LANMOR Consulting

Civil Engineers & Transport Planners

Meadow View

Drainage Strategy

March 2026

252037/DS/AG/KBL/01

Rev A

LANMOR Consulting

Civil Engineers & Transport Planners

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1 INTRODUCTION

1.1 General

1.1.1 Lanmor Consulting has been appointed to prepare a Drainage Strategy for the proposed development at Land north of Meadow View, Blagrove Lane, Wokingham, Berkshire, RG41 4AU.

1.1.2 The location of the site is shown below in Figure 1.1.

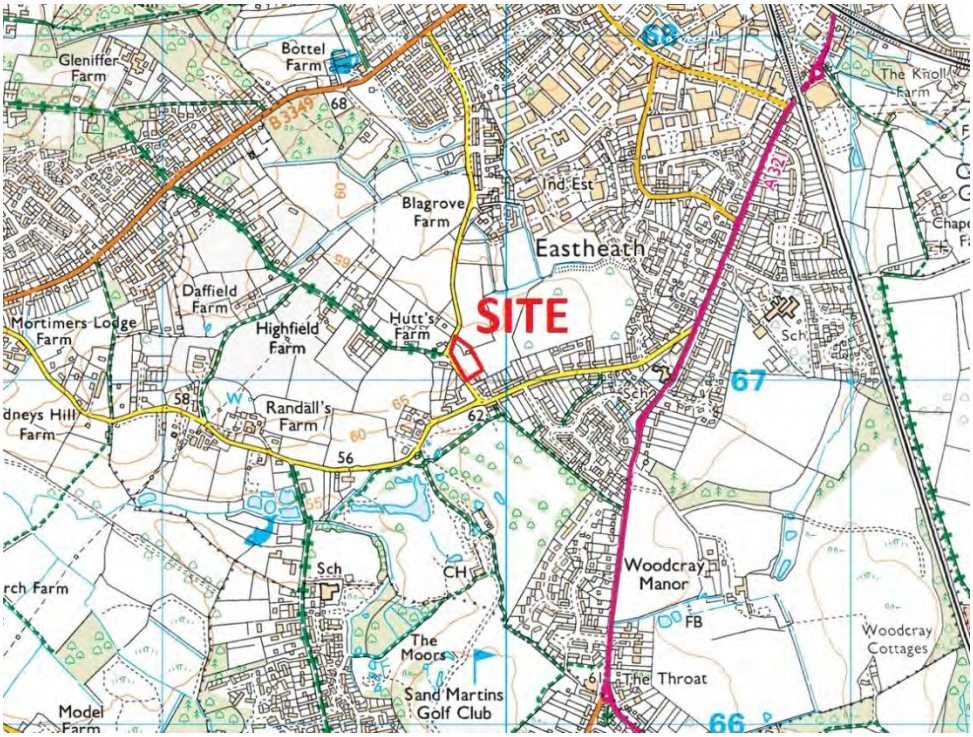

Figure 1.1 – Site Location

1.2 Scope

1.2.1 This report will consider the proposed drainage strategy regime for the above site. It will assess the site's existing conditions, suitable methods of discharging the runoff and will set out the drainage strategy for the development, including proposed discharge rates and any requirements for attenuation.

1.2.2 The information and details within this Drainage Strategy report will be refined, modified and updated as the detailed design is progressed, post-planning. The scope of this report is outlined below:

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

2 SITE CONDITIONS

2.1 Existing Site

2.1.1 The site is a large open field (approximately 0.7 hectares) located to the north of Meadow View, with some dilapidated stables to the northeast. It is therefore currently considered greenfield land, but forms part of the garden / land linked to Meadow View. The site is relatively flat with a fall of approximately 0.5 m from north to south.

2.1.2 A copy of the topographical survey of the site has been included in Appendix A.

2.2 Regional Geology

2.2.1 The British Geological Survey (BGS) indicates that the site is underlain by Bagshot Formation – Sand. Sedimentary bedrock formed between 56 and 47.8 million years ago during the Palaeogene period. There is no information regarding the superficial geology of the site.

2.2.2 However, a soils investigation was carried out on the 12th of February 2026. During the investigation 6 boreholes to 3.1m deep were conducted. The result of the soils investigation showed that the sand formation is only between the depths of 0m – 1m while the rest of the borehole was filled with clay. Given the results, infiltration techniques are not recommended. A copy of the Soils Investigation report is included in Appendix B.

2.3 Proposed Development

2.3.1 The planning application seeks to construct 5 dwellings in the currently vacant land. This will consist of 1 x 5-bedroom detached house and 4 x 4-bedroom detached houses. The proposed layout of the development is attached to this report in Appendix A as drawing 2695/07-A.

3 EXISTING DRAINAGE

3.1.1 The site is currently vacant and so it is assumed that there is no existing drainage to speak of. The topographical survey has not identified any inspection chambers across the site; however, a ditch has been located along the western boundary into which overland runoff likely flows at an unrestricted rate.

3.1.2 As part of the investigation into the existing drainage Thames Water records were obtained. These show that there is a Thames Water maintained sewer within Blagrove Lane, but that this stops just outside Viewlands at manhole 8901, to the south of Meadow View. Here, the manhole has a cover level of 63.68m AOD and an invert level of 62.79m AOD. The sewer along Blagrove Lane has a diameter of 150mm and flows south, then east down Evendons Lane. A copy of the Thames Water sewer records has been included in Appendix B.

4 PROPOSED DRAINAGE

Foul Water

4.1.1 There is no foul provision for the existing site, and the public sewer does not extend up to the site, so it is proposed to create a new connection to manhole 8901 from the south of the site. The proposed foul system will transport effluent from all of the properties to the publicly maintained Thames Water network. The new connection will be subject to an S106 application to Thames Water, since it is proposed to connect new dwellings into the mains system. The foul drainage system for the site is indicated on drawing 252037/500/01 within Appendix C.

Surface Water

4.1.2 With regards to the disposal of surface water runoff from the development, the Sustainable Drainage Systems (SuDS) hierarchy has been considered when developing the drainage strategy for the site.

4.1.3 As the proposed dwellings will incorporate pitched roofs and there are no proposals for flat roof construction, the use of blue or green roof systems was not considered a viable option for this development and has therefore been discounted.

4.1.4 Rainwater harvesting was also considered as a potential means of reusing surface water runoff within the development. However, such systems require a separate internal plumbing network, storage tanks and pumping infrastructure to distribute non-potable water throughout the buildings. In addition, successful implementation requires sufficient and consistent water demand to avoid potential water quality issues within the stored supply.

4.1.5 Furthermore, rainwater harvesting tanks should not be relied upon for attenuation within drainage calculations, as there is no guarantee that storage capacity will be available at the start of a rainfall event. Should the tanks already be full, they would provide no effective storage for storm runoff and additional attenuation infrastructure would still be required. For these reasons, rainwater harvesting has not been incorporated into the drainage strategy.

4.1.6 The next stage within the SuDS hierarchy is the use of infiltration techniques such as soakaways or infiltration basins. A site-specific ground investigation has been undertaken and confirmed that the site is underlain by clay strata. Clay soils are typically of very low permeability and are unsuitable for infiltration drainage systems. As such, infiltration techniques would be unlikely to achieve the required half-drain time and would not comply with Building Regulations. Ground infiltration has therefore been discounted.

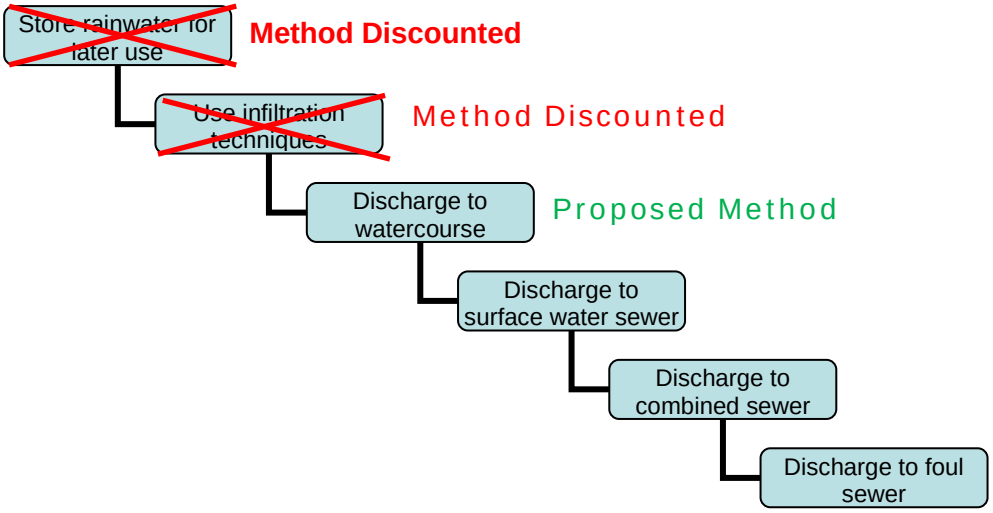

Figure 4.1 – SuDS Hierarchy

4.1.7 The next preferred option within the hierarchy is discharge to a watercourse. A ditch is located to the west of the site and has been identified as a suitable receiving watercourse. It is therefore proposed that surface water runoff from the development will discharge to this ditch at controlled rates.

4.1.8 Surface water attenuation will be provided through a combination of attenuation tanks and permeable paving systems located beneath the private driveways and access areas. Due to the presence of the underlying clay strata, the permeable paving systems will be tanked and will not discharge directly to ground. Instead, the sub-base will provide temporary storage and convey runoff to the attenuation tanks.

4.1.9 Two attenuation tanks are proposed within the site. The first attenuation tank will measure approximately 7 m in length, 3.5 m in width and 0.8 m in depth, while the second attenuation tank will measure approximately 11 m in length, 3.5 m in width and 0.8 m in depth. The tanks will consist of modular crate systems, with each crate measuring 1.0 m in length, 0.5 m in width and 0.4 m in height.

4.1.10 Permeable paving will also be used to provide additional attenuation storage and to manage surface water runoff from the hardstanding areas. The permeable paving has been divided into three sections. Permeable paving area 1 will comprise a 450 mm granular sub-base, while permeable paving areas 2 and 3 will each incorporate a 500 mm granular sub-base.

4.1.11 To ensure effective utilisation of the available storage across the sloping site, full-height baffle walls will be installed within the granular sub-base of permeable paving areas 2 and 3. These baffles compartmentalise the sub-base storage and control the longitudinal movement of water through the system, preventing preferential flow paths and ensuring that the full attenuation capacity is utilised. An illustration of the baffle arrangement is provided in Figure 4.2.

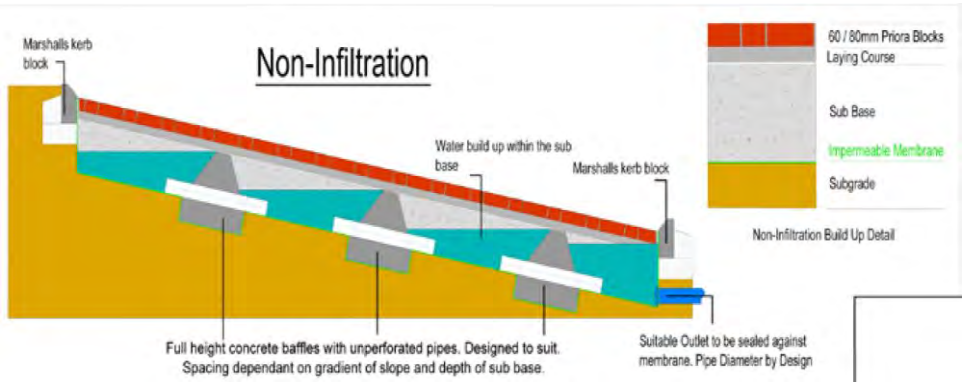

Figure 4.2 – Baffle arrangements

4.1.12 The surface water runoff collected within the permeable paving systems will discharge to the attenuation tanks via diffuser units. Flow between the permeable paving and the attenuation tanks will be controlled through 20 mm orifice plates to regulate the rate at which runoff enters the tanks.

4.1.13 Roof drainage from the proposed dwellings will discharge directly to the attenuation tanks via the surface water drainage network.

4.1.14 The drainage system is divided into two sections across the site. Surface water runoff from Plots 1 and 2 will be managed through permeable paving area 1 and attenuation tank 1. Runoff from Plots 3, 4 and 5 will be managed through permeable paving areas 2 and 3 and the second attenuation tank.

4.1.15 For each attenuation tank, surface water will be conveyed to pumping stations. Each pumping station will discharge at a restricted rate of 1 l/s to the receiving ditch, providing a combined discharge rate of 2 l/s from the site.

4.1.16 MicroDrainage modelling has been undertaken to size the attenuation tanks, permeable paving systems and pumping stations. The system has been designed to accommodate the 1 in 100-year rainfall event including a 40% climate change allowance without flooding on site. The supporting hydraulic calculations are provided in Appendix D.

Hydraulic Calculations

4.1.17 Hydraulic calculations have been undertaken using MicroDrainage software to determine the existing Greenfield runoff rates from the site and to establish appropriate discharge criteria for the proposed development. A summary of the existing Greenfield runoff rates and the proposed restricted discharge rates is presented in Table 4.1 below.

Return Period (Years)	Greenfield Rate (l/s)	Proposed Discharge (l/s)
Q_{BAR}	1.1	-
1 in 1	0.9	2.0
1 in 30	2.5	2.0
1 in 100	3.5	2.0
1 in 100 +40%	-	2.0

Table 4.1 – Existing & Proposed Runoff Rates

4.1.18 The results demonstrate that surface water runoff from the site will be restricted to a maximum combined discharge rate of 2 l/s via the two proposed pumping stations prior to discharge to the receiving ditch. Whilst higher than the 1 in 1 year greenfield rate, this is the minimum achievable discharge rate for a pumped solution as the pumps are unable to function at a lower rate.

4.1.19 Surface water runoff from the roofs of the proposed dwellings will be conveyed directly to the attenuation tanks, while runoff from the hardstanding areas will first be stored within the permeable paving sub-base layers before being conveyed to the attenuation tanks via diffuser units and controlled through 20mm orifice plates.

4.1.20 This approach ensures that surface water runoff is attenuated and managed on site prior to discharge, thereby reducing the risk of flooding both within the development and downstream of the site.

5 SURFACE WATER TREATMENT

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

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

5.1.3 Table 26.2 in C753 reproduced as Table 5.1, 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 5.1 below.

TABLE 26.2 Pollution hazard indices for different land use classifications

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

Table 5.1 – CIRIA SuDS Manual C753 (Land use classifications)

5.1.4 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.

5.1.5 The proposed development will incorporate tanked permeable paving and attenuation storage to provide water quality treatment prior to discharge to the receiving ditch. Table 26.4 of C753 reproduced below as Table 5.2 sets out the mitigation indices provided by SuDS features for discharge to surface waters.

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	0.4
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]	0.8[4]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

Table 5.2 – CIRIA SuDS Manual C753 (Mitigation Indices to groundwater)

5.1.6 The permeable paving will provide mitigation of 0.7 for total suspended solids, 0.6 for metals and 0.7 for hydrocarbons and the soakaways 0.4 mitigation for all hazards. These are all greater than the pollution hazard indices identified in Table 5.1 above.

6 SUDS / SURFACE WATER MAINTENANCE

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

6.1.2 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”.

6.1.3 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.

6.1.4 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.

6.1.5 Following completion of the development the owners of the properties will be responsible for maintaining the drainage network, including the SuDS elements.

6.2 Inspection, Manhole, Catch pit Chambers and Pipes

6.2.1 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.

6.2.2 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.

6.2.3 For the Inspection, Manhole, catch pit 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 6.1 – Manhole, Catch pit and Pipes Maintenance

6.3 Attenuation Tanks

6.3.1 For the attenuation tanks, the following maintenance will be required.

Attenuation Tank Maintenance Schedule		
	Required Action	**Typical Frequency**
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Annually
	Remove debris from the catchment surface (where it may cause risk to performance).	Monthly
	For systems where rainfall infiltrates in the tank from above, check surface of filter for blockage by sediment, algae or other matter, remove and replace surface infiltration medium as necessary	Annually
	Remove sediment from pre-treatment structures.	Annually or as required
Remedial Actions	Repair/rehabilitate inlets/outlets, overflows and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tanks for sediment build-up and remove if necessary	Every 5 years or as required

Table 6.2 – Attenuation Tank Maintenance Schedule

6.4 Permeable Paving

6.4.1 For permeable paving, the following maintenance is required.

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.
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds	As required- once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting 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 6.3 – Permeable Paving Maintenance Schedule

7 SUMMARY AND CONCLUSION

7.1.1 The proposed development is for the construction of 5 dwellings in the vacant land to the north of Meadow View, Blagrove Lane.

7.1.2 The existing site is currently an undeveloped field located to the north of Meadow View and bounded by Blagrove Lane along its western boundary. Mapping obtained from Thames Water indicates that a foul sewer is located to the south of the site within Blagrove Lane. It is therefore proposed that foul flows from the development will discharge to the existing Thames Water sewer via a new connection. As the development proposes new dwellings, a Section 106 application will be required to obtain permission to connect to the public sewer network.

7.1.3 A site-specific ground investigation was undertaken to determine the suitability of the ground conditions for infiltration drainage. The investigation confirmed that the site is underlain by clay strata, which typically exhibits low permeability and is unsuitable for infiltration-based drainage systems. On this basis, infiltration techniques such as soakaways have been discounted from the drainage strategy.

7.1.4 In accordance with the Sustainable Drainage Systems (SuDS) hierarchy, surface water runoff from the proposed development will instead be managed through a combination of tanked permeable paving systems and attenuation tanks. Roof runoff from the proposed dwellings will discharge directly to the attenuation tanks, while surface water runoff from the hardstanding areas will first be collected within permeable paving sub-base layers before being conveyed to the attenuation tanks via diffuser units and controlled through 20 mm orifice plates. From the attenuation tanks, surface water will be discharged to the receiving ditch via two pumping stations, each restricted to a discharge rate of 1 l/s, providing a combined discharge rate of 2 l/s. The system has been designed using MicroDrainage modelling to accommodate the 1 in 100-year storm event including a 40% climate change allowance without flooding on site.

7.1.5 For the reasons outlined within this report, the proposed drainage strategy provides a sustainable and robust method for managing both foul and surface water runoff from the development. The strategy accords with the SuDS hierarchy and demonstrates that the proposed development will not increase flood risk on or off site. On this basis, there are no drainage-related reasons why planning permission should be refused.

APPENDIX A

Topographical Survey

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LEGEND

FEATURE STYLES

SURVEY CONTROL
FENCE
HEDGE
FWS
SWS
POWER LINE (OVERHEAD)
TELECOM LINE (OVERHEAD)
EMBANKMENT

FENCE TYPES

BWR	Barbed Wire
CB	Close Board
CI	Corrugated Iron
CL	Chain Link
CP	Chestnut Paling
CPL	Conc Panel
CW	Chicken Wire
IW	Interwoven
IR	Iron Railing
OB	Openboard
PR	Post and rail
PW	Post and Wire

FEATURE ABREVIATIONS

BS	Bus Stop
BT	Telecom Cover
BTB	Telecom Box/Booth
BW	Brick Wall
CB	Concrete Bollard
CL	Cover Level
CTB	Cable TV Box
CTO	Cable TV Outlet
CTV	Cable TV Cover
EB	Electric Box
EC	Electric Cover
EM	Electric Meter
ELB	Electric Light Bollard
EP	Electricity Pole
FH	Fire Hydrant
FL	Floor level
G	Gully
GM	Gas Meter
GV	Gas Valve
IC	Inspection Chamber
IL	Invert Level
KLS	Keep Left Sign
KO	Kerb Offlet
LP	Lamp Post
MB	Metal Bollard
MH	Manhole
MKR	Marker
P	Post
PB	Post Box
RG	Road Gully
RNB	Road Name Board
RS	Road Sign
RW	Retaining Wall
SC	Stopcock
SV	Sluice Valve
TL	Traffic Light
TP	Telegraph Pole
UTL	Unable To Lift Cover
WB	Water Butt
WL	Water Level
WM	Water Meter

DATUM
GRID – ORDNANCE SURVEY NATIONAL GRID (OSTN15)
LEVELS – ORDNANCE SURVEY (OSGM15)

SURVEY CONTROL			
STN	-E-	-N-	-Z-
1	479903.145	167030.076	64.679
2	479927.471	167020.842	64.485
3	479861.530	167083.366	65.186
4	479889.042	167011.894	64.318
5	479937.725	167025.187	64.653
6	479870.853	167101.226	65.110
7	479876.456	167087.613	65.227
8	479845.686	167123.798	64.699
9	479883.732	167099.177	65.495
10	479893.139	167095.853	65.228
11	479900.194	167097.353	65.060
12	479830.530	167079.302	65.402
13	479890.746	166997.333	63.164
14	479903.159	166999.464	63.873
15	479845.260	167110.682	64.849

TREE SCHEDULE				
TREE	GIRTH	HEIGHT	SPREAD	SPECIES
1	0.8	16.0	4.0	SILVER BIRCH
2	multi bole	8.0	5.0	HAZEL
3	1.0	8.0	4.0	HAWTHORN
4	multi bole	8.0	4.5	HAZEL
5	0.6	10.0	4.0	OAK
6	multi bole	8.0	5.0	HAZEL
7	multi bole	8.0	5.0	HAZEL
8	multi bole	8.0	4.5	HAZEL
9	multi bole	10.0	4.5	HOLLY
10	2x1.0	10.0	4.5	HOLLY
11	0.6	8.0	3.5	HOLLY
12	4x0.6	8.0	4.5	HOLLY
13	0.7	10.0	4.5	HOLLY
14	0.7	10.0	4.5	HOLLY
15	3.0	18.0	12.0	OAK
16	multi bole	8.0	5.0	HAZEL
17	2.5	18.0	10.0	OAK
18	0.8	10.0	6.0	FIELD MAPLE
19	4.0	18.0	13.0	OAK
20	1.2	11.0	6.0	FIELD MAPLE
21	0.8/1.0/1.3	14.0	8.0	OAK
22	0.6	7.0	3.0	DEAD
23	1.0	8.0	3.5	HOLLY
24	0.7	8.0	3.5	ROWAN
25	multi bole	6.0	4.0	HAZEL
26	5x0.6	10.0	5.0	PRUNUS
27	3x0.6	8.0	5.0	PRUNUS
28	3.0	12.0	9.0	OAK

NOTES

Surveyed boundaries are not necessarily the site legal boundaries. Client should refer to the relevant Land Registry document for confirmation of title.

Every effort has been made to show all features, however those hidden or obscured at the time of survey cannot be shown.

Tree canopy measured values are written as maximium spreads. Tree species and condition to be confirmed by an arboriculturist

Drainage and service covers that were buried, obscured or not visible at the time of the survey cannot be shown. Sewer connections between manholes are assumed to be straight and only pipes visible from the cover are shown.

SURVEYED BY
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land & engineering surveyors

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CLIENT

ROB & YVONNE WARD

SITE

MEADOW VIEW
BLAGROVE LANE
WOKINGHAM
BERKSHIRE
RG41 4AU

TITLE

SITE SURVEY

AS EXISTING

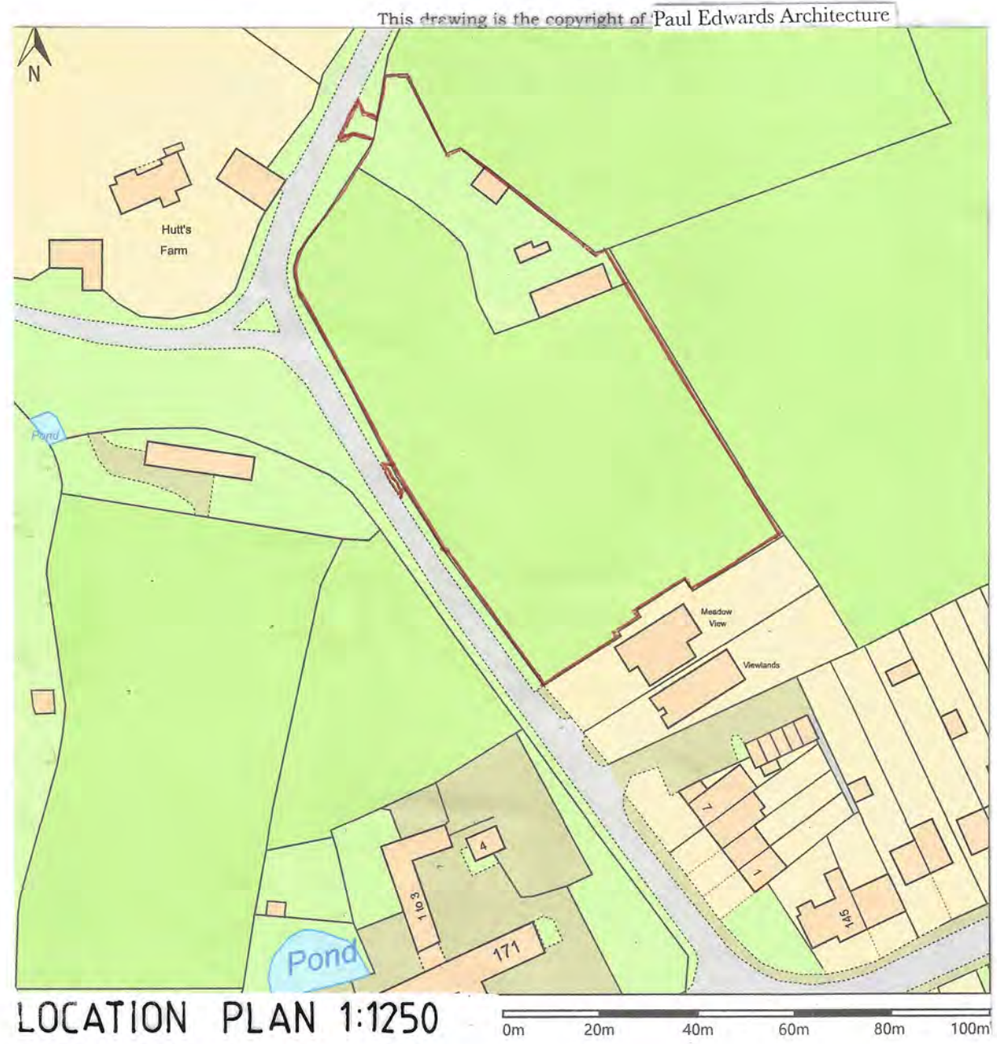
SCALE	DATE
1/200 (A0)	APRIL 2025
DRAWING No. 01	JOB No. 8054

Proposed Site Plan

Notes

All dimensions and levels on site are to be checked prior to commencement of work.

This drawing is the copyright of Paul Edwards Architecture



LOCATION PLAN 1:1250

SITE PLAN 1:500 0 5 10 15 20 30

SITE AREA = 0·708 ha = 1·750 acres

1 No 5 bedroom detached house
4 No 4 bedroom detached houses

A : FOOTPATH AMENDED WITHIN SITE AND PARKING SPACES FOR PLOTS 2 AND 3 AMENDED 16:07:25

Project
Proposed detached houses
Land adjacent Meadow View
Blagrove Lane
WOKINGHAM
Berks

Client
Mr R Ward

Drawing
SITE PLANS

Scale: As shown at A2
Date: July 2025

Paul Edwards Architecture
12 Sandy Lane, Barkham, Wokingham, Berks RG41 4DB
Tel: 01189772925 Mob: 07831837415 E-mail: paul@pauledwardsarchitecture.co.uk

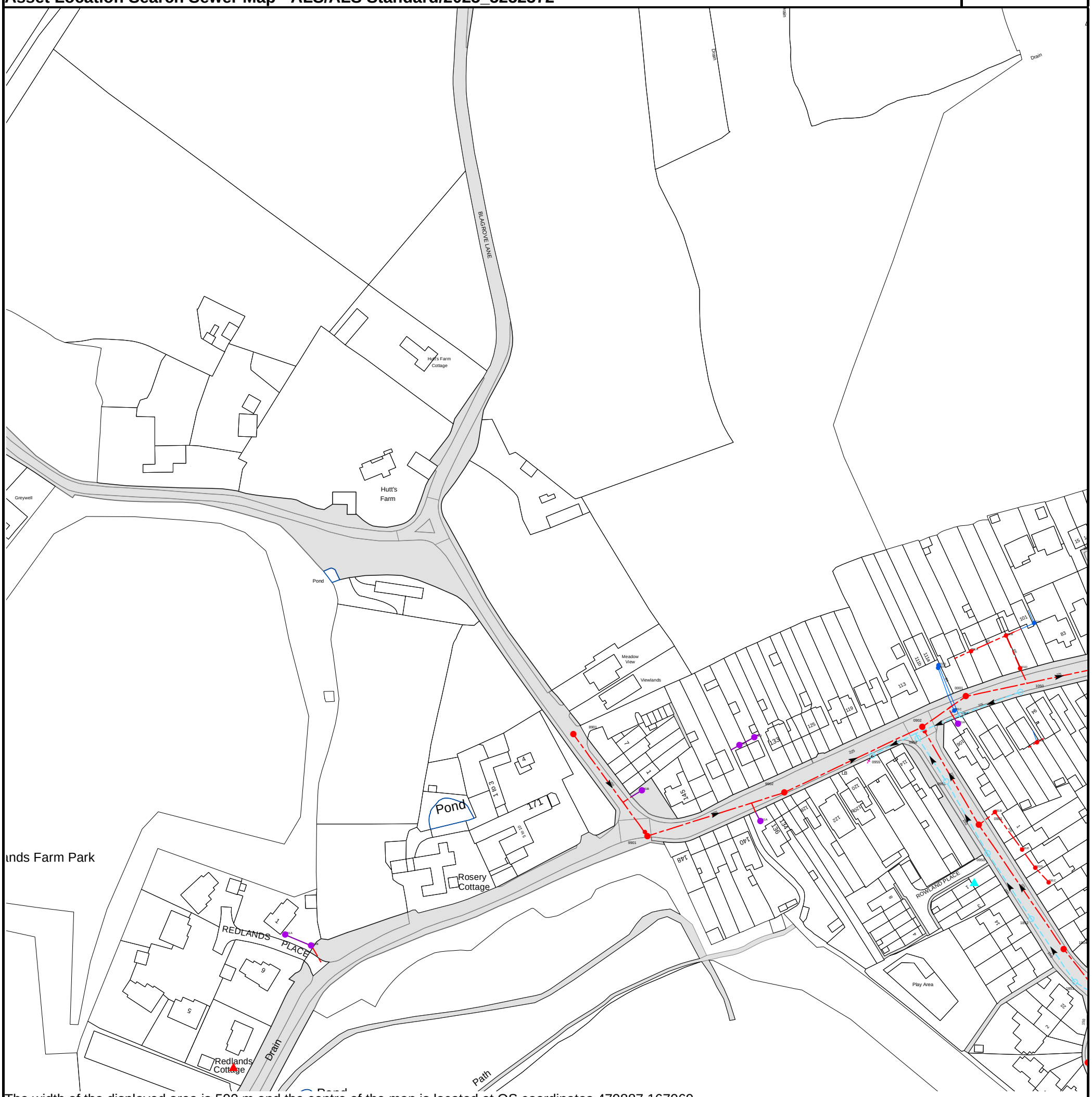
Job 2695 Dwg. 07 A

Repropoint 551113

APPENDIX B

Thames Water Sewer Records

Asset Location Search Sewer Map - ALS/ALS Standard/2025_5252372



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 479887,167069

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map (2024) with the Sanction of the controller of H.M. Stationery Office, License no. AC0000849556 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
781A	n/a	n/a
781B	n/a	n/a
9901	62.29	58.29
991A	n/a	n/a
001E	n/a	n/a
001D	n/a	n/a
091C	n/a	n/a
091A	n/a	n/a
0954	64	62.85
001A	n/a	n/a
0901	63.6	60.9
0950	63.7	63.01
091B	n/a	n/a
001B	n/a	n/a
101D	n/a	n/a
191E	n/a	n/a
1852	63.94	63.17
101C	n/a	n/a
191D	n/a	n/a
191C	n/a	n/a
1804	64.05	61.27
1851	64.14	63.4
1802	64.14	61.84
8901	63.68	62.79
991B	n/a	n/a
991C	n/a	n/a
991D	n/a	n/a
9902	63.02	58.05
0955	63.42	62.26
0952	63.62	62.7
0902	63.72	57.73
0951	63.53	n/a
0001	63.98	57.75
1050	64.12	63.18
191B	n/a	n/a

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

Foul Sewer: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water Sewer: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined Sewer: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

- Storm Sewer
- Sludge Sewer
- Foul Trunk Sewer
- Surface Trunk Sewer
- Combined Trunk Sewer
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Vacuum
- Thames Water Proposed
- Vent Pipe
- Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

- Sewer
- Culverted Watercourse
- Proposed
- Decommissioned Sewer
- Content of this drainage network is currently unknown
- Ownership of this drainage network is currently unknown

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

- Air Valve
- Meter
- Dam Chase
- Vent
- Fitting

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

- Ancillary
- Drop Pipe
- Control Valve
- Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

- Inlet
- Outfall
- Undefined End

Other Symbols

Symbols used on maps which do not fall under other general categories.

- Change of Characteristic Indicator
- Public / Private Pumping Station
- Invert Level
- Summit

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Chamber
- Operational Site

Ducts or Crossings

- Casement — Ducts may contain high voltage cables. Please check with Thames Water.
- Conduit Bridge
- Subway
- Tunnel

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plan are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters.
Text next to a manhole indicates the manhole reference number and should not be taken as a measurement.
If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

Albury Soils Investigation

REPORT ON A SITE INVESTIGATION

Site

LAND ADJACENT TO MEADOW VIEW, BLAGROVE LANE, WOKINGHAM BERKSHIRE RG41 4AU

Client

YVONNE AND ROB WARD

Report Ref

26/13342/GO

Issued

March 2026

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DOCUMENT CONTROL		
Report Title	Report on a Site Investigation	
Contract	Blagrove Lane, Wokingham	
Client	**Yvonne & Rob Ward**	
Report Reference	26/13342/GO	
Prepared by	**G C D Owens** BSc MSc FGS MIEnvSc Director	
Approved by	**K J Clark** BSc Hons Director	

DOCUMENT HISTORY				
Revision	Status	Date	Issued by	Revision Detail
0	Final	05/03/2026		

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The following foreword should be read in conjunction with this report. Any variations on the general procedures outlined below are indicated in the text.

FOREWORD

The recommendations made and opinions expressed in this Report are based on the strata conditions revealed by the fieldworks as indicated on the exploratory records, together with an assessment of the data from in situ and laboratory tests. No liability can be accepted for conditions which have not been revealed by the fieldworks, for example, between exploratory positions. While this Report may offer opinions on the possible configuration of strata, both between the excavations and below the maximum depth achieved by the investigation, these comments are for guidance only and no liability can be accepted for their accuracy. The data obtained relate to the conditions which are relevant at the time of the investigation.

The groundwater observations entered on exploratory records are those noted at the time of the investigation. The normal rate of progress does not usually permit the recording of any equilibrium water level for any one water strike. It should be noted that groundwater levels are prone to seasonal variation and to changes in local drainage conditions. The word 'none' indicates that groundwater was sealed off by the borehole casing or that no water was observed in the exploratory hole upon completion.

It should be appreciated that this report does not constitute a Geotechnical Design Report (GDR) as defined in Eurocode 7 and no aspect of this report constitutes a design. Specific sections of this report are generally in line with the guidance set out in Eurocode 7 for a Ground Investigation Report (GIR), as defined within BS EN 1997:-2 (2024). This provides guidance on the number and spacing of investigation positions, methods of investigation and sample quality class to be achieved which may not have been met by this investigation.

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REPORT REF: 26/13342/GO
CONTRACT: BLAGROVE LANE, WOKINGHAM

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1 Proposed Layout
2 Photos

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1 Exploratory Records
2 Laboratory Test Results
3 Desiccation

EXECUTIVE SUMMARY

This investigation has demonstrated that made ground and variable soils of unclear geological origin overlie cohesive soils of variable volume change potential, indicative of the Bagshot Formation of the Eocene epoch. Strip or spread foundation located within the Bagshot Formation, at a minimum depth of 1.00m, can be designed to apply a maximum increase in load of 125kPa. The final foundation depth should be determined using NHBC criteria, taking into account the proximity of mature oak trees. It is also recommended that foundations for plot 2 are locally extended to 1.30m, below the variable soils, to ensure a consistent founding medium.

The siteworks have been undertaken during a period of exceptionally wet weather and it is known that groundwater levels can vary with season. It is recommended, therefore, that a series of trial excavations are undertaken in advance of groundworks to assess the quantities of water which will be encountered and whether pumping from sumps will be a suitable method of controlling groundwater inflows.

The presence of cohesive strata confirms that the use of traditional soakaways will not be a suitable method of disposing of surface water and alternative drainage measures should be explored.

1 INTRODUCTION

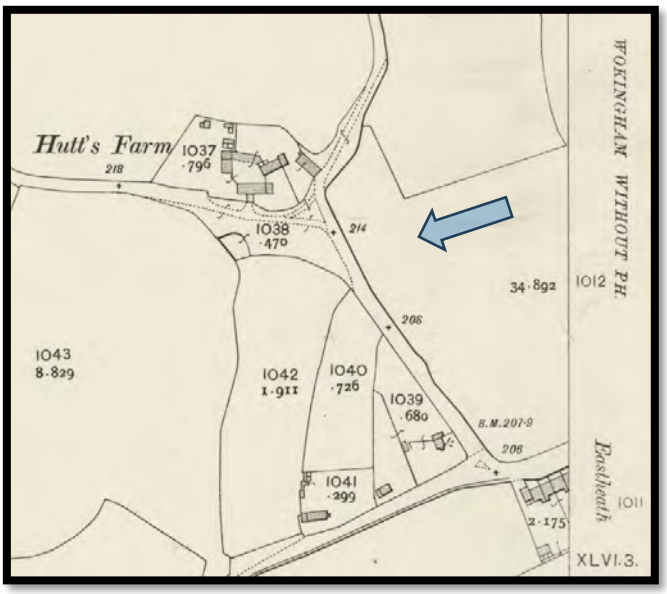
1.1 Scope

The client proposes to construct five detached houses at Land adjacent to Meadow View, Blagrove Lane, Wokingham ("the site"). Accordingly, a site investigation has been undertaken in order to ascertain the nature and engineering properties of the soils underlying the proposed development site and to obtain data which will assist in the formulation of a safe and economical foundation solution.

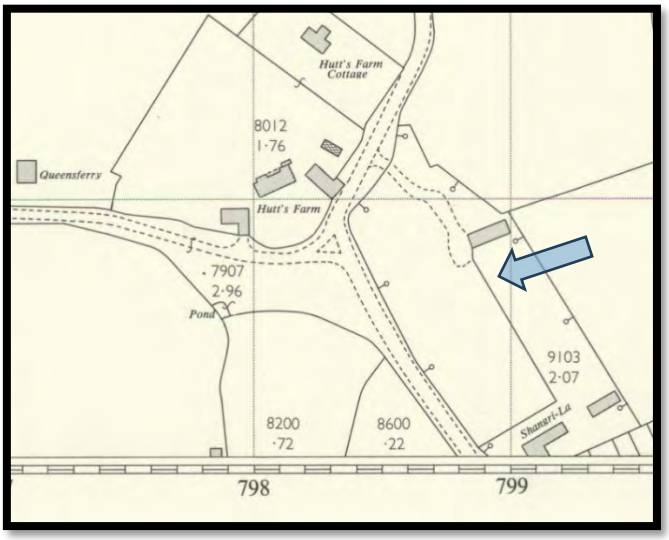
The programme of this investigation comprised the construction of seven boreholes using hand-held window sampling techniques. At two of the locations continuous dynamic probing (DPH) was completed using a lightweight rig. During this work samples were recovered for further examination and laboratory testing. In addition, a number of in situ hand shear vane tests were also performed. This report describes the work undertaken, presents the information obtained and discusses the ground conditions with respect to foundation design and construction.

