><td>O K</td></tr><tr><td>180 min Summer</td><td>33.633</td><td>0.733</td><td>0.1</td><td>4.2</td><td>O K</td></tr><tr><td>240 min Summer</td><td>33.658</td><td>0.758</td><td>0.1</td><td>4.3</td><td>O K</td></tr><tr><td>360 min Summer</td><td>33.683</td><td>0.783</td><td>0.1</td><td>4.5</td><td>O K</td></tr><tr><td>480 min Summer</td><td>33.698</td><td>0.798</td><td>0.1</td><td>4.6</td><td>O K</td></tr><tr><td>600 min Summer</td><td>33.743</td><td>0.843</td><td>0.1</td><td>4.6</td><td>O K</td></tr><tr><td>720 min Summer</td><td>33.759</td><td>0.866</td><td>0.1</td><td>4.6</td><td>O K</td></tr><tr><td>960 min Summer</td><td>33.766</td><td>0.866</td><td>0.1</td><td>4.6</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>33.692</td><td>0.792</td><td>0.1</td><td>4.5</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>33.647</td><td>0.747</td><td>0.1</td><td>4.3</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>33.601</td><td>0.701</td><td>0.1</td><td>4.0</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>33.521</td><td>0.621</td><td>0.1</td><td>3.5</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>33.459</td><td>0.559</td><td>0.1</td><td>3.2</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>33.410</td><td>0.510</td><td>0.1</td><td>2.9</td><td>O K</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr></thead><tbody><tr><td>15 min Summer</td><td>126.521</td><td>0.0</td><td>19</td></tr><tr><td>30 min Summer</td><td>86.489</td><td>0.0</td><td>33</td></tr><tr><td>60 min Summer</td><td>56.422</td><td>0.0</td><td>62</td></tr><tr><td>120 min Summer</td><td>35.422</td><td>0.0</td><td>122</td></tr><tr><td>180 min Summer</td><td>26.491</td><td>0.0</td><td>182</td></tr><tr><td>240 min Summer</td><td>21.442</td><td>0.0</td><td>240</td></tr><tr><td>360 min Summer</td><td>15.918</td><td>0.0</td><td>306</td></tr><tr><td>480 min Summer</td><td>12.861</td><td>0.0</td><td>364</td></tr><tr><td>600 min Summer</td><td>10.890</td><td>0.0</td><td>430</td></tr><tr><td>720 min Summer</td><td>9.459</td><td>0.0</td><td>498</td></tr><tr><td>960 min Summer</td><td>7.649</td><td>0.0</td><td>636</td></tr><tr><td>1440 min Summer</td><td>5.623</td><td>0.0</td><td>908</td></tr><tr><td>2160 min Summer</td><td>4.123</td><td>0.0</td><td>1300</td></tr><tr><td>2880 min Summer</td><td>3.303</td><td>0.0</td><td>1700</td></tr><tr><td>4320 min Summer</td><td>2.412</td><td>0.0</td><td>2464</td></tr><tr><td>5760 min Summer</td><td>1.933</td><td>0.0</td><td>3224</td></tr><tr><td>7200 min Summer</td><td>1.628</td><td>0.0</td><td>3960</td></tr></tbody></table>						Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	33.228	0.328	0.0	1.9	O K	30 min Summer	33.344	0.444	0.1	2.5	O K	60 min Summer	33.467	0.567	0.1	3.2	O K	120 min Summer	33.582	0.682	0.1	3.9	O K	180 min Summer	33.633	0.733	0.1	4.2	O K	240 min Summer	33.658	0.758	0.1	4.3	O K	360 min Summer	33.683	0.783	0.1	4.5	O K	480 min Summer	33.698	0.798	0.1	4.6	O K	600 min Summer	33.743	0.843	0.1	4.6	O K	720 min Summer	33.759	0.866	0.1	4.6	O K	960 min Summer	33.766	0.866	0.1	4.6	O K	1440 min Summer	33.692	0.792	0.1	4.5	O K	2160 min Summer	33.647	0.747	0.1	4.3	O K	2880 min Summer	33.601	0.701	0.1	4.0	O K	4320 min Summer	33.521	0.621	0.1	3.5	O K	5760 min Summer	33.459	0.559	0.1	3.2	O K	7200 min Summer	33.410	0.510	0.1	2.9	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	126.521	0.0	19	30 min Summer	86.489	0.0	33	60 min Summer	56.422	0.0	62	120 min Summer	35.422	0.0	122	180 min Summer	26.491	0.0	182	240 min Summer	21.442	0.0	240	360 min Summer	15.918	0.0	306	480 min Summer	12.861	0.0	364	600 min Summer	10.890	0.0	430	720 min Summer	9.459	0.0	498	960 min Summer	7.649	0.0	636	1440 min Summer	5.623	0.0	908	2160 min Summer	4.123	0.0	1300	2880 min Summer	3.303	0.0	1700	4320 min Summer	2.412	0.0	2464	5760 min Summer	1.933	0.0	3224	7200 min Summer	1.628	0.0	3960
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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW		Dukes Road Plot 5			
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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
8640 min Summer	33.370	0.470	0.1	2.7	○ K
10080 min Summer	33.337	0.437	0.1	2.5	○ K
15 min Winter	33.228	0.328	0.0	1.9	○ K
30 min Winter	33.344	0.444	0.1	2.5	○ K
60 min Winter	33.468	0.568	0.1	3.2	○ K
120 min Winter	33.584	0.684	0.1	3.9	○ K
180 min Winter	33.636	0.736	0.1	4.2	○ K
240 min Winter	33.663	0.763	0.1	4.3	○ K
360 min Winter	33.687	0.787	0.1	4.5	○ K
480 min Winter	33.698	0.798	0.1	4.6	○ K
600 min Winter	33.722	0.822	0.1	4.6	○ K
720 min Winter	33.720	0.820	0.1	4.6	○ K
960 min Winter	33.693	0.793	0.1	4.5	○ K
1440 min Winter	33.655	0.755	0.1	4.3	○ K
2160 min Winter	33.591	0.691	0.1	3.9	○ K
2880 min Winter	33.531	0.631	0.1	3.6	○ K
4320 min Winter	33.436	0.536	0.1	3.1	○ K
5760 min Winter	33.366	0.466	0.1	2.7	○ K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
8640 min Summer	1.415	0.0	4672		
10080 min Summer	1.257	0.0	5448		
15 min Winter	126.521	0.0	19		
30 min Winter	86.489	0.0	33		
60 min Winter	56.422	0.0	62		
120 min Winter	35.422	0.0	120		
180 min Winter	26.491	0.0	176		
240 min Winter	21.442	0.0	232		
360 min Winter	15.918	0.0	334		
480 min Winter	12.861	0.0	376		
600 min Winter	10.890	0.0	452		
720 min Winter	9.499	0.0	530		
960 min Winter	7.649	0.0	682		
1440 min Winter	5.623	0.0	968		
2160 min Winter	4.123	0.0	1388		
2880 min Winter	3.303	0.0	1788		
4320 min Winter	2.412	0.0	2592		
5760 min Winter	1.933	0.0	3344		
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<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
7200 min Winter	33.314	0.414	0.1	2.4	○ K
8640 min Winter	33.272	0.372	0.1	2.1	○ K
10080 min Winter	33.239	0.339	0.0	1.9	○ K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
7200 min Winter	1.628	0.0	4104		
8640 min Winter	1.415	0.0	4840		
10080 min Winter	1.257	0.0	5552		
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XP Solutions Source Control 2015.1		

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	19.900	Shortest Storm (mins)	15
Ratio R	0.316	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) 34.500

