ROK PLANNING

REBUTTAL PROOF IN RESPONSE TO THE PROOF OF EVIDENCE OF TANDRIDGE DISTRICT COUNCIL (A EVANS MRTPI)

ON BEHALF OF WOOLBRO GROUP AND MORRIS INVESTMENT (THE APPELLANT)

AGAINST THE NON-DETERMINATION OF TANDRIDGE DISTRICT COUNCIL FOR RESIDENTIAL DEVELOPMENT AT LAND AT THE OLD COTTAGE, STATION ROAD, LINGFIELD, RH7 6PG

JULY 2023

PINS REFERENCE: APP/M3645/3319149

LPA REFERENCE: 2022/685

CONTENTS

APPENDICES

1. FOURTH REASON FOR REFUSAL

1.1 Paragraph 2.3 of Tandridge District Council's Proof of Evidence adds an additional fourth reason for refusal to the Council's case against the proposal in stating:

"2.3 Due to previous oversight, a fourth ground for refusal was missed off from these putative reasons of refusal. This relates to the Council's concerns over the amount of housing proposed and the layout of the development and the impact the development will have on adjoining areas of the countryside. These were matters referred to in the Council's Statement of Case (CD2.2) at paragraph 8.30 and will be referred to under 'Character and appearance' section in Section 6 of this proof of evidence below. The Council would therefore identify a fourth putative reason for refusal, including reference to development plan policy CSP18, as follows:

iv. The quantum of development, its layout and form will result in a cramped and over-developed site, together with the introduction of significant areas of circulation space, will have an urbanising effect on the site and adjoining areas of open countryside. As such the proposed development would fail to comply with development plan policies CSP18, CSP21 and DP7."

1.2 It is plainly highly irregular for an LPA to introduce an additional reason for refusal of planning permission in its proof of evidence, as TDC has sought to do in this case. This is compounded by the history of reformulation of TDC's reasons for refusal of planning permission at earlier stages in the process. Submissions will be made for the Appellant at the inquiry in this respect and the legitimacy of the Council's conduct is likely to require exploration in cross examination. The Appellant reserves its position in this respect.

1.3 Notwithstanding that the reason for refusal was not available to the Appellant to respond to in full in their proofs of evidence, the themes relating to the quantum of development, layout, and density were addressed in Appellant's proofs, principally in those prepared by Alun Evans and Neil Deely. These matters are addressed further in this rebuttal proof and will be further addressed in examination in chief of the Appellant's witnesses.

1.4 In particular, the allegations of a "cramped", "over-developed site", and "urbanising effect on the site and adjoining areas of countryside" are responded to as follows.

Quantum of Development

1.5 An assessment of the proposed housing density in relation to the Development Plan and the surrounding context can be found in paragraphs 5.7-5.17 of my Proof of Evidence. This highlights that the proposed density in the Appeal Scheme is significantly lower than the proposed site capacity for development as per TDC's own assessment within Examination Note TED17 (CD4.4). This demonstrates that the quantum of development is appropriate for the Appeal Site and will not result in a "cramped and over-developed site".

1.6 Additionally, paragraphs 5.18-5.19 highlight the national planning policy imperative to make effective use of land and concludes that the Appeal Scheme provides an optimal balance between this and other material planning considerations.

1.7 Section 7 of Neil Deely's evidence titled 'Quantum of Development (Density)' addresses this matter in detail. Notably, paragraph 88 of TDC's Officer Report (CD2.1) is supportive of the density in stating that it **'sits comfortably below'** (my emphasis) the policy position of CSP19.

1.8 The proposed density is significantly below the density range of 30-40 dwellings per hectare (dph) for set out in Policy CSP19. Mechanistically applied, this would result a development comprising 189-252 homes. This demonstrates that the density of the proposed scheme is wholly compatible with its context and would not result in an "over-developed" site.

CRAMPED

1.9 Section 8 of Neil Deely's proposal, which addresses 'Layout and Form', further addresses the 'urbanising effect' of the proposal. Paragraphs 8.11 - 8.37 address these concerns and conclude:

- The arrangement on the southern and eastern boundaries and the retention of existing hedgerows and trees edging the land to create a landscape buffer in the location;
- The southern edge boundary and landscape treatment avoid presenting a 'hard edge';
- There is a landscape buffer of 20-40m on the southern edge of the site;
- The layout incorporates a number of informal and green amenity spaces along the edges of the site, in addition to the formal village green space in the centre of the northern area of land.

1.10 Neil Deely's proof of evidence further considers the impact of the proposals on the character of the area. In assessing the scheme against policy CSP18 and Supplementary Planning Document Guidance, including the Surrey Design Guide, there is significant evidence in paragraphs 7.9 – 7.15 to demonstrate that:

- Key elements of landscape will be retained and incorporated in the layout;
- The proposed development responds well to key features and characteristics of the surrounding heritage assets;
- The density and development does not lead it to conflict with the character and distinctiveness of local area.

URBANISING EFFECT

1.11 The evidence presented in Ben Croot's proof of evidence seeks to address the claims that the Appeal Site proposal will have a "urbanising effect on the open countryside".

1.12 Section 6.0 and 7.0 of Ben Croot's evidence considers landscape and visual matters in detail. It is noted that Landscape Visual Impact Assessment (LVIA) (CD1.44) prepared on behalf of the Appellant undertook a number of character studies, in which the following conclusions were determined:

- Built form and settlement are a characteristic of the landscape;
- Built up areas, including Lingfield, can be found regularly;

- The Appeal Site is visually contained by Town Hill and Station Road and therefore does not read ‘open countryside’;
- The provision of a generous amount of public open space and landscaped buffers to the site boundaries avoids the creation of a ‘hard urban edge’

1.13 The additional reason for refusal also claims that “the introduction of significant areas of circulation space” will contribute to the “urbanising effect”. In response to this claim, it is noted that the circulation provided in the layout comprises of metalled spine roads suitable for larger service and emergency vehicles along with stretches of tertiary access roads surfaced in bound gravel or possibly permeable block paving as a softer landscape approach at the fringes of the scheme (precise details to be confirmed as part of reserved matters). The amount of circulation is broadly consistent with the extent of roads in comparable areas of the existing settlement of Lingfield. Road access is given to each property only and no vehicular circulation is provided except for access to dwelling houses within the development. One access point is provided from Town Hill limiting turning and traffic to this single point, and thereby limiting movement to this higher capacity road.

1.14 Thus, it is demonstrated that the proposed layout is commensurate with the existing settlement and does not result in an urbanising effect on the settlement or the surrounding area, highlighting the presence of Town Hill and Station Road and the landscaped buffers to the edges of the proposed development.

1.15 Furthermore, Clifford Thurlow’s proof of evidence references a list of historic planning applications on the appeal site at paragraph 4.1. This includes a consent granted on 26 August 1970 (ref. GOR/475/1970) which was not implemented for a 51-dwelling scheme and creation of new access roads. As seen in the application documents enclosed at Appendix 3, the approved layout comprised a concentration of built form towards the junction with Station Road and Town Hill. This is further evidence that development can be incorporated within this part of the appeal site without having an unacceptable or urbanising effect on the landscape to the south and east, contrary to Mr Thurlow’s statements at paragraphs 6.24 - 6.25 in this respect.

1.16 Overall, the evidence considers the Appeal Scheme to be in-keeping with the established pattern of development in Lingfield and consistent with relevant planning policies and guidance with regards to density, layout, and form.

2. PUBLIC RIGHT OF WAY

2.1 Paragraph 6.33 of Clifford Thurlow's proof of evidence refers to "other planning considerations to be taken into account in the determination of this appeal". This includes sub-paragraph ii):

"PRoW 381a:

a) the vehicular access to the northern outlier of development is required to cross the PRoW. The appellant has prepared detailed drawings of this crossing point which are being discussed with Surrey County Council as highway authority and public rights of way authority, TDC is not currently aware that agreement has been reached with the County Council that acceptable details of the crossing point from a highway safety perspective have been agreed. This is a matter which remains to be concluded prior to the opening of the public inquiry into this appeal or during the inquiry. However, TDC has looked at the impact of the crossing point on natural screening to the south side of the northern outlier and, although there will be some loss of this screening, no objection is raised on landscape or arboriculture grounds; and

b) PRoW 381a will be more intensively used if the development of the appeal site is allowed. This will be the most convenient route for many residents of that development to access the facilities in the centre of Lingfield Village on foot or by cycle and likewise to access the railway station. The surface of the PRoW is tarmac but this surface is worn away in places and suffers heave from roots of adjoining trees. The street lighting along the PRoW is also understood to require repair and ongoing maintenance. TDC consider that improvements to PRoW 381a should be provided for in a Section 106 agreement or Unilateral Undertaking. The Council understands that the appellant is willing to enter in to such an undertaking subject to costing of the works.

Adopting the precautionary principle, there could be objection under development plan policy DP5 on highway safety grounds whether the proposed access to the northern outlier of the proposed residential development satisfactorily provides for the safety of users of PRoW 381a, unless the appellant can reach agreement with Surrey County Council as public rights of way authority on the matter."

2.2 It should be noted that the statutory consultee response to the appeal application from SCC's Countryside Access Officer (CD1.4) requests that details of safety measures relating to the PRoW crossing **"should be agreed with the Countryside Access Officer prior to works commencing"**.

2.3 The phrase "prior to works commencing" is implicit that (a) the principle of development can proceed (in terms of dealing with the PROW impact) and (b) that the impact of development on the PROW can be adequately mitigated. Such details will be secured by an appropriate planning conditions requiring the submission and approval of technical details prior to the commencement of the development. The response does not recommend that outline permission is refused in the absence of these details, nor provide any indication that an appropriate scheme of measures could not be feasibly provided.

2.4 Further, paragraph 2.8 of David McMurtary's proof of evidence notes that, despite SCC accepting that this matter could be dealt with by planning condition, the Officer's Report stated that due to concerns with "other implications such as the loss of vegetation marked as being retained to allow for visibility splays", it was not considered appropriate for this to be dealt with by way of a pre-commencement condition. Therefore, it is understood that highway safety matters are acknowledged to be able to be dealt with by planning condition, subject to considerations of loss of vegetation.

2.5 Subsequent to the publication of the Officer's Report, the Appellant provided details of highways safety measures including detailed drawings of the crossing point (CD1.12 & CD1.13). This demonstrates that the crossing can be accommodated without compromising the safety of users of the PRoW, as set out in David McMurtary's proof of evidence. **Neither TDC nor SCC have raised any specific concerns with the feasibility or effectiveness of the proposed measures.** It provides further detail of the extent of any loss of vegetation as a result of the safety measures. This is minimal.

2.6 Paragraph 6.33 of Clifford Thurlow's proof of evidence referred to above confirms that following review of the submitted details, there is no objection on landscaping or arboriculture grounds. Therefore, there is no reason on the basis of TDC and SCC's stated positions as outlined above that this matter cannot be appropriately dealt with by planning condition. It is submitted that this should not be a matter of material substance at the forthcoming public inquiry.

2.7 With regards to part b) of paragraph 6.33 of Clifford Thurlow's proof of evidence, the Appellant has confirmed their willingness to enter into an undertaking to provide improvements to the PRoW, as acknowledged. An advanced draft s106 agreement is in circulation between the main parties. This includes contributions to the County Council prior to the construction of any of the dwellings comprised in the development, which the County Council covenants to use towards improvements to PRoW 381a including surfacing works, removal and/or upgrading of stiles/gates and new signage. This is considered to adequately address this matter as per the comments from SCC's Countryside Access Officer.

3 SURFACE WATER DRAINAGE

3.1 Paragraph 6.34 of Clifford Thurlow's proof of evidence also refers to a "precautionary objection" under development plan policy DP21 "unless details of an adequate and sustainable surface water drainage system can be demonstrated by the appellant as being capable of being provided.

3.2 This refers to consultee comments made by SCC as the Lead Local Flood Authority (LLFA) on 27th April (CD1.1). These state that:

"We are not satisfied that the proposed drainage scheme meets the requirements set out in the aforementioned documents; however, in the event that planning permission be granted by the Local Planning Authority, suitably worded conditions should be applied to ensure that the SuDS Scheme is properly implemented and maintained throughout the lifetime of the development. Suggested conditions are below:"

3.3 The response proceeds to list a recommended condition requiring details of the design of a surface water drainage scheme to be submitted and approved by the LPA, to include specified requirements listed a) to f). It is considered that this condition will ensure that a suitable drainage scheme will be provided at detailed planning stage and thus there should not be an objection on these grounds at this stage.

3.4 Notwithstanding this, a detailed response to SCC's comments is provided in the technical note by Lanmor Consulting at Appendix 1 of this document. This demonstrates that the requirements set out in SCC's response can be incorporated into the proposed surface water drainage scheme. Indeed, some of the requirements have already been incorporated in the submitted Flood Risk Assessment (CD1.41), as highlighted in the technical note. As such, there are no grounds to suggest that an adequate and sustainable surface water drainage system is not capable of being provided as part of the Appeal Scheme.

4 REPTILE MITIGATION

4.1 Paragraph 6.35 of Clifford Thurlow's proof of evidence states that:

> *"the appellant needs to demonstrate that the appeal proposals will not have an unacceptable impact on reptiles by agreeing to provide an acceptable reptile mitigation strategy to address the concerns of the Surrey Wildlife Trust as the Council's consultee on biodiversity matters. Again, adopting the precautionary principle, there could be an objection under development plan policies CSP17 and DP19 unless details of an acceptable reptile mitigation strategy can be demonstrated as being capable of being provided by the appellant."*

4.2 This does not acknowledge that an Outline Reptile Mitigation Strategy prepared by LUC (CD1.11) was submitted with this appeal on 23rd March. Subsequently, on 28th April, Georgia Tuttle (ROK Planning, on behalf of the Appellant) highlighted the submission of this document by email to TDC as it was apparent that it had been acknowledged in the Officer's Report published on 21st April.

4.3 It was then agreed during the Statement of Common Ground discussions over the following weeks that this information was acceptable for the purposes of the outline application, subject to the provision of a more detailed strategy as secured by planning condition. This is confirmed in paragraph 1.20 (subheading "Trees/ ecology") of the signed SoCG (CD10.13) which confirms that "The Outline Reptile Strategy submitted with the planning application is considered to be acceptable subject to appropriate conditions".

4.4 As such, it is considered that the statement at paragraph 6.35 cited above does not accurately reflect the discussions held during the course of this appeal. Indeed, it is considered that the submitted Outline Reptile Mitigation Strategy adequately addresses the SWT's comments relating to biodiversity matters and that any additional requirements can be secured by way of an appropriate planning condition requiring a detailed strategy to be submitted and approved by the LPA.

5 FIVE-YEAR HOUSING LAND SUPPLY

5.1 Clifford Thurlow's proof of evidence refers to an "update" to its five-year housing land supply position, which is included at Appendix 1 of that document. The update comprises two tables which set out the total supply of housing in the district and the resulting impact to its housing supply position (in the form of an update to Table 2 of the AMR 2021-22).

5.2 Planning Practice Guidance on Housing supply and delivery (paragraph 014 Reference ID: 68-014-20190722) includes clear guidance on the information that annual position statements need to include. For example, for sites with detailed planning permission, they should provide details of numbers of homes under construction and completed each year and commentary on build out rates. This allows a robust assessment of sites that are deliverable within a five-year period.

5.3 The update at Appendix 1 of Clifford Thurlow's proof does not provide sufficient detail of individual sites or permissions to demonstrate that the figure arrived at of a total supply of 1,183 additional dwellings is robust and deliverable within five years. Consequently, it is not considered that the housing land supply figure of 1.76 can be relied upon. It is further noted that this update has not undergone any process of adoption by the Council as a formal document.

5.4 As such, the Appellant is of the view that the published figure of 1.57 years as per the TDC's AMR 2021-22 (CD9.5) is the valid housing land supply position for Tandridge for the purposes of this appeal.

5.5 Notwithstanding this, it is highlighted that the discrepancy between the two figures is relatively minor and that in both cases it is clearly evident in my view that TDC is a very long way short of being able to demonstrate a five-year supply of housing land.

5.6 Furthermore, Clifford Thurlow seems to suggest at paragraph 6.39 that the implication of the DLUHC Ministerial Statement on 5th December 2022 (CD10.10) is that objectively assessed housing need for housing may be to some extent disregarded. This is not the case. The statement refers to draft legislation (Levelling-up and Regeneration Bill) and therefore cannot be given weight at this stage. Notwithstanding that, the ability for LPAs to determine their own housing need through the Local Plan process does not prejudice the requirement for LPAs to meet their objectively assessed need where there is no up-to-date Local Plan in place, as is the case in Tandridge. Thus, this does not materially affect the clearly evidenced acute need for more housing in Tandridge, which this Appeal Scheme will make a significant contribution towards meeting.

APPENDIX 1 – RESPONSE TO OBJECTION BY SURREY COUNTY COUNCIL AS LEAD LOCAL FLOOD AUTHORITY BY LANMOR CONSULTING, 20TH JULY 2023

LANMOR Consulting
Civil Engineers & Transport Planners

Response to Objection by Surrey County Council as Lead Local Flood Authority

To outline planning application

For development at
Land at The Old Cottage, Station Road, Lingfield, RH7 6PG

Ref: TA/2022/685

20th July 2023

1.1 Surrey County Council (SCC) as the Lead Local Flood Authority (LLFA), provided comments to Tandridge District Council (TDC) as the Local Planning Authority (LPA) in April 2023. The comments were in response to the planning application for development off land at the Old Cottage, Station Road, Lingfield, reference TA/2022/685.

1.2 The LLFA objected to the Flood Risk Assessment (CD1.41) submitted with the outline application as it was not considered to meet (in full) the requirements set out in planning policy and guidance. While the LPA didn't raise these reasons in their original statement, the proof of evidence of Mr Clifford Thurlow has cited the LLFA objections as one of several other planning considerations to be taken into account in determining the appeal.

1.3 The first point in the response from the LLFA related to the Greenfield runoff rates and that full calculations have not been provided to support the rates set out in the Flood Risk Assessment report, reference 211493/FRA/MN/KBL/KBL dated March 2022. The Greenfield runoff rates for the site were tabulated on page 13 as Table 7.1.

1.4 The rates were estimated using MicroDrainage software, the Q_{BAR} discharge rates was estimated at 32 l/s, the 1 in 1 year at 27.2 l/s, the 1 in 30 year at 72.4 l/s and the 1 in 100 year at 101.9 l/s. A copy of the Greenfield results are included as Appendix A. A discharge rate of 15 l/s was set from the proposed development for the design of the on site drainage. This is less than 50% of the Q_{BAR} rate and just over 50% of the 1 in 1 year rate.

1.5 The LLFA accepts that in accordance with Technical Standard S2: 'For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event.'

1.6 The illustrative masterplan submitted with the outline application shows the layout for the residential dwellings. The site has a large area around the perimeter that is undeveloped. More than half of the 6.2ha site will be developed and the impermeable area (roofs and roads) measures approximately 3ha, just under half the total site area. The proposed discharge rate of 15 l/s is less than the Greenfield runoff rate for the development area and just over the Greenfield runoff from the developed impermeable areas. Therefore, it is concluded the proposals meet the requirements of the Standard S2 in that the discharge from the development will be blow the current Greenfield rate for the application site.

1.7 The second point of the LLFA response relates to the drainage calculations for the various return periods. Only the extreme event for a 1 in 100 year + climate change allowance was included in the FRA, which is the worst case scenario. However, for completeness the calculations for the 1 in 1, 1 in 30 and the 1 in 100 are included in Appendix B and clearly demonstrate that there will be no flooding on site for any of these events.

1.8 The LLFA third point concerns the application of the climate change allowance for rainfall intensities. The LLFA state that the incorrect allowance has been allowed for and that in May 2022 the allowances changed. They are correct in that the allowances changed in May 2022, but the report was prepared in March 2022 and was submitted to the LPA in March 2022 before the allowances changed, however we understand registration of the application was delayed until June 2022.

1.9 The climate change allowance used in the FRA was 40% and this has now increased to 45%, if the 5% increase in rainfall intensity was applied, the result would be a requirement for more storage. Some of the drainage features have sufficient capacity to deal with the increased demand, while other features will need to be increased to prevent flooding on site.

1.10 These measures will involve increasing the sub-base thickness of permeable paving section PPS2 to 500mm thick and increasing the size of attenuation tanks 1, 2, 3, 4 and 5 by around 1m to provide the additional storage required. An updated drainage strategy is included in Appendix C to demonstrate that the additional storage required to provide for the 45% climate change allowance.

1.11 The next point in the LLFA response relates to the discharge of the development to the watercourse. They say no information has been provided regarding the watercourse, outfall and bank levels and the design includes pumping which is not acceptable. The watercourse which the development will discharge to is clearly shown on the topographical survey included in the FRA, it includes bed and bank levels. The proposed drainage strategy is to collect runoff from the development, attenuate it and discharge to the watercourse at a restricted rate. The watercourse runs along the southern and eastern boundaries of the site and discharges via a culvert under Station Road to a ditch on the other side of the road. This ditch runs in an easterly direction to Eden Brook.

1.12 The ditch which the development discharges into is only 500-600mm deep so it is not possible to get a gravity connection from the pond to the ditch. Even with the shallowest of SuDS features such as permeable paving it would be a struggle to achieve a gravity connection. Given the shallow depth of the watercourse a gravity connection is not possible, pumping the runoff is the only possibility.

1.13 The LLFA maintain that a pumped discharge would not meet standard S12 of the "Non-Statutory Technical Standards for Sustainable Drainage Systems". Standard S12 of the guidance states "Pumping should only be used to facilitate drainage for those parts of the site where it is not reasonably practicable to drain water by gravity." The volume of runoff to be stored and levels across the site means that a gravity connection to the watercourse is not possible, so the only solution is a pumped discharge and therefore, as this is the only option, the proposals comply with standard S12.

1.14 The LLFA also suggest that the development offers opportunity to utilise a range of sustainable surface water management techniques which not only contribute to a reduction in discharge but provide amenity, biodiversity and water quality.

1.15 The LLFA say that justification has not been provided why green roofs, permeable paving, raingardens etc have not been provided. The FRA clearly states that the properties will have pitched roofs and therefore are not suitable for green roofs. The soil infiltration is poor and the testing has proved that soakaways are not practical, however permeable paving for attention has been proposed in the areas where the fall of the land is shallow that allows runoff to be stored in the paving subbase.

1.16 Within the design provision has been made for several swales and an open pond, all of which slow the discharge and provide amenity, biodiversity and water quality benefits. So, contrary to the LLFA comments, the proposals are providing a range of SuDS features that will provide amenity, biodiversity and water quality. There is the potential to include more features at the detailed design stage to the north where the ground is steeper, and this could be secured by way of condition.

1.17 The final point in the LLFA response relates to maintenance considerations. Within the FRA the maintenance of the SuDS features is clearly set out in chapter 7. With regards to the watercourse, the developer has the same riparian responsibilities as any other landowner with a watercourse on their property. They are responsible for letting flood flows through their land without obstructing it or polluting it, they should keep the banks clear of anything that could cause an obstruction or increased flood risk downstream.

1.18 In conclusion, the proposed drainage strategy has employed attenuation to reduce the runoff rate from the development to below greenfield discharge rate. SuDS features have been used to attenuate runoff and provide amenity, biodiversity and water quality of the runoff. Calculations for the 1in1, 1in30 and 1in100 year events show there will be no flooding on site and the increased climate change allowance of 45% can be accommodated in the proposed SuDS features with a small increase in the size of each feature. The report has provided maintenance strategies for the development and demonstrated that the only option for discharge is a pumped solution.

1.19 It is considered that the FRA report and additional supporting information in this note has demonstrated that the proposals are compliant with the Non-Statutory Technical Standards for Sustainable Drainage Systems, and will not result in flooding within the development or in the surrounding area, therefore we see no reason why the application should be refused on the grounds of flooding or drainage.

APPENDIX A

ICP SUDS Mean Annual Flood

Input

Return Period (years) 100 SAAR (mm) 800 Urban 0.000
Area (ha) 6.222 Soil 0.450 Region Number Region 7

Results l/s

QBAR Rural 32.0
QBAR Urban 32.0

Q100 years 101.9

Q1 year 27.2
Q30 years 72.4
Q100 years 101.9

APPENDIX B

Cascade Summary of Results for PP1.srcx

Upstream Structures	Outflow To	Overflow To
(None)	TANK 3.srcx	(None)

Half Drain Time : 6 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	55.387	0.087	0.0	2.2	2.2	0.5	O K
30 min Summer	55.413	0.113	0.0	2.4	2.4	0.9	O K
60 min Summer	55.426	0.126	0.0	2.4	2.4	1.1	O K
120 min Summer	55.417	0.117	0.0	2.4	2.4	1.0	O K
180 min Summer	55.399	0.099	0.0	2.4	2.4	0.7	O K
240 min Summer	55.387	0.087	0.0	2.2	2.2	0.5	O K
360 min Summer	55.371	0.071	0.0	1.7	1.7	0.4	O K
480 min Summer	55.363	0.063	0.0	1.5	1.5	0.3	O K
600 min Summer	55.357	0.057	0.0	1.3	1.3	0.2	O K
720 min Summer	55.353	0.053	0.0	1.1	1.1	0.2	O K
960 min Summer	55.347	0.047	0.0	0.9	0.9	0.2	O K
1440 min Summer	55.340	0.040	0.0	0.7	0.7	0.1	O K
2160 min Summer	55.334	0.034	0.0	0.5	0.5	0.1	O K
2880 min Summer	55.330	0.030	0.0	0.4	0.4	0.1	O K
4320 min Summer	55.326	0.026	0.0	0.3	0.3	0.0	O K
5760 min Summer	55.324	0.024	0.0	0.3	0.3	0.0	O K
7200 min Summer	55.322	0.022	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	29.648	0.0	1.2	13
30 min Summer	19.726	0.0	2.2	22
60 min Summer	12.800	0.0	3.5	38
120 min Summer	8.156	0.0	5.0	68
180 min Summer	6.242	0.0	6.0	96
240 min Summer	5.155	0.0	6.7	126
360 min Summer	3.898	0.0	7.8	186
480 min Summer	3.196	0.0	8.7	246
600 min Summer	2.740	0.0	9.4	306
720 min Summer	2.417	0.0	10.0	366
960 min Summer	1.983	0.0	11.0	488
1440 min Summer	1.501	0.0	12.4	716
2160 min Summer	1.134	0.0	13.9	1092
2880 min Summer	0.930	0.0	15.0	1468
4320 min Summer	0.704	0.0	16.4	2188
5760 min Summer	0.578	0.0	17.3	2904
7200 min Summer	0.495	0.0	17.7	3544

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	55.320	0.020	0.0	0.2	0.2	0.0	O K
10080 min Summer	55.319	0.019	0.0	0.2	0.2	0.0	O K
15 min Winter	55.405	0.105	0.0	2.4	2.4	0.8	O K
30 min Winter	55.428	0.128	0.0	2.4	2.4	1.1	O K
60 min Winter	55.430	0.130	0.0	2.4	2.4	1.2	O K
120 min Winter	55.401	0.101	0.0	2.4	2.4	0.7	O K
180 min Winter	55.382	0.082	0.0	2.0	2.0	0.5	O K
240 min Winter	55.370	0.070	0.0	1.7	1.7	0.3	O K
360 min Winter	55.358	0.058	0.0	1.3	1.3	0.2	O K
480 min Winter	55.351	0.051	0.0	1.1	1.1	0.2	O K
600 min Winter	55.347	0.047	0.0	0.9	0.9	0.2	O K
720 min Winter	55.344	0.044	0.0	0.8	0.8	0.1	O K
960 min Winter	55.339	0.039	0.0	0.7	0.7	0.1	O K
1440 min Winter	55.333	0.033	0.0	0.5	0.5	0.1	O K
2160 min Winter	55.328	0.028	0.0	0.4	0.4	0.1	O K
2880 min Winter	55.325	0.025	0.0	0.3	0.3	0.0	O K
4320 min Winter	55.322	0.022	0.0	0.2	0.2	0.0	O K
5760 min Winter	55.320	0.020	0.0	0.2	0.2	0.0	O K
7200 min Winter	55.318	0.018	0.0	0.2	0.2	0.0	O K
8640 min Winter	55.317	0.017	0.0	0.1	0.1	0.0	O K
10080 min Winter	55.316	0.016	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	0.436	0.0	18.0	4336
10080 min Summer	0.391	0.0	18.0	5104
15 min Winter	29.648	0.0	1.6	14
30 min Winter	19.726	0.0	2.7	23
60 min Winter	12.800	0.0	4.2	40
120 min Winter	8.156	0.0	5.8	70
180 min Winter	6.242	0.0	6.9	98
240 min Winter	5.155	0.0	7.8	126
360 min Winter	3.898	0.0	9.1	184
480 min Winter	3.196	0.0	10.0	246
600 min Winter	2.740	0.0	10.8	306
720 min Winter	2.417	0.0	11.5	364
960 min Winter	1.983	0.0	12.6	484
1440 min Winter	1.501	0.0	14.3	728
2160 min Winter	1.134	0.0	16.1	1080
2880 min Winter	0.930	0.0	17.3	1452
4320 min Winter	0.704	0.0	19.1	2176
5760 min Winter	0.578	0.0	20.3	2880
7200 min Winter	0.495	0.0	21.0	3624
8640 min Winter	0.436	0.0	21.4	4536
10080 min Winter	0.391	0.0	21.7	5200

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.058

Time (mins) From:	To:	Area (ha)
0	4	0.058

Cascade Model Details for PP1.srcx

Storage is Online Cover Level (m) 55.900

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	11.6
Membrane Percolation (mm/hr)	1000	Length (m)	35.0
Max Percolation (l/s)	112.8	Slope (1:X)	40.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	55.300	Cap Volume Depth (m)	0.400

Hydro-Brake Optimum® Outflow Control

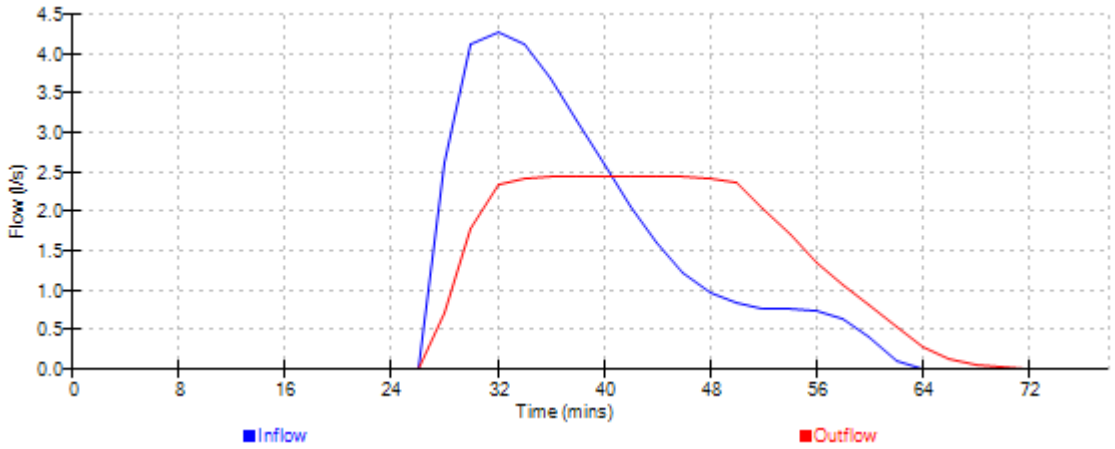
Unit Reference	MD-SHE-0083-2500-0400-2500
Design Head (m)	0.400
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	83
Invert Level (m)	55.300
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

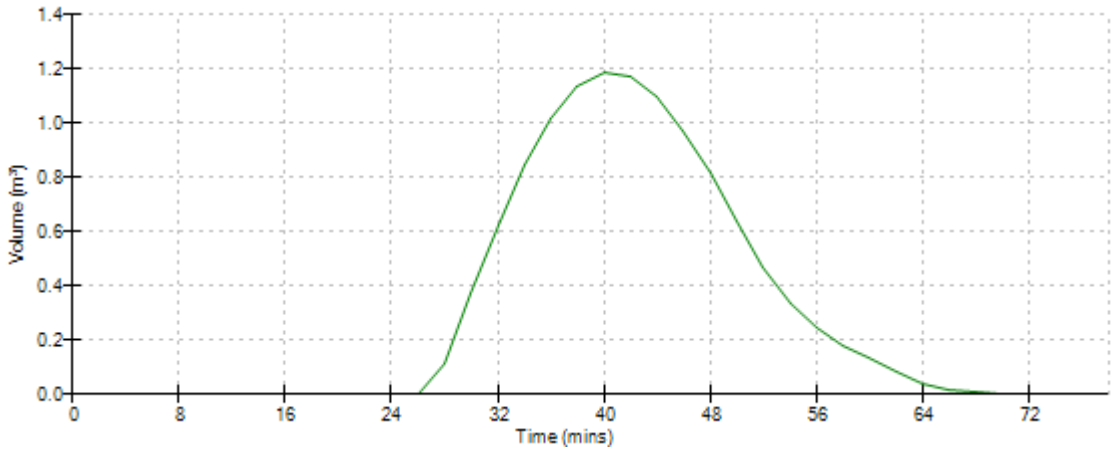
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	2.5
Flush-Flo™	0.131	2.4
Kick-Flo®	0.290	2.1
Mean Flow over Head Range	-	2.0

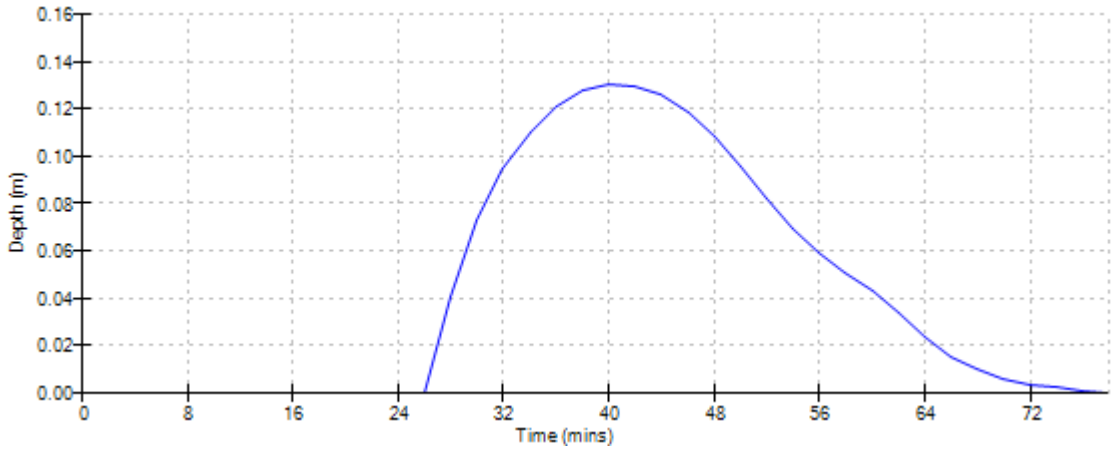
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.4	1.200	4.1	3.000	6.2	7.000	9.4
0.200	2.4	1.400	4.4	3.500	6.7	7.500	9.8
0.300	2.2	1.600	4.6	4.000	7.1	8.000	10.1
0.400	2.5	1.800	4.9	4.500	7.5	8.500	10.4
0.500	2.7	2.000	5.2	5.000	8.0	9.000	10.7
0.600	3.0	2.200	5.4	5.500	8.3	9.500	11.0
0.800	3.4	2.400	5.6	6.000	8.7		
1.000	3.7	2.600	5.8	6.500	9.1		

Cascade Event: 60 min Winter for PP1.srcx







Cascade Summary of Results for PP2.srcx

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

Half Drain Time : 4 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	53.265	0.165	0.0	4.9	4.9	2.0	O K
30 min Summer	53.279	0.179	0.0	4.9	4.9	2.3	O K
60 min Summer	53.264	0.164	0.0	4.9	4.9	1.9	O K
120 min Summer	53.226	0.126	0.0	4.9	4.9	1.1	O K
180 min Summer	53.206	0.106	0.0	4.2	4.2	0.8	O K
240 min Summer	53.194	0.094	0.0	3.6	3.6	0.6	O K
360 min Summer	53.180	0.080	0.0	2.9	2.9	0.5	O K
480 min Summer	53.171	0.071	0.0	2.4	2.4	0.4	O K
600 min Summer	53.165	0.065	0.0	2.1	2.1	0.3	O K
720 min Summer	53.160	0.060	0.0	1.8	1.8	0.3	O K
960 min Summer	53.154	0.054	0.0	1.5	1.5	0.2	O K
1440 min Summer	53.146	0.046	0.0	1.1	1.1	0.2	O K
2160 min Summer	53.140	0.040	0.0	0.9	0.9	0.1	O K
2880 min Summer	53.136	0.036	0.0	0.7	0.7	0.1	O K
4320 min Summer	53.131	0.031	0.0	0.5	0.5	0.1	O K
5760 min Summer	53.128	0.028	0.0	0.4	0.4	0.1	O K
7200 min Summer	53.126	0.026	0.0	0.4	0.4	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	29.648	0.0	3.9	13
30 min Summer	19.726	0.0	5.6	21
60 min Summer	12.800	0.0	7.7	36
120 min Summer	8.156	0.0	10.1	66
180 min Summer	6.242	0.0	11.7	96
240 min Summer	5.155	0.0	13.0	126
360 min Summer	3.898	0.0	14.9	184
480 min Summer	3.196	0.0	16.4	244
600 min Summer	2.740	0.0	17.6	306
720 min Summer	2.417	0.0	18.6	364
960 min Summer	1.983	0.0	20.4	490
1440 min Summer	1.501	0.0	23.2	720
2160 min Summer	1.134	0.0	26.2	1076
2880 min Summer	0.930	0.0	28.5	1428
4320 min Summer	0.704	0.0	31.9	2160
5760 min Summer	0.578	0.0	34.6	2840
7200 min Summer	0.495	0.0	36.6	3608

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	53.124	0.024	0.0	0.3	0.3	0.0	O K
10080 min Summer	53.123	0.023	0.0	0.3	0.3	0.0	O K
15 min Winter	53.279	0.179	0.0	4.9	4.9	2.3	O K
30 min Winter	53.285	0.185	0.0	4.9	4.9	2.5	O K
60 min Winter	53.254	0.154	0.0	4.9	4.9	1.7	O K
120 min Winter	53.206	0.106	0.0	4.2	4.2	0.8	O K
180 min Winter	53.188	0.088	0.0	3.4	3.4	0.6	O K
240 min Winter	53.178	0.078	0.0	2.8	2.8	0.4	O K
360 min Winter	53.166	0.066	0.0	2.1	2.1	0.3	O K
480 min Winter	53.159	0.059	0.0	1.8	1.8	0.2	O K
600 min Winter	53.154	0.054	0.0	1.5	1.5	0.2	O K
720 min Winter	53.150	0.050	0.0	1.3	1.3	0.2	O K
960 min Winter	53.145	0.045	0.0	1.1	1.1	0.1	O K
1440 min Winter	53.139	0.039	0.0	0.8	0.8	0.1	O K
2160 min Winter	53.133	0.033	0.0	0.6	0.6	0.1	O K
2880 min Winter	53.130	0.030	0.0	0.5	0.5	0.1	O K
4320 min Winter	53.126	0.026	0.0	0.4	0.4	0.0	O K
5760 min Winter	53.123	0.023	0.0	0.3	0.3	0.0	O K
7200 min Winter	53.121	0.021	0.0	0.3	0.3	0.0	O K
8640 min Winter	53.120	0.020	0.0	0.2	0.2	0.0	O K
10080 min Winter	53.119	0.019	0.0	0.2	0.2	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.436	0.0	38.1	4352
10080 min Summer	0.391	0.0	39.5	5136
15 min Winter	29.648	0.0	4.6	13
30 min Winter	19.726	0.0	6.5	22
60 min Winter	12.800	0.0	8.7	38
120 min Winter	8.156	0.0	11.5	66
180 min Winter	6.242	0.0	13.3	96
240 min Winter	5.155	0.0	14.8	124
360 min Winter	3.898	0.0	16.9	184
480 min Winter	3.196	0.0	18.5	242
600 min Winter	2.740	0.0	19.9	306
720 min Winter	2.417	0.0	21.1	360
960 min Winter	1.983	0.0	23.1	474
1440 min Winter	1.501	0.0	26.2	736
2160 min Winter	1.134	0.0	29.6	1060
2880 min Winter	0.930	0.0	32.2	1440
4320 min Winter	0.704	0.0	36.2	2140
5760 min Winter	0.578	0.0	39.2	2936
7200 min Winter	0.495	0.0	41.6	3632
8640 min Winter	0.436	0.0	43.4	4288
10080 min Winter	0.391	0.0	45.0	5016

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.093

Time (mins) From:	To:	Area (ha)
0	4	0.093

Cascade Model Details for PP2.srcx

Storage is Online Cover Level (m) 53.800

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.0
Membrane Percolation (mm/hr)	1000	Length (m)	61.0
Max Percolation (l/s)	67.8	Slope (1:X)	120.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	53.100	Cap Volume Depth (m)	0.500

Hydro-Brake Optimum® Outflow Control

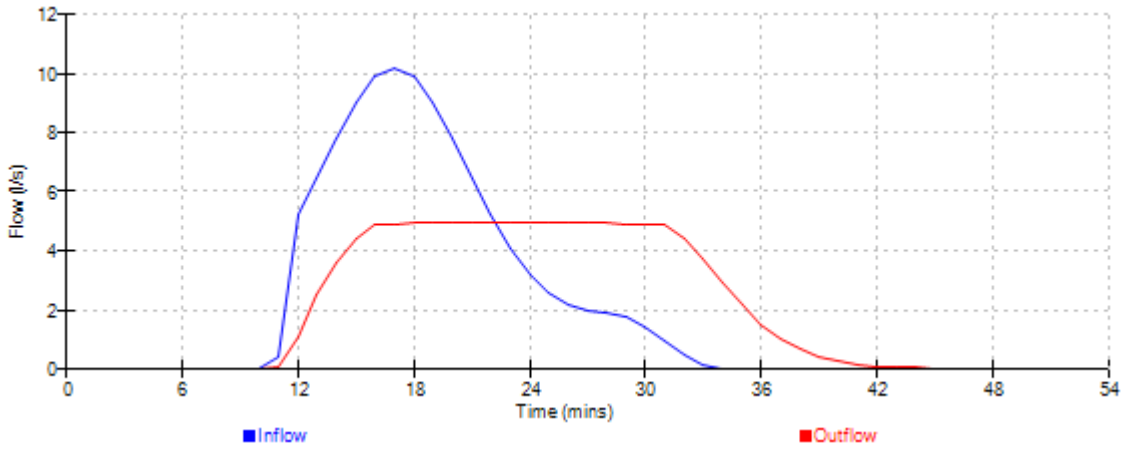
Unit Reference	MD-SHE-0113-5000-0400-5000
Design Head (m)	0.400
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	113
Invert Level (m)	53.100
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

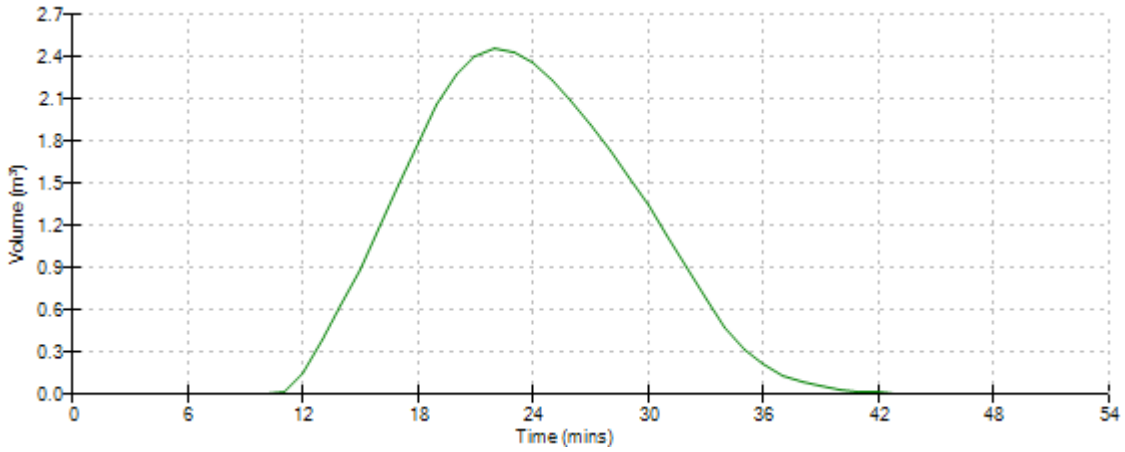
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	4.9
Flush-Flo™	0.168	4.9
Kick-Flo®	0.310	4.4
Mean Flow over Head Range	-	3.9

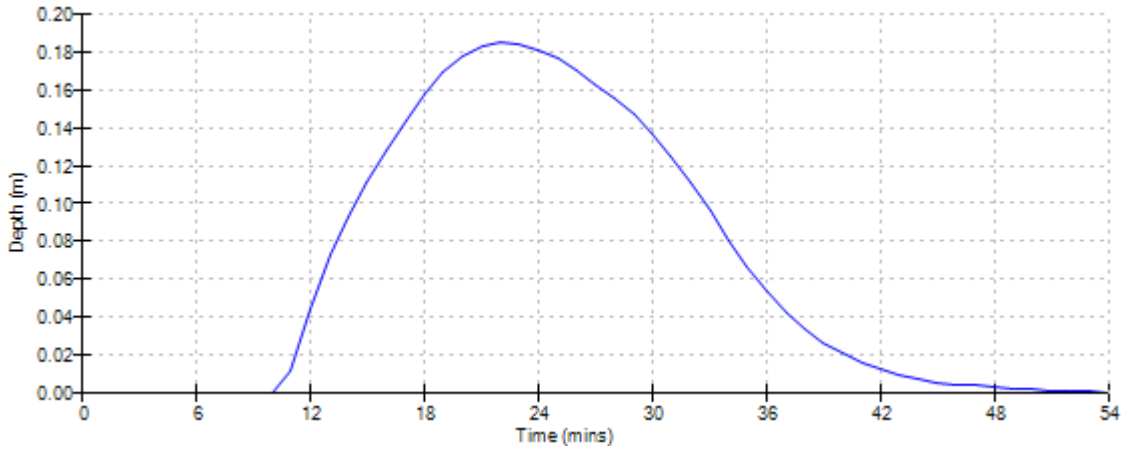
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.9	1.200	8.3	3.000	12.8	7.000	19.3
0.200	4.9	1.400	8.9	3.500	13.7	7.500	20.0
0.300	4.5	1.600	9.5	4.000	14.6	8.000	20.6
0.400	4.9	1.800	10.0	4.500	15.4	8.500	21.3
0.500	5.5	2.000	10.5	5.000	16.3	9.000	21.9
0.600	6.0	2.200	11.0	5.500	17.1	9.500	22.5
0.800	6.8	2.400	11.5	6.000	17.8		
1.000	7.6	2.600	11.9	6.500	18.6		

Cascade Event: 30 min Winter for PP2.srcx







Cascade Summary of Results for SWALE 1.srcx

Upstream Structures	Outflow To	Overflow To
TANK 2.srcx	POND.srcx	(None)

Half Drain Time : 20 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	54.228	0.188	0.0	5.0	5.0	6.6	O K
30 min Summer	54.250	0.210	0.0	5.0	5.0	8.4	O K
60 min Summer	54.264	0.224	0.0	5.0	5.0	9.7	O K
120 min Summer	54.265	0.225	0.0	5.0	5.0	9.8	O K
180 min Summer	54.258	0.218	0.0	5.0	5.0	9.1	O K
240 min Summer	54.247	0.207	0.0	5.0	5.0	8.2	O K
360 min Summer	54.219	0.179	0.0	5.0	5.0	5.9	O K
480 min Summer	54.191	0.151	0.0	5.0	5.0	4.0	O K
600 min Summer	54.165	0.125	0.0	4.9	4.9	2.6	O K
720 min Summer	54.141	0.101	0.0	4.8	4.8	1.6	O K
960 min Summer	54.116	0.076	0.0	4.3	4.3	0.9	O K
1440 min Summer	54.094	0.054	0.0	3.5	3.5	0.4	O K
2160 min Summer	54.078	0.038	0.0	2.7	2.7	0.2	O K
2880 min Summer	54.069	0.029	0.0	2.2	2.2	0.1	O K
4320 min Summer	54.059	0.019	0.0	1.7	1.7	0.0	O K
5760 min Summer	54.053	0.013	0.0	1.4	1.4	0.0	O K
7200 min Summer	54.048	0.008	0.0	1.2	1.2	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	29.648	0.0	16.3	17
30 min Summer	19.726	0.0	21.7	32
60 min Summer	12.800	0.0	28.2	56
120 min Summer	8.156	0.0	35.9	88
180 min Summer	6.242	0.0	41.3	122
240 min Summer	5.155	0.0	45.4	154
360 min Summer	3.898	0.0	51.5	216
480 min Summer	3.196	0.0	56.3	274
600 min Summer	2.740	0.0	60.4	330
720 min Summer	2.417	0.0	63.9	384
960 min Summer	1.983	0.0	69.9	492
1440 min Summer	1.501	0.0	79.4	736
2160 min Summer	1.134	0.0	89.9	1100
2880 min Summer	0.930	0.0	98.4	1468
4320 min Summer	0.704	0.0	111.7	2172
5760 min Summer	0.578	0.0	122.2	2896
7200 min Summer	0.495	0.0	130.9	3592

Cascade Summary of Results for SWALE 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	54.048	0.008	0.0	1.2	1.2	0.0	O K
10080 min Summer	54.044	0.004	0.0	1.0	1.0	0.0	O K
15 min Winter	54.242	0.202	0.0	5.0	5.0	7.8	O K
30 min Winter	54.269	0.229	0.0	5.0	5.0	10.1	O K
60 min Winter	54.287	0.247	0.0	5.0	5.0	11.9	O K
120 min Winter	54.284	0.244	0.0	5.0	5.0	11.6	O K
180 min Winter	54.269	0.229	0.0	5.0	5.0	10.1	O K
240 min Winter	54.248	0.208	0.0	5.0	5.0	8.3	O K
360 min Winter	54.199	0.159	0.0	5.0	5.0	4.5	O K
480 min Winter	54.152	0.112	0.0	4.8	4.8	2.0	O K
600 min Winter	54.121	0.081	0.0	4.5	4.5	1.0	O K
720 min Winter	54.108	0.068	0.0	4.0	4.0	0.7	O K
960 min Winter	54.092	0.052	0.0	3.4	3.4	0.4	O K
1440 min Winter	54.076	0.036	0.0	2.6	2.6	0.2	O K
2160 min Winter	54.064	0.024	0.0	2.0	2.0	0.1	O K
2880 min Winter	54.057	0.017	0.0	1.6	1.6	0.0	O K
4320 min Winter	54.049	0.009	0.0	1.2	1.2	0.0	O K
5760 min Winter	54.046	0.006	0.0	1.1	1.1	0.0	O K
7200 min Winter	54.040	0.000	0.0	0.9	0.9	0.0	O K
8640 min Winter	54.040	0.000	0.0	0.8	0.8	0.0	O K
10080 min Winter	54.040	0.000	0.0	0.7	0.7	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.436	0.0	138.1	4336
10080 min Summer	0.391	0.0	144.7	5112
15 min Winter	29.648	0.0	18.3	18
30 min Winter	19.726	0.0	24.3	32
60 min Winter	12.800	0.0	31.5	60
120 min Winter	8.156	0.0	40.3	96
180 min Winter	6.242	0.0	46.2	130
240 min Winter	5.155	0.0	50.9	164
360 min Winter	3.898	0.0	57.7	224
480 min Winter	3.196	0.0	63.1	276
600 min Winter	2.740	0.0	67.6	322
720 min Winter	2.417	0.0	71.6	378
960 min Winter	1.983	0.0	78.3	494
1440 min Winter	1.501	0.0	88.9	732
2160 min Winter	1.134	0.0	100.8	1088
2880 min Winter	0.930	0.0	110.1	1420
4320 min Winter	0.704	0.0	125.0	2144
5760 min Winter	0.578	0.0	136.5	2848
7200 min Winter	0.495	0.0	146.7	3544
8640 min Winter	0.436	0.0	154.9	0
10080 min Winter	0.391	0.0	162.2	0

Cascade Rainfall Details for SWALE 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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.154

Time (mins) From:	To:	Area (ha)
0	4	0.154

Cascade Model Details for SWALE 1.srcx

Storage is Online Cover Level (m) 55.000

Swale Structure

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	87.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	2.0
Safety Factor	2.0	Slope (1:X)	500.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	54.040	Cap Infiltration Depth (m)	0.000
Base Width (m)	0.5		

Hydro-Brake Optimum® Outflow Control

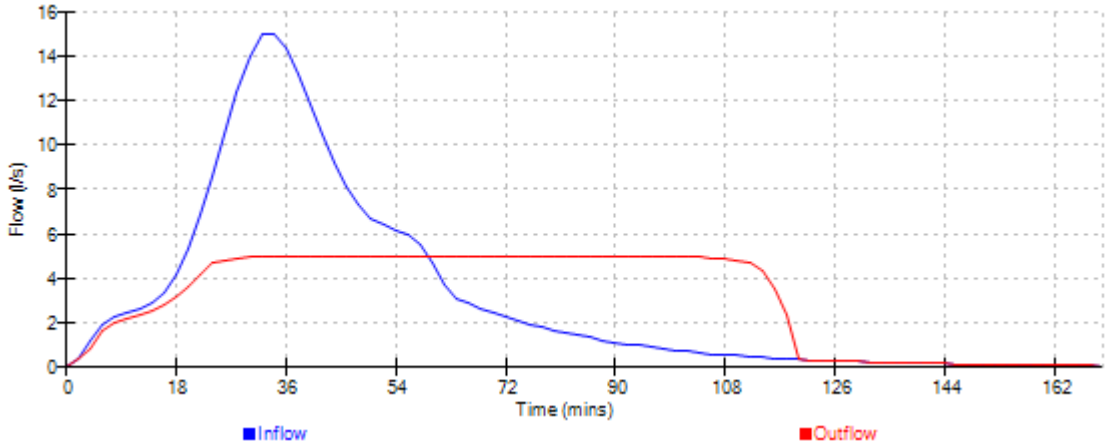
Unit Reference	MD-SHE-0109-5000-0800-5000
Design Head (m)	0.800
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	109
Invert Level (m)	54.000
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

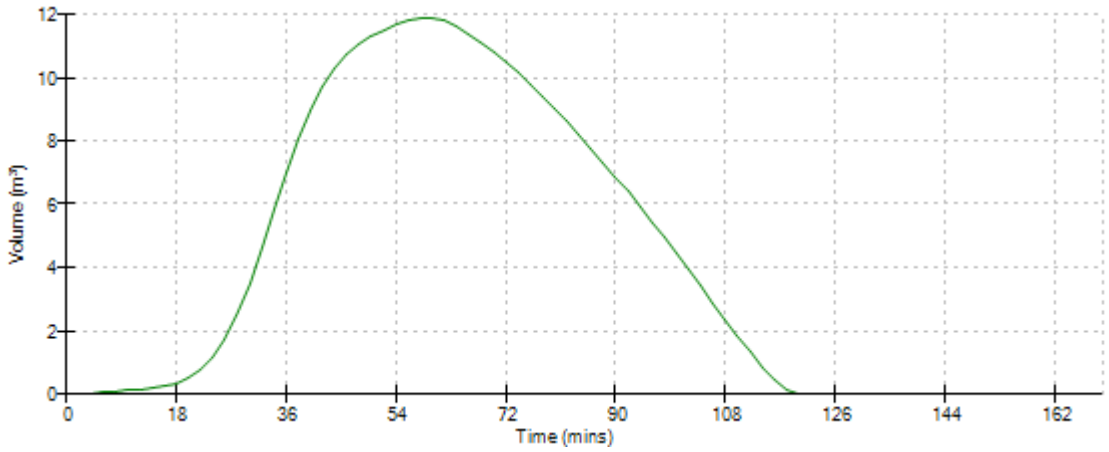
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	5.0
Flush-Flo™	0.242	5.0
Kick-Flo®	0.537	4.2
Mean Flow over Head Range	-	4.3