1.2 The Site

The site is located at Ordnance Survey National Grid Reference 479877, 167049. The supplied topographical survey indicates levels range from 65mOD in the north to 64mOD at the southern tip of the site. At the time of the works the site comprises fields, with a dilapidated nissen hut and stables in the north east of the site. An examination of the readily accessible historical OS mapping for the area reveals the site has historically been undeveloped fields, with the exception of a structure and access track which is shown on the 1967 mapping. Relevant extracts of the available 1911 and 1967 mapping are presented below. A review of the modern aerial imagery confirms the site area has remained largely an undeveloped field with minimal activity apparent since the earliest image dated 2003.



Extract of OS 25 inch mapping (1911)



Extract of OS 1:2500 scale mapping (1967)

2 FIELDWORKS

The seven boreholes and two probes were constructed on 12th February 2026 at locations as shown on the Proposed Layout, drawing no. 26/13342/1, which is presented as Figure 1. The salient details of this drawing have been extracted from Site Plans prepared by Paul Edwards Architecture dated July 2025. The exploratory positions have been located in order to provide adequate site coverage, taking into account the proposed development layout.

The depths and descriptions of the strata encountered in the boreholes are given on the records which comprise Appendix 1 to this report. These records note the depths at which samples were taken, the results of in situ tests and the groundwater observations noted at the time of the fieldworks.

At locations 1 and 5 continuous dynamic probing was completed using a lightweight rig utilising DPH specification equipment. The results are presented in graphical format, as a penetration resistance-depth relationship, with the number of blows required to drive the probe 100mm.

Photographs which give a general impression of the site at the time of the fieldworks are included below and in Figure 2.

3 GROUND CONDITIONS

3.1 Geology

A desk-based examination of the British Geological Survey (BGS) GeoIndex of superficial and bedrock mapping at 1:50,000 scale, indicates the site as being underlain by the Bagshot Formation of Eocene age.

A review of the UK Radon maps indicate that the site is within an area where less than 1% of homes are above the action level and protection measures are not required.

3.2 Stratigraphy

Consideration of the exploratory records indicates that grass over made ground in the form of dark brown to mid brown and greyish brown, slightly gravelly slightly clayey to clayey, silty sand with variable flint gravel content, was proved to depths of between 0.30m and 0.80m.

Brownish grey clayey sand and gravel of flint and occasional sandstone was noted between 0.40m and 0.80m within borehole 1 and between 0.40m and 0.70m within borehole 7, which may possibly be disturbed or made ground.

Further variable soils consisting of brown and grey clayey sand and sandy clay with variable flint gravel content was also observed between 0.40m and 1.30m within borehole 2, and from 0.30m to 0.80m within borehole 5. The exact geological origin of these soils is unclear, with the inclusion of rounded flint indicative of a recent geological deposit such as Head.

Orangish brown and light grey silty clay with laminations of sand was generally exposed beneath the Head and made ground. These cohesive soils are indicative of the Bagshot Formation in this area and the boreholes were concluded within this deposit at 3.10m.

3.3 Groundwater

During the construction of the exploratory positions groundwater strikes were recorded at ground level at borehole 6 between 0.35m and 0.90m depths at the remaining positions. Short-term standing water levels were observed at ground level within borehole 6 between 0.20m and 0.40m upon completion of the remaining boreholes.

3.4 In Situ Testing

During the construction of the boreholes 2, 4, 5, 6 and 7 in situ hand shear vane tests were performed using the Geonor Shear Vane test equipment. Shear strengths of 100kPa and 140kPa were recorded reflecting the stiff in situ condition for a cohesive soil.

Dynamic probing was performed adjacent to boreholes 1 and 5. Initially blow counts ranging from 1 to 7 blows/100mm were recorded to depths of 5.2m and 5.3m, increasing steadily below this depth from 7 blows/100mm to 23 blows/100mm. The probes were concluded at depths of 9.4m and 9.5m.

4 LABORATORY TESTING

A programme of laboratory testing has been undertaken and the results are presented as Appendix 2 to this report. Each type of test is summarised below and the results obtained have been used to assist in the formulation of the discussion.

4.1 Water Content

The water contents of samples of the soils encountered at this site have been determined. Water contents within the range 11% to 33.7% have been recorded.

4.2 Index Properties

The liquid and plastic limits of samples of the clay soils have been determined. The results of this work indicate that the samples tested can generally be described as inorganic clays of variable plasticity and range from low to high volume change potential.

4.3 Chemical Testing – Soluble Sulphates & pH

Samples of the soils and groundwater encountered at this site have been subjected to chemical analyses in order to determine their soluble sulphate contents and pH values. Under the conditions of this work low concentrations of soluble sulphate have been recorded in association with slightly acidic to near neutral pH values. The results are summarised in tabular form below.

Table 1 - Summary of Chemical Tests

BH/TP No.	Sample		Concentration of Sulphates expressed as SO_4		Total Sulphate as SO_4 mg/kg	pH
	Depth m	Type	2:1 Water : Soil Extract mg/l	Groundwater mg/l		
1	2.00	CLAY	188		1900	4.9
3	(0.25)	WATER		9		6.7
4	0.50	MADE GROUND	10		160	7.5
5	1.00	CLAY	16		130	5.8
6	1.50	CLAY	30		350	4.8

5 GEOTECHNICAL DISCUSSION

5.1 Foundations

The client proposes to construct five detached houses at the site under consideration as per the proposed layout in Figure 1. At the time of the preparation of this report the anticipated structural loads were not known.

It cannot be recommended that major structural foundations be located within the made ground revealed by this investigation. Soils of this origin are frequently present in a weak and variable condition such that unacceptable settlement could occur even under the action of light loading intensities. Therefore, it will be necessary to continue foundation excavations through these undesirable materials where they are of less than 1.00m in thickness to this minimum depth in order to avoid that zone of soil which is subject to normal seasonal moisture variation or frost action. The above precautions need not necessarily be applied to light ancillary structures, which will be formed structurally discrete from the main development and in which a greater degree of settlement can be tolerated.

It is known that a number of mature trees are present in the vicinity of the proposed structures, which include mature Oaks at the north eastern corner and south west, with Holly, Hawthorne and Hazel present along the southern part of the western boundary. A discussion of the causes, effects and classification of desiccation in clay soils is included in Appendix 3 to this report.

An appraisal of the water content profiles suggests that apparent moisture deficiency may be present within borehole 7 from 1.00m to 2.00m. However, this may be due to the varying lithology of the Bagshot Formation and reflective of the increased proportion of sand within the sample matrices. It should, however, be noted that roots and root remains were observed throughout the soil profile at borehole 1. The final foundation depths should be determined using NHBC criteria with respect to building near trees and the appropriate volume change potential for each of the relevant plots, which is primarily medium volume change potential.

It is also recommended that a nominal founding depth of 1.30m be adopted for plot 2, to ensure that the variable gravelly soils encountered within borehole 2 are fully penetrated and that all foundations are placed within the Bagshot Formation. Further investigation would be prudent to confirm the depth of the Bagshot Formation is consistent in this part of the site.

Strip or spread foundations constructed within the Bagshot Formation, at a minimum depth of 1.00m and in accordance with NHBC criteria, can be designed to accept a maximum increase in load of 125kPa. At this loading intensity a factor of safety of 3 against general shear

failure will be operative and settlement of less than 20mm is anticipated. These movements are likely to occur over a number of years post completion of the development.

Should trial excavations prove a consistent high groundwater table, then an alternative foundation scheme will be required. In this context attention could be given to the use of piles. The design of piles lies outside the scope of this report as it is dependent upon the type of pile employed, its size and bearing capacity. Therefore, when the loadings are known it will be sensible to seek the advice of suitably experienced specialist piling contractors in order to provide a satisfactory solution to the problem. It is likely that deeper cable percussive boreholes will be necessary to provide sufficient information to enable piled foundation design.

5.2 Stability of Excavations

It is recommended that adequate temporary support or shoring be provided to all excavations made at this site, given the presence of a high groundwater table and granular soils near surface, in order to comply with current statutory safety regulations and to maintain the stability of the excavation sides.

5.3 Groundwater

A high groundwater table has been encountered during this investigation. However, the siteworks have been undertaken during a period of exceptionally wet weather and it is known that groundwater levels can vary with season. It is recommended, therefore, that a series of trial excavations are undertaken in advance of groundworks to assess the quantities of water which will be encountered and whether pumping from sumps will be a suitable method of controlling groundwater inflows.

The cohesive soils revealed in this investigation are susceptible to rapid softening in the unconfined state. Where excavations are to be left open for extended periods then the bases should be blinded using leanmix concrete following final trimming to prevent deterioration of the founding medium.

5.4 Drainage

The near surface drainage characteristics of the underlying cohesive soils have not been considered due to the presence of groundwater. The plastic nature of the cohesive soils demonstrated by laboratory testing infers that the Bagshot Formation would be an unsuitable drainage medium and alternative means of surface water disposal should be explored.

5.5 Ground Floor Slabs

The thickness of made ground revealed by this investigation, commonly in excess of 0.60m, infers that a system of fully suspended floor slabs should be incorporated within the proposed structure in accordance with NHBC criteria.

5.6 Buried Concrete

The information obtained from this investigation has been compared with the criteria proposed in BRE Special Digest 1, 2005 Edition, Concrete in Aggressive Ground. Using the information in Table C1 (natural ground) of this publication the Aggressive Chemical Environment for Concrete Classification (ACEC) is AC-1, which coincides with a Design Sulphate Class DS-1. The ACEC Class above can be used to determine the Design Chemical Class for concrete for general cast-in-situ use as required in Part D of the Digest.

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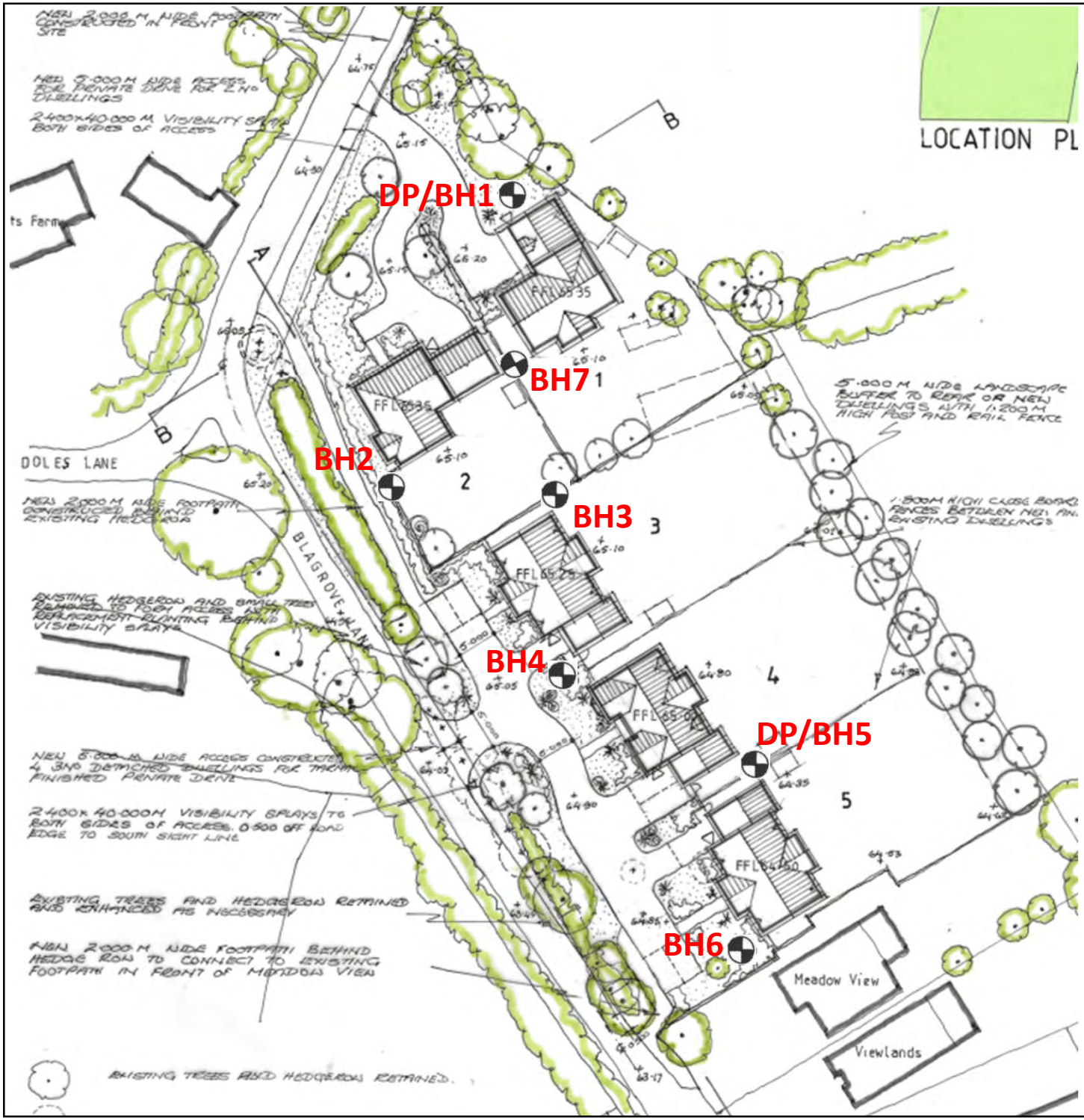
LIST OF ABBREVIATIONS

AOD	-	Above Ordnance Datum
ACM	-	Asbestos-containing Material
AST	-	Above-ground Storage Tank
BGS	-	British Geological Survey
BH	-	Borehole
BRE	-	Building Research Establishment
BSI	-	British Standards Institution
BS	-	British Standard
C4SL	-	Category Four Screening Level
CIRIA	-	Construction Industry Research and Information Association
CP	-	Cable Percussive
DPH	-	Dynamic Probing Heavy
DPSH	-	Dynamic Probing Super Heavy
EA	-	Environment Agency
GAC	-	Generic Assessment Criteria
LL	-	Liquid Limit
mAOD	-	Metres Above Ordnance Datum
mBGL	-	Metres Below Ground Level
mOD	-	Metres Ordnance Datum
OS	-	Ordnance Survey
PAH	-	Polycyclic Aromatic Hydrocarbons
PCB	-	Polychlorinated Biphenyl
PID	-	Photo Ionisation Detector
PL	-	Plastic Limit
PSD	-	Particle Size Distribution
SGV	-	Soil Guideline Value
SOM	-	Soil Organic Matter
SPT	-	Standard Penetration Test
SPZ	-	Source Protection Zone
SVOC	-	Semi-volatile Organic Compounds
TPH	-	Total Petroleum Hydrocarbon
UST	-	Underground Storage Tank
UXB	-	Unexploded Bombs
UXO	-	Unexploded Ordnance
VOC	-	Volatile Organic Compound

FIGURE 1

PROPOSED LAYOUT



Legend:

Borehole Location

Site Boundary

Title:	Site Plan
Dwg No:	26/13342/1
Drawn by:	GO
Client:	Yvonne and Rob Ward
Contract:	Blagrove Lane, Wokingham
Job Ref:	26/13342/GO
Scale:	NTS
Revision:	0
Issue Date:	04/03/2026

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FIGURE 2

PHOTOS

Dilapidated Stables in north east of site

Dilapidated Nissen Hut

South of site

Title:	Photos
Dwg No:	26/13342/2
Drawn by:	GO
Client:	Yvonne and Rob Ward
Contract:	Blagrove Lane, Wokingham
Job Ref:	26/13342/GO
Scale:	NTS
Revision:	0
Issue Date:	04/03/2026

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APPENDIX 1

EXPLORATORY RECORDS

ALBURY S.I. LTD Miltons Yard, Petworth Road, Witley, Surrey GU8 5LH www.alburysi.co.uk		BOREHOLE	1
CONTRACT	Blagrove Lane, Wokingham	**Report Ref**	26/13342/GO
Client	Yvonne and Rob Ward	**Date**	12/02/2026
Site Address	Land adjacent to Meadow View, Blagrove Lane, Wokingham, Berkshire RG41 4AU	**Ground Level**	

Water Strikes (m)		Type & Dimensions	Ease of excavation (m)			
1.	0.50	Drive-in Window Sampler	Very easy:		Difficult:	0.50-3.10
2.		60mm to 50mm diameter	Moderate:	GL-0.50	Very hard:	
Water level observed upon completion (m):		0.40			**Technician:**	DH, EK

Remarks

DPH dynamic probe performed adjacent to position

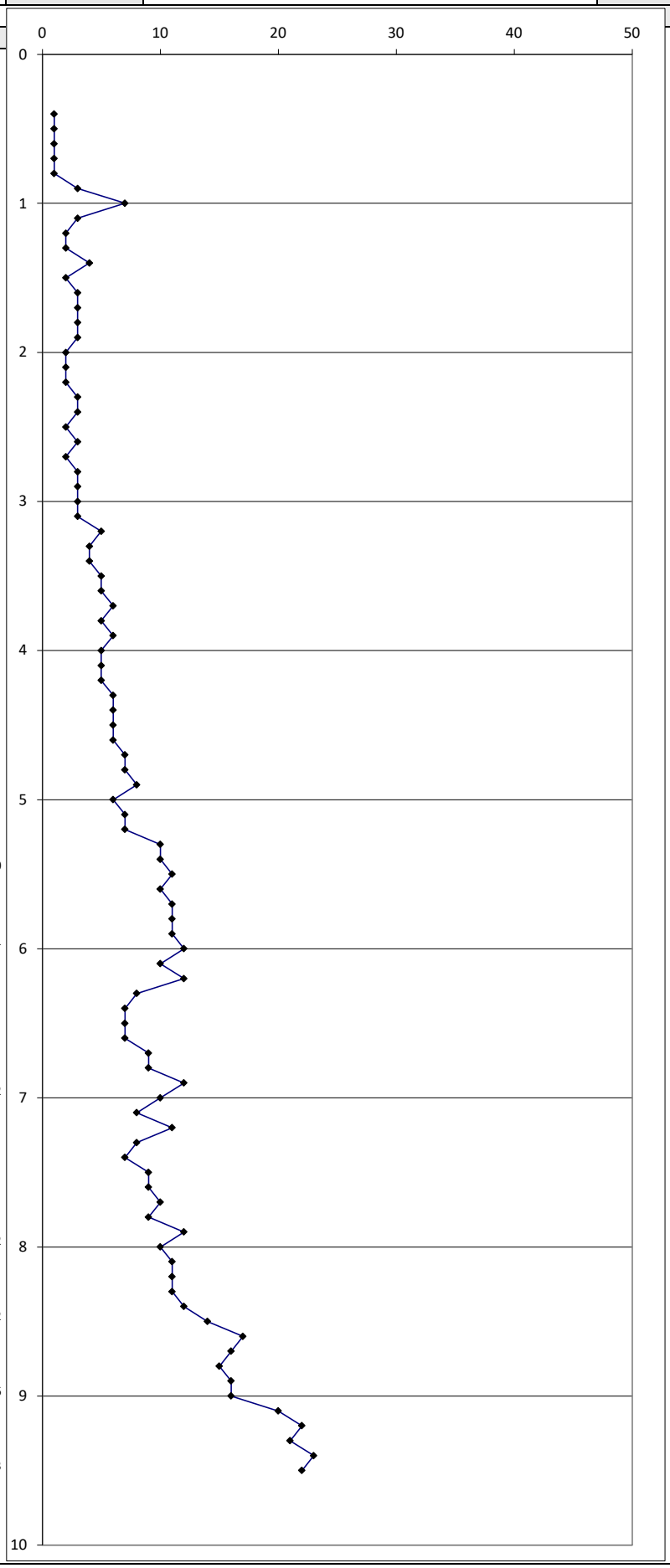
Samples or tests		Shear Strength (kPa)	Depth	Legend	Strata Description
Type	Depth (m)				
D	0.10				Grass over MADE GROUND (dark brown slightly gravelly silty SAND becoming clayey with depth. Gravel of flint, with much rounded pebbles)
D	0.30				
			0.40		
D	0.50				Loose brownish grey clayey SAND and GRAVEL of flint and occasional sandstone (possible disturbed or MADE GROUND?)
			0.80		
D	1.00				Firm to stiff orangish brown and light grey silty CLAY with laminations of fine sand and roots, traces of claystone at depth (2.00m), root remains present at 2.50m and 3.00m [BAGSHOT FORMATION]
D	1.50				
D	2.00				
D	2.50				
D	3.00				
			3.10		END OF BOREHOLE

Symbol Code: **B** - Large Disturbed **D** - Small Disturbed **W** - Water Sample **R** - Root Sample **HSV** - Hand Shear Vane **PID** - Photo Ionisation Detector

ALBURY S.I. LTD Miltons Yard, Petworth Road, Witley, Surrey GU8 5LH	Report Ref	26/13342/GO	DYNAMIC PROBE	1
Sheet 1 of 1	**Client**	Yvonne & Rob Ward	**Date**	12/02/2026
DPH Dynamic Probe	**Contract**	Blagrove Lane, Wokingham	**Ground Level**	

Sacrificial Tip

Depth, m	Blows / 100 mm	Torque, Nm
GL	1 1 1 1 1 3	
1	7 3 2 2 4	0
	2 3 3 3 3 3	
2	2 2 2 3 3	10
	2 3 2 3 3 3	
3	3 3 5 4 4	10
	5 5 6 5 6 6	
4	5 5 5 6 6	30
	6 6 7 7 8	
5	6 7 7 10 10	45
	11 10 11 11 11	
6	12 10 12 8 7	50
	7 7 9 9 12	
7	10 8 11 8 7	50
	9 9 10 9 12	
8	10 11 11 11 12	60
	14 17 16 15 16	
9	16 20 22 21 23	75
	22	
10		



Remarks

Probing commenced from base of hand excavated starter pit

ALBURY S.I. LTD Miltons Yard, Petworth Road, Witley, Surrey GU8 5LH www.alburysi.co.uk		BOREHOLE	2
CONTRACT	Blagrove Lane, Wokingham	**Report Ref**	26/13342/GO
Client	Yvonne and Rob Ward	**Date**	12/02/2026
Site Address	Land adjacent to Meadow View, Blagrove Lane, Wokingham, Berkshire RG41 4AU	**Ground Level**	

Water Strikes (m)		Type & Dimensions	Ease of excavation (m)			
1.	0.50	Drive-in Window Sampler	Very easy:		Difficult:	0.80-3.10
2.		60mm to 50mm diameter	Moderate:	GL-0.80	Very hard:	
Water level observed upon completion (m):		0.30			**Technician:**	DH

Remarks

Samples or tests		Shear Strength (kPa)	Depth	Legend	Strata Description
Type	Depth (m)				
D	0.10				Grass over MADE GROUND (mid brown slightly gravelly clayey SAND. Gravel of flint
D	0.30		0.40		
D	0.50				Brown slightly gravelly clayey SAND. Gravel of flint [HEAD]
			0.70		Stiff brown and grey very gravelly sandy CLAY. Gravel of flint [HEAD]
D	1.00	140			
			1.30		Brown and grey silty CLAY with laminations of sand, becoming orangish brown and brownish grey at depth, very silty/sandy at 3.00m [BAGSHOT FORMATION]
D	1.50				
D	2.00				
D	2.50				
D	3.00				
			3.10		END OF BOREHOLE

Symbol Code: **B** - Large Disturbed **D** - Small Disturbed **W** - Water Sample **R** - Root Sample **HSV** - Hand Shear Vane **PID** - Photo Ionisation Detector

ALBURY S.I. LTD Miltons Yard, Petworth Road, Witley, Surrey GU8 5LH www.alburysi.co.uk		BOREHOLE	3
CONTRACT	Blagrove Lane, Wokingham	**Report Ref**	26/13342/GO
Client	Yvonne and Rob Ward	**Date**	12/02/2026
Site Address	Land adjacent to Meadow View, Blagrove Lane, Wokingham, Berkshire RG41 4AU	**Ground Level**	

Water Strikes (m)		Type & Dimensions	Ease of excavation (m)			
1.	0.90	Drive-in Window Sampler	Very easy:		Difficult:	1.00-3.10
2.		60mm to 50mm diameter	Moderate:	GL-1.00	Very hard:	
Water level observed upon completion (m):		0.25			**Technician:**	EK

Remarks

Samples or tests		Shear Strength (kPa)	Depth	Legend	Strata Description
Type	Depth (m)				
D	0.10				Grass over MADE GROUND (mid brown slightly clayey silty SAND with rootlets, becoming clayey with depth and a slight organic odour at 0.50m. Gravel of flint with some rounded pebbles)
D	0.30				
D	0.50				
			0.80		
D	1.00				Light brown and brownish grey clayey SAND/very sandy CLAY [HEAD]
			1.10		Orangish brown sandy CLAY [BAGSHOT FORMATION]
D	1.50				
			1.90		
D	2.00				Orangish brown and light grey silty CLAY with frequent laminations of sand [BAGSHOT FORMATION]
D	2.50				
			2.80		
D	3.00				Brown mottled grey silty CLAY with laminations of fine sand [BAGSHOT FORMATION]
			3.10		END OF BOREHOLE
W	(0.25)				

Symbol Code: **B** - Large Disturbed **D** - Small Disturbed **W** - Water Sample **R** - Root Sample **HSV** - Hand Shear Vane **PID** - Photo Ionisation Detector

ALBURY S.I. LTD Miltons Yard, Petworth Road, Witley, Surrey GU8 5LH www.alburysi.co.uk		BOREHOLE	4
CONTRACT	Blagrove Lane, Wokingham	**Report Ref**	26/13342/GO
Client	Yvonne and Rob Ward	**Date**	12/02/2026
Site Address	Land adjacent to Meadow View, Blagrove Lane, Wokingham, Berkshire RG41 4AU	**Ground Level**	

Water Strikes (m)		Type & Dimensions	Ease of excavation (m)			
1.	0.50	Drive-in Window Sampler	Very easy:		Difficult:	0.80-3.10
2.		60mm to 50mm diameter	Moderate:	GL-0.80	Very hard:	
Water level observed upon completion (m):		0.45			**Technician:**	DH

Remarks

Samples or tests		Shear Strength (kPa)	Depth	Legend	Strata Description
Type	Depth (m)				
D	0.10				Grass over probable disturbed or MADE GROUND (mid brown slightly gravelly clayey SAND with roots. Gravel of flint)
D	0.30				
D	0.50				
			0.80		
D	1.00	100			Stiff light grey and orangish brown silty CLAY with laminations of sand, becoming very silty/sandy at 3.00m [BAGSHOT FORMATION]
D	1.50				
D	2.00				
D	2.50				
D	3.00				
			3.10		END OF BOREHOLE

Symbol Code: **B** - Large Disturbed **D** - Small Disturbed **W** - Water Sample **R** - Root Sample **HSV** - Hand Shear Vane **PID** - Photo Ionisation Detector

ALBURY S.I. LTD Miltons Yard, Petworth Road, Witley, Surrey GU8 5LH www.alburysi.co.uk		BOREHOLE	5
CONTRACT	Blagrove Lane, Wokingham	**Report Ref**	26/13342/GO
Client	Yvonne and Rob Ward	**Date**	12/02/2026
Site Address	Land adjacent to Meadow View, Blagrove Lane, Wokingham, Berkshire RG41 4AU	**Ground Level**	

Water Strikes (m)		Type & Dimensions	Ease of excavation (m)			
1.	0.35	Drive-in Window Sampler	Very easy:		Difficult:	0.50-3.10
2.		60mm to 50mm diameter	Moderate:	GL-0.50	Very hard:	
Water level observed upon completion (m):		0.20			**Technician:**	EK

Remarks

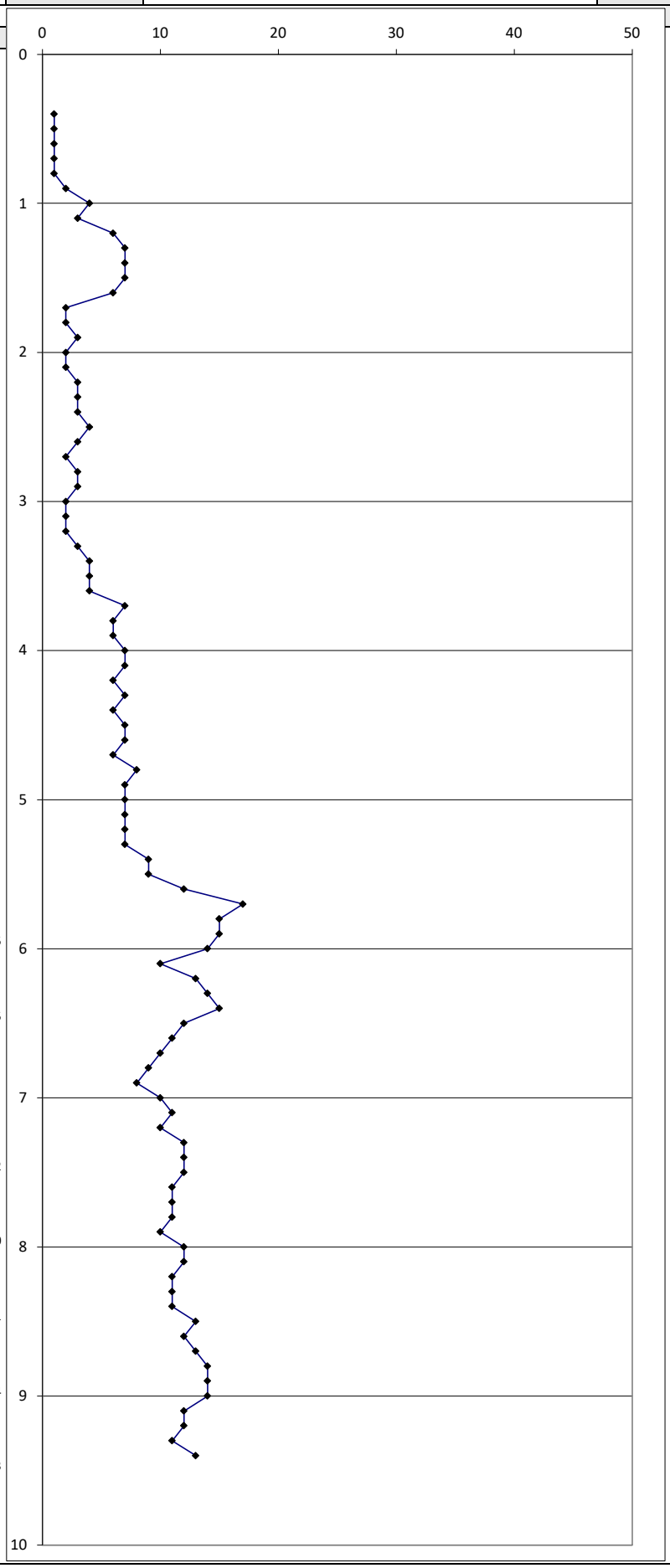
DPH dynamic probe performed adjacent to position

Samples or tests		Shear Strength (kPa)	Depth	Legend	Strata Description
Type	Depth (m)				
D	0.10				Grass over MADE GROUND (greyish brown gravelly clayey SAND with rootlets. Gravel of flint)
D	0.30		0.30		Brown and grey slightly gravelly slightly clayey silty SAND. Gravel of flint with much medium rounded pebbles
D	0.50				
			0.80		Stiff orangish brown and grey very silty CLAY with laminations of sand
D	1.00	100			[BAGSHOT FORMATION]
D	1.50				
			1.70		Stiff orangish brown and light grey silty CLAY with frequent laminations of sand, becoming brownish grey and light grey with depth
D	2.00				[BAGSHOT FORMATION]
D	2.50				
			2.70		Stiff yellowish brown mottled grey silty CLAY with occasional laminations of orange sand
D	3.00				[BAGSHOT FORMATION]
			3.10		END OF BOREHOLE

Symbol Code: **B** - Large Disturbed **D** - Small Disturbed **W** - Water Sample **R** - Root Sample **HSV** - Hand Shear Vane **PID** - Photo Ionisation Detector

ALBURY S.I. LTD Miltons Yard, Petworth Road, Witley, Surrey GU8 5LH	Report Ref	26/13342/GO	DYNAMIC PROBE	5
Sheet 1 of 1	**Client**	Yvonne & Rob Ward	**Date**	12/02/2026
DPH Dynamic Probe	**Contract**	Blagrove Lane, Wokingham	**Ground Level**	
Sacrificial Tip				

Depth, m	Blows / 100 mm
GL	1 1 1 1 1
1	4 3 6 7 7
	7 6 2 2 3
2	2 2 3 3 3
	4 3 2 3 3
3	2 2 2 3 4
	4 4 7 6 6
4	7 7 6 7 6
	7 7 6 8 7
5	7 7 7 7 9
	9 12 17 15 15
6	14 10 13 14 15
	12 11 10 9 8
7	10 11 10 12 12
	12 11 11 11 10
8	12 12 11 11 11
	13 12 13 14 14
9	14 12 12 11 13
10	



Torque, Nm
0
10
10
40
45
60
60
70
75

Remarks

Probing commenced from base of hand excavated starter pit

ALBURY S.I. LTD Miltons Yard, Petworth Road, Witley, Surrey GU8 5LH www.alburysi.co.uk		BOREHOLE	6
CONTRACT	Blagrove Lane, Wokingham	**Report Ref**	26/13342/GO
Client	Yvonne and Rob Ward	**Date**	12/02/2026
Site Address	Land adjacent to Meadow View, Blagrove Lane, Wokingham, Berkshire RG41 4AU	**Ground Level**	

Water Strikes (m)		Type & Dimensions	Ease of excavation (m)			
1.	Ground Level	Drive-in Window Sampler	Very easy:		Difficult:	0.80-3.10
2.		60mm to 50mm diameter	Moderate:	GL-0.80	Very hard:	
Water level observed upon completion (m):		Ground Level	**Technician:**	EK		

Remarks

Samples or tests		Shear Strength (kPa)	Depth		Legend	Strata Description
Type	Depth (m)					
D	0.10					Grass over MADE GROUND (dark brown gravelly clayey SAND with rootlets, becoming brownish grey with organic staining and odour at 0.50m. Gravel of flint with much coarse)
D	0.30					
D	0.50					
			0.80			
D	1.00	100				Stiff light grey and yellowish brown and grey silty CLAY with laminations of sand and rare fine roots [BAGSHOT FORMATION]
D	1.50					
D	2.00					
			2.20			
D	2.50					Orangish brown and grey very silty CLAY with frequent laminations of orangish brown fine sand [BAGSHOT FORMATION]
D	3.00					
			3.10			END OF BOREHOLE
W	(0.25)					

Symbol Code: **B** - Large Disturbed **D** - Small Disturbed **W** - Water Sample **R** - Root Sample **HSV** - Hand Shear Vane **PID** - Photo Ionisation Detector

ALBURY S.I. LTD Miltons Yard, Petworth Road, Witley, Surrey GU8 5LH www.alburysi.co.uk		BOREHOLE	7
CONTRACT	Blagrove Lane, Wokingham	**Report Ref**	26/13342/GO
Client	Yvonne and Rob Ward	**Date**	12/02/2026
Site Address	Land adjacent to Meadow View, Blagrove Lane, Wokingham, Berkshire RG41 4AU	**Ground Level**	

Water Strikes (m)		Type & Dimensions	Ease of excavation (m)			
1.	0.50	Drive-in Window Sampler	Very easy:		Difficult:	0.50-3.10
2.		60mm to 50mm diameter	Moderate:	GL-0.50	Very hard:	
Water level observed upon completion (m):		0.40			**Technician:**	DH, EK

Remarks

Samples or tests		Shear Strength (kPa)	Depth	Legend	Strata Description
Type	Depth (m)				
D	0.10				Grass over MADE GROUND (mid brown slightly gravelly clayey SAND with rootlets. Gravel of flint and concrete fragments)
D	0.30		0.40		
D	0.50				Brown and grey gravelly very silty SAND. Gravel of flint (possible disturbed or MADE GROUND?)
			0.70		Stiff orangish brown and grey sandy CLAY with root hairs in the upper margins (1.00m), becoming brownish grey silty CLAY with laminations of sand, to mottled yellowish, orangish brown and grey at depth
D	1.00	140			[BAGSHOT FORMATION]
D	1.50				
D	2.00				
D	2.50				
D	3.00				
			3.10		END OF BOREHOLE

Symbol Code: **B** - Large Disturbed **D** - Small Disturbed **W** - Water Sample **R** - Root Sample **HSV** - Hand Shear Vane **PID** - Photo Ionisation Detector

APPENDIX 2

LABORATORY TEST RESULTS

INDEX PROPERTIES AND WATER CONTENTS

BS 1377 : Part 2 and BS EN ISO 17892: Part 1 and Part 12: 5.3 and 6.1

Report Ref	26/13342/GO	Contract	Blagrove Lane, Wokingham	*Sheet 1 of 4*

BH No.	Sample		Water Content W %	Liquid Limit W_L %	Plastic Limit W_P %	Plasticity Index IP %	Passing 425 µm Sieve %	Modified Plasticity Index IPc %	Atterberg Classification	NHBC Classification VCP	Sample Preparation	Remarks
	Depth m	Description										
1	1.00	Orangish brown and light grey silty CLAY with laminations of fine sand and roots	20.1	44	17	27	100	27	CI	Medium	A	
	1.50	Orangish brown and light grey silty CLAY with laminations of fine sand and roots	23.4									
	2.00	Orangish brown and light grey silty CLAY with laminations of fine sand and roots	27.8									
	2.50	Orangish brown and light grey silty CLAY with laminations of fine sand and root remains	28.7									
	3.00	Orangish brown and light grey silty CLAY with laminations of fine sand and root remains	30.7									
2	1.00	Brown and grey very gravelly sandy CLAY. Gravel of flint	11.0	31	13	18	53	10	CL	Low	S	
	1.50	Brown and grey silty CLAY with laminations of sand	21.3									
	2.00	Brown and grey silty CLAY with laminations of sand	30.5									
	2.50	Brown and grey silty CLAY with laminations of sand	33.5									
	3.00	Orangish brown and brownish grey laminated very silty/sandy CLAY	25.1									
		(continued on next sheet)										

Liquid Limit determined by one-point fall cone method using 80g 30° cone and correction factors after Clayton and Jukes (1978) unless otherwise stated above

KEY: *Soil Type:* **C** - Clay **M** - Silt **O** - Organic **NP** - Non Plastic

Plasticity: **L** - Low **I** - Intermediate **H** - High **V** - Very High **E** - Extremely High

Sample Preparation: **A** - As Received **H** - Particles >425µm removed by hand picking **S** - Particles >425µm removed by washing and wet sieving with oven drying

INDEX PROPERTIES AND WATER CONTENTS

BS 1377 : Part 2 and BS EN ISO 17892: Part 1 and Part 12: 5.3 and 6.1

Report Ref	26/13342/GO	Contract	Blagrove Lane, Wokingham	*Sheet 2 of 4*

BH No.	Sample		Water Content W %	Liquid Limit W_L %	Plastic Limit W_P %	Plasticity Index IP %	Passing 425 µm Sieve %	Modified Plasticity Index IPc %	Atterberg Classification	NHBC Classification VCP	Sample Preparation	Remarks
	Depth m	Description										
3	1.50	Orangish brown sandy CLAY	23.2	32	18	14	100	14	CL	Low	A	
	2.00	Orangish brown and light grey silty CLAY with frequent laminations of sand	25.2									
	2.50	Orangish brown and light grey silty CLAY with frequent laminations of sand	22.8									
	3.00	Brown mottled grey silty CLAY with laminations of fine sand	24.6									
4	1.00	Light grey and orangish brown silty CLAY with laminations of sand	26.4	37	`16	21	100	21	CI	Medium	A	
	1.50	Light grey and orangish brown silty CLAY with laminations of sand	28.1									
	2.00	Light grey and orangish brown silty CLAY with laminations of sand	26.1									
	2.50	Light grey and orangish brown silty CLAY with laminations of sand	29.7									
	3.00	Light grey and orangish brown silty CLAY with laminations of sand	29.7									
		(continued on next sheet)										

Liquid Limit determined by one-point fall cone method using 80g 30° cone and correction factors after Clayton and Jukes (1978) unless otherwise stated above

KEY: *Soil Type:* **C** - Clay **M** - Silt **O** - Organic **NP** - Non Plastic

Plasticity: **L** - Low **I** - Intermediate **H** - High **V** - Very High **E** - Extremely High

Sample Preparation: **A** - As Received **H** - Particles >425µm removed by hand picking **S** - Particles >425µm removed by washing and wet sieving with oven drying

INDEX PROPERTIES AND WATER CONTENTS

BS 1377 : Part 2 and BS EN ISO 17892: Part 1 and Part 12: 5.3 and 6.1

Report Ref	26/13342/GO	Contract	Blagrove Lane, Wokingham	*Sheet 3 of 4*

BH No.	Sample		Water Content W %	Liquid Limit W_L %	Plastic Limit W_P %	Plasticity Index IP %	Passing 425 µm Sieve %	Modified Plasticity Index IPc %	Atterberg Classification	NHBC Classification VCP	Sample Preparation	Remarks
	Depth m	Description										
5	1.00	Orangish brown and grey very silty CLAY with laminations of sand	26.3									
	1.50	Orangish brown and grey very silty CLAY with laminations of sand	23.7	36	17	19	100	19	CI	Low	A	
	2.00	Orangish brown and light grey silty CLAY with laminations of sand	28.1									
	2.50	Brownish grey and light grey silty CLAY with frequent laminations of sand	30.2									
	3.00	Yellowish brown mottled grey silty CLAY with occasional laminations of orange sand	27.6									
6	1.00	Light grey and yellowish brown and grey silty CLAY with laminations of sand and rare fine roots	30.5	67	23	44	100	44	CH	High	A	
	1.50	Light grey and yellowish brown and grey silty CLAY with laminations of sand	26.0									
	2.00	Light grey and yellowish brown and grey silty CLAY with laminations of sand	27.4									
	2.50	Orangish brown and grey very silty CLAY with frequent laminations of orangish brown fine sand	27.7									
	3.00	Orangish brown and grey very silty CLAY with frequent laminations of orangish brown fine sand	27.7									
		(continued on next sheet)										

Liquid Limit determined by one-point fall cone method using 80g 30° cone and correction factors after Clayton and Jukes (1978) unless otherwise stated above

KEY: *Soil Type:* **C** - Clay **M** - Silt **O** - Organic **NP** - Non Plastic

Plasticity: **L** - Low **I** - Intermediate **H** - High **V** - Very High **E** - Extremely High

Sample Preparation: **A** - As Received **H** - Particles >425µm removed by hand picking **S** - Particles >425µm removed by washing and wet sieving with oven drying

INDEX PROPERTIES AND WATER CONTENTS

BS 1377 : Part 2 and BS EN ISO 17892: Part 1 and Part 12: 5.3 and 6.1

Report Ref	26/13342/GO	Contract	Blagrove Lane, Wokingham	*Sheet 4 of 4*

BH No.	Sample		Water Content W %	Liquid Limit W_L %	Plastic Limit W_P %	Plasticity Index IP %	Passing 425 µm Sieve %	Modified Plasticity Index IPc %	Atterberg Classification	NHBC Classification VCP	Sample Preparation	Remarks
	Depth m	Description										
7	1.00	Orangish brown and grey sandy CLAY with root hairs	20.6									
	1.50	Brownish grey silty CLAY with laminations of sand	19.0	57	17	40	100	40	CH	Medium	A	
	2.00	Brownish grey silty CLAY with laminations of sand	21.8									
	2.50	Brownish grey silty CLAY with laminations of sand	26.8									
	3.00	Mottled yellowish, orangish brown and grey silty CLAY with laminations of sand	29.2									

Liquid Limit determined by one-point fall cone method using 80g 30° cone and correction factors after Clayton and Jukes (1978) unless otherwise stated above

KEY: *Soil Type:* **C** - Clay **M** - Silt **O** - Organic **NP** - Non Plastic

Plasticity: **L** - Low **I** - Intermediate **H** - High **V** - Very High **E** - Extremely High

Sample Preparation: **A** - As Received **H** - Particles >425µm removed by hand picking **S** - Particles >425µm removed by washing and wet sieving with oven drying

APPENDIX 3

DESICCATION

DESICCATION

Classification

The removal of moisture from a soil as a result of external influences with a constant stress regime, results in shrinkage or settlement of the soil. The magnitude of shrinkage is dependent upon the geological stress history of the soil, its clay content and the composition of the clay minerals. Under normal climatic conditions, there is a seasonal cyclic variation in soil moisture and, hence, volume change, which extends to depths of approximately 1m. When the soil moisture deficit attains a critical value, the shrinkage of the soil can become significant. In these circumstances, the soil can be regarded as being present in a desiccated state.