Cellular Storage Structure

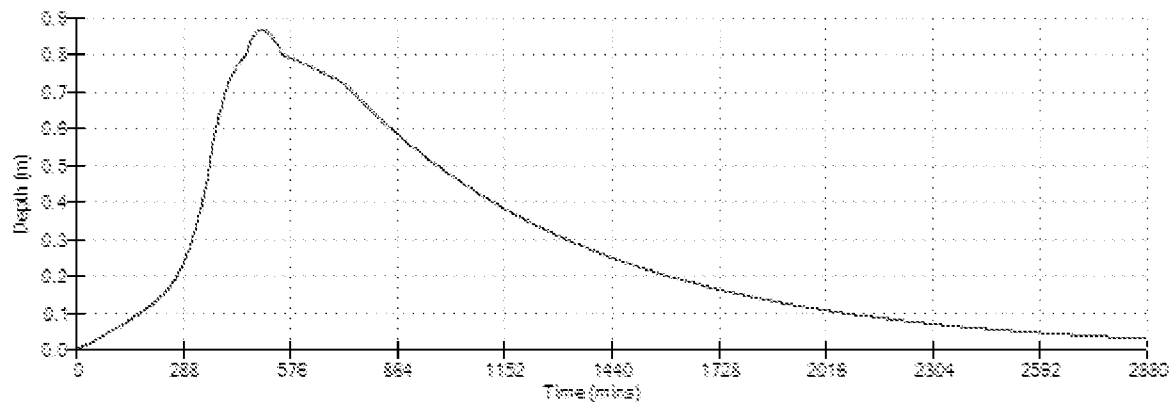
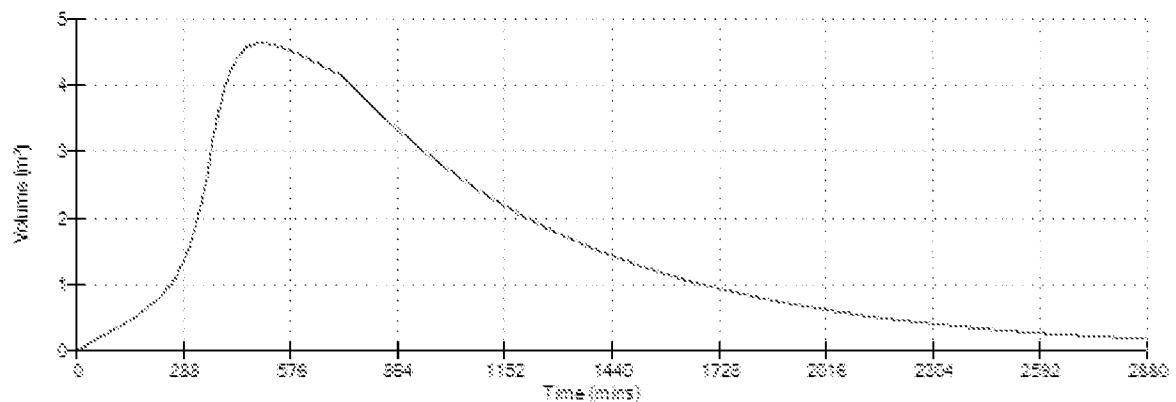
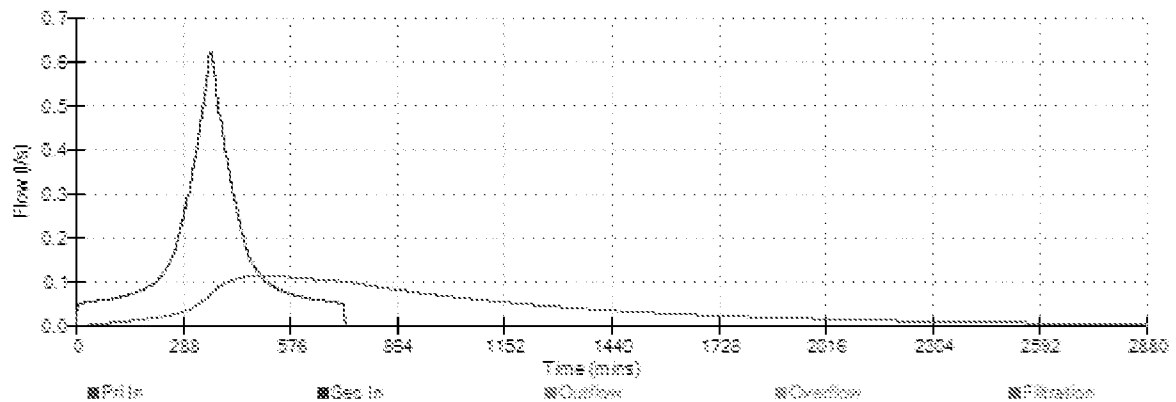
Invert Level (m) 32.900 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.03600

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	6.0	6.0	0.801	0.0	17.2
0.800	6.0	17.2			