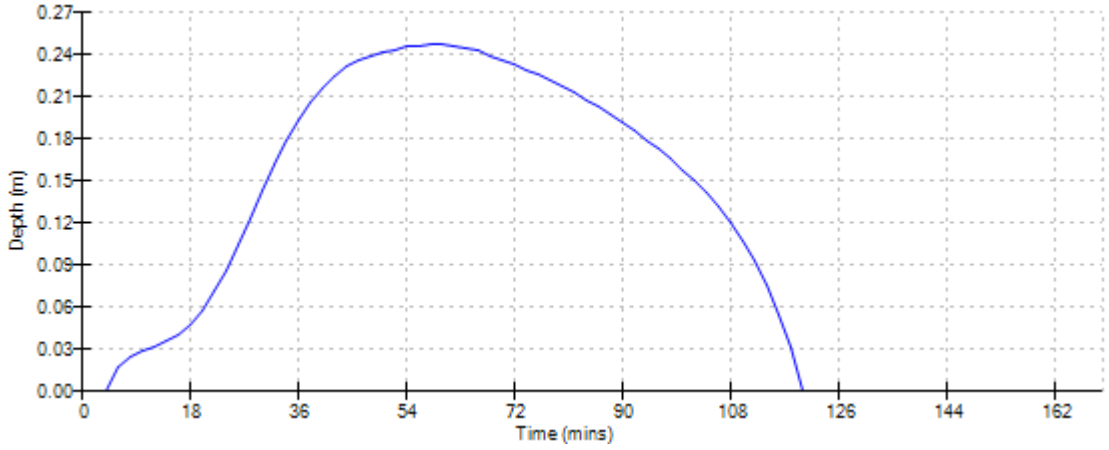
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.7	1.200	6.0	3.000	9.3	7.000	13.9
0.200	5.0	1.400	6.5	3.500	10.0	7.500	14.4
0.300	5.0	1.600	6.9	4.000	10.6	8.000	14.8
0.400	4.8	1.800	7.3	4.500	11.3	8.500	15.2
0.500	4.5	2.000	7.7	5.000	11.8	9.000	15.7
0.600	4.4	2.200	8.0	5.500	12.4	9.500	16.1
0.800	5.0	2.400	8.4	6.000	12.9		
1.000	5.5	2.600	8.7	6.500	13.4		

Cascade Event: 60 min Winter for SWALE 1.srcx







Cascade Summary of Results for SWALE 2.srcx

Upstream Structures	Outflow To	Overflow To
TANK 4.srcx TANK 5.srcx	POND.srcx	(None)

Half Drain Time : 0 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	50.268	0.148	0.0	48.4	48.4	0.6	O K
30 min Summer	50.256	0.136	0.0	42.8	42.8	0.5	O K
60 min Summer	50.235	0.115	0.0	33.3	33.3	0.4	O K
120 min Summer	50.214	0.094	0.0	24.5	24.5	0.2	O K
180 min Summer	50.202	0.082	0.0	19.9	19.9	0.2	O K
240 min Summer	50.194	0.074	0.0	17.1	17.1	0.1	O K
360 min Summer	50.184	0.064	0.0	13.7	13.7	0.1	O K
480 min Summer	50.177	0.057	0.0	11.7	11.7	0.1	O K
600 min Summer	50.173	0.053	0.0	10.3	10.3	0.1	O K
720 min Summer	50.170	0.050	0.0	9.5	9.5	0.1	O K
960 min Summer	50.164	0.044	0.0	7.9	7.9	0.0	O K
1440 min Summer	50.157	0.037	0.0	6.1	6.1	0.0	O K
2160 min Summer	50.152	0.032	0.0	4.8	4.8	0.0	O K
2880 min Summer	50.149	0.029	0.0	4.3	4.3	0.0	O K
4320 min Summer	50.144	0.024	0.0	3.2	3.2	0.0	O K
5760 min Summer	50.142	0.022	0.0	2.7	2.7	0.0	O K
7200 min Summer	50.139	0.019	0.0	2.3	2.3	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	29.648	0.0	29.6	10
30 min Summer	19.726	0.0	39.4	17
60 min Summer	12.800	0.0	51.1	32
120 min Summer	8.156	0.0	65.1	62
180 min Summer	6.242	0.0	74.8	92
240 min Summer	5.155	0.0	82.3	122
360 min Summer	3.898	0.0	93.4	184
480 min Summer	3.196	0.0	102.1	242
600 min Summer	2.740	0.0	109.5	306
720 min Summer	2.417	0.0	115.9	364
960 min Summer	1.983	0.0	126.8	484
1440 min Summer	1.501	0.0	144.0	722
2160 min Summer	1.134	0.0	162.9	1088
2880 min Summer	0.930	0.0	178.1	1432
4320 min Summer	0.704	0.0	202.1	2184
5760 min Summer	0.578	0.0	221.5	2936
7200 min Summer	0.495	0.0	236.5	3712

Cascade Summary of Results for SWALE 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	50.138	0.018	0.0	2.0	2.0	0.0	O K
10080 min Summer	50.136	0.016	0.0	1.8	1.8	0.0	O K
15 min Winter	50.269	0.149	0.0	48.9	48.9	0.6	O K
30 min Winter	50.246	0.126	0.0	38.0	38.0	0.4	O K
60 min Winter	50.221	0.101	0.0	27.2	27.2	0.3	O K
120 min Winter	50.200	0.080	0.0	19.4	19.4	0.2	O K
180 min Winter	50.190	0.070	0.0	15.9	15.9	0.1	O K
240 min Winter	50.183	0.063	0.0	13.6	13.6	0.1	O K
360 min Winter	50.175	0.055	0.0	10.9	10.9	0.1	O K
480 min Winter	50.169	0.049	0.0	9.2	9.2	0.1	O K
600 min Winter	50.165	0.045	0.0	8.1	8.1	0.1	O K
720 min Winter	50.162	0.042	0.0	7.3	7.3	0.0	O K
960 min Winter	50.157	0.037	0.0	6.1	6.1	0.0	O K
1440 min Winter	50.151	0.031	0.0	4.7	4.7	0.0	O K
2160 min Winter	50.147	0.027	0.0	3.7	3.7	0.0	O K
2880 min Winter	50.144	0.024	0.0	3.1	3.1	0.0	O K
4320 min Winter	50.140	0.020	0.0	2.4	2.4	0.0	O K
5760 min Winter	50.138	0.018	0.0	2.1	2.1	0.0	O K
7200 min Winter	50.136	0.016	0.0	1.8	1.8	0.0	O K
8640 min Winter	50.134	0.014	0.0	1.4	1.4	0.0	O K
10080 min Winter	50.133	0.013	0.0	1.3	1.3	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.436	0.0	249.7	4360
10080 min Summer	0.391	0.0	261.5	5064
15 min Winter	29.648	0.0	33.1	10
30 min Winter	19.726	0.0	44.1	17
60 min Winter	12.800	0.0	57.2	34
120 min Winter	8.156	0.0	73.0	62
180 min Winter	6.242	0.0	83.8	92
240 min Winter	5.155	0.0	92.2	122
360 min Winter	3.898	0.0	104.6	184
480 min Winter	3.196	0.0	114.4	250
600 min Winter	2.740	0.0	122.6	318
720 min Winter	2.417	0.0	129.8	388
960 min Winter	1.983	0.0	142.0	516
1440 min Winter	1.501	0.0	161.2	738
2160 min Winter	1.134	0.0	182.5	1100
2880 min Winter	0.930	0.0	199.7	1452
4320 min Winter	0.704	0.0	226.6	2248
5760 min Winter	0.578	0.0	247.8	2936
7200 min Winter	0.495	0.0	265.3	3592
8640 min Winter	0.436	0.0	279.9	4480
10080 min Winter	0.391	0.0	292.7	4712

Cascade Rainfall Details for SWALE 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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.320

Time (mins) From:	To:	Area (ha)
0	4	0.320

Cascade Model Details for SWALE 2.srcx

Storage is Online Cover Level (m) 50.700

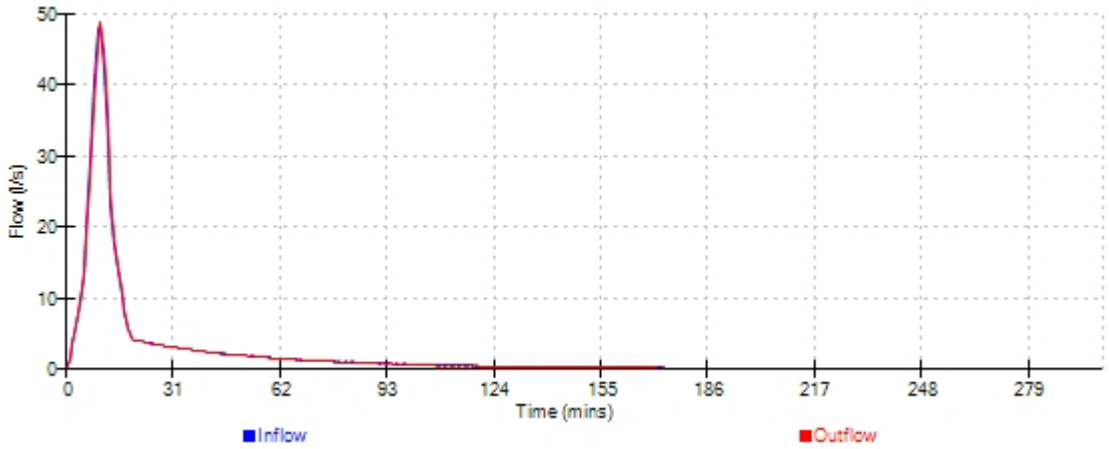
Swale Structure

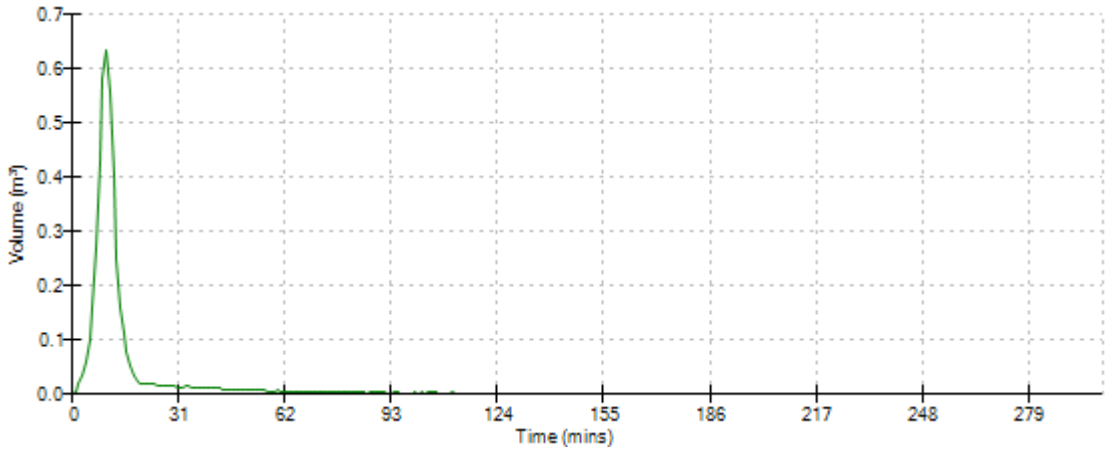
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	70.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	2.0
Safety Factor	2.0	Slope (1:X)	48.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	50.120	Cap Infiltration Depth (m)	0.000
Base Width (m)	1.0		

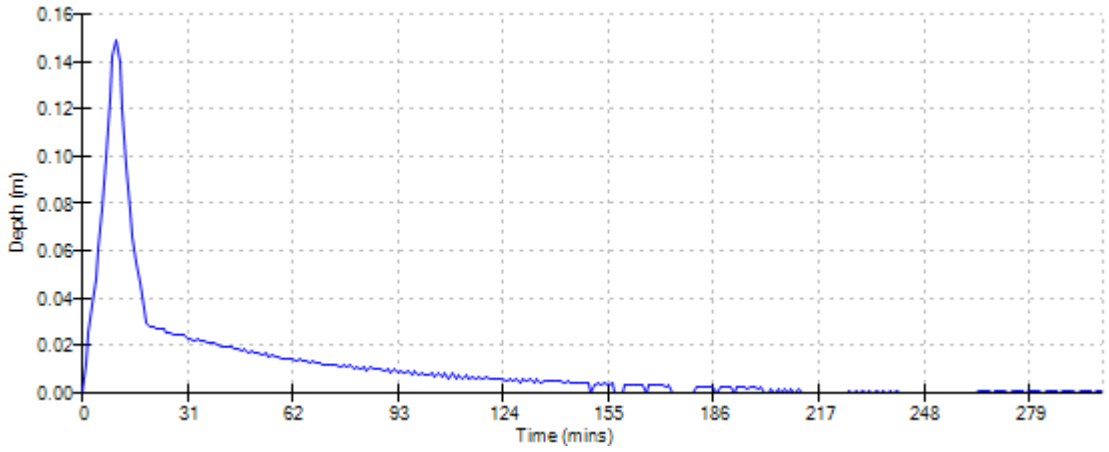
Weir Outflow Control

Discharge Coef 0.544 Width (m) 0.500 Invert Level (m) 50.120

Cascade Event: 15 min Winter for SWALE 2.srcx







Cascade Summary of Results for TANK 1.srcx

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

Half Drain Time : 241 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	55.661	0.061	0.0	1.2	1.2	20.9	O K
30 min Summer	55.679	0.079	0.0	1.6	1.6	27.1	O K
60 min Summer	55.698	0.098	0.0	1.9	1.9	33.5	O K
120 min Summer	55.715	0.115	0.0	2.0	2.0	39.5	O K
180 min Summer	55.724	0.124	0.0	2.0	2.0	42.4	O K
240 min Summer	55.730	0.130	0.0	2.0	2.0	44.3	O K
360 min Summer	55.736	0.136	0.0	2.1	2.1	46.3	O K
480 min Summer	55.738	0.138	0.0	2.1	2.1	47.3	O K
600 min Summer	55.739	0.139	0.0	2.1	2.1	47.6	O K
720 min Summer	55.739	0.139	0.0	2.1	2.1	47.5	O K
960 min Summer	55.736	0.136	0.0	2.1	2.1	46.6	O K
1440 min Summer	55.728	0.128	0.0	2.0	2.0	43.6	O K
2160 min Summer	55.713	0.113	0.0	2.0	2.0	38.7	O K
2880 min Summer	55.701	0.101	0.0	1.9	1.9	34.5	O K
4320 min Summer	55.685	0.085	0.0	1.7	1.7	29.2	O K
5760 min Summer	55.675	0.075	0.0	1.5	1.5	25.7	O K
7200 min Summer	55.668	0.068	0.0	1.4	1.4	23.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	29.648	0.0	18.8	18
30 min Summer	19.726	0.0	25.7	33
60 min Summer	12.800	0.0	35.6	62
120 min Summer	8.156	0.0	45.7	120
180 min Summer	6.242	0.0	52.7	156
240 min Summer	5.155	0.0	58.1	188
360 min Summer	3.898	0.0	66.0	254
480 min Summer	3.196	0.0	72.3	324
600 min Summer	2.740	0.0	77.5	392
720 min Summer	2.417	0.0	82.1	462
960 min Summer	1.983	0.0	89.8	598
1440 min Summer	1.501	0.0	101.8	864
2160 min Summer	1.134	0.0	117.2	1232
2880 min Summer	0.930	0.0	128.0	1588
4320 min Summer	0.704	0.0	144.7	2332
5760 min Summer	0.578	0.0	160.1	3048
7200 min Summer	0.495	0.0	171.2	3744

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	55.663	0.063	0.0	1.2	1.2	21.4	O K
10080 min Summer	55.658	0.058	0.0	1.1	1.1	20.0	O K
15 min Winter	55.668	0.068	0.0	1.4	1.4	23.4	O K
30 min Winter	55.689	0.089	0.0	1.8	1.8	30.4	O K
60 min Winter	55.710	0.110	0.0	2.0	2.0	37.8	O K
120 min Winter	55.731	0.131	0.0	2.1	2.1	44.8	O K
180 min Winter	55.741	0.141	0.0	2.1	2.1	48.2	O K
240 min Winter	55.746	0.146	0.0	2.1	2.1	50.0	O K
360 min Winter	55.751	0.151	0.0	2.1	2.1	51.8	O K
480 min Winter	55.753	0.153	0.0	2.1	2.1	52.2	O K
600 min Winter	55.752	0.152	0.0	2.1	2.1	51.9	O K
720 min Winter	55.749	0.149	0.0	2.1	2.1	51.1	O K
960 min Winter	55.743	0.143	0.0	2.1	2.1	48.8	O K
1440 min Winter	55.727	0.127	0.0	2.0	2.0	43.4	O K
2160 min Winter	55.705	0.105	0.0	1.9	1.9	35.9	O K
2880 min Winter	55.690	0.090	0.0	1.8	1.8	30.9	O K
4320 min Winter	55.673	0.073	0.0	1.5	1.5	25.0	O K
5760 min Winter	55.663	0.063	0.0	1.3	1.3	21.6	O K
7200 min Winter	55.657	0.057	0.0	1.1	1.1	19.4	O K
8640 min Winter	55.652	0.052	0.0	1.0	1.0	17.9	O K
10080 min Winter	55.649	0.049	0.0	0.9	0.9	16.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.436	0.0	180.5	4488
10080 min Summer	0.391	0.0	188.3	5152
15 min Winter	29.648	0.0	21.3	18
30 min Winter	19.726	0.0	29.1	32
60 min Winter	12.800	0.0	40.0	60
120 min Winter	8.156	0.0	51.4	118
180 min Winter	6.242	0.0	59.1	172
240 min Winter	5.155	0.0	65.2	200
360 min Winter	3.898	0.0	74.1	274
480 min Winter	3.196	0.0	81.1	352
600 min Winter	2.740	0.0	87.0	428
720 min Winter	2.417	0.0	92.1	500
960 min Winter	1.983	0.0	100.8	644
1440 min Winter	1.501	0.0	114.3	910
2160 min Winter	1.134	0.0	131.3	1280
2880 min Winter	0.930	0.0	143.5	1644
4320 min Winter	0.704	0.0	162.3	2340
5760 min Winter	0.578	0.0	179.4	3056
7200 min Winter	0.495	0.0	191.8	3752
8640 min Winter	0.436	0.0	202.3	4496
10080 min Winter	0.391	0.0	211.2	5240

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.386

Time (mins) From:	To:	Area (ha)
0	4	0.386

Cascade Model Details for TANK 1.srcx

Storage is Online Cover Level (m) 57.600

Cellular Storage Structure

Invert Level (m) 55.600 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	360.0	360.0	1.201	0.0	451.2
1.200	360.0	451.2			

Hydro-Brake Optimum® Outflow Control

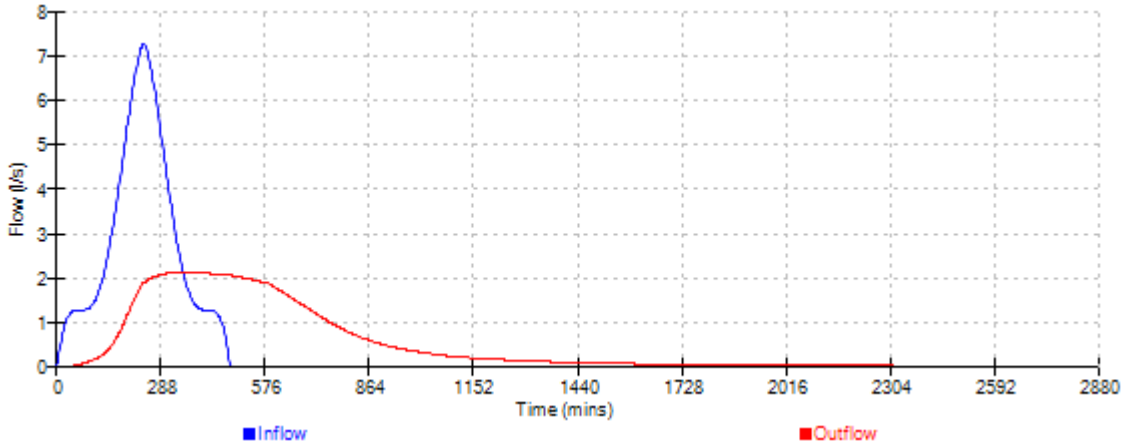
Unit Reference	MD-SHE-0072-2500-1200-2500
Design Head (m)	1.200
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	72
Invert Level (m)	55.600
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

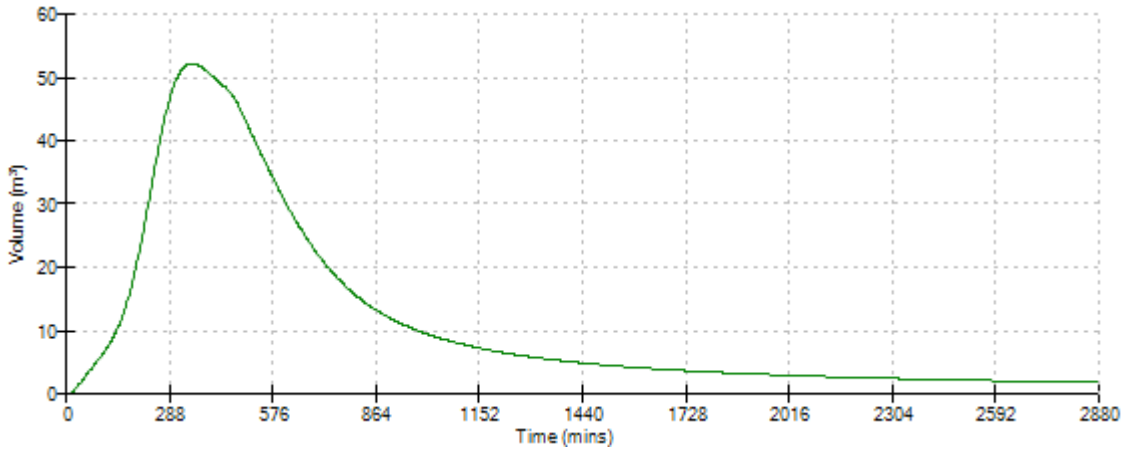
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	2.5
Flush-Flo™	0.318	2.3
Kick-Flo®	0.644	1.9
Mean Flow over Head Range	-	2.1

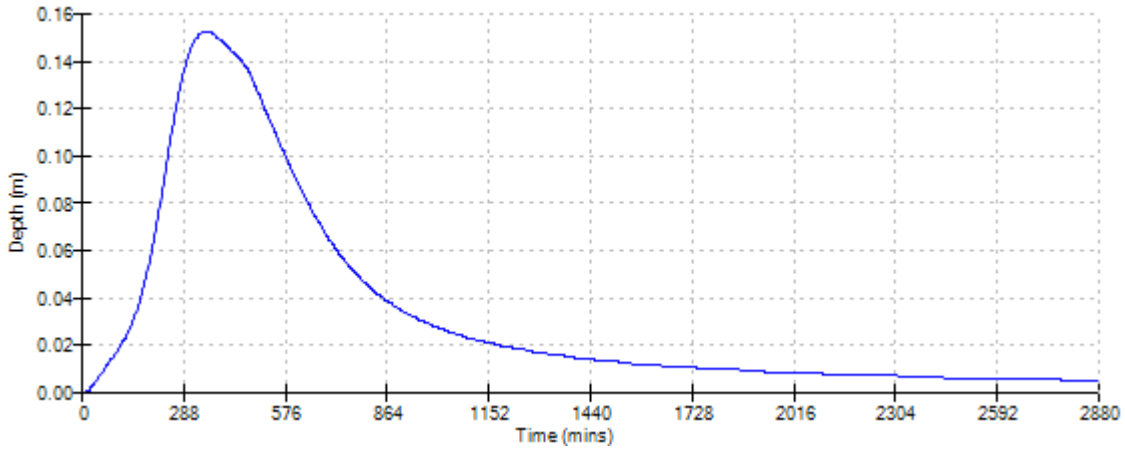
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.9	1.200	2.5	3.000	3.8	7.000	5.7
0.200	2.2	1.400	2.7	3.500	4.1	7.500	5.9
0.300	2.3	1.600	2.8	4.000	4.4	8.000	6.0
0.400	2.3	1.800	3.0	4.500	4.6	8.500	6.2
0.500	2.2	2.000	3.2	5.000	4.8	9.000	6.4
0.600	2.0	2.200	3.3	5.500	5.1	9.500	6.5
0.800	2.1	2.400	3.4	6.000	5.3		
1.000	2.3	2.600	3.6	6.500	5.5		

Cascade Event: 480 min Winter for TANK 1.srcx







Cascade Summary of Results for TANK 2.srcx

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

Half Drain Time : 21 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	51.578	0.078	0.0	3.9	3.9	5.9	O K
30 min Summer	51.589	0.089	0.0	4.5	4.5	6.8	O K
60 min Summer	51.594	0.094	0.0	4.7	4.7	7.2	O K
120 min Summer	51.589	0.089	0.0	4.5	4.5	6.8	O K
180 min Summer	51.582	0.082	0.0	4.1	4.1	6.3	O K
240 min Summer	51.576	0.076	0.0	3.8	3.8	5.8	O K
360 min Summer	51.565	0.065	0.0	3.3	3.3	5.0	O K
480 min Summer	51.558	0.058	0.0	2.9	2.9	4.4	O K
600 min Summer	51.552	0.052	0.0	2.6	2.6	4.0	O K
720 min Summer	51.547	0.047	0.0	2.4	2.4	3.6	O K
960 min Summer	51.541	0.041	0.0	2.0	2.0	3.1	O K
1440 min Summer	51.532	0.032	0.0	1.6	1.6	2.5	O K
2160 min Summer	51.525	0.025	0.0	1.3	1.3	1.9	O K
2880 min Summer	51.521	0.021	0.0	1.1	1.1	1.6	O K
4320 min Summer	51.516	0.016	0.0	0.8	0.8	1.2	O K
5760 min Summer	51.513	0.013	0.0	0.7	0.7	1.0	O K
7200 min Summer	51.511	0.011	0.0	0.6	0.6	0.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	29.648	0.0	7.7	15
30 min Summer	19.726	0.0	10.3	23
60 min Summer	12.800	0.0	13.4	40
120 min Summer	8.156	0.0	17.1	72
180 min Summer	6.242	0.0	19.6	104
240 min Summer	5.155	0.0	21.6	134
360 min Summer	3.898	0.0	24.5	196
480 min Summer	3.196	0.0	26.8	258
600 min Summer	2.740	0.0	28.7	318
720 min Summer	2.417	0.0	30.4	378
960 min Summer	1.983	0.0	33.3	500
1440 min Summer	1.501	0.0	37.8	738
2160 min Summer	1.134	0.0	42.8	1104
2880 min Summer	0.930	0.0	46.8	1468
4320 min Summer	0.704	0.0	53.2	2196
5760 min Summer	0.578	0.0	58.3	2944
7200 min Summer	0.495	0.0	62.3	3672

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	51.510	0.010	0.0	0.5	0.5	0.8	O K
10080 min Summer	51.509	0.009	0.0	0.5	0.5	0.7	O K
15 min Winter	51.587	0.087	0.0	4.4	4.4	6.6	O K
30 min Winter	51.598	0.098	0.0	4.9	4.9	7.5	O K
60 min Winter	51.600	0.100	0.0	5.0	5.0	7.6	O K
120 min Winter	51.589	0.089	0.0	4.5	4.5	6.8	O K
180 min Winter	51.579	0.079	0.0	3.9	3.9	6.0	O K
240 min Winter	51.570	0.070	0.0	3.5	3.5	5.3	O K
360 min Winter	51.557	0.057	0.0	2.9	2.9	4.3	O K
480 min Winter	51.549	0.049	0.0	2.4	2.4	3.7	O K
600 min Winter	51.543	0.043	0.0	2.1	2.1	3.2	O K
720 min Winter	51.538	0.038	0.0	1.9	1.9	2.9	O K
960 min Winter	51.532	0.032	0.0	1.6	1.6	2.4	O K
1440 min Winter	51.525	0.025	0.0	1.2	1.2	1.9	O K
2160 min Winter	51.519	0.019	0.0	0.9	0.9	1.4	O K
2880 min Winter	51.515	0.015	0.0	0.8	0.8	1.2	O K
4320 min Winter	51.512	0.012	0.0	0.6	0.6	0.9	O K
5760 min Winter	51.510	0.010	0.0	0.5	0.5	0.7	O K
7200 min Winter	51.508	0.008	0.0	0.4	0.4	0.6	O K
8640 min Winter	51.507	0.007	0.0	0.4	0.4	0.5	O K
10080 min Winter	51.507	0.007	0.0	0.3	0.3	0.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.436	0.0	65.8	4408
10080 min Summer	0.391	0.0	68.9	5120
15 min Winter	29.648	0.0	8.7	15
30 min Winter	19.726	0.0	11.6	24
60 min Winter	12.800	0.0	15.0	42
120 min Winter	8.156	0.0	19.1	76
180 min Winter	6.242	0.0	22.0	108
240 min Winter	5.155	0.0	24.2	140
360 min Winter	3.898	0.0	27.5	202
480 min Winter	3.196	0.0	30.0	262
600 min Winter	2.740	0.0	32.2	324
720 min Winter	2.417	0.0	34.1	384
960 min Winter	1.983	0.0	37.3	504
1440 min Winter	1.501	0.0	42.3	742
2160 min Winter	1.134	0.0	48.0	1084
2880 min Winter	0.930	0.0	52.5	1472
4320 min Winter	0.704	0.0	59.6	2188
5760 min Winter	0.578	0.0	65.2	2928
7200 min Winter	0.495	0.0	69.8	3640
8640 min Winter	0.436	0.0	73.7	4400
10080 min Winter	0.391	0.0	77.2	5040

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.140

Time (mins) From:	To:	Area (ha)
0	4	0.140

Cascade Model Details for TANK 2.srcx

Storage is Online Cover Level (m) 53.410

Cellular Storage Structure

Invert Level (m) 51.500 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

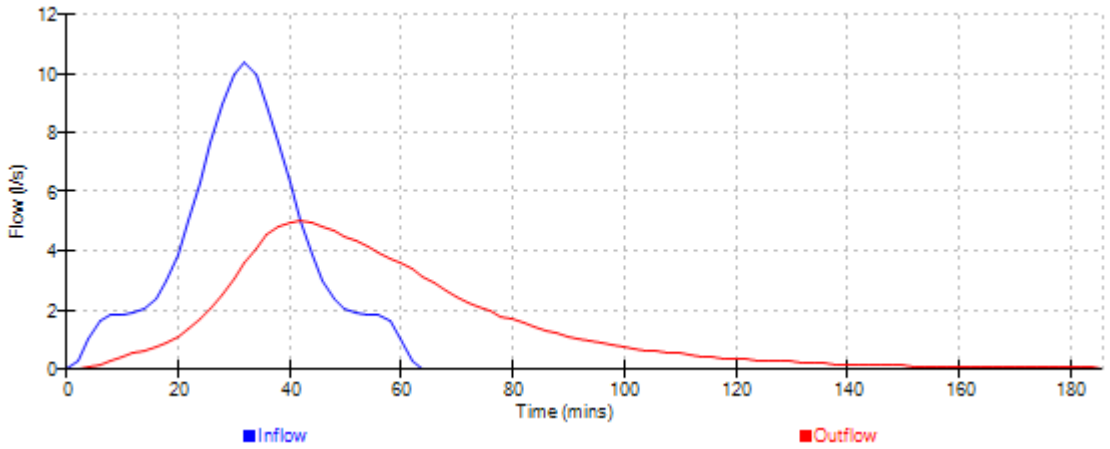
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	80.0	80.0	0.801	0.0	162.6
0.800	80.0	162.6			

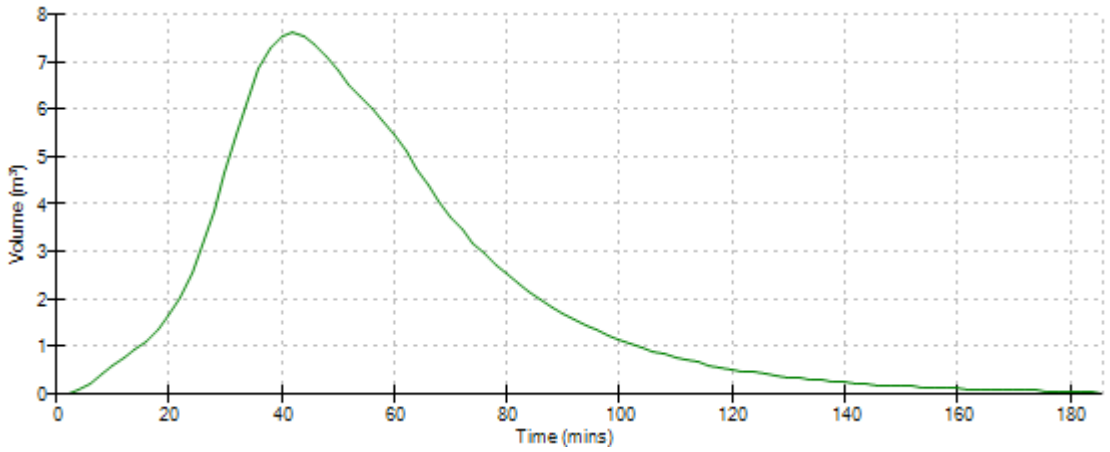
Pump Outflow Control

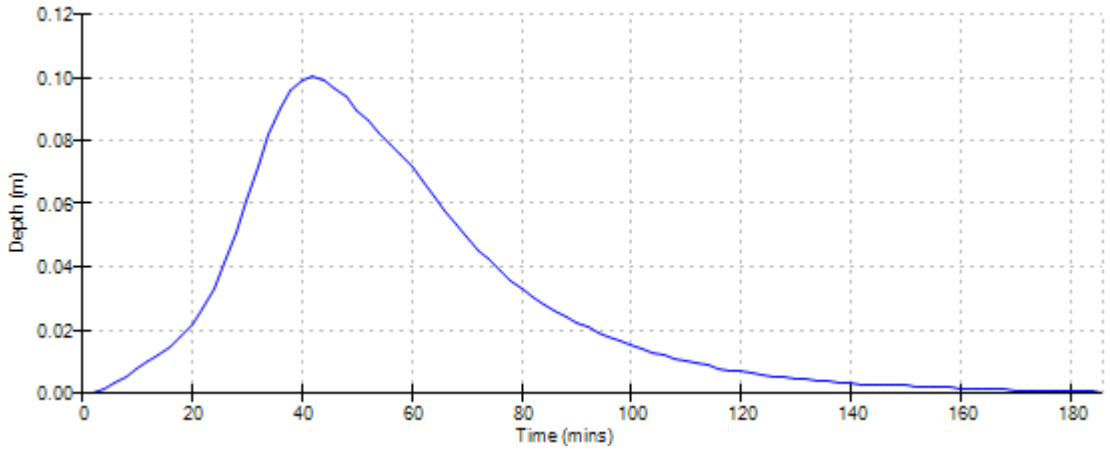
Invert Level (m) 51.500

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.0000	0.900	5.0000	1.700	5.0000	2.500	5.0000
0.200	5.0000	1.000	5.0000	1.800	5.0000	2.600	5.0000
0.300	5.0000	1.100	5.0000	1.900	5.0000	2.700	5.0000
0.400	5.0000	1.200	5.0000	2.000	5.0000	2.800	5.0000
0.500	5.0000	1.300	5.0000	2.100	5.0000	2.900	5.0000
0.600	5.0000	1.400	5.0000	2.200	5.0000	3.000	5.0000
0.700	5.0000	1.500	5.0000	2.300	5.0000		
0.800	5.0000	1.600	5.0000	2.400	5.0000		

Cascade Event: 60 min Winter for TANK 2.srcx







Cascade Summary of Results for TANK 3.srcx

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

Half Drain Time : 25 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	54.051	0.051	0.0	1.3	1.3	3.5	O K
30 min Summer	54.067	0.067	0.0	2.1	2.1	4.6	O K
60 min Summer	54.076	0.076	0.0	2.6	2.6	5.2	O K
120 min Summer	54.084	0.084	0.0	3.0	3.0	5.7	O K
180 min Summer	54.085	0.085	0.0	3.0	3.0	5.8	O K
240 min Summer	54.083	0.083	0.0	2.9	2.9	5.6	O K
360 min Summer	54.077	0.077	0.0	2.6	2.6	5.2	O K
480 min Summer	54.071	0.071	0.0	2.3	2.3	4.9	O K
600 min Summer	54.067	0.067	0.0	2.1	2.1	4.6	O K
720 min Summer	54.063	0.063	0.0	1.9	1.9	4.3	O K
960 min Summer	54.058	0.058	0.0	1.6	1.6	3.9	O K
1440 min Summer	54.050	0.050	0.0	1.3	1.3	3.4	O K
2160 min Summer	54.044	0.044	0.0	1.0	1.0	3.0	O K
2880 min Summer	54.039	0.039	0.0	0.8	0.8	2.7	O K
4320 min Summer	54.034	0.034	0.0	0.6	0.6	2.3	O K
5760 min Summer	54.031	0.031	0.0	0.5	0.5	2.1	O K
7200 min Summer	54.028	0.028	0.0	0.4	0.4	1.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	29.648	0.0	4.2	19
30 min Summer	19.726	0.0	6.3	31
60 min Summer	12.800	0.0	8.8	48
120 min Summer	8.156	0.0	11.8	80
180 min Summer	6.242	0.0	13.8	110
240 min Summer	5.155	0.0	15.4	140
360 min Summer	3.898	0.0	17.6	200
480 min Summer	3.196	0.0	19.4	260
600 min Summer	2.740	0.0	20.8	320
720 min Summer	2.417	0.0	22.1	378
960 min Summer	1.983	0.0	24.2	500
1440 min Summer	1.501	0.0	27.5	738
2160 min Summer	1.134	0.0	31.0	1104
2880 min Summer	0.930	0.0	33.7	1472
4320 min Summer	0.704	0.0	37.6	2204
5760 min Summer	0.578	0.0	40.5	2936
7200 min Summer	0.495	0.0	42.7	3600

Cascade Summary of Results for TANK 3.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	54.026	0.026	0.0	0.4	0.4	1.8	O K
10080 min Summer	54.025	0.025	0.0	0.3	0.3	1.7	O K
15 min Winter	54.058	0.058	0.0	1.6	1.6	4.0	O K
30 min Winter	54.074	0.074	0.0	2.5	2.5	5.0	O K
60 min Winter	54.084	0.084	0.0	3.0	3.0	5.7	O K
120 min Winter	54.089	0.089	0.0	3.2	3.2	6.1	O K
180 min Winter	54.085	0.085	0.0	3.0	3.0	5.8	O K
240 min Winter	54.080	0.080	0.0	2.8	2.8	5.4	O K
360 min Winter	54.071	0.071	0.0	2.3	2.3	4.8	O K
480 min Winter	54.064	0.064	0.0	2.0	2.0	4.4	O K
600 min Winter	54.059	0.059	0.0	1.7	1.7	4.1	O K
720 min Winter	54.056	0.056	0.0	1.6	1.6	3.8	O K
960 min Winter	54.050	0.050	0.0	1.3	1.3	3.4	O K
1440 min Winter	54.043	0.043	0.0	1.0	1.0	2.9	O K
2160 min Winter	54.037	0.037	0.0	0.8	0.8	2.5	O K
2880 min Winter	54.033	0.033	0.0	0.6	0.6	2.3	O K
4320 min Winter	54.029	0.029	0.0	0.5	0.5	2.0	O K
5760 min Winter	54.026	0.026	0.0	0.4	0.4	1.8	O K
7200 min Winter	54.024	0.024	0.0	0.3	0.3	1.6	O K
8640 min Winter	54.022	0.022	0.0	0.3	0.3	1.5	O K
10080 min Winter	54.021	0.021	0.0	0.2	0.2	1.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.436	0.0	44.3	4408
10080 min Summer	0.391	0.0	45.5	5136
15 min Winter	29.648	0.0	5.0	20
30 min Winter	19.726	0.0	7.3	32
60 min Winter	12.800	0.0	10.1	50
120 min Winter	8.156	0.0	13.4	82
180 min Winter	6.242	0.0	15.7	112
240 min Winter	5.155	0.0	17.5	144
360 min Winter	3.898	0.0	20.0	204
480 min Winter	3.196	0.0	22.0	264
600 min Winter	2.740	0.0	23.7	324
720 min Winter	2.417	0.0	25.1	384
960 min Winter	1.983	0.0	27.5	506
1440 min Winter	1.501	0.0	31.2	740
2160 min Winter	1.134	0.0	35.2	1128
2880 min Winter	0.930	0.0	38.3	1476
4320 min Winter	0.704	0.0	42.8	2196
5760 min Winter	0.578	0.0	46.3	2936
7200 min Winter	0.495	0.0	48.9	3608
8640 min Winter	0.436	0.0	50.9	4352
10080 min Winter	0.391	0.0	52.6	5152

Cascade Rainfall Details for TANK 3.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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.056

Time (mins) From:	To:	Area (ha)
0	4	0.056

Cascade Model Details for TANK 3.srcx

Storage is Online Cover Level (m) 55.500

Cellular Storage Structure

Invert Level (m) 54.000 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	72.0	72.0	0.801	0.0	100.8
0.800	72.0	100.8			

Hydro-Brake Optimum® Outflow Control

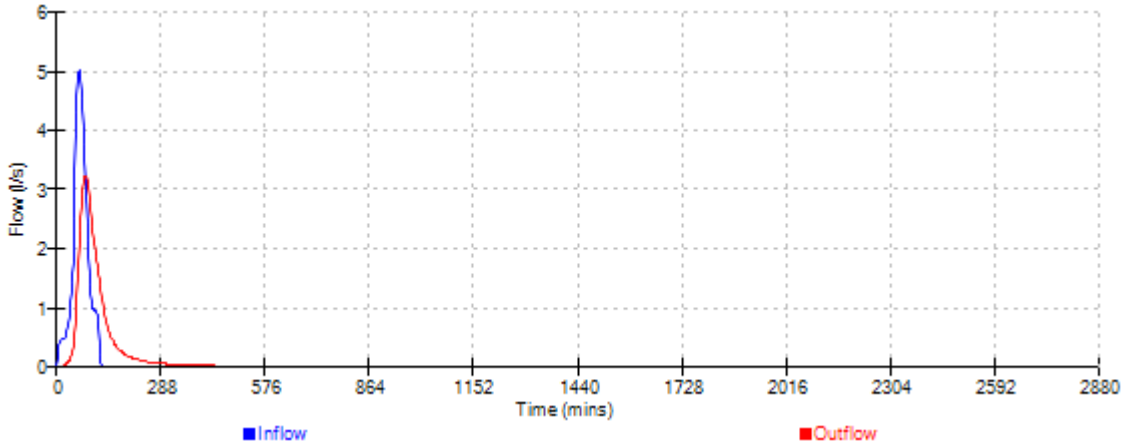
Unit Reference	MD-SHE-0109-5000-0800-5000
Design Head (m)	0.800
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	109
Invert Level (m)	54.000
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

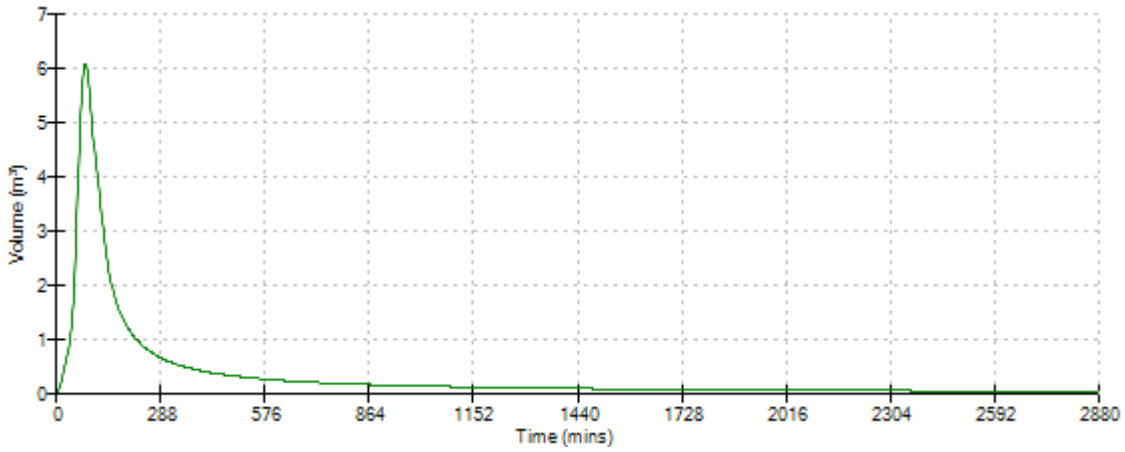
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	5.0
Flush-Flo™	0.242	5.0
Kick-Flo®	0.537	4.2
Mean Flow over Head Range	-	4.3

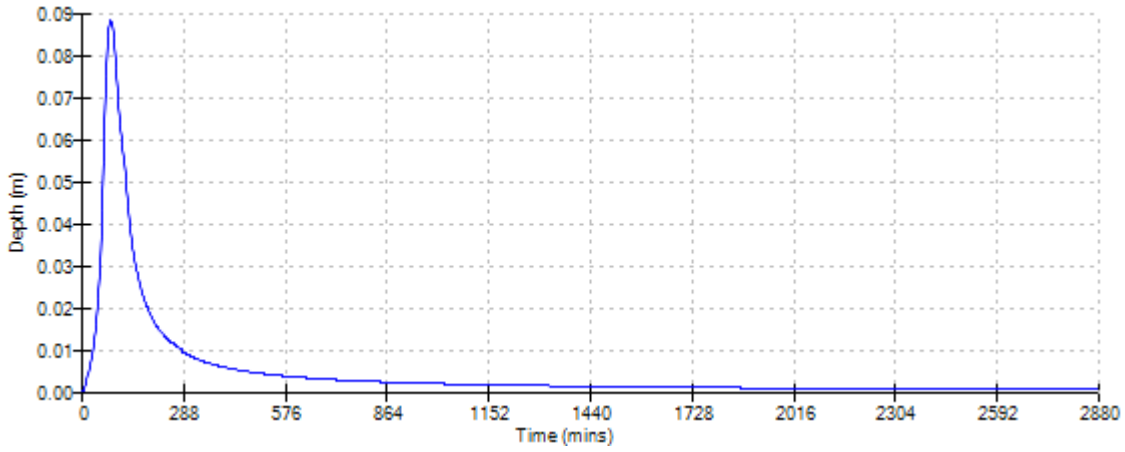
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.7	1.200	6.0	3.000	9.3	7.000	13.9
0.200	5.0	1.400	6.5	3.500	10.0	7.500	14.4
0.300	5.0	1.600	6.9	4.000	10.6	8.000	14.8
0.400	4.8	1.800	7.3	4.500	11.3	8.500	15.2
0.500	4.5	2.000	7.7	5.000	11.8	9.000	15.7
0.600	4.4	2.200	8.0	5.500	12.4	9.500	16.1
0.800	5.0	2.400	8.4	6.000	12.9		
1.000	5.5	2.600	8.7	6.500	13.4		

Cascade Event: 120 min Winter for TANK 3.srcx







Cascade Summary of Results for TANK 4.srcx

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

Half Drain Time : 22 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	53.181	0.081	0.0	2.0	2.0	3.7	O K
30 min Summer	53.193	0.093	0.0	2.3	2.3	4.3	O K
60 min Summer	53.200	0.100	0.0	2.5	2.5	4.6	O K
120 min Summer	53.198	0.098	0.0	2.4	2.4	4.5	O K
180 min Summer	53.191	0.091	0.0	2.3	2.3	4.2	O K
240 min Summer	53.185	0.085	0.0	2.1	2.1	3.9	O K
360 min Summer	53.174	0.074	0.0	1.9	1.9	3.4	O K
480 min Summer	53.166	0.066	0.0	1.7	1.7	3.0	O K
600 min Summer	53.160	0.060	0.0	1.5	1.5	2.7	O K
720 min Summer	53.155	0.055	0.0	1.4	1.4	2.5	O K
960 min Summer	53.148	0.048	0.0	1.2	1.2	2.2	O K
1440 min Summer	53.138	0.038	0.0	0.9	0.9	1.7	O K
2160 min Summer	53.130	0.030	0.0	0.7	0.7	1.4	O K
2880 min Summer	53.125	0.025	0.0	0.6	0.6	1.1	O K
4320 min Summer	53.119	0.019	0.0	0.5	0.5	0.9	O K
5760 min Summer	53.116	0.016	0.0	0.4	0.4	0.7	O K
7200 min Summer	53.114	0.014	0.0	0.3	0.3	0.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	29.648	0.0	4.6	15
30 min Summer	19.726	0.0	6.2	23
60 min Summer	12.800	0.0	8.0	40
120 min Summer	8.156	0.0	10.3	74
180 min Summer	6.242	0.0	11.8	106
240 min Summer	5.155	0.0	13.0	136
360 min Summer	3.898	0.0	14.7	198
480 min Summer	3.196	0.0	16.1	260
600 min Summer	2.740	0.0	17.2	320
720 min Summer	2.417	0.0	18.2	382
960 min Summer	1.983	0.0	20.0	502
1440 min Summer	1.501	0.0	22.7	740
2160 min Summer	1.134	0.0	25.7	1104
2880 min Summer	0.930	0.0	28.1	1468
4320 min Summer	0.704	0.0	31.9	2200
5760 min Summer	0.578	0.0	34.9	2936
7200 min Summer	0.495	0.0	37.4	3632

Cascade Summary of Results for TANK 4.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	53.112	0.012	0.0	0.3	0.3	0.5	O K
10080 min Summer	53.111	0.011	0.0	0.3	0.3	0.5	O K
15 min Winter	53.191	0.091	0.0	2.3	2.3	4.1	O K
30 min Winter	53.204	0.104	0.0	2.5	2.5	4.7	O K
60 min Winter	53.209	0.109	0.0	2.5	2.5	5.0	O K
120 min Winter	53.199	0.099	0.0	2.5	2.5	4.5	O K
180 min Winter	53.189	0.089	0.0	2.2	2.2	4.1	O K
240 min Winter	53.180	0.080	0.0	2.0	2.0	3.7	O K
360 min Winter	53.167	0.067	0.0	1.7	1.7	3.0	O K
480 min Winter	53.157	0.057	0.0	1.4	1.4	2.6	O K
600 min Winter	53.150	0.050	0.0	1.3	1.3	2.3	O K
720 min Winter	53.145	0.045	0.0	1.1	1.1	2.1	O K
960 min Winter	53.138	0.038	0.0	0.9	0.9	1.7	O K
1440 min Winter	53.129	0.029	0.0	0.7	0.7	1.3	O K
2160 min Winter	53.122	0.022	0.0	0.6	0.6	1.0	O K
2880 min Winter	53.118	0.018	0.0	0.5	0.5	0.8	O K
4320 min Winter	53.114	0.014	0.0	0.4	0.4	0.6	O K
5760 min Winter	53.112	0.012	0.0	0.3	0.3	0.5	O K
7200 min Winter	53.110	0.010	0.0	0.2	0.2	0.4	O K
8640 min Winter	53.109	0.009	0.0	0.2	0.2	0.4	O K
10080 min Winter	53.108	0.008	0.0	0.2	0.2	0.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.436	0.0	39.5	4368
10080 min Summer	0.391	0.0	41.4	5024
15 min Winter	29.648	0.0	5.2	15
30 min Winter	19.726	0.0	6.9	25
60 min Winter	12.800	0.0	9.0	44
120 min Winter	8.156	0.0	11.5	78
180 min Winter	6.242	0.0	13.2	110
240 min Winter	5.155	0.0	14.5	142
360 min Winter	3.898	0.0	16.5	204
480 min Winter	3.196	0.0	18.0	266
600 min Winter	2.740	0.0	19.3	326
720 min Winter	2.417	0.0	20.4	386
960 min Winter	1.983	0.0	22.4	510
1440 min Winter	1.501	0.0	25.4	750
2160 min Winter	1.134	0.0	28.8	1104
2880 min Winter	0.930	0.0	31.5	1472
4320 min Winter	0.704	0.0	35.7	2224
5760 min Winter	0.578	0.0	39.1	2928
7200 min Winter	0.495	0.0	41.9	3680
8640 min Winter	0.436	0.0	44.2	4400
10080 min Winter	0.391	0.0	46.3	5160

Cascade Rainfall Details for TANK 4.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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.084

Time (mins) From:	To:	Area (ha)
0	4	0.084

Cascade Model Details for TANK 4.srcx

Storage is Online Cover Level (m) 54.600

Cellular Storage Structure

Invert Level (m) 53.100 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

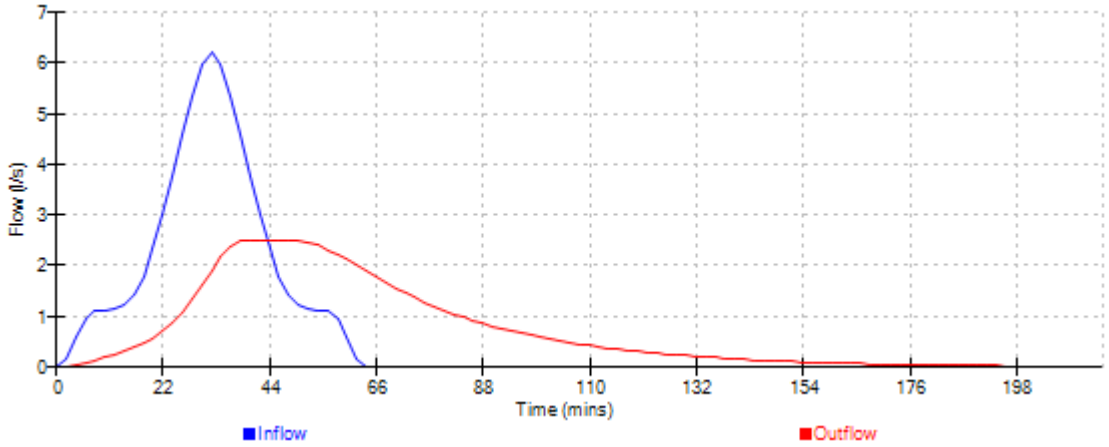
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	48.0	48.0	0.801	0.0	73.6
0.800	48.0	73.6			

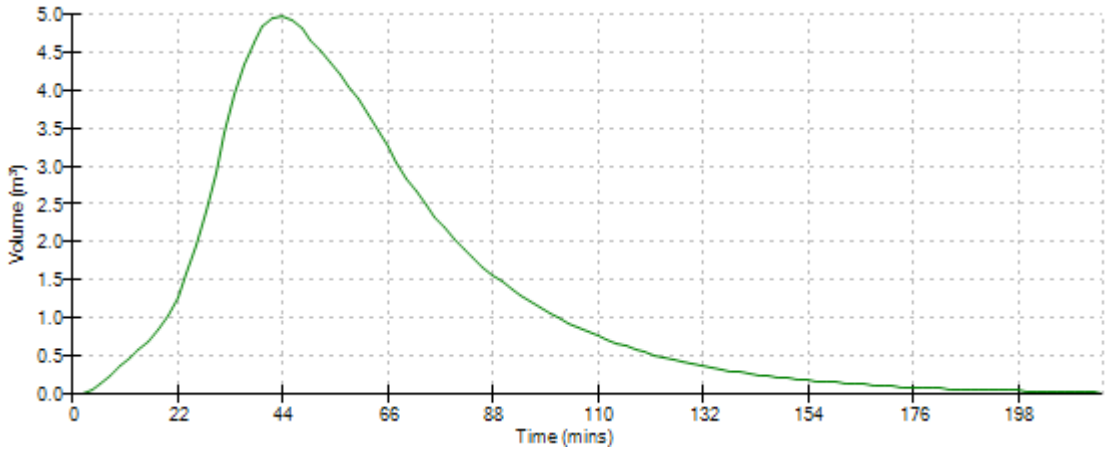
Pump Outflow Control

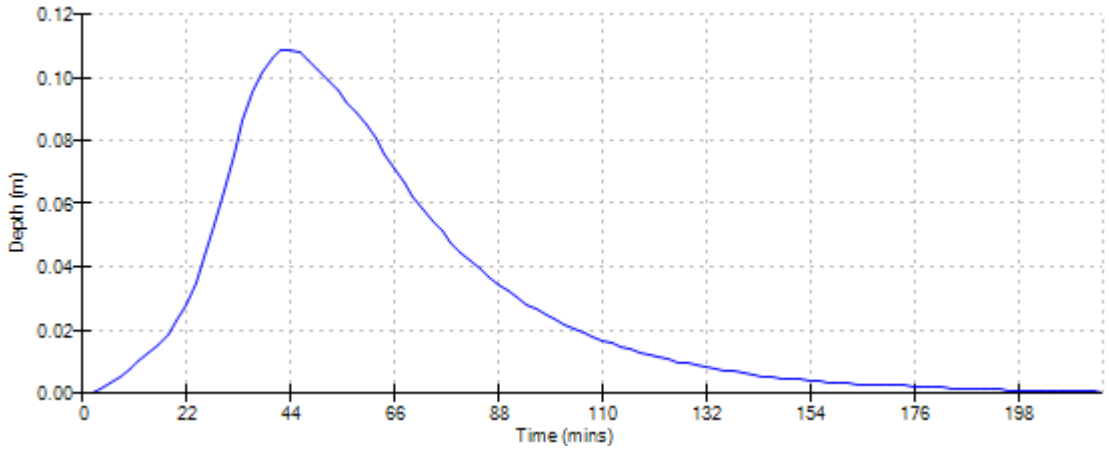
Invert Level (m) 53.100

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.5000	0.900	2.5000	1.700	2.5000	2.500	2.5000
0.200	2.5000	1.000	2.5000	1.800	2.5000	2.600	2.5000
0.300	2.5000	1.100	2.5000	1.900	2.5000	2.700	2.5000
0.400	2.5000	1.200	2.5000	2.000	2.5000	2.800	2.5000
0.500	2.5000	1.300	2.5000	2.100	2.5000	2.900	2.5000
0.600	2.5000	1.400	2.5000	2.200	2.5000	3.000	2.5000
0.700	2.5000	1.500	2.5000	2.300	2.5000		
0.800	2.5000	1.600	2.5000	2.400	2.5000		