Causes

A common cause of desiccation consists of the reduction in soil moisture by tree root action. In the absence of a water table at shallow depth, root action of trees will reduce the soil moisture level in order to maintain growth. In general terms, the increase in rainfall which occurs during winter periods will allow for some replacement of the moisture content of the soil, particularly where isolated or immature trees are concerned.

However, when drought summer conditions or limited winter rainfall occurs, desiccated zones will develop within the zone of influence of tree roots. In woodland, desiccation develops as it is not possible for rainfall to overcome the soil moisture deficit. Other causes of desiccation, which have created problems to structures, include incorrectly installed and insulated heating pipes or ducts and industrial processes, ie furnaces or brick kilns.

Effects

The development of desiccation in clay soils will result in an increase in strength of the material. In addition, negative pore water pressure or soil suction will develop. Any foundation system located within soil which is subject to a reduction in soil moisture can experience structural distress, which results from the loss in volume or shrinkage of the ground. Also, if the source of the desiccation is removed, there will be heave of the soils as a result of an increase in equilibrium water content

It is evident, therefore, that foundation systems founded in soils which are actively experiencing an increase or decrease in soil moisture, will be subject to either heave or settlement, which can induce stresses within the structure. It should also be appreciated that a desiccated soil, which is experiencing an increase in equilibrium water content, will attempt to increase its volume in a horizontal as well as vertical plane. It is important, therefore, to ensure that horizontal movements do not apply differential stresses to structural elements, by incorporating collapsible membranes within remedial works.

Identification

A soil in a state of equilibrium is present in a semi-solid state. At the onset of desiccation, the condition of the soil moves towards the boundary between a solid and semi-solid state, this boundary being defined as the plastic limit of the soil. It follows, therefore, that when the natural water content of a soil lies close to, or falls below, the value of the plastic limit, the soil can be considered to be desiccated.

An alternative proposal was made by Driscoll (1983), who related the soil suction induced by desiccation to a function of the liquid limit of the soil. In general terms, desiccation is assumed to be present when the moisture content falls below a level of 40% liquid limit. The arbitrary factor of 0.4 relates to a soil suction value proposed by Croney (1977) and may vary with the composition and mineralogy of different soil types. This approach is only considered to be valid over a limited depth range as the overburden effect will result in a natural reduction in soil moisture and result in the development of negative pore pressures.

A further approach, which considers the shear strength of the clay, Pugh et al (1995), recognises the fact that a reduction in soil moisture will result in an increase in undrained shear strength as well as the development of negative pore pressures. Whilst this approach has a considerable amount of merit, care is required in establishing the value of the soil's in situ shear strength, particularly if it is not possible to obtain representative "undisturbed" samples from cable percussion boreholes. The proposal made in the Pugh paper that the simple pocket penetrometer will provide accurate consistent results should be treated with care, as the pocket penetrometer can take no account of the effects of disturbance and remoulding that are inevitable when completing a trial pit with a mechanical excavator. It is for this reason that this Company attempts to establish the shear strength of clay soils by using the Geonor Field Vane. With this test equipment the appropriate-sized vane is pushed into the side of the pit, through the thin disturbed zone which is caused by the teeth of the bucket during excavation. Furthermore, by use of the 'blank' probe, it is possible to take account of any skin friction which builds up on the shaft of the vane and thus provide a more accurate assessment of the shear strength of the soils.

Hence, a combination of the methods discussed above should be considered in order to confirm whether the development of soil moisture reduction to achieve a desiccated state has occurred within a particular site. The data for affected areas should, where possible, be compared with soils which lie outside the influence of tree root bulbs and may, therefore, be considered to be present in a stable and equilibrium state.

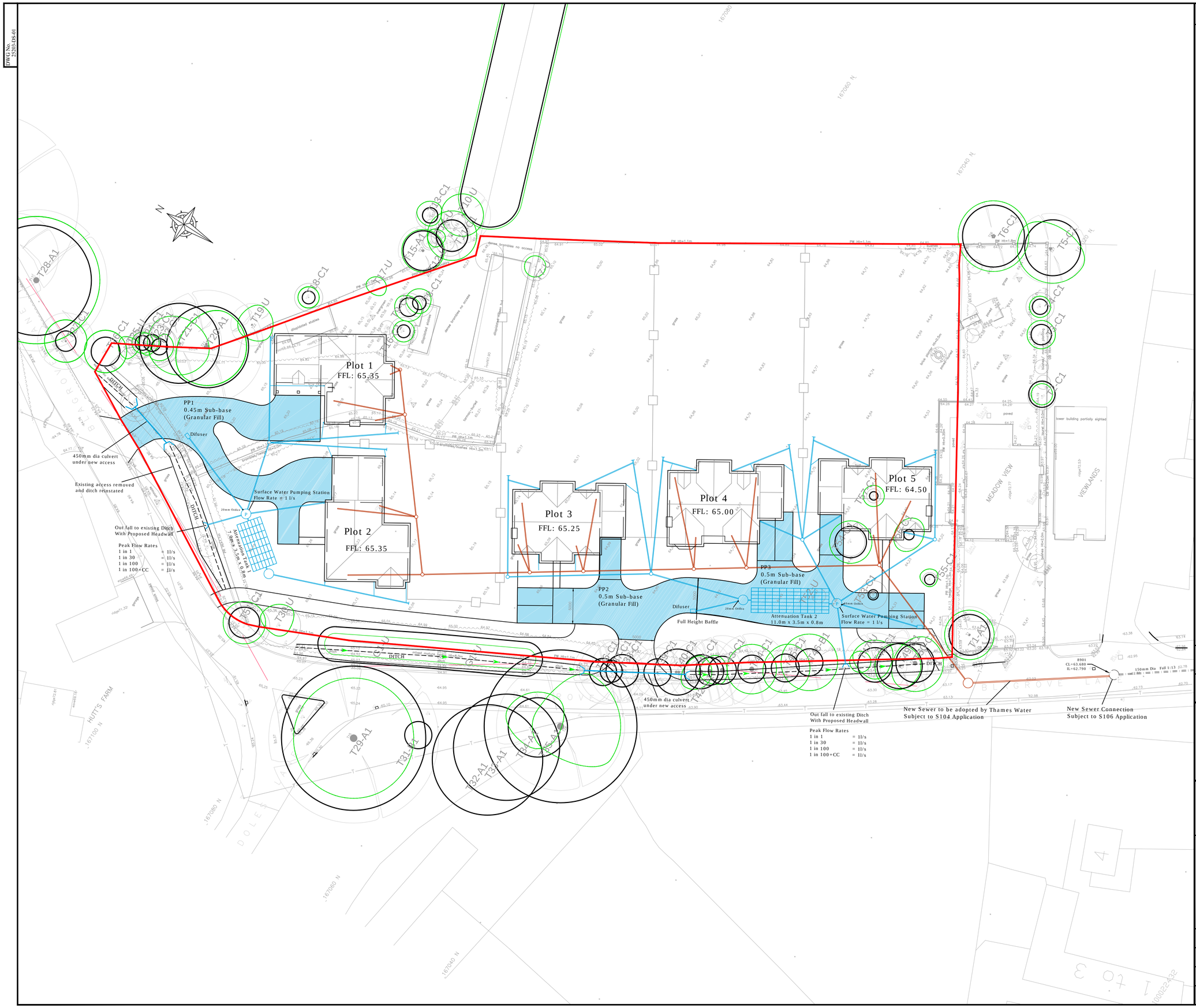
References

Croney D (1977)	The Design and Performance of Road Pavements London HMSO pp 674
Driscoll R (1983)	The Influence of Vegetation on the Swelling and Shrinking of Clay Soils in Britain Geotechnique 33.4 pp 93-105
Pugh RS, Parnell PG and Parks RD (1995)	A rapid and reliable on site method of assessing desiccation in clay soils Geotechnical Engineering 13 Jan 1995 pp 25—30

APPENDIX C

Proposed Drainage Strategy

DWG No. 252037-DS-01



NOTES

1. All dimensions are in meters unless expressed otherwise and all levels are shown in meters above Ordnance Datum.
2. This drawing shall be read in conjunction with the drainage schedules and standard details.
3. All existing sewer routes are to be proved on site by the contractor and any discrepancies notified to engineer.
4. All sewers shall be constructed in accordance with Part H of the Building Regulations and Sewers for Adoption 7th Edition.
5. It is the contractors responsibility to ensure compliance with current building regulations and codes of practice.
6. Reference should be made to the structural engineers details for all aspects of foundation design and construction.
7. The contractor should check all dimensions on site. Any discrepancies shall be reported to the engineer immediately.
8. Connections to the adopted drainage authority sewers shall be made under the supervision of the authority. The contractor shall be responsible for obtaining the necessary consents required from the drainage authority.
9. Bed type B,F and N shall be used for rigid pipes. Bed type Z shall be used for all gully connections and pipes under proposed carriageways with less than 700mm cover. The concrete bed and surround is to extend to the side of the trench or be of minimum width and voids filled with well compacted selected backfill.
10. All precast concrete manhole units are to conform to B.S. 5911. Precast concrete cover slabs are to be heavy duty.
11. Downstream exit pipes of 600mm dia. and over should be fitted with heavy duty safety chains across their mouths.
12. Where large differential settlement is probable, several short lengths of pipe with flexible joints should be laid on either side of the chamber.
13. Where drains pass through foundations, a flexible joint should be provided within 150mm of the face of the structure.
14. Fast setting resin mortars may be used in lieu of cement mortar for bedding manhole frames where agreed with the Engineer to enable early cover loading.
15. The concrete base slab shall be 225mm minimum thickness for chambers up to 4500mm deep. Manholes over 4500mm deep require a slab 450mm thick.
16. All manholes over 2000mm deep are to be fitted with a "DANGER TEST FOR OXYGEN" sign
17. Appropriate measures (to be agreed with the district council's building control section) are to be taken to discourage rodent entry into the properties.
18. The contractor is to keep a record of any variations made on site, including the relocation of sewers or drains, so that an as built drawing can be prepared upon completion of the project.
19. Location of RWP's and SVP's to be confirmed by the architect, Sub Stacks shall not be used unless connected to a ventilated section of the sewer in accordance with Building Regulations.

Rev	Amendment	Drawn	Checked	Approved	Date
P2	AMENDMENTS	IN	RS	KBL	06/03/26
P1	PRELLIMINARY ISSUE	IN	RS	KBL	14/11/25

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Drainage Strategy

Sheet 1 of 1

DRAWN	IN	CHECKED	RS	APPROVED	KBL
DATE	Nov-2025	DATE	Nov-2025	DATE	Nov-2025
SCALE	1:250	PRJ No.	252037	SIZE	REV
DWG No.	252037-DS-01			A1	P2

APPENDIX D

MicroDrainage Calculations

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.300
Area (ha)	0.608	Urban	0.000
SAAR (mm)	700	Region Number	Region 6

Results	**l/s**
QBAR Rural	1.1
QBAR Urban	1.1
Q100 years	3.5
Q1 year	0.9
Q30 years	2.5
Q100 years	3.5

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Cascade Summary of Results for PP1.srcx

Upstream Structures	Outflow To	Overflow To
(None)	Tank 1.srcx	(None)

Half Drain Time : 24 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	64.094	0.084	0.1	0.2	0.3	0.3	O K
30 min Summer	64.127	0.117	0.1	0.3	0.4	0.5	O K
60 min Summer	64.148	0.138	0.1	0.3	0.4	0.7	O K
120 min Summer	64.161	0.151	0.1	0.3	0.4	0.9	O K
180 min Summer	64.163	0.153	0.1	0.3	0.4	0.9	O K
240 min Summer	64.160	0.150	0.1	0.3	0.4	0.9	O K
360 min Summer	64.151	0.141	0.1	0.3	0.4	0.8	O K
480 min Summer	64.139	0.129	0.1	0.3	0.4	0.6	O K
600 min Summer	64.128	0.118	0.1	0.3	0.4	0.5	O K
720 min Summer	64.117	0.107	0.1	0.3	0.4	0.4	O K
960 min Summer	64.099	0.089	0.1	0.2	0.3	0.3	O K
1440 min Summer	64.076	0.066	0.1	0.2	0.3	0.2	O K
2160 min Summer	64.057	0.047	0.0	0.2	0.2	0.1	O K
2880 min Summer	64.047	0.037	0.0	0.1	0.2	0.1	O K
4320 min Summer	64.037	0.027	0.0	0.1	0.1	0.0	O K
5760 min Summer	64.033	0.023	0.0	0.1	0.1	0.0	O K
7200 min Summer	64.031	0.021	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	28.578	0.0	0.4	17
30 min Summer	18.555	0.0	0.8	30
60 min Summer	11.729	0.0	1.3	44
120 min Summer	7.265	0.0	1.9	78
180 min Summer	5.463	0.0	2.3	112
240 min Summer	4.458	0.0	2.5	144
360 min Summer	3.345	0.0	2.9	206
480 min Summer	2.714	0.0	3.2	266
600 min Summer	2.305	0.0	3.5	326
720 min Summer	2.017	0.0	3.6	384
960 min Summer	1.634	0.0	3.9	502
1440 min Summer	1.215	0.0	4.4	738
2160 min Summer	0.904	0.0	4.7	1100
2880 min Summer	0.733	0.0	5.0	1468
4320 min Summer	0.545	0.0	5.2	2172
5760 min Summer	0.442	0.0	5.2	2928
7200 min Summer	0.376	0.0	5.1	3560

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Cascade Summary of Results for PP1.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	64.029	0.019	0.0	0.1	0.1	0.0	O K
10080 min Summer	64.028	0.018	0.0	0.1	0.1	0.0	O K
15 min Winter	64.116	0.106	0.1	0.3	0.3	0.4	O K
30 min Winter	64.148	0.138	0.1	0.3	0.4	0.7	O K
60 min Winter	64.166	0.156	0.1	0.3	0.5	0.9	O K
120 min Winter	64.173	0.163	0.1	0.3	0.5	1.0	O K
180 min Winter	64.169	0.159	0.1	0.3	0.5	1.0	O K
240 min Winter	64.161	0.151	0.1	0.3	0.4	0.9	O K
360 min Winter	64.143	0.133	0.1	0.3	0.4	0.7	O K
480 min Winter	64.125	0.115	0.1	0.3	0.4	0.5	O K
600 min Winter	64.109	0.099	0.1	0.2	0.3	0.4	O K
720 min Winter	64.096	0.086	0.1	0.2	0.3	0.3	O K
960 min Winter	64.076	0.066	0.1	0.2	0.3	0.2	O K
1440 min Winter	64.055	0.045	0.0	0.2	0.2	0.1	O K
2160 min Winter	64.042	0.032	0.0	0.1	0.1	0.0	O K
2880 min Winter	64.037	0.027	0.0	0.1	0.1	0.0	O K
4320 min Winter	64.032	0.022	0.0	0.1	0.1	0.0	O K
5760 min Winter	64.029	0.019	0.0	0.1	0.1	0.0	O K
7200 min Winter	64.027	0.017	0.0	0.0	0.1	0.0	O K
8640 min Winter	64.025	0.015	0.0	0.0	0.0	0.0	O K
10080 min Winter	64.024	0.014	0.0	0.0	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.329	0.0	5.0	4400
10080 min Summer	0.294	0.0	4.9	5024
15 min Winter	28.578	0.0	0.6	17
30 min Winter	18.555	0.0	1.1	30
60 min Winter	11.729	0.0	1.6	48
120 min Winter	7.265	0.0	2.3	84
180 min Winter	5.463	0.0	2.7	120
240 min Winter	4.458	0.0	3.0	152
360 min Winter	3.345	0.0	3.4	216
480 min Winter	2.714	0.0	3.8	276
600 min Winter	2.305	0.0	4.0	332
720 min Winter	2.017	0.0	4.3	390
960 min Winter	1.634	0.0	4.6	508
1440 min Winter	1.215	0.0	5.1	736
2160 min Winter	0.904	0.0	5.6	1088
2880 min Winter	0.733	0.0	5.9	1460
4320 min Winter	0.545	0.0	6.2	2136
5760 min Winter	0.442	0.0	6.3	2880
7200 min Winter	0.376	0.0	6.3	3616
8640 min Winter	0.329	0.0	6.2	4312
10080 min Winter	0.294	0.0	6.1	4992

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Cascade Rainfall Details for PP1.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.028

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

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Cascade Model Details for PP1.srcx

Storage is Online Cover Level (m) 64.660

Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	27.8
Max Percolation (l/s)	38.6	Slope (1:X)	51.5
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.010	Cap Volume Depth (m)	0.450

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	3.7
Membrane Percolation (mm/hr)	1000	Length (m)	22.2
Max Percolation (l/s)	22.8	Slope (1:X)	64.2
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.210	Cap Volume Depth (m)	0.450

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 64.010

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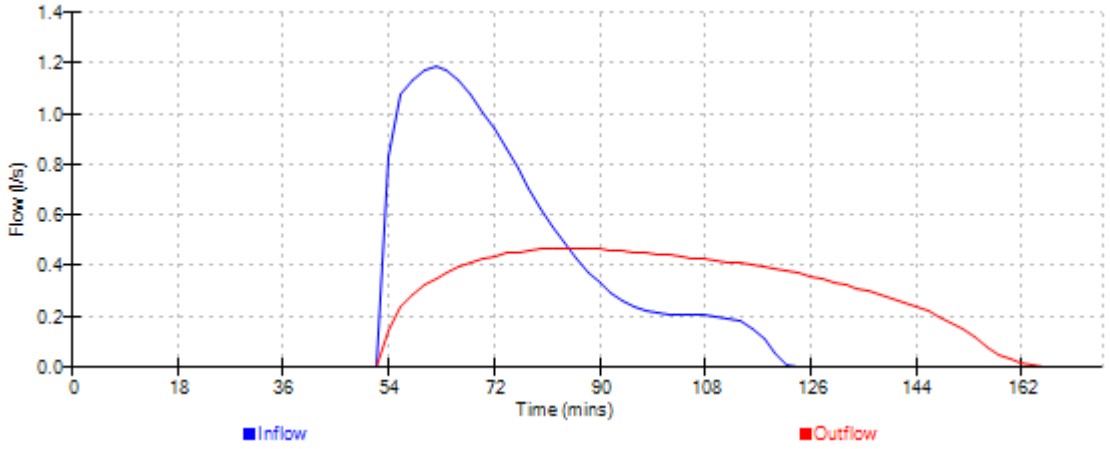
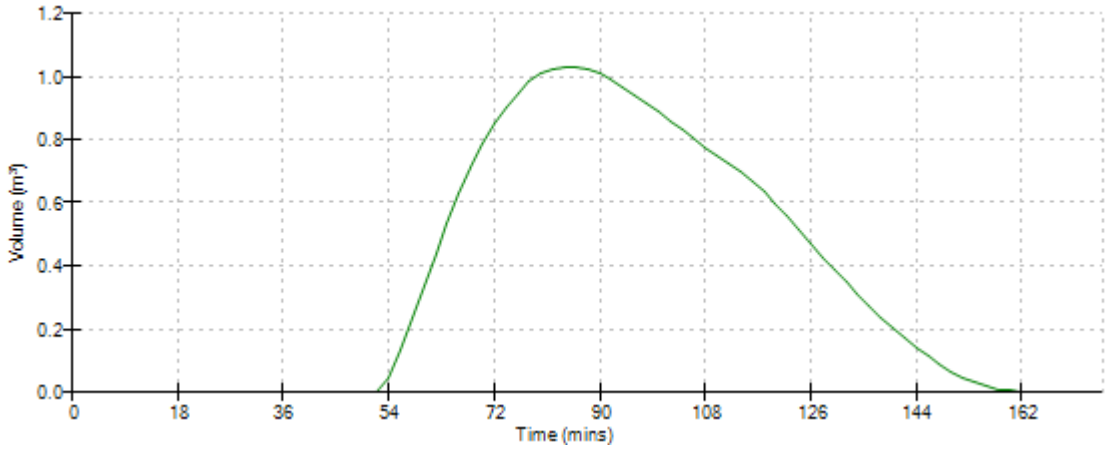
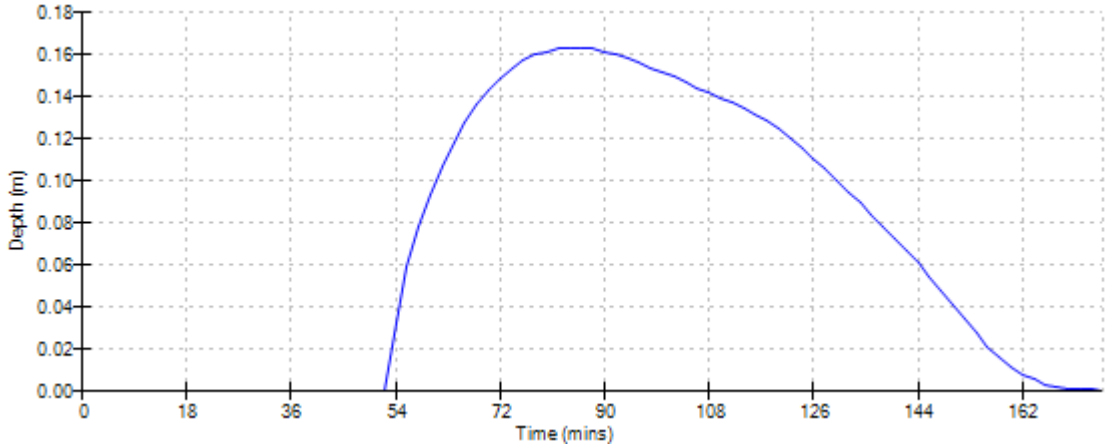
Cascade Event: 120 min Winter for PP1.srcx







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Cascade Summary of Results for PP2.srcx

Upstream Structures	Outflow To	Overflow To
(None)	Tank 2.srcx	(None)

Half Drain Time : 15 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	64.307	0.057	0.1	0.2	0.3	0.2	O K
30 min Summer	64.327	0.077	0.1	0.2	0.3	0.3	O K
60 min Summer	64.341	0.091	0.1	0.2	0.4	0.5	O K
120 min Summer	64.348	0.098	0.1	0.2	0.4	0.5	O K
180 min Summer	64.347	0.097	0.1	0.2	0.4	0.5	O K
240 min Summer	64.344	0.094	0.1	0.2	0.4	0.5	O K
360 min Summer	64.335	0.085	0.1	0.2	0.3	0.4	O K
480 min Summer	64.326	0.076	0.1	0.2	0.3	0.3	O K
600 min Summer	64.318	0.068	0.1	0.2	0.3	0.3	O K
720 min Summer	64.311	0.061	0.1	0.2	0.3	0.2	O K
960 min Summer	64.300	0.050	0.1	0.2	0.2	0.1	O K
1440 min Summer	64.289	0.039	0.0	0.1	0.2	0.1	O K
2160 min Summer	64.279	0.029	0.0	0.1	0.1	0.0	O K
2880 min Summer	64.275	0.025	0.0	0.1	0.1	0.0	O K
4320 min Summer	64.271	0.021	0.0	0.1	0.1	0.0	O K
5760 min Summer	64.268	0.018	0.0	0.1	0.1	0.0	O K
7200 min Summer	64.266	0.016	0.0	0.0	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	28.578	0.0	0.3	17
30 min Summer	18.555	0.0	0.6	27
60 min Summer	11.729	0.0	0.9	42
120 min Summer	7.265	0.0	1.3	76
180 min Summer	5.463	0.0	1.5	108
240 min Summer	4.458	0.0	1.7	140
360 min Summer	3.345	0.0	2.0	200
480 min Summer	2.714	0.0	2.2	260
600 min Summer	2.305	0.0	2.4	320
720 min Summer	2.017	0.0	2.5	378
960 min Summer	1.634	0.0	2.7	492
1440 min Summer	1.215	0.0	3.0	736
2160 min Summer	0.904	0.0	3.2	1100
2880 min Summer	0.733	0.0	3.4	1468
4320 min Summer	0.545	0.0	3.5	2140
5760 min Summer	0.442	0.0	3.6	2856
7200 min Summer	0.376	0.0	3.5	3616

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Cascade Summary of Results for PP2.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	64.265	0.015	0.0	0.0	0.0	0.0	O K
10080 min Summer	64.264	0.014	0.0	0.0	0.0	0.0	O K
15 min Winter	64.322	0.072	0.1	0.2	0.3	0.3	O K
30 min Winter	64.341	0.091	0.1	0.2	0.4	0.5	O K
60 min Winter	64.352	0.102	0.1	0.3	0.4	0.6	O K
120 min Winter	64.353	0.103	0.1	0.3	0.4	0.6	O K
180 min Winter	64.348	0.098	0.1	0.2	0.4	0.5	O K
240 min Winter	64.340	0.090	0.1	0.2	0.4	0.5	O K
360 min Winter	64.326	0.076	0.1	0.2	0.3	0.3	O K
480 min Winter	64.313	0.063	0.1	0.2	0.3	0.2	O K
600 min Winter	64.303	0.053	0.1	0.2	0.2	0.2	O K
720 min Winter	64.297	0.047	0.1	0.2	0.2	0.1	O K
960 min Winter	64.288	0.038	0.0	0.1	0.2	0.1	O K
1440 min Winter	64.278	0.028	0.0	0.1	0.1	0.0	O K
2160 min Winter	64.273	0.023	0.0	0.1	0.1	0.0	O K
2880 min Winter	64.270	0.020	0.0	0.1	0.1	0.0	O K
4320 min Winter	64.267	0.017	0.0	0.0	0.1	0.0	O K
5760 min Winter	64.264	0.014	0.0	0.0	0.0	0.0	O K
7200 min Winter	64.263	0.013	0.0	0.0	0.0	0.0	O K
8640 min Winter	64.262	0.012	0.0	0.0	0.0	0.0	O K
10080 min Winter	64.261	0.011	0.0	0.0	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.329	0.0	3.4	4272
10080 min Summer	0.294	0.0	3.4	5040
15 min Winter	28.578	0.0	0.4	16
30 min Winter	18.555	0.0	0.7	28
60 min Winter	11.729	0.0	1.1	46
120 min Winter	7.265	0.0	1.5	82
180 min Winter	5.463	0.0	1.8	116
240 min Winter	4.458	0.0	2.0	146
360 min Winter	3.345	0.0	2.4	206
480 min Winter	2.714	0.0	2.6	264
600 min Winter	2.305	0.0	2.8	320
720 min Winter	2.017	0.0	2.9	376
960 min Winter	1.634	0.0	3.2	498
1440 min Winter	1.215	0.0	3.5	734
2160 min Winter	0.904	0.0	3.8	1084
2880 min Winter	0.733	0.0	4.0	1428
4320 min Winter	0.545	0.0	4.2	2200
5760 min Winter	0.442	0.0	4.3	2936
7200 min Winter	0.376	0.0	4.3	3552
8640 min Winter	0.329	0.0	4.3	4400
10080 min Winter	0.294	0.0	4.2	5048

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Cascade Rainfall Details for PP2.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.019

Time (mins) From:	To:	Area (ha)
0	4	0.019

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Cascade Model Details for PP2.srcx

Storage is Online Cover Level (m) 64.900

Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	25.0
Max Percolation (l/s)	34.7	Slope (1:X)	75.7
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.250	Cap Volume Depth (m)	0.450

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	3.0
Membrane Percolation (mm/hr)	1000	Length (m)	7.2
Max Percolation (l/s)	6.0	Slope (1:X)	0.0
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.450	Cap Volume Depth (m)	0.450

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 64.250

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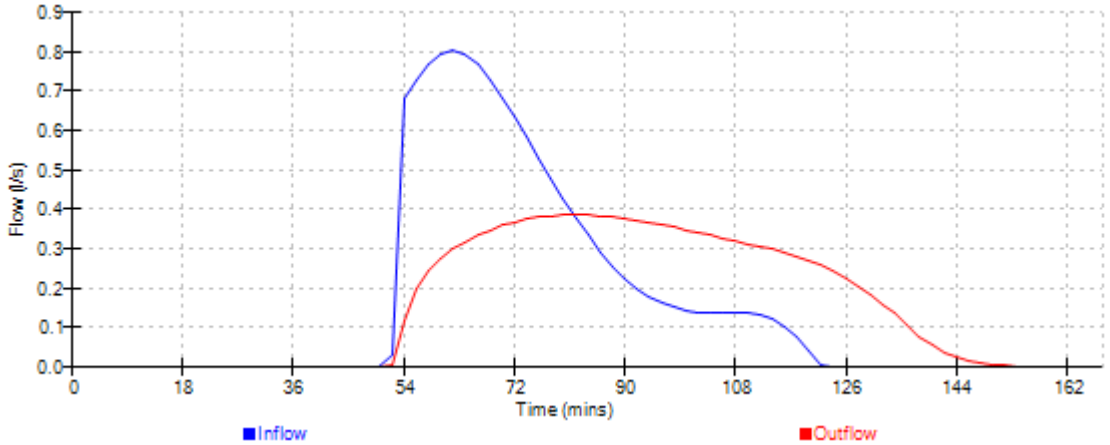
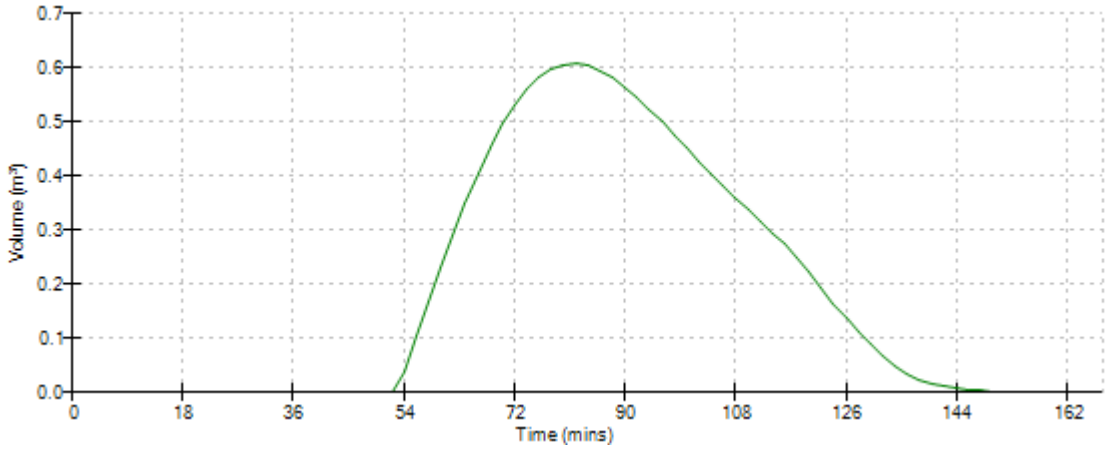
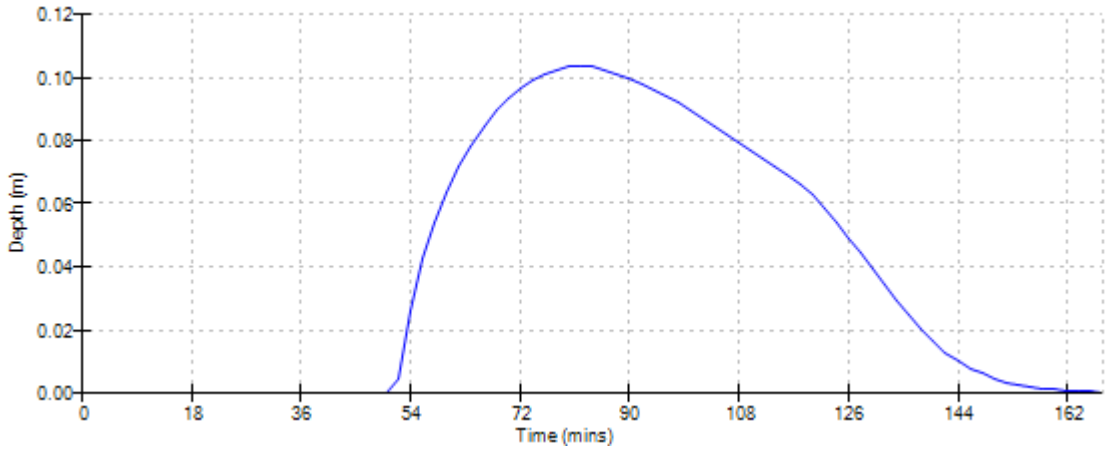
Cascade Event: 120 min Winter for PP2.srcx







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Cascade Summary of Results for PP3.srcx

Upstream Structures	Outflow To	Overflow To
(None)	Tank 2.srcx	(None)

Half Drain Time : 7 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	63.460	0.000	0.0	0.0	0.0	0.0	O K
30 min Summer	63.460	0.000	0.0	0.0	0.0	0.0	O K
60 min Summer	63.528	0.068	0.0	0.2	0.2	0.1	O K
120 min Summer	63.562	0.102	0.0	0.3	0.3	0.1	O K
180 min Summer	63.570	0.110	0.0	0.3	0.3	0.2	O K
240 min Summer	63.571	0.111	0.0	0.3	0.3	0.2	O K
360 min Summer	63.566	0.106	0.0	0.3	0.3	0.2	O K
480 min Summer	63.557	0.097	0.0	0.2	0.3	0.1	O K
600 min Summer	63.547	0.087	0.0	0.2	0.3	0.1	O K
720 min Summer	63.538	0.078	0.0	0.2	0.2	0.1	O K
960 min Summer	63.523	0.063	0.0	0.2	0.2	0.1	O K
1440 min Summer	63.502	0.042	0.0	0.1	0.2	0.0	O K
2160 min Summer	63.489	0.029	0.0	0.1	0.1	0.0	O K
2880 min Summer	63.484	0.024	0.0	0.1	0.1	0.0	O K
4320 min Summer	63.480	0.020	0.0	0.1	0.1	0.0	O K
5760 min Summer	63.477	0.017	0.0	0.1	0.1	0.0	O K
7200 min Summer	63.476	0.016	0.0	0.0	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	28.578	0.0	0.0	0
30 min Summer	18.555	0.0	0.0	0
60 min Summer	11.729	0.0	0.3	46
120 min Summer	7.265	0.0	0.6	78
180 min Summer	5.463	0.0	0.8	110
240 min Summer	4.458	0.0	1.0	142
360 min Summer	3.345	0.0	1.2	202
480 min Summer	2.714	0.0	1.4	260
600 min Summer	2.305	0.0	1.5	318
720 min Summer	2.017	0.0	1.6	376
960 min Summer	1.634	0.0	1.7	492
1440 min Summer	1.215	0.0	1.8	728
2160 min Summer	0.904	0.0	1.9	1080
2880 min Summer	0.733	0.0	1.9	1468
4320 min Summer	0.545	0.0	1.8	2140
5760 min Summer	0.442	0.0	1.8	2904
7200 min Summer	0.376	0.0	1.7	3672