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Event: 720 min Summer



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Summary of Results for 100 year Return Period (+40%) Half Drain Time : 469 minutes. <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>33.228</td><td>0.328</td><td>0.0</td><td>1.9</td><td>O K</td></tr><tr><td>30 min Summer</td><td>33.344</td><td>0.444</td><td>0.1</td><td>2.5</td><td>O K</td></tr><tr><td>60 min Summer</td><td>33.467</td><td>0.567</td><td>0.1</td><td>3.2</td><td>O K</td></tr><tr><td>120 min Summer</td><td>33.582</td><td>0.682</td><td>0.1</td><td>3.9</td><td>O K</td></tr><tr><td>180 min Summer</td><td>33.633</td><td>0.733</td><td>0.1</td><td>4.2</td><td>O K</td></tr><tr><td>240 min Summer</td><td>33.658</td><td>0.758</td><td>0.1</td><td>4.3</td><td>O K</td></tr><tr><td>360 min Summer</td><td>33.683</td><td>0.783</td><td>0.1</td><td>4.5</td><td>O K</td></tr><tr><td>480 min Summer</td><td>33.698</td><td>0.798</td><td>0.1</td><td>4.6</td><td>O K</td></tr><tr><td>600 min Summer</td><td>33.743</td><td>0.843</td><td>0.1</td><td>4.6</td><td>O K</td></tr><tr><td>720 min Summer</td><td>33.759</td><td>0.866</td><td>0.1</td><td>4.6</td><td>O K</td></tr><tr><td>960 min Summer</td><td>33.766</td><td>0.866</td><td>0.1</td><td>4.6</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>33.692</td><td>0.792</td><td>0.1</td><td>4.5</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>33.647</td><td>0.747</td><td>0.1</td><td>4.3</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>33.601</td><td>0.701</td><td>0.1</td><td>4.0</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>33.521</td><td>0.621</td><td>0.1</td><td>3.5</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>33.459</td><td>0.559</td><td>0.1</td><td>3.2</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>33.410</td><td>0.510</td><td>0.1</td><td>2.9</td><td>O K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>126.521</td><td>0.0</td><td>19</td></tr><tr><td>30 min Summer</td><td>86.489</td><td>0.0</td><td>33</td></tr><tr><td>60 min Summer</td><td>56.422</td><td>0.0</td><td>62</td></tr><tr><td>120 min Summer</td><td>35.422</td><td>0.0</td><td>122</td></tr><tr><td>180 min Summer</td><td>26.491</td><td>0.0</td><td>182</td></tr><tr><td>240 min Summer</td><td>21.442</td><td>0.0</td><td>240</td></tr><tr><td>360 min Summer</td><td>15.918</td><td>0.0</td><td>306</td></tr><tr><td>480 min Summer</td><td>12.861</td><td>0.0</td><td>364</td></tr><tr><td>600 min Summer</td><td>10.890</td><td>0.0</td><td>430</td></tr><tr><td>720 min Summer</td><td>9.459</td><td>0.0</td><td>498</td></tr><tr><td>960 min Summer</td><td>7.649</td><td>0.0</td><td>636</td></tr><tr><td>1440 min Summer</td><td>5.623</td><td>0.0</td><td>908</td></tr><tr><td>2160 min Summer</td><td>4.123</td><td>0.0</td><td>1300</td></tr><tr><td>2880 min Summer</td><td>3.303</td><td>0.0</td><td>1700</td></tr><tr><td>4320 min Summer</td><td>2.412</td><td>0.0</td><td>2464</td></tr><tr><td>5760 min Summer</td><td>1.933</td><td>0.0</td><td>3224</td></tr><tr><td>7200 min Summer</td><td>1.628</td><td>0.0</td><td>3960</td></tr></table>						Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	33.228	0.328	0.0	1.9	O K	30 min Summer	33.344	0.444	0.1	2.5	O K	60 min Summer	33.467	0.567	0.1	3.2	O K	120 min Summer	33.582	0.682	0.1	3.9	O K	180 min Summer	33.633	0.733	0.1	4.2	O K	240 min Summer	33.658	0.758	0.1	4.3	O K	360 min Summer	33.683	0.783	0.1	4.5	O K	480 min Summer	33.698	0.798	0.1	4.6	O K	600 min Summer	33.743	0.843	0.1	4.6	O K	720 min Summer	33.759	0.866	0.1	4.6	O K	960 min Summer	33.766	0.866	0.1	4.6	O K	1440 min Summer	33.692	0.792	0.1	4.5	O K	2160 min Summer	33.647	0.747	0.1	4.3	O K	2880 min Summer	33.601	0.701	0.1	4.0	O K	4320 min Summer	33.521	0.621	0.1	3.5	O K	5760 min Summer	33.459	0.559	0.1	3.2	O K	7200 min Summer	33.410	0.510	0.1	2.9	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	126.521	0.0	19	30 min Summer	86.489	0.0	33	60 min Summer	56.422	0.0	62	120 min Summer	35.422	0.0	122	180 min Summer	26.491	0.0	182	240 min Summer	21.442	0.0	240	360 min Summer	15.918	0.0	306	480 min Summer	12.861	0.0	364	600 min Summer	10.890	0.0	430	720 min Summer	9.459	0.0	498	960 min Summer	7.649	0.0	636	1440 min Summer	5.623	0.0	908	2160 min Summer	4.123	0.0	1300	2880 min Summer	3.303	0.0	1700	4320 min Summer	2.412	0.0	2464	5760 min Summer	1.933	0.0	3224	7200 min Summer	1.628	0.0	3960
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360 min Summer	15.918	0.0	306																																																																																																																																																																																						
480 min Summer	12.861	0.0	364																																																																																																																																																																																						
600 min Summer	10.890	0.0	430																																																																																																																																																																																						
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Date 11/03/2022 12:05 File Plot 6 Soakaway.srcx		Designed by JR Checked by			
XP Solutions		Source Control 2015.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
8640 min Summer	33.370	0.470	0.1	2.7	○ K
10080 min Summer	33.337	0.437	0.1	2.5	○ K
15 min Winter	33.228	0.328	0.0	1.9	○ K
30 min Winter	33.344	0.444	0.1	2.5	○ K
60 min Winter	33.468	0.568	0.1	3.2	○ K
120 min Winter	33.584	0.684	0.1	3.9	○ K
180 min Winter	33.636	0.736	0.1	4.2	○ K
240 min Winter	33.663	0.763	0.1	4.3	○ K
360 min Winter	33.687	0.787	0.1	4.5	○ K
480 min Winter	33.698	0.798	0.1	4.6	○ K
600 min Winter	33.722	0.822	0.1	4.6	○ K
720 min Winter	33.720	0.820	0.1	4.6	○ K
960 min Winter	33.693	0.793	0.1	4.5	○ K
1440 min Winter	33.655	0.755	0.1	4.3	○ K
2160 min Winter	33.591	0.691	0.1	3.9	○ K
2880 min Winter	33.531	0.631	0.1	3.6	○ K
4320 min Winter	33.436	0.536	0.1	3.1	○ K
5760 min Winter	33.366	0.466	0.1	2.7	○ K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
8640 min Summer	1.415	0.0	4672		
10080 min Summer	1.257	0.0	5448		
15 min Winter	126.521	0.0	19		
30 min Winter	86.489	0.0	33		
60 min Winter	56.422	0.0	62		
120 min Winter	35.422	0.0	120		
180 min Winter	26.491	0.0	176		
240 min Winter	21.442	0.0	232		
360 min Winter	15.918	0.0	334		
480 min Winter	12.861	0.0	376		
600 min Winter	10.890	0.0	452		
720 min Winter	9.499	0.0	530		
960 min Winter	7.649	0.0	682		
1440 min Winter	5.623	0.0	968		
2160 min Winter	4.123	0.0	1388		
2880 min Winter	3.303	0.0	1788		
4320 min Winter	2.412	0.0	2592		
5760 min Winter	1.933	0.0	3344		
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<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
7200 min Winter	33.314	0.414	0.1	2.4	○ K
8640 min Winter	33.272	0.372	0.1	2.1	○ K
10080 min Winter	33.239	0.339	0.0	1.9	○ K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
7200 min Winter	1.628	0.0	4104		
8640 min Winter	1.415	0.0	4840		
10080 min Winter	1.257	0.0	5552		
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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	19.900	Shortest Storm (mins)	15
Ratio R	0.316	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) 34.500

Cellular Storage Structure

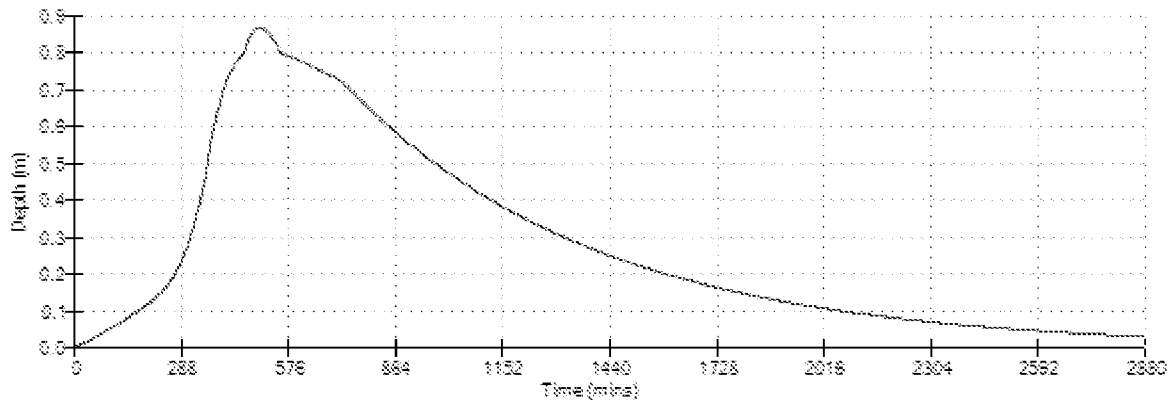
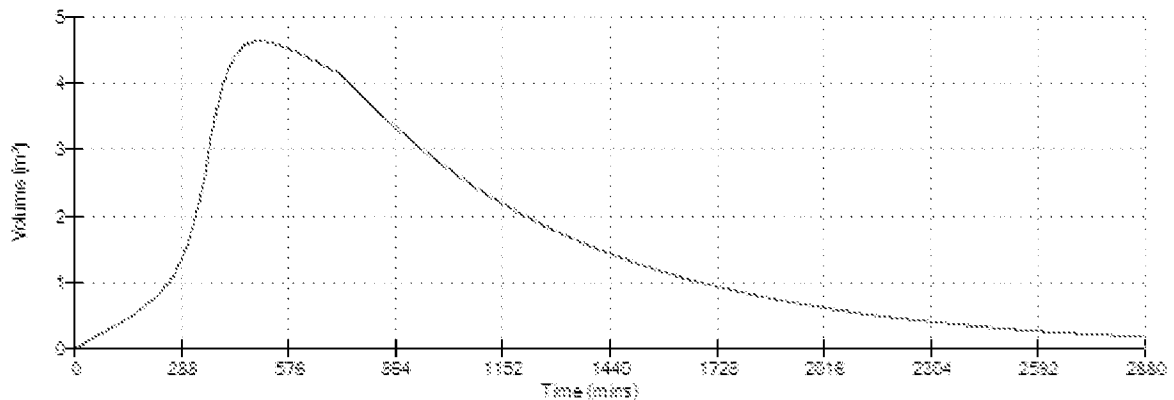
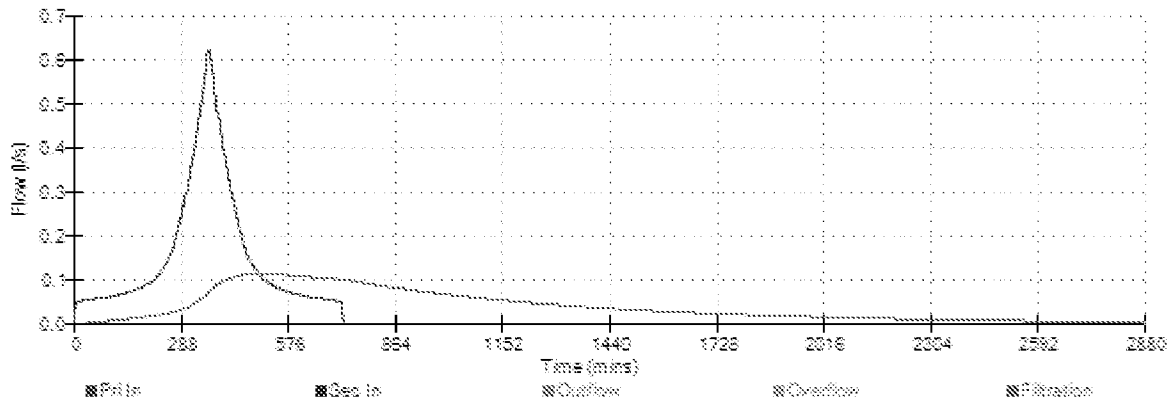
Invert Level (m) 32.900 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.03600