Cascade Event: 60 min Winter for TANK 4.srcx







Cascade Summary of Results for TANK 5.srcx

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

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	50.824	0.074	0.0	1.9	1.9	6.2	O K
30 min Summer	50.839	0.089	0.0	2.2	2.2	7.4	O K
60 min Summer	50.850	0.100	0.0	2.5	2.5	8.3	O K
120 min Summer	50.855	0.105	0.0	2.5	2.5	8.8	O K
180 min Summer	50.853	0.103	0.0	2.5	2.5	8.6	O K
240 min Summer	50.849	0.099	0.0	2.5	2.5	8.3	O K
360 min Summer	50.841	0.091	0.0	2.3	2.3	7.6	O K
480 min Summer	50.834	0.084	0.0	2.1	2.1	7.0	O K
600 min Summer	50.828	0.078	0.0	1.9	1.9	6.5	O K
720 min Summer	50.823	0.073	0.0	1.8	1.8	6.1	O K
960 min Summer	50.815	0.065	0.0	1.6	1.6	5.4	O K
1440 min Summer	50.803	0.053	0.0	1.3	1.3	4.5	O K
2160 min Summer	50.793	0.043	0.0	1.1	1.1	3.6	O K
2880 min Summer	50.787	0.037	0.0	0.9	0.9	3.1	O K
4320 min Summer	50.779	0.029	0.0	0.7	0.7	2.4	O K
5760 min Summer	50.774	0.024	0.0	0.6	0.6	2.0	O K
7200 min Summer	50.771	0.021	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	29.648	0.0	7.1	16
30 min Summer	19.726	0.0	9.5	27
60 min Summer	12.800	0.0	12.3	44
120 min Summer	8.156	0.0	15.7	78
180 min Summer	6.242	0.0	18.1	112
240 min Summer	5.155	0.0	19.9	144
360 min Summer	3.898	0.0	22.6	208
480 min Summer	3.196	0.0	24.7	270
600 min Summer	2.740	0.0	26.5	332
720 min Summer	2.417	0.0	28.0	392
960 min Summer	1.983	0.0	30.7	512
1440 min Summer	1.501	0.0	34.8	754
2160 min Summer	1.134	0.0	39.5	1124
2880 min Summer	0.930	0.0	43.1	1472
4320 min Summer	0.704	0.0	49.0	2204
5760 min Summer	0.578	0.0	53.7	2936
7200 min Summer	0.495	0.0	57.4	3672

Cascade Summary of Results for TANK 5.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	50.768	0.018	0.0	0.5	0.5	1.5	O K
10080 min Summer	50.766	0.016	0.0	0.4	0.4	1.4	O K
15 min Winter	50.833	0.083	0.0	2.1	2.1	7.0	O K
30 min Winter	50.850	0.100	0.0	2.5	2.5	8.3	O K
60 min Winter	50.861	0.111	0.0	2.5	2.5	9.3	O K
120 min Winter	50.864	0.114	0.0	2.5	2.5	9.5	O K
180 min Winter	50.857	0.107	0.0	2.5	2.5	9.0	O K
240 min Winter	50.850	0.100	0.0	2.5	2.5	8.4	O K
360 min Winter	50.838	0.088	0.0	2.2	2.2	7.4	O K
480 min Winter	50.828	0.078	0.0	2.0	2.0	6.5	O K
600 min Winter	50.821	0.071	0.0	1.8	1.8	5.9	O K
720 min Winter	50.814	0.064	0.0	1.6	1.6	5.4	O K
960 min Winter	50.805	0.055	0.0	1.4	1.4	4.6	O K
1440 min Winter	50.794	0.044	0.0	1.1	1.1	3.6	O K
2160 min Winter	50.784	0.034	0.0	0.8	0.8	2.8	O K
2880 min Winter	50.778	0.028	0.0	0.7	0.7	2.3	O K
4320 min Winter	50.771	0.021	0.0	0.5	0.5	1.8	O K
5760 min Winter	50.768	0.018	0.0	0.4	0.4	1.5	O K
7200 min Winter	50.765	0.015	0.0	0.4	0.4	1.3	O K
8640 min Winter	50.763	0.013	0.0	0.3	0.3	1.1	O K
10080 min Winter	50.762	0.012	0.0	0.3	0.3	1.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.436	0.0	60.6	4400
10080 min Summer	0.391	0.0	63.5	5136
15 min Winter	29.648	0.0	8.0	16
30 min Winter	19.726	0.0	10.6	29
60 min Winter	12.800	0.0	13.8	46
120 min Winter	8.156	0.0	17.6	84
180 min Winter	6.242	0.0	20.3	120
240 min Winter	5.155	0.0	22.3	152
360 min Winter	3.898	0.0	25.3	216
480 min Winter	3.196	0.0	27.7	280
600 min Winter	2.740	0.0	29.7	342
720 min Winter	2.417	0.0	31.4	404
960 min Winter	1.983	0.0	34.3	528
1440 min Winter	1.501	0.0	39.0	766
2160 min Winter	1.134	0.0	44.2	1124
2880 min Winter	0.930	0.0	48.3	1500
4320 min Winter	0.704	0.0	54.9	2208
5760 min Winter	0.578	0.0	60.1	2920
7200 min Winter	0.495	0.0	64.3	3640
8640 min Winter	0.436	0.0	67.9	4400
10080 min Winter	0.391	0.0	71.1	5120

Cascade Rainfall Details for TANK 5.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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.129

Time (mins) From:	To:	Area (ha)
0	4	0.129

Cascade Model Details for TANK 5.srcx

Storage is Online Cover Level (m) 52.250

Cellular Storage Structure

Invert Level (m) 50.750 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

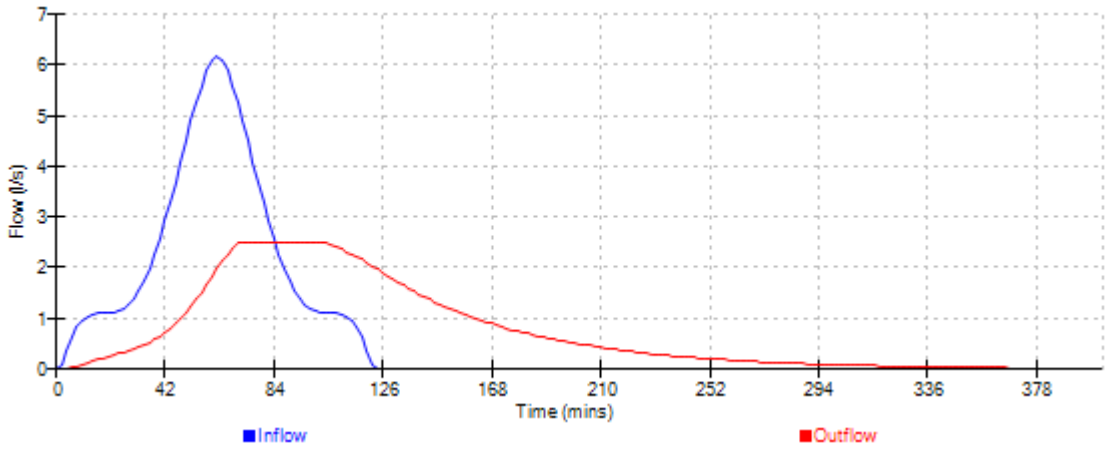
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	88.0	88.0	0.801	0.0	118.4
0.800	88.0	118.4			

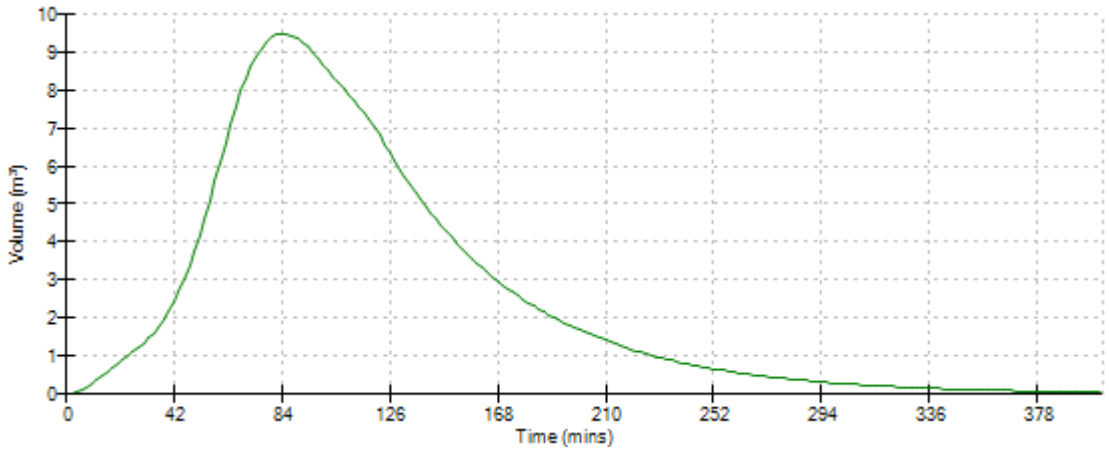
Pump Outflow Control

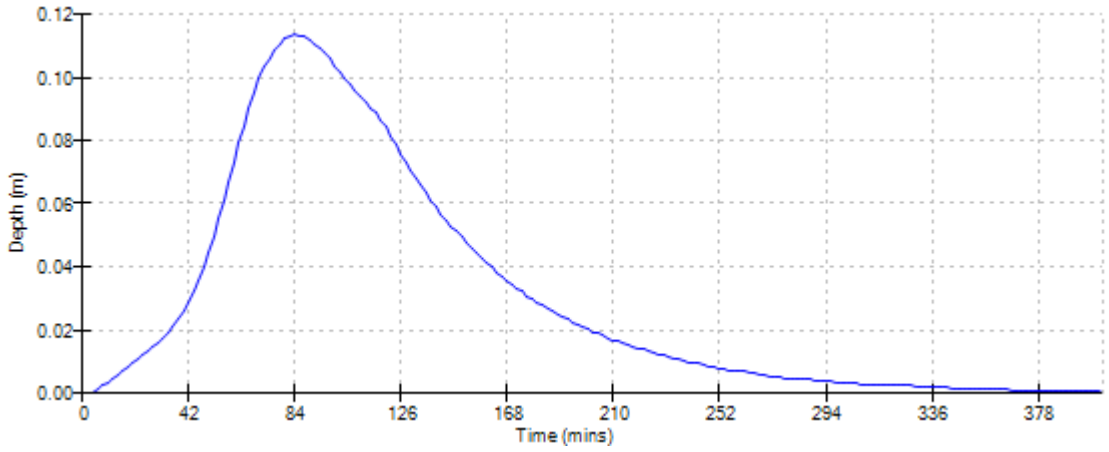
Invert Level (m) 50.750

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.5000	0.900	2.5000	1.700	2.5000	2.500	2.5000
0.200	2.5000	1.000	2.5000	1.800	2.5000	2.600	2.5000
0.300	2.5000	1.100	2.5000	1.900	2.5000	2.700	2.5000
0.400	2.5000	1.200	2.5000	2.000	2.5000	2.800	2.5000
0.500	2.5000	1.300	2.5000	2.100	2.5000	2.900	2.5000
0.600	2.5000	1.400	2.5000	2.200	2.5000	3.000	2.5000
0.700	2.5000	1.500	2.5000	2.300	2.5000		
0.800	2.5000	1.600	2.5000	2.400	2.5000		

Cascade Event: 120 min Winter for TANK 5.srcx







Cascade Summary of Results for TANK 6.srcx

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

Half Drain Time : 148 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	51.748	0.048	0.0	0.9	0.9	13.2	O K
30 min Summer	51.762	0.062	0.0	1.3	1.3	16.9	O K
60 min Summer	51.775	0.075	0.0	1.7	1.7	20.5	O K
120 min Summer	51.785	0.085	0.0	1.9	1.9	23.3	O K
180 min Summer	51.791	0.091	0.0	2.0	2.0	24.9	O K
240 min Summer	51.794	0.094	0.0	2.1	2.1	25.8	O K
360 min Summer	51.797	0.097	0.0	2.1	2.1	26.4	O K
480 min Summer	51.797	0.097	0.0	2.1	2.1	26.4	O K
600 min Summer	51.795	0.095	0.0	2.1	2.1	26.1	O K
720 min Summer	51.794	0.094	0.0	2.1	2.1	25.6	O K
960 min Summer	51.790	0.090	0.0	2.0	2.0	24.6	O K
1440 min Summer	51.782	0.082	0.0	1.9	1.9	22.5	O K
2160 min Summer	51.773	0.073	0.0	1.6	1.6	19.9	O K
2880 min Summer	51.766	0.066	0.0	1.5	1.5	18.1	O K
4320 min Summer	51.758	0.058	0.0	1.2	1.2	15.8	O K
5760 min Summer	51.752	0.052	0.0	1.0	1.0	14.2	O K
7200 min Summer	51.748	0.048	0.0	0.9	0.9	13.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	29.648	0.0	12.0	18
30 min Summer	19.726	0.0	16.5	32
60 min Summer	12.800	0.0	22.7	60
120 min Summer	8.156	0.0	29.1	98
180 min Summer	6.242	0.0	33.5	130
240 min Summer	5.155	0.0	37.0	164
360 min Summer	3.898	0.0	42.0	232
480 min Summer	3.196	0.0	46.0	298
600 min Summer	2.740	0.0	49.3	366
720 min Summer	2.417	0.0	52.2	432
960 min Summer	1.983	0.0	57.1	558
1440 min Summer	1.501	0.0	64.8	808
2160 min Summer	1.134	0.0	74.4	1168
2880 min Summer	0.930	0.0	81.3	1528
4320 min Summer	0.704	0.0	91.9	2248
5760 min Summer	0.578	0.0	101.6	2992
7200 min Summer	0.495	0.0	108.7	3680

Cascade Summary of Results for TANK 6.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	51.745	0.045	0.0	0.8	0.8	12.3	O K
10080 min Summer	51.742	0.042	0.0	0.7	0.7	11.6	O K
15 min Winter	51.754	0.054	0.0	1.1	1.1	14.7	O K
30 min Winter	51.769	0.069	0.0	1.6	1.6	19.0	O K
60 min Winter	51.784	0.084	0.0	1.9	1.9	23.1	O K
120 min Winter	51.795	0.095	0.0	2.1	2.1	26.1	O K
180 min Winter	51.801	0.101	0.0	2.2	2.2	27.6	O K
240 min Winter	51.804	0.104	0.0	2.2	2.2	28.4	O K
360 min Winter	51.804	0.104	0.0	2.2	2.2	28.4	O K
480 min Winter	51.801	0.101	0.0	2.2	2.2	27.7	O K
600 min Winter	51.798	0.098	0.0	2.2	2.2	26.9	O K
720 min Winter	51.795	0.095	0.0	2.1	2.1	25.9	O K
960 min Winter	51.788	0.088	0.0	2.0	2.0	24.1	O K
1440 min Winter	51.777	0.077	0.0	1.7	1.7	21.1	O K
2160 min Winter	51.766	0.066	0.0	1.5	1.5	18.0	O K
2880 min Winter	51.759	0.059	0.0	1.2	1.2	16.0	O K
4320 min Winter	51.750	0.050	0.0	1.0	1.0	13.7	O K
5760 min Winter	51.745	0.045	0.0	0.8	0.8	12.2	O K
7200 min Winter	51.741	0.041	0.0	0.7	0.7	11.2	O K
8640 min Winter	51.738	0.038	0.0	0.6	0.6	10.4	O K
10080 min Winter	51.736	0.036	0.0	0.6	0.6	9.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.436	0.0	114.6	4416
10080 min Summer	0.391	0.0	119.6	5144
15 min Winter	29.648	0.0	13.6	18
30 min Winter	19.726	0.0	18.6	32
60 min Winter	12.800	0.0	25.5	60
120 min Winter	8.156	0.0	32.7	100
180 min Winter	6.242	0.0	37.6	138
240 min Winter	5.155	0.0	41.5	176
360 min Winter	3.898	0.0	47.2	250
480 min Winter	3.196	0.0	51.6	320
600 min Winter	2.740	0.0	55.4	388
720 min Winter	2.417	0.0	58.6	456
960 min Winter	1.983	0.0	64.1	586
1440 min Winter	1.501	0.0	72.7	836
2160 min Winter	1.134	0.0	83.4	1192
2880 min Winter	0.930	0.0	91.1	1556
4320 min Winter	0.704	0.0	103.1	2292
5760 min Winter	0.578	0.0	113.9	3000
7200 min Winter	0.495	0.0	121.8	3728
8640 min Winter	0.436	0.0	128.4	4416
10080 min Winter	0.391	0.0	134.1	5152

Cascade Rainfall Details for TANK 6.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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.245

Time (mins) From:	To:	Area (ha)
0	4	0.245

Cascade Model Details for TANK 6.srcx

Storage is Online Cover Level (m) 53.200

Cellular Storage Structure

Invert Level (m) 51.700 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	288.0	288.0	0.801	0.0	342.4
0.800	288.0	342.4			

Hydro-Brake Optimum® Outflow Control

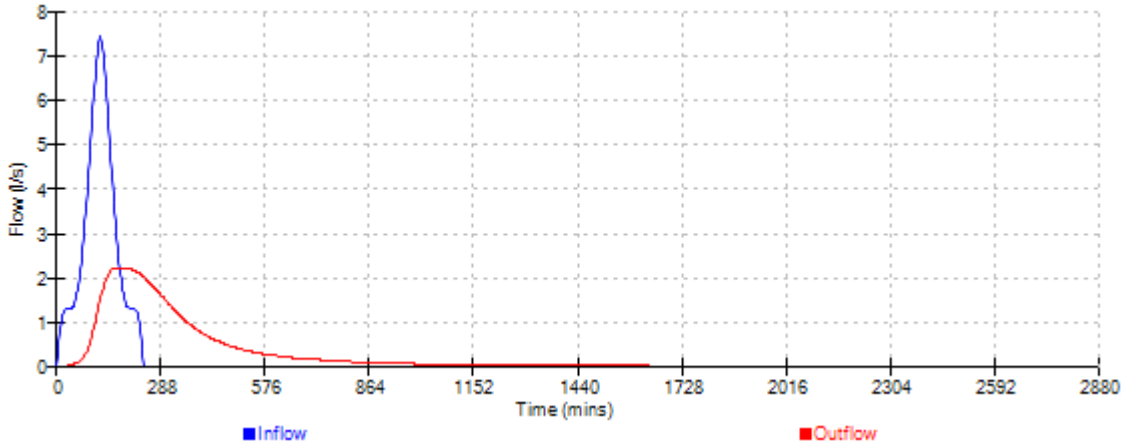
Unit Reference	MD-SHE-0078-2500-0800-2500
Design Head (m)	0.800
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	78
Invert Level (m)	51.700
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

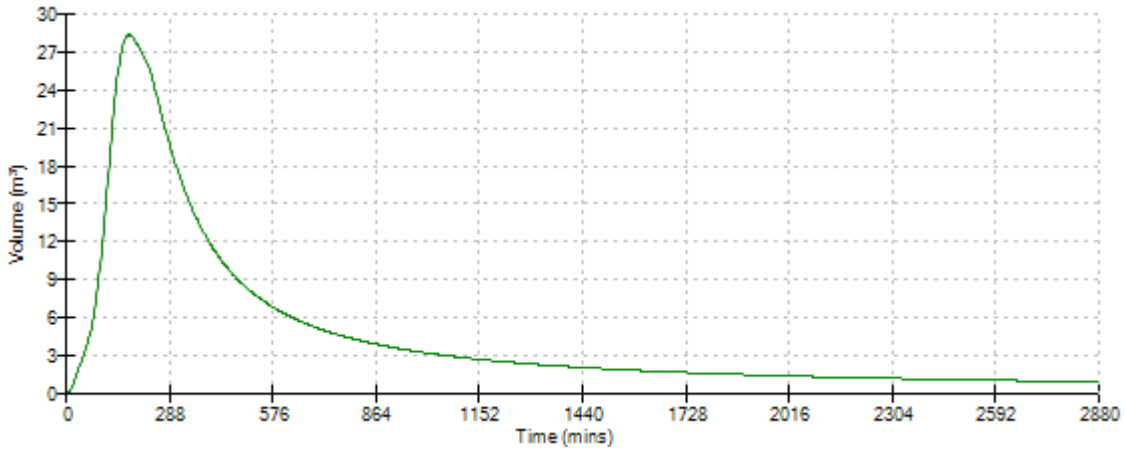
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	2.5
Flush-Flo™	0.236	2.5
Kick-Flo®	0.508	2.0
Mean Flow over Head Range	-	2.2

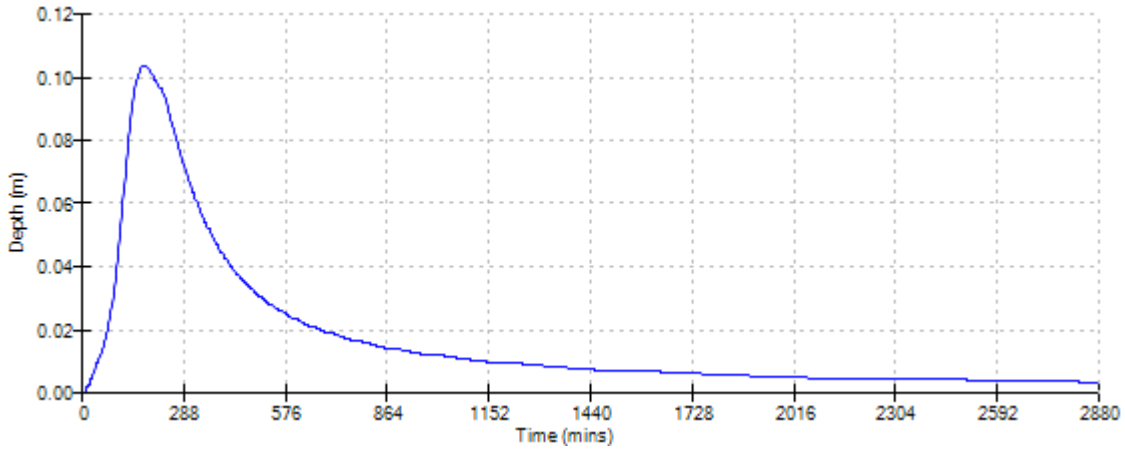
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.2	1.200	3.0	3.000	4.6	7.000	6.8
0.200	2.5	1.400	3.2	3.500	4.9	7.500	7.0
0.300	2.5	1.600	3.4	4.000	5.2	8.000	7.3
0.400	2.4	1.800	3.6	4.500	5.5	8.500	7.5
0.500	2.1	2.000	3.8	5.000	5.8	9.000	7.7
0.600	2.2	2.200	4.0	5.500	6.1	9.500	7.9
0.800	2.5	2.400	4.1	6.000	6.3		
1.000	2.8	2.600	4.3	6.500	6.6		

Cascade Event: 240 min Winter for TANK 6.srcx







Cascade Summary of Results for PP1.srcx

Upstream Structures	Outflow To	Overflow To
(None)	TANK 3.srcx	(None)

Half Drain Time : 28 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	55.554	0.254	0.0	2.4	2.4	4.5	O K
30 min Summer	55.594	0.294	0.0	2.4	2.4	6.0	O K
60 min Summer	55.611	0.311	0.0	2.4	2.4	6.7	Flood Risk
120 min Summer	55.604	0.304	0.0	2.4	2.4	6.4	Flood Risk
180 min Summer	55.580	0.280	0.0	2.4	2.4	5.4	O K
240 min Summer	55.552	0.252	0.0	2.4	2.4	4.4	O K
360 min Summer	55.497	0.197	0.0	2.4	2.4	2.7	O K
480 min Summer	55.448	0.148	0.0	2.4	2.4	1.5	O K
600 min Summer	55.411	0.111	0.0	2.4	2.4	0.9	O K
720 min Summer	55.393	0.093	0.0	2.3	2.3	0.6	O K
960 min Summer	55.377	0.077	0.0	1.9	1.9	0.4	O K
1440 min Summer	55.361	0.061	0.0	1.4	1.4	0.3	O K
2160 min Summer	55.350	0.050	0.0	1.0	1.0	0.2	O K
2880 min Summer	55.344	0.044	0.0	0.8	0.8	0.1	O K
4320 min Summer	55.337	0.037	0.0	0.6	0.6	0.1	O K
5760 min Summer	55.333	0.033	0.0	0.5	0.5	0.1	O K
7200 min Summer	55.330	0.030	0.0	0.4	0.4	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	72.682	0.0	5.9	16
30 min Summer	48.363	0.0	8.5	29
60 min Summer	30.811	0.0	11.3	46
120 min Summer	19.036	0.0	14.4	80
180 min Summer	14.191	0.0	16.3	114
240 min Summer	11.467	0.0	17.7	146
360 min Summer	8.493	0.0	19.8	204
480 min Summer	6.855	0.0	21.4	260
600 min Summer	5.801	0.0	22.7	314
720 min Summer	5.059	0.0	23.8	368
960 min Summer	4.074	0.0	25.5	490
1440 min Summer	2.998	0.0	28.1	734
2160 min Summer	2.203	0.0	30.7	1100
2880 min Summer	1.769	0.0	32.5	1424
4320 min Summer	1.297	0.0	34.9	2188
5760 min Summer	1.040	0.0	36.5	2920
7200 min Summer	0.876	0.0	37.6	3576

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	55.327	0.027	0.0	0.4	0.4	0.1	O K
10080 min Summer	55.326	0.026	0.0	0.3	0.3	0.0	O K
15 min Winter	55.579	0.279	0.0	2.4	2.4	5.4	O K
30 min Winter	55.619	0.319	0.0	2.4	2.4	7.1	Flood Risk
60 min Winter	55.635	0.335	0.0	2.4	2.4	7.8	Flood Risk
120 min Winter	55.619	0.319	0.0	2.4	2.4	7.1	Flood Risk
180 min Winter	55.582	0.282	0.0	2.4	2.4	5.5	O K
240 min Winter	55.536	0.236	0.0	2.4	2.4	3.9	O K
360 min Winter	55.444	0.144	0.0	2.4	2.4	1.4	O K
480 min Winter	55.393	0.093	0.0	2.3	2.3	0.6	O K
600 min Winter	55.379	0.079	0.0	2.0	2.0	0.4	O K
720 min Winter	55.370	0.070	0.0	1.7	1.7	0.3	O K
960 min Winter	55.360	0.060	0.0	1.4	1.4	0.3	O K
1440 min Winter	55.350	0.050	0.0	1.0	1.0	0.2	O K
2160 min Winter	55.341	0.041	0.0	0.7	0.7	0.1	O K
2880 min Winter	55.336	0.036	0.0	0.6	0.6	0.1	O K
4320 min Winter	55.331	0.031	0.0	0.4	0.4	0.1	O K
5760 min Winter	55.327	0.027	0.0	0.4	0.4	0.1	O K
7200 min Winter	55.325	0.025	0.0	0.3	0.3	0.0	O K
8640 min Winter	55.323	0.023	0.0	0.3	0.3	0.0	O K
10080 min Winter	55.321	0.021	0.0	0.2	0.2	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.762	0.0	38.4	4280
10080 min Summer	0.677	0.0	39.0	5000
15 min Winter	72.682	0.0	6.8	17
30 min Winter	48.363	0.0	9.7	30
60 min Winter	30.811	0.0	12.9	48
120 min Winter	19.036	0.0	16.4	86
180 min Winter	14.191	0.0	18.6	124
240 min Winter	11.467	0.0	20.1	154
360 min Winter	8.493	0.0	22.5	206
480 min Winter	6.855	0.0	24.3	250
600 min Winter	5.801	0.0	25.7	306
720 min Winter	5.059	0.0	26.9	368
960 min Winter	4.074	0.0	28.9	486
1440 min Winter	2.998	0.0	31.8	730
2160 min Winter	2.203	0.0	34.8	1088
2880 min Winter	1.769	0.0	36.9	1448
4320 min Winter	1.297	0.0	39.9	2140
5760 min Winter	1.040	0.0	41.8	2960
7200 min Winter	0.876	0.0	43.2	3544
8640 min Winter	0.762	0.0	44.3	4392
10080 min Winter	0.677	0.0	45.1	5064

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.058

Time (mins) From:	To:	Area (ha)
0	4	0.058

Cascade Model Details for PP1.srcx

Storage is Online Cover Level (m) 55.900

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	11.6
Membrane Percolation (mm/hr)	1000	Length (m)	35.0
Max Percolation (l/s)	112.8	Slope (1:X)	40.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	55.300	Cap Volume Depth (m)	0.400

Hydro-Brake Optimum® Outflow Control

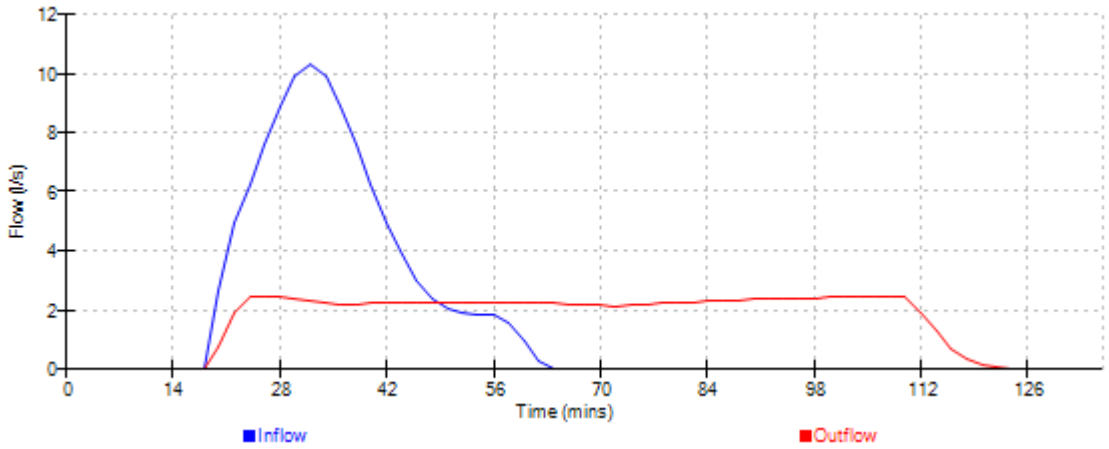
Unit Reference	MD-SHE-0083-2500-0400-2500
Design Head (m)	0.400
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	83
Invert Level (m)	55.300
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

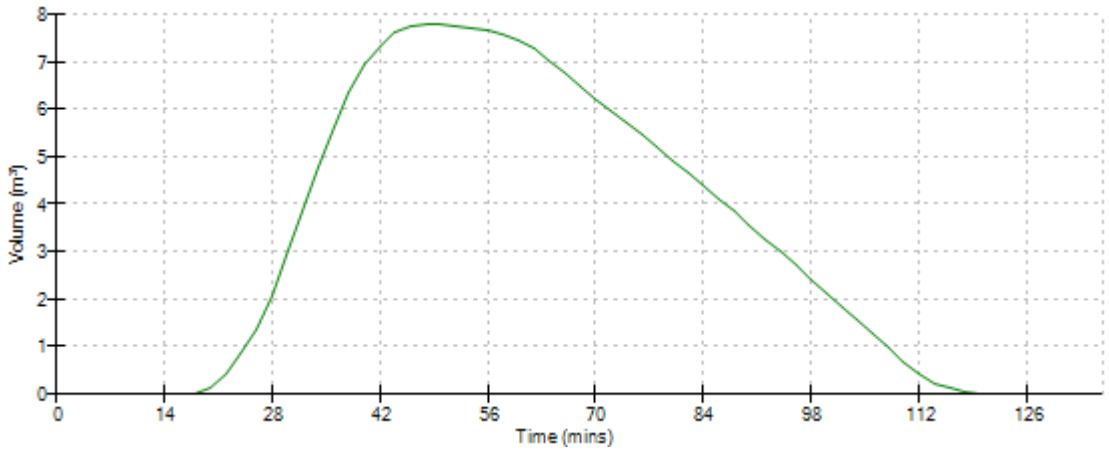
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	2.5
Flush-Flo™	0.131	2.4
Kick-Flo®	0.290	2.1
Mean Flow over Head Range	-	2.0

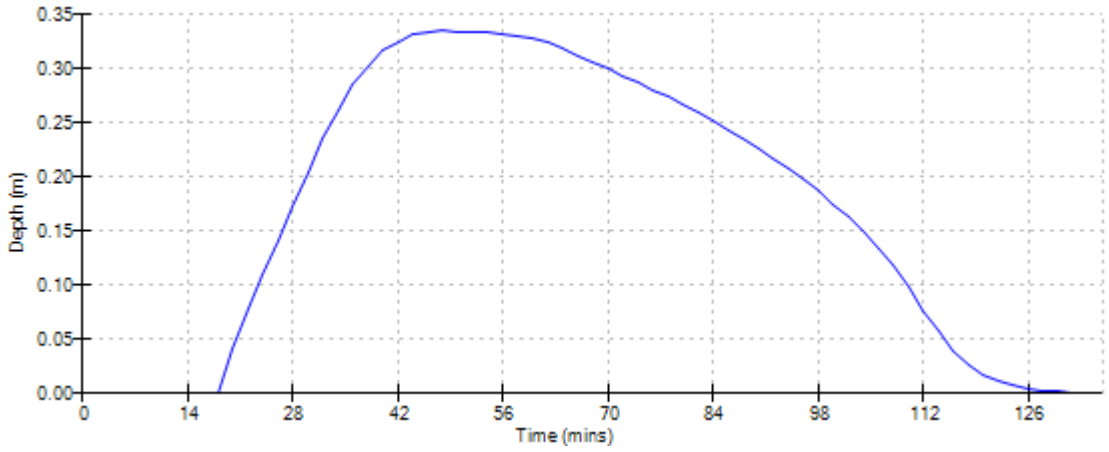
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.4	1.200	4.1	3.000	6.2	7.000	9.4
0.200	2.4	1.400	4.4	3.500	6.7	7.500	9.8
0.300	2.2	1.600	4.6	4.000	7.1	8.000	10.1
0.400	2.5	1.800	4.9	4.500	7.5	8.500	10.4
0.500	2.7	2.000	5.2	5.000	8.0	9.000	10.7
0.600	3.0	2.200	5.4	5.500	8.3	9.500	11.0
0.800	3.4	2.400	5.6	6.000	8.7		
1.000	3.7	2.600	5.8	6.500	9.1		

Cascade Event: 60 min Winter for PP1.srcx







Cascade Summary of Results for PP2.srcx

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

Half Drain Time : 23 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	53.441	0.341	0.0	4.9	4.9	8.4	O K
30 min Summer	53.468	0.368	0.0	4.9	4.9	9.8	O K
60 min Summer	53.470	0.370	0.0	4.9	4.9	9.9	O K
120 min Summer	53.442	0.342	0.0	4.9	4.9	8.4	O K
180 min Summer	53.402	0.302	0.0	4.9	4.9	6.6	O K
240 min Summer	53.355	0.255	0.0	4.9	4.9	4.7	O K
360 min Summer	53.277	0.177	0.0	4.9	4.9	2.2	O K
480 min Summer	53.226	0.126	0.0	4.9	4.9	1.1	O K
600 min Summer	53.209	0.109	0.0	4.3	4.3	0.8	O K
720 min Summer	53.197	0.097	0.0	3.8	3.8	0.7	O K
960 min Summer	53.183	0.083	0.0	3.1	3.1	0.5	O K
1440 min Summer	53.169	0.069	0.0	2.3	2.3	0.3	O K
2160 min Summer	53.157	0.057	0.0	1.7	1.7	0.2	O K
2880 min Summer	53.151	0.051	0.0	1.4	1.4	0.2	O K
4320 min Summer	53.143	0.043	0.0	1.0	1.0	0.1	O K
5760 min Summer	53.138	0.038	0.0	0.8	0.8	0.1	O K
7200 min Summer	53.135	0.035	0.0	0.7	0.7	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	72.682	0.0	11.4	16
30 min Summer	48.363	0.0	15.6	25
60 min Summer	30.811	0.0	20.2	42
120 min Summer	19.036	0.0	25.3	76
180 min Summer	14.191	0.0	28.4	110
240 min Summer	11.467	0.0	30.7	140
360 min Summer	8.493	0.0	34.1	194
480 min Summer	6.855	0.0	36.8	248
600 min Summer	5.801	0.0	38.9	306
720 min Summer	5.059	0.0	40.8	366
960 min Summer	4.074	0.0	43.8	488
1440 min Summer	2.998	0.0	48.2	726
2160 min Summer	2.203	0.0	53.0	1100
2880 min Summer	1.769	0.0	56.6	1452
4320 min Summer	1.297	0.0	61.7	2160
5760 min Summer	1.040	0.0	65.5	2896
7200 min Summer	0.876	0.0	68.5	3648

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	53.132	0.032	0.0	0.6	0.6	0.1	O K
10080 min Summer	53.130	0.030	0.0	0.5	0.5	0.1	O K
15 min Winter	53.467	0.367	0.0	4.9	4.9	9.7	O K
30 min Winter	53.497	0.397	0.0	4.9	4.9	11.3	O K
60 min Winter	53.495	0.395	0.0	4.9	4.9	11.2	O K
120 min Winter	53.449	0.349	0.0	4.9	4.9	8.8	O K
180 min Winter	53.381	0.281	0.0	4.9	4.9	5.7	O K
240 min Winter	53.304	0.204	0.0	4.9	4.9	3.0	O K
360 min Winter	53.216	0.116	0.0	4.6	4.6	1.0	O K
480 min Winter	53.196	0.096	0.0	3.7	3.7	0.7	O K
600 min Winter	53.185	0.085	0.0	3.2	3.2	0.5	O K
720 min Winter	53.178	0.078	0.0	2.8	2.8	0.4	O K
960 min Winter	53.168	0.068	0.0	2.2	2.2	0.3	O K
1440 min Winter	53.157	0.057	0.0	1.7	1.7	0.2	O K
2160 min Winter	53.148	0.048	0.0	1.2	1.2	0.2	O K
2880 min Winter	53.142	0.042	0.0	1.0	1.0	0.1	O K
4320 min Winter	53.136	0.036	0.0	0.7	0.7	0.1	O K
5760 min Winter	53.132	0.032	0.0	0.6	0.6	0.1	O K
7200 min Winter	53.129	0.029	0.0	0.5	0.5	0.1	O K
8640 min Winter	53.127	0.027	0.0	0.4	0.4	0.1	O K
10080 min Winter	53.125	0.025	0.0	0.4	0.4	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.762	0.0	71.0	4320
10080 min Summer	0.677	0.0	73.0	5096
15 min Winter	72.682	0.0	13.0	16
30 min Winter	48.363	0.0	17.7	27
60 min Winter	30.811	0.0	22.8	46
120 min Winter	19.036	0.0	28.5	82
180 min Winter	14.191	0.0	31.9	116
240 min Winter	11.467	0.0	34.5	142
360 min Winter	8.493	0.0	38.4	188
480 min Winter	6.855	0.0	41.4	246
600 min Winter	5.801	0.0	43.8	308
720 min Winter	5.059	0.0	45.8	366
960 min Winter	4.074	0.0	49.2	478
1440 min Winter	2.998	0.0	54.3	724
2160 min Winter	2.203	0.0	59.7	1076
2880 min Winter	1.769	0.0	63.7	1428
4320 min Winter	1.297	0.0	69.5	2184
5760 min Winter	1.040	0.0	73.9	2896
7200 min Winter	0.876	0.0	77.3	3528
8640 min Winter	0.762	0.0	80.2	4344
10080 min Winter	0.677	0.0	82.6	4992

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.093

Time (mins) From:	To:	Area (ha)
0	4	0.093

Cascade Model Details for PP2.srcx

Storage is Online Cover Level (m) 53.800

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.0
Membrane Percolation (mm/hr)	1000	Length (m)	61.0
Max Percolation (l/s)	67.8	Slope (1:X)	120.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	53.100	Cap Volume Depth (m)	0.500

Hydro-Brake Optimum® Outflow Control

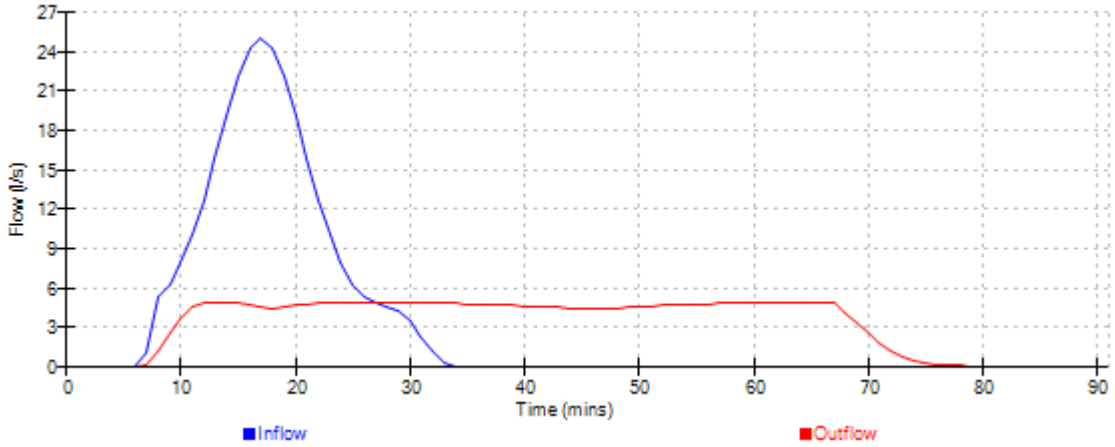
Unit Reference	MD-SHE-0113-5000-0400-5000
Design Head (m)	0.400
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	113
Invert Level (m)	53.100
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

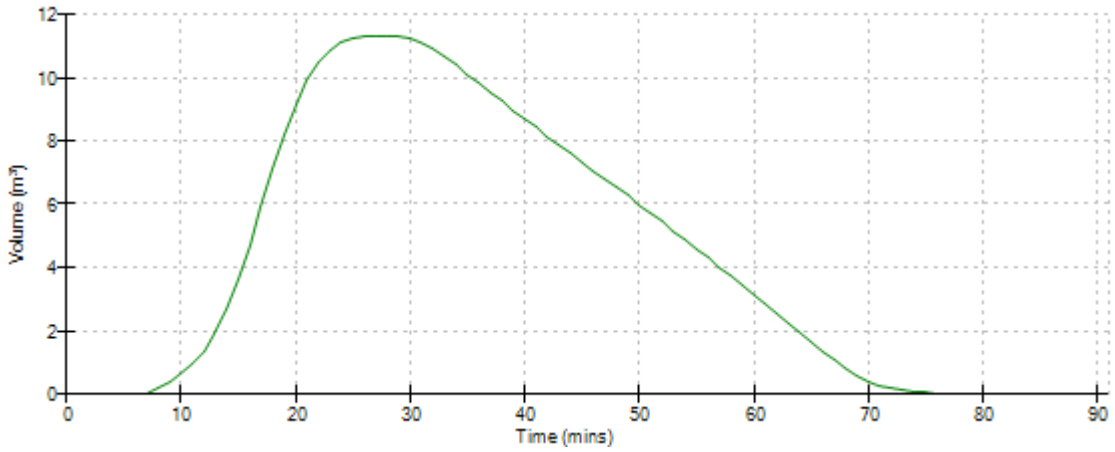
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	4.9
Flush-Flo™	0.168	4.9
Kick-Flo®	0.310	4.4
Mean Flow over Head Range	-	3.9

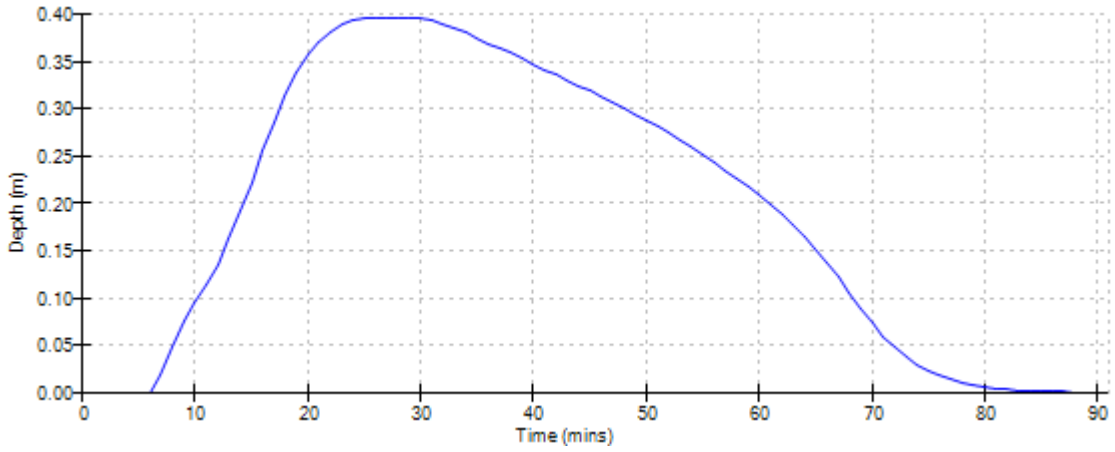
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.9	1.200	8.3	3.000	12.8	7.000	19.3
0.200	4.9	1.400	8.9	3.500	13.7	7.500	20.0
0.300	4.5	1.600	9.5	4.000	14.6	8.000	20.6
0.400	4.9	1.800	10.0	4.500	15.4	8.500	21.3
0.500	5.5	2.000	10.5	5.000	16.3	9.000	21.9
0.600	6.0	2.200	11.0	5.500	17.1	9.500	22.5
0.800	6.8	2.400	11.5	6.000	17.8		
1.000	7.6	2.600	11.9	6.500	18.6		

Cascade Event: 30 min Winter for PP2.srcx







Cascade Summary of Results for SWALE 1.srcx

Upstream Structures	Outflow To	Overflow To
TANK 2.srcx	POND.srcx	(None)

Half Drain Time : 90 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	54.359	0.319	0.0	5.0	5.0	20.0	O K
30 min Summer	54.407	0.367	0.0	5.0	5.0	26.3	O K
60 min Summer	54.452	0.412	0.0	5.0	5.0	32.9	O K
120 min Summer	54.491	0.451	0.0	5.0	5.0	39.3	O K
180 min Summer	54.509	0.469	0.0	5.0	5.0	42.5	O K
240 min Summer	54.507	0.467	0.0	5.0	5.0	42.1	O K
360 min Summer	54.493	0.453	0.0	5.0	5.0	39.6	O K
480 min Summer	54.476	0.436	0.0	5.0	5.0	36.7	O K
600 min Summer	54.454	0.414	0.0	5.0	5.0	33.2	O K
720 min Summer	54.428	0.388	0.0	5.0	5.0	29.3	O K
960 min Summer	54.373	0.333	0.0	5.0	5.0	21.7	O K
1440 min Summer	54.269	0.229	0.0	5.0	5.0	10.1	O K
2160 min Summer	54.155	0.115	0.0	4.8	4.8	2.1	O K
2880 min Summer	54.112	0.072	0.0	4.2	4.2	0.8	O K
4320 min Summer	54.087	0.047	0.0	3.1	3.1	0.3	O K
5760 min Summer	54.075	0.035	0.0	2.5	2.5	0.2	O K
7200 min Summer	54.067	0.027	0.0	2.1	2.1	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	72.682	0.0	40.0	46
30 min Summer	48.363	0.0	53.3	71
60 min Summer	30.811	0.0	67.9	104
120 min Summer	19.036	0.0	84.0	148
180 min Summer	14.191	0.0	93.9	184
240 min Summer	11.467	0.0	101.2	224
360 min Summer	8.493	0.0	112.3	274
480 min Summer	6.855	0.0	120.9	330
600 min Summer	5.801	0.0	127.9	388
720 min Summer	5.059	0.0	133.8	450
960 min Summer	4.074	0.0	143.7	572
1440 min Summer	2.998	0.0	158.6	798
2160 min Summer	2.203	0.0	174.9	1124
2880 min Summer	1.769	0.0	187.2	1468
4320 min Summer	1.297	0.0	205.9	2196
5760 min Summer	1.040	0.0	219.9	2888
7200 min Summer	0.876	0.0	231.7	3664

Cascade Summary of Results for SWALE 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	54.062	0.022	0.0	1.8	1.8	0.1	O K
10080 min Summer	54.058	0.018	0.0	1.6	1.6	0.0	O K
15 min Winter	54.381	0.341	0.0	5.0	5.0	22.7	O K
30 min Winter	54.434	0.394	0.0	5.0	5.0	30.3	O K
60 min Winter	54.486	0.446	0.0	5.0	5.0	38.4	O K
120 min Winter	54.533	0.493	0.0	5.0	5.0	46.7	O K
180 min Winter	54.553	0.513	0.0	5.0	5.0	50.6	O K
240 min Winter	54.561	0.521	0.0	5.0	5.0	52.0	O K
360 min Winter	54.539	0.499	0.0	5.0	5.0	47.9	O K
480 min Winter	54.506	0.466	0.0	5.0	5.0	41.9	O K
600 min Winter	54.463	0.423	0.0	5.0	5.0	34.7	O K
720 min Winter	54.418	0.378	0.0	5.0	5.0	27.9	O K
960 min Winter	54.327	0.287	0.0	5.0	5.0	16.0	O K
1440 min Winter	54.166	0.126	0.0	4.9	4.9	2.7	O K
2160 min Winter	54.102	0.062	0.0	3.8	3.8	0.6	O K
2880 min Winter	54.086	0.046	0.0	3.1	3.1	0.3	O K
4320 min Winter	54.070	0.030	0.0	2.3	2.3	0.1	O K
5760 min Winter	54.061	0.021	0.0	1.8	1.8	0.1	O K
7200 min Winter	54.056	0.016	0.0	1.6	1.6	0.0	O K
8640 min Winter	54.051	0.011	0.0	1.3	1.3	0.0	O K
10080 min Winter	54.049	0.009	0.0	1.2	1.2	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.762	0.0	241.8	4368
10080 min Summer	0.677	0.0	250.7	5032
15 min Winter	72.682	0.0	44.8	53
30 min Winter	48.363	0.0	59.7	81
60 min Winter	30.811	0.0	76.1	116
120 min Winter	19.036	0.0	93.9	162
180 min Winter	14.191	0.0	105.1	196
240 min Winter	11.467	0.0	113.3	236
360 min Winter	8.493	0.0	125.8	290
480 min Winter	6.855	0.0	135.5	350
600 min Winter	5.801	0.0	143.3	416
720 min Winter	5.059	0.0	149.9	478
960 min Winter	4.074	0.0	160.9	596
1440 min Winter	2.998	0.0	177.6	782
2160 min Winter	2.203	0.0	195.8	1100
2880 min Winter	1.769	0.0	209.7	1468
4320 min Winter	1.297	0.0	230.6	2204
5760 min Winter	1.040	0.0	246.3	2864
7200 min Winter	0.876	0.0	259.4	3648
8640 min Winter	0.762	0.0	270.5	4360
10080 min Winter	0.677	0.0	280.5	4584

Cascade Rainfall Details for SWALE 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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.154

Time (mins) From:	To:	Area (ha)
0	4	0.154

Cascade Model Details for SWALE 1.srcx

Storage is Online Cover Level (m) 55.000

Swale Structure

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	87.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	2.0
Safety Factor	2.0	Slope (1:X)	500.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	54.040	Cap Infiltration Depth (m)	0.000
Base Width (m)	0.5		

Hydro-Brake Optimum® Outflow Control

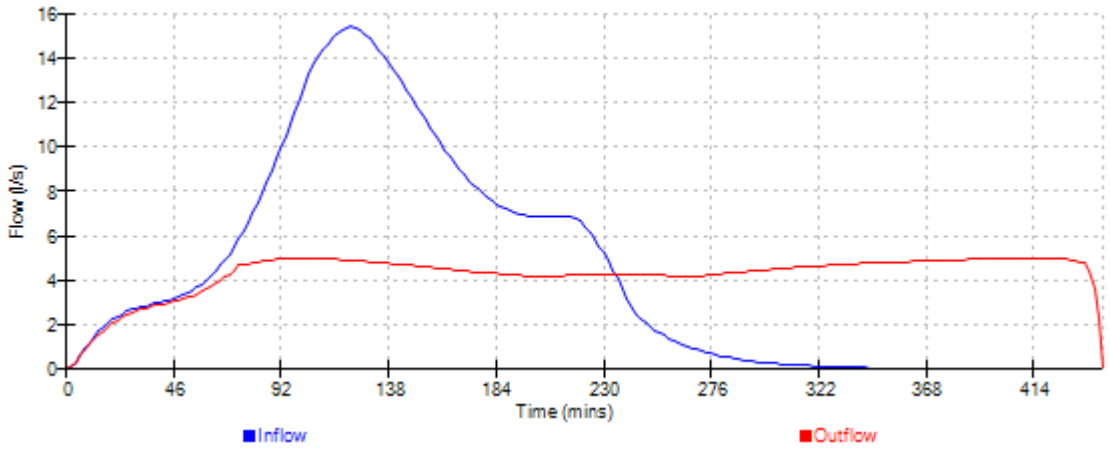
Unit Reference	MD-SHE-0109-5000-0800-5000
Design Head (m)	0.800
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	109
Invert Level (m)	54.000
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

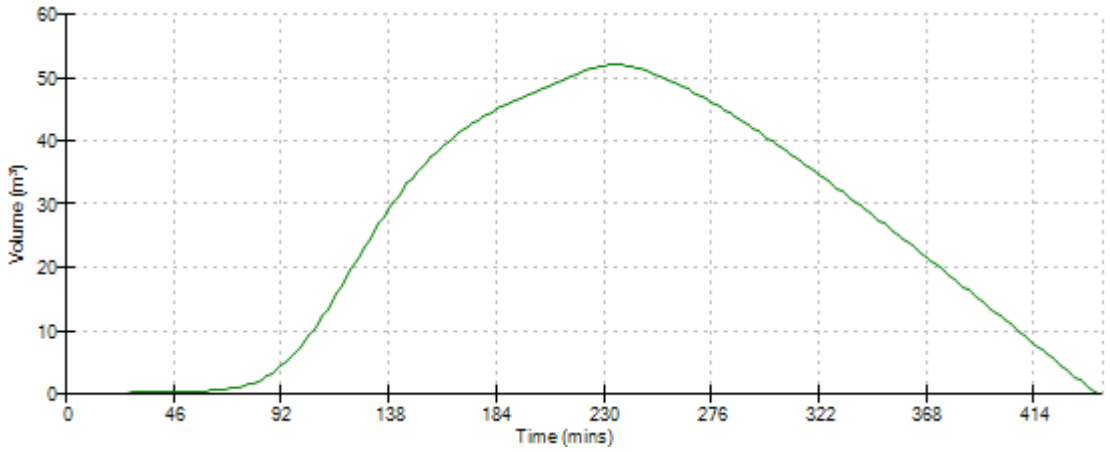
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	5.0
Flush-Flo™	0.242	5.0
Kick-Flo®	0.537	4.2
Mean Flow over Head Range	-	4.3

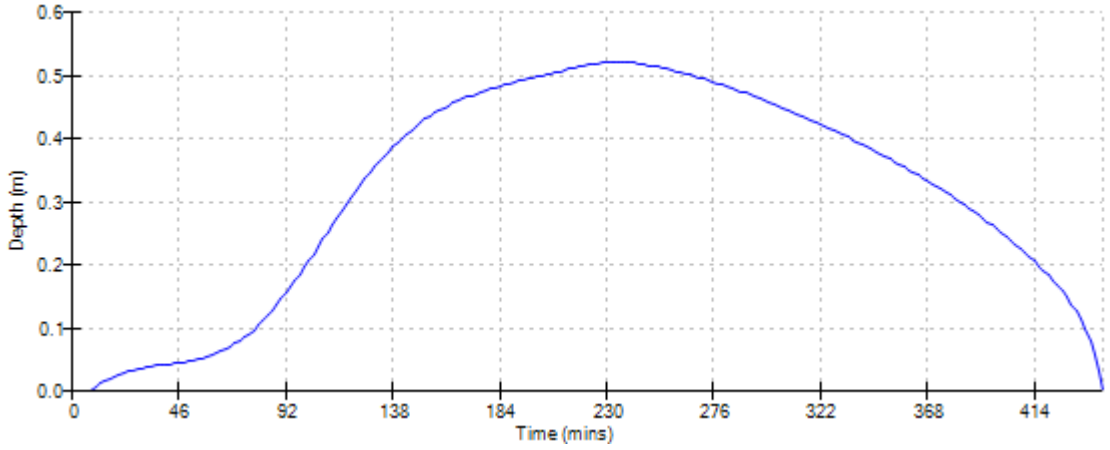
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.7	1.200	6.0	3.000	9.3	7.000	13.9
0.200	5.0	1.400	6.5	3.500	10.0	7.500	14.4
0.300	5.0	1.600	6.9	4.000	10.6	8.000	14.8
0.400	4.8	1.800	7.3	4.500	11.3	8.500	15.2
0.500	4.5	2.000	7.7	5.000	11.8	9.000	15.7
0.600	4.4	2.200	8.0	5.500	12.4	9.500	16.1
0.800	5.0	2.400	8.4	6.000	12.9		
1.000	5.5	2.600	8.7	6.500	13.4		

Cascade Event: 240 min Winter for SWALE 1.srcx







Cascade Summary of Results for SWALE 2.srcx

Upstream Structures	Outflow To	Overflow To
TANK 4.srcx TANK 5.srcx	POND.srcx	(None)