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Cascade Summary of Results for PP3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	63.474	0.014	0.0	0.0	0.0	0.0	O K
10080 min Summer	63.473	0.013	0.0	0.0	0.0	0.0	O K
15 min Winter	63.460	0.000	0.0	0.0	0.0	0.0	O K
30 min Winter	63.524	0.064	0.0	0.2	0.2	0.1	O K
60 min Winter	63.569	0.109	0.0	0.3	0.3	0.2	O K
120 min Winter	63.589	0.129	0.0	0.3	0.3	0.2	O K
180 min Winter	63.587	0.127	0.0	0.3	0.3	0.2	O K
240 min Winter	63.579	0.119	0.0	0.3	0.3	0.2	O K
360 min Winter	63.559	0.099	0.0	0.2	0.3	0.1	O K
480 min Winter	63.541	0.081	0.0	0.2	0.2	0.1	O K
600 min Winter	63.526	0.066	0.0	0.2	0.2	0.1	O K
720 min Winter	63.514	0.054	0.0	0.2	0.2	0.0	O K
960 min Winter	63.501	0.041	0.0	0.1	0.2	0.0	O K
1440 min Winter	63.488	0.028	0.0	0.1	0.1	0.0	O K
2160 min Winter	63.483	0.023	0.0	0.1	0.1	0.0	O K
2880 min Winter	63.480	0.020	0.0	0.1	0.1	0.0	O K
4320 min Winter	63.476	0.016	0.0	0.0	0.0	0.0	O K
5760 min Winter	63.474	0.014	0.0	0.0	0.0	0.0	O K
7200 min Winter	63.472	0.012	0.0	0.0	0.0	0.0	O K
8640 min Winter	63.471	0.011	0.0	0.0	0.0	0.0	O K
10080 min Winter	63.471	0.011	0.0	0.0	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.329	0.0	1.6	4336
10080 min Summer	0.294	0.0	1.6	5048
15 min Winter	28.578	0.0	0.0	0
30 min Winter	18.555	0.0	0.1	30
60 min Winter	11.729	0.0	0.5	46
120 min Winter	7.265	0.0	0.8	82
180 min Winter	5.463	0.0	1.1	116
240 min Winter	4.458	0.0	1.3	146
360 min Winter	3.345	0.0	1.5	206
480 min Winter	2.714	0.0	1.7	260
600 min Winter	2.305	0.0	1.8	314
720 min Winter	2.017	0.0	1.9	370
960 min Winter	1.634	0.0	2.1	490
1440 min Winter	1.215	0.0	2.3	710
2160 min Winter	0.904	0.0	2.5	1084
2880 min Winter	0.733	0.0	2.5	1456
4320 min Winter	0.545	0.0	2.4	2172
5760 min Winter	0.442	0.0	2.3	2840
7200 min Winter	0.376	0.0	2.2	3624
8640 min Winter	0.329	0.0	2.1	4464
10080 min Winter	0.294	0.0	2.0	5296

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Cascade Rainfall Details for PP3.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.017

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

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Cascade Model Details for PP3.srcx

Storage is Online Cover Level (m) 64.110

Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	31.0
Max Percolation (l/s)	43.1	Slope (1:X)	18.0
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	63.460	Cap Volume Depth (m)	0.450

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	3.4
Membrane Percolation (mm/hr)	1000	Length (m)	9.9
Max Percolation (l/s)	9.4	Slope (1:X)	0.0
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	63.807	Cap Volume Depth (m)	0.450

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	9.0
Max Percolation (l/s)	12.5	Slope (1:X)	13.3
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.060	Cap Volume Depth (m)	0.450

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 63.460

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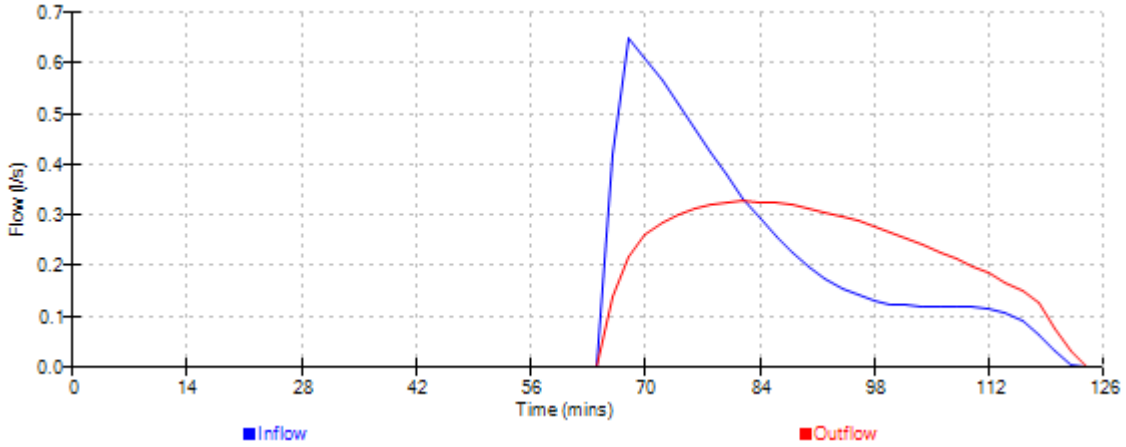
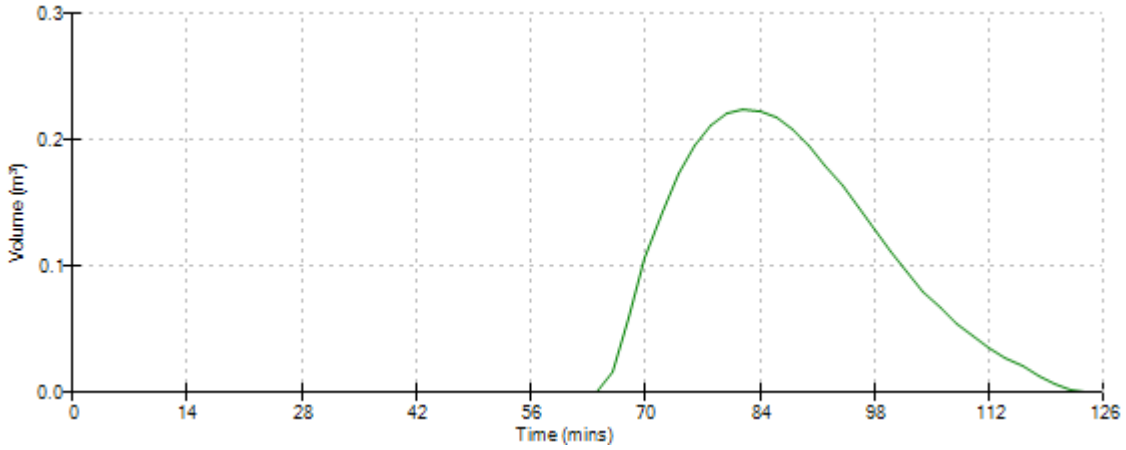
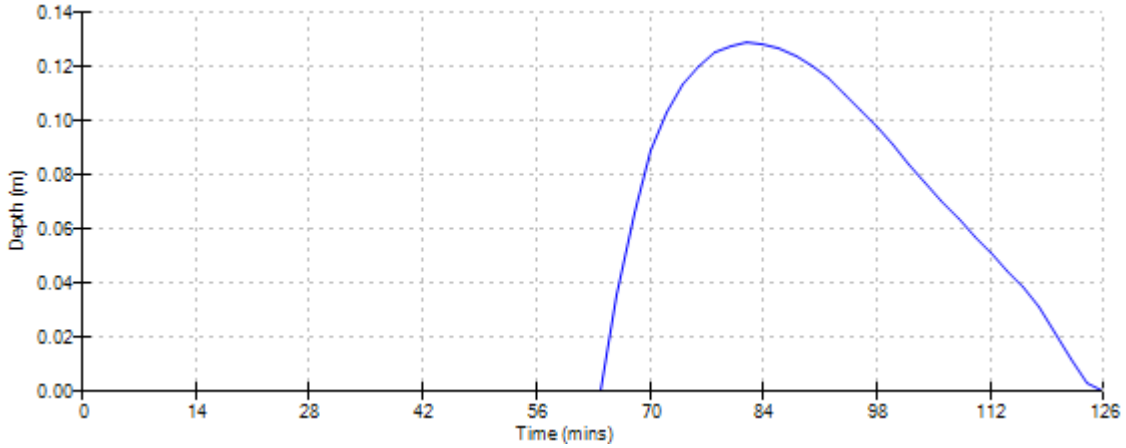
Cascade Event: 120 min Winter for PP3.srcx







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Cascade Summary of Results for Tank 1.srcx

Upstream Structures	Outflow To	Overflow To
PP1.srcx	(None)	(None)

Half Drain Time : 31 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	63.811	0.071	0.0	0.7	0.7	1.6	O K
30 min Summer	63.822	0.082	0.0	0.8	0.8	1.9	O K
60 min Summer	63.830	0.090	0.0	0.9	0.9	2.1	O K
120 min Summer	63.832	0.092	0.0	0.9	0.9	2.1	O K
180 min Summer	63.830	0.090	0.0	0.9	0.9	2.1	O K
240 min Summer	63.827	0.087	0.0	0.9	0.9	2.0	O K
360 min Summer	63.822	0.082	0.0	0.8	0.8	1.9	O K
480 min Summer	63.817	0.077	0.0	0.8	0.8	1.8	O K
600 min Summer	63.812	0.072	0.0	0.7	0.7	1.7	O K
720 min Summer	63.808	0.068	0.0	0.7	0.7	1.6	O K
960 min Summer	63.801	0.061	0.0	0.6	0.6	1.4	O K
1440 min Summer	63.790	0.050	0.0	0.5	0.5	1.2	O K
2160 min Summer	63.780	0.040	0.0	0.4	0.4	0.9	O K
2880 min Summer	63.774	0.034	0.0	0.3	0.3	0.8	O K
4320 min Summer	63.766	0.026	0.0	0.3	0.3	0.6	O K
5760 min Summer	63.761	0.021	0.0	0.2	0.2	0.5	O K
7200 min Summer	63.758	0.018	0.0	0.2	0.2	0.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	28.578	0.0	2.2	17
30 min Summer	18.555	0.0	3.1	28
60 min Summer	11.729	0.0	4.1	44
120 min Summer	7.265	0.0	5.3	78
180 min Summer	5.463	0.0	6.1	112
240 min Summer	4.458	0.0	6.7	146
360 min Summer	3.345	0.0	7.6	210
480 min Summer	2.714	0.0	8.4	272
600 min Summer	2.305	0.0	8.9	332
720 min Summer	2.017	0.0	9.4	392
960 min Summer	1.634	0.0	10.3	512
1440 min Summer	1.215	0.0	11.6	752
2160 min Summer	0.904	0.0	12.9	1116
2880 min Summer	0.733	0.0	13.9	1472
4320 min Summer	0.545	0.0	15.3	2204
5760 min Summer	0.442	0.0	16.1	2936
7200 min Summer	0.376	0.0	16.8	3664

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Cascade Summary of Results for Tank 1.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	63.756	0.016	0.0	0.2	0.2	0.4	O K
10080 min Summer	63.754	0.014	0.0	0.1	0.1	0.3	O K
15 min Winter	63.819	0.079	0.0	0.8	0.8	1.8	O K
30 min Winter	63.833	0.093	0.0	0.9	0.9	2.2	O K
60 min Winter	63.840	0.100	0.0	1.0	1.0	2.3	O K
120 min Winter	63.839	0.099	0.0	1.0	1.0	2.3	O K
180 min Winter	63.834	0.094	0.0	0.9	0.9	2.2	O K
240 min Winter	63.829	0.089	0.0	0.9	0.9	2.1	O K
360 min Winter	63.821	0.081	0.0	0.8	0.8	1.9	O K
480 min Winter	63.813	0.073	0.0	0.7	0.7	1.7	O K
600 min Winter	63.806	0.066	0.0	0.7	0.7	1.5	O K
720 min Winter	63.801	0.061	0.0	0.6	0.6	1.4	O K
960 min Winter	63.792	0.052	0.0	0.5	0.5	1.2	O K
1440 min Winter	63.780	0.040	0.0	0.4	0.4	0.9	O K
2160 min Winter	63.771	0.031	0.0	0.3	0.3	0.7	O K
2880 min Winter	63.766	0.026	0.0	0.3	0.3	0.6	O K
4320 min Winter	63.759	0.019	0.0	0.2	0.2	0.4	O K
5760 min Winter	63.755	0.015	0.0	0.2	0.2	0.4	O K
7200 min Winter	63.753	0.013	0.0	0.1	0.1	0.3	O K
8640 min Winter	63.751	0.011	0.0	0.1	0.1	0.3	O K
10080 min Winter	63.750	0.010	0.0	0.1	0.1	0.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.329	0.0	17.3	4392
10080 min Summer	0.294	0.0	17.8	5088
15 min Winter	28.578	0.0	2.6	17
30 min Winter	18.555	0.0	3.6	29
60 min Winter	11.729	0.0	4.7	46
120 min Winter	7.265	0.0	6.0	84
180 min Winter	5.463	0.0	6.9	118
240 min Winter	4.458	0.0	7.6	152
360 min Winter	3.345	0.0	8.7	218
480 min Winter	2.714	0.0	9.5	280
600 min Winter	2.305	0.0	10.2	342
720 min Winter	2.017	0.0	10.7	402
960 min Winter	1.634	0.0	11.7	522
1440 min Winter	1.215	0.0	13.2	764
2160 min Winter	0.904	0.0	14.8	1120
2880 min Winter	0.733	0.0	16.0	1468
4320 min Winter	0.545	0.0	17.5	2196
5760 min Winter	0.442	0.0	18.6	2936
7200 min Winter	0.376	0.0	19.4	3728
8640 min Winter	0.329	0.0	20.1	4432
10080 min Winter	0.294	0.0	20.6	5000

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Cascade Rainfall Details for Tank 1.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.036

Time (mins) From:	To:	Area (ha)
0	4	0.036

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Cascade Model Details for Tank 1.srcx

Storage is Online Cover Level (m) 65.340

Cellular Storage Structure

Invert Level (m) 63.740 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	24.5	24.5	0.801	0.0	41.3
0.800	24.5	41.3			

Pump Outflow Control

Invert Level (m) 63.740

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0000	1.200	1.0000	3.000	1.0000	7.000	1.0000
0.200	1.0000	1.400	1.0000	3.500	1.0000	7.500	1.0000
0.300	1.0000	1.600	1.0000	4.000	1.0000	8.000	1.0000
0.400	1.0000	1.800	1.0000	4.500	1.0000	8.500	1.0000
0.500	1.0000	2.000	1.0000	5.000	1.0000	9.000	1.0000
0.600	1.0000	2.200	1.0000	5.500	1.0000	9.500	1.0000
0.800	1.0000	2.400	1.0000	6.000	1.0000		
1.000	1.0000	2.600	1.0000	6.500	1.0000		

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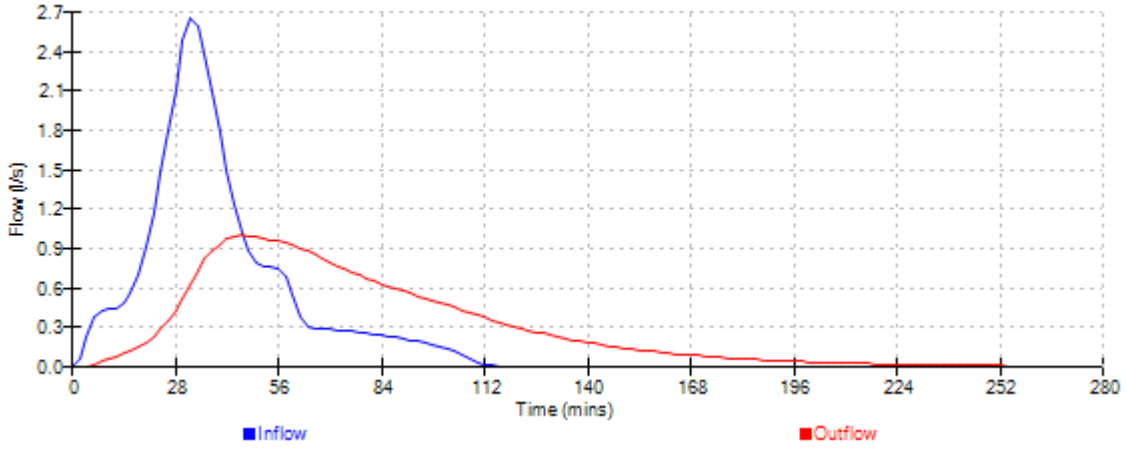
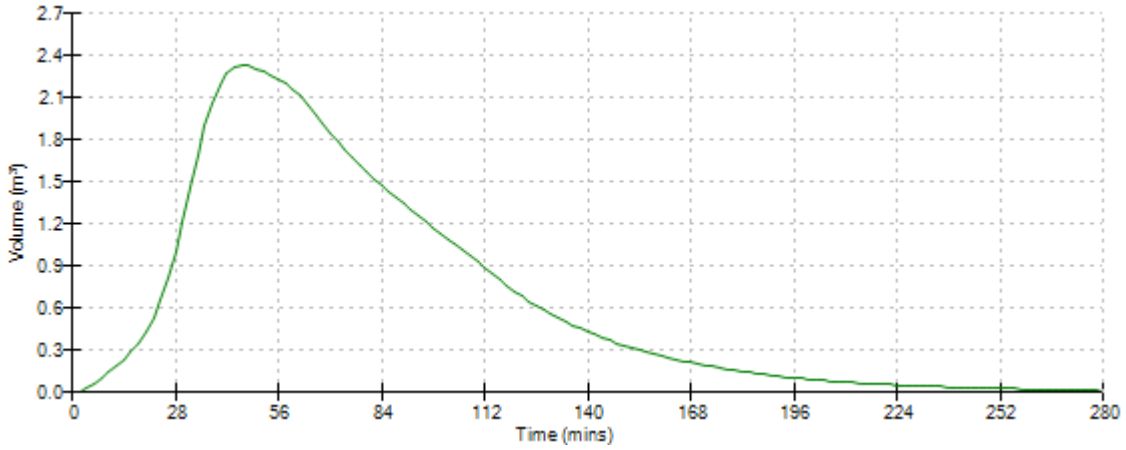
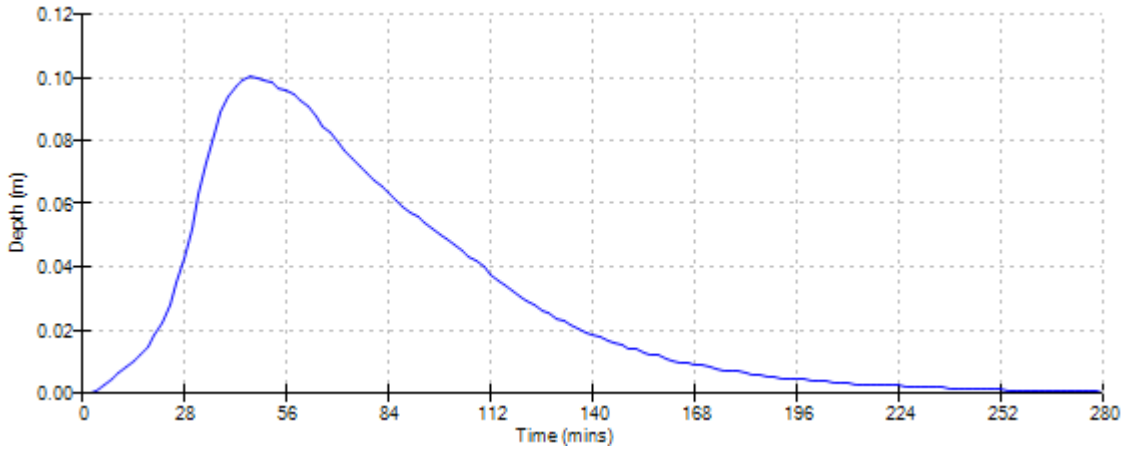
Cascade Event: 60 min Winter for Tank 1.srcx







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Cascade Summary of Results for Tank 2.srcx

Upstream Structures	Outflow To	Overflow To
PP2.srcx	(None)	(None)
PP3.srcx		

Half Drain Time : 42 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	62.923	0.063	0.0	0.6	0.6	2.3	O K
30 min Summer	62.936	0.076	0.0	0.8	0.8	2.8	O K
60 min Summer	62.947	0.087	0.0	0.9	0.9	3.2	O K
120 min Summer	62.954	0.094	0.0	0.9	0.9	3.4	O K
180 min Summer	62.956	0.096	0.0	1.0	1.0	3.5	O K
240 min Summer	62.956	0.096	0.0	1.0	1.0	3.5	O K
360 min Summer	62.953	0.093	0.0	0.9	0.9	3.4	O K
480 min Summer	62.949	0.089	0.0	0.9	0.9	3.3	O K
600 min Summer	62.945	0.085	0.0	0.8	0.8	3.1	O K
720 min Summer	62.940	0.080	0.0	0.8	0.8	2.9	O K
960 min Summer	62.933	0.073	0.0	0.7	0.7	2.7	O K
1440 min Summer	62.922	0.062	0.0	0.6	0.6	2.3	O K
2160 min Summer	62.910	0.050	0.0	0.5	0.5	1.8	O K
2880 min Summer	62.902	0.042	0.0	0.4	0.4	1.6	O K
4320 min Summer	62.893	0.033	0.0	0.3	0.3	1.2	O K
5760 min Summer	62.887	0.027	0.0	0.3	0.3	1.0	O K
7200 min Summer	62.883	0.023	0.0	0.2	0.2	0.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	28.578	0.0	2.8	17
30 min Summer	18.555	0.0	3.7	31
60 min Summer	11.729	0.0	5.1	54
120 min Summer	7.265	0.0	6.7	86
180 min Summer	5.463	0.0	7.7	120
240 min Summer	4.458	0.0	8.6	154
360 min Summer	3.345	0.0	9.8	220
480 min Summer	2.714	0.0	10.7	286
600 min Summer	2.305	0.0	11.5	346
720 min Summer	2.017	0.0	12.1	408
960 min Summer	1.634	0.0	13.2	530
1440 min Summer	1.215	0.0	14.8	768
2160 min Summer	0.904	0.0	16.4	1128
2880 min Summer	0.733	0.0	17.5	1496
4320 min Summer	0.545	0.0	19.0	2208
5760 min Summer	0.442	0.0	20.1	2944
7200 min Summer	0.376	0.0	21.0	3672

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Cascade Summary of Results for Tank 2.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	62.880	0.020	0.0	0.2	0.2	0.7	O K
10080 min Summer	62.878	0.018	0.0	0.2	0.2	0.7	O K
15 min Winter	62.931	0.071	0.0	0.7	0.7	2.6	O K
30 min Winter	62.947	0.087	0.0	0.9	0.9	3.2	O K
60 min Winter	62.960	0.100	0.0	1.0	1.0	3.6	O K
120 min Winter	62.966	0.106	0.0	1.0	1.0	3.9	O K
180 min Winter	62.966	0.106	0.0	1.0	1.0	3.9	O K
240 min Winter	62.964	0.104	0.0	1.0	1.0	3.8	O K
360 min Winter	62.957	0.097	0.0	1.0	1.0	3.5	O K
480 min Winter	62.949	0.089	0.0	0.9	0.9	3.2	O K
600 min Winter	62.942	0.082	0.0	0.8	0.8	3.0	O K
720 min Winter	62.936	0.076	0.0	0.8	0.8	2.8	O K
960 min Winter	62.926	0.066	0.0	0.7	0.7	2.4	O K
1440 min Winter	62.913	0.053	0.0	0.5	0.5	1.9	O K
2160 min Winter	62.900	0.040	0.0	0.4	0.4	1.5	O K
2880 min Winter	62.893	0.033	0.0	0.3	0.3	1.2	O K
4320 min Winter	62.885	0.025	0.0	0.2	0.2	0.9	O K
5760 min Winter	62.880	0.020	0.0	0.2	0.2	0.7	O K
7200 min Winter	62.877	0.017	0.0	0.2	0.2	0.6	O K
8640 min Winter	62.875	0.015	0.0	0.1	0.1	0.5	O K
10080 min Winter	62.873	0.013	0.0	0.1	0.1	0.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.329	0.0	21.7	4408
10080 min Summer	0.294	0.0	22.3	5128
15 min Winter	28.578	0.0	3.2	17
30 min Winter	18.555	0.0	4.4	31
60 min Winter	11.729	0.0	5.9	58
120 min Winter	7.265	0.0	7.7	92
180 min Winter	5.463	0.0	8.9	130
240 min Winter	4.458	0.0	9.8	166
360 min Winter	3.345	0.0	11.2	232
480 min Winter	2.714	0.0	12.3	296
600 min Winter	2.305	0.0	13.2	358
720 min Winter	2.017	0.0	13.9	420
960 min Winter	1.634	0.0	15.2	542
1440 min Winter	1.215	0.0	17.0	780
2160 min Winter	0.904	0.0	18.8	1144
2880 min Winter	0.733	0.0	20.1	1496
4320 min Winter	0.545	0.0	21.9	2204
5760 min Winter	0.442	0.0	23.2	2944
7200 min Winter	0.376	0.0	24.2	3664
8640 min Winter	0.329	0.0	25.0	4336
10080 min Winter	0.294	0.0	25.6	5152

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Cascade Rainfall Details for Tank 2.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.048

Time (mins) From:	To:	Area (ha)
0	4	0.048

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Cascade Model Details for Tank 2.srcx

Storage is Online Cover Level (m) 64.460

Cellular Storage Structure

Invert Level (m) 62.860 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	38.5	38.5	0.801	0.0	61.7
0.800	38.5	61.7			

Pump Outflow Control

Invert Level (m) 62.860

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0000	1.200	1.0000	3.000	1.0000	7.000	1.0000
0.200	1.0000	1.400	1.0000	3.500	1.0000	7.500	1.0000
0.300	1.0000	1.600	1.0000	4.000	1.0000	8.000	1.0000
0.400	1.0000	1.800	1.0000	4.500	1.0000	8.500	1.0000
0.500	1.0000	2.000	1.0000	5.000	1.0000	9.000	1.0000
0.600	1.0000	2.200	1.0000	5.500	1.0000	9.500	1.0000
0.800	1.0000	2.400	1.0000	6.000	1.0000		
1.000	1.0000	2.600	1.0000	6.500	1.0000		

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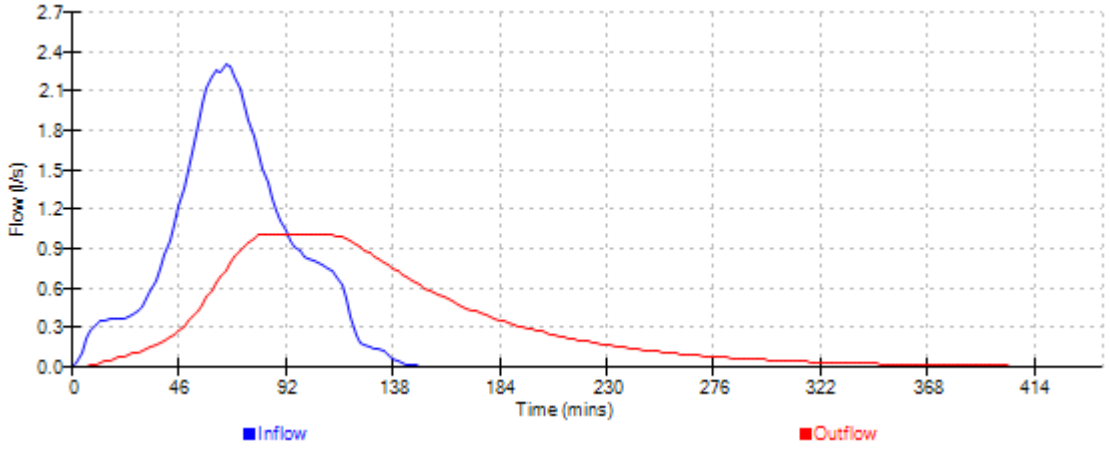
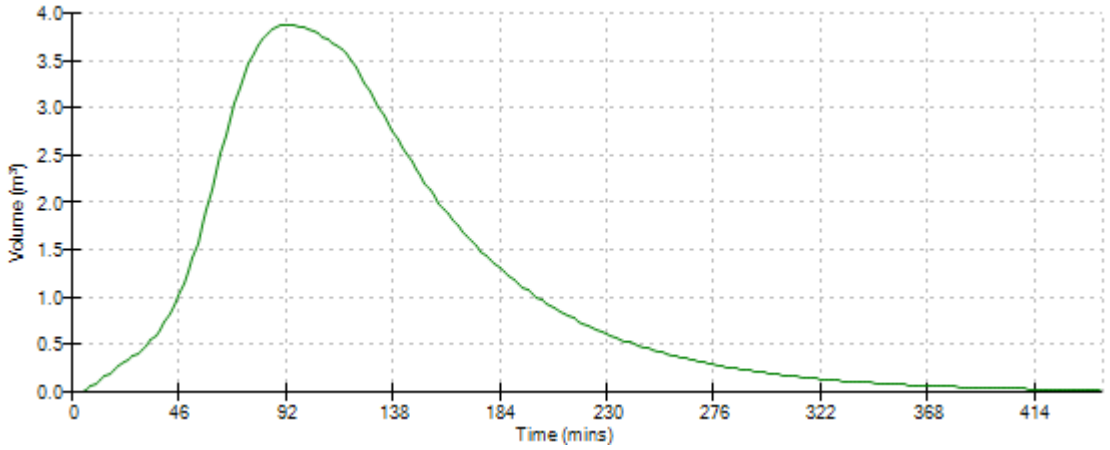
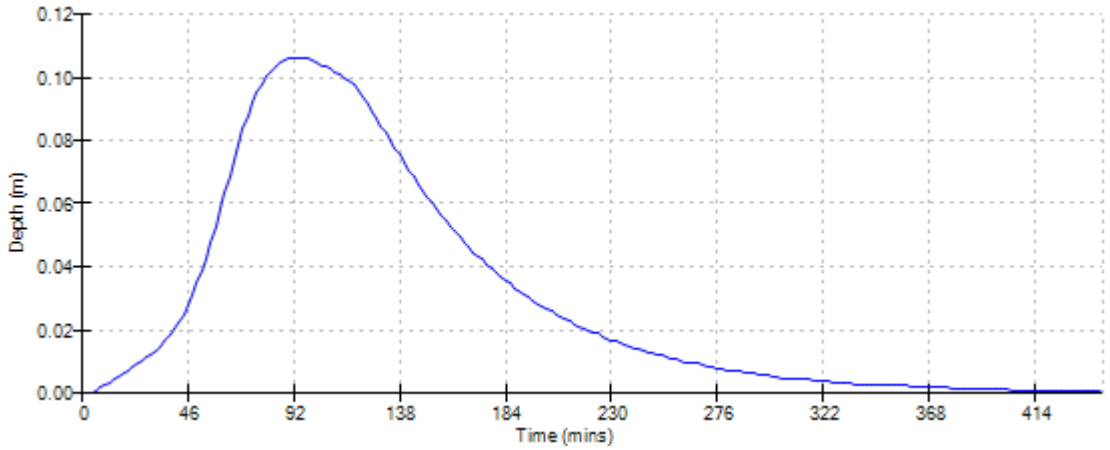
Cascade Event: 120 min Winter for Tank 2.srcx







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Cascade Summary of Results for PP1.srcx

Upstream Structures	Outflow To	Overflow To
(None)	Tank 1.srcx	(None)

Half Drain Time : 50 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	64.248	0.238	0.2	0.4	0.6	2.2	O K
30 min Summer	64.279	0.269	0.3	0.4	0.7	3.0	O K
60 min Summer	64.296	0.286	0.3	0.4	0.8	3.4	O K
120 min Summer	64.304	0.294	0.3	0.4	0.8	3.7	O K
180 min Summer	64.302	0.292	0.3	0.4	0.8	3.6	O K
240 min Summer	64.296	0.286	0.3	0.4	0.8	3.4	O K
360 min Summer	64.281	0.271	0.3	0.4	0.7	3.0	O K
480 min Summer	64.265	0.255	0.3	0.4	0.7	2.6	O K
600 min Summer	64.251	0.241	0.2	0.4	0.6	2.3	O K
720 min Summer	64.238	0.228	0.2	0.4	0.6	2.0	O K
960 min Summer	64.212	0.202	0.2	0.4	0.5	1.6	O K
1440 min Summer	64.170	0.160	0.1	0.3	0.5	1.0	O K
2160 min Summer	64.127	0.117	0.1	0.3	0.4	0.5	O K
2880 min Summer	64.101	0.091	0.1	0.2	0.3	0.3	O K
4320 min Summer	64.069	0.059	0.1	0.2	0.2	0.1	O K
5760 min Summer	64.054	0.044	0.0	0.2	0.2	0.1	O K
7200 min Summer	64.046	0.036	0.0	0.1	0.2	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	70.008	0.0	2.6	17
30 min Summer	45.613	0.0	3.7	31
60 min Summer	28.447	0.0	4.8	50
120 min Summer	17.244	0.0	6.1	84
180 min Summer	12.741	0.0	6.8	118
240 min Summer	10.239	0.0	7.4	152
360 min Summer	7.483	0.0	8.2	218
480 min Summer	5.987	0.0	8.7	280
600 min Summer	5.035	0.0	9.2	344
720 min Summer	4.369	0.0	9.6	406
960 min Summer	3.490	0.0	10.2	528
1440 min Summer	2.541	0.0	11.0	764
2160 min Summer	1.847	0.0	11.9	1124
2880 min Summer	1.473	0.0	12.4	1472
4320 min Summer	1.069	0.0	13.1	2200
5760 min Summer	0.851	0.0	13.4	2936
7200 min Summer	0.713	0.0	13.5	3600

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Cascade Summary of Results for PP1.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	64.040	0.030	0.0	0.1	0.1	0.0	O K
10080 min Summer	64.037	0.027	0.0	0.1	0.1	0.0	O K
15 min Winter	64.266	0.256	0.3	0.4	0.7	2.6	O K
30 min Winter	64.299	0.289	0.3	0.4	0.8	3.5	O K
60 min Winter	64.316	0.306	0.3	0.5	0.8	4.0	O K
120 min Winter	64.320	0.310	0.4	0.5	0.8	4.1	O K
180 min Winter	64.314	0.304	0.3	0.5	0.8	4.0	O K
240 min Winter	64.304	0.294	0.3	0.4	0.8	3.7	O K
360 min Winter	64.282	0.272	0.3	0.4	0.7	3.0	O K
480 min Winter	64.260	0.250	0.3	0.4	0.7	2.5	O K
600 min Winter	64.241	0.231	0.2	0.4	0.6	2.1	O K
720 min Winter	64.222	0.212	0.2	0.4	0.6	1.7	O K
960 min Winter	64.185	0.175	0.2	0.3	0.5	1.2	O K
1440 min Winter	64.134	0.124	0.1	0.3	0.4	0.6	O K
2160 min Winter	64.092	0.082	0.1	0.2	0.3	0.3	O K
2880 min Winter	64.069	0.059	0.1	0.2	0.2	0.1	O K
4320 min Winter	64.049	0.039	0.0	0.1	0.2	0.1	O K
5760 min Winter	64.040	0.030	0.0	0.1	0.1	0.0	O K
7200 min Winter	64.036	0.026	0.0	0.1	0.1	0.0	O K
8640 min Winter	64.034	0.024	0.0	0.1	0.1	0.0	O K
10080 min Winter	64.032	0.022	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.617	0.0	13.6	4368
10080 min Summer	0.545	0.0	13.5	5104
15 min Winter	70.008	0.0	3.0	17
30 min Winter	45.613	0.0	4.2	31
60 min Winter	28.447	0.0	5.6	56
120 min Winter	17.244	0.0	7.0	90
180 min Winter	12.741	0.0	7.8	126
240 min Winter	10.239	0.0	8.4	162
360 min Winter	7.483	0.0	9.3	230
480 min Winter	5.987	0.0	9.9	296
600 min Winter	5.035	0.0	10.5	360
720 min Winter	4.369	0.0	10.9	422
960 min Winter	3.490	0.0	11.6	540
1440 min Winter	2.541	0.0	12.6	768
2160 min Winter	1.847	0.0	13.6	1120
2880 min Winter	1.473	0.0	14.2	1468
4320 min Winter	1.069	0.0	15.0	2196
5760 min Winter	0.851	0.0	15.5	2928
7200 min Winter	0.713	0.0	15.8	3552
8640 min Winter	0.617	0.0	15.9	4352
10080 min Winter	0.545	0.0	15.9	5024

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Cascade Rainfall Details for PP1.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.028

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

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Cascade Model Details for PP1.srcx

Storage is Online Cover Level (m) 64.660

Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	27.8
Max Percolation (l/s)	38.6	Slope (1:X)	51.5
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.010	Cap Volume Depth (m)	0.450

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	3.7
Membrane Percolation (mm/hr)	1000	Length (m)	22.2
Max Percolation (l/s)	22.8	Slope (1:X)	64.2
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.210	Cap Volume Depth (m)	0.450