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	6.0	6.0	0.801	0.0	17.2
0.800	6.0	17.2			

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Event: 720 min Summer



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Summary of Results for 100 year Return Period (+40%) Half Drain Time : 483 minutes. <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>33.192</td><td>0.292</td><td>0.1</td><td>2.5</td><td>O K</td></tr><tr><td>30 min Summer</td><td>33.295</td><td>0.395</td><td>0.1</td><td>3.4</td><td>O K</td></tr><tr><td>60 min Summer</td><td>33.405</td><td>0.505</td><td>0.1</td><td>4.3</td><td>O K</td></tr><tr><td>120 min Summer</td><td>33.509</td><td>0.609</td><td>0.1</td><td>5.2</td><td>O K</td></tr><tr><td>180 min Summer</td><td>33.555</td><td>0.655</td><td>0.1</td><td>5.6</td><td>O K</td></tr><tr><td>240 min Summer</td><td>33.579</td><td>0.679</td><td>0.1</td><td>5.8</td><td>O K</td></tr><tr><td>360 min Summer</td><td>33.603</td><td>0.703</td><td>0.1</td><td>6.0</td><td>O K</td></tr><tr><td>480 min Summer</td><td>33.617</td><td>0.717</td><td>0.1</td><td>6.1</td><td>O K</td></tr><tr><td>600 min Summer</td><td>33.625</td><td>0.725</td><td>0.1</td><td>6.2</td><td>O K</td></tr><tr><td>720 min Summer</td><td>33.630</td><td>0.730</td><td>0.1</td><td>6.2</td><td>O K</td></tr><tr><td>960 min Summer</td><td>33.631</td><td>0.731</td><td>0.1</td><td>6.2</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>33.615</td><td>0.715</td><td>0.1</td><td>6.1</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>33.578</td><td>0.678</td><td>0.1</td><td>5.8</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>33.538</td><td>0.638</td><td>0.1</td><td>5.5</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>33.467</td><td>0.567</td><td>0.1</td><td>4.9</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>33.412</td><td>0.512</td><td>0.1</td><td>4.4</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>33.368</td><td>0.468</td><td>0.1</td><td>4.0</td><td>O K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>126.521</td><td>0.0</td><td>19</td></tr><tr><td>30 min Summer</td><td>86.489</td><td>0.0</td><td>33</td></tr><tr><td>60 min Summer</td><td>56.422</td><td>0.0</td><td>64</td></tr><tr><td>120 min Summer</td><td>35.422</td><td>0.0</td><td>122</td></tr><tr><td>180 min Summer</td><td>26.491</td><td>0.0</td><td>182</td></tr><tr><td>240 min Summer</td><td>21.442</td><td>0.0</td><td>240</td></tr><tr><td>360 min Summer</td><td>15.918</td><td>0.0</td><td>310</td></tr><tr><td>480 min Summer</td><td>12.861</td><td>0.0</td><td>372</td></tr><tr><td>600 min Summer</td><td>10.890</td><td>0.0</td><td>434</td></tr><tr><td>720 min Summer</td><td>9.499</td><td>0.0</td><td>500</td></tr><tr><td>960 min Summer</td><td>7.649</td><td>0.0</td><td>636</td></tr><tr><td>1440 min Summer</td><td>5.623</td><td>0.0</td><td>910</td></tr><tr><td>2160 min Summer</td><td>4.123</td><td>0.0</td><td>1316</td></tr><tr><td>2880 min Summer</td><td>3.303</td><td>0.0</td><td>1704</td></tr><tr><td>4320 min Summer</td><td>2.412</td><td>0.0</td><td>2468</td></tr><tr><td>5760 min Summer</td><td>1.933</td><td>0.0</td><td>3232</td></tr><tr><td>7200 min Summer</td><td>1.628</td><td>0.0</td><td>3968</td></tr></table>						Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	33.192	0.292	0.1	2.5	O K	30 min Summer	33.295	0.395	0.1	3.4	O K	60 min Summer	33.405	0.505	0.1	4.3	O K	120 min Summer	33.509	0.609	0.1	5.2	O K	180 min Summer	33.555	0.655	0.1	5.6	O K	240 min Summer	33.579	0.679	0.1	5.8	O K	360 min Summer	33.603	0.703	0.1	6.0	O K	480 min Summer	33.617	0.717	0.1	6.1	O K	600 min Summer	33.625	0.725	0.1	6.2	O K	720 min Summer	33.630	0.730	0.1	6.2	O K	960 min Summer	33.631	0.731	0.1	6.2	O K	1440 min Summer	33.615	0.715	0.1	6.1	O K	2160 min Summer	33.578	0.678	0.1	5.8	O K	2880 min Summer	33.538	0.638	0.1	5.5	O K	4320 min Summer	33.467	0.567	0.1	4.9	O K	5760 min Summer	33.412	0.512	0.1	4.4	O K	7200 min Summer	33.368	0.468	0.1	4.0	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	126.521	0.0	19	30 min Summer	86.489	0.0	33	60 min Summer	56.422	0.0	64	120 min Summer	35.422	0.0	122	180 min Summer	26.491	0.0	182	240 min Summer	21.442	0.0	240	360 min Summer	15.918	0.0	310	480 min Summer	12.861	0.0	372	600 min Summer	10.890	0.0	434	720 min Summer	9.499	0.0	500	960 min Summer	7.649	0.0	636	1440 min Summer	5.623	0.0	910	2160 min Summer	4.123	0.0	1316	2880 min Summer	3.303	0.0	1704	4320 min Summer	2.412	0.0	2468	5760 min Summer	1.933	0.0	3232	7200 min Summer	1.628	0.0	3968
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480 min Summer	12.861	0.0	372																																																																																																																																																																																						
600 min Summer	10.890	0.0	434																																																																																																																																																																																						
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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW		Dukes Road Plot 7			
Date 11/03/2022 11:47 File Plot 7 Soakaway.srcx		Designed by JR Checked by			
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
8640 min Summer	33.332	0.432	0.1	3.7	○ K
10080 min Summer	33.302	0.402	0.1	3.4	○ K
15 min Winter	33.192	0.292	0.1	2.5	○ K
30 min Winter	33.295	0.395	0.1	3.4	○ K
60 min Winter	33.406	0.506	0.1	4.3	○ K
120 min Winter	33.510	0.610	0.1	5.2	○ K
180 min Winter	33.558	0.658	0.1	5.6	○ K
240 min Winter	33.583	0.683	0.1	5.8	○ K
360 min Winter	33.607	0.707	0.1	6.0	○ K
480 min Winter	33.617	0.717	0.1	6.1	○ K
600 min Winter	33.623	0.723	0.1	6.2	○ K
720 min Winter	33.624	0.724	0.1	6.2	○ K
960 min Winter	33.616	0.716	0.1	6.1	○ K
1440 min Winter	33.585	0.685	0.1	5.9	○ K
2160 min Winter	33.529	0.629	0.1	5.4	○ K
2880 min Winter	33.477	0.577	0.1	4.9	○ K
4320 min Winter	33.392	0.492	0.1	4.2	○ K
5760 min Winter	33.330	0.430	0.1	3.7	○ K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
8640 min Summer	1.415	0.0	4680		
10080 min Summer	1.257	0.0	5448		
15 min Winter	126.521	0.0	19		
30 min Winter	86.489	0.0	33		
60 min Winter	56.422	0.0	62		
120 min Winter	35.422	0.0	120		
180 min Winter	26.491	0.0	176		
240 min Winter	21.442	0.0	232		
360 min Winter	15.918	0.0	338		
480 min Winter	12.861	0.0	380		
600 min Winter	10.890	0.0	456		
720 min Winter	9.499	0.0	534		
960 min Winter	7.649	0.0	684		
1440 min Winter	5.623	0.0	980		
2160 min Winter	4.123	0.0	1404		
2880 min Winter	3.303	0.0	1812		
4320 min Winter	2.412	0.0	2592		
5760 min Winter	1.933	0.0	3352		
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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW		Dukes Road Plot 7			
Date 11/03/2022 11:47 File Plot 7 Soakaway.srcx		Designed by JR Checked by			
XP Solutions		Source Control 2015.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
7200 min Winter	33.282	0.382	0.1	3.3	○ K
8640 min Winter	33.244	0.344	0.1	2.9	○ K
10080 min Winter	33.214	0.314	0.1	2.7	○ K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
7200 min Winter	1.628	0.0	4112		
8640 min Winter	1.415	0.0	4848		
10080 min Winter	1.257	0.0	5552		
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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW	Dukes Road Plot 7																															
Date 11/03/2022 11:47 File Plot 7 Soakaway.srcx	Designed by JR Checked by																															
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<u>Rainfall Details</u> <table> <tr> <td>Rainfall Model</td> <td>FSR</td> <td>Winter Storms</td> <td>Yes</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> <td>Cv (Summer)</td> <td>1.000</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> <td>Cv (Winter)</td> <td>1.000</td> </tr> <tr> <td>M5-60 (mm)</td> <td>19.900</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.316</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+40</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.008 <table> <tr> <td>Time (mins)</td> <td>Area</td> </tr> <tr> <td>From: To:</td> <td>(ha)</td> </tr> <tr> <td>0</td> <td>4 0.008</td> </tr> </table>			Rainfall Model	FSR	Winter Storms	Yes	Return Period (years)	100	Cv (Summer)	1.000	Region	England and Wales	Cv (Winter)	1.000	M5-60 (mm)	19.900	Shortest Storm (mins)	15	Ratio R	0.316	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+40	Time (mins)	Area	From: To:	(ha)	0	4 0.008
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Date 11/03/2022 11:47 File Plot 7 Soakaway.srcx	Designed by JR Checked by	
XP Solutions Source Control 2015.1		