Half Drain Time : 0 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	50.386	0.266	0.0	116.7	116.7	2.3	O K
30 min Summer	50.363	0.243	0.0	102.2	102.2	1.9	O K
60 min Summer	50.321	0.201	0.0	76.6	76.6	1.2	O K
120 min Summer	50.276	0.156	0.0	52.6	52.6	0.7	O K
180 min Summer	50.254	0.134	0.0	41.7	41.7	0.5	O K
240 min Summer	50.239	0.119	0.0	34.9	34.9	0.4	O K
360 min Summer	50.221	0.101	0.0	27.2	27.2	0.3	O K
480 min Summer	50.210	0.090	0.0	23.1	23.1	0.2	O K
600 min Summer	50.203	0.083	0.0	20.3	20.3	0.2	O K
720 min Summer	50.197	0.077	0.0	18.3	18.3	0.2	O K
960 min Summer	50.189	0.069	0.0	15.5	15.5	0.1	O K
1440 min Summer	50.179	0.059	0.0	12.3	12.3	0.1	O K
2160 min Summer	50.170	0.050	0.0	9.5	9.5	0.1	O K
2880 min Summer	50.163	0.043	0.0	7.7	7.7	0.1	O K
4320 min Summer	50.155	0.035	0.0	5.6	5.6	0.0	O K
5760 min Summer	50.151	0.031	0.0	4.7	4.7	0.0	O K
7200 min Summer	50.148	0.028	0.0	3.9	3.9	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	72.682	0.0	72.6	10
30 min Summer	48.363	0.0	96.6	17
60 min Summer	30.811	0.0	123.1	32
120 min Summer	19.036	0.0	152.1	62
180 min Summer	14.191	0.0	170.1	92
240 min Summer	11.467	0.0	183.3	122
360 min Summer	8.493	0.0	203.6	182
480 min Summer	6.855	0.0	219.1	244
600 min Summer	5.801	0.0	231.8	304
720 min Summer	5.059	0.0	242.6	366
960 min Summer	4.074	0.0	260.5	488
1440 min Summer	2.998	0.0	287.6	730
2160 min Summer	2.203	0.0	317.0	1100
2880 min Summer	1.769	0.0	339.2	1468
4320 min Summer	1.297	0.0	373.0	2164
5760 min Summer	1.040	0.0	398.5	2880
7200 min Summer	0.876	0.0	419.4	3568

Cascade Summary of Results for SWALE 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	50.147	0.027	0.0	3.7	3.7	0.0	O K
10080 min Summer	50.144	0.024	0.0	3.1	3.1	0.0	O K
15 min Winter	50.386	0.266	0.0	117.0	117.0	2.3	O K
30 min Winter	50.343	0.223	0.0	89.9	89.9	1.6	O K
60 min Winter	50.294	0.174	0.0	62.0	62.0	0.9	O K
120 min Winter	50.252	0.132	0.0	40.7	40.7	0.5	O K
180 min Winter	50.232	0.112	0.0	31.8	31.8	0.3	O K
240 min Winter	50.220	0.100	0.0	26.8	26.8	0.3	O K
360 min Winter	50.205	0.085	0.0	21.0	21.0	0.2	O K
480 min Winter	50.197	0.077	0.0	18.1	18.1	0.2	O K
600 min Winter	50.191	0.071	0.0	16.0	16.0	0.1	O K
720 min Winter	50.186	0.066	0.0	14.5	14.5	0.1	O K
960 min Winter	50.179	0.059	0.0	12.3	12.3	0.1	O K
1440 min Winter	50.170	0.050	0.0	9.5	9.5	0.1	O K
2160 min Winter	50.161	0.041	0.0	7.1	7.1	0.0	O K
2880 min Winter	50.156	0.036	0.0	5.9	5.9	0.0	O K
4320 min Winter	50.150	0.030	0.0	4.4	4.4	0.0	O K
5760 min Winter	50.145	0.025	0.0	3.4	3.4	0.0	O K
7200 min Winter	50.143	0.023	0.0	3.0	3.0	0.0	O K
8640 min Winter	50.141	0.021	0.0	2.6	2.6	0.0	O K
10080 min Winter	50.139	0.019	0.0	2.3	2.3	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.762	0.0	437.5	4496
10080 min Summer	0.677	0.0	453.6	5040
15 min Winter	72.682	0.0	81.3	10
30 min Winter	48.363	0.0	108.2	17
60 min Winter	30.811	0.0	137.9	32
120 min Winter	19.036	0.0	170.4	60
180 min Winter	14.191	0.0	190.5	92
240 min Winter	11.467	0.0	205.3	122
360 min Winter	8.493	0.0	228.1	186
480 min Winter	6.855	0.0	245.4	238
600 min Winter	5.801	0.0	259.6	306
720 min Winter	5.059	0.0	271.7	382
960 min Winter	4.074	0.0	291.8	470
1440 min Winter	2.998	0.0	322.1	714
2160 min Winter	2.203	0.0	355.1	1072
2880 min Winter	1.769	0.0	380.1	1496
4320 min Winter	1.297	0.0	417.9	2152
5760 min Winter	1.040	0.0	446.5	2664
7200 min Winter	0.876	0.0	469.7	3808
8640 min Winter	0.762	0.0	490.3	4248
10080 min Winter	0.677	0.0	508.2	4776

Cascade Rainfall Details for SWALE 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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.320

Time (mins) From:	To:	Area (ha)
0	4	0.320

Cascade Model Details for SWALE 2.srcx

Storage is Online Cover Level (m) 50.700

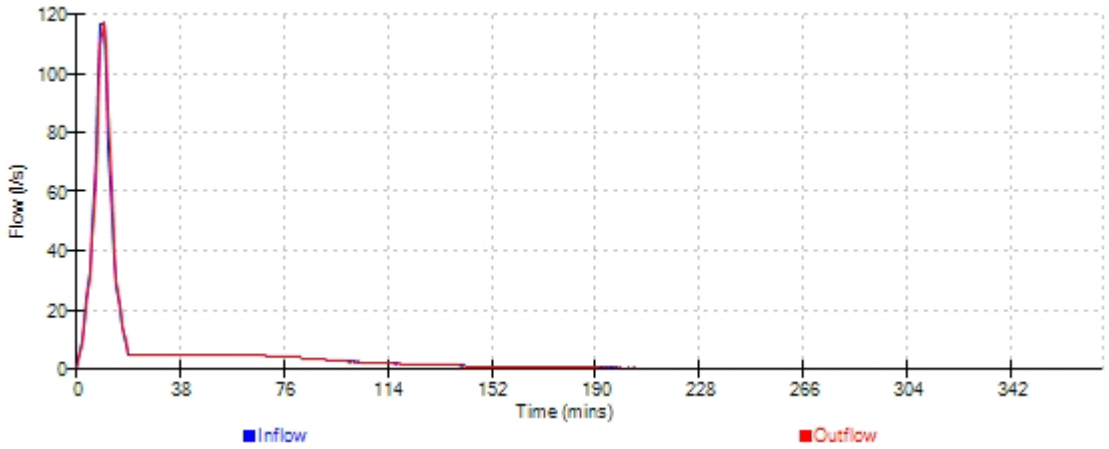
Swale Structure

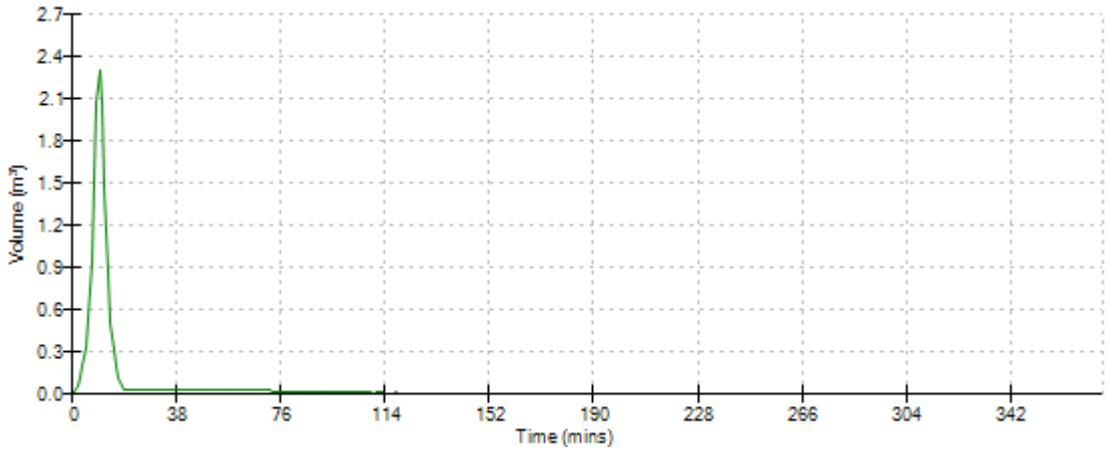
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	70.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	2.0
Safety Factor	2.0	Slope (1:X)	48.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	50.120	Cap Infiltration Depth (m)	0.000
Base Width (m)	1.0		

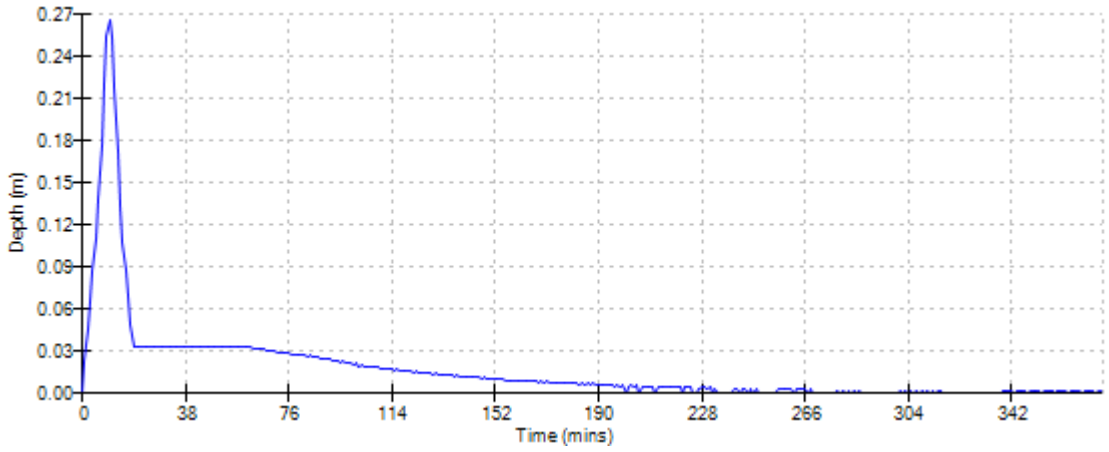
Weir Outflow Control

Discharge Coef 0.544 Width (m) 0.500 Invert Level (m) 50.120

Cascade Event: 15 min Winter for SWALE 2.srcx







Cascade Summary of Results for TANK 1.srcx

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

Half Drain Time : 489 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	55.750	0.150	0.0	2.1	2.1	51.3	O K
30 min Summer	55.797	0.197	0.0	2.2	2.2	67.4	O K
60 min Summer	55.845	0.245	0.0	2.3	2.3	83.9	O K
120 min Summer	55.890	0.290	0.0	2.3	2.3	99.3	O K
180 min Summer	55.912	0.312	0.0	2.3	2.3	106.6	O K
240 min Summer	55.923	0.323	0.0	2.3	2.3	110.4	O K
360 min Summer	55.932	0.332	0.0	2.3	2.3	113.5	O K
480 min Summer	55.935	0.335	0.0	2.3	2.3	114.4	O K
600 min Summer	55.935	0.335	0.0	2.3	2.3	114.6	O K
720 min Summer	55.934	0.334	0.0	2.3	2.3	114.1	O K
960 min Summer	55.928	0.328	0.0	2.3	2.3	112.1	O K
1440 min Summer	55.910	0.310	0.0	2.3	2.3	105.9	O K
2160 min Summer	55.878	0.278	0.0	2.3	2.3	95.0	O K
2880 min Summer	55.847	0.247	0.0	2.3	2.3	84.5	O K
4320 min Summer	55.796	0.196	0.0	2.2	2.2	66.9	O K
5760 min Summer	55.757	0.157	0.0	2.1	2.1	53.8	O K
7200 min Summer	55.730	0.130	0.0	2.0	2.0	44.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	72.682	0.0	49.3	19
30 min Summer	48.363	0.0	66.3	33
60 min Summer	30.811	0.0	87.5	62
120 min Summer	19.036	0.0	108.4	122
180 min Summer	14.191	0.0	121.3	182
240 min Summer	11.467	0.0	130.8	240
360 min Summer	8.493	0.0	145.4	348
480 min Summer	6.855	0.0	156.5	402
600 min Summer	5.801	0.0	165.5	464
720 min Summer	5.059	0.0	173.2	528
960 min Summer	4.074	0.0	185.8	664
1440 min Summer	2.998	0.0	204.7	938
2160 min Summer	2.203	0.0	228.5	1340
2880 min Summer	1.769	0.0	244.6	1728
4320 min Summer	1.297	0.0	268.1	2464
5760 min Summer	1.040	0.0	288.4	3176
7200 min Summer	0.876	0.0	303.6	3888

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	55.710	0.110	0.0	2.0	2.0	37.6	O K
10080 min Summer	55.696	0.096	0.0	1.9	1.9	33.0	O K
15 min Winter	55.768	0.168	0.0	2.2	2.2	57.5	O K
30 min Winter	55.821	0.221	0.0	2.3	2.3	75.7	O K
60 min Winter	55.876	0.276	0.0	2.3	2.3	94.4	O K
120 min Winter	55.928	0.328	0.0	2.3	2.3	112.2	O K
180 min Winter	55.954	0.354	0.0	2.3	2.3	121.0	O K
240 min Winter	55.968	0.368	0.0	2.3	2.3	125.8	O K
360 min Winter	55.982	0.382	0.0	2.3	2.3	130.6	O K
480 min Winter	55.985	0.385	0.0	2.3	2.3	131.7	O K
600 min Winter	55.982	0.382	0.0	2.3	2.3	130.8	O K
720 min Winter	55.980	0.380	0.0	2.3	2.3	129.9	O K
960 min Winter	55.970	0.370	0.0	2.3	2.3	126.6	O K
1440 min Winter	55.941	0.341	0.0	2.3	2.3	116.6	O K
2160 min Winter	55.891	0.291	0.0	2.3	2.3	99.5	O K
2880 min Winter	55.844	0.244	0.0	2.3	2.3	83.5	O K
4320 min Winter	55.771	0.171	0.0	2.2	2.2	58.6	O K
5760 min Winter	55.724	0.124	0.0	2.0	2.0	42.4	O K
7200 min Winter	55.696	0.096	0.0	1.9	1.9	32.9	O K
8640 min Winter	55.684	0.084	0.0	1.7	1.7	28.6	O K
10080 min Winter	55.675	0.075	0.0	1.5	1.5	25.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.762	0.0	316.6	4584
10080 min Summer	0.677	0.0	327.5	5248
15 min Winter	72.682	0.0	55.5	18
30 min Winter	48.363	0.0	74.5	33
60 min Winter	30.811	0.0	98.2	62
120 min Winter	19.036	0.0	121.5	120
180 min Winter	14.191	0.0	136.0	178
240 min Winter	11.467	0.0	146.6	236
360 min Winter	8.493	0.0	162.9	348
480 min Winter	6.855	0.0	175.3	454
600 min Winter	5.801	0.0	185.4	542
720 min Winter	5.059	0.0	194.0	568
960 min Winter	4.074	0.0	208.2	722
1440 min Winter	2.998	0.0	229.2	1024
2160 min Winter	2.203	0.0	256.0	1448
2880 min Winter	1.769	0.0	274.0	1844
4320 min Winter	1.297	0.0	300.6	2592
5760 min Winter	1.040	0.0	323.1	3280
7200 min Winter	0.876	0.0	340.2	3888
8640 min Winter	0.762	0.0	354.8	4576
10080 min Winter	0.677	0.0	367.1	5248

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.386

Time (mins) From:	To:	Area (ha)
0	4	0.386

Cascade Model Details for TANK 1.srcx

Storage is Online Cover Level (m) 57.600

Cellular Storage Structure

Invert Level (m) 55.600 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	360.0	360.0	1.201	0.0	451.2
1.200	360.0	451.2			

Hydro-Brake Optimum® Outflow Control

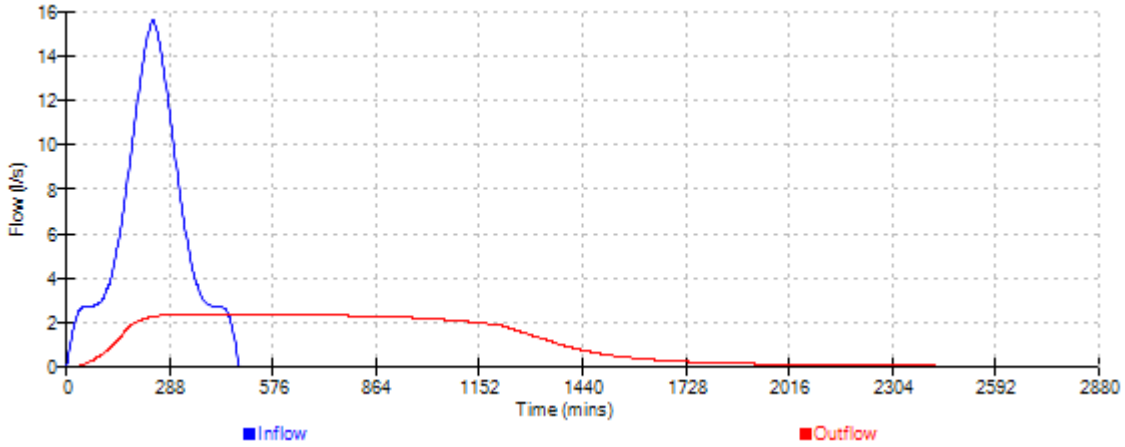
Unit Reference	MD-SHE-0072-2500-1200-2500
Design Head (m)	1.200
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	72
Invert Level (m)	55.600
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

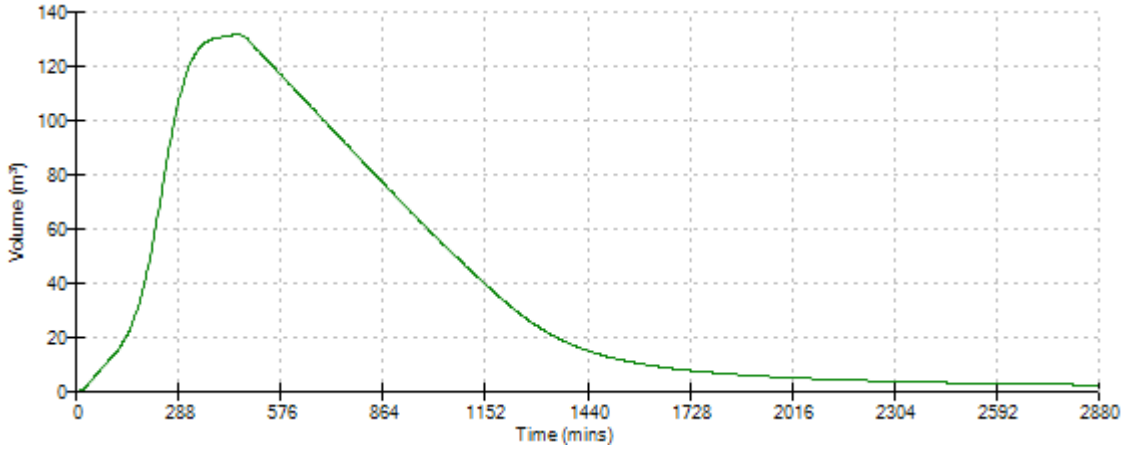
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	2.5
Flush-Flo™	0.318	2.3
Kick-Flo®	0.644	1.9
Mean Flow over Head Range	-	2.1

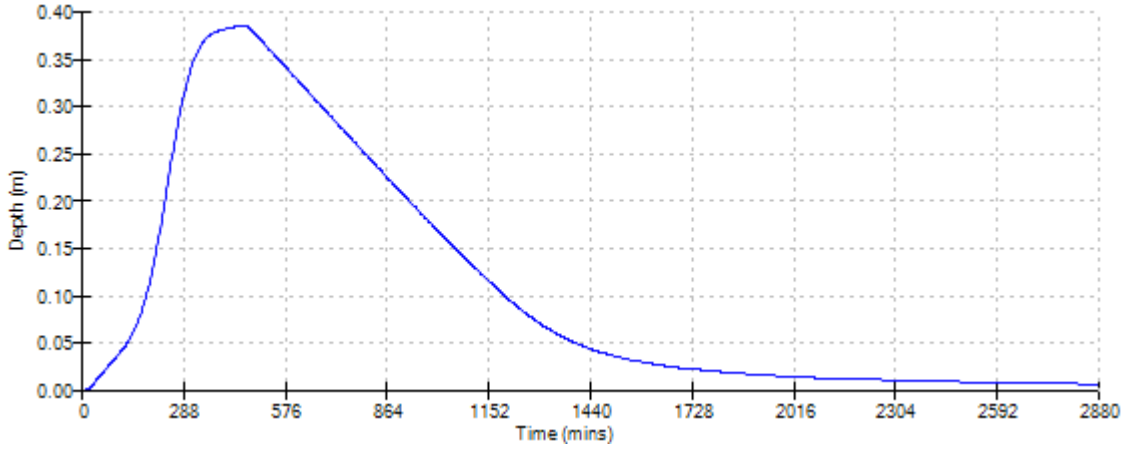
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.9	1.200	2.5	3.000	3.8	7.000	5.7
0.200	2.2	1.400	2.7	3.500	4.1	7.500	5.9
0.300	2.3	1.600	2.8	4.000	4.4	8.000	6.0
0.400	2.3	1.800	3.0	4.500	4.6	8.500	6.2
0.500	2.2	2.000	3.2	5.000	4.8	9.000	6.4
0.600	2.0	2.200	3.3	5.500	5.1	9.500	6.5
0.800	2.1	2.400	3.4	6.000	5.3		
1.000	2.3	2.600	3.6	6.500	5.5		

Cascade Event: 480 min Winter for TANK 1.srcx







Cascade Summary of Results for TANK 2.srcx

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

Half Drain Time : 41 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	51.708	0.208	0.0	5.0	5.0	15.8	O K
30 min Summer	51.752	0.252	0.0	5.0	5.0	19.2	O K
60 min Summer	51.774	0.274	0.0	5.0	5.0	20.9	O K
120 min Summer	51.769	0.269	0.0	5.0	5.0	20.5	O K
180 min Summer	51.748	0.248	0.0	5.0	5.0	18.8	O K
240 min Summer	51.723	0.223	0.0	5.0	5.0	16.9	O K
360 min Summer	51.678	0.178	0.0	5.0	5.0	13.5	O K
480 min Summer	51.642	0.142	0.0	5.0	5.0	10.8	O K
600 min Summer	51.616	0.116	0.0	5.0	5.0	8.8	O K
720 min Summer	51.599	0.099	0.0	5.0	5.0	7.5	O K
960 min Summer	51.584	0.084	0.0	4.2	4.2	6.4	O K
1440 min Summer	51.565	0.065	0.0	3.2	3.2	4.9	O K
2160 min Summer	51.549	0.049	0.0	2.4	2.4	3.7	O K
2880 min Summer	51.540	0.040	0.0	2.0	2.0	3.0	O K
4320 min Summer	51.530	0.030	0.0	1.5	1.5	2.2	O K
5760 min Summer	51.524	0.024	0.0	1.2	1.2	1.8	O K
7200 min Summer	51.520	0.020	0.0	1.0	1.0	1.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	72.682	0.0	19.0	16
30 min Summer	48.363	0.0	25.4	30
60 min Summer	30.811	0.0	32.3	46
120 min Summer	19.036	0.0	39.9	80
180 min Summer	14.191	0.0	44.7	114
240 min Summer	11.467	0.0	48.1	148
360 min Summer	8.493	0.0	53.5	210
480 min Summer	6.855	0.0	57.5	268
600 min Summer	5.801	0.0	60.9	324
720 min Summer	5.059	0.0	63.7	378
960 min Summer	4.074	0.0	68.4	500
1440 min Summer	2.998	0.0	75.5	738
2160 min Summer	2.203	0.0	83.3	1104
2880 min Summer	1.769	0.0	89.1	1468
4320 min Summer	1.297	0.0	98.0	2192
5760 min Summer	1.040	0.0	104.8	2936
7200 min Summer	0.876	0.0	110.4	3664

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	51.518	0.018	0.0	0.9	0.9	1.3	O K
10080 min Summer	51.516	0.016	0.0	0.8	0.8	1.2	O K
15 min Winter	51.737	0.237	0.0	5.0	5.0	18.0	O K
30 min Winter	51.789	0.289	0.0	5.0	5.0	22.0	O K
60 min Winter	51.813	0.313	0.0	5.0	5.0	23.8	O K
120 min Winter	51.799	0.299	0.0	5.0	5.0	22.7	O K
180 min Winter	51.763	0.263	0.0	5.0	5.0	20.0	O K
240 min Winter	51.723	0.223	0.0	5.0	5.0	16.9	O K
360 min Winter	51.654	0.154	0.0	5.0	5.0	11.7	O K
480 min Winter	51.607	0.107	0.0	5.0	5.0	8.2	O K
600 min Winter	51.591	0.091	0.0	4.5	4.5	6.9	O K
720 min Winter	51.580	0.080	0.0	4.0	4.0	6.1	O K
960 min Winter	51.566	0.066	0.0	3.3	3.3	5.0	O K
1440 min Winter	51.549	0.049	0.0	2.4	2.4	3.7	O K
2160 min Winter	51.536	0.036	0.0	1.8	1.8	2.7	O K
2880 min Winter	51.529	0.029	0.0	1.5	1.5	2.2	O K
4320 min Winter	51.522	0.022	0.0	1.1	1.1	1.6	O K
5760 min Winter	51.517	0.017	0.0	0.9	0.9	1.3	O K
7200 min Winter	51.515	0.015	0.0	0.7	0.7	1.1	O K
8640 min Winter	51.513	0.013	0.0	0.6	0.6	1.0	O K
10080 min Winter	51.511	0.011	0.0	0.6	0.6	0.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.762	0.0	115.2	4384
10080 min Summer	0.677	0.0	119.5	5024
15 min Winter	72.682	0.0	21.3	17
30 min Winter	48.363	0.0	28.4	30
60 min Winter	30.811	0.0	36.2	50
120 min Winter	19.036	0.0	44.7	88
180 min Winter	14.191	0.0	50.0	124
240 min Winter	11.467	0.0	53.9	158
360 min Winter	8.493	0.0	59.9	218
480 min Winter	6.855	0.0	64.5	268
600 min Winter	5.801	0.0	68.2	322
720 min Winter	5.059	0.0	71.4	382
960 min Winter	4.074	0.0	76.6	502
1440 min Winter	2.998	0.0	84.6	748
2160 min Winter	2.203	0.0	93.2	1104
2880 min Winter	1.769	0.0	99.8	1440
4320 min Winter	1.297	0.0	109.8	2200
5760 min Winter	1.040	0.0	117.4	2936
7200 min Winter	0.876	0.0	123.6	3616
8640 min Winter	0.762	0.0	129.1	4344
10080 min Winter	0.677	0.0	133.8	4984

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.140

Time (mins) From:	To:	Area (ha)
0	4	0.140

Cascade Model Details for TANK 2.srcx

Storage is Online Cover Level (m) 53.410

Cellular Storage Structure

Invert Level (m) 51.500 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

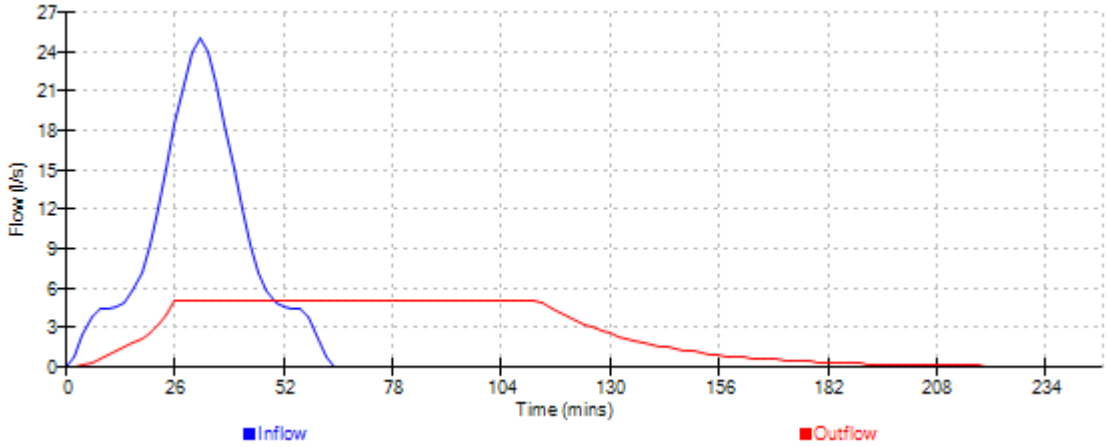
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	80.0	80.0	0.801	0.0	162.6
0.800	80.0	162.6			

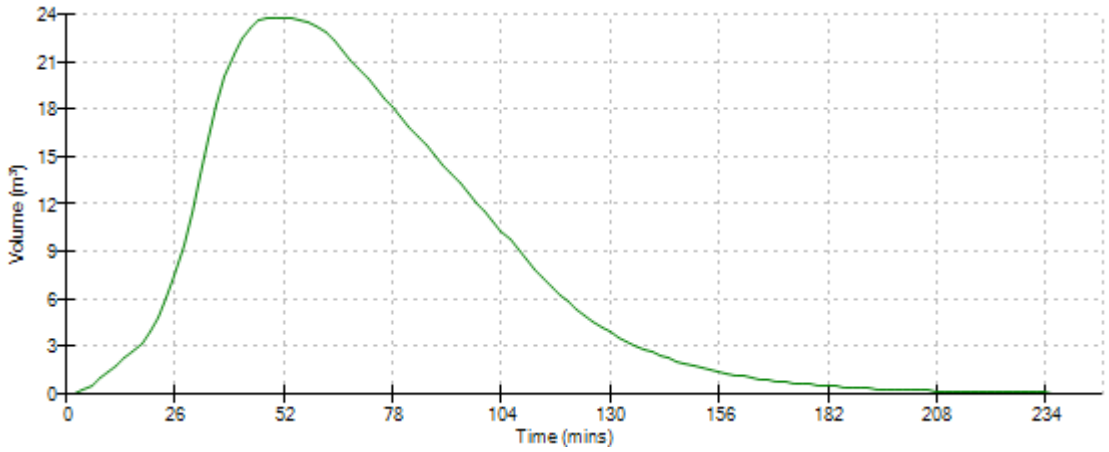
Pump Outflow Control

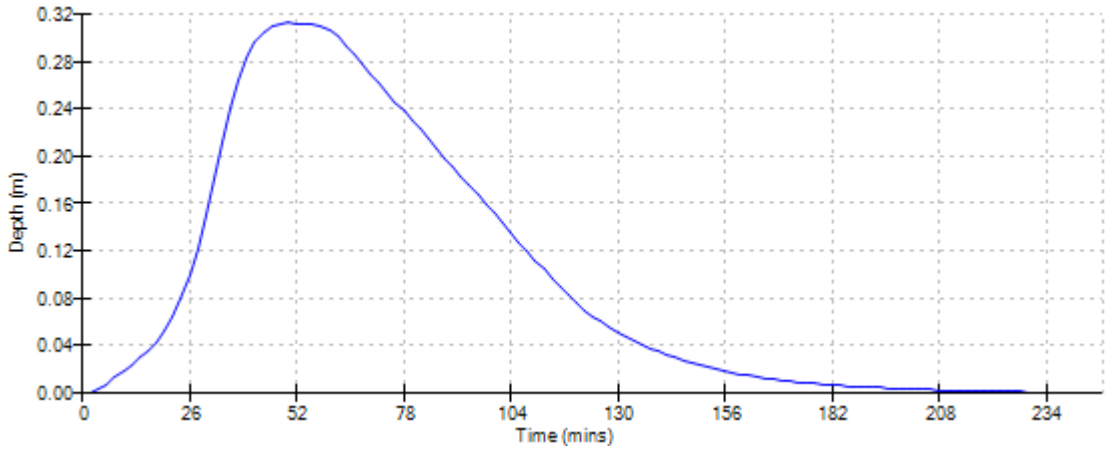
Invert Level (m) 51.500

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.0000	0.900	5.0000	1.700	5.0000	2.500	5.0000
0.200	5.0000	1.000	5.0000	1.800	5.0000	2.600	5.0000
0.300	5.0000	1.100	5.0000	1.900	5.0000	2.700	5.0000
0.400	5.0000	1.200	5.0000	2.000	5.0000	2.800	5.0000
0.500	5.0000	1.300	5.0000	2.100	5.0000	2.900	5.0000
0.600	5.0000	1.400	5.0000	2.200	5.0000	3.000	5.0000
0.700	5.0000	1.500	5.0000	2.300	5.0000		
0.800	5.0000	1.600	5.0000	2.400	5.0000		

Cascade Event: 60 min Winter for TANK 2.srcx







Cascade Summary of Results for TANK 3.srcx

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

Half Drain Time : 26 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	54.105	0.105	0.0	3.9	3.9	7.2	O K
30 min Summer	54.124	0.124	0.0	4.6	4.6	8.5	O K
60 min Summer	54.142	0.142	0.0	4.8	4.8	9.7	O K
120 min Summer	54.152	0.152	0.0	4.8	4.8	10.4	O K
180 min Summer	54.151	0.151	0.0	4.8	4.8	10.3	O K
240 min Summer	54.145	0.145	0.0	4.8	4.8	9.9	O K
360 min Summer	54.133	0.133	0.0	4.7	4.7	9.1	O K
480 min Summer	54.123	0.123	0.0	4.6	4.6	8.4	O K
600 min Summer	54.116	0.116	0.0	4.3	4.3	7.9	O K
720 min Summer	54.107	0.107	0.0	4.0	4.0	7.3	O K
960 min Summer	54.093	0.093	0.0	3.4	3.4	6.4	O K
1440 min Summer	54.077	0.077	0.0	2.6	2.6	5.3	O K
2160 min Summer	54.065	0.065	0.0	2.0	2.0	4.4	O K
2880 min Summer	54.057	0.057	0.0	1.6	1.6	3.9	O K
4320 min Summer	54.048	0.048	0.0	1.2	1.2	3.3	O K
5760 min Summer	54.042	0.042	0.0	0.9	0.9	2.9	O K
7200 min Summer	54.039	0.039	0.0	0.8	0.8	2.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	72.682	0.0	13.4	17
30 min Summer	48.363	0.0	18.5	27
60 min Summer	30.811	0.0	24.2	44
120 min Summer	19.036	0.0	30.4	78
180 min Summer	14.191	0.0	34.2	110
240 min Summer	11.467	0.0	36.9	142
360 min Summer	8.493	0.0	41.2	204
480 min Summer	6.855	0.0	44.4	264
600 min Summer	5.801	0.0	47.0	326
720 min Summer	5.059	0.0	49.2	382
960 min Summer	4.074	0.0	52.8	500
1440 min Summer	2.998	0.0	58.2	738
2160 min Summer	2.203	0.0	63.9	1104
2880 min Summer	1.769	0.0	68.1	1468
4320 min Summer	1.297	0.0	74.1	2204
5760 min Summer	1.040	0.0	78.4	2936
7200 min Summer	0.876	0.0	81.8	3672

Cascade Summary of Results for TANK 3.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	54.036	0.036	0.0	0.7	0.7	2.4	O K
10080 min Summer	54.034	0.034	0.0	0.6	0.6	2.3	O K
15 min Winter	54.116	0.116	0.0	4.3	4.3	7.9	O K
30 min Winter	54.139	0.139	0.0	4.8	4.8	9.5	O K
60 min Winter	54.158	0.158	0.0	4.8	4.8	10.8	O K
120 min Winter	54.162	0.162	0.0	4.9	4.9	11.1	O K
180 min Winter	54.155	0.155	0.0	4.8	4.8	10.6	O K
240 min Winter	54.145	0.145	0.0	4.8	4.8	9.9	O K
360 min Winter	54.127	0.127	0.0	4.7	4.7	8.7	O K
480 min Winter	54.112	0.112	0.0	4.2	4.2	7.7	O K
600 min Winter	54.099	0.099	0.0	3.7	3.7	6.8	O K
720 min Winter	54.090	0.090	0.0	3.3	3.3	6.1	O K
960 min Winter	54.078	0.078	0.0	2.7	2.7	5.3	O K
1440 min Winter	54.064	0.064	0.0	2.0	2.0	4.4	O K
2160 min Winter	54.054	0.054	0.0	1.5	1.5	3.7	O K
2880 min Winter	54.048	0.048	0.0	1.2	1.2	3.3	O K
4320 min Winter	54.040	0.040	0.0	0.9	0.9	2.7	O K
5760 min Winter	54.036	0.036	0.0	0.7	0.7	2.4	O K
7200 min Winter	54.032	0.032	0.0	0.6	0.6	2.2	O K
8640 min Winter	54.030	0.030	0.0	0.5	0.5	2.1	O K
10080 min Winter	54.028	0.028	0.0	0.4	0.4	1.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.762	0.0	84.5	4360
10080 min Summer	0.677	0.0	86.7	5136
15 min Winter	72.682	0.0	15.3	16
30 min Winter	48.363	0.0	21.0	29
60 min Winter	30.811	0.0	27.4	48
120 min Winter	19.036	0.0	34.3	84
180 min Winter	14.191	0.0	38.5	118
240 min Winter	11.467	0.0	41.6	150
360 min Winter	8.493	0.0	46.4	212
480 min Winter	6.855	0.0	50.0	268
600 min Winter	5.801	0.0	53.0	326
720 min Winter	5.059	0.0	55.4	384
960 min Winter	4.074	0.0	59.5	502
1440 min Winter	2.998	0.0	65.6	748
2160 min Winter	2.203	0.0	72.1	1108
2880 min Winter	1.769	0.0	76.8	1460
4320 min Winter	1.297	0.0	83.7	2200
5760 min Winter	1.040	0.0	88.7	2928
7200 min Winter	0.876	0.0	92.7	3680
8640 min Winter	0.762	0.0	95.9	4400
10080 min Winter	0.677	0.0	98.5	5128

Cascade Rainfall Details for TANK 3.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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.056

Time (mins) From:	To:	Area (ha)
0	4	0.056

Cascade Model Details for TANK 3.srcx

Storage is Online Cover Level (m) 55.500

Cellular Storage Structure

Invert Level (m) 54.000 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	72.0	72.0	0.801	0.0	100.8
0.800	72.0	100.8			

Hydro-Brake Optimum® Outflow Control

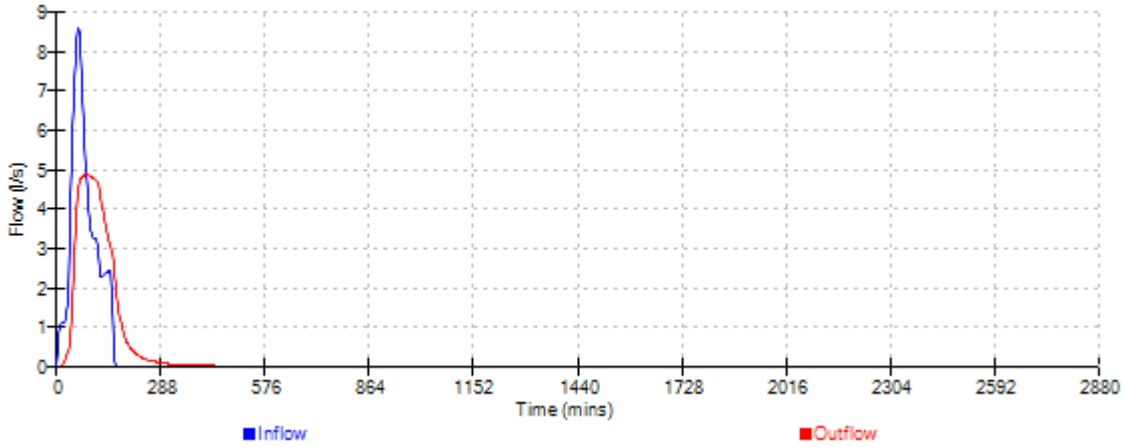
Unit Reference	MD-SHE-0109-5000-0800-5000
Design Head (m)	0.800
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	109
Invert Level (m)	54.000
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

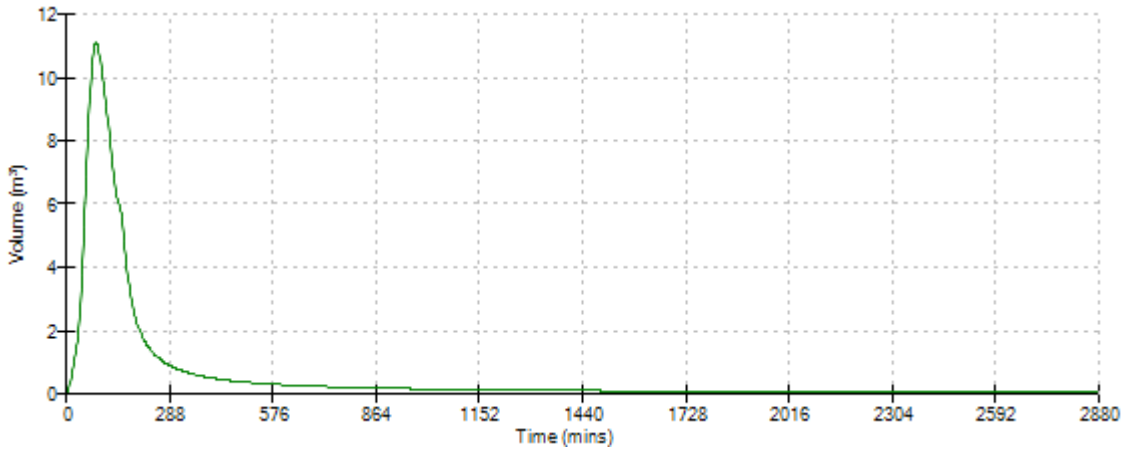
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	5.0
Flush-Flo™	0.242	5.0
Kick-Flo®	0.537	4.2
Mean Flow over Head Range	-	4.3

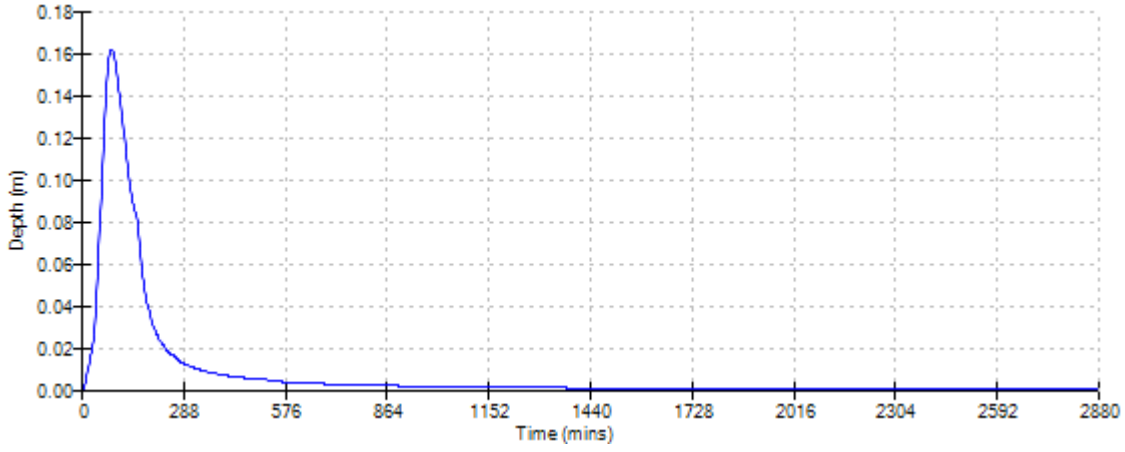
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.7	1.200	6.0	3.000	9.3	7.000	13.9
0.200	5.0	1.400	6.5	3.500	10.0	7.500	14.4
0.300	5.0	1.600	6.9	4.000	10.6	8.000	14.8
0.400	4.8	1.800	7.3	4.500	11.3	8.500	15.2
0.500	4.5	2.000	7.7	5.000	11.8	9.000	15.7
0.600	4.4	2.200	8.0	5.500	12.4	9.500	16.1
0.800	5.0	2.400	8.4	6.000	12.9		
1.000	5.5	2.600	8.7	6.500	13.4		

Cascade Event: 120 min Winter for TANK 3.srcx







Cascade Summary of Results for TANK 4.srcx

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

Half Drain Time : 54 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	53.314	0.214	0.0	2.5	2.5	9.8	O K
30 min Summer	53.364	0.264	0.0	2.5	2.5	12.0	O K
60 min Summer	53.392	0.292	0.0	2.5	2.5	13.3	O K
120 min Summer	53.395	0.295	0.0	2.5	2.5	13.4	O K
180 min Summer	53.378	0.278	0.0	2.5	2.5	12.7	O K
240 min Summer	53.357	0.257	0.0	2.5	2.5	11.7	O K
360 min Summer	53.316	0.216	0.0	2.5	2.5	9.9	O K
480 min Summer	53.280	0.180	0.0	2.5	2.5	8.2	O K
600 min Summer	53.250	0.150	0.0	2.5	2.5	6.8	O K
720 min Summer	53.226	0.126	0.0	2.5	2.5	5.7	O K
960 min Summer	53.198	0.098	0.0	2.4	2.4	4.5	O K
1440 min Summer	53.176	0.076	0.0	1.9	1.9	3.5	O K
2160 min Summer	53.158	0.058	0.0	1.4	1.4	2.6	O K
2880 min Summer	53.148	0.048	0.0	1.2	1.2	2.2	O K
4320 min Summer	53.135	0.035	0.0	0.9	0.9	1.6	O K
5760 min Summer	53.129	0.029	0.0	0.7	0.7	1.3	O K
7200 min Summer	53.124	0.024	0.0	0.6	0.6	1.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	72.682	0.0	11.4	17
30 min Summer	48.363	0.0	15.2	31
60 min Summer	30.811	0.0	19.4	50
120 min Summer	19.036	0.0	24.0	84
180 min Summer	14.191	0.0	26.8	118
240 min Summer	11.467	0.0	28.9	152
360 min Summer	8.493	0.0	32.1	216
480 min Summer	6.855	0.0	34.5	278
600 min Summer	5.801	0.0	36.5	336
720 min Summer	5.059	0.0	38.2	392
960 min Summer	4.074	0.0	41.0	502
1440 min Summer	2.998	0.0	45.3	738
2160 min Summer	2.203	0.0	50.0	1104
2880 min Summer	1.769	0.0	53.5	1468
4320 min Summer	1.297	0.0	58.8	2204
5760 min Summer	1.040	0.0	62.9	2936
7200 min Summer	0.876	0.0	66.2	3656

Cascade Summary of Results for TANK 4.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	53.121	0.021	0.0	0.5	0.5	1.0	O K
10080 min Summer	53.119	0.019	0.0	0.5	0.5	0.8	O K
15 min Winter	53.344	0.244	0.0	2.5	2.5	11.1	O K
30 min Winter	53.402	0.302	0.0	2.5	2.5	13.8	O K
60 min Winter	53.435	0.335	0.0	2.5	2.5	15.3	O K
120 min Winter	53.432	0.332	0.0	2.5	2.5	15.1	O K
180 min Winter	53.405	0.305	0.0	2.5	2.5	13.9	O K
240 min Winter	53.371	0.271	0.0	2.5	2.5	12.4	O K
360 min Winter	53.306	0.206	0.0	2.5	2.5	9.4	O K
480 min Winter	53.251	0.151	0.0	2.5	2.5	6.9	O K
600 min Winter	53.212	0.112	0.0	2.5	2.5	5.1	O K
720 min Winter	53.195	0.095	0.0	2.4	2.4	4.3	O K
960 min Winter	53.178	0.078	0.0	1.9	1.9	3.6	O K
1440 min Winter	53.158	0.058	0.0	1.5	1.5	2.7	O K
2160 min Winter	53.143	0.043	0.0	1.1	1.1	2.0	O K
2880 min Winter	53.135	0.035	0.0	0.9	0.9	1.6	O K
4320 min Winter	53.126	0.026	0.0	0.6	0.6	1.2	O K
5760 min Winter	53.121	0.021	0.0	0.5	0.5	0.9	O K
7200 min Winter	53.118	0.018	0.0	0.4	0.4	0.8	O K
8640 min Winter	53.115	0.015	0.0	0.4	0.4	0.7	O K
10080 min Winter	53.114	0.014	0.0	0.3	0.3	0.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.762	0.0	69.1	4392
10080 min Summer	0.677	0.0	71.7	5128
15 min Winter	72.682	0.0	12.8	17
30 min Winter	48.363	0.0	17.0	31
60 min Winter	30.811	0.0	21.7	56
120 min Winter	19.036	0.0	26.8	92
180 min Winter	14.191	0.0	30.0	128
240 min Winter	11.467	0.0	32.3	164
360 min Winter	8.493	0.0	35.9	230
480 min Winter	6.855	0.0	38.7	288
600 min Winter	5.801	0.0	40.9	338
720 min Winter	5.059	0.0	42.8	386
960 min Winter	4.074	0.0	46.0	510
1440 min Winter	2.998	0.0	50.8	750
2160 min Winter	2.203	0.0	55.9	1104
2880 min Winter	1.769	0.0	59.9	1472
4320 min Winter	1.297	0.0	65.9	2172
5760 min Winter	1.040	0.0	70.4	2880
7200 min Winter	0.876	0.0	74.2	3656
8640 min Winter	0.762	0.0	77.4	4264
10080 min Winter	0.677	0.0	80.3	5080

Cascade Rainfall Details for TANK 4.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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.084

Time (mins) From:	To:	Area (ha)
0	4	0.084

Cascade Model Details for TANK 4.srcx

Storage is Online Cover Level (m) 54.600

Cellular Storage Structure

Invert Level (m) 53.100 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

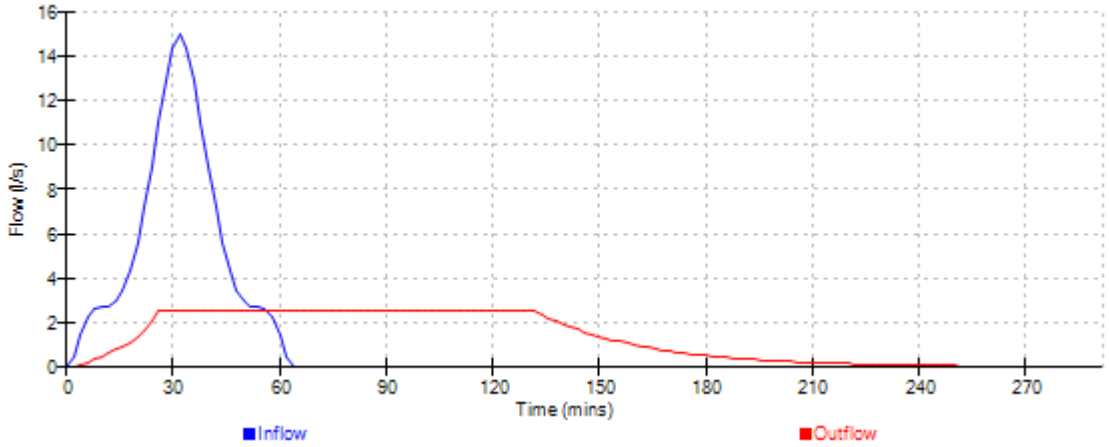
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	48.0	48.0	0.801	0.0	73.6
0.800	48.0	73.6			

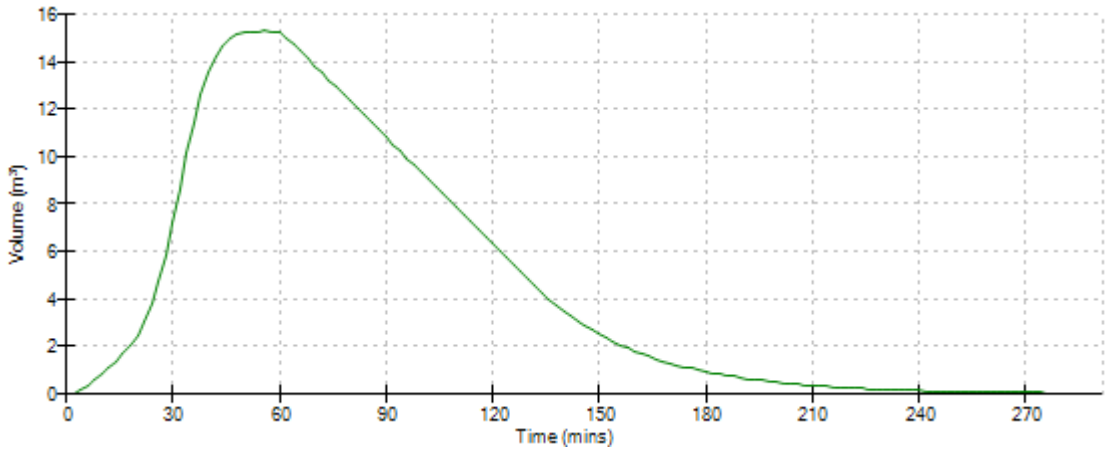
Pump Outflow Control

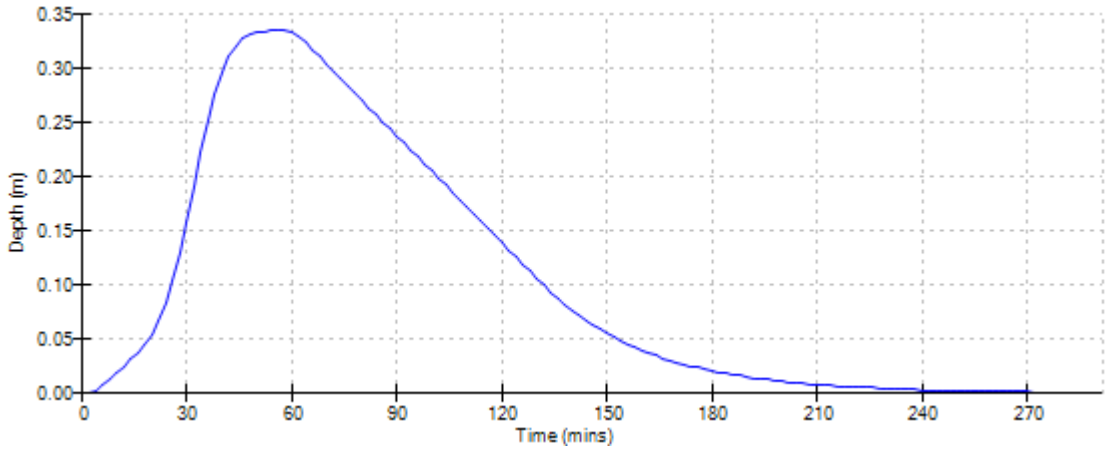
Invert Level (m) 53.100

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.5000	0.900	2.5000	1.700	2.5000	2.500	2.5000
0.200	2.5000	1.000	2.5000	1.800	2.5000	2.600	2.5000
0.300	2.5000	1.100	2.5000	1.900	2.5000	2.700	2.5000
0.400	2.5000	1.200	2.5000	2.000	2.5000	2.800	2.5000
0.500	2.5000	1.300	2.5000	2.100	2.5000	2.900	2.5000
0.600	2.5000	1.400	2.5000	2.200	2.5000	3.000	2.5000
0.700	2.5000	1.500	2.5000	2.300	2.5000		
0.800	2.5000	1.600	2.5000	2.400	2.5000		

Cascade Event: 60 min Winter for TANK 4.srcx







Cascade Summary of Results for TANK 5.srcx

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

Half Drain Time : 100 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	50.940	0.190	0.0	2.5	2.5	15.9	O K
30 min Summer	50.992	0.242	0.0	2.5	2.5	20.2	O K
60 min Summer	51.031	0.281	0.0	2.5	2.5	23.5	O K
120 min Summer	51.047	0.297	0.0	2.5	2.5	24.8	O K
180 min Summer	51.045	0.295	0.0	2.5	2.5	24.7	O K
240 min Summer	51.037	0.287	0.0	2.5	2.5	24.0	O K
360 min Summer	51.015	0.265	0.0	2.5	2.5	22.2	O K
480 min Summer	50.992	0.242	0.0	2.5	2.5	20.2	O K
600 min Summer	50.969	0.219	0.0	2.5	2.5	18.3	O K
720 min Summer	50.947	0.197	0.0	2.5	2.5	16.5	O K
960 min Summer	50.910	0.160	0.0	2.5	2.5	13.4	O K
1440 min Summer	50.860	0.110	0.0	2.5	2.5	9.2	O K
2160 min Summer	50.834	0.084	0.0	2.1	2.1	7.0	O K
2880 min Summer	50.819	0.069	0.0	1.7	1.7	5.8	O K
4320 min Summer	50.803	0.053	0.0	1.3	1.3	4.4	O K
5760 min Summer	50.793	0.043	0.0	1.1	1.1	3.6	O K
7200 min Summer	50.787	0.037	0.0	0.9	0.9	3.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	72.682	0.0	17.5	18
30 min Summer	48.363	0.0	23.4	32
60 min Summer	30.811	0.0	29.8	60
120 min Summer	19.036	0.0	36.8	96
180 min Summer	14.191	0.0	41.1	128
240 min Summer	11.467	0.0	44.3	162
360 min Summer	8.493	0.0	49.3	230
480 min Summer	6.855	0.0	53.0	298
600 min Summer	5.801	0.0	56.1	362
720 min Summer	5.059	0.0	58.7	426
960 min Summer	4.074	0.0	63.0	542
1440 min Summer	2.998	0.0	69.6	766
2160 min Summer	2.203	0.0	76.7	1124
2880 min Summer	1.769	0.0	82.1	1472
4320 min Summer	1.297	0.0	90.3	2204
5760 min Summer	1.040	0.0	96.5	2936
7200 min Summer	0.876	0.0	101.7	3672