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 64.010

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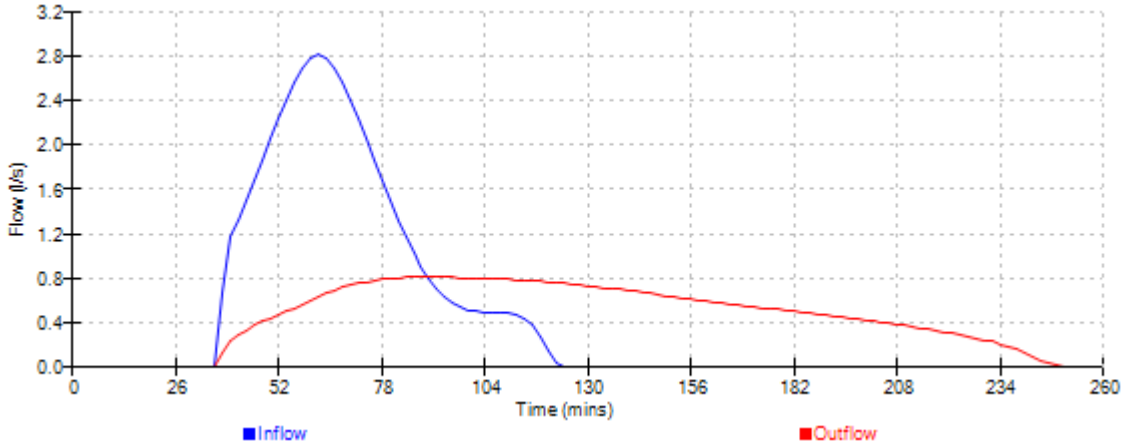
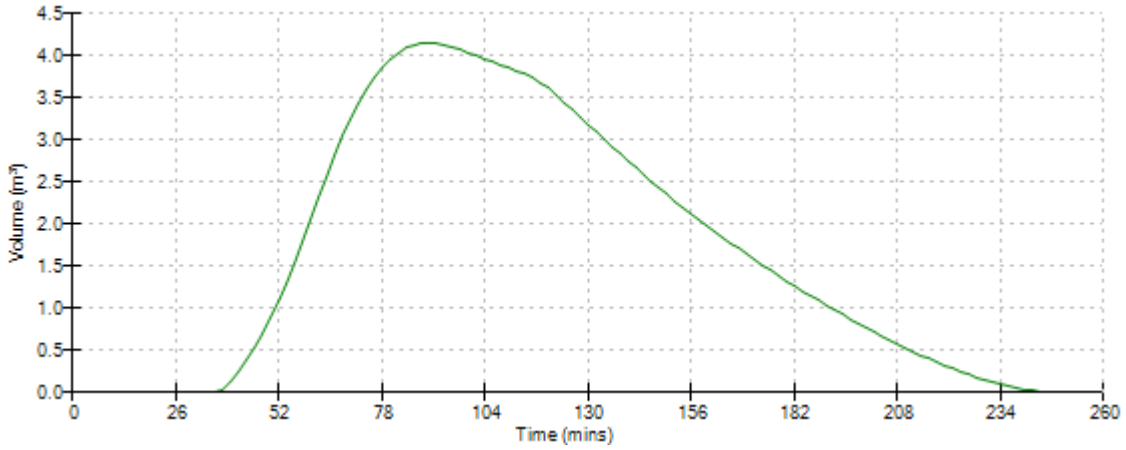
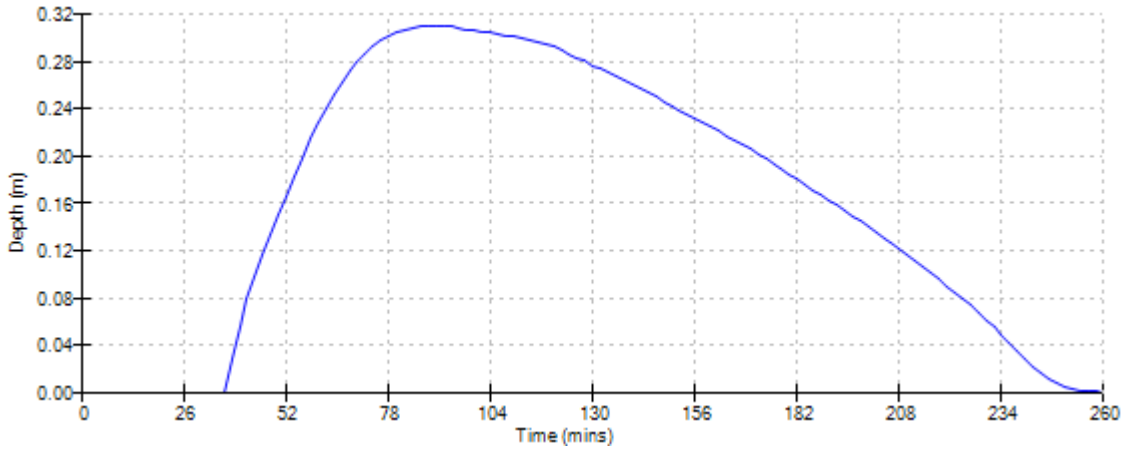
Cascade Event: 120 min Winter for PP1.srcx







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Cascade Summary of Results for PP2.srcx

Upstream Structures	Outflow To	Overflow To
(None)	Tank 2.srcx	(None)

Half Drain Time : 47 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	64.411	0.161	0.2	0.3	0.5	1.5	O K
30 min Summer	64.435	0.185	0.2	0.3	0.6	1.9	O K
60 min Summer	64.447	0.197	0.2	0.4	0.6	2.2	O K
120 min Summer	64.451	0.201	0.3	0.4	0.6	2.3	O K
180 min Summer	64.447	0.197	0.2	0.4	0.6	2.2	O K
240 min Summer	64.440	0.190	0.2	0.4	0.6	2.0	O K
360 min Summer	64.423	0.173	0.2	0.3	0.6	1.7	O K
480 min Summer	64.408	0.158	0.2	0.3	0.5	1.4	O K
600 min Summer	64.395	0.145	0.2	0.3	0.5	1.2	O K
720 min Summer	64.384	0.134	0.2	0.3	0.5	1.0	O K
960 min Summer	64.364	0.114	0.1	0.3	0.4	0.7	O K
1440 min Summer	64.337	0.087	0.1	0.2	0.3	0.4	O K
2160 min Summer	64.312	0.062	0.1	0.2	0.3	0.2	O K
2880 min Summer	64.298	0.048	0.1	0.2	0.2	0.1	O K
4320 min Summer	64.285	0.035	0.0	0.1	0.2	0.1	O K
5760 min Summer	64.278	0.028	0.0	0.1	0.1	0.0	O K
7200 min Summer	64.275	0.025	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	70.008	0.0	1.8	17
30 min Summer	45.613	0.0	2.5	30
60 min Summer	28.447	0.0	3.3	46
120 min Summer	17.244	0.0	4.1	80
180 min Summer	12.741	0.0	4.7	114
240 min Summer	10.239	0.0	5.0	148
360 min Summer	7.483	0.0	5.6	212
480 min Summer	5.987	0.0	5.9	274
600 min Summer	5.035	0.0	6.3	336
720 min Summer	4.369	0.0	6.5	396
960 min Summer	3.490	0.0	6.9	512
1440 min Summer	2.541	0.0	7.5	750
2160 min Summer	1.847	0.0	8.1	1104
2880 min Summer	1.473	0.0	8.5	1468
4320 min Summer	1.069	0.0	8.9	2192
5760 min Summer	0.851	0.0	9.2	2920
7200 min Summer	0.713	0.0	9.3	3648

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Cascade Summary of Results for PP2.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	64.272	0.022	0.0	0.1	0.1	0.0	O K
10080 min Summer	64.271	0.021	0.0	0.1	0.1	0.0	O K
15 min Winter	64.426	0.176	0.2	0.3	0.6	1.8	O K
30 min Winter	64.451	0.201	0.3	0.4	0.6	2.3	O K
60 min Winter	64.460	0.210	0.3	0.4	0.7	2.6	O K
120 min Winter	64.460	0.210	0.3	0.4	0.7	2.6	O K
180 min Winter	64.453	0.203	0.3	0.4	0.6	2.4	O K
240 min Winter	64.443	0.193	0.2	0.4	0.6	2.1	O K
360 min Winter	64.420	0.170	0.2	0.3	0.5	1.6	O K
480 min Winter	64.399	0.149	0.2	0.3	0.5	1.3	O K
600 min Winter	64.381	0.131	0.2	0.3	0.5	1.0	O K
720 min Winter	64.366	0.116	0.1	0.3	0.4	0.8	O K
960 min Winter	64.343	0.093	0.1	0.2	0.4	0.5	O K
1440 min Winter	64.314	0.064	0.1	0.2	0.3	0.2	O K
2160 min Winter	64.294	0.044	0.0	0.2	0.2	0.1	O K
2880 min Winter	64.284	0.034	0.0	0.1	0.2	0.1	O K
4320 min Winter	64.276	0.026	0.0	0.1	0.1	0.0	O K
5760 min Winter	64.272	0.022	0.0	0.1	0.1	0.0	O K
7200 min Winter	64.270	0.020	0.0	0.1	0.1	0.0	O K
8640 min Winter	64.268	0.018	0.0	0.1	0.1	0.0	O K
10080 min Winter	64.267	0.017	0.0	0.0	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.617	0.0	9.3	4256
10080 min Summer	0.545	0.0	9.2	5080
15 min Winter	70.008	0.0	2.1	17
30 min Winter	45.613	0.0	2.9	30
60 min Winter	28.447	0.0	3.8	50
120 min Winter	17.244	0.0	4.7	88
180 min Winter	12.741	0.0	5.3	124
240 min Winter	10.239	0.0	5.7	158
360 min Winter	7.483	0.0	6.3	224
480 min Winter	5.987	0.0	6.8	286
600 min Winter	5.035	0.0	7.1	348
720 min Winter	4.369	0.0	7.4	406
960 min Winter	3.490	0.0	7.9	522
1440 min Winter	2.541	0.0	8.6	750
2160 min Winter	1.847	0.0	9.2	1100
2880 min Winter	1.473	0.0	9.7	1468
4320 min Winter	1.069	0.0	10.3	2164
5760 min Winter	0.851	0.0	10.6	2928
7200 min Winter	0.713	0.0	10.8	3648
8640 min Winter	0.617	0.0	10.9	4360
10080 min Winter	0.545	0.0	10.9	5056

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Cascade Rainfall Details for PP2.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.019

Time (mins) From:	To:	Area (ha)
0	4	0.019

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Cascade Model Details for PP2.srcx

Storage is Online Cover Level (m) 64.900

Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	25.0
Max Percolation (l/s)	34.7	Slope (1:X)	75.7
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.250	Cap Volume Depth (m)	0.450

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	3.0
Membrane Percolation (mm/hr)	1000	Length (m)	7.2
Max Percolation (l/s)	6.0	Slope (1:X)	0.0
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.450	Cap Volume Depth (m)	0.450

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 64.250

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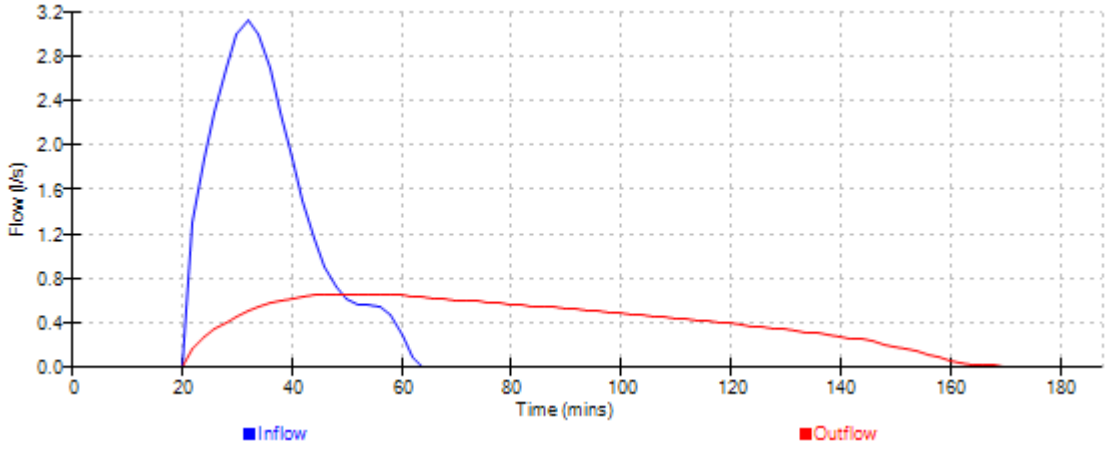
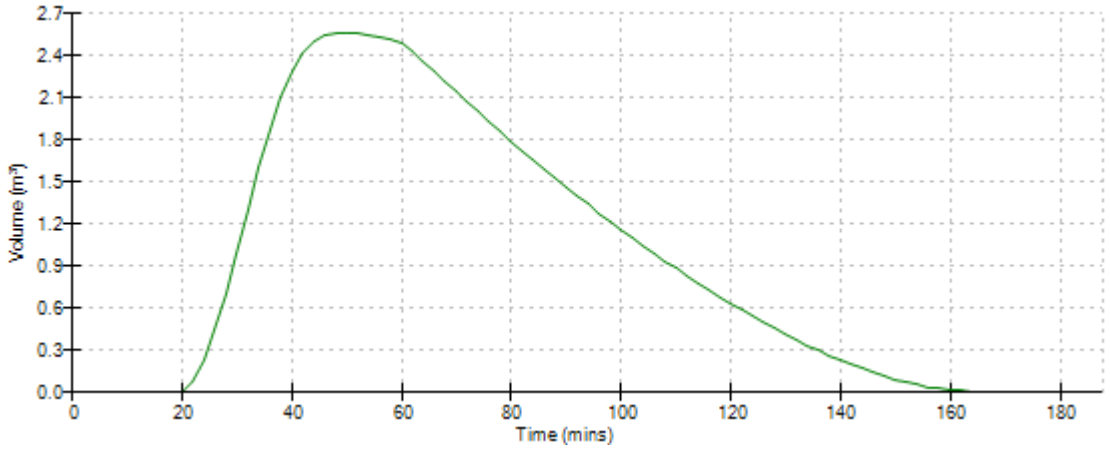
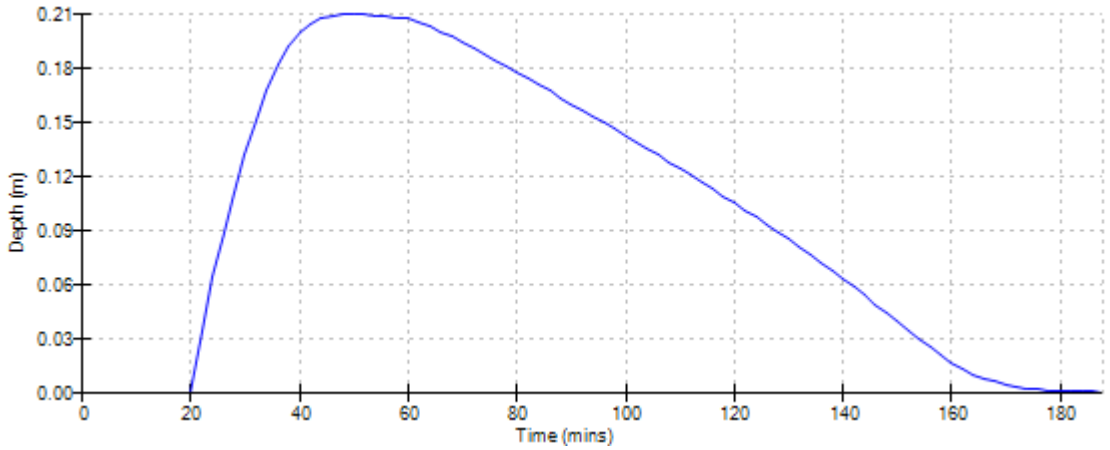
Cascade Event: 60 min Winter for PP2.srcx







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Cascade Summary of Results for PP3.srcx

Upstream Structures	Outflow To	Overflow To
(None)	Tank 2.srcx	(None)

Half Drain Time : 32 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	63.709	0.249	0.1	0.4	0.5	0.8	O K
30 min Summer	63.763	0.303	0.1	0.5	0.5	1.2	O K
60 min Summer	63.794	0.334	0.1	0.5	0.6	1.5	O K
120 min Summer	63.808	0.348	0.1	0.5	0.6	1.6	O K
180 min Summer	63.803	0.343	0.1	0.5	0.6	1.6	O K
240 min Summer	63.791	0.331	0.1	0.5	0.6	1.5	O K
360 min Summer	63.761	0.301	0.1	0.5	0.5	1.2	O K
480 min Summer	63.730	0.270	0.1	0.4	0.5	1.0	O K
600 min Summer	63.703	0.243	0.1	0.4	0.5	0.8	O K
720 min Summer	63.678	0.218	0.1	0.4	0.4	0.6	O K
960 min Summer	63.638	0.178	0.1	0.3	0.4	0.4	O K
1440 min Summer	63.585	0.125	0.0	0.3	0.3	0.2	O K
2160 min Summer	63.540	0.080	0.0	0.2	0.2	0.1	O K
2880 min Summer	63.516	0.056	0.0	0.2	0.2	0.0	O K
4320 min Summer	63.496	0.036	0.0	0.1	0.1	0.0	O K
5760 min Summer	63.487	0.027	0.0	0.1	0.1	0.0	O K
7200 min Summer	63.484	0.024	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	70.008	0.0	1.1	17
30 min Summer	45.613	0.0	1.7	30
60 min Summer	28.447	0.0	2.4	46
120 min Summer	17.244	0.0	3.2	80
180 min Summer	12.741	0.0	3.6	114
240 min Summer	10.239	0.0	3.9	146
360 min Summer	7.483	0.0	4.4	210
480 min Summer	5.987	0.0	4.7	270
600 min Summer	5.035	0.0	5.0	330
720 min Summer	4.369	0.0	5.2	390
960 min Summer	3.490	0.0	5.5	508
1440 min Summer	2.541	0.0	5.9	738
2160 min Summer	1.847	0.0	6.3	1100
2880 min Summer	1.473	0.0	6.4	1452
4320 min Summer	1.069	0.0	6.5	2160
5760 min Summer	0.851	0.0	6.4	2840
7200 min Summer	0.713	0.0	6.2	3592

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Cascade Summary of Results for PP3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	63.482	0.022	0.0	0.1	0.1	0.0	O K
10080 min Summer	63.480	0.020	0.0	0.1	0.1	0.0	O K
15 min Winter	63.743	0.283	0.1	0.4	0.5	1.1	O K
30 min Winter	63.799	0.339	0.1	0.5	0.6	1.6	O K
60 min Winter	63.817	0.357	0.1	0.5	0.6	1.8	Flood Risk
120 min Winter	63.819	0.359	0.1	0.5	0.6	1.9	Flood Risk
180 min Winter	63.811	0.351	0.1	0.5	0.6	1.7	Flood Risk
240 min Winter	63.793	0.333	0.1	0.5	0.6	1.5	O K
360 min Winter	63.746	0.286	0.1	0.4	0.5	1.1	O K
480 min Winter	63.703	0.243	0.1	0.4	0.5	0.8	O K
600 min Winter	63.666	0.206	0.1	0.4	0.4	0.6	O K
720 min Winter	63.635	0.175	0.1	0.3	0.4	0.4	O K
960 min Winter	63.590	0.130	0.0	0.3	0.3	0.2	O K
1440 min Winter	63.540	0.080	0.0	0.2	0.2	0.1	O K
2160 min Winter	63.508	0.048	0.0	0.2	0.2	0.0	O K
2880 min Winter	63.495	0.035	0.0	0.1	0.1	0.0	O K
4320 min Winter	63.485	0.025	0.0	0.1	0.1	0.0	O K
5760 min Winter	63.482	0.022	0.0	0.1	0.1	0.0	O K
7200 min Winter	63.479	0.019	0.0	0.1	0.1	0.0	O K
8640 min Winter	63.478	0.018	0.0	0.1	0.1	0.0	O K
10080 min Winter	63.476	0.016	0.0	0.0	0.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.617	0.0	6.0	4320
10080 min Summer	0.545	0.0	5.8	4952
15 min Winter	70.008	0.0	1.3	17
30 min Winter	45.613	0.0	2.1	30
60 min Winter	28.447	0.0	2.9	48
120 min Winter	17.244	0.0	3.7	86
180 min Winter	12.741	0.0	4.2	122
240 min Winter	10.239	0.0	4.6	156
360 min Winter	7.483	0.0	5.1	220
480 min Winter	5.987	0.0	5.4	280
600 min Winter	5.035	0.0	5.7	338
720 min Winter	4.369	0.0	6.0	396
960 min Winter	3.490	0.0	6.3	510
1440 min Winter	2.541	0.0	6.8	736
2160 min Winter	1.847	0.0	7.3	1092
2880 min Winter	1.473	0.0	7.5	1468
4320 min Winter	1.069	0.0	7.8	2180
5760 min Winter	0.851	0.0	7.8	2928
7200 min Winter	0.713	0.0	7.7	3752
8640 min Winter	0.617	0.0	7.5	4368
10080 min Winter	0.545	0.0	7.3	4968

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Cascade Rainfall Details for PP3.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.017

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

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Cascade Model Details for PP3.srcx

Storage is Online Cover Level (m) 64.110

Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	31.0
Max Percolation (l/s)	43.1	Slope (1:X)	18.0
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	63.460	Cap Volume Depth (m)	0.450

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	3.4
Membrane Percolation (mm/hr)	1000	Length (m)	9.9
Max Percolation (l/s)	9.4	Slope (1:X)	0.0
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	63.807	Cap Volume Depth (m)	0.450

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	9.0
Max Percolation (l/s)	12.5	Slope (1:X)	13.3
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.060	Cap Volume Depth (m)	0.450

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 63.460

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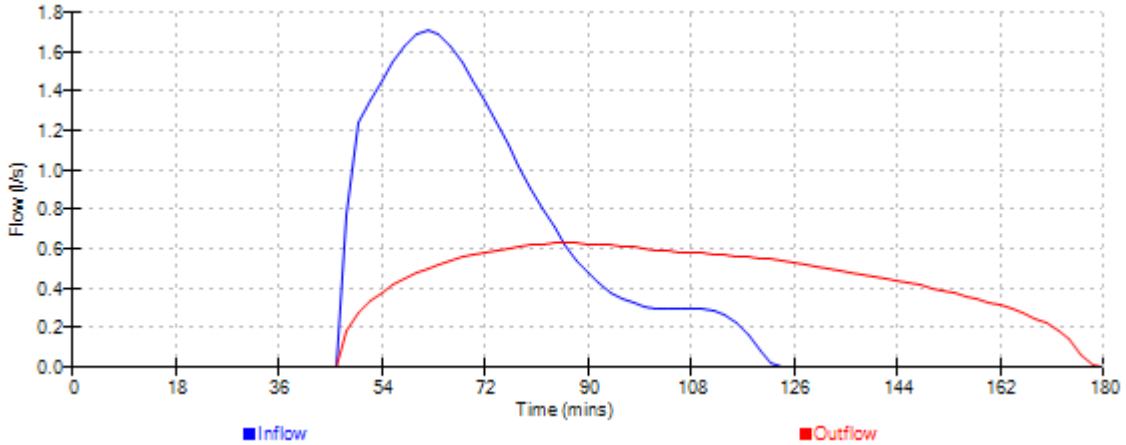
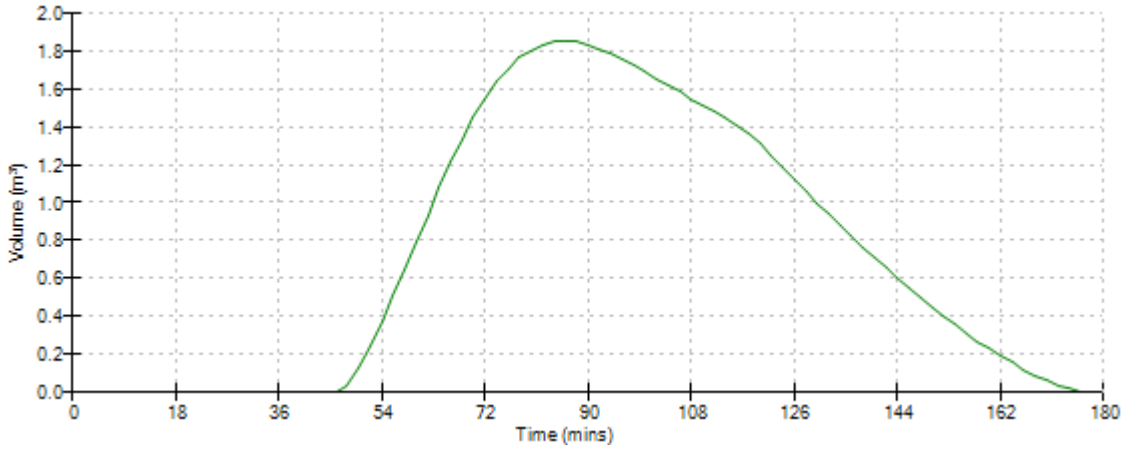
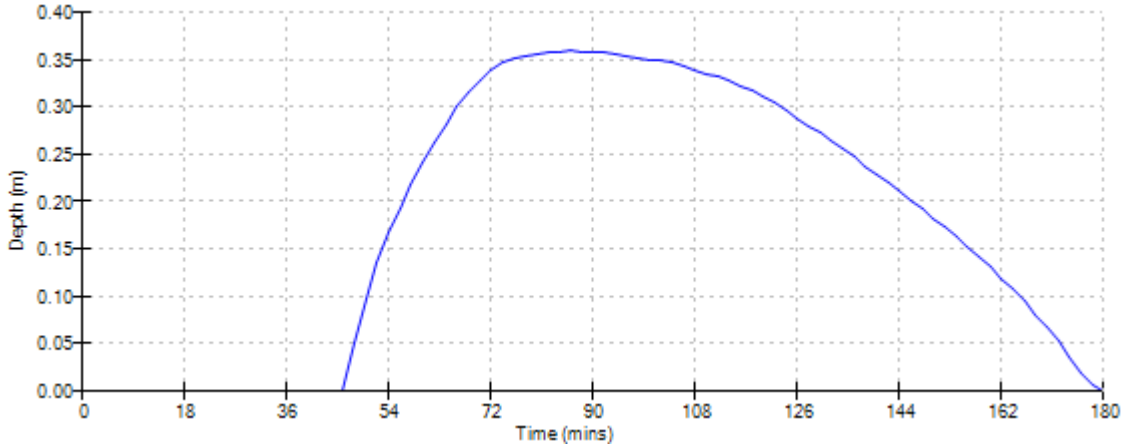
Cascade Event: 120 min Winter for PP3.srcx







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Cascade Summary of Results for Tank 1.srcx

Upstream Structures	Outflow To	Overflow To
PP1.srcx	(None)	(None)

Half Drain Time : 61 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	63.924	0.184	0.0	1.0	1.0	4.3	O K
30 min Summer	63.969	0.229	0.0	1.0	1.0	5.3	O K
60 min Summer	64.002	0.262	0.0	1.0	1.0	6.1	O K
120 min Summer	64.013	0.273	0.0	1.0	1.0	6.4	O K
180 min Summer	64.010	0.270	0.0	1.0	1.0	6.3	O K
240 min Summer	64.002	0.262	0.0	1.0	1.0	6.1	O K
360 min Summer	63.981	0.241	0.0	1.0	1.0	5.6	O K
480 min Summer	63.958	0.218	0.0	1.0	1.0	5.1	O K
600 min Summer	63.934	0.194	0.0	1.0	1.0	4.5	O K
720 min Summer	63.912	0.172	0.0	1.0	1.0	4.0	O K
960 min Summer	63.875	0.135	0.0	1.0	1.0	3.1	O K
1440 min Summer	63.836	0.096	0.0	1.0	1.0	2.2	O K
2160 min Summer	63.816	0.076	0.0	0.8	0.8	1.8	O K
2880 min Summer	63.804	0.064	0.0	0.6	0.6	1.5	O K
4320 min Summer	63.789	0.049	0.0	0.5	0.5	1.1	O K
5760 min Summer	63.780	0.040	0.0	0.4	0.4	0.9	O K
7200 min Summer	63.774	0.034	0.0	0.3	0.3	0.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	70.008	0.0	6.5	18
30 min Summer	45.613	0.0	8.6	32
60 min Summer	28.447	0.0	10.8	60
120 min Summer	17.244	0.0	13.2	100
180 min Summer	12.741	0.0	14.7	132
240 min Summer	10.239	0.0	15.9	166
360 min Summer	7.483	0.0	17.6	232
480 min Summer	5.987	0.0	18.9	298
600 min Summer	5.035	0.0	20.1	362
720 min Summer	4.369	0.0	21.1	424
960 min Summer	3.490	0.0	22.7	538
1440 min Summer	2.541	0.0	25.1	752
2160 min Summer	1.847	0.0	27.6	1124
2880 min Summer	1.473	0.0	29.5	1472
4320 min Summer	1.069	0.0	32.1	2204
5760 min Summer	0.851	0.0	34.0	2936
7200 min Summer	0.713	0.0	35.3	3672

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Cascade Summary of Results for Tank 1.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	63.770	0.030	0.0	0.3	0.3	0.7	O K
10080 min Summer	63.767	0.027	0.0	0.3	0.3	0.6	O K
15 min Winter	63.948	0.208	0.0	1.0	1.0	4.8	O K
30 min Winter	64.001	0.261	0.0	1.0	1.0	6.1	O K
60 min Winter	64.042	0.302	0.0	1.0	1.0	7.0	O K
120 min Winter	64.056	0.316	0.0	1.0	1.0	7.4	O K
180 min Winter	64.048	0.308	0.0	1.0	1.0	7.2	O K
240 min Winter	64.036	0.296	0.0	1.0	1.0	6.9	O K
360 min Winter	64.000	0.260	0.0	1.0	1.0	6.1	O K
480 min Winter	63.962	0.222	0.0	1.0	1.0	5.2	O K
600 min Winter	63.925	0.185	0.0	1.0	1.0	4.3	O K
720 min Winter	63.891	0.151	0.0	1.0	1.0	3.5	O K
960 min Winter	63.843	0.103	0.0	1.0	1.0	2.4	O K
1440 min Winter	63.820	0.080	0.0	0.8	0.8	1.9	O K
2160 min Winter	63.801	0.061	0.0	0.6	0.6	1.4	O K
2880 min Winter	63.789	0.049	0.0	0.5	0.5	1.1	O K
4320 min Winter	63.777	0.037	0.0	0.4	0.4	0.9	O K
5760 min Winter	63.770	0.030	0.0	0.3	0.3	0.7	O K
7200 min Winter	63.765	0.025	0.0	0.3	0.3	0.6	O K
8640 min Winter	63.762	0.022	0.0	0.2	0.2	0.5	O K
10080 min Winter	63.759	0.019	0.0	0.2	0.2	0.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.617	0.0	36.3	4400
10080 min Summer	0.545	0.0	37.0	5088
15 min Winter	70.008	0.0	7.3	18
30 min Winter	45.613	0.0	9.7	32
60 min Winter	28.447	0.0	12.2	60
120 min Winter	17.244	0.0	14.8	114
180 min Winter	12.741	0.0	16.5	142
240 min Winter	10.239	0.0	17.8	180
360 min Winter	7.483	0.0	19.7	254
480 min Winter	5.987	0.0	21.3	322
600 min Winter	5.035	0.0	22.6	386
720 min Winter	4.369	0.0	23.7	442
960 min Winter	3.490	0.0	25.6	532
1440 min Winter	2.541	0.0	28.3	766
2160 min Winter	1.847	0.0	31.3	1124
2880 min Winter	1.473	0.0	33.4	1480
4320 min Winter	1.069	0.0	36.6	2204
5760 min Winter	0.851	0.0	38.7	2944
7200 min Winter	0.713	0.0	40.2	3632
8640 min Winter	0.617	0.0	41.3	4360
10080 min Winter	0.545	0.0	42.2	5040

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Cascade Rainfall Details for Tank 1.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.036

Time (mins) From:	To:	Area (ha)
0	4	0.036

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Cascade Model Details for Tank 1.srcx

Storage is Online Cover Level (m) 65.340

Cellular Storage Structure

Invert Level (m) 63.740 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	24.5	24.5	0.801	0.0	41.3
0.800	24.5	41.3			

Pump Outflow Control

Invert Level (m) 63.740

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0000	1.200	1.0000	3.000	1.0000	7.000	1.0000
0.200	1.0000	1.400	1.0000	3.500	1.0000	7.500	1.0000
0.300	1.0000	1.600	1.0000	4.000	1.0000	8.000	1.0000
0.400	1.0000	1.800	1.0000	4.500	1.0000	8.500	1.0000
0.500	1.0000	2.000	1.0000	5.000	1.0000	9.000	1.0000
0.600	1.0000	2.200	1.0000	5.500	1.0000	9.500	1.0000
0.800	1.0000	2.400	1.0000	6.000	1.0000		
1.000	1.0000	2.600	1.0000	6.500	1.0000		

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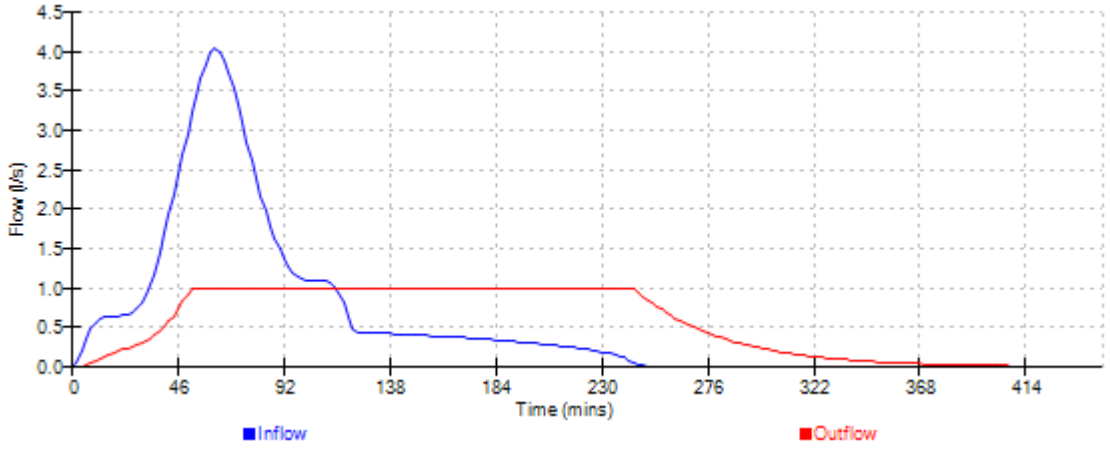
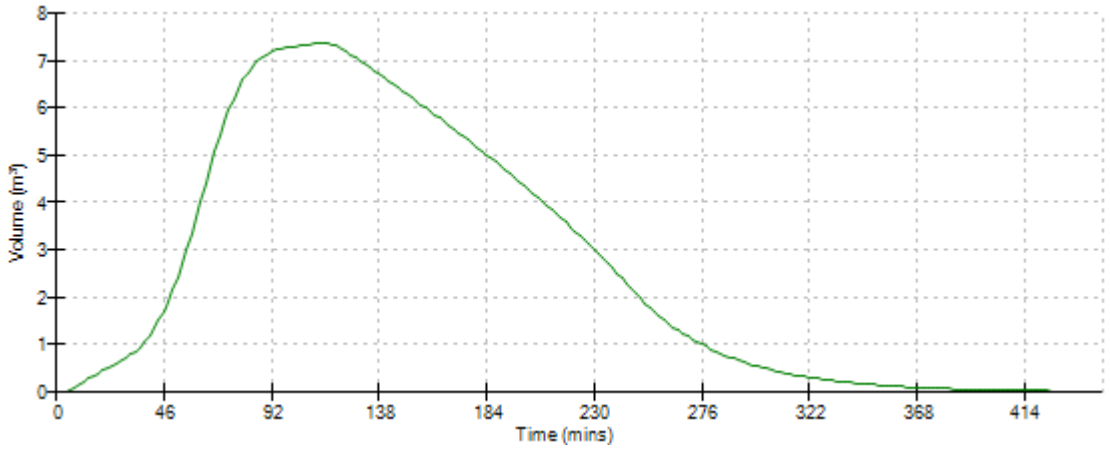
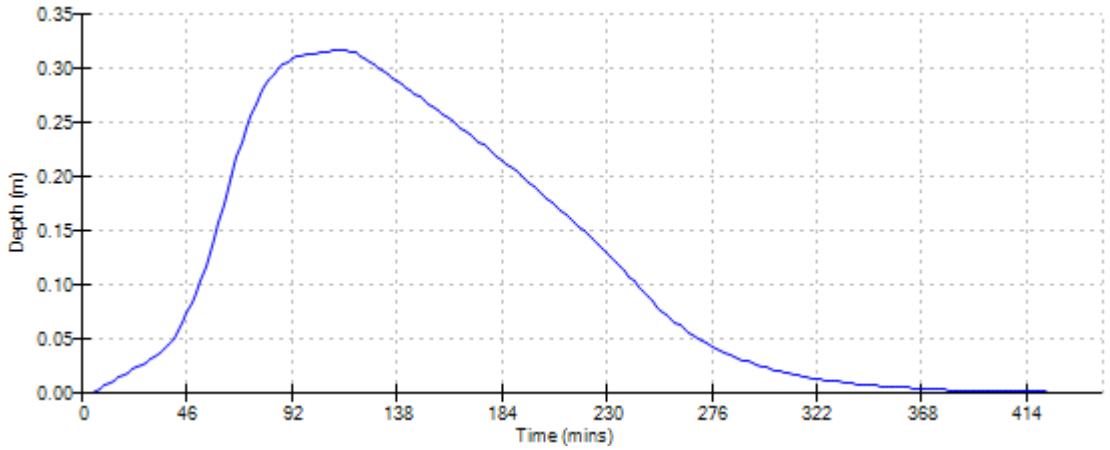
Cascade Event: 120 min Winter for Tank 1.srcx







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Cascade Summary of Results for Tank 2.srcx

Upstream Structures	Outflow To	Overflow To
PP2.srcx	(None)	(None)
PP3.srcx		

Half Drain Time : 110 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	63.025	0.165	0.0	1.0	1.0	6.0	O K
30 min Summer	63.072	0.212	0.0	1.0	1.0	7.8	O K
60 min Summer	63.118	0.258	0.0	1.0	1.0	9.4	O K
120 min Summer	63.157	0.297	0.0	1.0	1.0	10.9	O K
180 min Summer	63.168	0.308	0.0	1.0	1.0	11.3	O K
240 min Summer	63.167	0.307	0.0	1.0	1.0	11.2	O K
360 min Summer	63.158	0.298	0.0	1.0	1.0	10.9	O K
480 min Summer	63.146	0.286	0.0	1.0	1.0	10.4	O K
600 min Summer	63.131	0.271	0.0	1.0	1.0	9.9	O K
720 min Summer	63.115	0.255	0.0	1.0	1.0	9.3	O K
960 min Summer	63.080	0.220	0.0	1.0	1.0	8.0	O K
1440 min Summer	63.018	0.158	0.0	1.0	1.0	5.8	O K
2160 min Summer	62.962	0.102	0.0	1.0	1.0	3.7	O K
2880 min Summer	62.945	0.085	0.0	0.9	0.9	3.1	O K
4320 min Summer	62.926	0.066	0.0	0.7	0.7	2.4	O K
5760 min Summer	62.913	0.053	0.0	0.5	0.5	2.0	O K
7200 min Summer	62.905	0.045	0.0	0.5	0.5	1.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	70.008	0.0	8.4	19
30 min Summer	45.613	0.0	11.3	33
60 min Summer	28.447	0.0	14.4	64
120 min Summer	17.244	0.0	17.7	122
180 min Summer	12.741	0.0	19.8	180
240 min Summer	10.239	0.0	21.3	216
360 min Summer	7.483	0.0	23.6	272
480 min Summer	5.987	0.0	25.4	334
600 min Summer	5.035	0.0	26.9	396
720 min Summer	4.369	0.0	28.1	458
960 min Summer	3.490	0.0	30.2	580
1440 min Summer	2.541	0.0	33.2	812
2160 min Summer	1.847	0.0	36.3	1128
2880 min Summer	1.473	0.0	38.6	1488
4320 min Summer	1.069	0.0	41.7	2208
5760 min Summer	0.851	0.0	43.6	2936
7200 min Summer	0.713	0.0	44.9	3672