Model Details

Storage is Online Cover Level (m) 34.500

Cellular Storage Structure

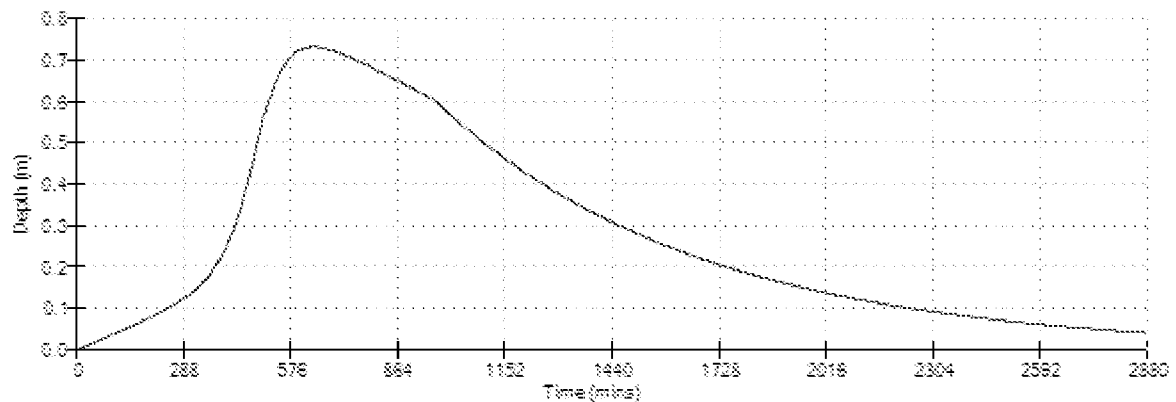
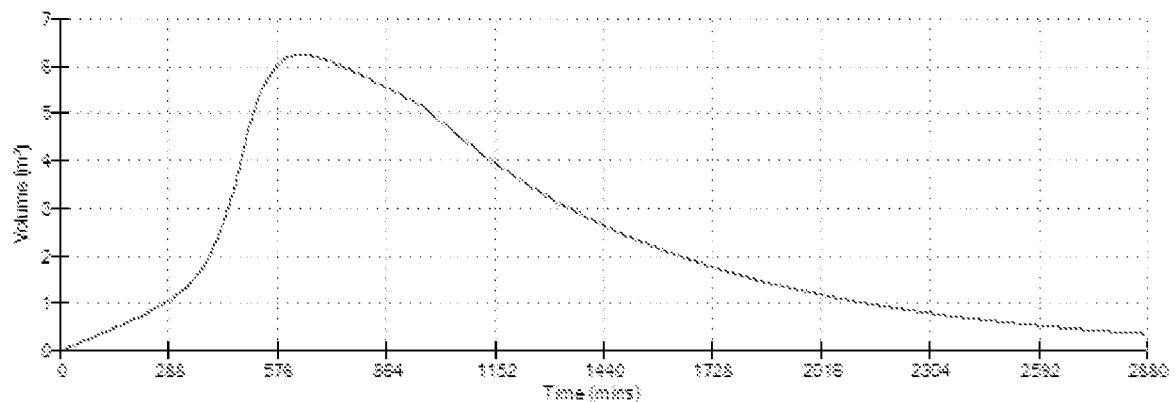
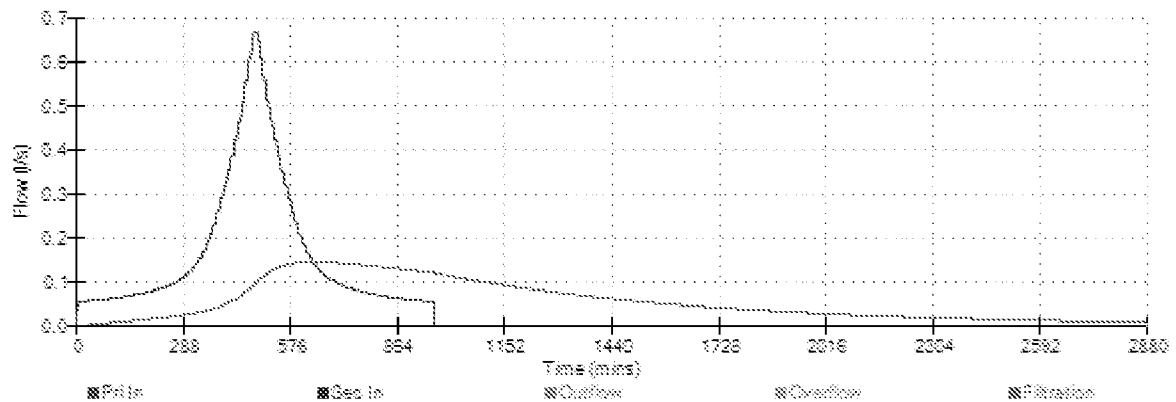
Invert Level (m) 32.900 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.03600