Cascade Summary of Results for TANK 5.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	50.782	0.032	0.0	0.8	0.8	2.7	O K
10080 min Summer	50.779	0.029	0.0	0.7	0.7	2.4	O K
15 min Winter	50.965	0.215	0.0	2.5	2.5	18.0	O K
30 min Winter	51.024	0.274	0.0	2.5	2.5	22.9	O K
60 min Winter	51.072	0.322	0.0	2.5	2.5	26.9	O K
120 min Winter	51.090	0.340	0.0	2.5	2.5	28.4	O K
180 min Winter	51.085	0.335	0.0	2.5	2.5	28.0	O K
240 min Winter	51.071	0.321	0.0	2.5	2.5	26.9	O K
360 min Winter	51.036	0.286	0.0	2.5	2.5	23.9	O K
480 min Winter	50.999	0.249	0.0	2.5	2.5	20.8	O K
600 min Winter	50.963	0.213	0.0	2.5	2.5	17.8	O K
720 min Winter	50.930	0.180	0.0	2.5	2.5	15.0	O K
960 min Winter	50.877	0.127	0.0	2.5	2.5	10.6	O K
1440 min Winter	50.837	0.087	0.0	2.2	2.2	7.3	O K
2160 min Winter	50.815	0.065	0.0	1.6	1.6	5.5	O K
2880 min Winter	50.803	0.053	0.0	1.3	1.3	4.4	O K
4320 min Winter	50.789	0.039	0.0	1.0	1.0	3.3	O K
5760 min Winter	50.782	0.032	0.0	0.8	0.8	2.6	O K
7200 min Winter	50.777	0.027	0.0	0.7	0.7	2.2	O K
8640 min Winter	50.773	0.023	0.0	0.6	0.6	1.9	O K
10080 min Winter	50.771	0.021	0.0	0.5	0.5	1.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.762	0.0	106.2	4408
10080 min Summer	0.677	0.0	110.1	5136
15 min Winter	72.682	0.0	19.6	17
30 min Winter	48.363	0.0	26.2	32
60 min Winter	30.811	0.0	33.3	60
120 min Winter	19.036	0.0	41.2	110
180 min Winter	14.191	0.0	46.1	138
240 min Winter	11.467	0.0	49.7	178
360 min Winter	8.493	0.0	55.2	252
480 min Winter	6.855	0.0	59.4	320
600 min Winter	5.801	0.0	62.8	386
720 min Winter	5.059	0.0	65.7	448
960 min Winter	4.074	0.0	70.6	558
1440 min Winter	2.998	0.0	77.9	766
2160 min Winter	2.203	0.0	85.9	1128
2880 min Winter	1.769	0.0	92.0	1484
4320 min Winter	1.297	0.0	101.2	2204
5760 min Winter	1.040	0.0	108.1	2912
7200 min Winter	0.876	0.0	113.9	3600
8640 min Winter	0.762	0.0	118.9	4320
10080 min Winter	0.677	0.0	123.3	5128

Cascade Rainfall Details for TANK 5.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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.129

Time (mins) From:	To:	Area (ha)
0	4	0.129

Cascade Model Details for TANK 5.srcx

Storage is Online Cover Level (m) 52.250

Cellular Storage Structure

Invert Level (m) 50.750 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

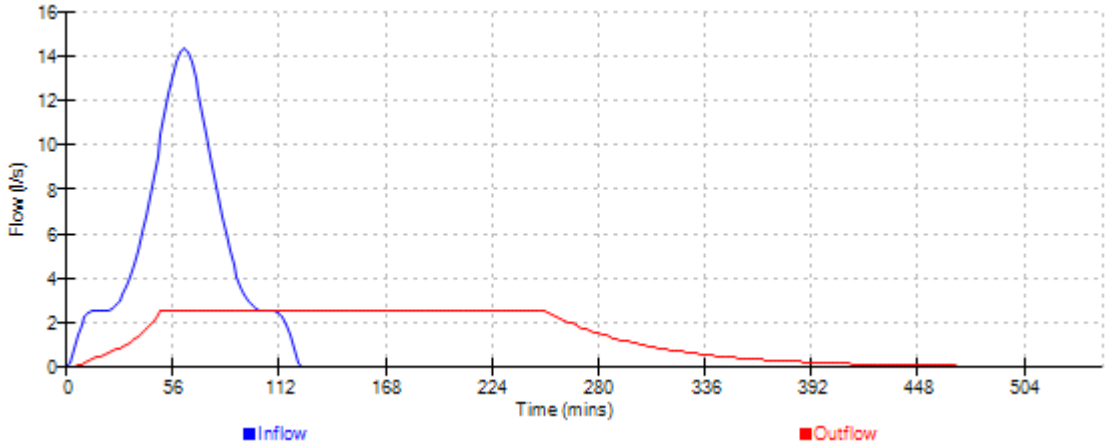
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	88.0	88.0	0.801	0.0	118.4
0.800	88.0	118.4			

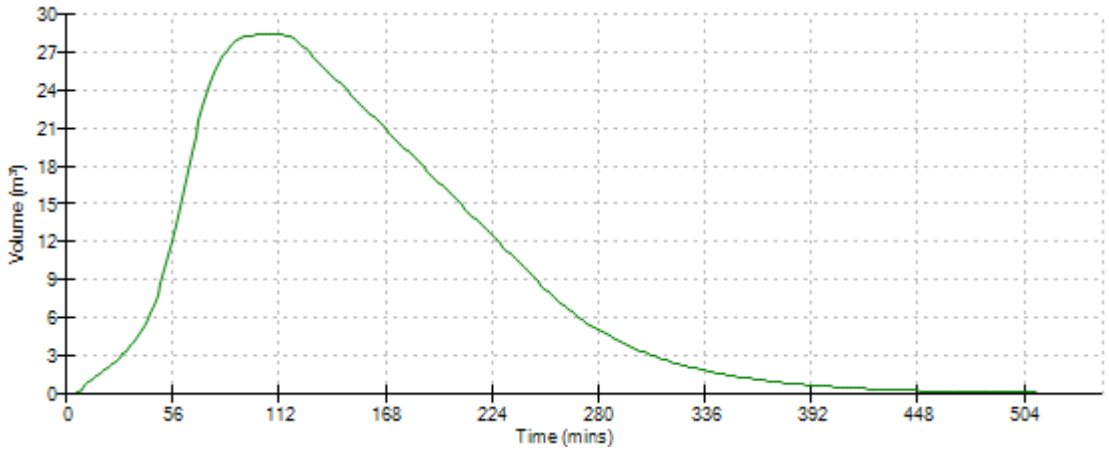
Pump Outflow Control

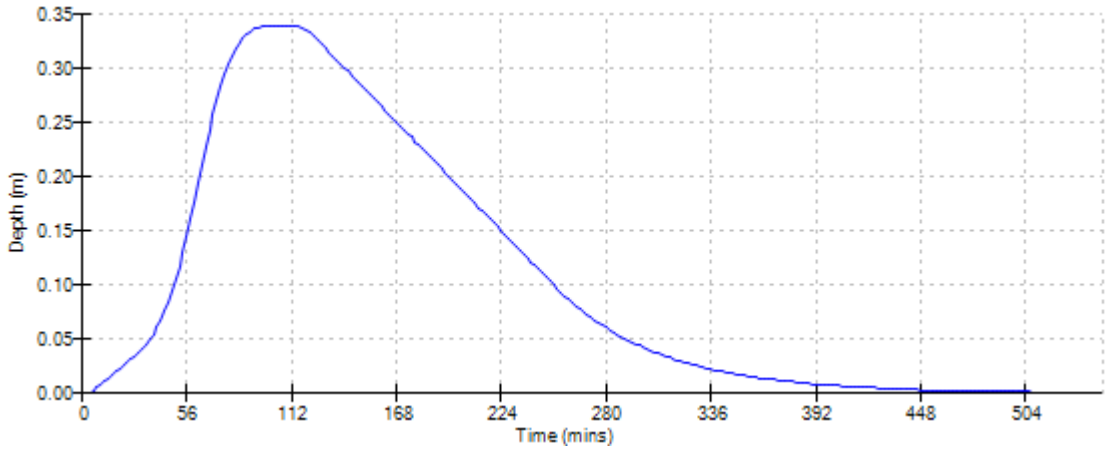
Invert Level (m) 50.750

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.5000	0.900	2.5000	1.700	2.5000	2.500	2.5000
0.200	2.5000	1.000	2.5000	1.800	2.5000	2.600	2.5000
0.300	2.5000	1.100	2.5000	1.900	2.5000	2.700	2.5000
0.400	2.5000	1.200	2.5000	2.000	2.5000	2.800	2.5000
0.500	2.5000	1.300	2.5000	2.100	2.5000	2.900	2.5000
0.600	2.5000	1.400	2.5000	2.200	2.5000	3.000	2.5000
0.700	2.5000	1.500	2.5000	2.300	2.5000		
0.800	2.5000	1.600	2.5000	2.400	2.5000		

Cascade Event: 120 min Winter for TANK 5.srcx







Cascade Summary of Results for TANK 6.srcx

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

Half Drain Time : 256 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	51.817	0.117	0.0	2.3	2.3	32.1	O K
30 min Summer	51.853	0.153	0.0	2.4	2.4	41.8	O K
60 min Summer	51.887	0.187	0.0	2.5	2.5	51.2	O K
120 min Summer	51.915	0.215	0.0	2.5	2.5	58.9	O K
180 min Summer	51.924	0.224	0.0	2.5	2.5	61.4	O K
240 min Summer	51.928	0.228	0.0	2.5	2.5	62.4	O K
360 min Summer	51.931	0.231	0.0	2.5	2.5	63.1	O K
480 min Summer	51.929	0.229	0.0	2.5	2.5	62.8	O K
600 min Summer	51.926	0.226	0.0	2.5	2.5	61.8	O K
720 min Summer	51.921	0.221	0.0	2.5	2.5	60.4	O K
960 min Summer	51.909	0.209	0.0	2.5	2.5	57.2	O K
1440 min Summer	51.884	0.184	0.0	2.5	2.5	50.3	O K
2160 min Summer	51.851	0.151	0.0	2.4	2.4	41.2	O K
2880 min Summer	51.825	0.125	0.0	2.3	2.3	34.3	O K
4320 min Summer	51.796	0.096	0.0	2.1	2.1	26.2	O K
5760 min Summer	51.781	0.081	0.0	1.8	1.8	22.1	O K
7200 min Summer	51.771	0.071	0.0	1.6	1.6	19.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	72.682	0.0	31.6	18
30 min Summer	48.363	0.0	42.5	33
60 min Summer	30.811	0.0	55.7	62
120 min Summer	19.036	0.0	69.0	120
180 min Summer	14.191	0.0	77.2	174
240 min Summer	11.467	0.0	83.2	202
360 min Summer	8.493	0.0	92.6	264
480 min Summer	6.855	0.0	99.6	332
600 min Summer	5.801	0.0	105.4	402
720 min Summer	5.059	0.0	110.3	470
960 min Summer	4.074	0.0	118.5	606
1440 min Summer	2.998	0.0	130.6	866
2160 min Summer	2.203	0.0	145.1	1236
2880 min Summer	1.769	0.0	155.3	1588
4320 min Summer	1.297	0.0	170.3	2288
5760 min Summer	1.040	0.0	183.0	3000
7200 min Summer	0.876	0.0	192.7	3744

Cascade Summary of Results for TANK 6.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	51.765	0.065	0.0	1.4	1.4	17.8	O K
10080 min Summer	51.760	0.060	0.0	1.3	1.3	16.5	O K
15 min Winter	51.832	0.132	0.0	2.3	2.3	36.0	O K
30 min Winter	51.872	0.172	0.0	2.4	2.4	47.0	O K
60 min Winter	51.911	0.211	0.0	2.5	2.5	57.8	O K
120 min Winter	51.945	0.245	0.0	2.5	2.5	67.0	O K
180 min Winter	51.957	0.257	0.0	2.5	2.5	70.4	O K
240 min Winter	51.961	0.261	0.0	2.5	2.5	71.3	O K
360 min Winter	51.961	0.261	0.0	2.5	2.5	71.3	O K
480 min Winter	51.957	0.257	0.0	2.5	2.5	70.3	O K
600 min Winter	51.950	0.250	0.0	2.5	2.5	68.5	O K
720 min Winter	51.942	0.242	0.0	2.5	2.5	66.1	O K
960 min Winter	51.922	0.222	0.0	2.5	2.5	60.7	O K
1440 min Winter	51.882	0.182	0.0	2.5	2.5	49.9	O K
2160 min Winter	51.835	0.135	0.0	2.4	2.4	36.8	O K
2880 min Winter	51.804	0.104	0.0	2.2	2.2	28.3	O K
4320 min Winter	51.779	0.079	0.0	1.8	1.8	21.5	O K
5760 min Winter	51.766	0.066	0.0	1.5	1.5	18.0	O K
7200 min Winter	51.759	0.059	0.0	1.2	1.2	16.0	O K
8640 min Winter	51.754	0.054	0.0	1.1	1.1	14.6	O K
10080 min Winter	51.750	0.050	0.0	1.0	1.0	13.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.762	0.0	201.0	4416
10080 min Summer	0.677	0.0	207.9	5144
15 min Winter	72.682	0.0	35.5	18
30 min Winter	48.363	0.0	47.8	32
60 min Winter	30.811	0.0	62.5	62
120 min Winter	19.036	0.0	77.3	118
180 min Winter	14.191	0.0	86.6	174
240 min Winter	11.467	0.0	93.3	228
360 min Winter	8.493	0.0	103.8	284
480 min Winter	6.855	0.0	111.7	362
600 min Winter	5.801	0.0	118.2	438
720 min Winter	5.059	0.0	123.7	512
960 min Winter	4.074	0.0	132.8	656
1440 min Winter	2.998	0.0	146.5	924
2160 min Winter	2.203	0.0	162.6	1296
2880 min Winter	1.769	0.0	174.0	1616
4320 min Winter	1.297	0.0	190.9	2312
5760 min Winter	1.040	0.0	205.1	3008
7200 min Winter	0.876	0.0	215.9	3744
8640 min Winter	0.762	0.0	225.2	4408
10080 min Winter	0.677	0.0	233.1	5152

Cascade Rainfall Details for TANK 6.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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.245

Time (mins) From:	To:	Area (ha)
0	4	0.245

Cascade Model Details for TANK 6.srcx

Storage is Online Cover Level (m) 53.200

Cellular Storage Structure

Invert Level (m) 51.700 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	288.0	288.0	0.801	0.0	342.4
0.800	288.0	342.4			

Hydro-Brake Optimum® Outflow Control

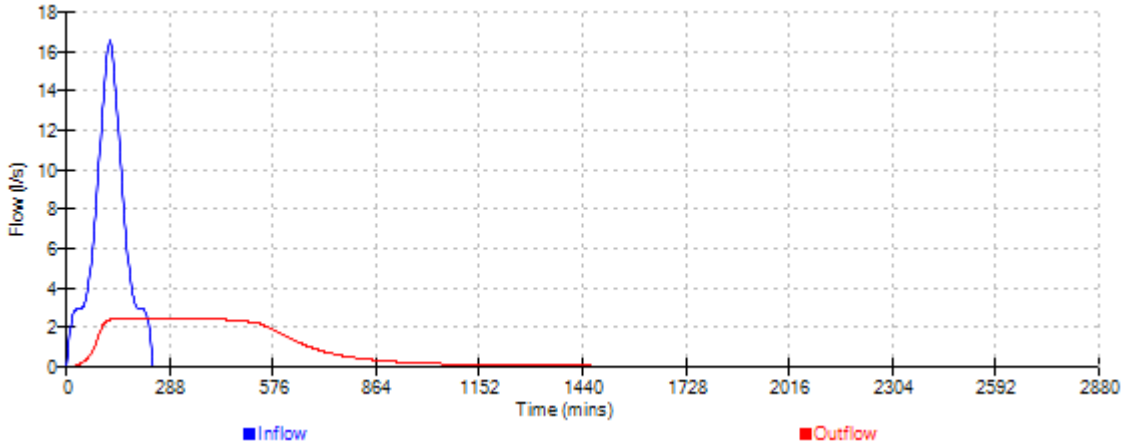
Unit Reference	MD-SHE-0078-2500-0800-2500
Design Head (m)	0.800
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	78
Invert Level (m)	51.700
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

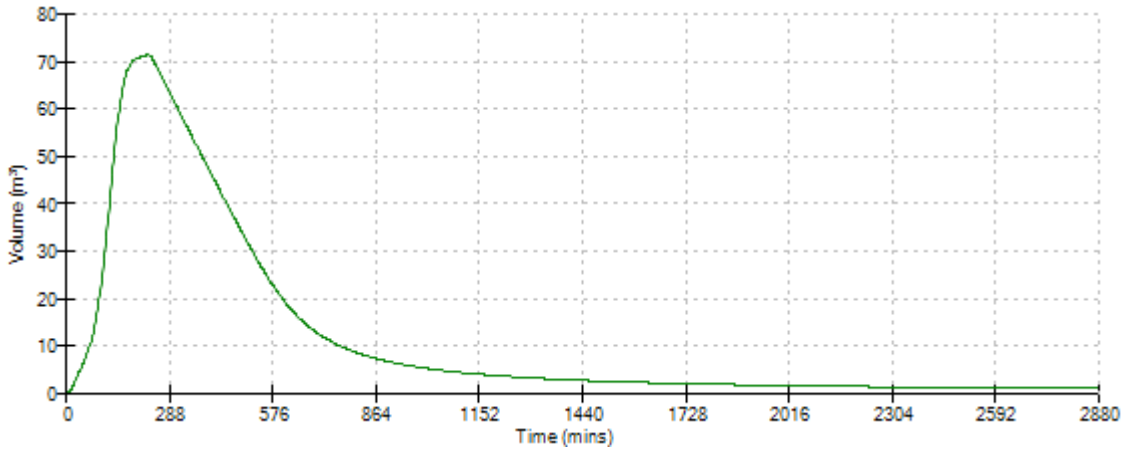
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	2.5
Flush-Flo™	0.236	2.5
Kick-Flo®	0.508	2.0
Mean Flow over Head Range	-	2.2

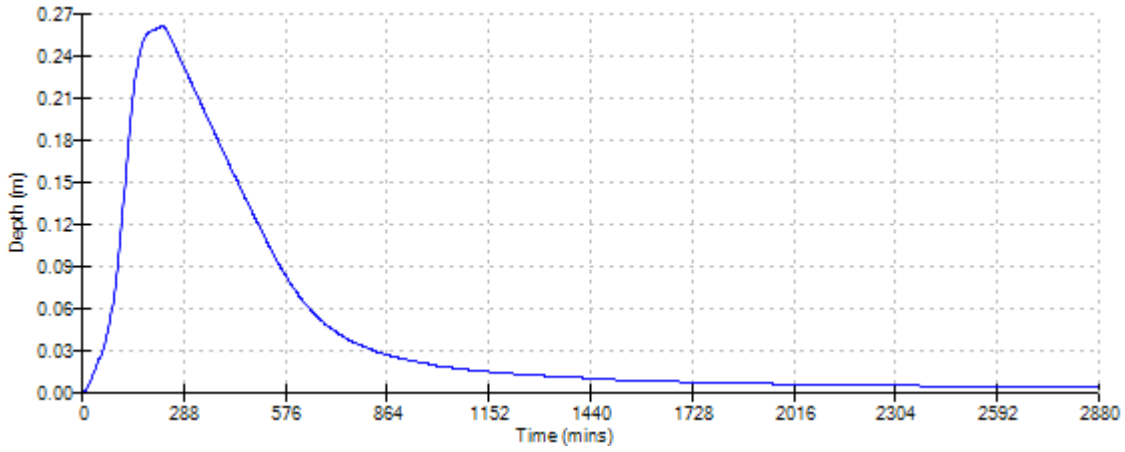
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.2	1.200	3.0	3.000	4.6	7.000	6.8
0.200	2.5	1.400	3.2	3.500	4.9	7.500	7.0
0.300	2.5	1.600	3.4	4.000	5.2	8.000	7.3
0.400	2.4	1.800	3.6	4.500	5.5	8.500	7.5
0.500	2.1	2.000	3.8	5.000	5.8	9.000	7.7
0.600	2.2	2.200	4.0	5.500	6.1	9.500	7.9
0.800	2.5	2.400	4.1	6.000	6.3		
1.000	2.8	2.600	4.3	6.500	6.6		

Cascade Event: 240 min Winter for TANK 6.srcx







Cascade Summary of Results for PP1.srcx

Upstream Structures	Outflow To	Overflow To
(None)	TANK 3.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	55.612	0.312	0.0	2.4	2.4	6.8	Flood Risk
30 min Summer	55.658	0.358	0.0	2.4	2.4	8.9	Flood Risk
60 min Summer	55.680	0.380	0.0	2.4	2.4	10.0	Flood Risk
120 min Summer	55.677	0.377	0.0	2.4	2.4	9.9	Flood Risk
180 min Summer	55.659	0.359	0.0	2.4	2.4	9.0	Flood Risk
240 min Summer	55.638	0.338	0.0	2.4	2.4	7.9	Flood Risk
360 min Summer	55.593	0.293	0.0	2.4	2.4	6.0	O K
480 min Summer	55.539	0.239	0.0	2.4	2.4	4.0	O K
600 min Summer	55.490	0.190	0.0	2.4	2.4	2.5	O K
720 min Summer	55.448	0.148	0.0	2.4	2.4	1.5	O K
960 min Summer	55.397	0.097	0.0	2.4	2.4	0.7	O K
1440 min Summer	55.372	0.072	0.0	1.8	1.8	0.4	O K
2160 min Summer	55.358	0.058	0.0	1.3	1.3	0.2	O K
2880 min Summer	55.350	0.050	0.0	1.0	1.0	0.2	O K
4320 min Summer	55.341	0.041	0.0	0.7	0.7	0.1	O K
5760 min Summer	55.336	0.036	0.0	0.6	0.6	0.1	O K
7200 min Summer	55.333	0.033	0.0	0.5	0.5	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	94.179	0.0	8.2	17
30 min Summer	63.261	0.0	11.7	30
60 min Summer	40.510	0.0	15.5	48
120 min Summer	25.003	0.0	19.6	82
180 min Summer	18.552	0.0	22.0	118
240 min Summer	14.912	0.0	23.7	152
360 min Summer	10.975	0.0	26.3	218
480 min Summer	8.815	0.0	28.2	276
600 min Summer	7.430	0.0	29.8	332
720 min Summer	6.458	0.0	31.1	384
960 min Summer	5.172	0.0	33.2	490
1440 min Summer	3.774	0.0	36.2	734
2160 min Summer	2.748	0.0	39.2	1100
2880 min Summer	2.192	0.0	41.3	1424
4320 min Summer	1.590	0.0	44.1	2164
5760 min Summer	1.265	0.0	45.9	2840
7200 min Summer	1.060	0.0	47.2	3544

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	55.330	0.030	0.0	0.4	0.4	0.1	O K
10080 min Summer	55.328	0.028	0.0	0.4	0.4	0.1	O K
15 min Winter	55.637	0.337	0.0	2.4	2.4	7.9	Flood Risk
30 min Winter	55.687	0.387	0.0	2.4	2.4	10.4	Flood Risk
60 min Winter	55.710	0.410	0.0	2.5	2.5	11.7	Flood Risk
120 min Winter	55.703	0.403	0.0	2.5	2.5	11.3	Flood Risk
180 min Winter	55.676	0.376	0.0	2.4	2.4	9.9	Flood Risk
240 min Winter	55.644	0.344	0.0	2.4	2.4	8.2	Flood Risk
360 min Winter	55.566	0.266	0.0	2.4	2.4	4.9	O K
480 min Winter	55.478	0.178	0.0	2.4	2.4	2.2	O K
600 min Winter	55.407	0.107	0.0	2.4	2.4	0.8	O K
720 min Winter	55.388	0.088	0.0	2.2	2.2	0.5	O K
960 min Winter	55.372	0.072	0.0	1.8	1.8	0.4	O K
1440 min Winter	55.357	0.057	0.0	1.3	1.3	0.2	O K
2160 min Winter	55.347	0.047	0.0	0.9	0.9	0.2	O K
2880 min Winter	55.341	0.041	0.0	0.7	0.7	0.1	O K
4320 min Winter	55.334	0.034	0.0	0.5	0.5	0.1	O K
5760 min Winter	55.330	0.030	0.0	0.4	0.4	0.1	O K
7200 min Winter	55.327	0.027	0.0	0.4	0.4	0.1	O K
8640 min Winter	55.325	0.025	0.0	0.3	0.3	0.0	O K
10080 min Winter	55.324	0.024	0.0	0.3	0.3	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.917	0.0	48.1	4272
10080 min Summer	0.812	0.0	48.8	4984
15 min Winter	94.179	0.0	9.4	17
30 min Winter	63.261	0.0	13.4	30
60 min Winter	40.510	0.0	17.7	52
120 min Winter	25.003	0.0	22.2	90
180 min Winter	18.552	0.0	24.9	128
240 min Winter	14.912	0.0	26.8	164
360 min Winter	10.975	0.0	29.7	230
480 min Winter	8.815	0.0	31.9	280
600 min Winter	7.430	0.0	33.7	320
720 min Winter	6.458	0.0	35.1	368
960 min Winter	5.172	0.0	37.5	490
1440 min Winter	3.774	0.0	40.9	720
2160 min Winter	2.748	0.0	44.4	1080
2880 min Winter	2.192	0.0	46.8	1460
4320 min Winter	1.590	0.0	50.1	2192
5760 min Winter	1.265	0.0	52.3	2912
7200 min Winter	1.060	0.0	53.9	3576
8640 min Winter	0.917	0.0	55.1	4304
10080 min Winter	0.812	0.0	56.1	4968

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.058

Time (mins) From:	To:	Area (ha)
0	4	0.058

Cascade Model Details for PP1.srcx

Storage is Online Cover Level (m) 55.900

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	11.6
Membrane Percolation (mm/hr)	1000	Length (m)	35.0
Max Percolation (l/s)	112.8	Slope (1:X)	40.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	55.300	Cap Volume Depth (m)	0.400

Hydro-Brake Optimum® Outflow Control

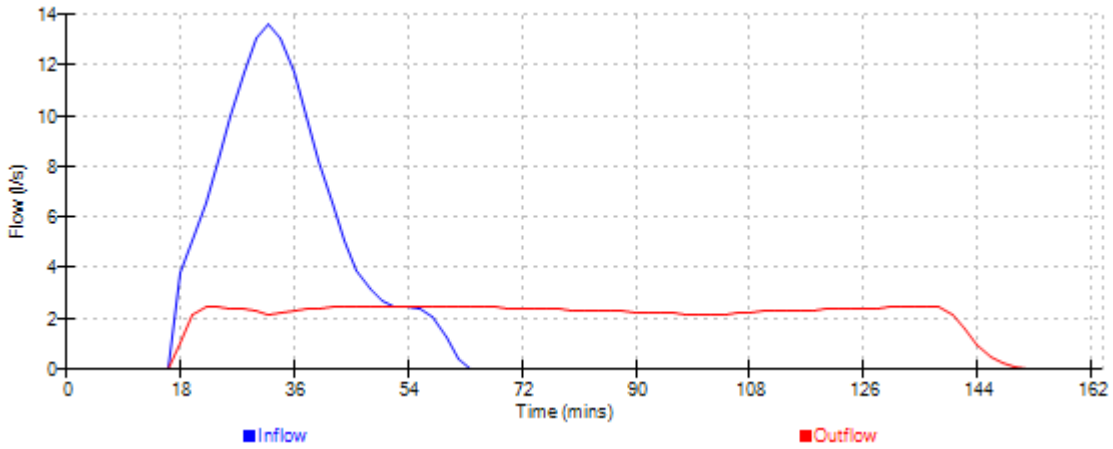
Unit Reference	MD-SHE-0083-2500-0400-2500
Design Head (m)	0.400
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	83
Invert Level (m)	55.300
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

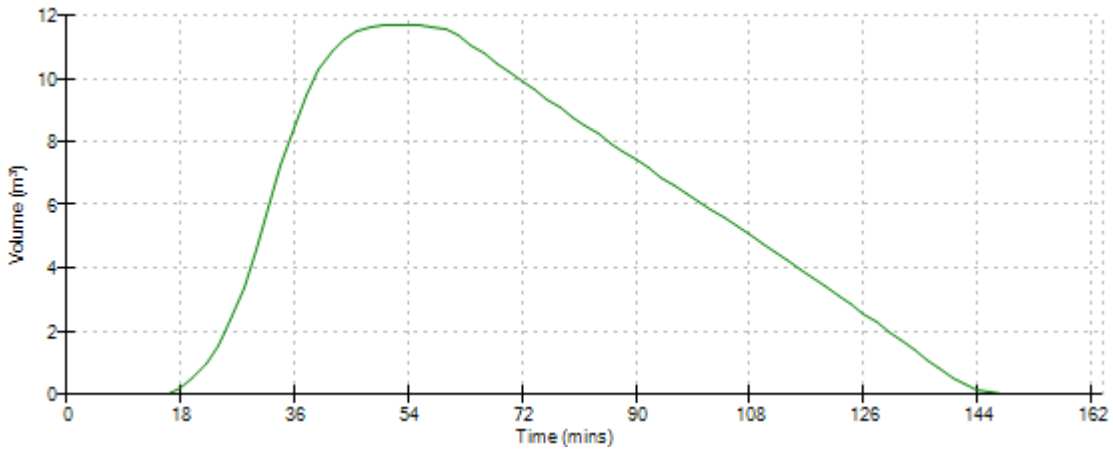
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	2.5
Flush-Flo™	0.131	2.4
Kick-Flo®	0.290	2.1
Mean Flow over Head Range	-	2.0

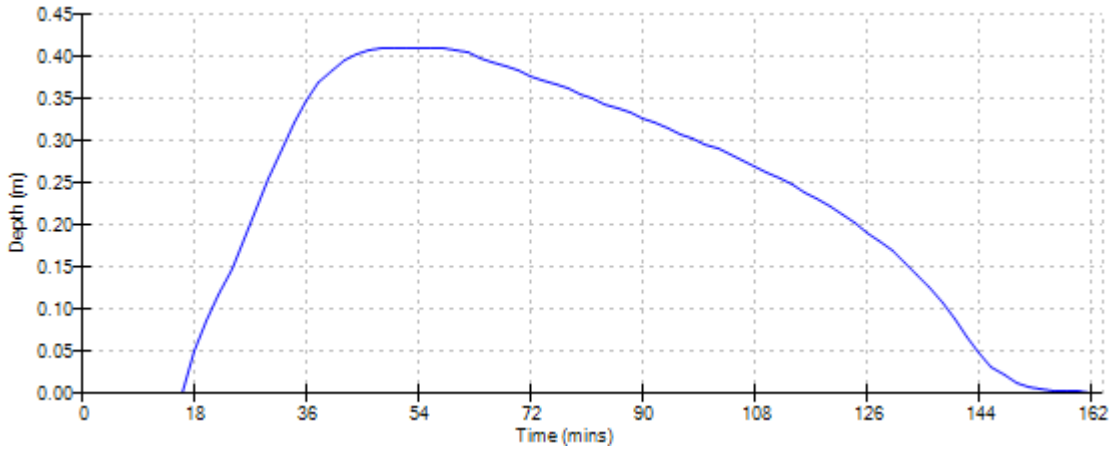
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.4	1.200	4.1	3.000	6.2	7.000	9.4
0.200	2.4	1.400	4.4	3.500	6.7	7.500	9.8
0.300	2.2	1.600	4.6	4.000	7.1	8.000	10.1
0.400	2.5	1.800	4.9	4.500	7.5	8.500	10.4
0.500	2.7	2.000	5.2	5.000	8.0	9.000	10.7
0.600	3.0	2.200	5.4	5.500	8.3	9.500	11.0
0.800	3.4	2.400	5.6	6.000	8.7		
1.000	3.7	2.600	5.8	6.500	9.1		

Cascade Event: 60 min Winter for PP1.srcx







Cascade Summary of Results for PP2.srcx

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

Half Drain Time : 34 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	53.504	0.404	0.0	5.0	5.0	11.7	Flood Risk
30 min Summer	53.541	0.441	0.0	5.2	5.2	14.0	Flood Risk
60 min Summer	53.551	0.451	0.0	5.2	5.2	14.6	Flood Risk
120 min Summer	53.531	0.431	0.0	5.1	5.1	13.4	Flood Risk
180 min Summer	53.500	0.400	0.0	4.9	4.9	11.5	O K
240 min Summer	53.465	0.365	0.0	4.9	4.9	9.6	O K
360 min Summer	53.388	0.288	0.0	4.9	4.9	6.0	O K
480 min Summer	53.311	0.211	0.0	4.9	4.9	3.2	O K
600 min Summer	53.253	0.153	0.0	4.9	4.9	1.7	O K
720 min Summer	53.221	0.121	0.0	4.8	4.8	1.1	O K
960 min Summer	53.199	0.099	0.0	3.9	3.9	0.7	O K
1440 min Summer	53.179	0.079	0.0	2.9	2.9	0.5	O K
2160 min Summer	53.165	0.065	0.0	2.1	2.1	0.3	O K
2880 min Summer	53.157	0.057	0.0	1.7	1.7	0.2	O K
4320 min Summer	53.148	0.048	0.0	1.2	1.2	0.2	O K
5760 min Summer	53.142	0.042	0.0	1.0	1.0	0.1	O K
7200 min Summer	53.138	0.038	0.0	0.8	0.8	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	94.179	0.0	15.2	16
30 min Summer	63.261	0.0	20.8	27
60 min Summer	40.510	0.0	27.0	44
120 min Summer	25.003	0.0	33.6	78
180 min Summer	18.552	0.0	37.5	112
240 min Summer	14.912	0.0	40.3	146
360 min Summer	10.975	0.0	44.5	208
480 min Summer	8.815	0.0	47.7	262
600 min Summer	7.430	0.0	50.3	314
720 min Summer	6.458	0.0	52.5	368
960 min Summer	5.172	0.0	56.0	490
1440 min Summer	3.774	0.0	61.2	722
2160 min Summer	2.748	0.0	66.7	1100
2880 min Summer	2.192	0.0	70.7	1436
4320 min Summer	1.590	0.0	76.4	2132
5760 min Summer	1.265	0.0	80.5	2936
7200 min Summer	1.060	0.0	83.8	3584

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	53.135	0.035	0.0	0.7	0.7	0.1	O K
10080 min Summer	53.133	0.033	0.0	0.6	0.6	0.1	O K
15 min Winter	53.534	0.434	0.0	5.1	5.1	13.5	Flood Risk
30 min Winter	53.576	0.476	0.0	5.4	5.4	16.3	Flood Risk
60 min Winter	53.585	0.485	0.0	5.4	5.4	16.9	Flood Risk
120 min Winter	53.553	0.453	0.0	5.2	5.2	14.8	Flood Risk
180 min Winter	53.505	0.405	0.0	5.0	5.0	11.8	Flood Risk
240 min Winter	53.451	0.351	0.0	4.9	4.9	8.9	O K
360 min Winter	53.311	0.211	0.0	4.9	4.9	3.2	O K
480 min Winter	53.221	0.121	0.0	4.8	4.8	1.0	O K
600 min Winter	53.203	0.103	0.0	4.1	4.1	0.8	O K
720 min Winter	53.192	0.092	0.0	3.5	3.5	0.6	O K
960 min Winter	53.179	0.079	0.0	2.8	2.8	0.4	O K
1440 min Winter	53.165	0.065	0.0	2.1	2.1	0.3	O K
2160 min Winter	53.154	0.054	0.0	1.5	1.5	0.2	O K
2880 min Winter	53.148	0.048	0.0	1.2	1.2	0.2	O K
4320 min Winter	53.140	0.040	0.0	0.9	0.9	0.1	O K
5760 min Winter	53.135	0.035	0.0	0.7	0.7	0.1	O K
7200 min Winter	53.132	0.032	0.0	0.6	0.6	0.1	O K
8640 min Winter	53.130	0.030	0.0	0.5	0.5	0.1	O K
10080 min Winter	53.128	0.028	0.0	0.4	0.4	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.917	0.0	86.5	4264
10080 min Summer	0.812	0.0	88.8	4968
15 min Winter	94.179	0.0	17.2	16
30 min Winter	63.261	0.0	23.5	29
60 min Winter	40.510	0.0	30.4	48
120 min Winter	25.003	0.0	37.8	86
180 min Winter	18.552	0.0	42.2	122
240 min Winter	14.912	0.0	45.3	156
360 min Winter	10.975	0.0	50.0	210
480 min Winter	8.815	0.0	53.6	248
600 min Winter	7.430	0.0	56.5	308
720 min Winter	6.458	0.0	59.0	366
960 min Winter	5.172	0.0	62.9	488
1440 min Winter	3.774	0.0	68.8	730
2160 min Winter	2.748	0.0	75.0	1068
2880 min Winter	2.192	0.0	79.5	1424
4320 min Winter	1.590	0.0	86.0	2160
5760 min Winter	1.265	0.0	90.7	2832
7200 min Winter	1.060	0.0	94.5	3672
8640 min Winter	0.917	0.0	97.6	4160
10080 min Winter	0.812	0.0	100.3	5064

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.093

Time (mins) From:	To:	Area (ha)
0	4	0.093

Cascade Model Details for PP2.srcx

Storage is Online Cover Level (m) 53.800

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.0
Membrane Percolation (mm/hr)	1000	Length (m)	61.0
Max Percolation (l/s)	67.8	Slope (1:X)	120.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	53.100	Cap Volume Depth (m)	0.500

Hydro-Brake Optimum® Outflow Control

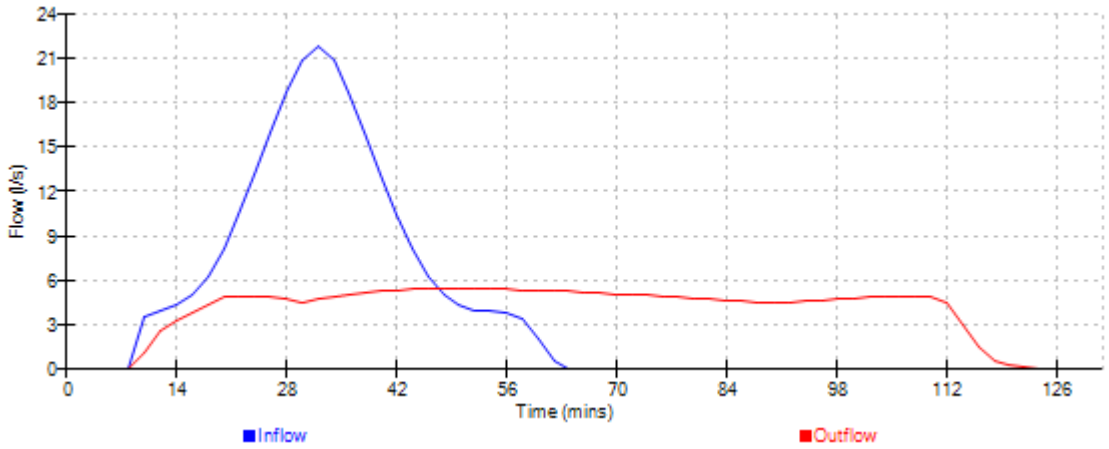
Unit Reference	MD-SHE-0113-5000-0400-5000
Design Head (m)	0.400
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	113
Invert Level (m)	53.100
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

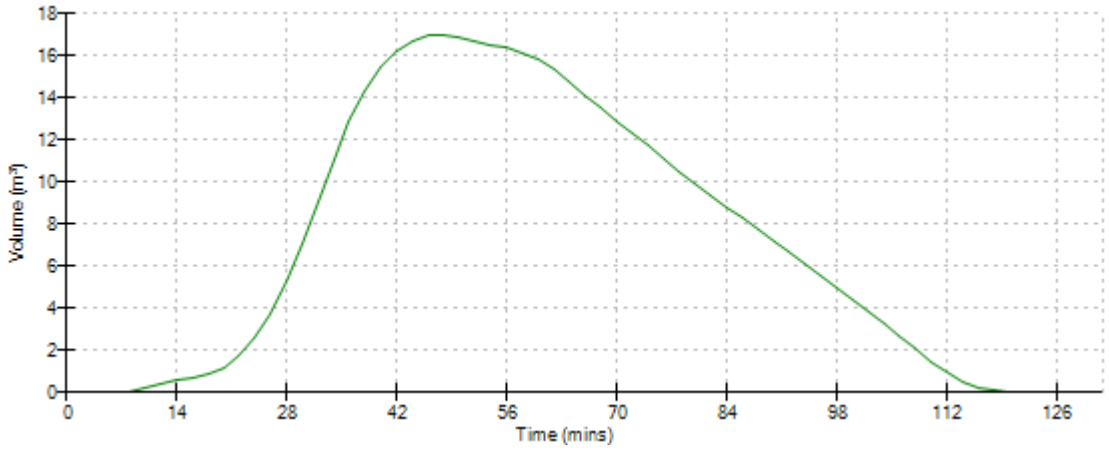
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	4.9
Flush-Flo™	0.168	4.9
Kick-Flo®	0.310	4.4
Mean Flow over Head Range	-	3.9

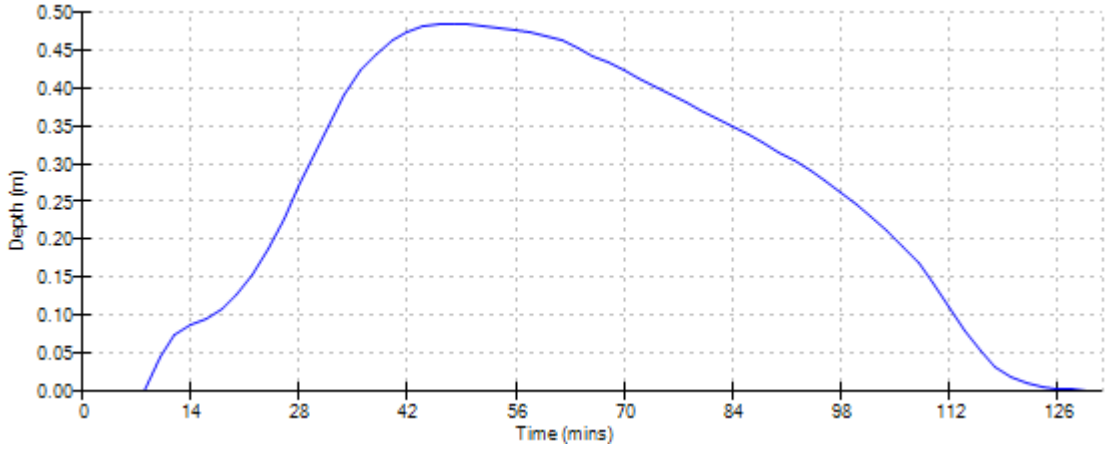
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.9	1.200	8.3	3.000	12.8	7.000	19.3
0.200	4.9	1.400	8.9	3.500	13.7	7.500	20.0
0.300	4.5	1.600	9.5	4.000	14.6	8.000	20.6
0.400	4.9	1.800	10.0	4.500	15.4	8.500	21.3
0.500	5.5	2.000	10.5	5.000	16.3	9.000	21.9
0.600	6.0	2.200	11.0	5.500	17.1	9.500	22.5
0.800	6.8	2.400	11.5	6.000	17.8		
1.000	7.6	2.600	11.9	6.500	18.6		

Cascade Event: 60 min Winter for PP2.srcx







Cascade Summary of Results for SWALE 1.srcx

Upstream Structures	Outflow To	Overflow To
TANK 2.srcx	POND.srcx	(None)

Half Drain Time : 129 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	54.410	0.370	0.0	5.0	5.0	26.6	O K
30 min Summer	54.472	0.432	0.0	5.0	5.0	36.2	O K
60 min Summer	54.536	0.496	0.0	5.0	5.0	47.3	O K
120 min Summer	54.582	0.542	0.0	5.0	5.0	56.3	O K
180 min Summer	54.602	0.562	0.0	5.0	5.0	60.3	O K
240 min Summer	54.613	0.573	0.0	5.0	5.0	62.6	O K
360 min Summer	54.610	0.570	0.0	5.0	5.0	62.0	O K
480 min Summer	54.596	0.556	0.0	5.0	5.0	59.1	O K
600 min Summer	54.581	0.541	0.0	5.0	5.0	56.1	O K
720 min Summer	54.563	0.523	0.0	5.0	5.0	52.5	O K
960 min Summer	54.515	0.475	0.0	5.0	5.0	43.5	O K
1440 min Summer	54.407	0.367	0.0	5.0	5.0	26.2	O K
2160 min Summer	54.263	0.223	0.0	5.0	5.0	9.6	O K
2880 min Summer	54.162	0.122	0.0	4.9	4.9	2.5	O K
4320 min Summer	54.102	0.062	0.0	3.8	3.8	0.6	O K
5760 min Summer	54.085	0.045	0.0	3.0	3.0	0.3	O K
7200 min Summer	54.076	0.036	0.0	2.6	2.6	0.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	94.179	0.0	51.9	64
30 min Summer	63.261	0.0	69.7	97
60 min Summer	40.510	0.0	89.3	138
120 min Summer	25.003	0.0	110.2	186
180 min Summer	18.552	0.0	122.7	222
240 min Summer	14.912	0.0	131.5	256
360 min Summer	10.975	0.0	145.2	322
480 min Summer	8.815	0.0	155.4	374
600 min Summer	7.430	0.0	163.8	426
720 min Summer	6.458	0.0	170.9	484
960 min Summer	5.172	0.0	182.4	606
1440 min Summer	3.774	0.0	199.7	840
2160 min Summer	2.748	0.0	218.0	1172
2880 min Summer	2.192	0.0	231.8	1496
4320 min Summer	1.590	0.0	252.3	2192
5760 min Summer	1.265	0.0	267.6	2888
7200 min Summer	1.060	0.0	280.1	3672

Cascade Summary of Results for SWALE 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	54.069	0.029	0.0	2.2	2.2	0.1	O K
10080 min Summer	54.064	0.024	0.0	2.0	2.0	0.1	O K
15 min Winter	54.435	0.395	0.0	5.0	5.0	30.3	O K
30 min Winter	54.506	0.466	0.0	5.0	5.0	42.0	O K
60 min Winter	54.573	0.533	0.0	5.0	5.0	54.5	O K
120 min Winter	54.620	0.580	0.0	5.0	5.0	64.2	O K
180 min Winter	54.642	0.602	0.0	5.0	5.0	69.1	O K
240 min Winter	54.655	0.615	0.0	5.0	5.0	72.0	O K
360 min Winter	54.664	0.624	0.0	5.0	5.0	74.0	O K
480 min Winter	54.645	0.605	0.0	5.0	5.0	69.6	O K
600 min Winter	54.621	0.581	0.0	5.0	5.0	64.4	O K
720 min Winter	54.590	0.550	0.0	5.0	5.0	57.8	O K
960 min Winter	54.507	0.467	0.0	5.0	5.0	42.1	O K
1440 min Winter	54.328	0.288	0.0	5.0	5.0	16.3	O K
2160 min Winter	54.131	0.091	0.0	4.7	4.7	1.3	O K
2880 min Winter	54.102	0.062	0.0	3.8	3.8	0.6	O K
4320 min Winter	54.080	0.040	0.0	2.8	2.8	0.2	O K
5760 min Winter	54.069	0.029	0.0	2.2	2.2	0.1	O K
7200 min Winter	54.062	0.022	0.0	1.8	1.8	0.1	O K
8640 min Winter	54.057	0.017	0.0	1.6	1.6	0.0	O K
10080 min Winter	54.054	0.014	0.0	1.5	1.5	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.917	0.0	291.2	4400
10080 min Summer	0.812	0.0	300.6	5112
15 min Winter	94.179	0.0	58.1	74
30 min Winter	63.261	0.0	78.1	111
60 min Winter	40.510	0.0	100.1	152
120 min Winter	25.003	0.0	123.4	202
180 min Winter	18.552	0.0	137.5	240
240 min Winter	14.912	0.0	147.3	272
360 min Winter	10.975	0.0	162.6	342
480 min Winter	8.815	0.0	174.2	386
600 min Winter	7.430	0.0	183.5	444
720 min Winter	6.458	0.0	191.4	514
960 min Winter	5.172	0.0	204.3	648
1440 min Winter	3.774	0.0	223.7	866
2160 min Winter	2.748	0.0	244.2	1112
2880 min Winter	2.192	0.0	259.7	1460
4320 min Winter	1.590	0.0	282.6	2152
5760 min Winter	1.265	0.0	299.7	2840
7200 min Winter	1.060	0.0	313.7	3536
8640 min Winter	0.917	0.0	325.9	4344
10080 min Winter	0.812	0.0	336.6	5056

Cascade Rainfall Details for SWALE 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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.154

Time (mins) From:	To:	Area (ha)
0	4	0.154

Cascade Model Details for SWALE 1.srcx

Storage is Online Cover Level (m) 55.000

Swale Structure

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	87.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	2.0
Safety Factor	2.0	Slope (1:X)	500.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	54.040	Cap Infiltration Depth (m)	0.000
Base Width (m)	0.5		

Hydro-Brake Optimum® Outflow Control

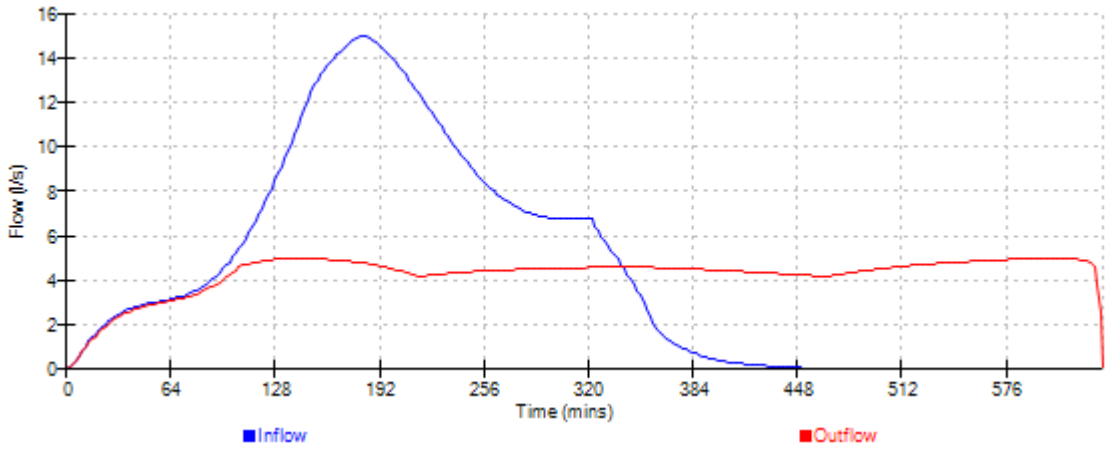
Unit Reference	MD-SHE-0109-5000-0800-5000
Design Head (m)	0.800
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	109
Invert Level (m)	54.000
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

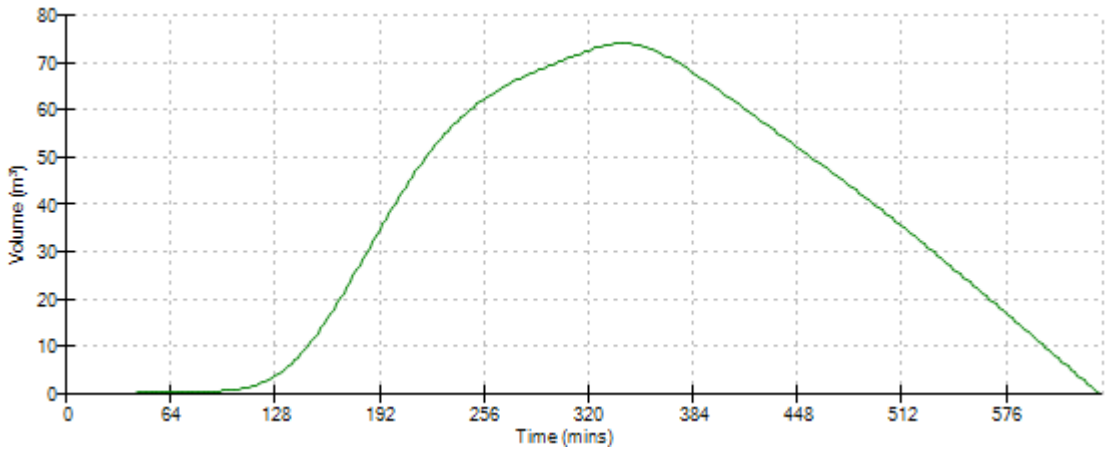
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	5.0
Flush-Flo™	0.242	5.0
Kick-Flo®	0.537	4.2
Mean Flow over Head Range	-	4.3

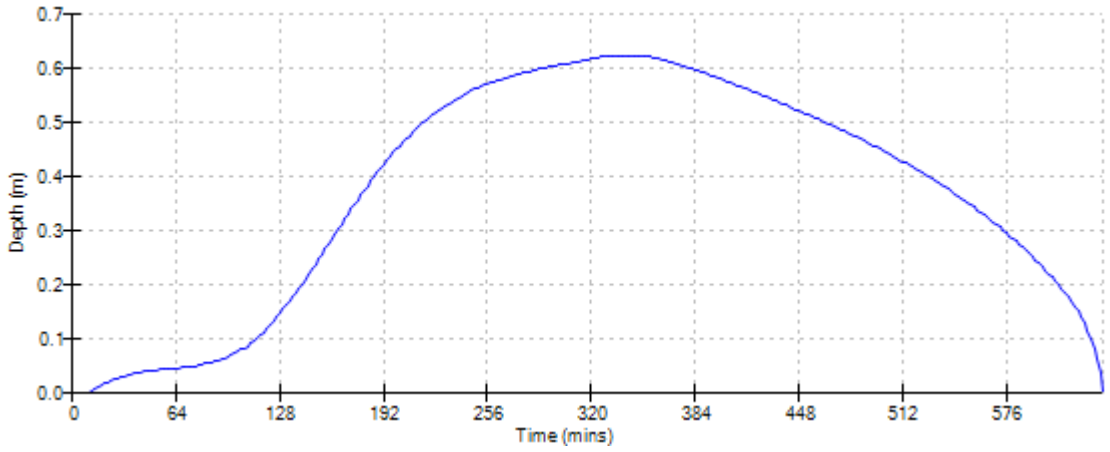
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.7	1.200	6.0	3.000	9.3	7.000	13.9
0.200	5.0	1.400	6.5	3.500	10.0	7.500	14.4
0.300	5.0	1.600	6.9	4.000	10.6	8.000	14.8
0.400	4.8	1.800	7.3	4.500	11.3	8.500	15.2
0.500	4.5	2.000	7.7	5.000	11.8	9.000	15.7
0.600	4.4	2.200	8.0	5.500	12.4	9.500	16.1
0.800	5.0	2.400	8.4	6.000	12.9		
1.000	5.5	2.600	8.7	6.500	13.4		

Cascade Event: 360 min Winter for SWALE 1.srcx







Cascade Summary of Results for SWALE 2.srcx

Upstream Structures	Outflow To	Overflow To
TANK 4.srcx TANK 5.srcx	POND.srcx	(None)

Half Drain Time : 0 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	50.433	0.313	0.0	149.0	149.0	3.3	Flood Risk
30 min Summer	50.408	0.288	0.0	131.5	131.5	2.7	Flood Risk
60 min Summer	50.358	0.238	0.0	98.8	98.8	1.8	O K
120 min Summer	50.305	0.185	0.0	67.7	67.7	1.0	O K
180 min Summer	50.277	0.157	0.0	52.9	52.9	0.7	O K
240 min Summer	50.258	0.138	0.0	43.8	43.8	0.5	O K
360 min Summer	50.236	0.116	0.0	33.8	33.8	0.4	O K
480 min Summer	50.223	0.103	0.0	28.1	28.1	0.3	O K
600 min Summer	50.214	0.094	0.0	24.5	24.5	0.2	O K
720 min Summer	50.207	0.087	0.0	22.0	22.0	0.2	O K
960 min Summer	50.198	0.078	0.0	18.6	18.6	0.2	O K
1440 min Summer	50.187	0.067	0.0	14.7	14.7	0.1	O K
2160 min Summer	50.177	0.057	0.0	11.5	11.5	0.1	O K
2880 min Summer	50.170	0.050	0.0	9.5	9.5	0.1	O K
4320 min Summer	50.161	0.041	0.0	7.1	7.1	0.0	O K
5760 min Summer	50.155	0.035	0.0	5.6	5.6	0.0	O K
7200 min Summer	50.152	0.032	0.0	4.8	4.8	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	94.179	0.0	94.0	10
30 min Summer	63.261	0.0	126.4	18
60 min Summer	40.510	0.0	161.9	32
120 min Summer	25.003	0.0	199.8	62
180 min Summer	18.552	0.0	222.4	92
240 min Summer	14.912	0.0	238.4	122
360 min Summer	10.975	0.0	263.2	184
480 min Summer	8.815	0.0	281.8	240
600 min Summer	7.430	0.0	296.9	300
720 min Summer	6.458	0.0	309.7	358
960 min Summer	5.172	0.0	330.7	484
1440 min Summer	3.774	0.0	362.0	734
2160 min Summer	2.748	0.0	395.5	1116
2880 min Summer	2.192	0.0	420.3	1452
4320 min Summer	1.590	0.0	457.3	2184
5760 min Summer	1.265	0.0	484.6	2912
7200 min Summer	1.060	0.0	507.1	3672