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Cascade Summary of Results for Tank 2.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	62.899	0.039	0.0	0.4	0.4	1.4	O K
10080 min Summer	62.895	0.035	0.0	0.3	0.3	1.3	O K
15 min Winter	63.046	0.186	0.0	1.0	1.0	6.8	O K
30 min Winter	63.100	0.240	0.0	1.0	1.0	8.8	O K
60 min Winter	63.153	0.293	0.0	1.0	1.0	10.7	O K
120 min Winter	63.200	0.340	0.0	1.0	1.0	12.4	O K
180 min Winter	63.218	0.358	0.0	1.0	1.0	13.1	O K
240 min Winter	63.219	0.359	0.0	1.0	1.0	13.1	O K
360 min Winter	63.201	0.341	0.0	1.0	1.0	12.5	O K
480 min Winter	63.180	0.320	0.0	1.0	1.0	11.7	O K
600 min Winter	63.153	0.293	0.0	1.0	1.0	10.7	O K
720 min Winter	63.123	0.263	0.0	1.0	1.0	9.6	O K
960 min Winter	63.064	0.204	0.0	1.0	1.0	7.5	O K
1440 min Winter	62.975	0.115	0.0	1.0	1.0	4.2	O K
2160 min Winter	62.942	0.082	0.0	0.8	0.8	3.0	O K
2880 min Winter	62.927	0.067	0.0	0.7	0.7	2.4	O K
4320 min Winter	62.909	0.049	0.0	0.5	0.5	1.8	O K
5760 min Winter	62.899	0.039	0.0	0.4	0.4	1.4	O K
7200 min Winter	62.893	0.033	0.0	0.3	0.3	1.2	O K
8640 min Winter	62.888	0.028	0.0	0.3	0.3	1.0	O K
10080 min Winter	62.885	0.025	0.0	0.2	0.2	0.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.617	0.0	45.9	4400
10080 min Summer	0.545	0.0	46.8	5120
15 min Winter	70.008	0.0	9.5	19
30 min Winter	45.613	0.0	12.8	33
60 min Winter	28.447	0.0	16.2	62
120 min Winter	17.244	0.0	19.9	120
180 min Winter	12.741	0.0	22.3	178
240 min Winter	10.239	0.0	24.0	230
360 min Winter	7.483	0.0	26.6	290
480 min Winter	5.987	0.0	28.6	356
600 min Winter	5.035	0.0	30.3	424
720 min Winter	4.369	0.0	31.7	488
960 min Winter	3.490	0.0	34.1	608
1440 min Winter	2.541	0.0	37.6	810
2160 min Winter	1.847	0.0	41.3	1136
2880 min Winter	1.473	0.0	44.0	1500
4320 min Winter	1.069	0.0	47.4	2204
5760 min Winter	0.851	0.0	49.7	2936
7200 min Winter	0.713	0.0	51.4	3672
8640 min Winter	0.617	0.0	52.6	4400
10080 min Winter	0.545	0.0	53.6	5144

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Cascade Rainfall Details for Tank 2.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	30	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.048

Time (mins) From:	To:	Area (ha)
0	4	0.048

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Cascade Model Details for Tank 2.srcx

Storage is Online Cover Level (m) 64.460

Cellular Storage Structure

Invert Level (m) 62.860 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	38.5	38.5	0.801	0.0	61.7
0.800	38.5	61.7			

Pump Outflow Control

Invert Level (m) 62.860

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0000	1.200	1.0000	3.000	1.0000	7.000	1.0000
0.200	1.0000	1.400	1.0000	3.500	1.0000	7.500	1.0000
0.300	1.0000	1.600	1.0000	4.000	1.0000	8.000	1.0000
0.400	1.0000	1.800	1.0000	4.500	1.0000	8.500	1.0000
0.500	1.0000	2.000	1.0000	5.000	1.0000	9.000	1.0000
0.600	1.0000	2.200	1.0000	5.500	1.0000	9.500	1.0000
0.800	1.0000	2.400	1.0000	6.000	1.0000		
1.000	1.0000	2.600	1.0000	6.500	1.0000		

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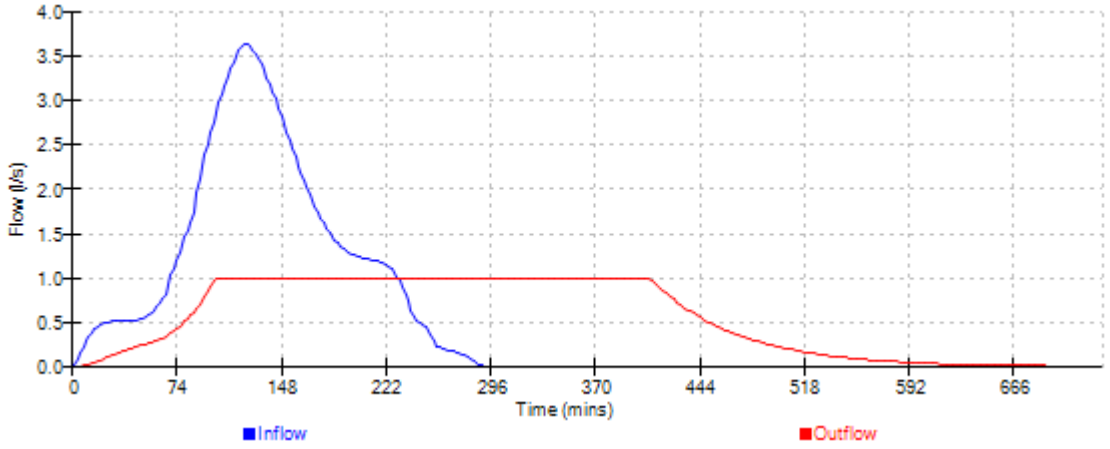
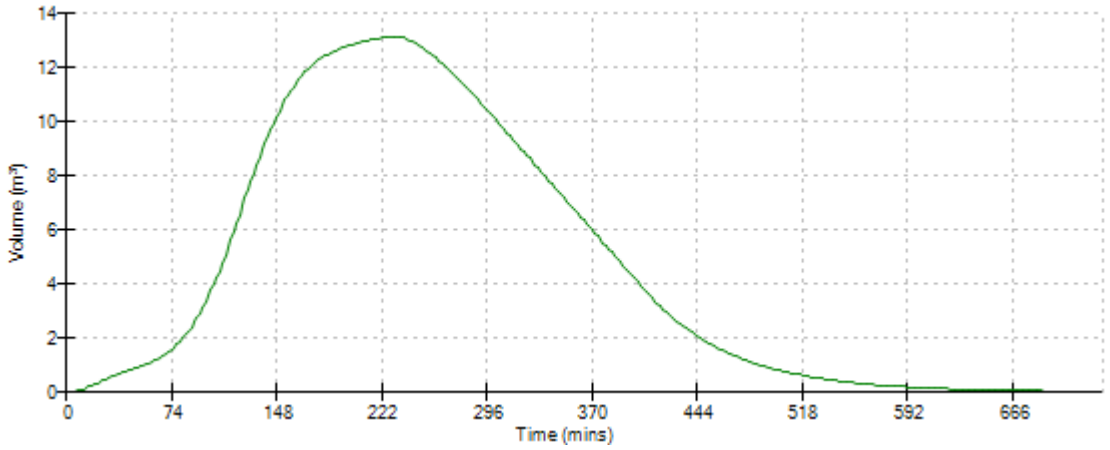
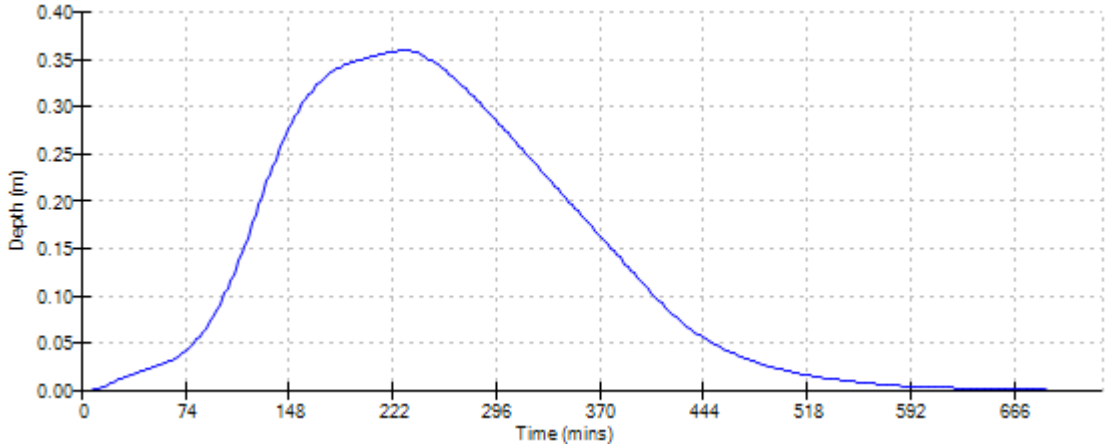
Cascade Event: 240 min Winter for Tank 2.srcx







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Cascade Summary of Results for PP1.srcx

Upstream Structures	Outflow To	Overflow To
(None)	Tank 1.srcx	(None)

Half Drain Time : 69 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	64.289	0.279	0.3	0.4	0.7	3.2	O K
30 min Summer	64.325	0.315	0.4	0.5	0.8	4.3	O K
60 min Summer	64.345	0.335	0.4	0.5	0.9	5.0	O K
120 min Summer	64.353	0.343	0.4	0.5	0.9	5.3	O K
180 min Summer	64.351	0.341	0.4	0.5	0.9	5.2	O K
240 min Summer	64.345	0.335	0.4	0.5	0.9	5.0	O K
360 min Summer	64.329	0.319	0.4	0.5	0.8	4.4	O K
480 min Summer	64.312	0.302	0.3	0.5	0.8	3.9	O K
600 min Summer	64.297	0.287	0.3	0.4	0.8	3.5	O K
720 min Summer	64.283	0.273	0.3	0.4	0.7	3.1	O K
960 min Summer	64.259	0.249	0.3	0.4	0.7	2.5	O K
1440 min Summer	64.217	0.207	0.2	0.4	0.5	1.7	O K
2160 min Summer	64.167	0.157	0.1	0.3	0.5	0.9	O K
2880 min Summer	64.132	0.122	0.1	0.3	0.4	0.6	O K
4320 min Summer	64.092	0.082	0.1	0.2	0.3	0.3	O K
5760 min Summer	64.069	0.059	0.1	0.2	0.2	0.1	O K
7200 min Summer	64.056	0.046	0.0	0.2	0.2	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	90.593	0.0	3.6	17
30 min Summer	59.559	0.0	5.1	31
60 min Summer	37.356	0.0	6.7	54
120 min Summer	22.681	0.0	8.4	86
180 min Summer	16.733	0.0	9.4	120
240 min Summer	13.414	0.0	10.1	154
360 min Summer	9.744	0.0	11.0	220
480 min Summer	7.766	0.0	11.7	286
600 min Summer	6.511	0.0	12.3	350
720 min Summer	5.635	0.0	12.8	412
960 min Summer	4.483	0.0	13.5	532
1440 min Summer	3.242	0.0	14.6	778
2160 min Summer	2.342	0.0	15.6	1128
2880 min Summer	1.857	0.0	16.3	1472
4320 min Summer	1.337	0.0	17.1	2204
5760 min Summer	1.058	0.0	17.6	2936
7200 min Summer	0.882	0.0	17.8	3664

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Cascade Summary of Results for PP1.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	64.049	0.039	0.0	0.1	0.2	0.1	O K
10080 min Summer	64.043	0.033	0.0	0.1	0.1	0.0	O K
15 min Winter	64.308	0.298	0.3	0.4	0.8	3.8	O K
30 min Winter	64.345	0.335	0.4	0.5	0.9	5.0	O K
60 min Winter	64.367	0.357	0.4	0.5	0.9	5.8	Flood Risk
120 min Winter	64.372	0.362	0.4	0.5	0.9	6.0	Flood Risk
180 min Winter	64.367	0.357	0.4	0.5	0.9	5.8	Flood Risk
240 min Winter	64.357	0.347	0.4	0.5	0.9	5.4	O K
360 min Winter	64.334	0.324	0.4	0.5	0.8	4.6	O K
480 min Winter	64.311	0.301	0.3	0.5	0.8	3.9	O K
600 min Winter	64.290	0.280	0.3	0.4	0.7	3.3	O K
720 min Winter	64.271	0.261	0.3	0.4	0.7	2.8	O K
960 min Winter	64.239	0.229	0.2	0.4	0.6	2.1	O K
1440 min Winter	64.181	0.171	0.1	0.3	0.5	1.1	O K
2160 min Winter	64.125	0.115	0.1	0.3	0.4	0.5	O K
2880 min Winter	64.093	0.083	0.1	0.2	0.3	0.3	O K
4320 min Winter	64.061	0.051	0.0	0.2	0.2	0.1	O K
5760 min Winter	64.049	0.039	0.0	0.1	0.2	0.1	O K
7200 min Winter	64.041	0.031	0.0	0.1	0.1	0.0	O K
8640 min Winter	64.037	0.027	0.0	0.1	0.1	0.0	O K
10080 min Winter	64.035	0.025	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.760	0.0	17.9	4304
10080 min Summer	0.670	0.0	17.9	5072
15 min Winter	90.593	0.0	4.2	17
30 min Winter	59.559	0.0	5.9	31
60 min Winter	37.356	0.0	7.7	58
120 min Winter	22.681	0.0	9.5	92
180 min Winter	16.733	0.0	10.6	130
240 min Winter	13.414	0.0	11.4	166
360 min Winter	9.744	0.0	12.5	236
480 min Winter	7.766	0.0	13.3	302
600 min Winter	6.511	0.0	13.9	368
720 min Winter	5.635	0.0	14.5	428
960 min Winter	4.483	0.0	15.3	552
1440 min Winter	3.242	0.0	16.5	792
2160 min Winter	2.342	0.0	17.7	1128
2880 min Winter	1.857	0.0	18.5	1472
4320 min Winter	1.337	0.0	19.6	2184
5760 min Winter	1.058	0.0	20.2	2912
7200 min Winter	0.882	0.0	20.5	3560
8640 min Winter	0.760	0.0	20.7	4360
10080 min Winter	0.670	0.0	20.8	5120

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Cascade Rainfall Details for PP1.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.028

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

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Cascade Model Details for PP1.srcx

Storage is Online Cover Level (m) 64.660

Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	27.8
Max Percolation (l/s)	38.6	Slope (1:X)	51.5
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.010	Cap Volume Depth (m)	0.450

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	3.7
Membrane Percolation (mm/hr)	1000	Length (m)	22.2
Max Percolation (l/s)	22.8	Slope (1:X)	64.2
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.210	Cap Volume Depth (m)	0.450

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 64.010

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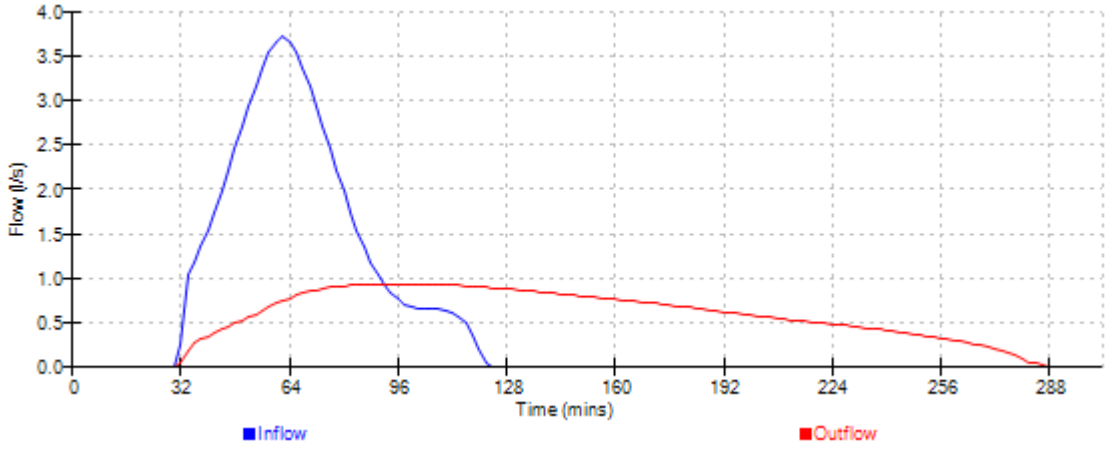
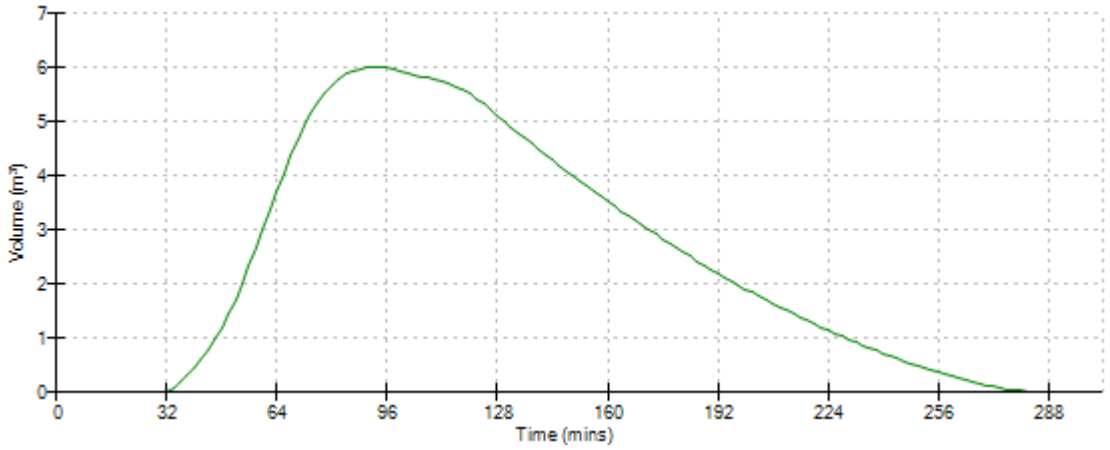
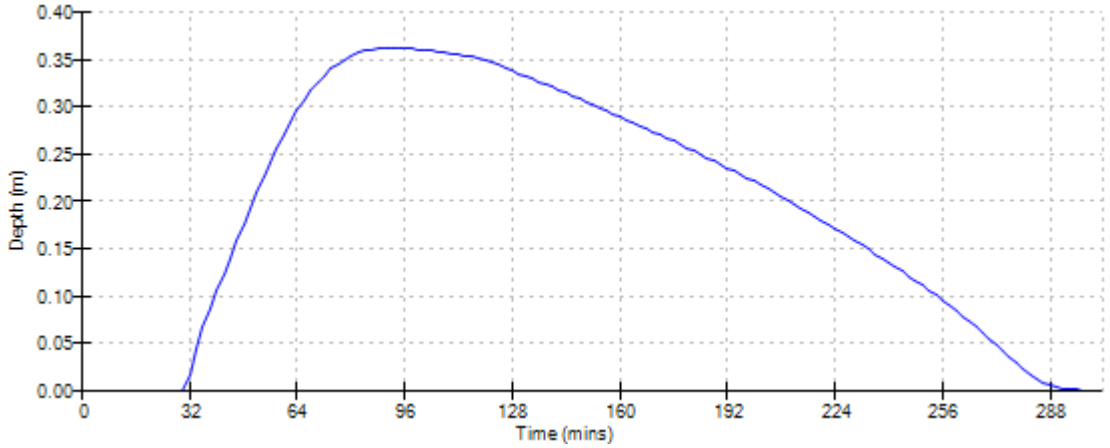
Cascade Event: 120 min Winter for PP1.srcx







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Cascade Summary of Results for PP2.srcx

Upstream Structures	Outflow To	Overflow To
(None)	Tank 2.srcx	(None)

Half Drain Time : 50 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	64.445	0.195	0.2	0.4	0.6	2.2	O K
30 min Summer	64.468	0.218	0.3	0.4	0.7	2.8	O K
60 min Summer	64.480	0.230	0.3	0.4	0.7	3.2	O K
120 min Summer	64.484	0.234	0.3	0.4	0.7	3.3	O K
180 min Summer	64.480	0.230	0.3	0.4	0.7	3.2	O K
240 min Summer	64.474	0.224	0.3	0.4	0.7	3.0	O K
360 min Summer	64.460	0.210	0.3	0.4	0.7	2.6	O K
480 min Summer	64.447	0.197	0.2	0.4	0.6	2.2	O K
600 min Summer	64.432	0.182	0.2	0.3	0.6	1.9	O K
720 min Summer	64.419	0.169	0.2	0.3	0.5	1.6	O K
960 min Summer	64.397	0.147	0.2	0.3	0.5	1.2	O K
1440 min Summer	64.364	0.114	0.1	0.3	0.4	0.7	O K
2160 min Summer	64.333	0.083	0.1	0.2	0.3	0.4	O K
2880 min Summer	64.314	0.064	0.1	0.2	0.3	0.2	O K
4320 min Summer	64.294	0.044	0.0	0.2	0.2	0.1	O K
5760 min Summer	64.284	0.034	0.0	0.1	0.2	0.1	O K
7200 min Summer	64.278	0.028	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	90.593	0.0	2.5	17
30 min Summer	59.559	0.0	3.5	31
60 min Summer	37.356	0.0	4.6	48
120 min Summer	22.681	0.0	5.7	82
180 min Summer	16.733	0.0	6.4	116
240 min Summer	13.414	0.0	6.8	150
360 min Summer	9.744	0.0	7.5	216
480 min Summer	7.766	0.0	8.0	280
600 min Summer	6.511	0.0	8.4	342
720 min Summer	5.635	0.0	8.7	404
960 min Summer	4.483	0.0	9.2	522
1440 min Summer	3.242	0.0	9.9	762
2160 min Summer	2.342	0.0	10.6	1108
2880 min Summer	1.857	0.0	11.1	1468
4320 min Summer	1.337	0.0	11.7	2200
5760 min Summer	1.058	0.0	12.0	2904
7200 min Summer	0.882	0.0	12.2	3552

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Cascade Summary of Results for PP2.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	64.276	0.026	0.0	0.1	0.1	0.0	O K
10080 min Summer	64.274	0.024	0.0	0.1	0.1	0.0	O K
15 min Winter	64.458	0.208	0.3	0.4	0.6	2.5	O K
30 min Winter	64.482	0.232	0.3	0.4	0.7	3.3	O K
60 min Winter	64.494	0.244	0.4	0.4	0.8	3.7	O K
120 min Winter	64.496	0.246	0.4	0.4	0.8	3.7	O K
180 min Winter	64.489	0.239	0.4	0.4	0.8	3.5	O K
240 min Winter	64.479	0.229	0.3	0.4	0.7	3.2	O K
360 min Winter	64.460	0.210	0.3	0.4	0.7	2.6	O K
480 min Winter	64.441	0.191	0.2	0.4	0.6	2.1	O K
600 min Winter	64.421	0.171	0.2	0.3	0.6	1.7	O K
720 min Winter	64.403	0.153	0.2	0.3	0.5	1.3	O K
960 min Winter	64.375	0.125	0.2	0.3	0.4	0.9	O K
1440 min Winter	64.338	0.088	0.1	0.2	0.3	0.4	O K
2160 min Winter	64.308	0.058	0.1	0.2	0.3	0.2	O K
2880 min Winter	64.294	0.044	0.0	0.2	0.2	0.1	O K
4320 min Winter	64.281	0.031	0.0	0.1	0.1	0.1	O K
5760 min Winter	64.276	0.026	0.0	0.1	0.1	0.0	O K
7200 min Winter	64.273	0.023	0.0	0.1	0.1	0.0	O K
8640 min Winter	64.271	0.021	0.0	0.1	0.1	0.0	O K
10080 min Winter	64.269	0.019	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.760	0.0	12.2	4376
10080 min Summer	0.670	0.0	12.2	5048
15 min Winter	90.593	0.0	2.9	17
30 min Winter	59.559	0.0	4.0	31
60 min Winter	37.356	0.0	5.2	50
120 min Winter	22.681	0.0	6.5	88
180 min Winter	16.733	0.0	7.2	126
240 min Winter	13.414	0.0	7.8	160
360 min Winter	9.744	0.0	8.5	230
480 min Winter	7.766	0.0	9.0	294
600 min Winter	6.511	0.0	9.5	356
720 min Winter	5.635	0.0	9.8	418
960 min Winter	4.483	0.0	10.4	532
1440 min Winter	3.242	0.0	11.2	764
2160 min Winter	2.342	0.0	12.1	1104
2880 min Winter	1.857	0.0	12.6	1464
4320 min Winter	1.337	0.0	13.3	2200
5760 min Winter	1.058	0.0	13.8	2928
7200 min Winter	0.882	0.0	14.0	3600
8640 min Winter	0.760	0.0	14.2	4192
10080 min Winter	0.670	0.0	14.2	5136

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Cascade Rainfall Details for PP2.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.019

Time (mins) From:	To:	Area (ha)
0	4	0.019

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Cascade Model Details for PP2.srcx

Storage is Online Cover Level (m) 64.900

Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	25.0
Max Percolation (l/s)	34.7	Slope (1:X)	75.7
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.250	Cap Volume Depth (m)	0.450

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	3.0
Membrane Percolation (mm/hr)	1000	Length (m)	7.2
Max Percolation (l/s)	6.0	Slope (1:X)	0.0
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.450	Cap Volume Depth (m)	0.450

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 64.250

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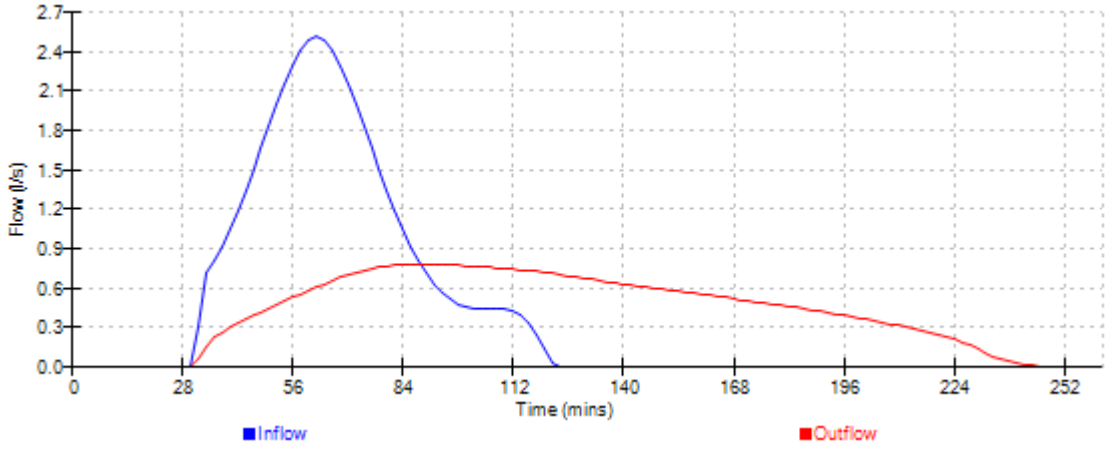
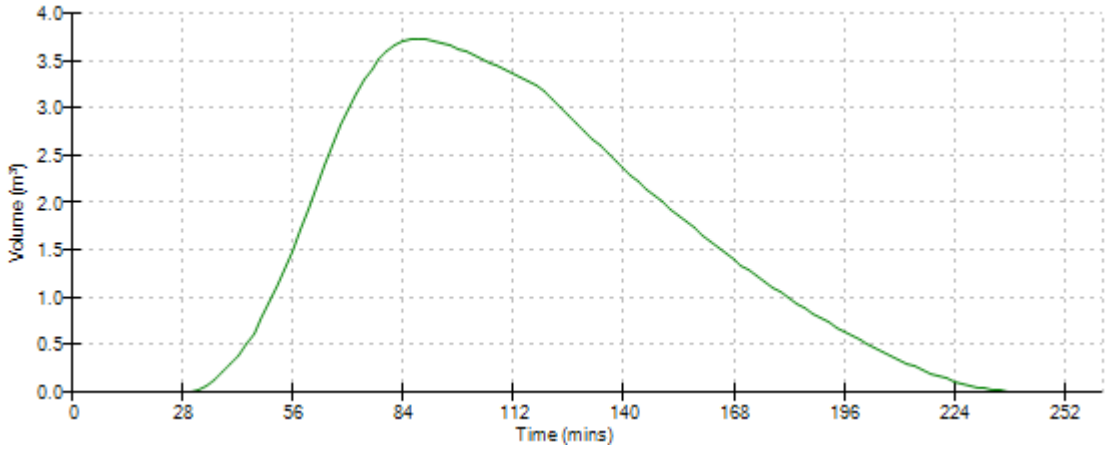
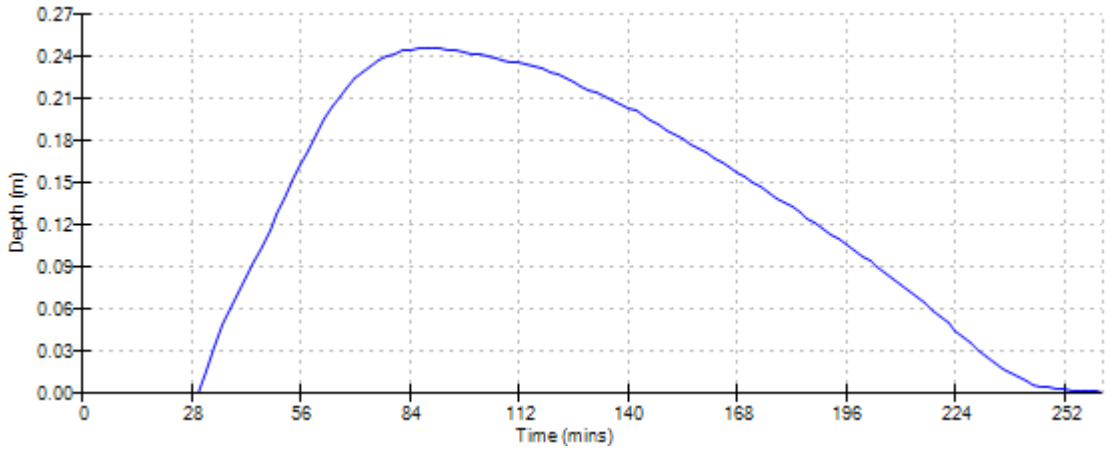
Cascade Event: 120 min Winter for PP2.srcx







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Cascade Summary of Results for PP3.srcx

Upstream Structures	Outflow To	Overflow To
(None)	Tank 2.srcx	(None)

Half Drain Time : 38 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	63.785	0.325	0.1	0.5	0.6	1.4	O K
30 min Summer	63.826	0.366	0.2	0.5	0.7	2.0	Flood Risk
60 min Summer	63.844	0.384	0.2	0.5	0.7	2.4	Flood Risk
120 min Summer	63.852	0.392	0.2	0.5	0.7	2.5	Flood Risk
180 min Summer	63.848	0.388	0.2	0.5	0.7	2.4	Flood Risk
240 min Summer	63.841	0.381	0.2	0.5	0.7	2.3	Flood Risk
360 min Summer	63.823	0.363	0.1	0.5	0.6	1.9	Flood Risk
480 min Summer	63.806	0.346	0.1	0.5	0.6	1.6	O K
600 min Summer	63.775	0.315	0.1	0.5	0.6	1.3	O K
720 min Summer	63.747	0.287	0.1	0.4	0.5	1.1	O K
960 min Summer	63.700	0.240	0.1	0.4	0.5	0.8	O K
1440 min Summer	63.634	0.174	0.1	0.3	0.4	0.4	O K
2160 min Summer	63.576	0.116	0.0	0.3	0.3	0.2	O K
2880 min Summer	63.542	0.082	0.0	0.2	0.2	0.1	O K
4320 min Summer	63.509	0.049	0.0	0.2	0.2	0.0	O K
5760 min Summer	63.495	0.035	0.0	0.1	0.1	0.0	O K
7200 min Summer	63.488	0.028	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	90.593	0.0	1.7	17
30 min Summer	59.559	0.0	2.6	30
60 min Summer	37.356	0.0	3.6	46
120 min Summer	22.681	0.0	4.6	80
180 min Summer	16.733	0.0	5.1	114
240 min Summer	13.414	0.0	5.6	148
360 min Summer	9.744	0.0	6.1	212
480 min Summer	7.766	0.0	6.5	276
600 min Summer	6.511	0.0	6.8	336
720 min Summer	5.635	0.0	7.1	398
960 min Summer	4.483	0.0	7.5	512
1440 min Summer	3.242	0.0	8.1	750
2160 min Summer	2.342	0.0	8.5	1104
2880 min Summer	1.857	0.0	8.8	1468
4320 min Summer	1.337	0.0	9.0	2184
5760 min Summer	1.058	0.0	9.0	2896
7200 min Summer	0.882	0.0	8.8	3600

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Cascade Summary of Results for PP3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	63.485	0.025	0.0	0.1	0.1	0.0	O K
10080 min Summer	63.483	0.023	0.0	0.1	0.1	0.0	O K
15 min Winter	63.814	0.354	0.1	0.5	0.6	1.8	Flood Risk
30 min Winter	63.846	0.386	0.2	0.5	0.7	2.4	Flood Risk
60 min Winter	63.864	0.404	0.2	0.5	0.8	2.8	Flood Risk
120 min Winter	63.867	0.407	0.2	0.5	0.8	2.8	Flood Risk
180 min Winter	63.857	0.397	0.2	0.5	0.8	2.6	Flood Risk
240 min Winter	63.845	0.385	0.2	0.5	0.7	2.4	Flood Risk
360 min Winter	63.819	0.359	0.1	0.5	0.6	1.9	Flood Risk
480 min Winter	63.785	0.325	0.1	0.5	0.6	1.4	O K
600 min Winter	63.743	0.283	0.1	0.4	0.5	1.1	O K
720 min Winter	63.706	0.246	0.1	0.4	0.5	0.8	O K
960 min Winter	63.649	0.189	0.1	0.4	0.4	0.5	O K
1440 min Winter	63.579	0.119	0.0	0.3	0.3	0.2	O K
2160 min Winter	63.530	0.070	0.0	0.2	0.2	0.1	O K
2880 min Winter	63.509	0.049	0.0	0.2	0.2	0.0	O K
4320 min Winter	63.491	0.031	0.0	0.1	0.1	0.0	O K
5760 min Winter	63.485	0.025	0.0	0.1	0.1	0.0	O K
7200 min Winter	63.482	0.022	0.0	0.1	0.1	0.0	O K
8640 min Winter	63.480	0.020	0.0	0.1	0.1	0.0	O K
10080 min Winter	63.479	0.019	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.760	0.0	8.6	4360
10080 min Summer	0.670	0.0	8.3	5040
15 min Winter	90.593	0.0	2.1	17
30 min Winter	59.559	0.0	3.1	30
60 min Winter	37.356	0.0	4.1	50
120 min Winter	22.681	0.0	5.3	88
180 min Winter	16.733	0.0	5.9	122
240 min Winter	13.414	0.0	6.4	158
360 min Winter	9.744	0.0	7.0	224
480 min Winter	7.766	0.0	7.5	288
600 min Winter	6.511	0.0	7.8	348
720 min Winter	5.635	0.0	8.1	406
960 min Winter	4.483	0.0	8.6	520
1440 min Winter	3.242	0.0	9.3	750
2160 min Winter	2.342	0.0	9.8	1100
2880 min Winter	1.857	0.0	10.2	1460
4320 min Winter	1.337	0.0	10.5	2200
5760 min Winter	1.058	0.0	10.6	2920
7200 min Winter	0.882	0.0	10.5	3608
8640 min Winter	0.760	0.0	10.4	4360
10080 min Winter	0.670	0.0	10.2	5128

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Cascade Rainfall Details for PP3.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.017

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

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Cascade Model Details for PP3.srcx

Storage is Online Cover Level (m) 64.110

Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	31.0
Max Percolation (l/s)	43.1	Slope (1:X)	18.0
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	63.460	Cap Volume Depth (m)	0.450

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	3.4
Membrane Percolation (mm/hr)	1000	Length (m)	9.9
Max Percolation (l/s)	9.4	Slope (1:X)	0.0
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	63.807	Cap Volume Depth (m)	0.450

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	9.0
Max Percolation (l/s)	12.5	Slope (1:X)	13.3
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.060	Cap Volume Depth (m)	0.450

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 63.460

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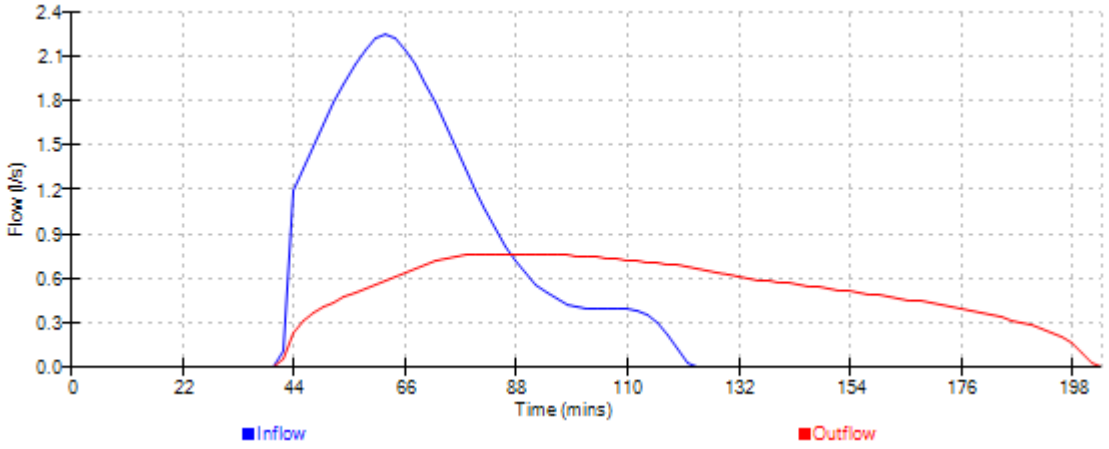
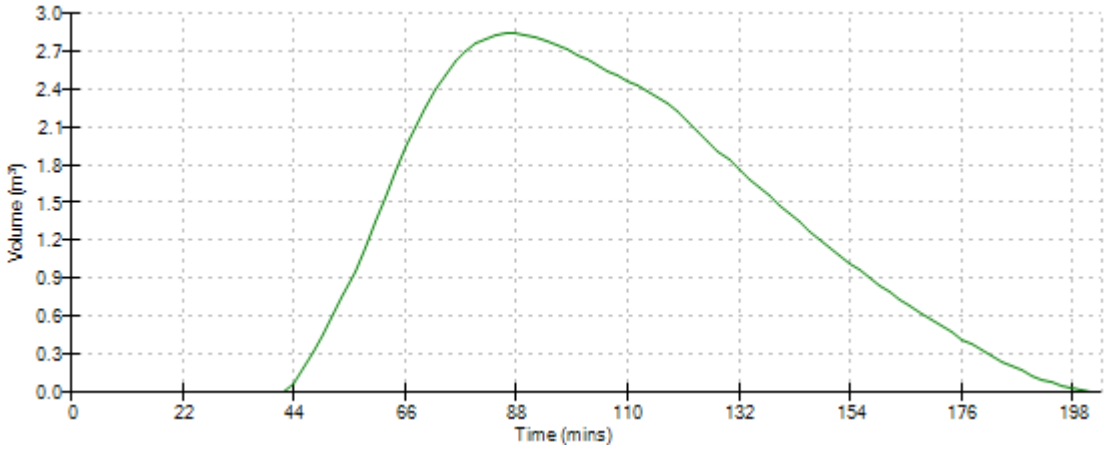
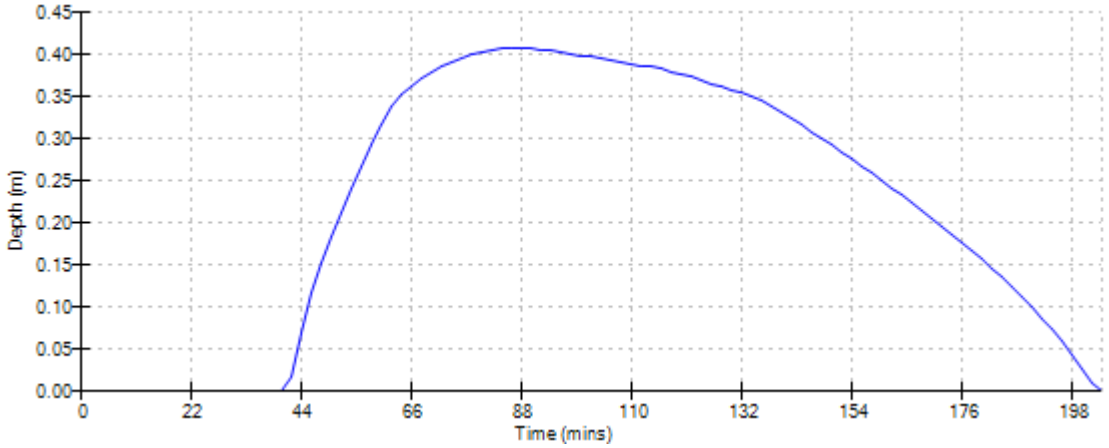
Cascade Event: 120 min Winter for PP3.srcx