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	9.0	9.0	0.801	0.0	25.0
0.800	9.0	25.0			

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XP Solutions		
Source Control 2015.1		

Event: 960 min Summer



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Date 11/03/2022 11:48 File Plot 8 Soakaway.srcx		Designed by JR Checked by			
XP Solutions		Source Control 2015.1			
Summary of Results for 100 year Return Period (+40%)					
Half Drain Time : 483 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	33.192	0.292	0.1	2.5	O K
30 min Summer	33.295	0.395	0.1	3.4	O K
60 min Summer	33.405	0.505	0.1	4.3	O K
120 min Summer	33.509	0.609	0.1	5.2	O K
180 min Summer	33.555	0.655	0.1	5.6	O K
240 min Summer	33.579	0.679	0.1	5.8	O K
360 min Summer	33.603	0.703	0.1	6.0	O K
480 min Summer	33.617	0.717	0.1	6.1	O K
600 min Summer	33.625	0.725	0.1	6.2	O K
720 min Summer	33.630	0.730	0.1	6.2	O K
960 min Summer	33.631	0.731	0.1	6.2	O K
1440 min Summer	33.615	0.715	0.1	6.1	O K
2160 min Summer	33.578	0.678	0.1	5.8	O K
2880 min Summer	33.538	0.638	0.1	5.5	O K
4320 min Summer	33.467	0.567	0.1	4.9	O K
5760 min Summer	33.412	0.512	0.1	4.4	O K
7200 min Summer	33.368	0.468	0.1	4.0	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	126.521	0.0	19		
30 min Summer	86.489	0.0	33		
60 min Summer	56.422	0.0	64		
120 min Summer	35.422	0.0	122		
180 min Summer	26.491	0.0	182		
240 min Summer	21.442	0.0	240		
360 min Summer	15.918	0.0	310		
480 min Summer	12.861	0.0	372		
600 min Summer	10.890	0.0	434		
720 min Summer	9.499	0.0	500		
960 min Summer	7.649	0.0	636		
1440 min Summer	5.623	0.0	910		
2160 min Summer	4.123	0.0	1316		
2880 min Summer	3.303	0.0	1704		
4320 min Summer	2.412	0.0	2468		
5760 min Summer	1.933	0.0	3232		
7200 min Summer	1.628	0.0	3968		
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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
8640 min Summer	33.332	0.432	0.1	3.7	○ K
10080 min Summer	33.302	0.402	0.1	3.4	○ K
15 min Winter	33.192	0.292	0.1	2.5	○ K
30 min Winter	33.295	0.395	0.1	3.4	○ K
60 min Winter	33.406	0.506	0.1	4.3	○ K
120 min Winter	33.510	0.610	0.1	5.2	○ K
180 min Winter	33.558	0.658	0.1	5.6	○ K
240 min Winter	33.583	0.683	0.1	5.8	○ K
360 min Winter	33.607	0.707	0.1	6.0	○ K
480 min Winter	33.617	0.717	0.1	6.1	○ K
600 min Winter	33.623	0.723	0.1	6.2	○ K
720 min Winter	33.624	0.724	0.1	6.2	○ K
960 min Winter	33.616	0.716	0.1	6.1	○ K
1440 min Winter	33.585	0.685	0.1	5.9	○ K
2160 min Winter	33.529	0.629	0.1	5.4	○ K
2880 min Winter	33.477	0.577	0.1	4.9	○ K
4320 min Winter	33.392	0.492	0.1	4.2	○ K
5760 min Winter	33.330	0.430	0.1	3.7	○ K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
8640 min Summer	1.415	0.0	4680		
10080 min Summer	1.257	0.0	5448		
15 min Winter	126.521	0.0	19		
30 min Winter	86.489	0.0	33		
60 min Winter	56.422	0.0	62		
120 min Winter	35.422	0.0	120		
180 min Winter	26.491	0.0	176		
240 min Winter	21.442	0.0	232		
360 min Winter	15.918	0.0	338		
480 min Winter	12.861	0.0	380		
600 min Winter	10.890	0.0	456		
720 min Winter	9.499	0.0	534		
960 min Winter	7.649	0.0	684		
1440 min Winter	5.623	0.0	980		
2160 min Winter	4.123	0.0	1404		
2880 min Winter	3.303	0.0	1812		
4320 min Winter	2.412	0.0	2592		
5760 min Winter	1.933	0.0	3352		
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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW		Dukes Road Plot 8			
Date 11/03/2022 11:48 File Plot 8 Soakaway.srcx		Designed by JR Checked by			
XP Solutions		Source Control 2015.1			
<u>Summary of Results for 100 year Return Period (+40%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
7200 min Winter	33.282	0.382	0.1	3.3	○ K
8640 min Winter	33.244	0.344	0.1	2.9	○ K
10080 min Winter	33.214	0.314	0.1	2.7	○ K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
7200 min Winter	1.628	0.0	4112		
8640 min Winter	1.415	0.0	4848		
10080 min Winter	1.257	0.0	5552		
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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW	Dukes Road Plot 8																															
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<u>Rainfall Details</u> <table> <tr> <td>Rainfall Model</td> <td>FSR</td> <td>Winter Storms</td> <td>Yes</td> </tr> <tr> <td>Return Period (years)</td> <td>100</td> <td>Cv (Summer)</td> <td>1.000</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> <td>Cv (Winter)</td> <td>1.000</td> </tr> <tr> <td>M5-60 (mm)</td> <td>19.900</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.316</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+40</td> </tr> </table> <u>Time Area Diagram</u> Total Area (ha) 0.008 <table> <tr> <td>Time (mins)</td> <td>Area</td> </tr> <tr> <td>From: To:</td> <td>(ha)</td> </tr> <tr> <td>0</td> <td>4 0.008</td> </tr> </table>			Rainfall Model	FSR	Winter Storms	Yes	Return Period (years)	100	Cv (Summer)	1.000	Region	England and Wales	Cv (Winter)	1.000	M5-60 (mm)	19.900	Shortest Storm (mins)	15	Ratio R	0.316	Longest Storm (mins)	10080	Summer Storms	Yes	Climate Change %	+40	Time (mins)	Area	From: To:	(ha)	0	4 0.008
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Model Details