Cascade Summary of Results for SWALE 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	50.149	0.029	0.0	4.2	4.2	0.0	O K
10080 min Summer	50.146	0.026	0.0	3.6	3.6	0.0	O K
15 min Winter	50.433	0.313	0.0	149.4	149.4	3.3	Flood Risk
30 min Winter	50.384	0.264	0.0	115.7	115.7	2.3	O K
60 min Winter	50.326	0.206	0.0	79.5	79.5	1.3	O K
120 min Winter	50.275	0.155	0.0	52.1	52.1	0.7	O K
180 min Winter	50.250	0.130	0.0	40.0	40.0	0.5	O K
240 min Winter	50.235	0.115	0.0	33.3	33.3	0.4	O K
360 min Winter	50.218	0.098	0.0	26.0	26.0	0.3	O K
480 min Winter	50.207	0.087	0.0	22.0	22.0	0.2	O K
600 min Winter	50.200	0.080	0.0	19.2	19.2	0.2	O K
720 min Winter	50.195	0.075	0.0	17.4	17.4	0.1	O K
960 min Winter	50.187	0.067	0.0	14.9	14.9	0.1	O K
1440 min Winter	50.177	0.057	0.0	11.5	11.5	0.1	O K
2160 min Winter	50.167	0.047	0.0	8.7	8.7	0.1	O K
2880 min Winter	50.161	0.041	0.0	7.1	7.1	0.0	O K
4320 min Winter	50.154	0.034	0.0	5.3	5.3	0.0	O K
5760 min Winter	50.149	0.029	0.0	4.2	4.2	0.0	O K
7200 min Winter	50.146	0.026	0.0	3.5	3.5	0.0	O K
8640 min Winter	50.144	0.024	0.0	3.1	3.1	0.0	O K
10080 min Winter	50.142	0.022	0.0	2.7	2.7	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.917	0.0	527.1	4360
10080 min Summer	0.812	0.0	544.5	4968
15 min Winter	94.179	0.0	105.3	10
30 min Winter	63.261	0.0	141.5	17
60 min Winter	40.510	0.0	181.3	32
120 min Winter	25.003	0.0	223.8	62
180 min Winter	18.552	0.0	249.1	92
240 min Winter	14.912	0.0	267.0	122
360 min Winter	10.975	0.0	294.8	180
480 min Winter	8.815	0.0	315.7	242
600 min Winter	7.430	0.0	332.6	298
720 min Winter	6.458	0.0	346.9	358
960 min Winter	5.172	0.0	370.4	482
1440 min Winter	3.774	0.0	405.5	734
2160 min Winter	2.748	0.0	442.9	1124
2880 min Winter	2.192	0.0	470.9	1400
4320 min Winter	1.590	0.0	512.4	2280
5760 min Winter	1.265	0.0	542.9	2768
7200 min Winter	1.060	0.0	568.4	3712
8640 min Winter	0.917	0.0	590.7	4480
10080 min Winter	0.812	0.0	610.0	4816

Cascade Rainfall Details for SWALE 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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.320

Time (mins) From:	To:	Area (ha)
0	4	0.320

Cascade Model Details for SWALE 2.srcx

Storage is Online Cover Level (m) 50.700

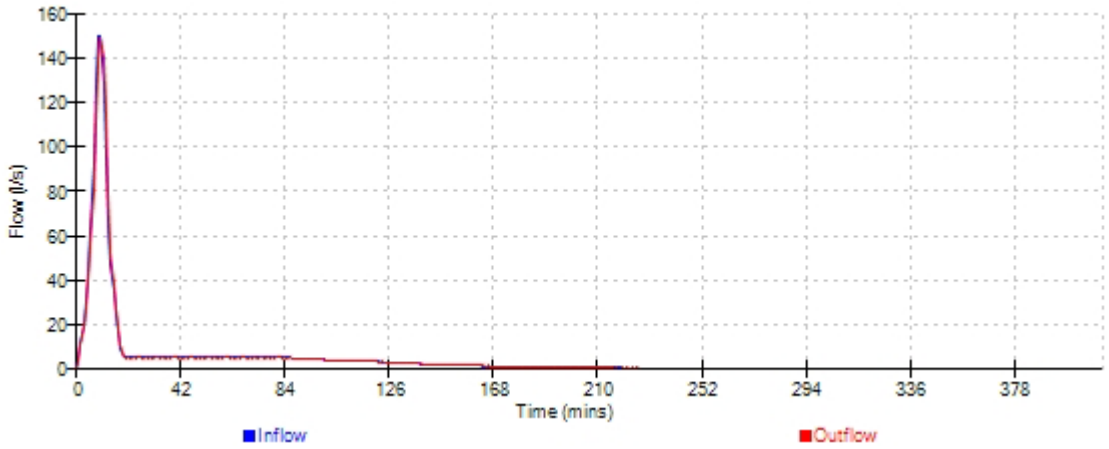
Swale Structure

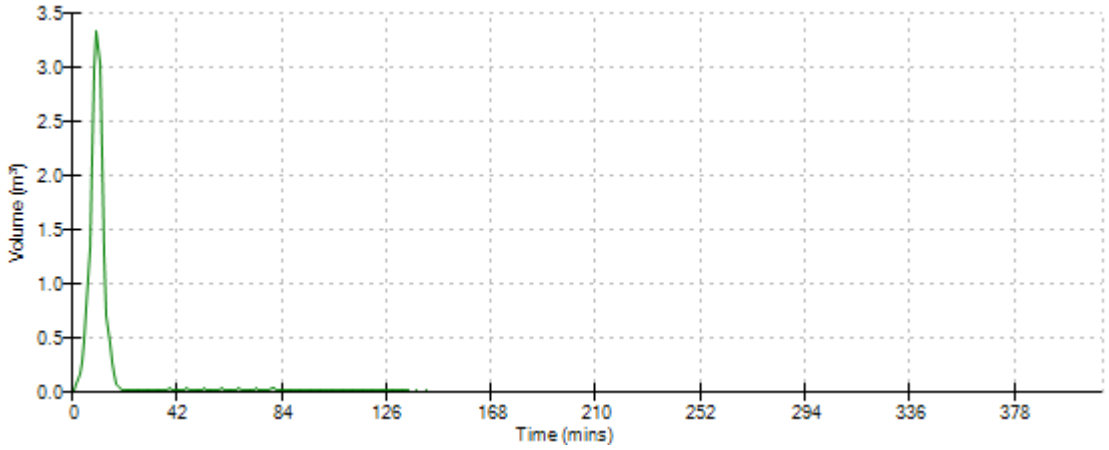
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	70.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	2.0
Safety Factor	2.0	Slope (1:X)	48.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	50.120	Cap Infiltration Depth (m)	0.000
Base Width (m)	1.0		

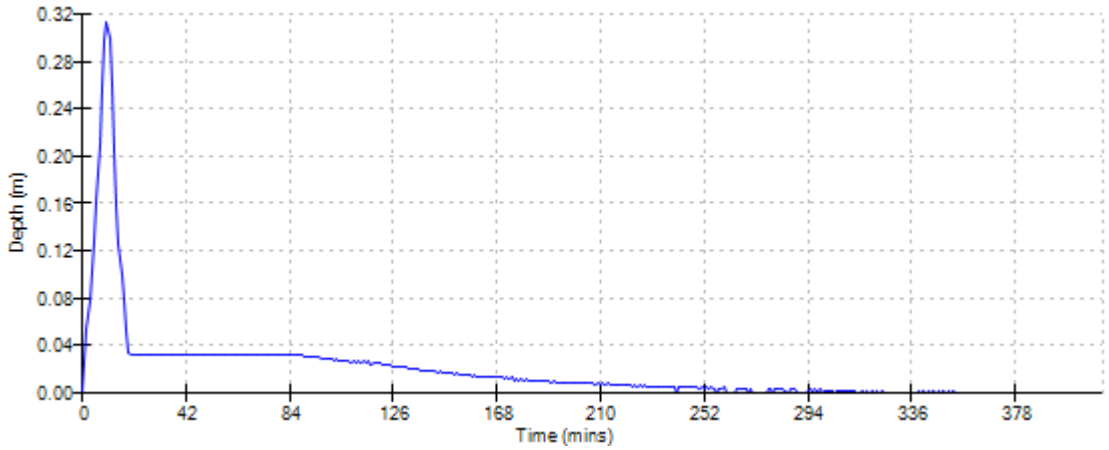
Weir Outflow Control

Discharge Coef 0.544 Width (m) 0.500 Invert Level (m) 50.120

Cascade Event: 15 min Winter for SWALE 2.srcx







Cascade Summary of Results for TANK 1.srcx

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

Half Drain Time : 652 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	55.795	0.195	0.0	2.2	2.2	66.7	O K
30 min Summer	55.859	0.259	0.0	2.3	2.3	88.7	O K
60 min Summer	55.926	0.326	0.0	2.3	2.3	111.5	O K
120 min Summer	55.989	0.389	0.0	2.3	2.3	133.1	O K
180 min Summer	56.019	0.419	0.0	2.3	2.3	143.5	O K
240 min Summer	56.036	0.436	0.0	2.3	2.3	149.0	O K
360 min Summer	56.053	0.453	0.0	2.3	2.3	154.8	O K
480 min Summer	56.057	0.457	0.0	2.3	2.3	156.2	O K
600 min Summer	56.055	0.455	0.0	2.3	2.3	155.7	O K
720 min Summer	56.053	0.453	0.0	2.3	2.3	154.9	O K
960 min Summer	56.045	0.445	0.0	2.3	2.3	152.0	O K
1440 min Summer	56.022	0.422	0.0	2.3	2.3	144.3	O K
2160 min Summer	55.983	0.383	0.0	2.3	2.3	130.8	O K
2880 min Summer	55.944	0.344	0.0	2.3	2.3	117.6	O K
4320 min Summer	55.875	0.275	0.0	2.3	2.3	94.2	O K
5760 min Summer	55.821	0.221	0.0	2.3	2.3	75.6	O K
7200 min Summer	55.781	0.181	0.0	2.2	2.2	61.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	94.179	0.0	64.6	19
30 min Summer	63.261	0.0	87.3	33
60 min Summer	40.510	0.0	115.4	64
120 min Summer	25.003	0.0	142.7	122
180 min Summer	18.552	0.0	158.9	182
240 min Summer	14.912	0.0	170.4	242
360 min Summer	10.975	0.0	188.1	360
480 min Summer	8.815	0.0	201.4	480
600 min Summer	7.430	0.0	212.1	534
720 min Summer	6.458	0.0	221.1	592
960 min Summer	5.172	0.0	235.8	714
1440 min Summer	3.774	0.0	257.1	980
2160 min Summer	2.748	0.0	285.2	1384
2880 min Summer	2.192	0.0	303.1	1788
4320 min Summer	1.590	0.0	329.1	2548
5760 min Summer	1.265	0.0	350.8	3280
7200 min Summer	1.060	0.0	367.3	3968

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	55.750	0.150	0.0	2.1	2.1	51.4	O K
10080 min Summer	55.727	0.127	0.0	2.0	2.0	43.6	O K
15 min Winter	55.819	0.219	0.0	2.3	2.3	74.8	O K
30 min Winter	55.891	0.291	0.0	2.3	2.3	99.6	O K
60 min Winter	55.967	0.367	0.0	2.3	2.3	125.4	O K
120 min Winter	56.039	0.439	0.0	2.3	2.3	150.2	O K
180 min Winter	56.075	0.475	0.0	2.3	2.3	162.5	O K
240 min Winter	56.095	0.495	0.0	2.3	2.3	169.4	O K
360 min Winter	56.119	0.519	0.0	2.3	2.3	177.5	O K
480 min Winter	56.128	0.528	0.0	2.3	2.3	180.6	O K
600 min Winter	56.129	0.529	0.0	2.3	2.3	181.0	O K
720 min Winter	56.125	0.525	0.0	2.3	2.3	179.6	O K
960 min Winter	56.111	0.511	0.0	2.3	2.3	174.7	O K
1440 min Winter	56.078	0.478	0.0	2.3	2.3	163.5	O K
2160 min Winter	56.018	0.418	0.0	2.3	2.3	143.1	O K
2880 min Winter	55.959	0.359	0.0	2.3	2.3	122.7	O K
4320 min Winter	55.857	0.257	0.0	2.3	2.3	88.0	O K
5760 min Winter	55.785	0.185	0.0	2.2	2.2	63.2	O K
7200 min Winter	55.737	0.137	0.0	2.1	2.1	46.8	O K
8640 min Winter	55.706	0.106	0.0	1.9	1.9	36.3	O K
10080 min Winter	55.691	0.091	0.0	1.8	1.8	31.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.917	0.0	381.2	4672
10080 min Summer	0.812	0.0	392.9	5344
15 min Winter	94.179	0.0	72.5	19
30 min Winter	63.261	0.0	97.9	33
60 min Winter	40.510	0.0	129.4	62
120 min Winter	25.003	0.0	160.0	120
180 min Winter	18.552	0.0	178.1	180
240 min Winter	14.912	0.0	190.9	238
360 min Winter	10.975	0.0	210.7	352
480 min Winter	8.815	0.0	225.5	464
600 min Winter	7.430	0.0	237.4	574
720 min Winter	6.458	0.0	247.5	678
960 min Winter	5.172	0.0	263.7	772
1440 min Winter	3.774	0.0	287.0	1068
2160 min Winter	2.748	0.0	319.5	1512
2880 min Winter	2.192	0.0	339.6	1932
4320 min Winter	1.590	0.0	368.9	2684
5760 min Winter	1.265	0.0	393.0	3400
7200 min Winter	1.060	0.0	411.4	4040
8640 min Winter	0.917	0.0	427.2	4672
10080 min Winter	0.812	0.0	440.4	5336

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.386

Time (mins) From:	To:	Area (ha)
0	4	0.386

Cascade Model Details for TANK 1.srcx

Storage is Online Cover Level (m) 57.600

Cellular Storage Structure

Invert Level (m) 55.600 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	360.0	360.0	1.201	0.0	451.2
1.200	360.0	451.2			

Hydro-Brake Optimum® Outflow Control

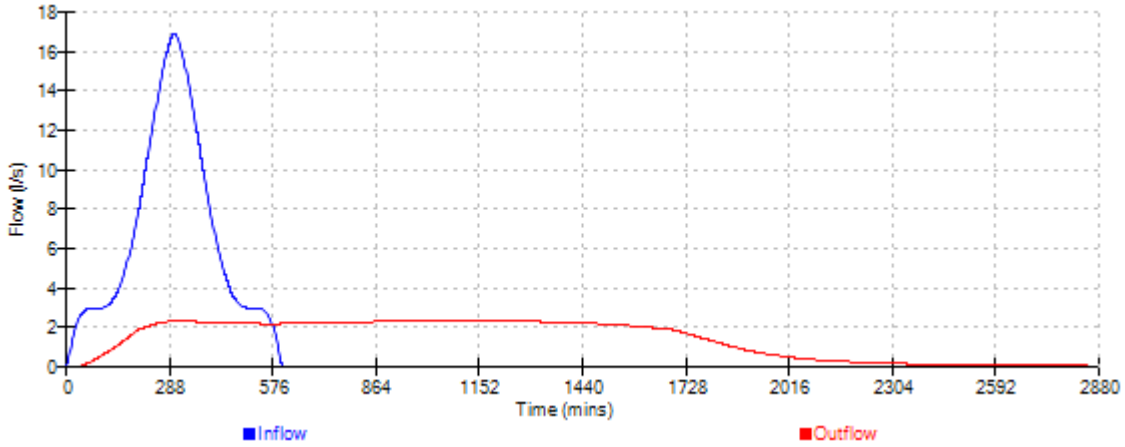
Unit Reference	MD-SHE-0072-2500-1200-2500
Design Head (m)	1.200
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	72
Invert Level (m)	55.600
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

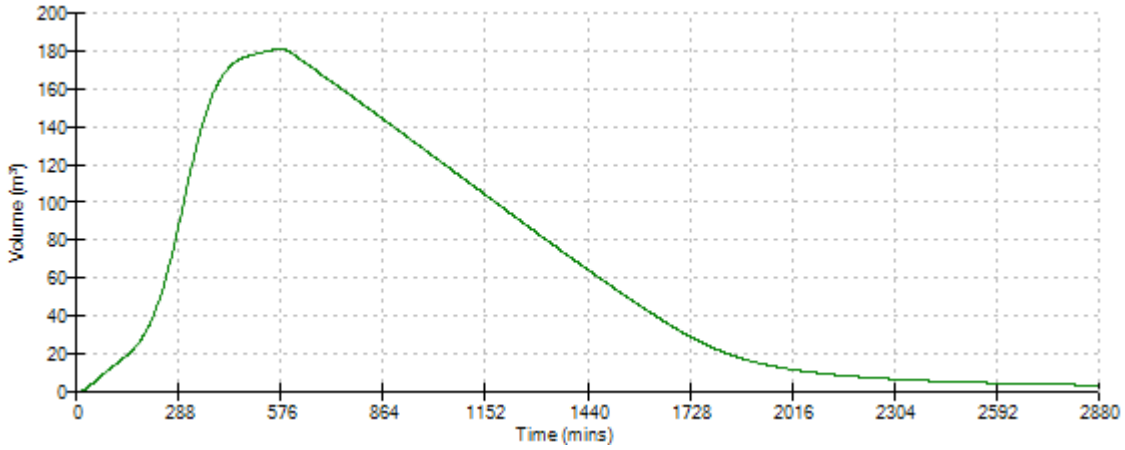
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	2.5
Flush-Flo™	0.318	2.3
Kick-Flo®	0.644	1.9
Mean Flow over Head Range	-	2.1

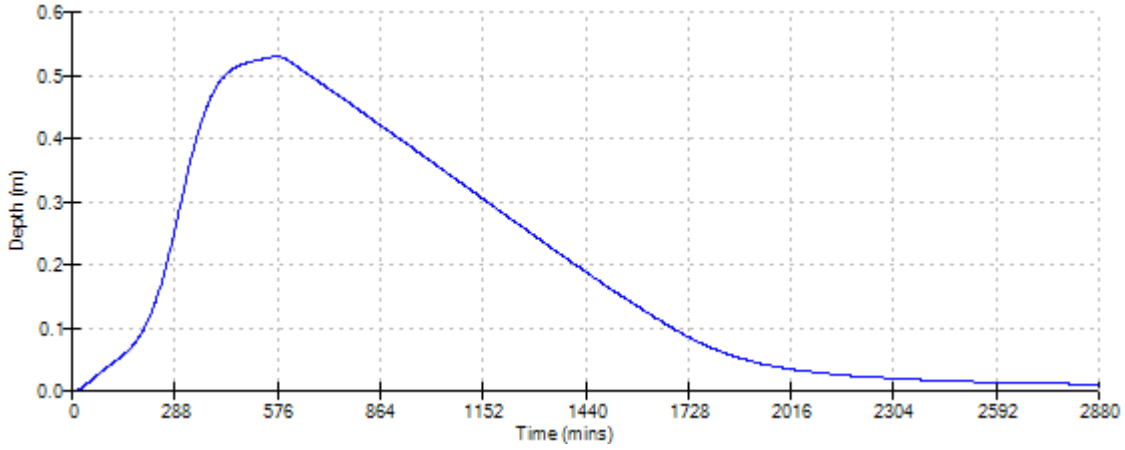
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.9	1.200	2.5	3.000	3.8	7.000	5.7
0.200	2.2	1.400	2.7	3.500	4.1	7.500	5.9
0.300	2.3	1.600	2.8	4.000	4.4	8.000	6.0
0.400	2.3	1.800	3.0	4.500	4.6	8.500	6.2
0.500	2.2	2.000	3.2	5.000	4.8	9.000	6.4
0.600	2.0	2.200	3.3	5.500	5.1	9.500	6.5
0.800	2.1	2.400	3.4	6.000	5.3		
1.000	2.3	2.600	3.6	6.500	5.5		

Cascade Event: 600 min Winter for TANK 1.srcx







Cascade Summary of Results for TANK 2.srcx

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

Half Drain Time : 62 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	51.779	0.279	0.0	5.0	5.0	21.2	O K
30 min Summer	51.848	0.348	0.0	5.0	5.0	26.5	O K
60 min Summer	51.888	0.388	0.0	5.0	5.0	29.5	O K
120 min Summer	51.890	0.390	0.0	5.0	5.0	29.7	O K
180 min Summer	51.867	0.367	0.0	5.0	5.0	27.9	O K
240 min Summer	51.838	0.338	0.0	5.0	5.0	25.7	O K
360 min Summer	51.783	0.283	0.0	5.0	5.0	21.5	O K
480 min Summer	51.733	0.233	0.0	5.0	5.0	17.7	O K
600 min Summer	51.690	0.190	0.0	5.0	5.0	14.4	O K
720 min Summer	51.656	0.156	0.0	5.0	5.0	11.8	O K
960 min Summer	51.609	0.109	0.0	5.0	5.0	8.3	O K
1440 min Summer	51.581	0.081	0.0	4.1	4.1	6.2	O K
2160 min Summer	51.561	0.061	0.0	3.1	3.1	4.6	O K
2880 min Summer	51.549	0.049	0.0	2.5	2.5	3.8	O K
4320 min Summer	51.536	0.036	0.0	1.8	1.8	2.7	O K
5760 min Summer	51.529	0.029	0.0	1.4	1.4	2.2	O K
7200 min Summer	51.524	0.024	0.0	1.2	1.2	1.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	94.179	0.0	24.7	17
30 min Summer	63.261	0.0	33.2	31
60 min Summer	40.510	0.0	42.5	52
120 min Summer	25.003	0.0	52.5	86
180 min Summer	18.552	0.0	58.4	120
240 min Summer	14.912	0.0	62.6	154
360 min Summer	10.975	0.0	69.1	218
480 min Summer	8.815	0.0	74.0	282
600 min Summer	7.430	0.0	78.0	340
720 min Summer	6.458	0.0	81.3	398
960 min Summer	5.172	0.0	86.9	504
1440 min Summer	3.774	0.0	95.1	738
2160 min Summer	2.748	0.0	103.8	1100
2880 min Summer	2.192	0.0	110.4	1468
4320 min Summer	1.590	0.0	120.2	2200
5760 min Summer	1.265	0.0	127.4	2936
7200 min Summer	1.060	0.0	133.5	3624

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	51.521	0.021	0.0	1.1	1.1	1.6	O K
10080 min Summer	51.519	0.019	0.0	0.9	0.9	1.4	O K
15 min Winter	51.817	0.317	0.0	5.0	5.0	24.1	O K
30 min Winter	51.899	0.399	0.0	5.0	5.0	30.3	O K
60 min Winter	51.948	0.448	0.0	5.0	5.0	34.1	O K
120 min Winter	51.944	0.444	0.0	5.0	5.0	33.8	O K
180 min Winter	51.908	0.408	0.0	5.0	5.0	31.0	O K
240 min Winter	51.862	0.362	0.0	5.0	5.0	27.5	O K
360 min Winter	51.775	0.275	0.0	5.0	5.0	20.9	O K
480 min Winter	51.699	0.199	0.0	5.0	5.0	15.1	O K
600 min Winter	51.640	0.140	0.0	5.0	5.0	10.7	O K
720 min Winter	51.603	0.103	0.0	5.0	5.0	7.9	O K
960 min Winter	51.583	0.083	0.0	4.2	4.2	6.3	O K
1440 min Winter	51.562	0.062	0.0	3.1	3.1	4.7	O K
2160 min Winter	51.545	0.045	0.0	2.3	2.3	3.4	O K
2880 min Winter	51.536	0.036	0.0	1.8	1.8	2.7	O K
4320 min Winter	51.526	0.026	0.0	1.3	1.3	2.0	O K
5760 min Winter	51.521	0.021	0.0	1.1	1.1	1.6	O K
7200 min Winter	51.518	0.018	0.0	0.9	0.9	1.3	O K
8640 min Winter	51.515	0.015	0.0	0.8	0.8	1.1	O K
10080 min Winter	51.514	0.014	0.0	0.7	0.7	1.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.917	0.0	138.7	4392
10080 min Summer	0.812	0.0	143.2	5080
15 min Winter	94.179	0.0	27.7	17
30 min Winter	63.261	0.0	37.2	31
60 min Winter	40.510	0.0	47.6	58
120 min Winter	25.003	0.0	58.8	92
180 min Winter	18.552	0.0	65.4	130
240 min Winter	14.912	0.0	70.1	166
360 min Winter	10.975	0.0	77.4	234
480 min Winter	8.815	0.0	82.9	294
600 min Winter	7.430	0.0	87.3	348
720 min Winter	6.458	0.0	91.1	390
960 min Winter	5.172	0.0	97.3	502
1440 min Winter	3.774	0.0	106.5	748
2160 min Winter	2.748	0.0	116.3	1100
2880 min Winter	2.192	0.0	123.7	1448
4320 min Winter	1.590	0.0	134.6	2200
5760 min Winter	1.265	0.0	142.7	2920
7200 min Winter	1.060	0.0	149.5	3664
8640 min Winter	0.917	0.0	155.3	4296
10080 min Winter	0.812	0.0	160.4	5008

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.140

Time (mins) From:	To:	Area (ha)
0	4	0.140

Cascade Model Details for TANK 2.srcx

Storage is Online Cover Level (m) 53.410

Cellular Storage Structure

Invert Level (m) 51.500 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

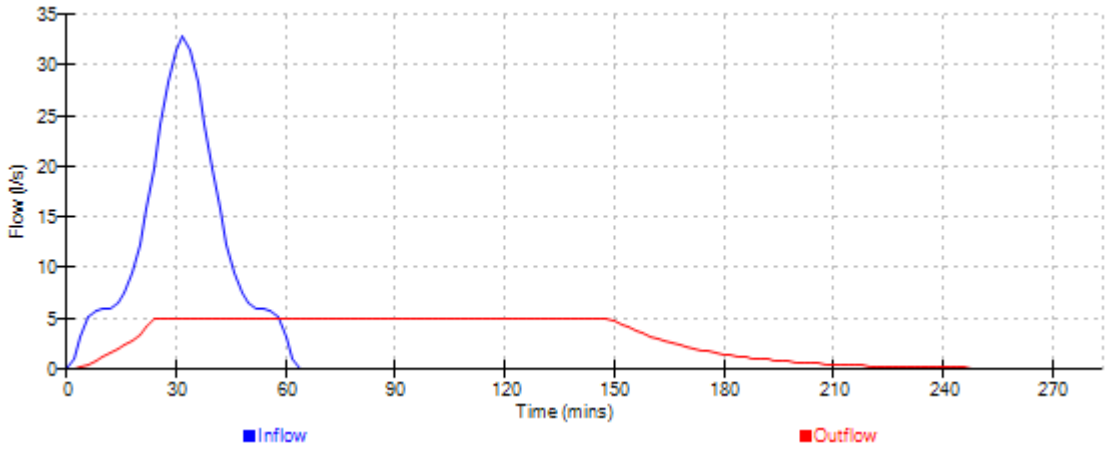
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	80.0	80.0	0.801	0.0	162.6
0.800	80.0	162.6			

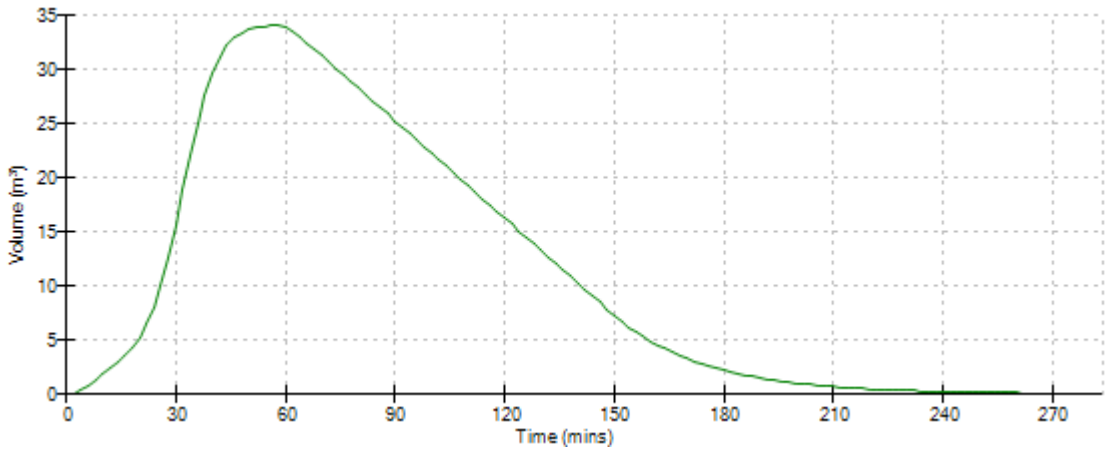
Pump Outflow Control

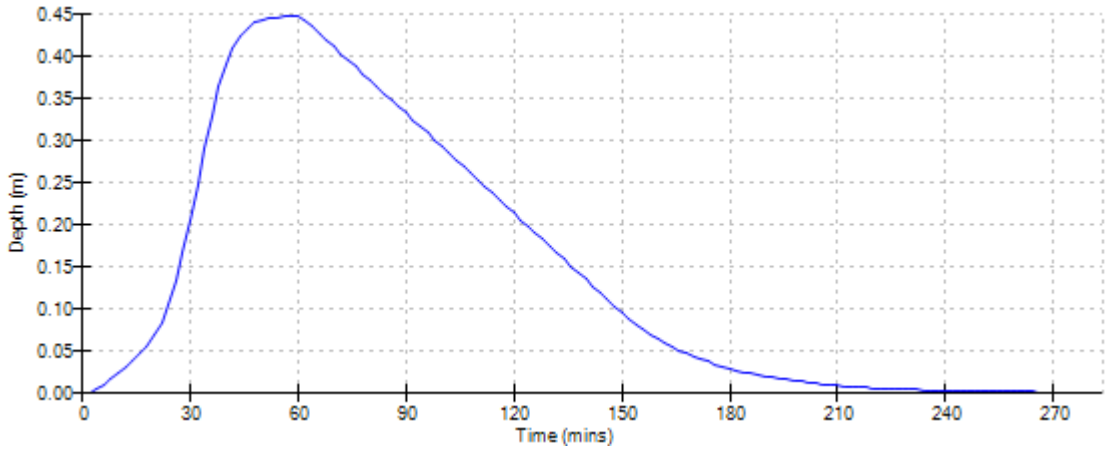
Invert Level (m) 51.500

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.0000	0.900	5.0000	1.700	5.0000	2.500	5.0000
0.200	5.0000	1.000	5.0000	1.800	5.0000	2.600	5.0000
0.300	5.0000	1.100	5.0000	1.900	5.0000	2.700	5.0000
0.400	5.0000	1.200	5.0000	2.000	5.0000	2.800	5.0000
0.500	5.0000	1.300	5.0000	2.100	5.0000	2.900	5.0000
0.600	5.0000	1.400	5.0000	2.200	5.0000	3.000	5.0000
0.700	5.0000	1.500	5.0000	2.300	5.0000		
0.800	5.0000	1.600	5.0000	2.400	5.0000		

Cascade Event: 60 min Winter for TANK 2.srcx







Cascade Summary of Results for TANK 3.srcx

Upstream Structures | **Outflow To** | **Overflow To**

PP1.srcx | POND.srcx | (None)

Half Drain Time : 29 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	54.131	0.131	0.0	4.7	4.7	8.9	O K
30 min Summer	54.163	0.163	0.0	4.9	4.9	11.1	O K
60 min Summer	54.189	0.189	0.0	4.9	4.9	12.9	O K
120 min Summer	54.203	0.203	0.0	5.0	5.0	13.9	O K
180 min Summer	54.198	0.198	0.0	5.0	5.0	13.5	O K
240 min Summer	54.187	0.187	0.0	4.9	4.9	12.8	O K
360 min Summer	54.166	0.166	0.0	4.9	4.9	11.4	O K
480 min Summer	54.151	0.151	0.0	4.8	4.8	10.3	O K
600 min Summer	54.138	0.138	0.0	4.7	4.7	9.4	O K
720 min Summer	54.128	0.128	0.0	4.7	4.7	8.7	O K
960 min Summer	54.113	0.113	0.0	4.2	4.2	7.7	O K
1440 min Summer	54.090	0.090	0.0	3.3	3.3	6.2	O K
2160 min Summer	54.074	0.074	0.0	2.5	2.5	5.1	O K
2880 min Summer	54.065	0.065	0.0	2.0	2.0	4.4	O K
4320 min Summer	54.054	0.054	0.0	1.5	1.5	3.7	O K
5760 min Summer	54.047	0.047	0.0	1.2	1.2	3.2	O K
7200 min Summer	54.043	0.043	0.0	1.0	1.0	2.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	94.179	0.0	18.0	17
30 min Summer	63.261	0.0	24.9	30
60 min Summer	40.510	0.0	32.5	46
120 min Summer	25.003	0.0	40.6	82
180 min Summer	18.552	0.0	45.4	114
240 min Summer	14.912	0.0	48.7	146
360 min Summer	10.975	0.0	53.9	208
480 min Summer	8.815	0.0	57.8	270
600 min Summer	7.430	0.0	60.9	330
720 min Summer	6.458	0.0	63.6	388
960 min Summer	5.172	0.0	67.8	504
1440 min Summer	3.774	0.0	74.1	740
2160 min Summer	2.748	0.0	80.7	1104
2880 min Summer	2.192	0.0	85.4	1468
4320 min Summer	1.590	0.0	92.1	2204
5760 min Summer	1.265	0.0	96.9	2936
7200 min Summer	1.060	0.0	100.6	3672

Cascade Summary of Results for TANK 3.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	54.040	0.040	0.0	0.8	0.8	2.7	O K
10080 min Summer	54.037	0.037	0.0	0.8	0.8	2.5	O K
15 min Winter	54.147	0.147	0.0	4.8	4.8	10.1	O K
30 min Winter	54.185	0.185	0.0	4.9	4.9	12.7	O K
60 min Winter	54.213	0.213	0.0	5.0	5.0	14.5	O K
120 min Winter	54.221	0.221	0.0	5.0	5.0	15.1	O K
180 min Winter	54.208	0.208	0.0	5.0	5.0	14.3	O K
240 min Winter	54.189	0.189	0.0	4.9	4.9	13.0	O K
360 min Winter	54.160	0.160	0.0	4.9	4.9	11.0	O K
480 min Winter	54.139	0.139	0.0	4.8	4.8	9.5	O K
600 min Winter	54.124	0.124	0.0	4.6	4.6	8.5	O K
720 min Winter	54.110	0.110	0.0	4.1	4.1	7.5	O K
960 min Winter	54.092	0.092	0.0	3.4	3.4	6.3	O K
1440 min Winter	54.074	0.074	0.0	2.5	2.5	5.1	O K
2160 min Winter	54.061	0.061	0.0	1.8	1.8	4.2	O K
2880 min Winter	54.054	0.054	0.0	1.5	1.5	3.7	O K
4320 min Winter	54.045	0.045	0.0	1.1	1.1	3.1	O K
5760 min Winter	54.040	0.040	0.0	0.8	0.8	2.7	O K
7200 min Winter	54.036	0.036	0.0	0.7	0.7	2.5	O K
8640 min Winter	54.033	0.033	0.0	0.6	0.6	2.3	O K
10080 min Winter	54.031	0.031	0.0	0.5	0.5	2.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.917	0.0	103.6	4336
10080 min Summer	0.812	0.0	106.0	5040
15 min Winter	94.179	0.0	20.4	17
30 min Winter	63.261	0.0	28.1	30
60 min Winter	40.510	0.0	36.7	50
120 min Winter	25.003	0.0	45.7	88
180 min Winter	18.552	0.0	51.1	124
240 min Winter	14.912	0.0	54.8	158
360 min Winter	10.975	0.0	60.7	218
480 min Winter	8.815	0.0	65.0	280
600 min Winter	7.430	0.0	68.6	334
720 min Winter	6.458	0.0	71.5	390
960 min Winter	5.172	0.0	76.3	504
1440 min Winter	3.774	0.0	83.4	750
2160 min Winter	2.748	0.0	90.9	1104
2880 min Winter	2.192	0.0	96.3	1472
4320 min Winter	1.590	0.0	103.9	2204
5760 min Winter	1.265	0.0	109.4	2928
7200 min Winter	1.060	0.0	113.7	3672
8640 min Winter	0.917	0.0	117.2	4352
10080 min Winter	0.812	0.0	120.2	5008

Cascade Rainfall Details for TANK 3.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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.056

Time (mins) From:	To:	Area (ha)
0	4	0.056

Cascade Model Details for TANK 3.srcx

Storage is Online Cover Level (m) 55.500

Cellular Storage Structure

Invert Level (m) 54.000 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	72.0	72.0	0.801	0.0	100.8
0.800	72.0	100.8			

Hydro-Brake Optimum® Outflow Control

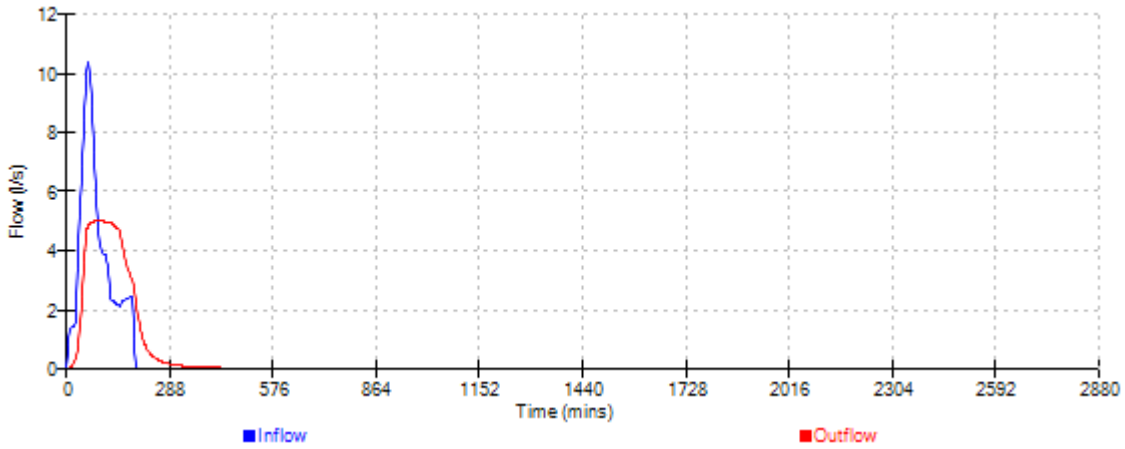
Unit Reference	MD-SHE-0109-5000-0800-5000
Design Head (m)	0.800
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	109
Invert Level (m)	54.000
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

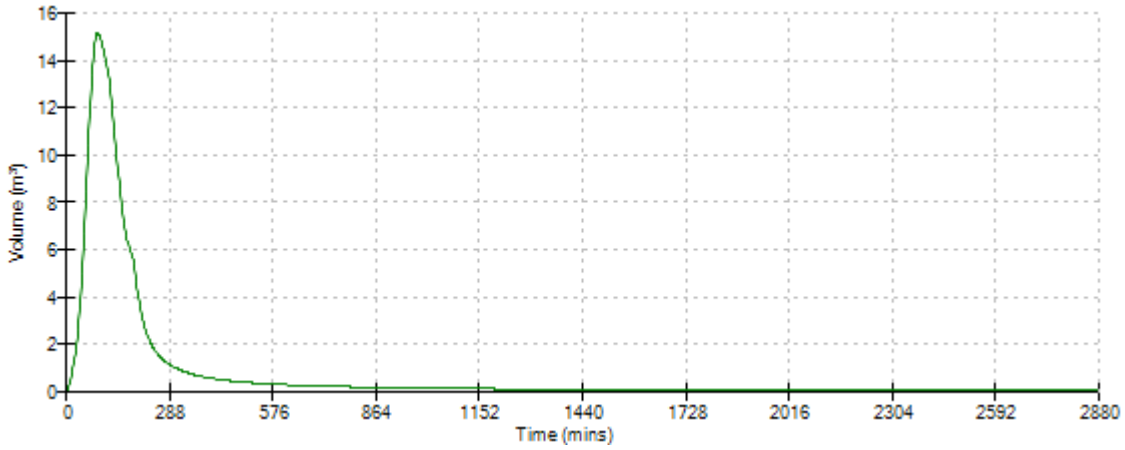
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	5.0
Flush-Flo™	0.242	5.0
Kick-Flo®	0.537	4.2
Mean Flow over Head Range	-	4.3

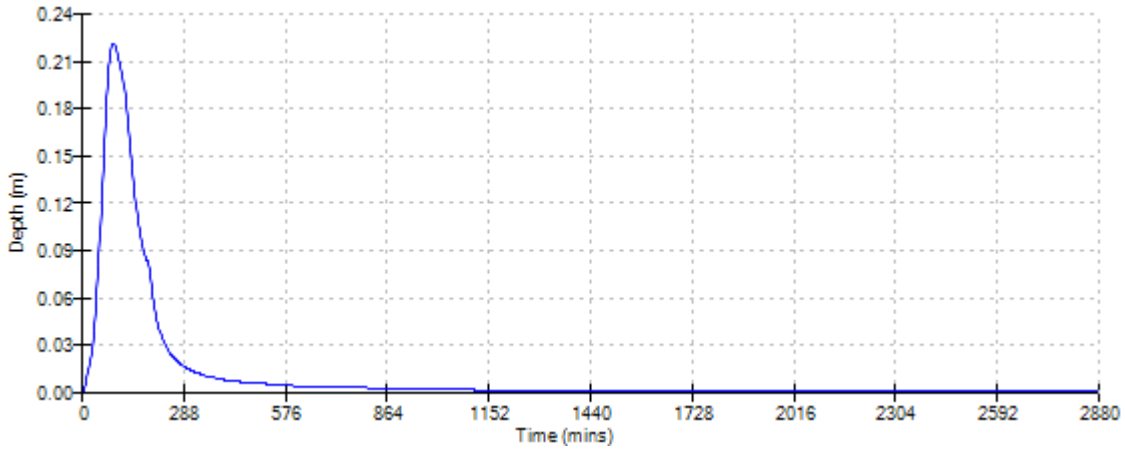
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.7	1.200	6.0	3.000	9.3	7.000	13.9
0.200	5.0	1.400	6.5	3.500	10.0	7.500	14.4
0.300	5.0	1.600	6.9	4.000	10.6	8.000	14.8
0.400	4.8	1.800	7.3	4.500	11.3	8.500	15.2
0.500	4.5	2.000	7.7	5.000	11.8	9.000	15.7
0.600	4.4	2.200	8.0	5.500	12.4	9.500	16.1
0.800	5.0	2.400	8.4	6.000	12.9		
1.000	5.5	2.600	8.7	6.500	13.4		

Cascade Event: 120 min Winter for TANK 3.srcx







Cascade Summary of Results for TANK 4.srcx

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

Half Drain Time : 79 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	53.386	0.286	0.0	2.5	2.5	13.0	O K
30 min Summer	53.462	0.362	0.0	2.5	2.5	16.5	O K
60 min Summer	53.511	0.411	0.0	2.5	2.5	18.7	O K
120 min Summer	53.522	0.422	0.0	2.5	2.5	19.2	O K
180 min Summer	53.506	0.406	0.0	2.5	2.5	18.5	O K
240 min Summer	53.482	0.382	0.0	2.5	2.5	17.4	O K
360 min Summer	53.433	0.333	0.0	2.5	2.5	15.2	O K
480 min Summer	53.387	0.287	0.0	2.5	2.5	13.1	O K
600 min Summer	53.345	0.245	0.0	2.5	2.5	11.2	O K
720 min Summer	53.308	0.208	0.0	2.5	2.5	9.5	O K
960 min Summer	53.250	0.150	0.0	2.5	2.5	6.8	O K
1440 min Summer	53.195	0.095	0.0	2.4	2.4	4.4	O K
2160 min Summer	53.172	0.072	0.0	1.8	1.8	3.3	O K
2880 min Summer	53.159	0.059	0.0	1.5	1.5	2.7	O K
4320 min Summer	53.143	0.043	0.0	1.1	1.1	2.0	O K
5760 min Summer	53.135	0.035	0.0	0.9	0.9	1.6	O K
7200 min Summer	53.129	0.029	0.0	0.7	0.7	1.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	94.179	0.0	14.8	17
30 min Summer	63.261	0.0	19.9	31
60 min Summer	40.510	0.0	25.5	58
120 min Summer	25.003	0.0	31.5	90
180 min Summer	18.552	0.0	35.0	124
240 min Summer	14.912	0.0	37.6	158
360 min Summer	10.975	0.0	41.5	224
480 min Summer	8.815	0.0	44.4	290
600 min Summer	7.430	0.0	46.8	352
720 min Summer	6.458	0.0	48.8	412
960 min Summer	5.172	0.0	52.1	522
1440 min Summer	3.774	0.0	57.0	738
2160 min Summer	2.748	0.0	62.3	1104
2880 min Summer	2.192	0.0	66.3	1468
4320 min Summer	1.590	0.0	72.1	2204
5760 min Summer	1.265	0.0	76.5	2912
7200 min Summer	1.060	0.0	80.1	3640

Cascade Summary of Results for TANK 4.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	53.125	0.025	0.0	0.6	0.6	1.1	O K
10080 min Summer	53.122	0.022	0.0	0.6	0.6	1.0	O K
15 min Winter	53.424	0.324	0.0	2.5	2.5	14.8	O K
30 min Winter	53.513	0.413	0.0	2.5	2.5	18.8	O K
60 min Winter	53.575	0.475	0.0	2.5	2.5	21.7	O K
120 min Winter	53.584	0.484	0.0	2.5	2.5	22.1	O K
180 min Winter	53.559	0.459	0.0	2.5	2.5	21.0	O K
240 min Winter	53.522	0.422	0.0	2.5	2.5	19.3	O K
360 min Winter	53.446	0.346	0.0	2.5	2.5	15.8	O K
480 min Winter	53.374	0.274	0.0	2.5	2.5	12.5	O K
600 min Winter	53.311	0.211	0.0	2.5	2.5	9.6	O K
720 min Winter	53.258	0.158	0.0	2.5	2.5	7.2	O K
960 min Winter	53.199	0.099	0.0	2.5	2.5	4.5	O K
1440 min Winter	53.173	0.073	0.0	1.8	1.8	3.4	O K
2160 min Winter	53.154	0.054	0.0	1.4	1.4	2.5	O K
2880 min Winter	53.143	0.043	0.0	1.1	1.1	2.0	O K
4320 min Winter	53.132	0.032	0.0	0.8	0.8	1.4	O K
5760 min Winter	53.125	0.025	0.0	0.6	0.6	1.1	O K
7200 min Winter	53.121	0.021	0.0	0.5	0.5	1.0	O K
8640 min Winter	53.118	0.018	0.0	0.5	0.5	0.8	O K
10080 min Winter	53.116	0.016	0.0	0.4	0.4	0.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.917	0.0	83.2	4360
10080 min Summer	0.812	0.0	85.9	5136
15 min Winter	94.179	0.0	16.6	17
30 min Winter	63.261	0.0	22.3	31
60 min Winter	40.510	0.0	28.6	58
120 min Winter	25.003	0.0	35.3	96
180 min Winter	18.552	0.0	39.2	134
240 min Winter	14.912	0.0	42.1	172
360 min Winter	10.975	0.0	46.4	242
480 min Winter	8.815	0.0	49.7	308
600 min Winter	7.430	0.0	52.4	368
720 min Winter	6.458	0.0	54.7	424
960 min Winter	5.172	0.0	58.4	510
1440 min Winter	3.774	0.0	63.9	750
2160 min Winter	2.748	0.0	69.8	1104
2880 min Winter	2.192	0.0	74.2	1468
4320 min Winter	1.590	0.0	80.8	2188
5760 min Winter	1.265	0.0	85.6	2896
7200 min Winter	1.060	0.0	89.7	3672
8640 min Winter	0.917	0.0	93.2	4344
10080 min Winter	0.812	0.0	96.2	5112

Cascade Rainfall Details for TANK 4.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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.084

Time (mins) From:	To:	Area (ha)
0	4	0.084

Cascade Model Details for TANK 4.srcx

Storage is Online Cover Level (m) 54.600

Cellular Storage Structure

Invert Level (m) 53.100 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

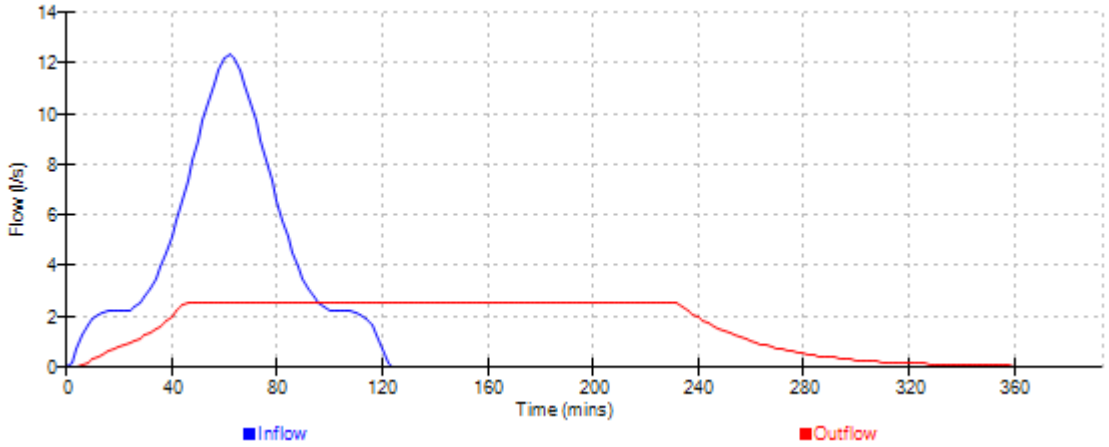
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	48.0	48.0	0.801	0.0	73.6
0.800	48.0	73.6			

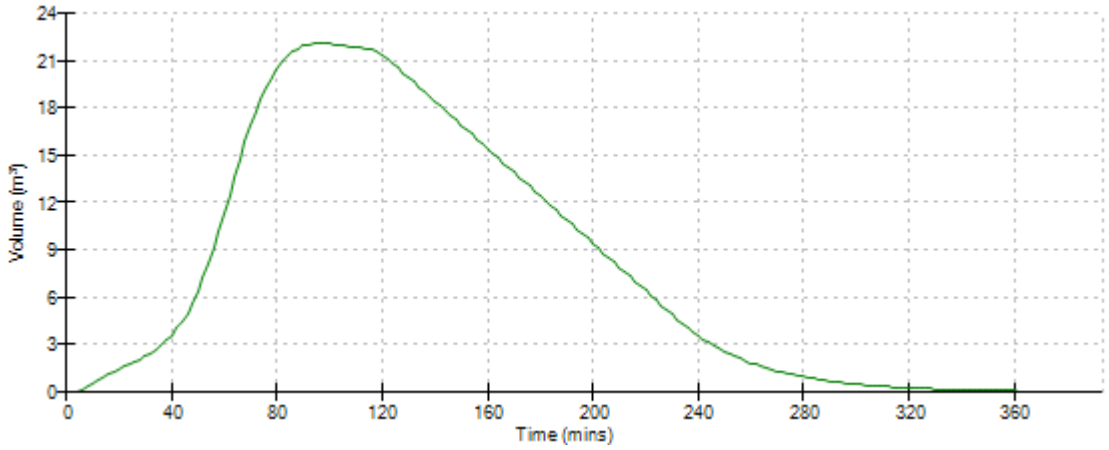
Pump Outflow Control

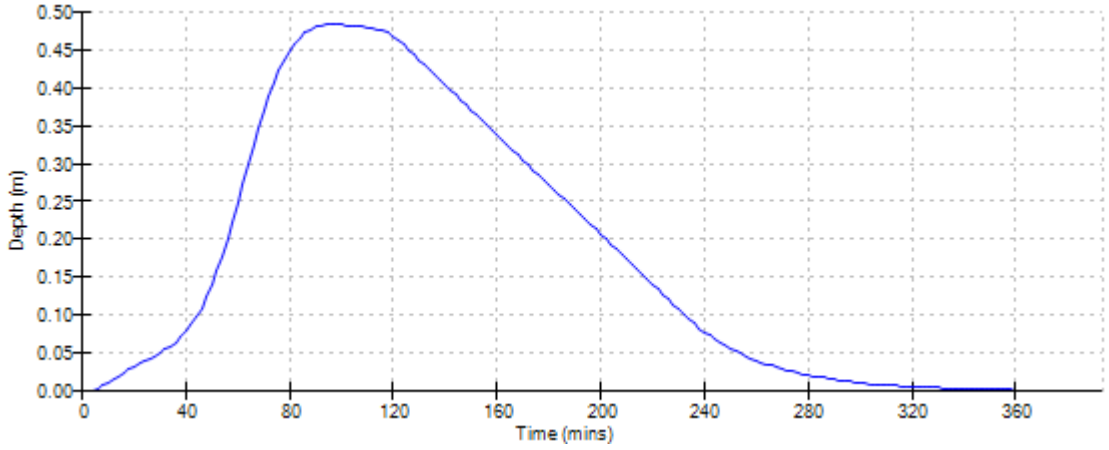
Invert Level (m) 53.100

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.5000	0.900	2.5000	1.700	2.5000	2.500	2.5000
0.200	2.5000	1.000	2.5000	1.800	2.5000	2.600	2.5000
0.300	2.5000	1.100	2.5000	1.900	2.5000	2.700	2.5000
0.400	2.5000	1.200	2.5000	2.000	2.5000	2.800	2.5000
0.500	2.5000	1.300	2.5000	2.100	2.5000	2.900	2.5000
0.600	2.5000	1.400	2.5000	2.200	2.5000	3.000	2.5000
0.700	2.5000	1.500	2.5000	2.300	2.5000		
0.800	2.5000	1.600	2.5000	2.400	2.5000		

Cascade Event: 120 min Winter for TANK 4.srcx







Cascade Summary of Results for TANK 5.srcx

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

Half Drain Time : 136 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	51.001	0.251	0.0	2.5	2.5	21.0	O K
30 min Summer	51.075	0.325	0.0	2.5	2.5	27.2	O K
60 min Summer	51.137	0.387	0.0	2.5	2.5	32.4	O K
120 min Summer	51.167	0.417	0.0	2.5	2.5	34.9	O K
180 min Summer	51.166	0.416	0.0	2.5	2.5	34.8	O K
240 min Summer	51.157	0.407	0.0	2.5	2.5	34.0	O K
360 min Summer	51.133	0.383	0.0	2.5	2.5	32.0	O K
480 min Summer	51.106	0.356	0.0	2.5	2.5	29.8	O K
600 min Summer	51.079	0.329	0.0	2.5	2.5	27.5	O K
720 min Summer	51.052	0.302	0.0	2.5	2.5	25.3	O K
960 min Summer	51.003	0.253	0.0	2.5	2.5	21.1	O K
1440 min Summer	50.924	0.174	0.0	2.5	2.5	14.5	O K
2160 min Summer	50.856	0.106	0.0	2.5	2.5	8.9	O K
2880 min Summer	50.836	0.086	0.0	2.2	2.2	7.2	O K
4320 min Summer	50.815	0.065	0.0	1.6	1.6	5.4	O K
5760 min Summer	50.802	0.052	0.0	1.3	1.3	4.4	O K
7200 min Summer	50.794	0.044	0.0	1.1	1.1	3.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	94.179	0.0	22.7	18
30 min Summer	63.261	0.0	30.6	32
60 min Summer	40.510	0.0	39.2	62
120 min Summer	25.003	0.0	48.3	110
180 min Summer	18.552	0.0	53.8	140
240 min Summer	14.912	0.0	57.7	172
360 min Summer	10.975	0.0	63.7	242
480 min Summer	8.815	0.0	68.2	308
600 min Summer	7.430	0.0	71.8	376
720 min Summer	6.458	0.0	74.9	442
960 min Summer	5.172	0.0	80.0	568
1440 min Summer	3.774	0.0	87.6	806
2160 min Summer	2.748	0.0	95.7	1128
2880 min Summer	2.192	0.0	101.7	1472
4320 min Summer	1.590	0.0	110.7	2204
5760 min Summer	1.265	0.0	117.4	2936
7200 min Summer	1.060	0.0	123.0	3672