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Cascade Summary of Results for Tank 1.srcx

Upstream Structures	Outflow To	Overflow To
PP1.srcx	(None)	(None)

Half Drain Time : 93 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	63.983	0.243	0.0	1.0	1.0	5.7	O K
30 min Summer	64.049	0.309	0.0	1.0	1.0	7.2	O K
60 min Summer	64.104	0.364	0.0	1.0	1.0	8.5	O K
120 min Summer	64.132	0.392	0.0	1.0	1.0	9.1	O K
180 min Summer	64.130	0.390	0.0	1.0	1.0	9.1	O K
240 min Summer	64.121	0.381	0.0	1.0	1.0	8.9	O K
360 min Summer	64.096	0.356	0.0	1.0	1.0	8.3	O K
480 min Summer	64.069	0.329	0.0	1.0	1.0	7.7	O K
600 min Summer	64.041	0.301	0.0	1.0	1.0	7.0	O K
720 min Summer	64.014	0.274	0.0	1.0	1.0	6.4	O K
960 min Summer	63.963	0.223	0.0	1.0	1.0	5.2	O K
1440 min Summer	63.884	0.144	0.0	1.0	1.0	3.4	O K
2160 min Summer	63.834	0.094	0.0	0.9	0.9	2.2	O K
2880 min Summer	63.819	0.079	0.0	0.8	0.8	1.8	O K
4320 min Summer	63.800	0.060	0.0	0.6	0.6	1.4	O K
5760 min Summer	63.789	0.049	0.0	0.5	0.5	1.1	O K
7200 min Summer	63.782	0.042	0.0	0.4	0.4	1.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	90.593	0.0	8.5	18
30 min Summer	59.559	0.0	11.3	33
60 min Summer	37.356	0.0	14.3	62
120 min Summer	22.681	0.0	17.4	120
180 min Summer	16.733	0.0	19.3	152
240 min Summer	13.414	0.0	20.7	182
360 min Summer	9.744	0.0	22.8	248
480 min Summer	7.766	0.0	24.4	314
600 min Summer	6.511	0.0	25.8	380
720 min Summer	5.635	0.0	27.0	444
960 min Summer	4.483	0.0	29.1	568
1440 min Summer	3.242	0.0	32.1	794
2160 min Summer	2.342	0.0	35.1	1124
2880 min Summer	1.857	0.0	37.4	1472
4320 min Summer	1.337	0.0	40.5	2204
5760 min Summer	1.058	0.0	42.7	2936
7200 min Summer	0.882	0.0	44.4	3648

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Cascade Summary of Results for Tank 1.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	63.776	0.036	0.0	0.4	0.4	0.8	O K
10080 min Summer	63.772	0.032	0.0	0.3	0.3	0.8	O K
15 min Winter	64.015	0.275	0.0	1.0	1.0	6.4	O K
30 min Winter	64.091	0.351	0.0	1.0	1.0	8.2	O K
60 min Winter	64.156	0.416	0.0	1.0	1.0	9.7	O K
120 min Winter	64.195	0.455	0.0	1.0	1.0	10.6	O K
180 min Winter	64.194	0.454	0.0	1.0	1.0	10.6	O K
240 min Winter	64.179	0.439	0.0	1.0	1.0	10.2	O K
360 min Winter	64.143	0.403	0.0	1.0	1.0	9.4	O K
480 min Winter	64.100	0.360	0.0	1.0	1.0	8.4	O K
600 min Winter	64.056	0.316	0.0	1.0	1.0	7.4	O K
720 min Winter	64.013	0.273	0.0	1.0	1.0	6.4	O K
960 min Winter	63.934	0.194	0.0	1.0	1.0	4.5	O K
1440 min Winter	63.839	0.099	0.0	1.0	1.0	2.3	O K
2160 min Winter	63.816	0.076	0.0	0.8	0.8	1.8	O K
2880 min Winter	63.801	0.061	0.0	0.6	0.6	1.4	O K
4320 min Winter	63.785	0.045	0.0	0.5	0.5	1.1	O K
5760 min Winter	63.777	0.037	0.0	0.4	0.4	0.9	O K
7200 min Winter	63.771	0.031	0.0	0.3	0.3	0.7	O K
8640 min Winter	63.767	0.027	0.0	0.3	0.3	0.6	O K
10080 min Winter	63.764	0.024	0.0	0.2	0.2	0.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.760	0.0	45.6	4400
10080 min Summer	0.670	0.0	46.6	5136
15 min Winter	90.593	0.0	9.6	18
30 min Winter	59.559	0.0	12.7	32
60 min Winter	37.356	0.0	16.0	60
120 min Winter	22.681	0.0	19.4	118
180 min Winter	16.733	0.0	21.6	172
240 min Winter	13.414	0.0	23.2	196
360 min Winter	9.744	0.0	25.5	270
480 min Winter	7.766	0.0	27.3	342
600 min Winter	6.511	0.0	28.9	410
720 min Winter	5.635	0.0	30.3	476
960 min Winter	4.483	0.0	32.7	596
1440 min Winter	3.242	0.0	36.1	766
2160 min Winter	2.342	0.0	39.6	1124
2880 min Winter	1.857	0.0	42.2	1496
4320 min Winter	1.337	0.0	46.0	2204
5760 min Winter	1.058	0.0	48.6	2912
7200 min Winter	0.882	0.0	50.5	3672
8640 min Winter	0.760	0.0	51.9	4368
10080 min Winter	0.670	0.0	53.0	5064

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Cascade Rainfall Details for Tank 1.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.036

Time (mins) From:	To:	Area (ha)
0	4	0.036

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Cascade Model Details for Tank 1.srcx

Storage is Online Cover Level (m) 65.340

Cellular Storage Structure

Invert Level (m) 63.740 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	24.5	24.5	0.801	0.0	41.3
0.800	24.5	41.3			

Pump Outflow Control

Invert Level (m) 63.740

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0000	1.200	1.0000	3.000	1.0000	7.000	1.0000
0.200	1.0000	1.400	1.0000	3.500	1.0000	7.500	1.0000
0.300	1.0000	1.600	1.0000	4.000	1.0000	8.000	1.0000
0.400	1.0000	1.800	1.0000	4.500	1.0000	8.500	1.0000
0.500	1.0000	2.000	1.0000	5.000	1.0000	9.000	1.0000
0.600	1.0000	2.200	1.0000	5.500	1.0000	9.500	1.0000
0.800	1.0000	2.400	1.0000	6.000	1.0000		
1.000	1.0000	2.600	1.0000	6.500	1.0000		

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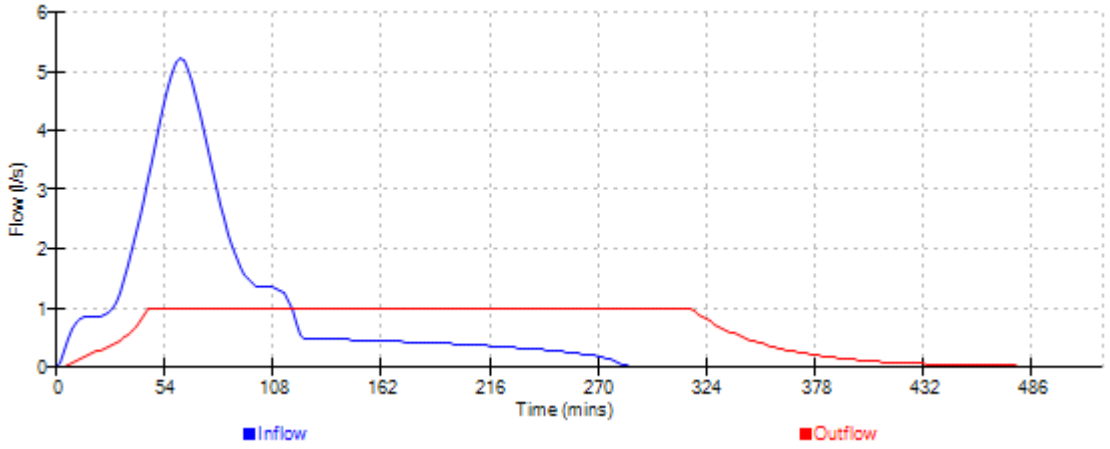
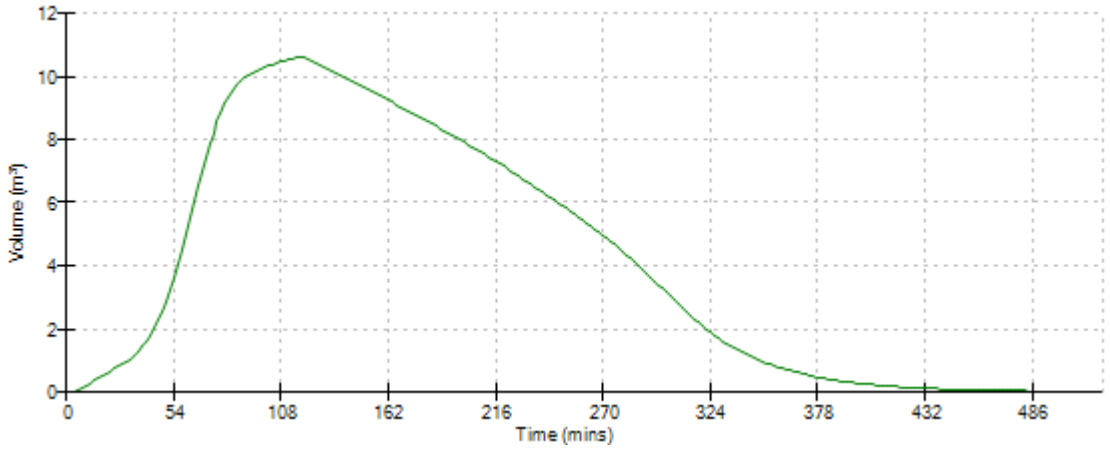
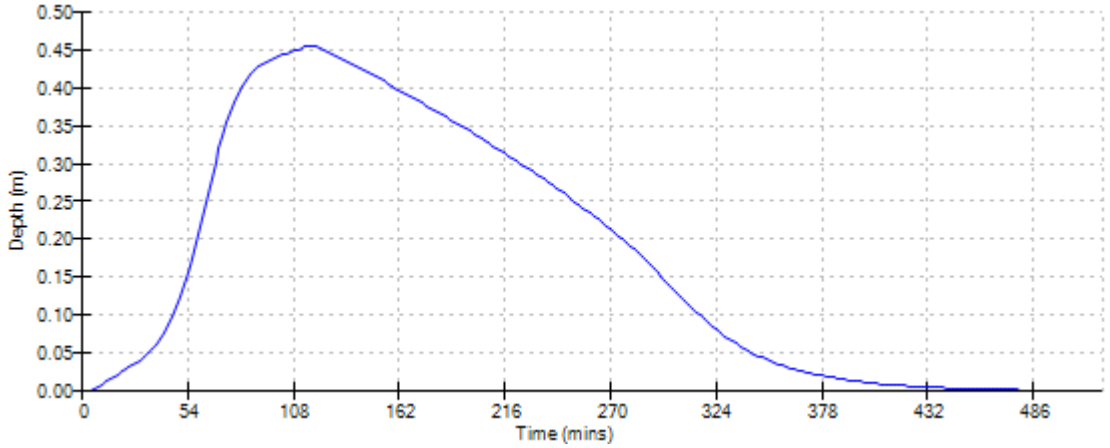
Cascade Event: 120 min Winter for Tank 1.srcx







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Cascade Summary of Results for Tank 2.srcx

Upstream Structures	Outflow To	Overflow To
PP2.srcx	(None)	(None)
PP3.srcx		

Half Drain Time : 164 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	63.077	0.217	0.0	1.0	1.0	7.9	O K
30 min Summer	63.143	0.283	0.0	1.0	1.0	10.3	O K
60 min Summer	63.209	0.349	0.0	1.0	1.0	12.8	O K
120 min Summer	63.269	0.409	0.0	1.0	1.0	15.0	O K
180 min Summer	63.297	0.437	0.0	1.0	1.0	16.0	O K
240 min Summer	63.305	0.445	0.0	1.0	1.0	16.3	O K
360 min Summer	63.294	0.434	0.0	1.0	1.0	15.9	O K
480 min Summer	63.279	0.419	0.0	1.0	1.0	15.3	O K
600 min Summer	63.262	0.402	0.0	1.0	1.0	14.7	O K
720 min Summer	63.243	0.383	0.0	1.0	1.0	14.0	O K
960 min Summer	63.203	0.343	0.0	1.0	1.0	12.5	O K
1440 min Summer	63.121	0.261	0.0	1.0	1.0	9.6	O K
2160 min Summer	63.025	0.165	0.0	1.0	1.0	6.0	O K
2880 min Summer	62.970	0.110	0.0	1.0	1.0	4.0	O K
4320 min Summer	62.941	0.081	0.0	0.8	0.8	3.0	O K
5760 min Summer	62.926	0.066	0.0	0.7	0.7	2.4	O K
7200 min Summer	62.916	0.056	0.0	0.6	0.6	2.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	90.593	0.0	11.2	19
30 min Summer	59.559	0.0	15.1	34
60 min Summer	37.356	0.0	19.1	64
120 min Summer	22.681	0.0	23.3	124
180 min Summer	16.733	0.0	26.0	182
240 min Summer	13.414	0.0	28.0	240
360 min Summer	9.744	0.0	30.9	310
480 min Summer	7.766	0.0	33.2	366
600 min Summer	6.511	0.0	35.0	426
720 min Summer	5.635	0.0	36.5	486
960 min Summer	4.483	0.0	39.0	610
1440 min Summer	3.242	0.0	42.8	852
2160 min Summer	2.342	0.0	46.6	1192
2880 min Summer	1.857	0.0	49.3	1504
4320 min Summer	1.337	0.0	53.1	2208
5760 min Summer	1.058	0.0	55.6	2936
7200 min Summer	0.882	0.0	57.2	3672

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Cascade Summary of Results for Tank 2.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	62.908	0.048	0.0	0.5	0.5	1.8	O K
10080 min Summer	62.903	0.043	0.0	0.4	0.4	1.6	O K
15 min Winter	63.104	0.244	0.0	1.0	1.0	8.9	O K
30 min Winter	63.178	0.318	0.0	1.0	1.0	11.6	O K
60 min Winter	63.254	0.394	0.0	1.0	1.0	14.4	O K
120 min Winter	63.325	0.465	0.0	1.0	1.0	17.0	O K
180 min Winter	63.360	0.500	0.0	1.0	1.0	18.3	O K
240 min Winter	63.375	0.515	0.0	1.0	1.0	18.8	O K
360 min Winter	63.367	0.507	0.0	1.0	1.0	18.6	O K
480 min Winter	63.343	0.483	0.0	1.0	1.0	17.7	O K
600 min Winter	63.315	0.455	0.0	1.0	1.0	16.7	O K
720 min Winter	63.284	0.424	0.0	1.0	1.0	15.5	O K
960 min Winter	63.214	0.354	0.0	1.0	1.0	13.0	O K
1440 min Winter	63.084	0.224	0.0	1.0	1.0	8.2	O K
2160 min Winter	62.963	0.103	0.0	1.0	1.0	3.8	O K
2880 min Winter	62.943	0.083	0.0	0.8	0.8	3.0	O K
4320 min Winter	62.921	0.061	0.0	0.6	0.6	2.2	O K
5760 min Winter	62.909	0.049	0.0	0.5	0.5	1.8	O K
7200 min Winter	62.901	0.041	0.0	0.4	0.4	1.5	O K
8640 min Winter	62.895	0.035	0.0	0.4	0.4	1.3	O K
10080 min Winter	62.891	0.031	0.0	0.3	0.3	1.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.760	0.0	58.4	4408
10080 min Summer	0.670	0.0	59.3	5136
15 min Winter	90.593	0.0	12.7	19
30 min Winter	59.559	0.0	16.9	34
60 min Winter	37.356	0.0	21.4	64
120 min Winter	22.681	0.0	26.2	122
180 min Winter	16.733	0.0	29.2	180
240 min Winter	13.414	0.0	31.4	238
360 min Winter	9.744	0.0	34.7	338
480 min Winter	7.766	0.0	37.3	388
600 min Winter	6.511	0.0	39.3	452
720 min Winter	5.635	0.0	41.1	520
960 min Winter	4.483	0.0	44.0	650
1440 min Winter	3.242	0.0	48.3	892
2160 min Winter	2.342	0.0	52.7	1164
2880 min Winter	1.857	0.0	56.0	1500
4320 min Winter	1.337	0.0	60.4	2224
5760 min Winter	1.058	0.0	63.2	2944
7200 min Winter	0.882	0.0	65.1	3664
8640 min Winter	0.760	0.0	66.6	4360
10080 min Winter	0.670	0.0	67.8	5120

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Cascade Rainfall Details for Tank 2.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.048

Time (mins) From:	To:	Area (ha)
0	4	0.048

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Cascade Model Details for Tank 2.srcx

Storage is Online Cover Level (m) 64.460

Cellular Storage Structure

Invert Level (m) 62.860 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	38.5	38.5	0.801	0.0	61.7
0.800	38.5	61.7			

Pump Outflow Control

Invert Level (m) 62.860

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0000	1.200	1.0000	3.000	1.0000	7.000	1.0000
0.200	1.0000	1.400	1.0000	3.500	1.0000	7.500	1.0000
0.300	1.0000	1.600	1.0000	4.000	1.0000	8.000	1.0000
0.400	1.0000	1.800	1.0000	4.500	1.0000	8.500	1.0000
0.500	1.0000	2.000	1.0000	5.000	1.0000	9.000	1.0000
0.600	1.0000	2.200	1.0000	5.500	1.0000	9.500	1.0000
0.800	1.0000	2.400	1.0000	6.000	1.0000		
1.000	1.0000	2.600	1.0000	6.500	1.0000		

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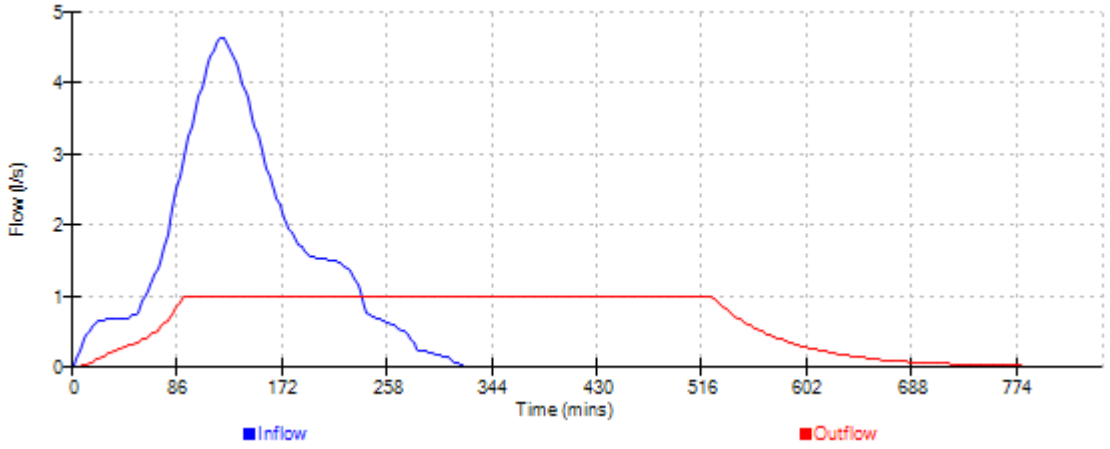
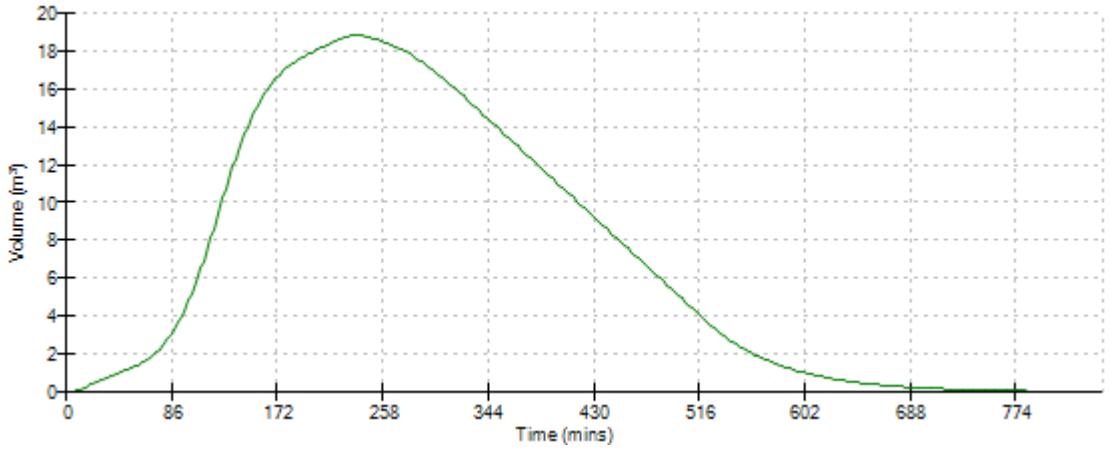
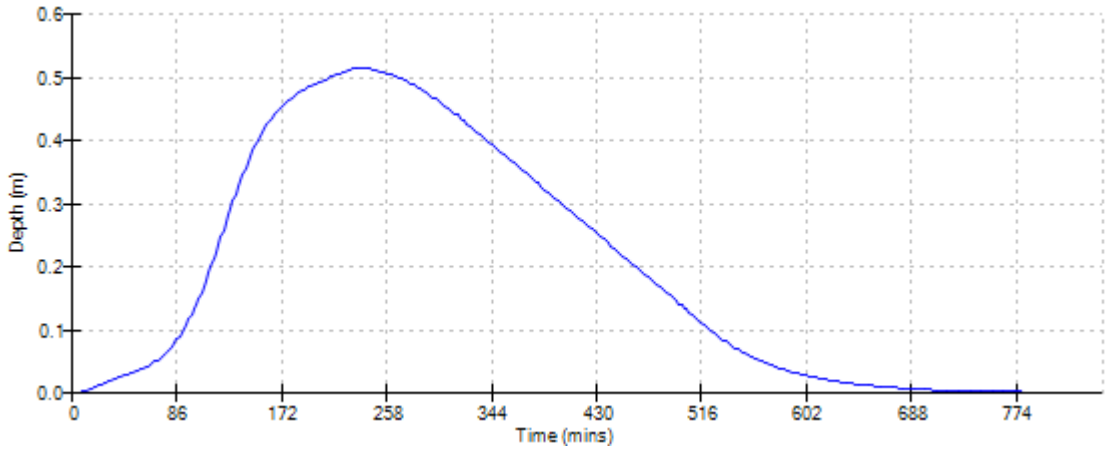
Cascade Event: 240 min Winter for Tank 2.srcx







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Cascade Summary of Results for PP1.srcx

Upstream Structures	Outflow To	Overflow To
(None)	Tank 1.srcx	(None)

Half Drain Time : 89 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	64.346	0.336	0.4	0.5	0.9	5.0	O K
30 min Summer	64.387	0.377	0.5	0.5	1.0	6.6	Flood Risk
60 min Summer	64.411	0.401	0.5	0.5	1.0	7.7	Flood Risk
120 min Summer	64.421	0.411	0.5	0.5	1.0	8.1	Flood Risk
180 min Summer	64.419	0.409	0.5	0.5	1.0	8.0	Flood Risk
240 min Summer	64.414	0.404	0.5	0.5	1.0	7.8	Flood Risk
360 min Summer	64.398	0.388	0.5	0.5	1.0	7.1	Flood Risk
480 min Summer	64.382	0.372	0.5	0.5	1.0	6.4	Flood Risk
600 min Summer	64.367	0.357	0.4	0.5	0.9	5.8	Flood Risk
720 min Summer	64.353	0.343	0.4	0.5	0.9	5.3	O K
960 min Summer	64.327	0.317	0.4	0.5	0.8	4.4	O K
1440 min Summer	64.284	0.274	0.3	0.4	0.7	3.1	O K
2160 min Summer	64.237	0.227	0.2	0.4	0.6	2.0	O K
2880 min Summer	64.196	0.186	0.2	0.4	0.5	1.3	O K
4320 min Summer	64.140	0.130	0.1	0.3	0.4	0.7	O K
5760 min Summer	64.106	0.096	0.1	0.2	0.3	0.4	O K
7200 min Summer	64.084	0.074	0.1	0.2	0.3	0.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	126.830	0.0	5.5	18
30 min Summer	83.383	0.0	7.6	32
60 min Summer	52.299	0.0	9.8	60
120 min Summer	31.753	0.0	12.2	90
180 min Summer	23.426	0.0	13.6	124
240 min Summer	18.779	0.0	14.6	158
360 min Summer	13.642	0.0	15.9	226
480 min Summer	10.873	0.0	16.9	292
600 min Summer	9.115	0.0	17.8	356
720 min Summer	7.889	0.0	18.4	420
960 min Summer	6.276	0.0	19.5	546
1440 min Summer	4.539	0.0	21.1	782
2160 min Summer	3.278	0.0	22.7	1148
2880 min Summer	2.600	0.0	23.8	1500
4320 min Summer	1.872	0.0	25.2	2204
5760 min Summer	1.482	0.0	26.1	2936
7200 min Summer	1.235	0.0	26.7	3672

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Cascade Summary of Results for PP1.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	64.069	0.059	0.1	0.2	0.2	0.1	O K
10080 min Summer	64.059	0.049	0.0	0.2	0.2	0.1	O K
15 min Winter	64.367	0.357	0.4	0.5	0.9	5.8	Flood Risk
30 min Winter	64.409	0.399	0.5	0.5	1.0	7.6	Flood Risk
60 min Winter	64.436	0.426	0.5	0.5	1.1	8.8	Flood Risk
120 min Winter	64.445	0.435	0.6	0.5	1.1	9.3	Flood Risk
180 min Winter	64.441	0.431	0.6	0.5	1.1	9.1	Flood Risk
240 min Winter	64.433	0.423	0.5	0.5	1.1	8.7	Flood Risk
360 min Winter	64.410	0.400	0.5	0.5	1.0	7.6	Flood Risk
480 min Winter	64.387	0.377	0.5	0.5	1.0	6.6	Flood Risk
600 min Winter	64.366	0.356	0.4	0.5	0.9	5.8	Flood Risk
720 min Winter	64.346	0.336	0.4	0.5	0.9	5.0	O K
960 min Winter	64.311	0.301	0.3	0.5	0.8	3.9	O K
1440 min Winter	64.256	0.246	0.2	0.4	0.6	2.4	O K
2160 min Winter	64.191	0.181	0.2	0.3	0.5	1.3	O K
2880 min Winter	64.145	0.135	0.1	0.3	0.4	0.7	O K
4320 min Winter	64.095	0.085	0.1	0.2	0.3	0.3	O K
5760 min Winter	64.070	0.060	0.1	0.2	0.2	0.1	O K
7200 min Winter	64.057	0.047	0.0	0.2	0.2	0.1	O K
8640 min Winter	64.049	0.039	0.0	0.1	0.2	0.1	O K
10080 min Winter	64.044	0.034	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.064	0.0	27.1	4352
10080 min Summer	0.938	0.0	27.3	5096
15 min Winter	126.830	0.0	6.3	18
30 min Winter	83.383	0.0	8.7	31
60 min Winter	52.299	0.0	11.2	58
120 min Winter	31.753	0.0	13.8	96
180 min Winter	23.426	0.0	15.3	134
240 min Winter	18.779	0.0	16.5	172
360 min Winter	13.642	0.0	18.0	244
480 min Winter	10.873	0.0	19.1	312
600 min Winter	9.115	0.0	20.1	378
720 min Winter	7.889	0.0	20.8	442
960 min Winter	6.276	0.0	22.1	568
1440 min Winter	4.539	0.0	23.9	808
2160 min Winter	3.278	0.0	25.7	1164
2880 min Winter	2.600	0.0	26.9	1500
4320 min Winter	1.872	0.0	28.6	2204
5760 min Winter	1.482	0.0	29.7	2904
7200 min Winter	1.235	0.0	30.5	3664
8640 min Winter	1.064	0.0	31.0	4296
10080 min Winter	0.938	0.0	31.4	5032

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Cascade Rainfall Details for PP1.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.028

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

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Cascade Model Details for PP1.srcx

Storage is Online Cover Level (m) 64.660

Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	27.8
Max Percolation (l/s)	38.6	Slope (1:X)	51.5
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.010	Cap Volume Depth (m)	0.450

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	3.7
Membrane Percolation (mm/hr)	1000	Length (m)	22.2
Max Percolation (l/s)	22.8	Slope (1:X)	64.2
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.210	Cap Volume Depth (m)	0.450

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 64.010

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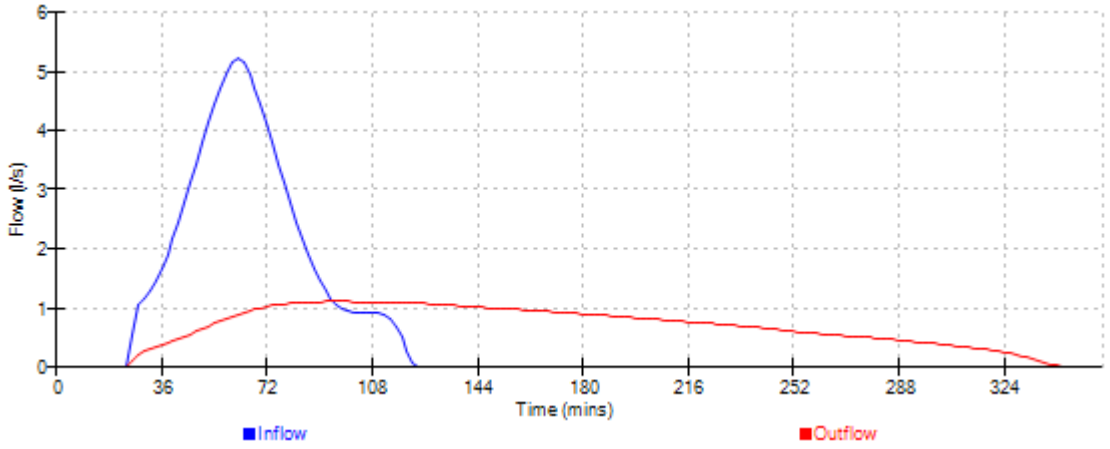
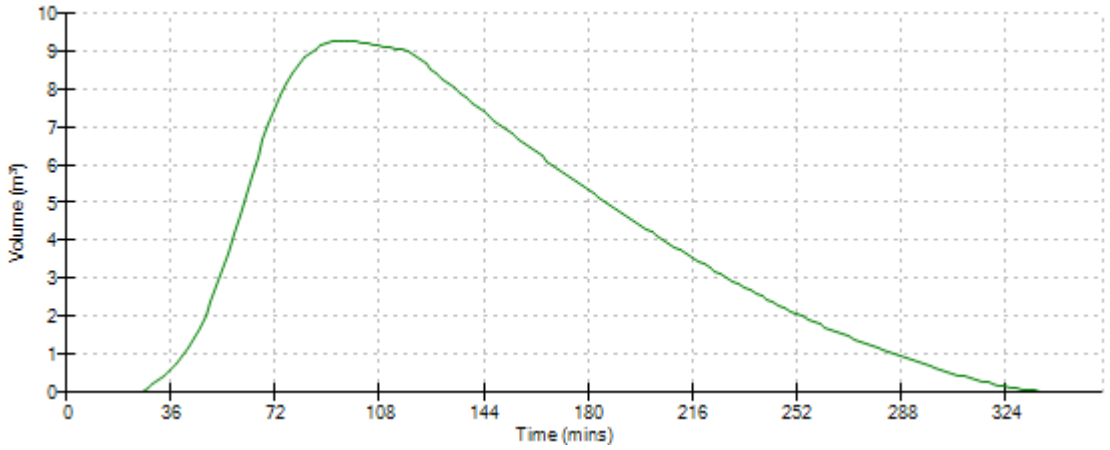
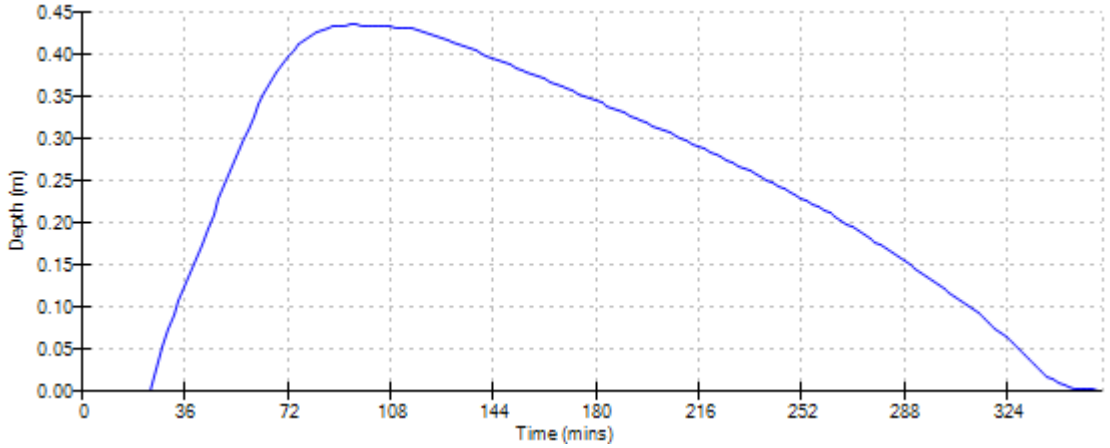
Cascade Event: 120 min Winter for PP1.srcx







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Cascade Summary of Results for PP2.srcx

Upstream Structures	Outflow To	Overflow To
(None)	Tank 2.srcx	(None)

Half Drain Time : 67 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	64.485	0.235	0.3	0.4	0.7	3.4	O K
30 min Summer	64.513	0.263	0.4	0.4	0.8	4.3	O K
60 min Summer	64.528	0.278	0.4	0.4	0.9	4.9	O K
120 min Summer	64.534	0.284	0.4	0.4	0.9	5.1	O K
180 min Summer	64.530	0.280	0.4	0.4	0.9	5.0	O K
240 min Summer	64.524	0.274	0.4	0.4	0.8	4.7	O K
360 min Summer	64.508	0.258	0.4	0.4	0.8	4.2	O K
480 min Summer	64.494	0.244	0.4	0.4	0.8	3.7	O K
600 min Summer	64.481	0.231	0.3	0.4	0.7	3.2	O K
720 min Summer	64.470	0.220	0.3	0.4	0.7	2.9	O K
960 min Summer	64.452	0.202	0.3	0.4	0.6	2.3	O K
1440 min Summer	64.414	0.164	0.2	0.3	0.5	1.5	O K
2160 min Summer	64.374	0.124	0.2	0.3	0.4	0.9	O K
2880 min Summer	64.348	0.098	0.1	0.2	0.4	0.5	O K
4320 min Summer	64.316	0.066	0.1	0.2	0.3	0.2	O K
5760 min Summer	64.299	0.049	0.1	0.2	0.2	0.1	O K
7200 min Summer	64.291	0.041	0.0	0.1	0.2	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	126.830	0.0	3.8	17
30 min Summer	83.383	0.0	5.2	31
60 min Summer	52.299	0.0	6.7	52
120 min Summer	31.753	0.0	8.3	86
180 min Summer	23.426	0.0	9.2	120
240 min Summer	18.779	0.0	9.9	154
360 min Summer	13.642	0.0	10.8	220
480 min Summer	10.873	0.0	11.5	284
600 min Summer	9.115	0.0	12.1	348
720 min Summer	7.889	0.0	12.5	412
960 min Summer	6.276	0.0	13.3	532
1440 min Summer	4.539	0.0	14.4	768
2160 min Summer	3.278	0.0	15.4	1124
2880 min Summer	2.600	0.0	16.2	1472
4320 min Summer	1.872	0.0	17.2	2204
5760 min Summer	1.482	0.0	17.8	2936
7200 min Summer	1.235	0.0	18.2	3640

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Cascade Summary of Results for PP2.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	64.285	0.035	0.0	0.1	0.2	0.1	O K
10080 min Summer	64.280	0.030	0.0	0.1	0.1	0.1	O K
15 min Winter	64.500	0.250	0.4	0.4	0.8	3.9	O K
30 min Winter	64.530	0.280	0.4	0.4	0.9	5.0	O K
60 min Winter	64.548	0.298	0.4	0.4	0.9	5.7	O K
120 min Winter	64.552	0.302	0.5	0.5	0.9	5.8	O K
180 min Winter	64.545	0.295	0.4	0.4	0.9	5.6	O K
240 min Winter	64.535	0.285	0.4	0.4	0.9	5.2	O K
360 min Winter	64.512	0.262	0.4	0.4	0.8	4.3	O K
480 min Winter	64.493	0.243	0.4	0.4	0.8	3.6	O K
600 min Winter	64.476	0.226	0.3	0.4	0.7	3.1	O K
720 min Winter	64.461	0.211	0.3	0.4	0.7	2.6	O K
960 min Winter	64.432	0.182	0.2	0.3	0.6	1.9	O K
1440 min Winter	64.384	0.134	0.2	0.3	0.5	1.0	O K
2160 min Winter	64.341	0.091	0.1	0.2	0.4	0.5	O K
2880 min Winter	64.317	0.067	0.1	0.2	0.3	0.3	O K
4320 min Winter	64.295	0.045	0.1	0.2	0.2	0.1	O K
5760 min Winter	64.285	0.035	0.0	0.1	0.2	0.1	O K
7200 min Winter	64.279	0.029	0.0	0.1	0.1	0.0	O K
8640 min Winter	64.276	0.026	0.0	0.1	0.1	0.0	O K
10080 min Winter	64.274	0.024	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.064	0.0	18.5	4352
10080 min Summer	0.938	0.0	18.6	5032
15 min Winter	126.830	0.0	4.3	17
30 min Winter	83.383	0.0	5.9	31
60 min Winter	52.299	0.0	7.6	58
120 min Winter	31.753	0.0	9.4	92
180 min Winter	23.426	0.0	10.4	130
240 min Winter	18.779	0.0	11.2	166
360 min Winter	13.642	0.0	12.2	234
480 min Winter	10.873	0.0	13.0	300
600 min Winter	9.115	0.0	13.6	366
720 min Winter	7.889	0.0	14.2	428
960 min Winter	6.276	0.0	15.0	550
1440 min Winter	4.539	0.0	16.2	782
2160 min Winter	3.278	0.0	17.4	1128
2880 min Winter	2.600	0.0	18.3	1472
4320 min Winter	1.872	0.0	19.5	2196
5760 min Winter	1.482	0.0	20.2	2888
7200 min Winter	1.235	0.0	20.8	3664
8640 min Winter	1.064	0.0	21.1	4400
10080 min Winter	0.938	0.0	21.4	4992