Storage is Online Cover Level (m) 34.500

Cellular Storage Structure

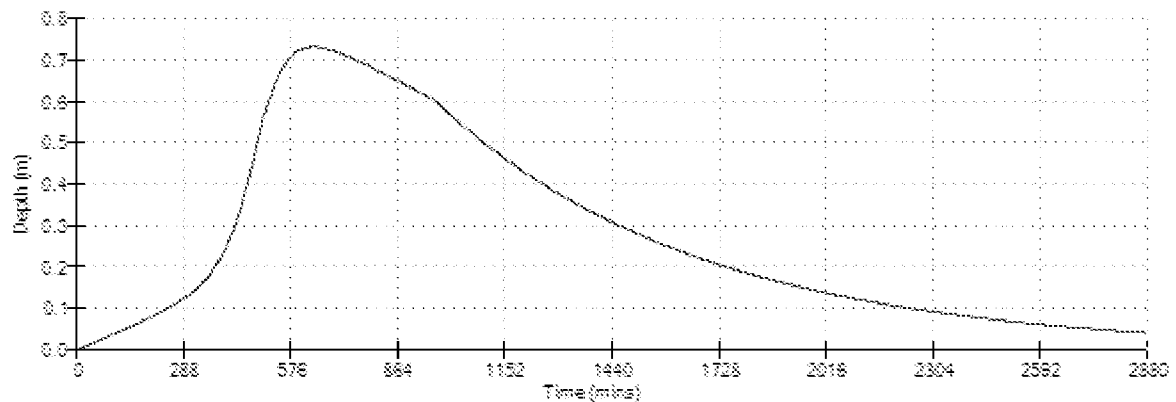
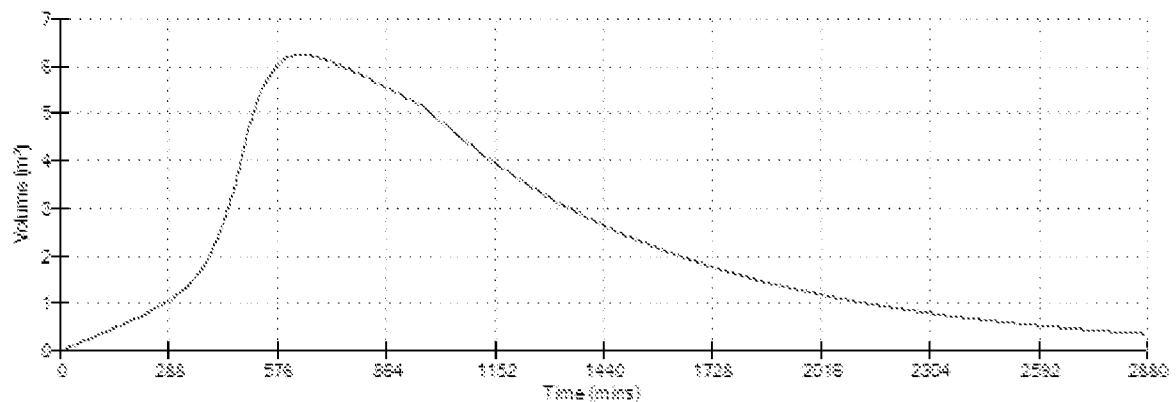
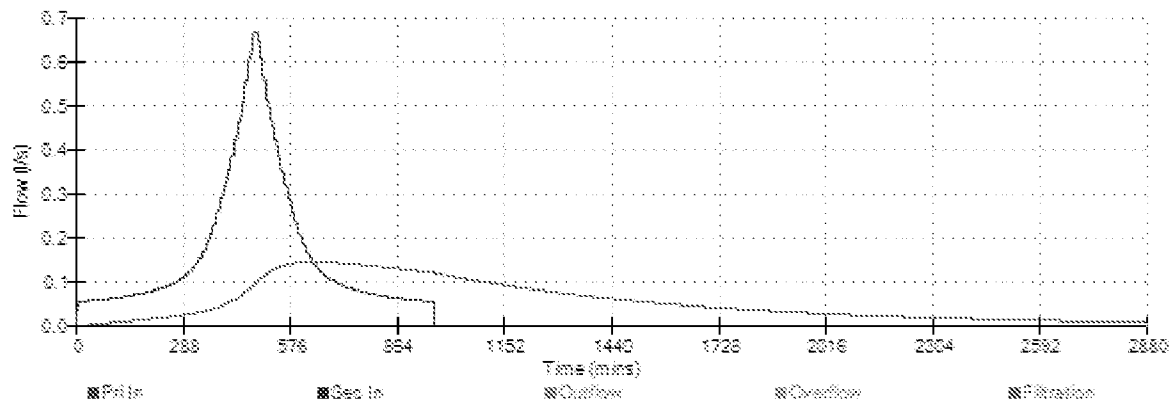
Invert Level (m) 32.900 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.03600

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	9.0	9.0	0.801	0.0	25.0
0.800	9.0	25.0			

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Event: 960 min Summer



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Thorogood House 34 Tolworth Close Surbition Surrey KT6 7EW		Dukes Road Plot 9																																																																																																																																																																																							
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Summary of Results for 100 year Return Period (+40%) Half Drain Time : 483 minutes. <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Infiltration (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>33.192</td><td>0.292</td><td>0.1</td><td>2.5</td><td>O K</td></tr><tr><td>30 min Summer</td><td>33.295</td><td>0.395</td><td>0.1</td><td>3.4</td><td>O K</td></tr><tr><td>60 min Summer</td><td>33.405</td><td>0.505</td><td>0.1</td><td>4.3</td><td>O K</td></tr><tr><td>120 min Summer</td><td>33.509</td><td>0.609</td><td>0.1</td><td>5.2</td><td>O K</td></tr><tr><td>180 min Summer</td><td>33.555</td><td>0.655</td><td>0.1</td><td>5.6</td><td>O K</td></tr><tr><td>240 min Summer</td><td>33.579</td><td>0.679</td><td>0.1</td><td>5.8</td><td>O K</td></tr><tr><td>360 min Summer</td><td>33.603</td><td>0.703</td><td>0.1</td><td>6.0</td><td>O K</td></tr><tr><td>480 min Summer</td><td>33.617</td><td>0.717</td><td>0.1</td><td>6.1</td><td>O K</td></tr><tr><td>600 min Summer</td><td>33.625</td><td>0.725</td><td>0.1</td><td>6.2</td><td>O K</td></tr><tr><td>720 min Summer</td><td>33.630</td><td>0.730</td><td>0.1</td><td>6.2</td><td>O K</td></tr><tr><td>960 min Summer</td><td>33.631</td><td>0.731</td><td>0.1</td><td>6.2</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>33.615</td><td>0.715</td><td>0.1</td><td>6.1</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>33.578</td><td>0.678</td><td>0.1</td><td>5.8</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>33.538</td><td>0.638</td><td>0.1</td><td>5.5</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>33.467</td><td>0.567</td><td>0.1</td><td>4.9</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>33.412</td><td>0.512</td><td>0.1</td><td>4.4</td><td>O K</td></tr><tr><td>7200 min Summer</td><td>33.368</td><td>0.468</td><td>0.1</td><td>4.0</td><td>O K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>126.521</td><td>0.0</td><td>19</td></tr><tr><td>30 min Summer</td><td>86.489</td><td>0.0</td><td>33</td></tr><tr><td>60 min Summer</td><td>56.422</td><td>0.0</td><td>64</td></tr><tr><td>120 min Summer</td><td>35.422</td><td>0.0</td><td>122</td></tr><tr><td>180 min Summer</td><td>26.491</td><td>0.0</td><td>182</td></tr><tr><td>240 min Summer</td><td>21.442</td><td>0.0</td><td>240</td></tr><tr><td>360 min Summer</td><td>15.918</td><td>0.0</td><td>310</td></tr><tr><td>480 min Summer</td><td>12.861</td><td>0.0</td><td>372</td></tr><tr><td>600 min Summer</td><td>10.890</td><td>0.0</td><td>434</td></tr><tr><td>720 min Summer</td><td>9.499</td><td>0.0</td><td>500</td></tr><tr><td>960 min Summer</td><td>7.649</td><td>0.0</td><td>636</td></tr><tr><td>1440 min Summer</td><td>5.623</td><td>0.0</td><td>910</td></tr><tr><td>2160 min Summer</td><td>4.123</td><td>0.0</td><td>1316</td></tr><tr><td>2880 min Summer</td><td>3.303</td><td>0.0</td><td>1704</td></tr><tr><td>4320 min Summer</td><td>2.412</td><td>0.0</td><td>2468</td></tr><tr><td>5760 min Summer</td><td>1.933</td><td>0.0</td><td>3232</td></tr><tr><td>7200 min Summer</td><td>1.628</td><td>0.0</td><td>3968</td></tr></table>						Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status	15 min Summer	33.192	0.292	0.1	2.5	O K	30 min Summer	33.295	0.395	0.1	3.4	O K	60 min Summer	33.405	0.505	0.1	4.3	O K	120 min Summer	33.509	0.609	0.1	5.2	O K	180 min Summer	33.555	0.655	0.1	5.6	O K	240 min Summer	33.579	0.679	0.1	5.8	O K	360 min Summer	33.603	0.703	0.1	6.0	O K	480 min Summer	33.617	0.717	0.1	6.1	O K	600 min Summer	33.625	0.725	0.1	6.2	O K	720 min Summer	33.630	0.730	0.1	6.2	O K	960 min Summer	33.631	0.731	0.1	6.2	O K	1440 min Summer	33.615	0.715	0.1	6.1	O K	2160 min Summer	33.578	0.678	0.1	5.8	O K	2880 min Summer	33.538	0.638	0.1	5.5	O K	4320 min Summer	33.467	0.567	0.1	4.9	O K	5760 min Summer	33.412	0.512	0.1	4.4	O K	7200 min Summer	33.368	0.468	0.1	4.0	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)	15 min Summer	126.521	0.0	19	30 min Summer	86.489	0.0	33	60 min Summer	56.422	0.0	64	120 min Summer	35.422	0.0	122	180 min Summer	26.491	0.0	182	240 min Summer	21.442	0.0	240	360 min Summer	15.918	0.0	310	480 min Summer	12.861	0.0	372	600 min Summer	10.890	0.0	434	720 min Summer	9.499	0.0	500	960 min Summer	7.649	0.0	636	1440 min Summer	5.623	0.0	910	2160 min Summer	4.123	0.0	1316	2880 min Summer	3.303	0.0	1704	4320 min Summer	2.412	0.0	2468	5760 min Summer	1.933	0.0	3232	7200 min Summer	1.628	0.0	3968
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Date 11/03/2022 11:48 File Plot 9 Soakaway.srcx		Designed by JR Checked by			
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
8640 min Summer	33.332	0.432	0.1	3.7	○ K
10080 min Summer	33.302	0.402	0.1	3.4	○ K
15 min Winter	33.192	0.292	0.1	2.5	○ K
30 min Winter	33.295	0.395	0.1	3.4	○ K
60 min Winter	33.406	0.506	0.1	4.3	○ K
120 min Winter	33.510	0.610	0.1	5.2	○ K
180 min Winter	33.558	0.658	0.1	5.6	○ K
240 min Winter	33.583	0.683	0.1	5.8	○ K
360 min Winter	33.607	0.707	0.1	6.0	○ K
480 min Winter	33.617	0.717	0.1	6.1	○ K
600 min Winter	33.623	0.723	0.1	6.2	○ K
720 min Winter	33.624	0.724	0.1	6.2	○ K
960 min Winter	33.616	0.716	0.1	6.1	○ K
1440 min Winter	33.585	0.685	0.1	5.9	○ K
2160 min Winter	33.529	0.629	0.1	5.4	○ K
2880 min Winter	33.477	0.577	0.1	4.9	○ K
4320 min Winter	33.392	0.492	0.1	4.2	○ K
5760 min Winter	33.330	0.430	0.1	3.7	○ K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
8640 min Summer	1.415	0.0	4680		
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<u>Summary of Results for 100 year Return Period (+40%)</u>																													
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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	19.900	Shortest Storm (mins)	15
Ratio R	0.316	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.008