Cascade Summary of Results for TANK 5.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	50.788	0.038	0.0	1.0	1.0	3.2	O K
10080 min Summer	50.784	0.034	0.0	0.9	0.9	2.8	O K
15 min Winter	51.033	0.283	0.0	2.5	2.5	23.7	O K
30 min Winter	51.118	0.368	0.0	2.5	2.5	30.8	O K
60 min Winter	51.192	0.442	0.0	2.5	2.5	37.0	O K
120 min Winter	51.234	0.484	0.0	2.5	2.5	40.5	O K
180 min Winter	51.229	0.479	0.0	2.5	2.5	40.0	O K
240 min Winter	51.215	0.465	0.0	2.5	2.5	38.9	O K
360 min Winter	51.180	0.430	0.0	2.5	2.5	35.9	O K
480 min Winter	51.138	0.388	0.0	2.5	2.5	32.4	O K
600 min Winter	51.095	0.345	0.0	2.5	2.5	28.8	O K
720 min Winter	51.054	0.304	0.0	2.5	2.5	25.4	O K
960 min Winter	50.978	0.228	0.0	2.5	2.5	19.1	O K
1440 min Winter	50.871	0.121	0.0	2.5	2.5	10.1	O K
2160 min Winter	50.832	0.082	0.0	2.0	2.0	6.8	O K
2880 min Winter	50.816	0.066	0.0	1.6	1.6	5.5	O K
4320 min Winter	50.798	0.048	0.0	1.2	1.2	4.0	O K
5760 min Winter	50.788	0.038	0.0	1.0	1.0	3.2	O K
7200 min Winter	50.782	0.032	0.0	0.8	0.8	2.7	O K
8640 min Winter	50.778	0.028	0.0	0.7	0.7	2.3	O K
10080 min Winter	50.775	0.025	0.0	0.6	0.6	2.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.917	0.0	127.8	4408
10080 min Summer	0.812	0.0	132.0	5096
15 min Winter	94.179	0.0	25.5	18
30 min Winter	63.261	0.0	34.2	32
60 min Winter	40.510	0.0	43.9	60
120 min Winter	25.003	0.0	54.1	116
180 min Winter	18.552	0.0	60.3	152
240 min Winter	14.912	0.0	64.6	186
360 min Winter	10.975	0.0	71.3	262
480 min Winter	8.815	0.0	76.4	336
600 min Winter	7.430	0.0	80.5	406
720 min Winter	6.458	0.0	83.9	474
960 min Winter	5.172	0.0	89.6	598
1440 min Winter	3.774	0.0	98.1	808
2160 min Winter	2.748	0.0	107.2	1124
2880 min Winter	2.192	0.0	114.0	1496
4320 min Winter	1.590	0.0	124.0	2204
5760 min Winter	1.265	0.0	131.5	2944
7200 min Winter	1.060	0.0	137.7	3672
8640 min Winter	0.917	0.0	143.1	4408
10080 min Winter	0.812	0.0	147.8	5096

Cascade Rainfall Details for TANK 5.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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.129

Time (mins) From:	To:	Area (ha)
0	4	0.129

Cascade Model Details for TANK 5.srcx

Storage is Online Cover Level (m) 52.250

Cellular Storage Structure

Invert Level (m) 50.750 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

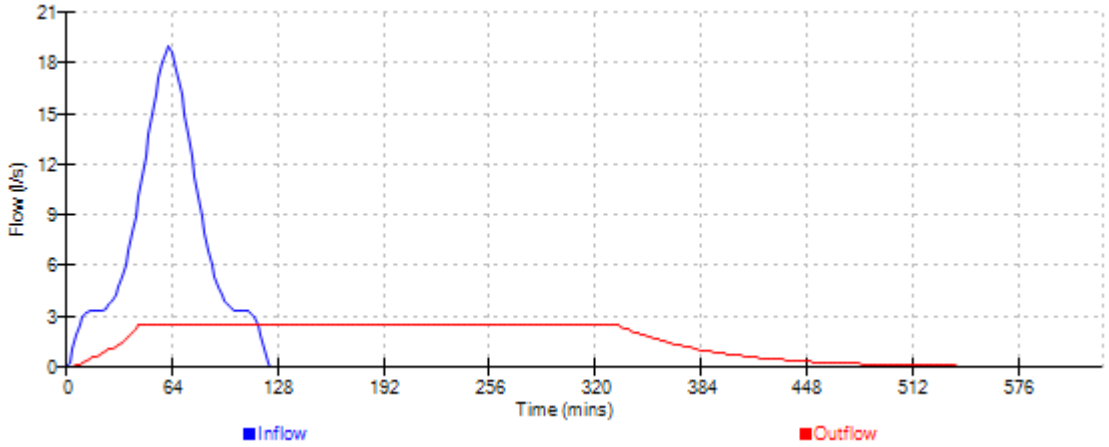
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	88.0	88.0	0.801	0.0	118.4
0.800	88.0	118.4			

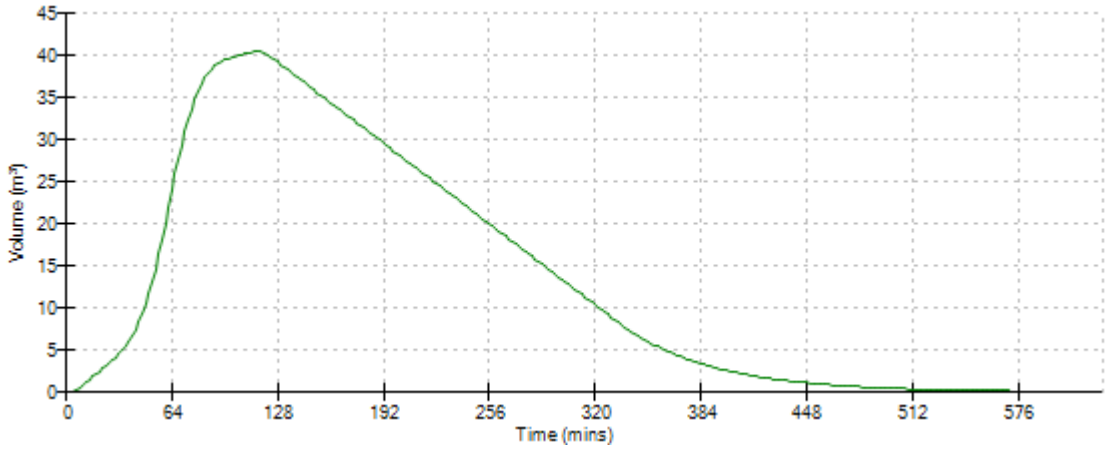
Pump Outflow Control

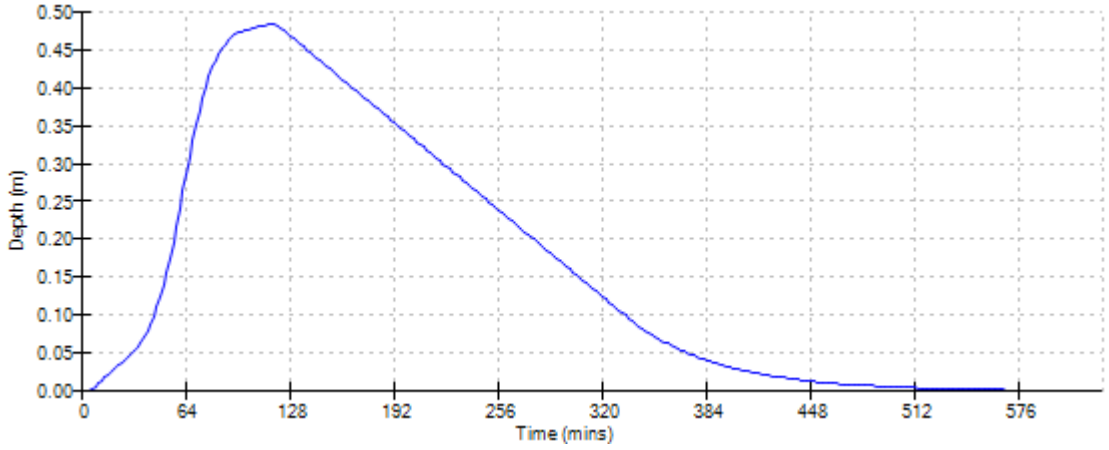
Invert Level (m) 50.750

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.5000	0.900	2.5000	1.700	2.5000	2.500	2.5000
0.200	2.5000	1.000	2.5000	1.800	2.5000	2.600	2.5000
0.300	2.5000	1.100	2.5000	1.900	2.5000	2.700	2.5000
0.400	2.5000	1.200	2.5000	2.000	2.5000	2.800	2.5000
0.500	2.5000	1.300	2.5000	2.100	2.5000	2.900	2.5000
0.600	2.5000	1.400	2.5000	2.200	2.5000	3.000	2.5000
0.700	2.5000	1.500	2.5000	2.300	2.5000		
0.800	2.5000	1.600	2.5000	2.400	2.5000		

Cascade Event: 120 min Winter for TANK 5.srcx







Cascade Summary of Results for TANK 6.srcx

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

Half Drain Time : 343 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	51.853	0.153	0.0	2.4	2.4	41.8	O K
30 min Summer	51.902	0.202	0.0	2.5	2.5	55.2	O K
60 min Summer	51.951	0.251	0.0	2.5	2.5	68.6	O K
120 min Summer	51.993	0.293	0.0	2.5	2.5	80.0	O K
180 min Summer	52.008	0.308	0.0	2.5	2.5	84.3	O K
240 min Summer	52.013	0.313	0.0	2.5	2.5	85.5	O K
360 min Summer	52.014	0.314	0.0	2.5	2.5	86.0	O K
480 min Summer	52.012	0.312	0.0	2.5	2.5	85.4	O K
600 min Summer	52.008	0.308	0.0	2.5	2.5	84.2	O K
720 min Summer	52.002	0.302	0.0	2.5	2.5	82.6	O K
960 min Summer	51.987	0.287	0.0	2.5	2.5	78.6	O K
1440 min Summer	51.955	0.255	0.0	2.5	2.5	69.9	O K
2160 min Summer	51.911	0.211	0.0	2.5	2.5	57.7	O K
2880 min Summer	51.874	0.174	0.0	2.4	2.4	47.7	O K
4320 min Summer	51.825	0.125	0.0	2.3	2.3	34.1	O K
5760 min Summer	51.798	0.098	0.0	2.2	2.2	26.8	O K
7200 min Summer	51.785	0.085	0.0	1.9	1.9	23.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	94.179	0.0	41.4	18
30 min Summer	63.261	0.0	56.0	33
60 min Summer	40.510	0.0	73.4	62
120 min Summer	25.003	0.0	90.8	122
180 min Summer	18.552	0.0	101.2	180
240 min Summer	14.912	0.0	108.5	240
360 min Summer	10.975	0.0	119.8	296
480 min Summer	8.815	0.0	128.3	358
600 min Summer	7.430	0.0	135.2	424
720 min Summer	6.458	0.0	141.1	492
960 min Summer	5.172	0.0	150.6	626
1440 min Summer	3.774	0.0	164.7	896
2160 min Summer	2.748	0.0	181.2	1276
2880 min Summer	2.192	0.0	192.5	1644
4320 min Summer	1.590	0.0	209.0	2336
5760 min Summer	1.265	0.0	222.7	3000
7200 min Summer	1.060	0.0	233.1	3744

Cascade Summary of Results for TANK 6.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	51.776	0.076	0.0	1.7	1.7	20.7	O K
10080 min Summer	51.769	0.069	0.0	1.6	1.6	18.9	O K
15 min Winter	51.871	0.171	0.0	2.4	2.4	46.9	O K
30 min Winter	51.927	0.227	0.0	2.5	2.5	62.1	O K
60 min Winter	51.983	0.283	0.0	2.5	2.5	77.4	O K
120 min Winter	52.032	0.332	0.0	2.5	2.5	90.8	O K
180 min Winter	52.052	0.352	0.0	2.5	2.5	96.2	O K
240 min Winter	52.059	0.359	0.0	2.5	2.5	98.3	O K
360 min Winter	52.062	0.362	0.0	2.5	2.5	98.9	O K
480 min Winter	52.056	0.356	0.0	2.5	2.5	97.3	O K
600 min Winter	52.049	0.349	0.0	2.5	2.5	95.4	O K
720 min Winter	52.039	0.339	0.0	2.5	2.5	92.8	O K
960 min Winter	52.017	0.317	0.0	2.5	2.5	86.6	O K
1440 min Winter	51.967	0.267	0.0	2.5	2.5	73.1	O K
2160 min Winter	51.900	0.200	0.0	2.5	2.5	54.7	O K
2880 min Winter	51.850	0.150	0.0	2.4	2.4	41.0	O K
4320 min Winter	51.796	0.096	0.0	2.1	2.1	26.4	O K
5760 min Winter	51.778	0.078	0.0	1.8	1.8	21.3	O K
7200 min Winter	51.767	0.067	0.0	1.5	1.5	18.4	O K
8640 min Winter	51.761	0.061	0.0	1.3	1.3	16.6	O K
10080 min Winter	51.756	0.056	0.0	1.2	1.2	15.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	0.917	0.0	242.0	4416
10080 min Summer	0.812	0.0	249.4	5144
15 min Winter	94.179	0.0	46.5	18
30 min Winter	63.261	0.0	62.9	33
60 min Winter	40.510	0.0	82.4	62
120 min Winter	25.003	0.0	101.8	120
180 min Winter	18.552	0.0	113.4	176
240 min Winter	14.912	0.0	121.6	232
360 min Winter	10.975	0.0	134.3	340
480 min Winter	8.815	0.0	143.8	386
600 min Winter	7.430	0.0	151.6	460
720 min Winter	6.458	0.0	158.1	536
960 min Winter	5.172	0.0	168.8	686
1440 min Winter	3.774	0.0	184.6	968
2160 min Winter	2.748	0.0	203.0	1360
2880 min Winter	2.192	0.0	215.7	1704
4320 min Winter	1.590	0.0	234.2	2336
5760 min Winter	1.265	0.0	249.5	3048
7200 min Winter	1.060	0.0	261.2	3744
8640 min Winter	0.917	0.0	271.1	4416
10080 min Winter	0.812	0.0	279.6	5240

Cascade Rainfall Details for TANK 6.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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 0.245

Time (mins) From:	To:	Area (ha)
0	4	0.245

Cascade Model Details for TANK 6.srcx

Storage is Online Cover Level (m) 53.200

Cellular Storage Structure

Invert Level (m) 51.700 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	288.0	288.0	0.801	0.0	342.4
0.800	288.0	342.4			

Hydro-Brake Optimum® Outflow Control

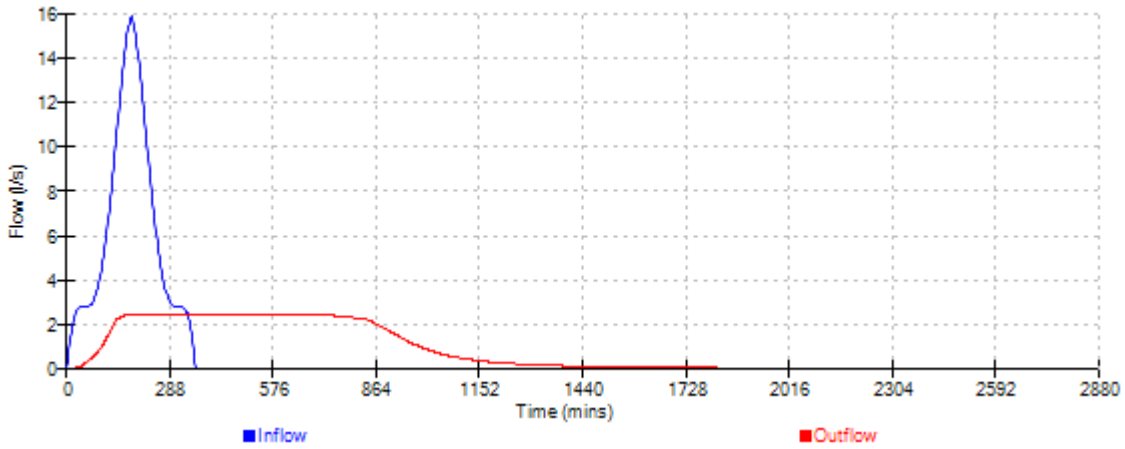
Unit Reference	MD-SHE-0078-2500-0800-2500
Design Head (m)	0.800
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	78
Invert Level (m)	51.700
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

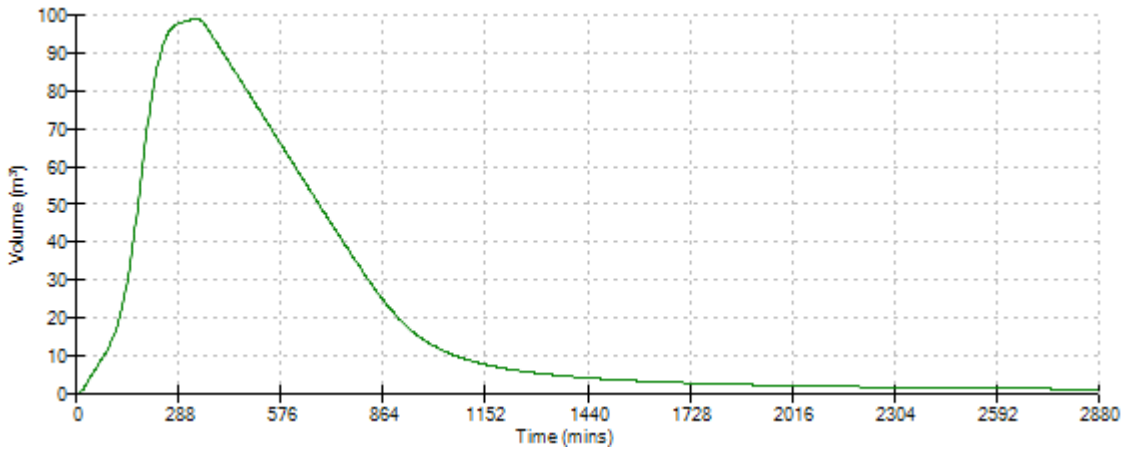
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	2.5
Flush-Flo™	0.236	2.5
Kick-Flo®	0.508	2.0
Mean Flow over Head Range	-	2.2

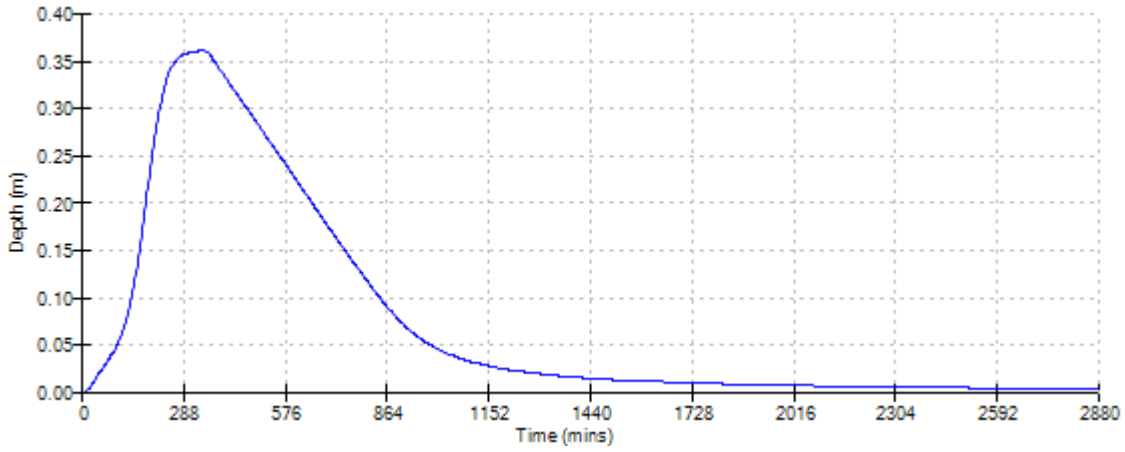
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.2	1.200	3.0	3.000	4.6	7.000	6.8
0.200	2.5	1.400	3.2	3.500	4.9	7.500	7.0
0.300	2.5	1.600	3.4	4.000	5.2	8.000	7.3
0.400	2.4	1.800	3.6	4.500	5.5	8.500	7.5
0.500	2.1	2.000	3.8	5.000	5.8	9.000	7.7
0.600	2.2	2.200	4.0	5.500	6.1	9.500	7.9
0.800	2.5	2.400	4.1	6.000	6.3		
1.000	2.8	2.600	4.3	6.500	6.6		

Cascade Event: 360 min Winter for TANK 6.srcx







APPENDIX C

Woolbro Group and Morris Investment

Station Road, Lingfield

Drainage Sketch

SCALE	DRAWN BY	PRJ No.	DWG No.
NTS	RS	211493	211493/DS/01 Rev B

LANMOR Consulting
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Cascade Summary of Results for PP1.srcx

Upstream Structures	Outflow To	Overflow To
(None)	TANK 3.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	55.700	0.400	0.0	2.5	2.5	11.1	Flood Risk
30 min Summer	55.760	0.460	0.0	2.6	2.6	14.6	Flood Risk
60 min Summer	55.796	0.496	0.0	2.7	2.7	16.6	Flood Risk
120 min Summer	55.800	0.500	0.0	2.7	2.7	16.8	Flood Risk
180 min Summer	55.785	0.485	0.0	2.7	2.7	15.9	Flood Risk
240 min Summer	55.766	0.466	0.0	2.6	2.6	14.9	Flood Risk
360 min Summer	55.729	0.429	0.0	2.5	2.5	12.8	Flood Risk
480 min Summer	55.695	0.395	0.0	2.4	2.4	10.8	Flood Risk
600 min Summer	55.660	0.360	0.0	2.4	2.4	9.0	Flood Risk
720 min Summer	55.626	0.326	0.0	2.4	2.4	7.4	Flood Risk
960 min Summer	55.541	0.241	0.0	2.4	2.4	4.0	O K
1440 min Summer	55.413	0.113	0.0	2.4	2.4	0.9	O K
2160 min Summer	55.376	0.076	0.0	1.9	1.9	0.4	O K
2880 min Summer	55.364	0.064	0.0	1.5	1.5	0.3	O K
4320 min Summer	55.352	0.052	0.0	1.1	1.1	0.2	O K
5760 min Summer	55.345	0.045	0.0	0.9	0.9	0.1	O K
7200 min Summer	55.341	0.041	0.0	0.7	0.7	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	136.560	0.0	12.8	17
30 min Summer	91.729	0.0	17.9	31
60 min Summer	58.739	0.0	23.5	54
120 min Summer	36.254	0.0	29.4	88
180 min Summer	26.900	0.0	32.9	122
240 min Summer	21.623	0.0	35.4	156
360 min Summer	15.914	0.0	39.2	224
480 min Summer	12.782	0.0	42.0	290
600 min Summer	10.774	0.0	44.3	356
720 min Summer	9.365	0.0	46.2	420
960 min Summer	7.499	0.0	49.4	530
1440 min Summer	5.473	0.0	53.9	738
2160 min Summer	3.985	0.0	58.6	1100
2880 min Summer	3.178	0.0	61.9	1448
4320 min Summer	2.306	0.0	66.5	2172
5760 min Summer	1.834	0.0	69.7	2936
7200 min Summer	1.536	0.0	72.1	3576

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	55.337	0.037	0.0	0.6	0.6	0.1	O K
10080 min Summer	55.335	0.035	0.0	0.5	0.5	0.1	O K
15 min Winter	55.730	0.430	0.0	2.5	2.5	12.8	Flood Risk
30 min Winter	55.800	0.500	0.0	2.7	2.7	16.8	Flood Risk
60 min Winter	55.846	0.546	0.0	2.8	2.8	19.4	Flood Risk
120 min Winter	55.848	0.548	0.0	2.8	2.8	19.5	Flood Risk
180 min Winter	55.826	0.526	0.0	2.8	2.8	18.3	Flood Risk
240 min Winter	55.797	0.497	0.0	2.7	2.7	16.6	Flood Risk
360 min Winter	55.740	0.440	0.0	2.6	2.6	13.4	Flood Risk
480 min Winter	55.688	0.388	0.0	2.4	2.4	10.5	Flood Risk
600 min Winter	55.634	0.334	0.0	2.4	2.4	7.7	Flood Risk
720 min Winter	55.559	0.259	0.0	2.4	2.4	4.7	O K
960 min Winter	55.417	0.117	0.0	2.4	2.4	1.0	O K
1440 min Winter	55.375	0.075	0.0	1.9	1.9	0.4	O K
2160 min Winter	55.359	0.059	0.0	1.4	1.4	0.2	O K
2880 min Winter	55.351	0.051	0.0	1.1	1.1	0.2	O K
4320 min Winter	55.342	0.042	0.0	0.8	0.8	0.1	O K
5760 min Winter	55.337	0.037	0.0	0.6	0.6	0.1	O K
7200 min Winter	55.334	0.034	0.0	0.5	0.5	0.1	O K
8640 min Winter	55.331	0.031	0.0	0.5	0.5	0.1	O K
10080 min Winter	55.329	0.029	0.0	0.4	0.4	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.330	0.0	74.0	4376
10080 min Summer	1.178	0.0	75.5	5136
15 min Winter	136.560	0.0	14.6	17
30 min Winter	91.729	0.0	20.3	31
60 min Winter	58.739	0.0	26.5	58
120 min Winter	36.254	0.0	33.2	94
180 min Winter	26.900	0.0	37.1	132
240 min Winter	21.623	0.0	39.9	170
360 min Winter	15.914	0.0	44.2	242
480 min Winter	12.782	0.0	47.4	310
600 min Winter	10.774	0.0	50.0	378
720 min Winter	9.365	0.0	52.1	436
960 min Winter	7.499	0.0	55.6	512
1440 min Winter	5.473	0.0	60.7	734
2160 min Winter	3.985	0.0	66.0	1068
2880 min Winter	3.178	0.0	69.9	1440
4320 min Winter	2.306	0.0	75.2	2156
5760 min Winter	1.834	0.0	78.9	2856
7200 min Winter	1.536	0.0	81.8	3728
8640 min Winter	1.330	0.0	84.1	4360
10080 min Winter	1.178	0.0	85.9	5112

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.058

Time (mins) From:	To:	Area (ha)
0	4	0.058

Cascade Model Details for PP1.srcx

Storage is Online Cover Level (m) 55.900

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	11.6
Membrane Percolation (mm/hr)	1000	Length (m)	35.0
Max Percolation (l/s)	112.8	Slope (1:X)	40.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	55.300	Cap Volume Depth (m)	0.400

Hydro-Brake Optimum® Outflow Control

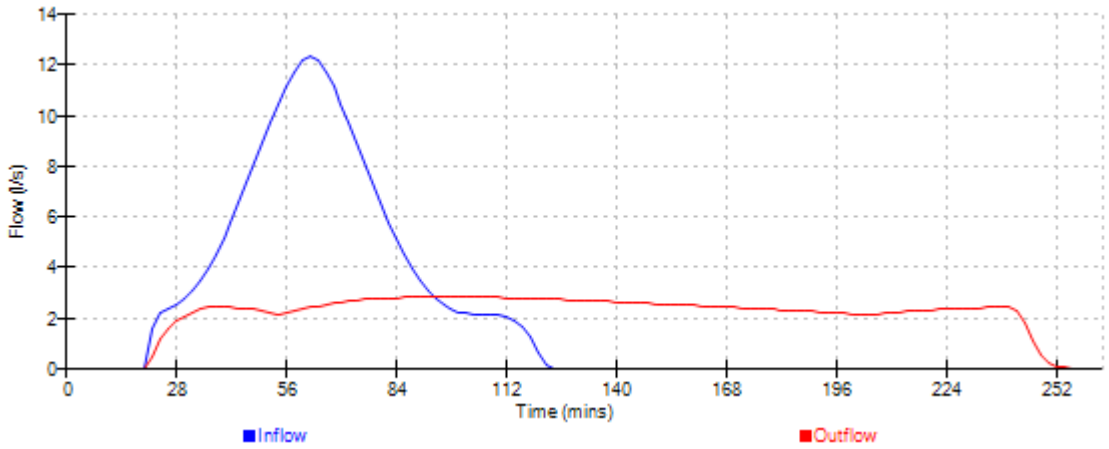
Unit Reference	MD-SHE-0083-2500-0400-2500
Design Head (m)	0.400
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	83
Invert Level (m)	55.300
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

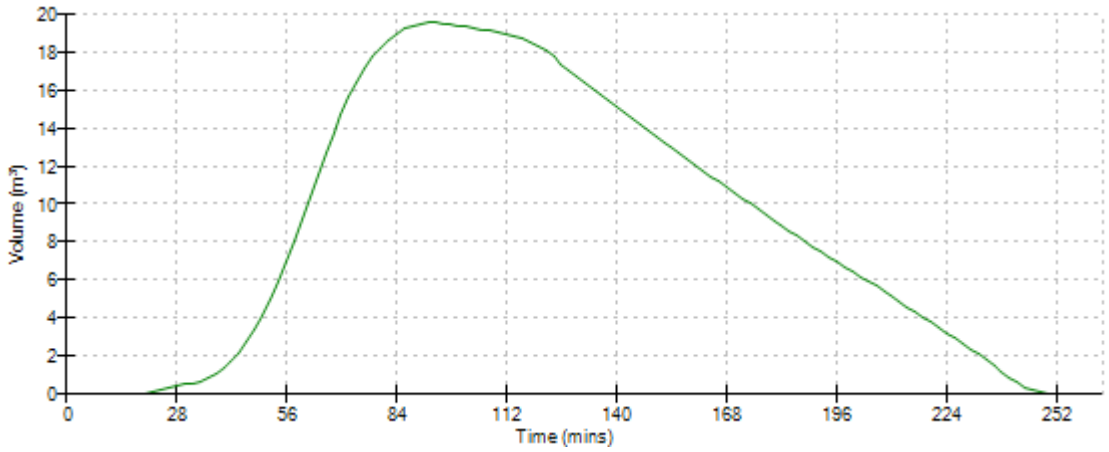
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	2.5
Flush-Flo™	0.131	2.4
Kick-Flo®	0.290	2.1
Mean Flow over Head Range	-	2.0

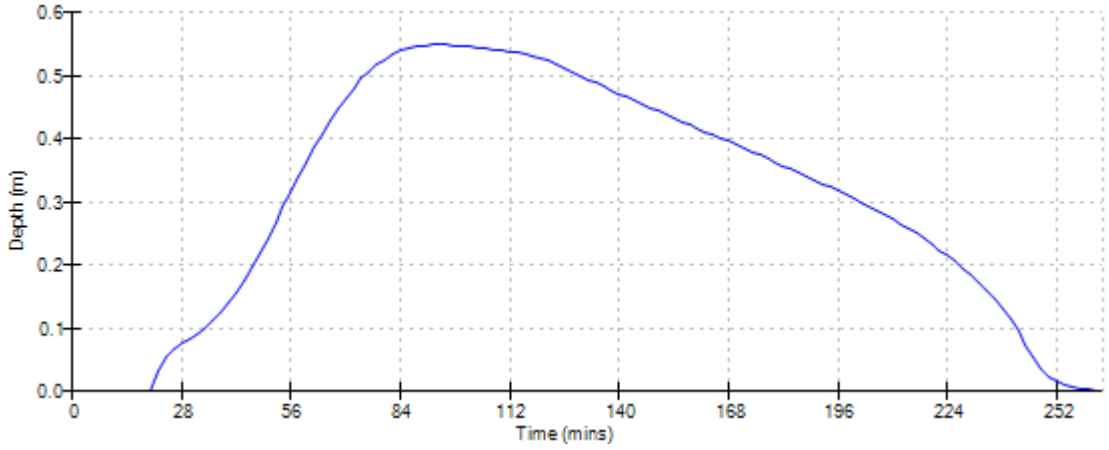
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.4	1.200	4.1	3.000	6.2	7.000	9.4
0.200	2.4	1.400	4.4	3.500	6.7	7.500	9.8
0.300	2.2	1.600	4.6	4.000	7.1	8.000	10.1
0.400	2.5	1.800	4.9	4.500	7.5	8.500	10.4
0.500	2.7	2.000	5.2	5.000	8.0	9.000	10.7
0.600	3.0	2.200	5.4	5.500	8.3	9.500	11.0
0.800	3.4	2.400	5.6	6.000	8.7		
1.000	3.7	2.600	5.8	6.500	9.1		

Cascade Event: 120 min Winter for PP1.srcx







Cascade Summary of Results for PP2.srcx

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

Half Drain Time : 48 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	53.607	0.507	0.0	5.5	5.5	18.5	Flood Risk
30 min Summer	53.667	0.567	0.0	5.8	5.8	22.6	Flood Risk
60 min Summer	53.692	0.592	0.0	5.9	5.9	24.2	Flood Risk
120 min Summer	53.679	0.579	0.0	5.9	5.9	23.4	Flood Risk
180 min Summer	53.649	0.549	0.0	5.7	5.7	21.5	Flood Risk
240 min Summer	53.618	0.518	0.0	5.6	5.6	19.3	Flood Risk
360 min Summer	53.562	0.462	0.0	5.3	5.3	15.4	Flood Risk
480 min Summer	53.508	0.408	0.0	5.0	5.0	12.0	Flood Risk
600 min Summer	53.455	0.355	0.0	4.9	4.9	9.1	O K
720 min Summer	53.392	0.292	0.0	4.9	4.9	6.1	O K
960 min Summer	53.276	0.176	0.0	4.9	4.9	2.2	O K
1440 min Summer	53.205	0.105	0.0	4.1	4.1	0.8	O K
2160 min Summer	53.182	0.082	0.0	3.0	3.0	0.5	O K
2880 min Summer	53.171	0.071	0.0	2.4	2.4	0.4	O K
4320 min Summer	53.159	0.059	0.0	1.8	1.8	0.2	O K
5760 min Summer	53.152	0.052	0.0	1.4	1.4	0.2	O K
7200 min Summer	53.147	0.047	0.0	1.2	1.2	0.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	136.560	0.0	22.6	17
30 min Summer	91.729	0.0	30.8	30
60 min Summer	58.739	0.0	39.7	48
120 min Summer	36.254	0.0	49.3	82
180 min Summer	26.900	0.0	55.0	116
240 min Summer	21.623	0.0	59.0	150
360 min Summer	15.914	0.0	65.2	216
480 min Summer	12.782	0.0	69.9	280
600 min Summer	10.774	0.0	73.6	342
720 min Summer	9.365	0.0	76.8	400
960 min Summer	7.499	0.0	82.0	502
1440 min Summer	5.473	0.0	89.7	734
2160 min Summer	3.985	0.0	97.8	1080
2880 min Summer	3.178	0.0	103.7	1444
4320 min Summer	2.306	0.0	112.4	2152
5760 min Summer	1.834	0.0	118.6	2840
7200 min Summer	1.536	0.0	123.7	3584

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	53.143	0.043	0.0	1.0	1.0	0.1	O K
10080 min Summer	53.141	0.041	0.0	0.9	0.9	0.1	O K
15 min Winter	53.646	0.546	0.0	5.7	5.7	21.2	Flood Risk
30 min Winter	53.727	0.627	0.0	6.1	6.1	26.3	Flood Risk
60 min Winter	53.765	0.665	0.0	6.3	6.3	28.3	Flood Risk
120 min Winter	53.736	0.636	0.0	6.1	6.1	26.8	Flood Risk
180 min Winter	53.684	0.584	0.0	5.9	5.9	23.7	Flood Risk
240 min Winter	53.633	0.533	0.0	5.6	5.6	20.4	Flood Risk
360 min Winter	53.549	0.449	0.0	5.2	5.2	14.5	Flood Risk
480 min Winter	53.466	0.366	0.0	4.9	4.9	9.6	O K
600 min Winter	53.345	0.245	0.0	4.9	4.9	4.3	O K
720 min Winter	53.244	0.144	0.0	4.9	4.9	1.5	O K
960 min Winter	53.204	0.104	0.0	4.1	4.1	0.8	O K
1440 min Winter	53.182	0.082	0.0	3.0	3.0	0.5	O K
2160 min Winter	53.167	0.067	0.0	2.2	2.2	0.3	O K
2880 min Winter	53.159	0.059	0.0	1.8	1.8	0.2	O K
4320 min Winter	53.149	0.049	0.0	1.3	1.3	0.2	O K
5760 min Winter	53.143	0.043	0.0	1.0	1.0	0.1	O K
7200 min Winter	53.139	0.039	0.0	0.8	0.8	0.1	O K
8640 min Winter	53.136	0.036	0.0	0.7	0.7	0.1	O K
10080 min Winter	53.134	0.034	0.0	0.7	0.7	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.330	0.0	128.0	4384
10080 min Summer	1.178	0.0	131.7	4984
15 min Winter	136.560	0.0	25.4	17
30 min Winter	91.729	0.0	34.6	30
60 min Winter	58.739	0.0	44.6	50
120 min Winter	36.254	0.0	55.4	88
180 min Winter	26.900	0.0	61.7	126
240 min Winter	21.623	0.0	66.2	162
360 min Winter	15.914	0.0	73.2	230
480 min Winter	12.782	0.0	78.4	296
600 min Winter	10.774	0.0	82.6	348
720 min Winter	9.365	0.0	86.2	384
960 min Winter	7.499	0.0	92.0	490
1440 min Winter	5.473	0.0	100.7	714
2160 min Winter	3.985	0.0	109.8	1076
2880 min Winter	3.178	0.0	116.5	1464
4320 min Winter	2.306	0.0	126.3	2144
5760 min Winter	1.834	0.0	133.4	2896
7200 min Winter	1.536	0.0	139.2	3680
8640 min Winter	1.330	0.0	144.0	4368
10080 min Winter	1.178	0.0	148.2	5080

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.093

Time (mins) From:	To:	Area (ha)
0	4	0.093

Cascade Model Details for PP2.srcx

Storage is Online Cover Level (m) 53.800

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.0
Membrane Percolation (mm/hr)	1000	Length (m)	61.0
Max Percolation (l/s)	67.8	Slope (1:X)	120.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	53.100	Cap Volume Depth (m)	0.500

Hydro-Brake Optimum® Outflow Control

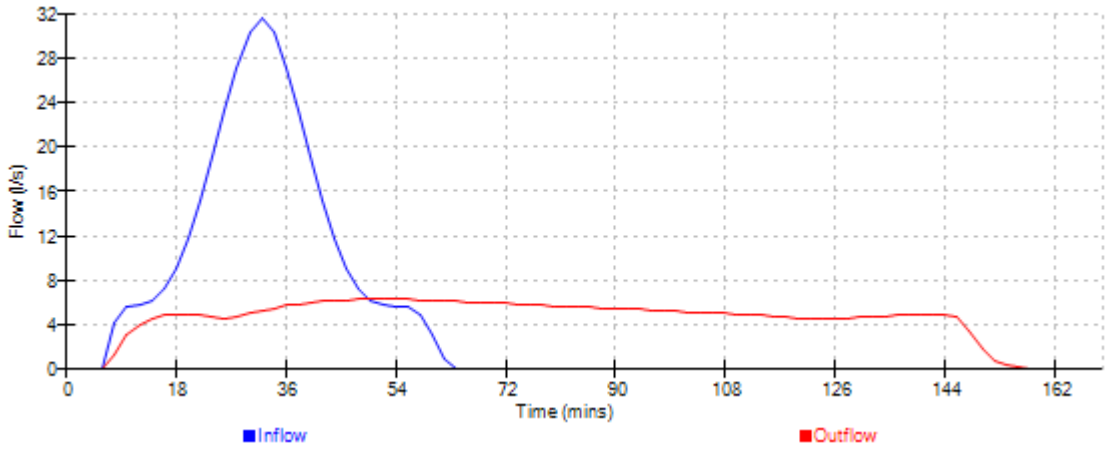
Unit Reference	MD-SHE-0113-5000-0400-5000
Design Head (m)	0.400
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	113
Invert Level (m)	53.100
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

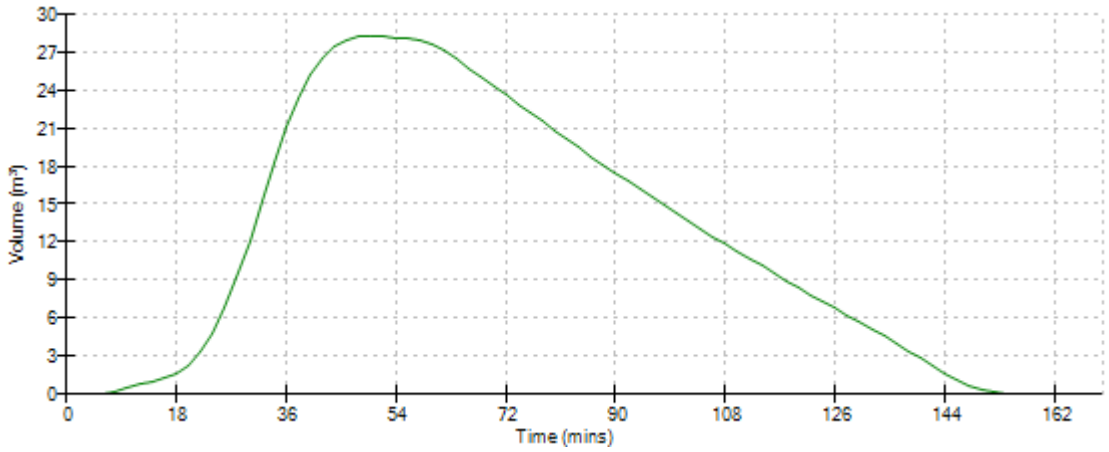
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	4.9
Flush-Flo™	0.168	4.9
Kick-Flo®	0.310	4.4
Mean Flow over Head Range	-	3.9

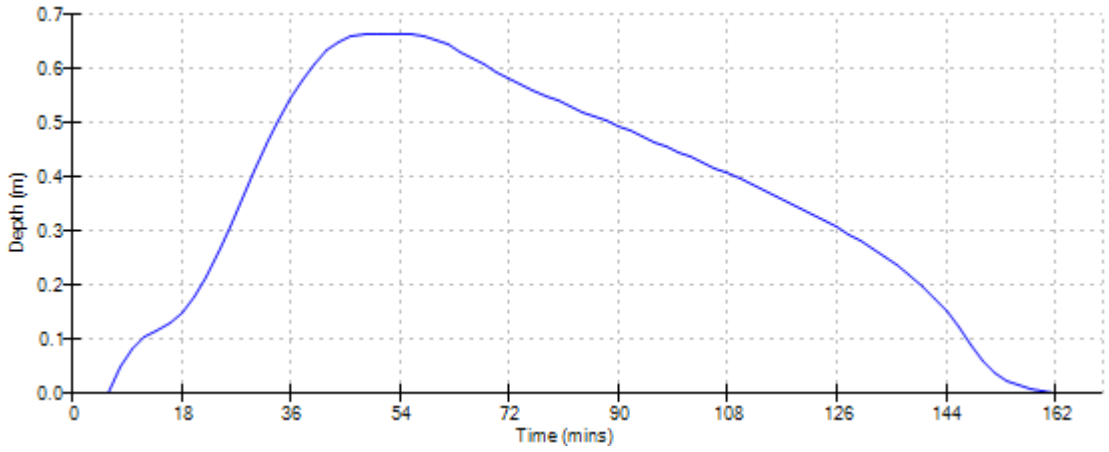
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.9	1.200	8.3	3.000	12.8	7.000	19.3
0.200	4.9	1.400	8.9	3.500	13.7	7.500	20.0
0.300	4.5	1.600	9.5	4.000	14.6	8.000	20.6
0.400	4.9	1.800	10.0	4.500	15.4	8.500	21.3
0.500	5.5	2.000	10.5	5.000	16.3	9.000	21.9
0.600	6.0	2.200	11.0	5.500	17.1	9.500	22.5
0.800	6.8	2.400	11.5	6.000	17.8		
1.000	7.6	2.600	11.9	6.500	18.6		

Cascade Event: 60 min Winter for PP2.srcx







Cascade Summary of Results for SWALE 1.srcx

Upstream Structures	Outflow To	Overflow To
TANK 2.srcx	POND.srcx	(None)

Half Drain Time : 210 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	54.501	0.461	0.0	5.0	5.0	41.0	O K
30 min Summer	54.584	0.544	0.0	5.0	5.0	56.7	O K
60 min Summer	54.647	0.607	0.0	5.0	5.0	70.0	O K
120 min Summer	54.700	0.660	0.0	5.0	5.0	82.5	Flood Risk
180 min Summer	54.726	0.686	0.0	5.0	5.0	88.8	Flood Risk
240 min Summer	54.740	0.700	0.0	5.0	5.0	92.6	Flood Risk
360 min Summer	54.761	0.721	0.0	5.0	5.0	97.9	Flood Risk
480 min Summer	54.771	0.731	0.0	5.0	5.0	100.6	Flood Risk
600 min Summer	54.762	0.722	0.0	5.0	5.0	98.2	Flood Risk
720 min Summer	54.753	0.713	0.0	5.0	5.0	95.9	Flood Risk
960 min Summer	54.734	0.694	0.0	5.0	5.0	90.9	Flood Risk
1440 min Summer	54.674	0.634	0.0	5.0	5.0	76.3	O K
2160 min Summer	54.561	0.521	0.0	5.0	5.0	52.1	O K
2880 min Summer	54.417	0.377	0.0	5.0	5.0	27.6	O K
4320 min Summer	54.207	0.167	0.0	5.0	5.0	5.0	O K
5760 min Summer	54.118	0.078	0.0	4.4	4.4	0.9	O K
7200 min Summer	54.099	0.059	0.0	3.7	3.7	0.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	136.560	0.0	75.3	102
30 min Summer	91.729	0.0	101.1	147
60 min Summer	58.739	0.0	129.5	196
120 min Summer	36.254	0.0	159.9	256
180 min Summer	26.900	0.0	177.9	298
240 min Summer	21.623	0.0	190.7	334
360 min Summer	15.914	0.0	210.5	402
480 min Summer	12.782	0.0	225.5	472
600 min Summer	10.774	0.0	237.6	518
720 min Summer	9.365	0.0	247.7	568
960 min Summer	7.499	0.0	264.5	670
1440 min Summer	5.473	0.0	289.6	902
2160 min Summer	3.985	0.0	316.1	1296
2880 min Summer	3.178	0.0	336.3	1616
4320 min Summer	2.306	0.0	365.9	2248
5760 min Summer	1.834	0.0	387.9	2904
7200 min Summer	1.536	0.0	406.4	3656

Cascade Summary of Results for SWALE 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	54.088	0.048	0.0	3.2	3.2	0.3	O K
10080 min Summer	54.081	0.041	0.0	2.9	2.9	0.2	O K
15 min Winter	54.538	0.498	0.0	5.0	5.0	47.7	O K
30 min Winter	54.616	0.576	0.0	5.0	5.0	63.2	O K
60 min Winter	54.682	0.642	0.0	5.0	5.0	78.1	O K
120 min Winter	54.741	0.701	0.0	5.0	5.0	92.7	Flood Risk
180 min Winter	54.770	0.730	0.0	5.0	5.0	100.5	Flood Risk
240 min Winter	54.788	0.748	0.0	5.0	5.0	105.3	Flood Risk
360 min Winter	54.813	0.773	0.0	5.0	5.0	112.1	Flood Risk
480 min Winter	54.830	0.790	0.0	5.1	5.1	116.9	Flood Risk
600 min Winter	54.827	0.787	0.0	5.1	5.1	116.3	Flood Risk
720 min Winter	54.815	0.775	0.0	5.0	5.0	112.7	Flood Risk
960 min Winter	54.782	0.742	0.0	5.0	5.0	103.6	Flood Risk
1440 min Winter	54.677	0.637	0.0	5.0	5.0	77.0	O K
2160 min Winter	54.464	0.424	0.0	5.0	5.0	34.9	O K
2880 min Winter	54.241	0.201	0.0	5.0	5.0	7.6	O K
4320 min Winter	54.107	0.067	0.0	4.0	4.0	0.7	O K
5760 min Winter	54.088	0.048	0.0	3.2	3.2	0.3	O K
7200 min Winter	54.078	0.038	0.0	2.7	2.7	0.2	O K
8640 min Winter	54.071	0.031	0.0	2.3	2.3	0.1	O K
10080 min Winter	54.066	0.026	0.0	2.1	2.1	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.330	0.0	422.2	4392
10080 min Summer	1.178	0.0	435.8	5112
15 min Winter	136.560	0.0	84.3	118
30 min Winter	91.729	0.0	113.2	165
60 min Winter	58.739	0.0	145.0	220
120 min Winter	36.254	0.0	179.0	282
180 min Winter	26.900	0.0	199.2	324
240 min Winter	21.623	0.0	213.5	360
360 min Winter	15.914	0.0	235.7	364
480 min Winter	12.782	0.0	252.5	482
600 min Winter	10.774	0.0	266.1	548
720 min Winter	9.365	0.0	277.5	588
960 min Winter	7.499	0.0	296.3	690
1440 min Winter	5.473	0.0	324.4	966
2160 min Winter	3.985	0.0	354.3	1340
2880 min Winter	3.178	0.0	376.3	1588
4320 min Winter	2.306	0.0	409.9	2192
5760 min Winter	1.834	0.0	434.6	2920
7200 min Winter	1.536	0.0	455.0	3632
8640 min Winter	1.330	0.0	472.6	4328
10080 min Winter	1.178	0.0	488.2	5056

Cascade Rainfall Details for SWALE 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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.154

Time (mins) From:	To:	Area (ha)
0	4	0.154

Cascade Model Details for SWALE 1.srcx

Storage is Online Cover Level (m) 55.000

Swale Structure

Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	87.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	2.0
Safety Factor	2.0	Slope (1:X)	500.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	54.040	Cap Infiltration Depth (m)	0.000
Base Width (m)	0.5		

Hydro-Brake Optimum® Outflow Control

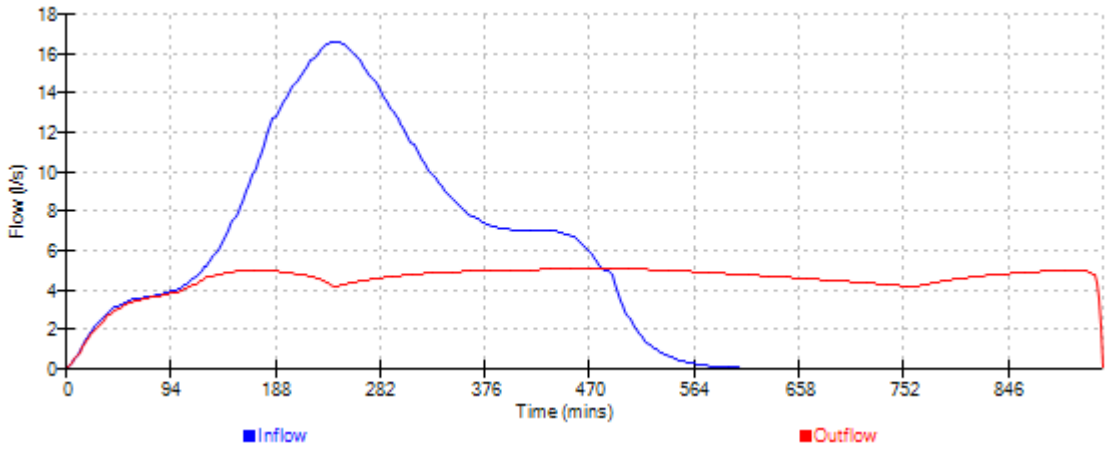
Unit Reference	MD-SHE-0109-5000-0800-5000
Design Head (m)	0.800
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	109
Invert Level (m)	54.000
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

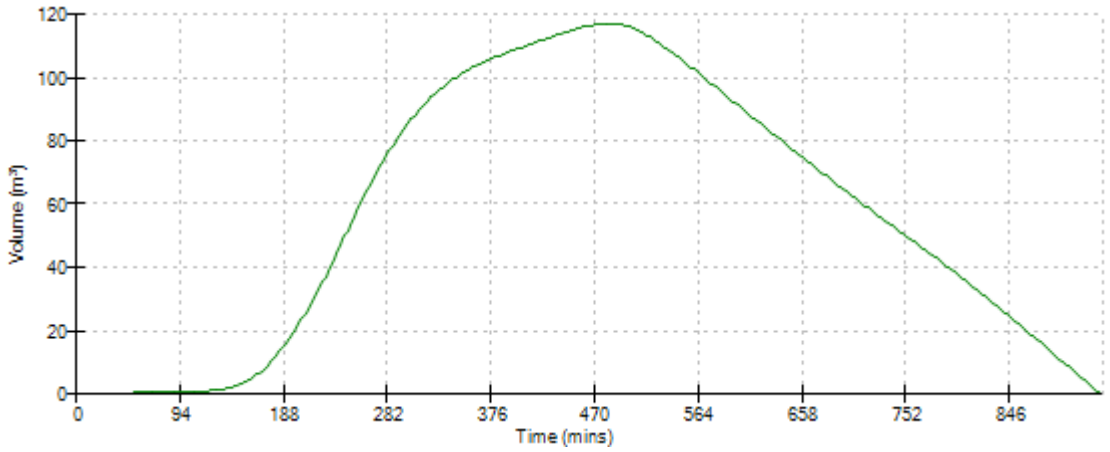
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	5.0
Flush-Flo™	0.242	5.0
Kick-Flo®	0.537	4.2
Mean Flow over Head Range	-	4.3

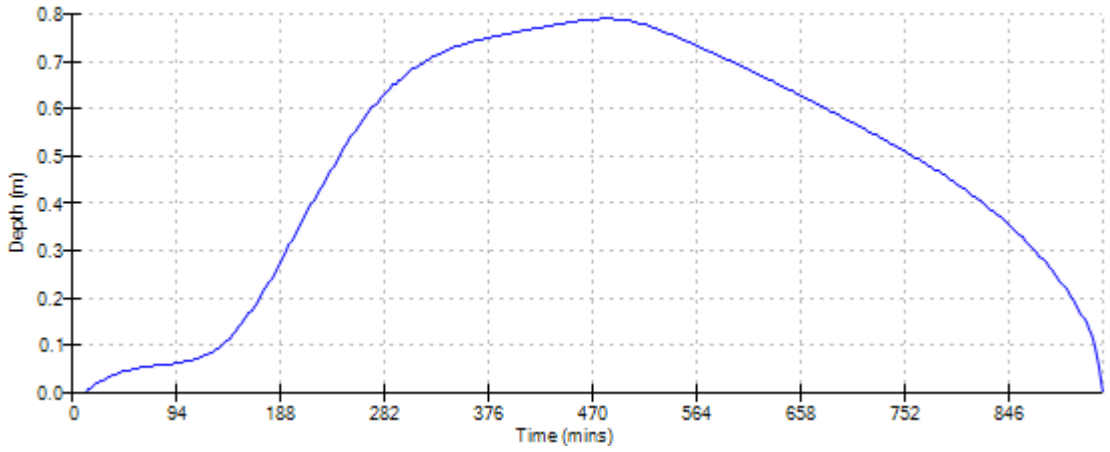
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.7	1.200	6.0	3.000	9.3	7.000	13.9
0.200	5.0	1.400	6.5	3.500	10.0	7.500	14.4
0.300	5.0	1.600	6.9	4.000	10.6	8.000	14.8
0.400	4.8	1.800	7.3	4.500	11.3	8.500	15.2
0.500	4.5	2.000	7.7	5.000	11.8	9.000	15.7
0.600	4.4	2.200	8.0	5.500	12.4	9.500	16.1
0.800	5.0	2.400	8.4	6.000	12.9		
1.000	5.5	2.600	8.7	6.500	13.4		

Cascade Event: 480 min Winter for SWALE 1.srcx







Cascade Summary of Results for SWALE 2.srcx

Upstream Structures	Outflow To	Overflow To
TANK 4.srcx TANK 5.srcx	POND.srcx	(None)

Half Drain Time : 0 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	50.515	0.395	0.0	211.7	211.7	5.7	Flood Risk
30 min Summer	50.485	0.365	0.0	187.7	187.7	4.8	Flood Risk
60 min Summer	50.420	0.300	0.0	139.8	139.8	3.0	Flood Risk
120 min Summer	50.352	0.232	0.0	95.4	95.4	1.7	O K
180 min Summer	50.317	0.197	0.0	74.3	74.3	1.2	O K
240 min Summer	50.293	0.173	0.0	61.2	61.2	0.9	O K
360 min Summer	50.264	0.144	0.0	46.4	46.4	0.6	O K
480 min Summer	50.247	0.127	0.0	38.4	38.4	0.5	O K
600 min Summer	50.235	0.115	0.0	33.3	33.3	0.4	O K
720 min Summer	50.227	0.107	0.0	29.7	29.7	0.3	O K
960 min Summer	50.215	0.095	0.0	24.8	24.8	0.2	O K
1440 min Summer	50.200	0.080	0.0	19.4	19.4	0.2	O K
2160 min Summer	50.190	0.070	0.0	15.7	15.7	0.1	O K
2880 min Summer	50.182	0.062	0.0	13.1	13.1	0.1	O K
4320 min Summer	50.172	0.052	0.0	10.2	10.2	0.1	O K
5760 min Summer	50.166	0.046	0.0	8.3	8.3	0.1	O K
7200 min Summer	50.161	0.041	0.0	7.1	7.1	0.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	136.560	0.0	136.4	10
30 min Summer	91.729	0.0	183.3	18
60 min Summer	58.739	0.0	234.7	32
120 min Summer	36.254	0.0	289.8	62
180 min Summer	26.900	0.0	322.5	92
240 min Summer	21.623	0.0	345.7	122
360 min Summer	15.914	0.0	381.6	182
480 min Summer	12.782	0.0	408.7	242
600 min Summer	10.774	0.0	430.6	306
720 min Summer	9.365	0.0	449.2	362
960 min Summer	7.499	0.0	479.6	476
1440 min Summer	5.473	0.0	525.0	714
2160 min Summer	3.985	0.0	573.4	1076
2880 min Summer	3.178	0.0	609.7	1468
4320 min Summer	2.306	0.0	663.5	2140
5760 min Summer	1.834	0.0	702.9	2936
7200 min Summer	1.536	0.0	736.1	3616