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Cascade Rainfall Details for PP2.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.019

Time (mins) From:	To:	Area (ha)
0	4	0.019

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Cascade Model Details for PP2.srcx

Storage is Online Cover Level (m) 64.900

Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	25.0
Max Percolation (l/s)	34.7	Slope (1:X)	75.7
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.250	Cap Volume Depth (m)	0.450

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	3.0
Membrane Percolation (mm/hr)	1000	Length (m)	7.2
Max Percolation (l/s)	6.0	Slope (1:X)	0.0
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.450	Cap Volume Depth (m)	0.450

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 64.250

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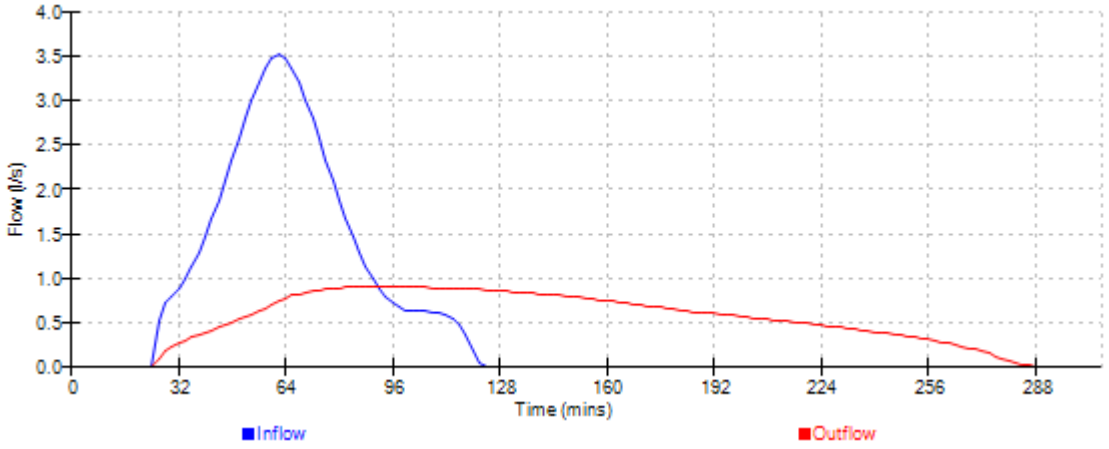
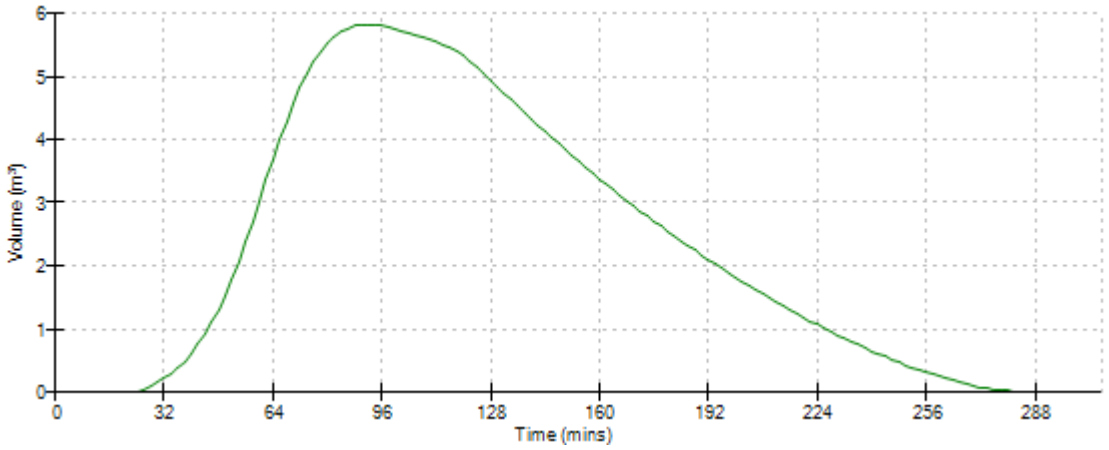
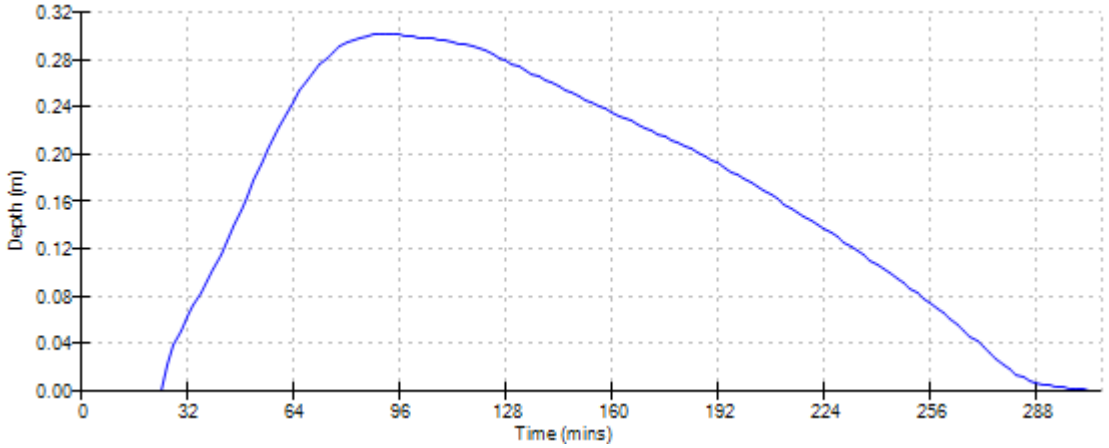
Cascade Event: 120 min Winter for PP2.srcx







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Cascade Summary of Results for PP3.srcx

Upstream Structures	Outflow To	Overflow To
(None)	Tank 2.srcx	(None)

Half Drain Time : 52 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	63.850	0.390	0.2	0.5	0.7	2.5	Flood Risk
30 min Summer	63.891	0.431	0.2	0.5	0.8	3.3	Flood Risk
60 min Summer	63.916	0.456	0.2	0.6	0.8	3.9	Flood Risk
120 min Summer	63.926	0.466	0.3	0.6	0.8	4.1	Flood Risk
180 min Summer	63.922	0.462	0.3	0.6	0.8	4.0	Flood Risk
240 min Summer	63.912	0.452	0.2	0.6	0.8	3.8	Flood Risk
360 min Summer	63.887	0.427	0.2	0.5	0.8	3.3	Flood Risk
480 min Summer	63.865	0.405	0.2	0.5	0.8	2.8	Flood Risk
600 min Summer	63.847	0.387	0.2	0.5	0.7	2.4	Flood Risk
720 min Summer	63.832	0.372	0.2	0.5	0.7	2.1	Flood Risk
960 min Summer	63.807	0.347	0.1	0.5	0.6	1.6	O K
1440 min Summer	63.727	0.267	0.1	0.4	0.5	1.0	O K
2160 min Summer	63.647	0.187	0.1	0.4	0.4	0.5	O K
2880 min Summer	63.599	0.139	0.0	0.3	0.3	0.3	O K
4320 min Summer	63.544	0.084	0.0	0.2	0.3	0.1	O K
5760 min Summer	63.517	0.057	0.0	0.2	0.2	0.0	O K
7200 min Summer	63.503	0.043	0.0	0.2	0.2	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	126.830	0.0	2.9	17
30 min Summer	83.383	0.0	4.1	31
60 min Summer	52.299	0.0	5.5	52
120 min Summer	31.753	0.0	6.9	84
180 min Summer	23.426	0.0	7.7	118
240 min Summer	18.779	0.0	8.3	152
360 min Summer	13.642	0.0	9.1	218
480 min Summer	10.873	0.0	9.7	280
600 min Summer	9.115	0.0	10.2	342
720 min Summer	7.889	0.0	10.6	404
960 min Summer	6.276	0.0	11.2	528
1440 min Summer	4.539	0.0	12.0	764
2160 min Summer	3.278	0.0	12.8	1108
2880 min Summer	2.600	0.0	13.3	1468
4320 min Summer	1.872	0.0	13.9	2200
5760 min Summer	1.482	0.0	14.2	2936
7200 min Summer	1.235	0.0	14.2	3632

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Cascade Summary of Results for PP3.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	63.495	0.035	0.0	0.1	0.1	0.0	O K
10080 min Summer	63.490	0.030	0.0	0.1	0.1	0.0	O K
15 min Winter	63.872	0.412	0.2	0.5	0.8	2.9	Flood Risk
30 min Winter	63.917	0.457	0.2	0.6	0.8	3.9	Flood Risk
60 min Winter	63.946	0.486	0.3	0.6	0.8	4.6	Flood Risk
120 min Winter	63.952	0.492	0.3	0.6	0.8	4.7	Flood Risk
180 min Winter	63.942	0.482	0.3	0.6	0.8	4.5	Flood Risk
240 min Winter	63.925	0.465	0.3	0.6	0.8	4.1	Flood Risk
360 min Winter	63.888	0.428	0.2	0.5	0.8	3.3	Flood Risk
480 min Winter	63.857	0.397	0.2	0.5	0.8	2.6	Flood Risk
600 min Winter	63.835	0.375	0.2	0.5	0.7	2.2	Flood Risk
720 min Winter	63.816	0.356	0.1	0.5	0.6	1.8	Flood Risk
960 min Winter	63.757	0.297	0.1	0.4	0.5	1.2	O K
1440 min Winter	63.661	0.201	0.1	0.4	0.4	0.5	O K
2160 min Winter	63.583	0.123	0.0	0.3	0.3	0.2	O K
2880 min Winter	63.544	0.084	0.0	0.2	0.3	0.1	O K
4320 min Winter	63.509	0.049	0.0	0.2	0.2	0.0	O K
5760 min Winter	63.496	0.036	0.0	0.1	0.1	0.0	O K
7200 min Winter	63.488	0.028	0.0	0.1	0.1	0.0	O K
8640 min Winter	63.485	0.025	0.0	0.1	0.1	0.0	O K
10080 min Winter	63.483	0.023	0.0	0.1	0.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.064	0.0	14.2	4264
10080 min Summer	0.938	0.0	14.0	5056
15 min Winter	126.830	0.0	3.4	17
30 min Winter	83.383	0.0	4.8	31
60 min Winter	52.299	0.0	6.3	58
120 min Winter	31.753	0.0	7.8	90
180 min Winter	23.426	0.0	8.8	128
240 min Winter	18.779	0.0	9.4	164
360 min Winter	13.642	0.0	10.3	232
480 min Winter	10.873	0.0	11.0	294
600 min Winter	9.115	0.0	11.6	356
720 min Winter	7.889	0.0	12.0	420
960 min Winter	6.276	0.0	12.7	540
1440 min Winter	4.539	0.0	13.7	766
2160 min Winter	3.278	0.0	14.6	1104
2880 min Winter	2.600	0.0	15.3	1464
4320 min Winter	1.872	0.0	16.0	2176
5760 min Winter	1.482	0.0	16.4	2888
7200 min Winter	1.235	0.0	16.6	3568
8640 min Winter	1.064	0.0	16.6	4336
10080 min Winter	0.938	0.0	16.6	4984

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Cascade Rainfall Details for PP3.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.017

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

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Cascade Model Details for PP3.srcx

Storage is Online Cover Level (m) 64.110

Complex Structure

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	31.0
Max Percolation (l/s)	43.1	Slope (1:X)	18.0
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	63.460	Cap Volume Depth (m)	0.450

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	3.4
Membrane Percolation (mm/hr)	1000	Length (m)	9.9
Max Percolation (l/s)	9.4	Slope (1:X)	0.0
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	63.807	Cap Volume Depth (m)	0.450

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.03600	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	9.0
Max Percolation (l/s)	12.5	Slope (1:X)	13.3
Safety Factor	3.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	64.060	Cap Volume Depth (m)	0.450

Orifice Outflow Control

Diameter (m) 0.020 Discharge Coefficient 0.600 Invert Level (m) 63.460

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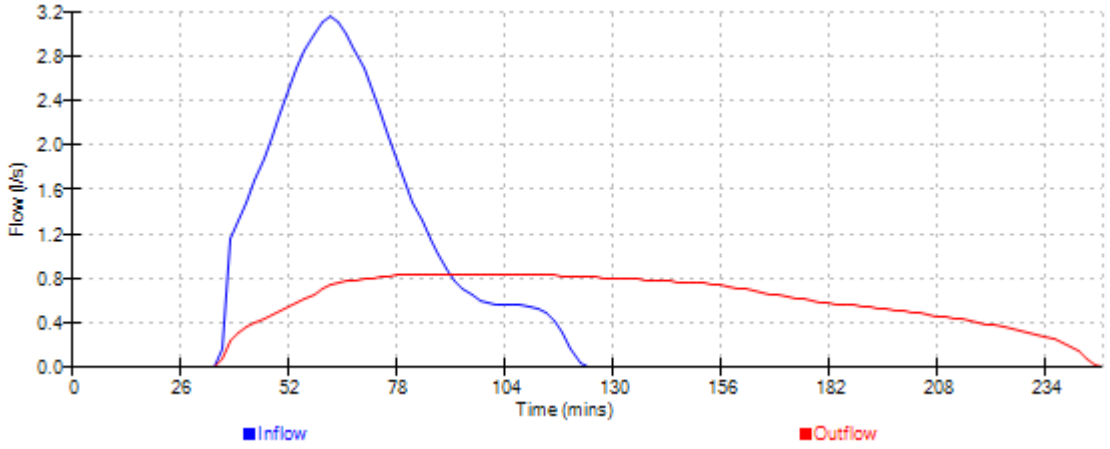
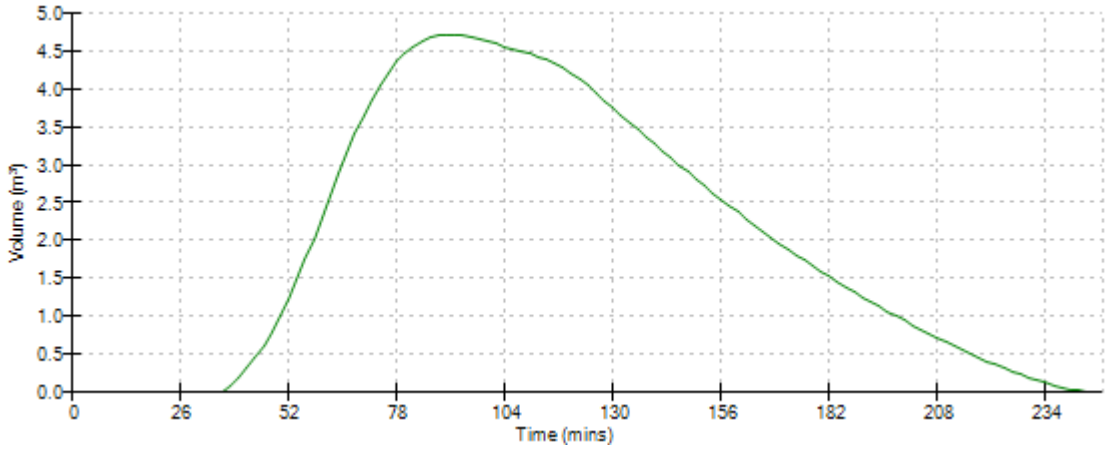
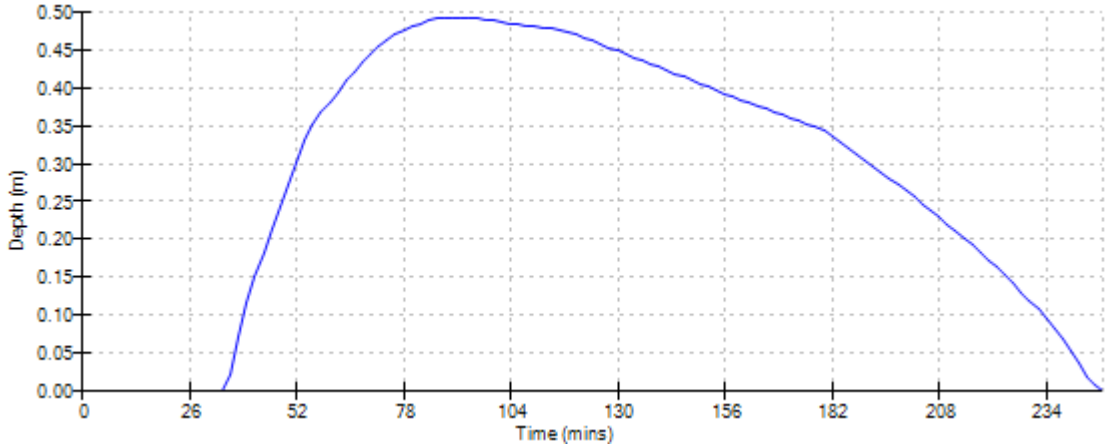
Cascade Event: 120 min Winter for PP3.srcx







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Cascade Summary of Results for Tank 1.srcx

Upstream Structures	Outflow To	Overflow To
PP1.srcx	(None)	(None)

Half Drain Time : 145 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	64.088	0.348	0.0	1.0	1.0	8.1	O K
30 min Summer	64.187	0.447	0.0	1.0	1.0	10.4	O K
60 min Summer	64.276	0.536	0.0	1.0	1.0	12.5	O K
120 min Summer	64.340	0.600	0.0	1.0	1.0	14.0	O K
180 min Summer	64.353	0.613	0.0	1.0	1.0	14.3	O K
240 min Summer	64.345	0.605	0.0	1.0	1.0	14.1	O K
360 min Summer	64.316	0.576	0.0	1.0	1.0	13.4	O K
480 min Summer	64.287	0.547	0.0	1.0	1.0	12.7	O K
600 min Summer	64.257	0.517	0.0	1.0	1.0	12.0	O K
720 min Summer	64.226	0.486	0.0	1.0	1.0	11.3	O K
960 min Summer	64.167	0.427	0.0	1.0	1.0	9.9	O K
1440 min Summer	64.056	0.316	0.0	1.0	1.0	7.4	O K
2160 min Summer	63.928	0.188	0.0	1.0	1.0	4.4	O K
2880 min Summer	63.854	0.114	0.0	1.0	1.0	2.6	O K
4320 min Summer	63.822	0.082	0.0	0.8	0.8	1.9	O K
5760 min Summer	63.807	0.067	0.0	0.7	0.7	1.6	O K
7200 min Summer	63.797	0.057	0.0	0.6	0.6	1.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	126.830	0.0	12.1	18
30 min Summer	83.383	0.0	15.9	33
60 min Summer	52.299	0.0	19.9	62
120 min Summer	31.753	0.0	24.2	122
180 min Summer	23.426	0.0	26.8	180
240 min Summer	18.779	0.0	28.7	224
360 min Summer	13.642	0.0	31.5	280
480 min Summer	10.873	0.0	33.8	342
600 min Summer	9.115	0.0	35.6	408
720 min Summer	7.889	0.0	37.3	474
960 min Summer	6.276	0.0	40.2	606
1440 min Summer	4.539	0.0	44.5	854
2160 min Summer	3.278	0.0	49.1	1192
2880 min Summer	2.600	0.0	52.4	1504
4320 min Summer	1.872	0.0	57.0	2204
5760 min Summer	1.482	0.0	60.4	2936
7200 min Summer	1.235	0.0	62.9	3672

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Cascade Summary of Results for Tank 1.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	63.790	0.050	0.0	0.5	0.5	1.2	O K
10080 min Summer	63.784	0.044	0.0	0.4	0.4	1.0	O K
15 min Winter	64.132	0.392	0.0	1.0	1.0	9.1	O K
30 min Winter	64.245	0.505	0.0	1.0	1.0	11.8	O K
60 min Winter	64.350	0.610	0.0	1.0	1.0	14.2	O K
120 min Winter	64.430	0.690	0.0	1.0	1.0	16.1	O K
180 min Winter	64.453	0.713	0.0	1.0	1.0	16.6	O K
240 min Winter	64.451	0.711	0.0	1.0	1.0	16.5	O K
360 min Winter	64.410	0.670	0.0	1.0	1.0	15.6	O K
480 min Winter	64.370	0.630	0.0	1.0	1.0	14.7	O K
600 min Winter	64.326	0.586	0.0	1.0	1.0	13.6	O K
720 min Winter	64.279	0.539	0.0	1.0	1.0	12.5	O K
960 min Winter	64.184	0.444	0.0	1.0	1.0	10.3	O K
1440 min Winter	64.010	0.270	0.0	1.0	1.0	6.3	O K
2160 min Winter	63.845	0.105	0.0	1.0	1.0	2.4	O K
2880 min Winter	63.824	0.084	0.0	0.8	0.8	1.9	O K
4320 min Winter	63.802	0.062	0.0	0.6	0.6	1.4	O K
5760 min Winter	63.790	0.050	0.0	0.5	0.5	1.2	O K
7200 min Winter	63.782	0.042	0.0	0.4	0.4	1.0	O K
8640 min Winter	63.777	0.037	0.0	0.4	0.4	0.9	O K
10080 min Winter	63.773	0.033	0.0	0.3	0.3	0.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.064	0.0	65.0	4400
10080 min Summer	0.938	0.0	66.6	5096
15 min Winter	126.830	0.0	13.5	18
30 min Winter	83.383	0.0	17.8	33
60 min Winter	52.299	0.0	22.2	62
120 min Winter	31.753	0.0	27.0	120
180 min Winter	23.426	0.0	29.9	176
240 min Winter	18.779	0.0	32.1	232
360 min Winter	13.642	0.0	35.2	320
480 min Winter	10.873	0.0	37.7	370
600 min Winter	9.115	0.0	39.8	444
720 min Winter	7.889	0.0	41.7	516
960 min Winter	6.276	0.0	44.9	654
1440 min Winter	4.539	0.0	50.0	896
2160 min Winter	3.278	0.0	55.2	1164
2880 min Winter	2.600	0.0	59.0	1496
4320 min Winter	1.872	0.0	64.4	2204
5760 min Winter	1.482	0.0	68.3	2936
7200 min Winter	1.235	0.0	71.4	3608
8640 min Winter	1.064	0.0	73.9	4400
10080 min Winter	0.938	0.0	75.8	4984

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Cascade Rainfall Details for Tank 1.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.036

Time (mins) From:	To:	Area (ha)
0	4	0.036

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Cascade Model Details for Tank 1.srcx

Storage is Online Cover Level (m) 65.340

Cellular Storage Structure

Invert Level (m) 63.740 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	24.5	24.5	0.801	0.0	41.3
0.800	24.5	41.3			

Pump Outflow Control

Invert Level (m) 63.740

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0000	1.200	1.0000	3.000	1.0000	7.000	1.0000
0.200	1.0000	1.400	1.0000	3.500	1.0000	7.500	1.0000
0.300	1.0000	1.600	1.0000	4.000	1.0000	8.000	1.0000
0.400	1.0000	1.800	1.0000	4.500	1.0000	8.500	1.0000
0.500	1.0000	2.000	1.0000	5.000	1.0000	9.000	1.0000
0.600	1.0000	2.200	1.0000	5.500	1.0000	9.500	1.0000
0.800	1.0000	2.400	1.0000	6.000	1.0000		
1.000	1.0000	2.600	1.0000	6.500	1.0000		

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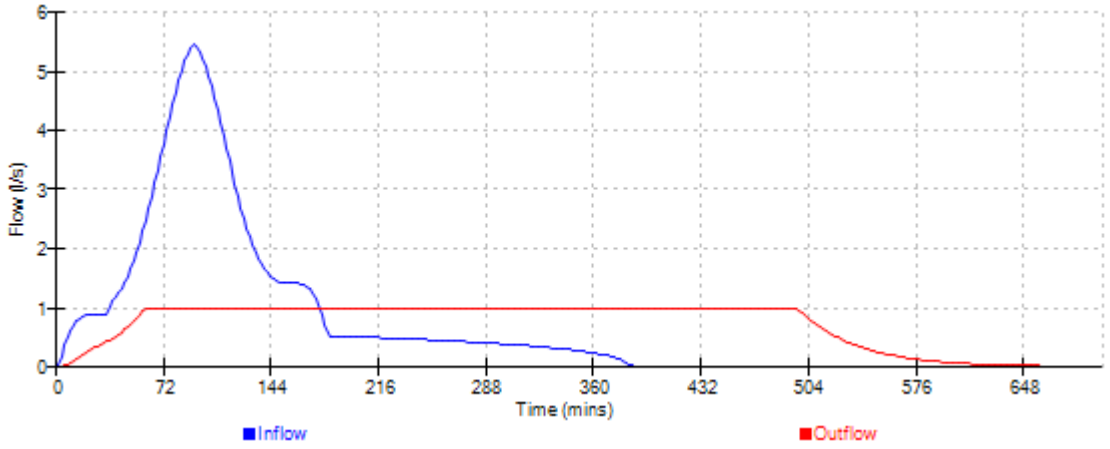
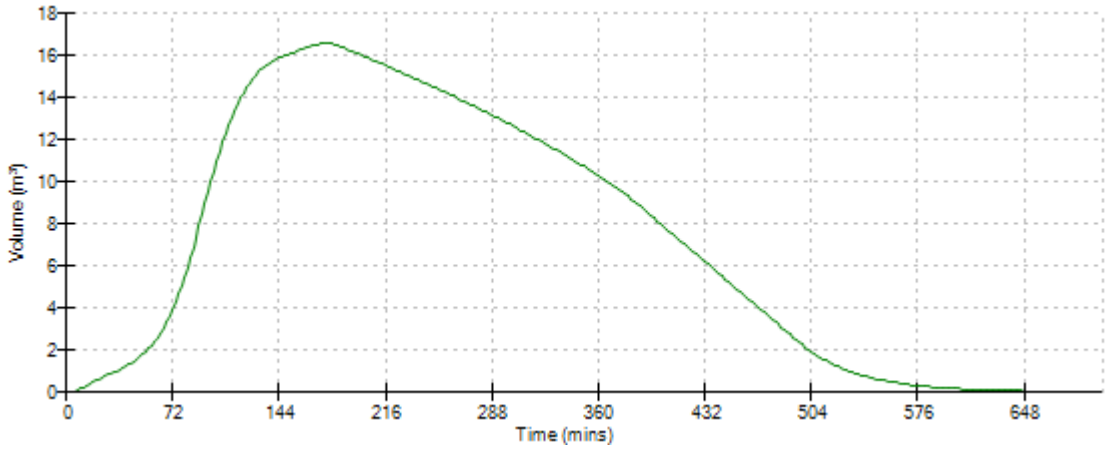
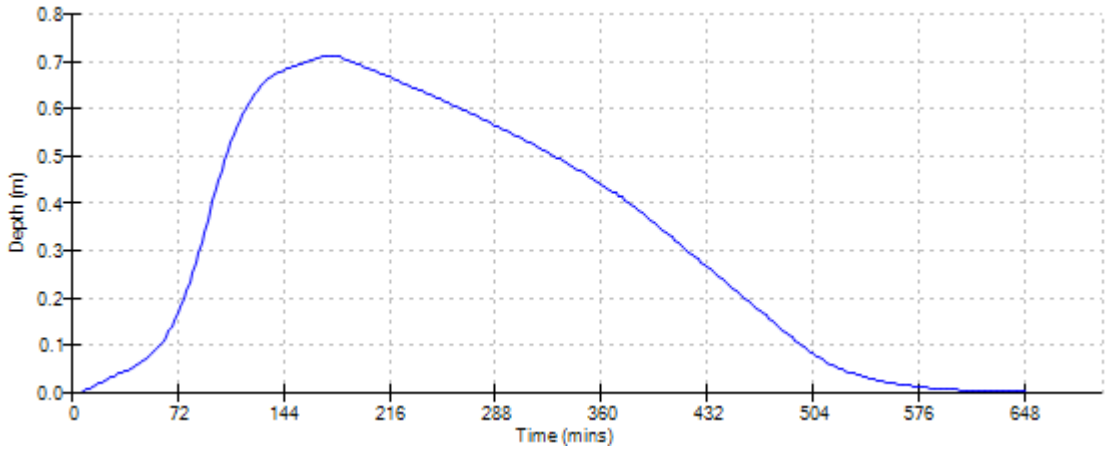
Cascade Event: 180 min Winter for Tank 1.srcx







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Cascade Summary of Results for Tank 2.srcx

Upstream Structures	Outflow To	Overflow To
PP2.srcx	(None)	(None)
PP3.srcx		

Half Drain Time : 249 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	63.167	0.307	0.0	1.0	1.0	11.2	O K
30 min Summer	63.262	0.402	0.0	1.0	1.0	14.7	O K
60 min Summer	63.359	0.499	0.0	1.0	1.0	18.3	O K
120 min Summer	63.456	0.596	0.0	1.0	1.0	21.8	O K
180 min Summer	63.506	0.646	0.0	1.0	1.0	23.6	O K
240 min Summer	63.534	0.674	0.0	1.0	1.0	24.7	O K
360 min Summer	63.546	0.686	0.0	1.0	1.0	25.1	O K
480 min Summer	63.529	0.669	0.0	1.0	1.0	24.5	O K
600 min Summer	63.511	0.651	0.0	1.0	1.0	23.8	O K
720 min Summer	63.492	0.632	0.0	1.0	1.0	23.1	O K
960 min Summer	63.453	0.593	0.0	1.0	1.0	21.7	O K
1440 min Summer	63.360	0.500	0.0	1.0	1.0	18.3	O K
2160 min Summer	63.227	0.367	0.0	1.0	1.0	13.4	O K
2880 min Summer	63.118	0.258	0.0	1.0	1.0	9.4	O K
4320 min Summer	62.985	0.125	0.0	1.0	1.0	4.6	O K
5760 min Summer	62.951	0.091	0.0	0.9	0.9	3.3	O K
7200 min Summer	62.937	0.077	0.0	0.8	0.8	2.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	126.830	0.0	16.0	19
30 min Summer	83.383	0.0	21.2	34
60 min Summer	52.299	0.0	26.8	64
120 min Summer	31.753	0.0	32.7	124
180 min Summer	23.426	0.0	36.3	184
240 min Summer	18.779	0.0	39.0	244
360 min Summer	13.642	0.0	42.9	360
480 min Summer	10.873	0.0	46.0	422
600 min Summer	9.115	0.0	48.7	480
720 min Summer	7.889	0.0	51.1	538
960 min Summer	6.276	0.0	54.9	660
1440 min Summer	4.539	0.0	60.2	910
2160 min Summer	3.278	0.0	65.7	1276
2880 min Summer	2.600	0.0	69.8	1616
4320 min Summer	1.872	0.0	75.5	2260
5760 min Summer	1.482	0.0	79.5	2936
7200 min Summer	1.235	0.0	82.5	3672

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Cascade Summary of Results for Tank 2.srcx

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
8640 min Summer	62.928	0.068	0.0	0.7	0.7	2.5	O K
10080 min Summer	62.920	0.060	0.0	0.6	0.6	2.2	O K
15 min Winter	63.205	0.345	0.0	1.0	1.0	12.6	O K
30 min Winter	63.312	0.452	0.0	1.0	1.0	16.5	O K
60 min Winter	63.423	0.563	0.0	1.0	1.0	20.6	O K
120 min Winter	63.535	0.675	0.0	1.0	1.0	24.7	O K
180 min Winter	63.596	0.736	0.0	1.0	1.0	26.9	O K
240 min Winter	63.631	0.771	0.0	1.0	1.0	28.2	O K
360 min Winter	63.658	0.798	0.0	1.0	1.0	29.2	O K
480 min Winter	63.647	0.787	0.0	1.0	1.0	28.8	O K
600 min Winter	63.621	0.761	0.0	1.0	1.0	27.8	O K
720 min Winter	63.595	0.735	0.0	1.0	1.0	26.9	O K
960 min Winter	63.528	0.668	0.0	1.0	1.0	24.4	O K
1440 min Winter	63.375	0.515	0.0	1.0	1.0	18.8	O K
2160 min Winter	63.167	0.307	0.0	1.0	1.0	11.2	O K
2880 min Winter	63.017	0.157	0.0	1.0	1.0	5.7	O K
4320 min Winter	62.944	0.084	0.0	0.8	0.8	3.1	O K
5760 min Winter	62.928	0.068	0.0	0.7	0.7	2.5	O K
7200 min Winter	62.917	0.057	0.0	0.6	0.6	2.1	O K
8640 min Winter	62.909	0.049	0.0	0.5	0.5	1.8	O K
10080 min Winter	62.904	0.044	0.0	0.4	0.4	1.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.064	0.0	84.8	4408
10080 min Summer	0.938	0.0	86.5	5136
15 min Winter	126.830	0.0	18.0	19
30 min Winter	83.383	0.0	23.8	34
60 min Winter	52.299	0.0	30.1	70
120 min Winter	31.753	0.0	36.7	124
180 min Winter	23.426	0.0	40.7	182
240 min Winter	18.779	0.0	43.6	240
360 min Winter	13.642	0.0	48.0	354
480 min Winter	10.873	0.0	51.6	456
600 min Winter	9.115	0.0	54.7	512
720 min Winter	7.889	0.0	57.4	570
960 min Winter	6.276	0.0	61.6	704
1440 min Winter	4.539	0.0	67.7	968
2160 min Winter	3.278	0.0	74.1	1336
2880 min Winter	2.600	0.0	78.8	1640
4320 min Winter	1.872	0.0	85.6	2208
5760 min Winter	1.482	0.0	90.4	2936
7200 min Winter	1.235	0.0	93.7	3672
8640 min Winter	1.064	0.0	96.2	4408
10080 min Winter	0.938	0.0	98.2	5136

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Cascade Rainfall Details for Tank 2.srcx

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.048

Time (mins) From:	To:	Area (ha)
0	4	0.048

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Cascade Model Details for Tank 2.srcx

Storage is Online Cover Level (m) 64.460

Cellular Storage Structure

Invert Level (m) 62.860 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	38.5	38.5	0.801	0.0	61.7
0.800	38.5	61.7			

Pump Outflow Control

Invert Level (m) 62.860

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0000	1.200	1.0000	3.000	1.0000	7.000	1.0000
0.200	1.0000	1.400	1.0000	3.500	1.0000	7.500	1.0000
0.300	1.0000	1.600	1.0000	4.000	1.0000	8.000	1.0000
0.400	1.0000	1.800	1.0000	4.500	1.0000	8.500	1.0000
0.500	1.0000	2.000	1.0000	5.000	1.0000	9.000	1.0000
0.600	1.0000	2.200	1.0000	5.500	1.0000	9.500	1.0000
0.800	1.0000	2.400	1.0000	6.000	1.0000		
1.000	1.0000	2.600	1.0000	6.500	1.0000		

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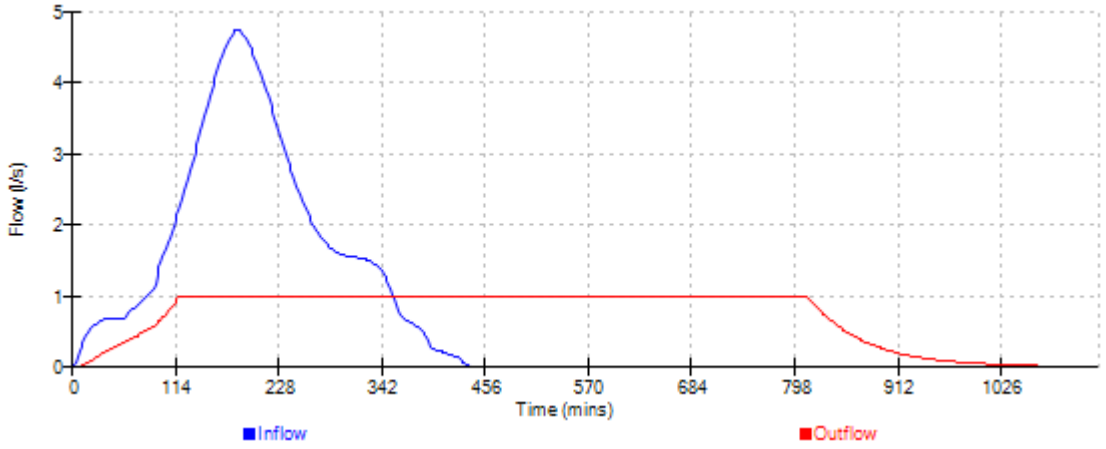
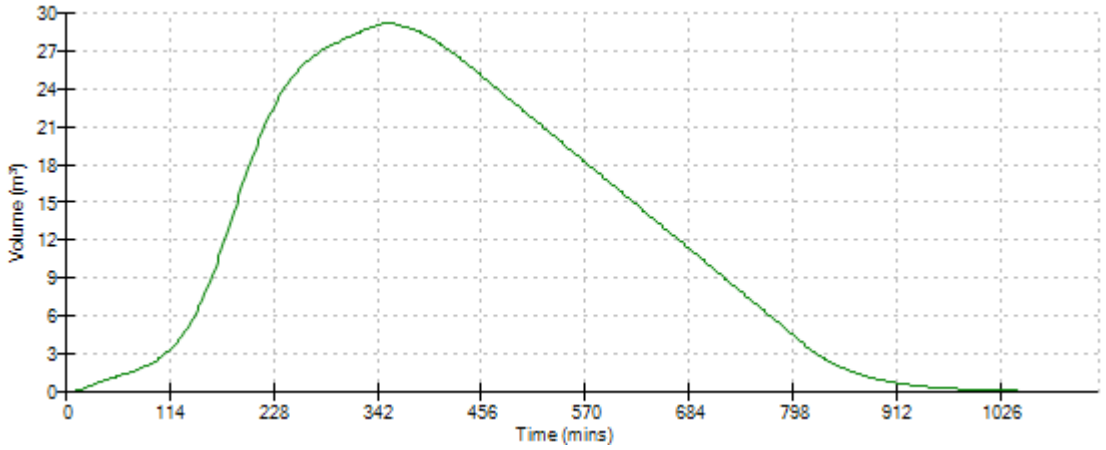
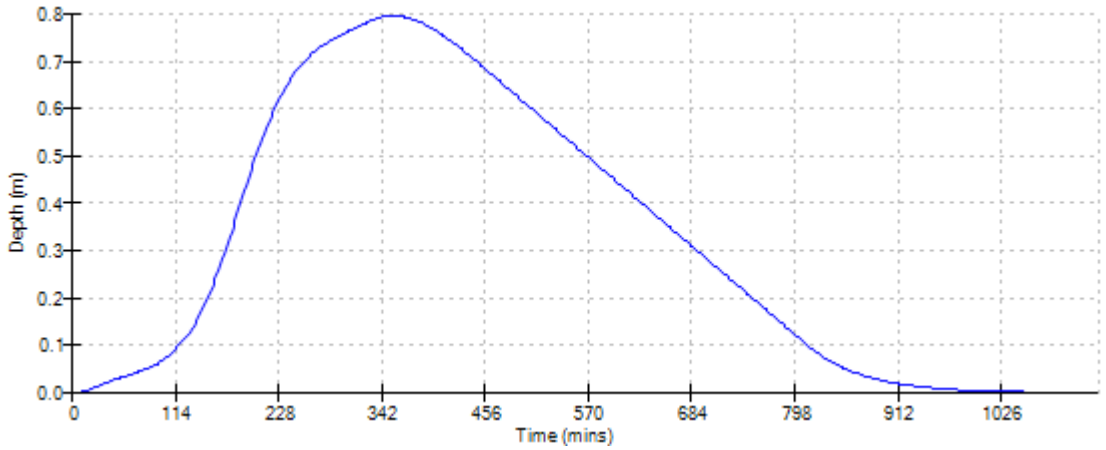
Cascade Event: 360 min Winter for Tank 2.srcx







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