Time (mins)	Area
From: To:	(ha)
0	4 0.008

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Date 11/03/2022 11:48 File Plot 9 Soakaway.srcx	Designed by JR Checked by	
XP Solutions Source Control 2015.1		

Model Details

Storage is Online Cover Level (m) 34.500

Cellular Storage Structure

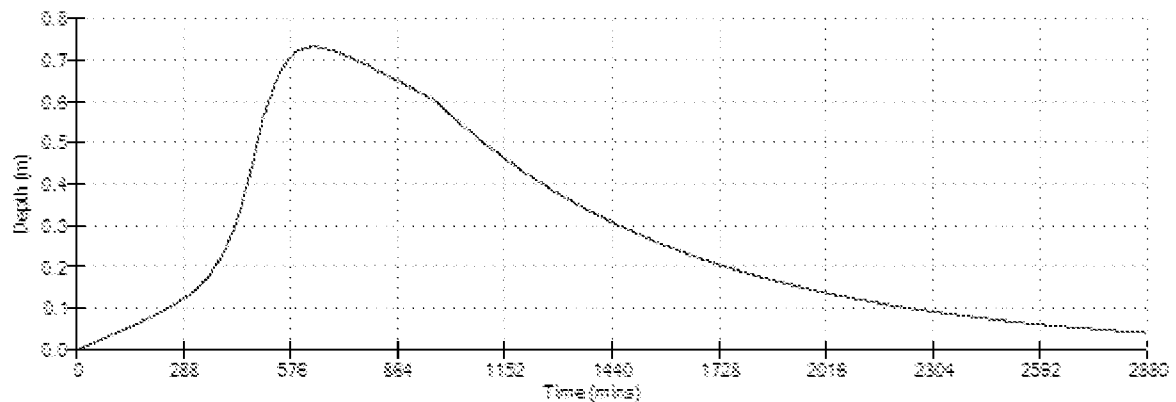
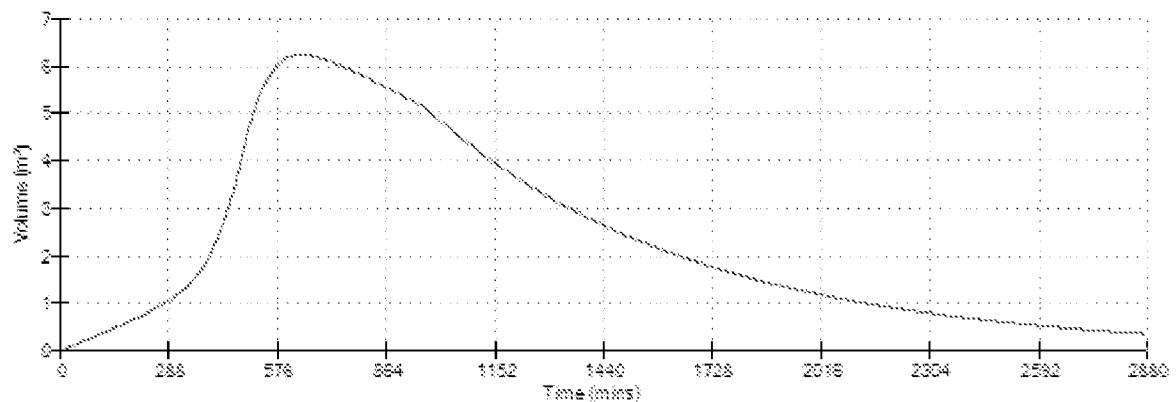
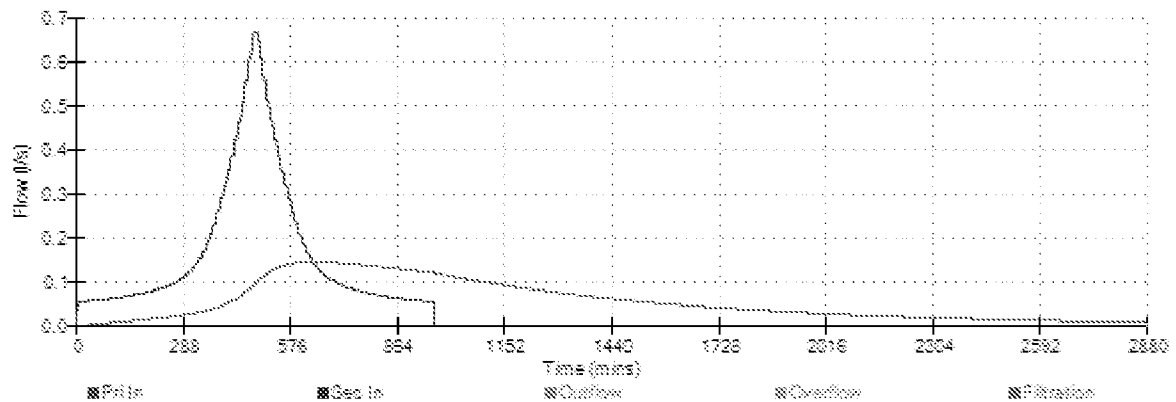
Invert Level (m) 32.900 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.03600

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	9.0	9.0	0.801	0.0	25.0
0.800	9.0	25.0			

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Event: 960 min Summer



APPENDIX C

Drawing 221528/DS/01 – Proposed Drainage Strategy



Land South of Dukes Road
Westergate

Drainage Strategy
Site Plan



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SCALE 1:500

DRAWN BY JR

PRJ No. 221528

DWG No. 221528/DS/01