Cascade Summary of Results for SWALE 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	50.157	0.037	0.0	6.0	6.0	0.0	O K
10080 min Summer	50.154	0.034	0.0	5.3	5.3	0.0	O K
15 min Winter	50.516	0.396	0.0	212.1	212.1	5.8	Flood Risk
30 min Winter	50.455	0.335	0.0	165.4	165.4	3.9	Flood Risk
60 min Winter	50.380	0.260	0.0	113.1	113.1	2.2	O K
120 min Winter	50.314	0.194	0.0	72.9	72.9	1.1	O K
180 min Winter	50.282	0.162	0.0	55.7	55.7	0.8	O K
240 min Winter	50.262	0.142	0.0	45.7	45.7	0.6	O K
360 min Winter	50.239	0.119	0.0	35.1	35.1	0.4	O K
480 min Winter	50.226	0.106	0.0	29.3	29.3	0.3	O K
600 min Winter	50.216	0.096	0.0	25.4	25.4	0.3	O K
720 min Winter	50.210	0.090	0.0	22.9	22.9	0.2	O K
960 min Winter	50.200	0.080	0.0	19.4	19.4	0.2	O K
1440 min Winter	50.189	0.069	0.0	15.5	15.5	0.1	O K
2160 min Winter	50.179	0.059	0.0	12.1	12.1	0.1	O K
2880 min Winter	50.172	0.052	0.0	10.0	10.0	0.1	O K
4320 min Winter	50.163	0.043	0.0	7.5	7.5	0.1	O K
5760 min Winter	50.156	0.036	0.0	5.9	5.9	0.0	O K
7200 min Winter	50.153	0.033	0.0	5.2	5.2	0.0	O K
8640 min Winter	50.150	0.030	0.0	4.5	4.5	0.0	O K
10080 min Winter	50.148	0.028	0.0	4.0	4.0	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.330	0.0	764.4	4360
10080 min Summer	1.178	0.0	789.5	5000
15 min Winter	136.560	0.0	152.8	10
30 min Winter	91.729	0.0	205.3	18
60 min Winter	58.739	0.0	262.9	32
120 min Winter	36.254	0.0	324.6	62
180 min Winter	26.900	0.0	361.2	92
240 min Winter	21.623	0.0	387.2	124
360 min Winter	15.914	0.0	427.4	184
480 min Winter	12.782	0.0	457.7	242
600 min Winter	10.774	0.0	482.3	300
720 min Winter	9.365	0.0	503.1	356
960 min Winter	7.499	0.0	537.1	484
1440 min Winter	5.473	0.0	588.0	710
2160 min Winter	3.985	0.0	642.2	1112
2880 min Winter	3.178	0.0	682.8	1424
4320 min Winter	2.306	0.0	743.1	2172
5760 min Winter	1.834	0.0	787.8	2952
7200 min Winter	1.536	0.0	824.6	3520
8640 min Winter	1.330	0.0	856.7	4272
10080 min Winter	1.178	0.0	884.3	4992

Cascade Rainfall Details for SWALE 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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.320

Time (mins) From:	To:	Area (ha)
0	4	0.320

Cascade Model Details for SWALE 2.srcx

Storage is Online Cover Level (m) 50.700

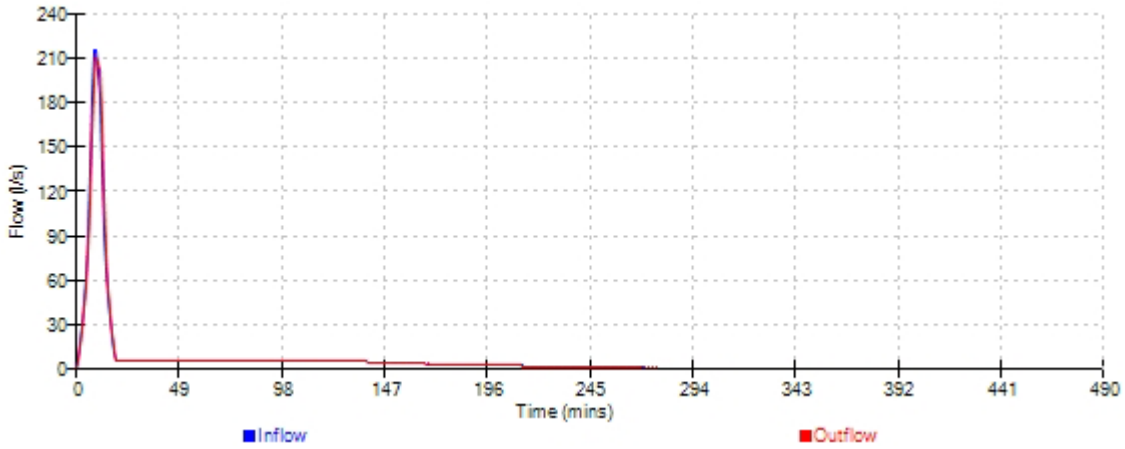
Swale Structure

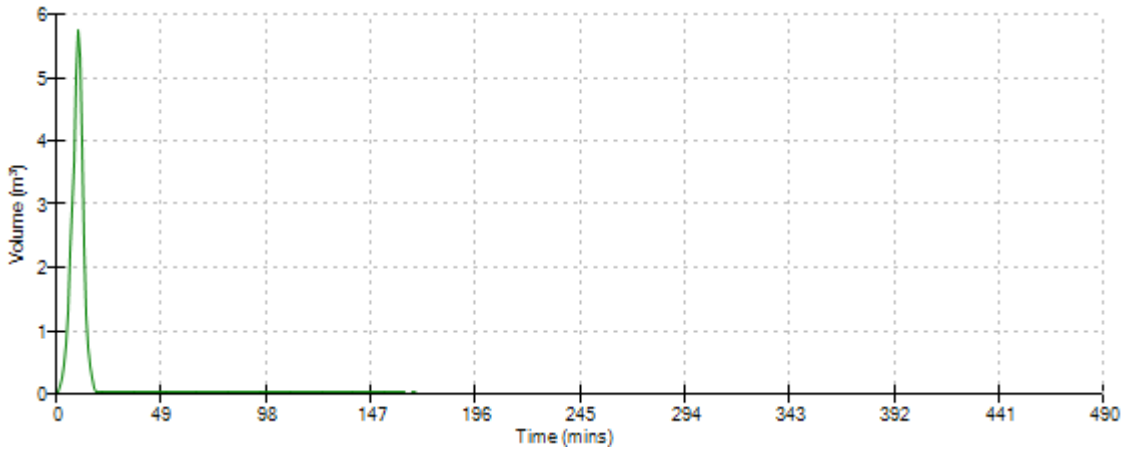
Infiltration Coefficient Base (m/hr)	0.00000	Length (m)	70.0
Infiltration Coefficient Side (m/hr)	0.00000	Side Slope (1:X)	2.0
Safety Factor	2.0	Slope (1:X)	48.0
Porosity	1.00	Cap Volume Depth (m)	0.000
Invert Level (m)	50.120	Cap Infiltration Depth (m)	0.000
Base Width (m)	1.0		

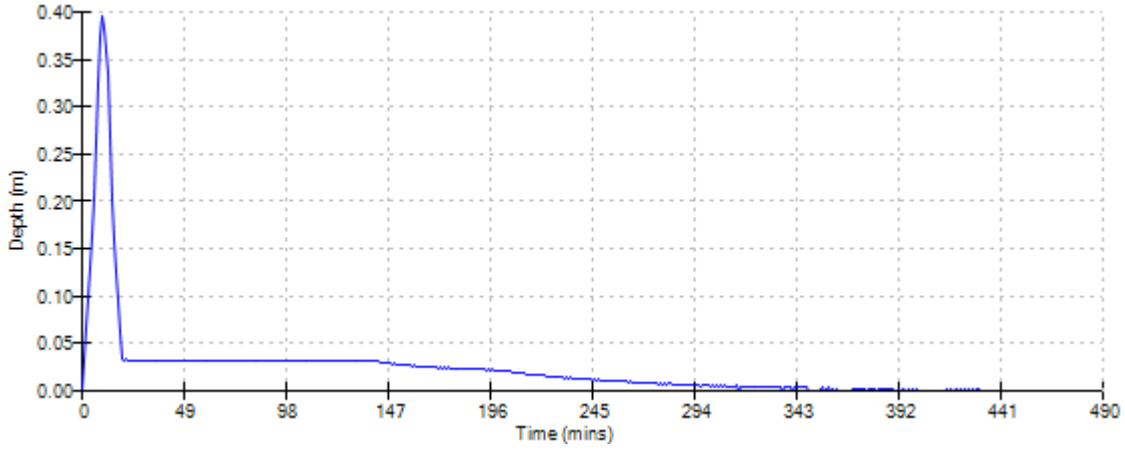
Weir Outflow Control

Discharge Coef 0.544 Width (m) 0.500 Invert Level (m) 50.120

Cascade Event: 15 min Winter for SWALE 2.srcx







Cascade Summary of Results for TANK 1.srcx

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

Half Drain Time : 1054 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	55.884	0.284	0.0	2.3	2.3	97.2	O K
30 min Summer	55.979	0.379	0.0	2.3	2.3	129.6	O K
60 min Summer	56.079	0.479	0.0	2.3	2.3	163.8	O K
120 min Summer	56.178	0.578	0.0	2.3	2.3	197.6	O K
180 min Summer	56.230	0.630	0.0	2.3	2.3	215.5	O K
240 min Summer	56.262	0.662	0.0	2.3	2.3	226.6	O K
360 min Summer	56.304	0.704	0.0	2.3	2.3	240.7	O K
480 min Summer	56.326	0.726	0.0	2.3	2.3	248.1	O K
600 min Summer	56.336	0.736	0.0	2.3	2.3	251.8	O K
720 min Summer	56.340	0.740	0.0	2.3	2.3	253.0	O K
960 min Summer	56.334	0.734	0.0	2.3	2.3	251.1	O K
1440 min Summer	56.310	0.710	0.0	2.3	2.3	242.9	O K
2160 min Summer	56.268	0.668	0.0	2.3	2.3	228.5	O K
2880 min Summer	56.219	0.619	0.0	2.3	2.3	211.7	O K
4320 min Summer	56.126	0.526	0.0	2.3	2.3	179.8	O K
5760 min Summer	56.044	0.444	0.0	2.3	2.3	151.9	O K
7200 min Summer	55.974	0.374	0.0	2.3	2.3	128.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	136.560	0.0	94.4	19
30 min Summer	91.729	0.0	126.7	34
60 min Summer	58.739	0.0	167.8	64
120 min Summer	36.254	0.0	207.2	124
180 min Summer	26.900	0.0	230.5	182
240 min Summer	21.623	0.0	246.8	242
360 min Summer	15.914	0.0	271.9	362
480 min Summer	12.782	0.0	290.4	482
600 min Summer	10.774	0.0	304.9	602
720 min Summer	9.365	0.0	316.5	720
960 min Summer	7.499	0.0	332.3	936
1440 min Summer	5.473	0.0	331.1	1168
2160 min Summer	3.985	0.0	413.5	1556
2880 min Summer	3.178	0.0	439.5	1956
4320 min Summer	2.306	0.0	477.3	2724
5760 min Summer	1.834	0.0	509.0	3464
7200 min Summer	1.536	0.0	532.9	4248

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	55.916	0.316	0.0	2.3	2.3	108.1	O K
10080 min Summer	55.868	0.268	0.0	2.3	2.3	91.6	O K
15 min Winter	55.919	0.319	0.0	2.3	2.3	109.0	O K
30 min Winter	56.026	0.426	0.0	2.3	2.3	145.5	O K
60 min Winter	56.138	0.538	0.0	2.3	2.3	184.2	O K
120 min Winter	56.252	0.652	0.0	2.3	2.3	223.0	O K
180 min Winter	56.313	0.713	0.0	2.3	2.3	243.7	O K
240 min Winter	56.349	0.749	0.0	2.3	2.3	256.3	O K
360 min Winter	56.398	0.798	0.0	2.3	2.3	272.9	O K
480 min Winter	56.425	0.825	0.0	2.3	2.3	282.2	O K
600 min Winter	56.440	0.840	0.0	2.3	2.3	287.4	O K
720 min Winter	56.448	0.848	0.0	2.3	2.3	289.9	O K
960 min Winter	56.448	0.848	0.0	2.3	2.3	290.0	O K
1440 min Winter	56.419	0.819	0.0	2.3	2.3	280.1	O K
2160 min Winter	56.366	0.766	0.0	2.3	2.3	262.0	O K
2880 min Winter	56.306	0.706	0.0	2.3	2.3	241.5	O K
4320 min Winter	56.160	0.560	0.0	2.3	2.3	191.5	O K
5760 min Winter	56.032	0.432	0.0	2.3	2.3	147.8	O K
7200 min Winter	55.931	0.331	0.0	2.3	2.3	113.1	O K
8640 min Winter	55.853	0.253	0.0	2.3	2.3	86.6	O K
10080 min Winter	55.797	0.197	0.0	2.2	2.2	67.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.330	0.0	553.3	4928
10080 min Summer	1.178	0.0	570.5	5648
15 min Winter	136.560	0.0	105.8	19
30 min Winter	91.729	0.0	141.5	33
60 min Winter	58.739	0.0	188.0	62
120 min Winter	36.254	0.0	231.9	122
180 min Winter	26.900	0.0	257.8	180
240 min Winter	21.623	0.0	275.9	240
360 min Winter	15.914	0.0	303.3	356
480 min Winter	12.782	0.0	322.9	472
600 min Winter	10.774	0.0	337.0	586
720 min Winter	9.365	0.0	346.0	700
960 min Winter	7.499	0.0	348.6	922
1440 min Winter	5.473	0.0	335.6	1326
2160 min Winter	3.985	0.0	463.1	1660
2880 min Winter	3.178	0.0	491.9	2132
4320 min Winter	2.306	0.0	534.0	2980
5760 min Winter	1.834	0.0	570.1	3744
7200 min Winter	1.536	0.0	596.9	4464
8640 min Winter	1.330	0.0	619.9	5104
10080 min Winter	1.178	0.0	639.4	5752

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.386

Time (mins) From:	To:	Area (ha)
0	4	0.386

Cascade Model Details for TANK 1.srcx

Storage is Online Cover Level (m) 57.600

Cellular Storage Structure

Invert Level (m) 55.600 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	360.0	360.0	1.201	0.0	451.2
1.200	360.0	451.2			

Hydro-Brake Optimum® Outflow Control

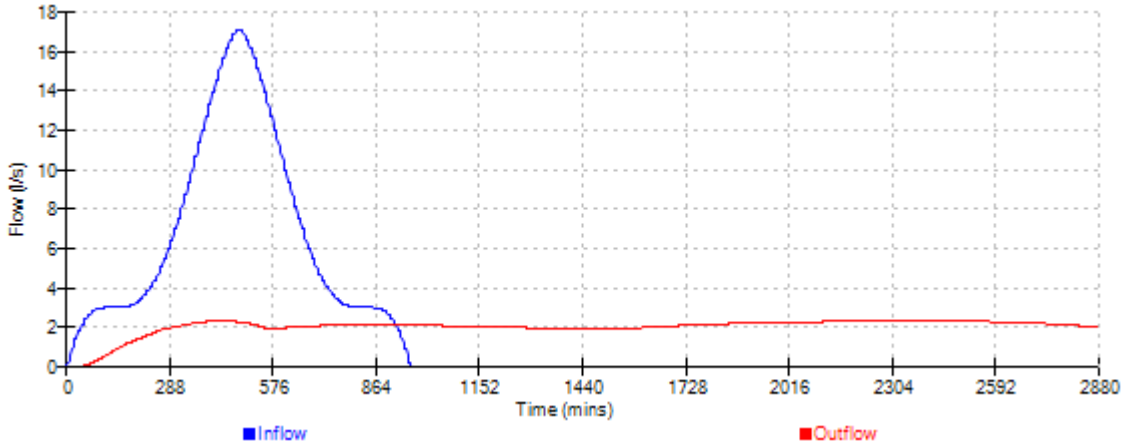
Unit Reference	MD-SHE-0072-2500-1200-2500
Design Head (m)	1.200
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	72
Invert Level (m)	55.600
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

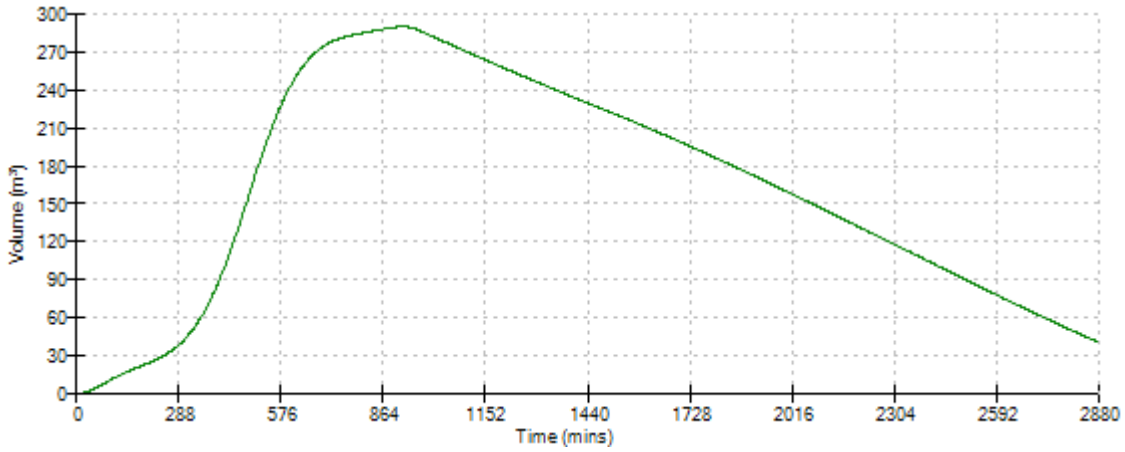
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	2.5
Flush-Flo™	0.318	2.3
Kick-Flo®	0.644	1.9
Mean Flow over Head Range	-	2.1

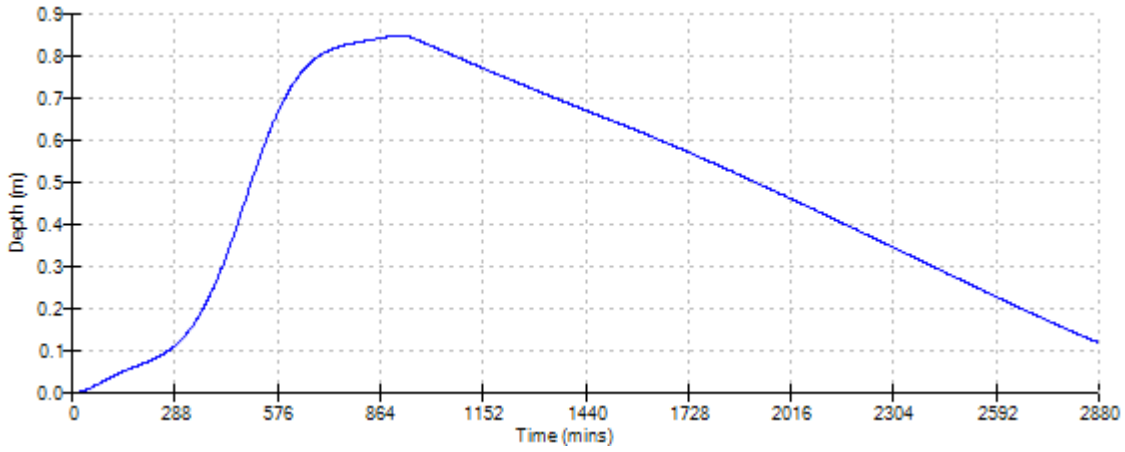
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.9	1.200	2.5	3.000	3.8	7.000	5.7
0.200	2.2	1.400	2.7	3.500	4.1	7.500	5.9
0.300	2.3	1.600	2.8	4.000	4.4	8.000	6.0
0.400	2.3	1.800	3.0	4.500	4.6	8.500	6.2
0.500	2.2	2.000	3.2	5.000	4.8	9.000	6.4
0.600	2.0	2.200	3.3	5.500	5.1	9.500	6.5
0.800	2.1	2.400	3.4	6.000	5.3		
1.000	2.3	2.600	3.6	6.500	5.5		

Cascade Event: 960 min Winter for TANK 1.srcx







Cascade Summary of Results for TANK 2.srcx

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

Half Drain Time : 95 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	51.921	0.421	0.0	5.0	5.0	32.0	O K
30 min Summer	52.036	0.536	0.0	5.0	5.0	40.8	O K
60 min Summer	52.119	0.619	0.0	5.0	5.0	47.1	O K
120 min Summer	52.139	0.639	0.0	5.0	5.0	48.6	O K
180 min Summer	52.120	0.620	0.0	5.0	5.0	47.1	O K
240 min Summer	52.090	0.590	0.0	5.0	5.0	44.9	O K
360 min Summer	52.030	0.530	0.0	5.0	5.0	40.3	O K
480 min Summer	51.969	0.469	0.0	5.0	5.0	35.7	O K
600 min Summer	51.912	0.412	0.0	5.0	5.0	31.3	O K
720 min Summer	51.858	0.358	0.0	5.0	5.0	27.2	O K
960 min Summer	51.765	0.265	0.0	5.0	5.0	20.1	O K
1440 min Summer	51.642	0.142	0.0	5.0	5.0	10.8	O K
2160 min Summer	51.589	0.089	0.0	4.4	4.4	6.7	O K
2880 min Summer	51.572	0.072	0.0	3.6	3.6	5.4	O K
4320 min Summer	51.553	0.053	0.0	2.6	2.6	4.0	O K
5760 min Summer	51.542	0.042	0.0	2.1	2.1	3.2	O K
7200 min Summer	51.535	0.035	0.0	1.8	1.8	2.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	136.560	0.0	35.8	18
30 min Summer	91.729	0.0	48.1	32
60 min Summer	58.739	0.0	61.6	60
120 min Summer	36.254	0.0	76.1	96
180 min Summer	26.900	0.0	84.7	130
240 min Summer	21.623	0.0	90.8	164
360 min Summer	15.914	0.0	100.2	232
480 min Summer	12.782	0.0	107.3	298
600 min Summer	10.774	0.0	113.1	362
720 min Summer	9.365	0.0	118.0	426
960 min Summer	7.499	0.0	126.0	542
1440 min Summer	5.473	0.0	137.9	766
2160 min Summer	3.985	0.0	150.6	1104
2880 min Summer	3.178	0.0	160.1	1468
4320 min Summer	2.306	0.0	174.3	2196
5760 min Summer	1.834	0.0	184.8	2936
7200 min Summer	1.536	0.0	193.5	3672

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	51.531	0.031	0.0	1.5	1.5	2.3	O K
10080 min Summer	51.527	0.027	0.0	1.4	1.4	2.1	O K
15 min Winter	51.976	0.476	0.0	5.0	5.0	36.2	O K
30 min Winter	52.111	0.611	0.0	5.0	5.0	46.5	O K
60 min Winter	52.215	0.715	0.0	5.0	5.0	54.4	O K
120 min Winter	52.243	0.743	0.0	5.0	5.0	56.4	O K
180 min Winter	52.215	0.715	0.0	5.0	5.0	54.4	O K
240 min Winter	52.171	0.671	0.0	5.0	5.0	51.0	O K
360 min Winter	52.077	0.577	0.0	5.0	5.0	43.8	O K
480 min Winter	51.982	0.482	0.0	5.0	5.0	36.6	O K
600 min Winter	51.892	0.392	0.0	5.0	5.0	29.8	O K
720 min Winter	51.811	0.311	0.0	5.0	5.0	23.6	O K
960 min Winter	51.680	0.180	0.0	5.0	5.0	13.7	O K
1440 min Winter	51.589	0.089	0.0	4.5	4.5	6.8	O K
2160 min Winter	51.566	0.066	0.0	3.3	3.3	5.0	O K
2880 min Winter	51.552	0.052	0.0	2.6	2.6	4.0	O K
4320 min Winter	51.538	0.038	0.0	1.9	1.9	2.9	O K
5760 min Winter	51.530	0.030	0.0	1.5	1.5	2.3	O K
7200 min Winter	51.526	0.026	0.0	1.3	1.3	1.9	O K
8640 min Winter	51.522	0.022	0.0	1.1	1.1	1.7	O K
10080 min Winter	51.520	0.020	0.0	1.0	1.0	1.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.330	0.0	201.1	4352
10080 min Summer	1.178	0.0	207.7	5088
15 min Winter	136.560	0.0	40.1	18
30 min Winter	91.729	0.0	53.9	32
60 min Winter	58.739	0.0	69.0	60
120 min Winter	36.254	0.0	85.2	112
180 min Winter	26.900	0.0	94.9	140
240 min Winter	21.623	0.0	101.7	178
360 min Winter	15.914	0.0	112.3	252
480 min Winter	12.782	0.0	120.2	322
600 min Winter	10.774	0.0	126.7	386
720 min Winter	9.365	0.0	132.1	448
960 min Winter	7.499	0.0	141.1	558
1440 min Winter	5.473	0.0	154.4	740
2160 min Winter	3.985	0.0	168.7	1104
2880 min Winter	3.178	0.0	179.3	1468
4320 min Winter	2.306	0.0	195.2	2188
5760 min Winter	1.834	0.0	207.0	2936
7200 min Winter	1.536	0.0	216.8	3656
8640 min Winter	1.330	0.0	225.2	4288
10080 min Winter	1.178	0.0	232.6	5040

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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.140

Time (mins) From:	To:	Area (ha)
0	4	0.140

Cascade Model Details for TANK 2.srcx

Storage is Online Cover Level (m) 53.410

Cellular Storage Structure

Invert Level (m) 51.500 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

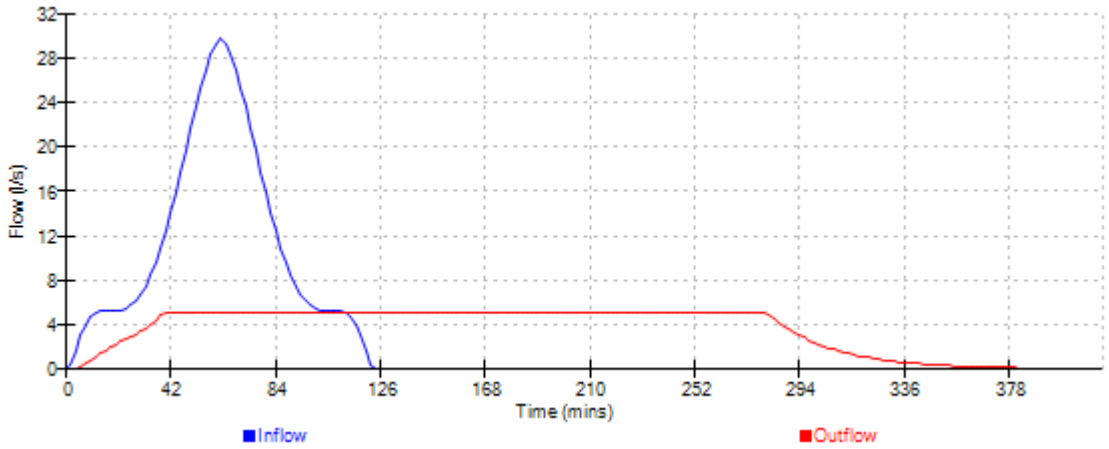
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	80.0	80.0	0.801	0.0	162.6
0.800	80.0	162.6			

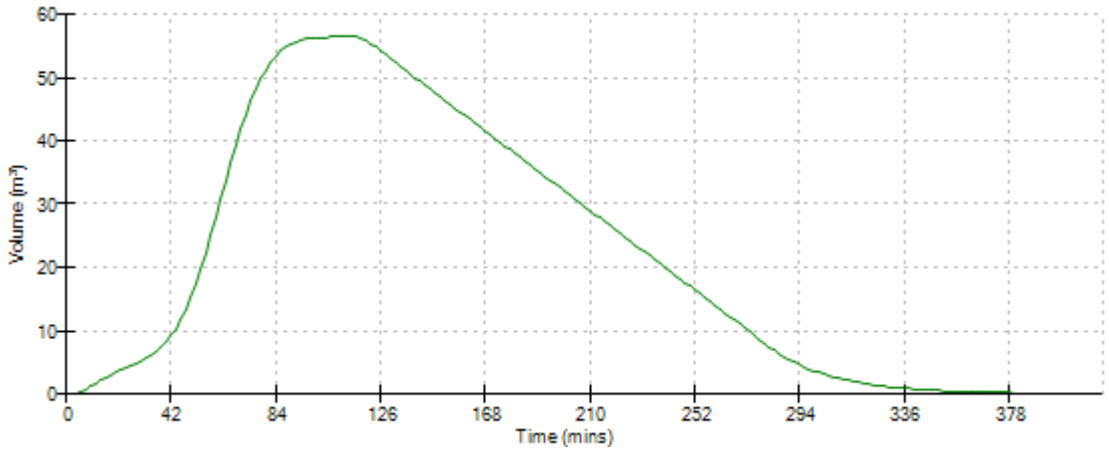
Pump Outflow Control

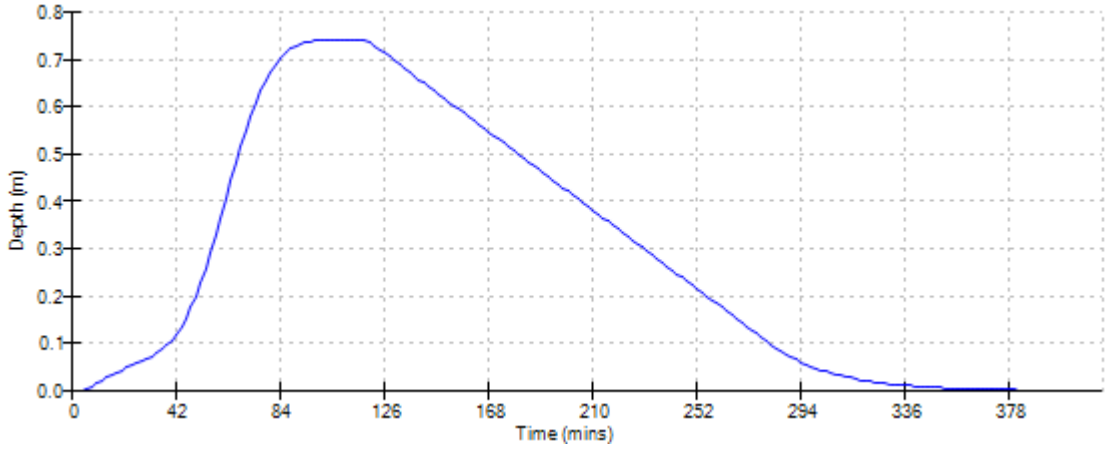
Invert Level (m) 51.500

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.0000	0.900	5.0000	1.700	5.0000	2.500	5.0000
0.200	5.0000	1.000	5.0000	1.800	5.0000	2.600	5.0000
0.300	5.0000	1.100	5.0000	1.900	5.0000	2.700	5.0000
0.400	5.0000	1.200	5.0000	2.000	5.0000	2.800	5.0000
0.500	5.0000	1.300	5.0000	2.100	5.0000	2.900	5.0000
0.600	5.0000	1.400	5.0000	2.200	5.0000	3.000	5.0000
0.700	5.0000	1.500	5.0000	2.300	5.0000		
0.800	5.0000	1.600	5.0000	2.400	5.0000		

Cascade Event: 120 min Winter for TANK 2.srcx







Cascade Summary of Results for TANK 3.srcx

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

Half Drain Time : 44 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	54.191	0.191	0.0	5.0	5.0	13.1	O K
30 min Summer	54.247	0.247	0.0	5.0	5.0	16.9	O K
60 min Summer	54.293	0.293	0.0	5.0	5.0	20.0	O K
120 min Summer	54.315	0.315	0.0	5.0	5.0	21.6	O K
180 min Summer	54.311	0.311	0.0	5.0	5.0	21.2	O K
240 min Summer	54.296	0.296	0.0	5.0	5.0	20.3	O K
360 min Summer	54.264	0.264	0.0	5.0	5.0	18.1	O K
480 min Summer	54.233	0.233	0.0	5.0	5.0	15.9	O K
600 min Summer	54.205	0.205	0.0	5.0	5.0	14.0	O K
720 min Summer	54.183	0.183	0.0	4.9	4.9	12.5	O K
960 min Summer	54.157	0.157	0.0	4.8	4.8	10.7	O K
1440 min Summer	54.124	0.124	0.0	4.6	4.6	8.5	O K
2160 min Summer	54.097	0.097	0.0	3.6	3.6	6.6	O K
2880 min Summer	54.082	0.082	0.0	2.9	2.9	5.6	O K
4320 min Summer	54.067	0.067	0.0	2.1	2.1	4.6	O K
5760 min Summer	54.059	0.059	0.0	1.7	1.7	4.0	O K
7200 min Summer	54.053	0.053	0.0	1.4	1.4	3.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	136.560	0.0	27.1	17
30 min Summer	91.729	0.0	37.1	31
60 min Summer	58.739	0.0	48.1	60
120 min Summer	36.254	0.0	59.8	92
180 min Summer	26.900	0.0	66.8	126
240 min Summer	21.623	0.0	71.7	158
360 min Summer	15.914	0.0	79.3	224
480 min Summer	12.782	0.0	84.9	288
600 min Summer	10.774	0.0	89.5	346
720 min Summer	9.365	0.0	93.4	402
960 min Summer	7.499	0.0	99.7	520
1440 min Summer	5.473	0.0	109.0	750
2160 min Summer	3.985	0.0	118.8	1104
2880 min Summer	3.178	0.0	125.9	1468
4320 min Summer	2.306	0.0	136.2	2200
5760 min Summer	1.834	0.0	143.6	2928
7200 min Summer	1.536	0.0	149.5	3656

Cascade Summary of Results for TANK 3.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	54.049	0.049	0.0	1.2	1.2	3.3	O K
10080 min Summer	54.046	0.046	0.0	1.1	1.1	3.1	O K
15 min Winter	54.216	0.216	0.0	5.0	5.0	14.8	O K
30 min Winter	54.280	0.280	0.0	5.0	5.0	19.2	O K
60 min Winter	54.335	0.335	0.0	5.0	5.0	22.9	O K
120 min Winter	54.357	0.357	0.0	5.0	5.0	24.4	O K
180 min Winter	54.347	0.347	0.0	5.0	5.0	23.7	O K
240 min Winter	54.324	0.324	0.0	5.0	5.0	22.1	O K
360 min Winter	54.271	0.271	0.0	5.0	5.0	18.5	O K
480 min Winter	54.221	0.221	0.0	5.0	5.0	15.1	O K
600 min Winter	54.183	0.183	0.0	4.9	4.9	12.5	O K
720 min Winter	54.162	0.162	0.0	4.9	4.9	11.1	O K
960 min Winter	54.130	0.130	0.0	4.7	4.7	8.9	O K
1440 min Winter	54.097	0.097	0.0	3.6	3.6	6.7	O K
2160 min Winter	54.077	0.077	0.0	2.6	2.6	5.3	O K
2880 min Winter	54.067	0.067	0.0	2.1	2.1	4.6	O K
4320 min Winter	54.056	0.056	0.0	1.6	1.6	3.8	O K
5760 min Winter	54.049	0.049	0.0	1.2	1.2	3.3	O K
7200 min Winter	54.044	0.044	0.0	1.0	1.0	3.0	O K
8640 min Winter	54.041	0.041	0.0	0.9	0.9	2.8	O K
10080 min Winter	54.038	0.038	0.0	0.8	0.8	2.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.330	0.0	154.4	4384
10080 min Summer	1.178	0.0	158.5	5040
15 min Winter	136.560	0.0	30.6	17
30 min Winter	91.729	0.0	41.8	31
60 min Winter	58.739	0.0	54.1	60
120 min Winter	36.254	0.0	67.3	110
180 min Winter	26.900	0.0	75.1	138
240 min Winter	21.623	0.0	80.5	174
360 min Winter	15.914	0.0	89.1	242
480 min Winter	12.782	0.0	95.4	304
600 min Winter	10.774	0.0	100.6	356
720 min Winter	9.365	0.0	104.9	412
960 min Winter	7.499	0.0	112.0	528
1440 min Winter	5.473	0.0	122.4	750
2160 min Winter	3.985	0.0	133.5	1104
2880 min Winter	3.178	0.0	141.6	1452
4320 min Winter	2.306	0.0	153.2	2188
5760 min Winter	1.834	0.0	161.7	2904
7200 min Winter	1.536	0.0	168.5	3624
8640 min Winter	1.330	0.0	174.1	4280
10080 min Winter	1.178	0.0	178.9	5016

Cascade Rainfall Details for TANK 3.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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.056

Time (mins) From:	To:	Area (ha)
0	4	0.056

Cascade Model Details for TANK 3.srcx

Storage is Online Cover Level (m) 55.500

Cellular Storage Structure

Invert Level (m) 54.000 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	72.0	72.0	0.801	0.0	100.8
0.800	72.0	100.8			

Hydro-Brake Optimum® Outflow Control

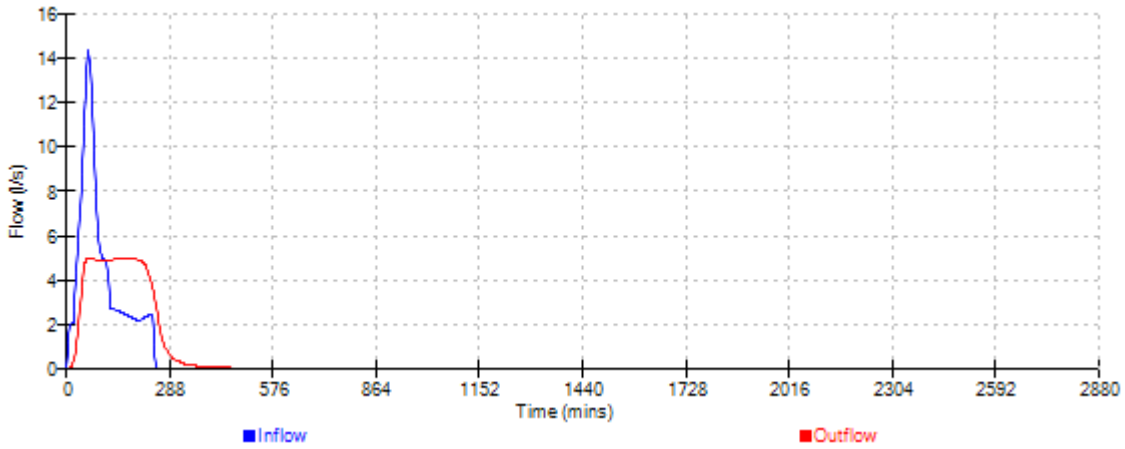
Unit Reference	MD-SHE-0109-5000-0800-5000
Design Head (m)	0.800
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	109
Invert Level (m)	54.000
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

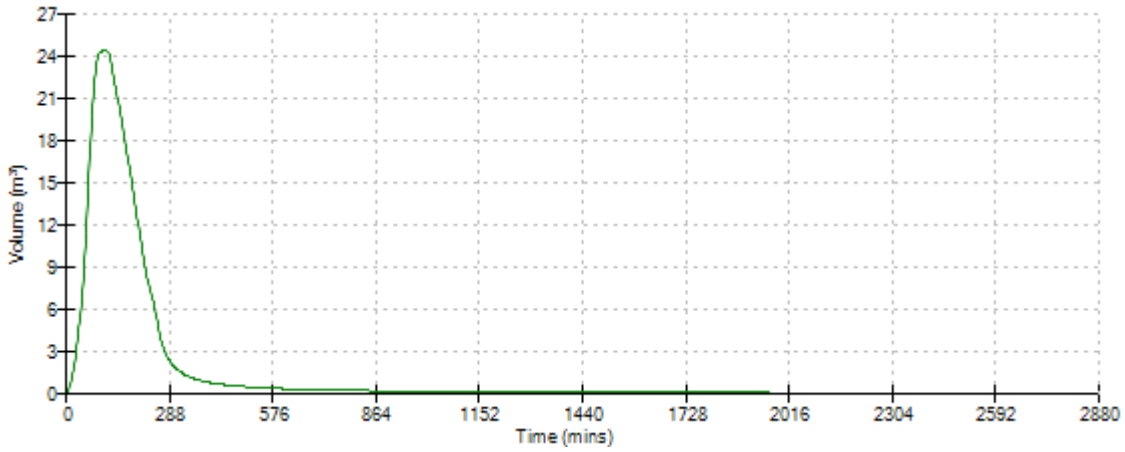
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	5.0
Flush-Flo™	0.242	5.0
Kick-Flo®	0.537	4.2
Mean Flow over Head Range	-	4.3

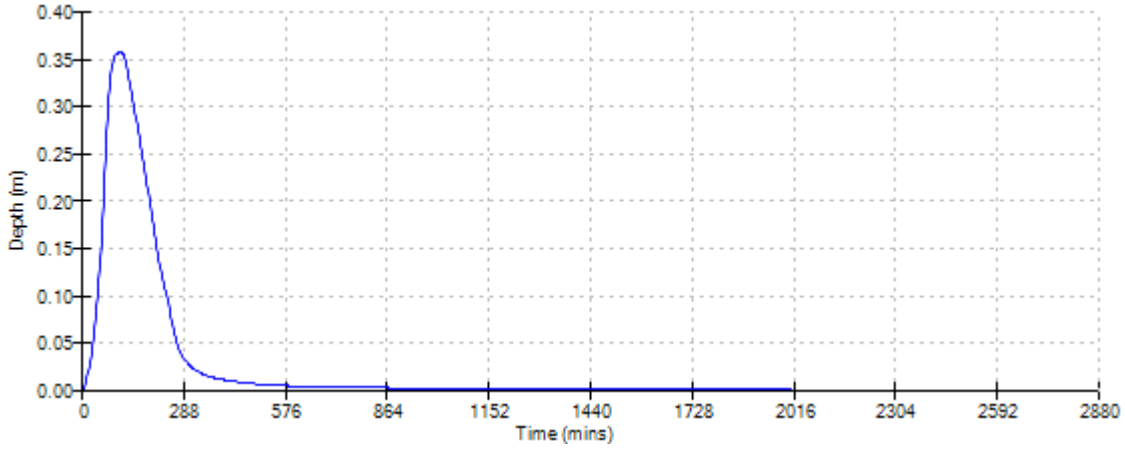
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.7	1.200	6.0	3.000	9.3	7.000	13.9
0.200	5.0	1.400	6.5	3.500	10.0	7.500	14.4
0.300	5.0	1.600	6.9	4.000	10.6	8.000	14.8
0.400	4.8	1.800	7.3	4.500	11.3	8.500	15.2
0.500	4.5	2.000	7.7	5.000	11.8	9.000	15.7
0.600	4.4	2.200	8.0	5.500	12.4	9.500	16.1
0.800	5.0	2.400	8.4	6.000	12.9		
1.000	5.5	2.600	8.7	6.500	13.4		

Cascade Event: 120 min Winter for TANK 3.srcx







Cascade Summary of Results for TANK 4.srcx

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

Half Drain Time : 125 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	53.529	0.429	0.0	2.5	2.5	19.6	O K
30 min Summer	53.652	0.552	0.0	2.5	2.5	25.2	O K
60 min Summer	53.749	0.649	0.0	2.5	2.5	29.6	O K
120 min Summer	53.784	0.684	0.0	2.5	2.5	31.2	O K
180 min Summer	53.773	0.673	0.0	2.5	2.5	30.7	O K
240 min Summer	53.749	0.649	0.0	2.5	2.5	29.6	O K
360 min Summer	53.699	0.599	0.0	2.5	2.5	27.3	O K
480 min Summer	53.647	0.547	0.0	2.5	2.5	25.0	O K
600 min Summer	53.596	0.496	0.0	2.5	2.5	22.6	O K
720 min Summer	53.547	0.447	0.0	2.5	2.5	20.4	O K
960 min Summer	53.456	0.356	0.0	2.5	2.5	16.3	O K
1440 min Summer	53.317	0.217	0.0	2.5	2.5	9.9	O K
2160 min Summer	53.208	0.108	0.0	2.5	2.5	4.9	O K
2880 min Summer	53.185	0.085	0.0	2.1	2.1	3.9	O K
4320 min Summer	53.163	0.063	0.0	1.6	1.6	2.9	O K
5760 min Summer	53.150	0.050	0.0	1.3	1.3	2.3	O K
7200 min Summer	53.142	0.042	0.0	1.1	1.1	1.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	136.560	0.0	21.5	18
30 min Summer	91.729	0.0	28.9	32
60 min Summer	58.739	0.0	37.0	62
120 min Summer	36.254	0.0	45.7	106
180 min Summer	26.900	0.0	50.8	138
240 min Summer	21.623	0.0	54.5	170
360 min Summer	15.914	0.0	60.1	238
480 min Summer	12.782	0.0	64.4	306
600 min Summer	10.774	0.0	67.9	374
720 min Summer	9.365	0.0	70.8	436
960 min Summer	7.499	0.0	75.6	560
1440 min Summer	5.473	0.0	82.7	794
2160 min Summer	3.985	0.0	90.4	1108
2880 min Summer	3.178	0.0	96.1	1468
4320 min Summer	2.306	0.0	104.6	2200
5760 min Summer	1.834	0.0	110.9	2936
7200 min Summer	1.536	0.0	116.1	3672

Cascade Summary of Results for TANK 4.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	53.137	0.037	0.0	0.9	0.9	1.7	O K
10080 min Summer	53.132	0.032	0.0	0.8	0.8	1.5	O K
15 min Winter	53.584	0.484	0.0	2.5	2.5	22.1	O K
30 min Winter	53.727	0.627	0.0	2.5	2.5	28.6	O K
60 min Winter	53.846	0.746	0.0	2.5	2.5	34.0	O K
120 min Winter	53.900	0.800	0.0	2.5	2.5	36.5	O K
180 min Winter	53.880	0.780	0.0	2.5	2.5	35.6	O K
240 min Winter	53.848	0.748	0.0	2.5	2.5	34.1	O K
360 min Winter	53.773	0.673	0.0	2.5	2.5	30.7	O K
480 min Winter	53.691	0.591	0.0	2.5	2.5	27.0	O K
600 min Winter	53.611	0.511	0.0	2.5	2.5	23.3	O K
720 min Winter	53.534	0.434	0.0	2.5	2.5	19.8	O K
960 min Winter	53.398	0.298	0.0	2.5	2.5	13.6	O K
1440 min Winter	53.218	0.118	0.0	2.5	2.5	5.4	O K
2160 min Winter	53.178	0.078	0.0	2.0	2.0	3.6	O K
2880 min Winter	53.163	0.063	0.0	1.6	1.6	2.9	O K
4320 min Winter	53.146	0.046	0.0	1.1	1.1	2.1	O K
5760 min Winter	53.136	0.036	0.0	0.9	0.9	1.7	O K
7200 min Winter	53.131	0.031	0.0	0.8	0.8	1.4	O K
8640 min Winter	53.127	0.027	0.0	0.7	0.7	1.2	O K
10080 min Winter	53.124	0.024	0.0	0.6	0.6	1.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.330	0.0	120.6	4344
10080 min Summer	1.178	0.0	124.6	5136
15 min Winter	136.560	0.0	24.1	18
30 min Winter	91.729	0.0	32.3	32
60 min Winter	58.739	0.0	41.4	60
120 min Winter	36.254	0.0	51.1	116
180 min Winter	26.900	0.0	56.9	146
240 min Winter	21.623	0.0	61.0	184
360 min Winter	15.914	0.0	67.4	260
480 min Winter	12.782	0.0	72.1	332
600 min Winter	10.774	0.0	76.0	402
720 min Winter	9.365	0.0	79.3	470
960 min Winter	7.499	0.0	84.6	588
1440 min Winter	5.473	0.0	92.7	782
2160 min Winter	3.985	0.0	101.2	1104
2880 min Winter	3.178	0.0	107.6	1468
4320 min Winter	2.306	0.0	117.1	2164
5760 min Winter	1.834	0.0	124.2	2936
7200 min Winter	1.536	0.0	130.1	3608
8640 min Winter	1.330	0.0	135.1	4384
10080 min Winter	1.178	0.0	139.6	5088

Cascade Rainfall Details for TANK 4.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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.084

Time (mins) From:	To:	Area (ha)
0	4	0.084

Cascade Model Details for TANK 4.srcx

Storage is Online Cover Level (m) 54.600

Cellular Storage Structure

Invert Level (m) 53.100 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

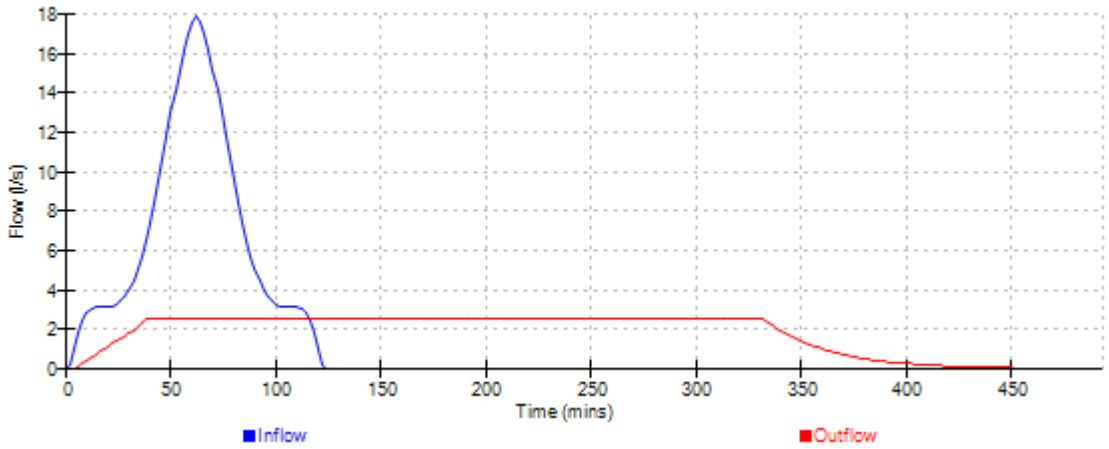
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	48.0	48.0	0.801	0.0	73.6
0.800	48.0	73.6			

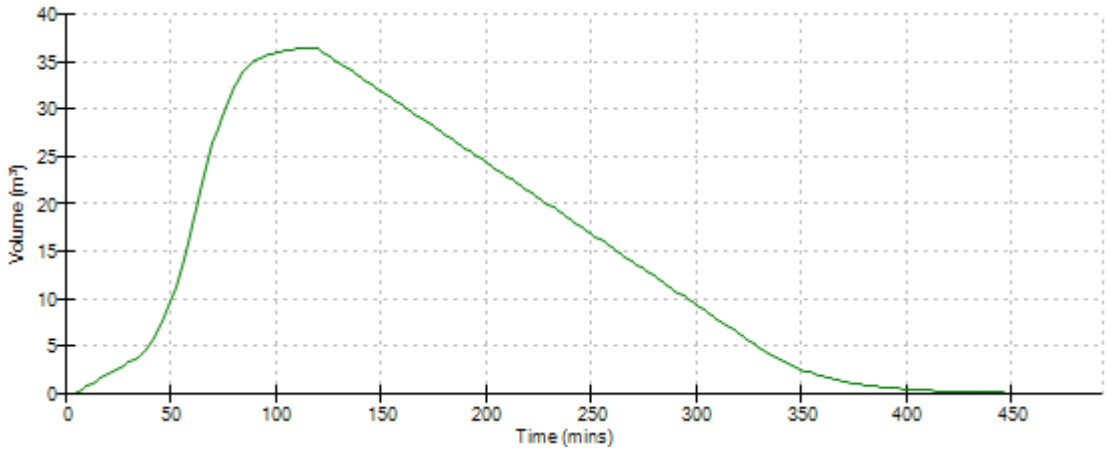
Pump Outflow Control

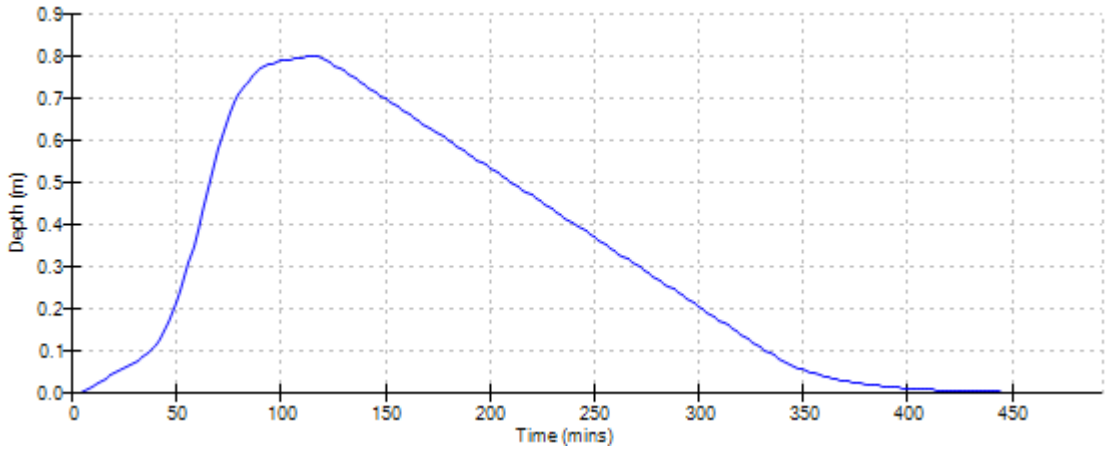
Invert Level (m) 53.100

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.5000	0.900	2.5000	1.700	2.5000	2.500	2.5000
0.200	2.5000	1.000	2.5000	1.800	2.5000	2.600	2.5000
0.300	2.5000	1.100	2.5000	1.900	2.5000	2.700	2.5000
0.400	2.5000	1.200	2.5000	2.000	2.5000	2.800	2.5000
0.500	2.5000	1.300	2.5000	2.100	2.5000	2.900	2.5000
0.600	2.5000	1.400	2.5000	2.200	2.5000	3.000	2.5000
0.700	2.5000	1.500	2.5000	2.300	2.5000		
0.800	2.5000	1.600	2.5000	2.400	2.5000		

Cascade Event: 120 min Winter for TANK 4.srcx







Cascade Summary of Results for TANK 5.srcx

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

Half Drain Time : 219 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	51.122	0.372	0.0	2.5	2.5	31.1	O K
30 min Summer	51.237	0.487	0.0	2.5	2.5	40.7	O K
60 min Summer	51.342	0.592	0.0	2.5	2.5	49.5	O K
120 min Summer	51.413	0.663	0.0	2.5	2.5	55.4	O K
180 min Summer	51.421	0.671	0.0	2.5	2.5	56.1	O K
240 min Summer	51.412	0.662	0.0	2.5	2.5	55.4	O K
360 min Summer	51.390	0.640	0.0	2.5	2.5	53.5	O K
480 min Summer	51.363	0.613	0.0	2.5	2.5	51.2	O K
600 min Summer	51.334	0.584	0.0	2.5	2.5	48.8	O K
720 min Summer	51.304	0.554	0.0	2.5	2.5	46.3	O K
960 min Summer	51.246	0.496	0.0	2.5	2.5	41.5	O K
1440 min Summer	51.137	0.387	0.0	2.5	2.5	32.4	O K
2160 min Summer	51.006	0.256	0.0	2.5	2.5	21.4	O K
2880 min Summer	50.915	0.165	0.0	2.5	2.5	13.8	O K
4320 min Summer	50.844	0.094	0.0	2.3	2.3	7.9	O K
5760 min Summer	50.826	0.076	0.0	1.9	1.9	6.3	O K
7200 min Summer	50.814	0.064	0.0	1.6	1.6	5.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	136.560	0.0	33.0	18
30 min Summer	91.729	0.0	44.3	33
60 min Summer	58.739	0.0	56.8	62
120 min Summer	36.254	0.0	70.1	120
180 min Summer	26.900	0.0	78.0	172
240 min Summer	21.623	0.0	83.6	200
360 min Summer	15.914	0.0	92.3	262
480 min Summer	12.782	0.0	98.9	330
600 min Summer	10.774	0.0	104.2	398
720 min Summer	9.365	0.0	108.7	466
960 min Summer	7.499	0.0	116.0	600
1440 min Summer	5.473	0.0	127.0	864
2160 min Summer	3.985	0.0	138.8	1212
2880 min Summer	3.178	0.0	147.5	1556
4320 min Summer	2.306	0.0	160.6	2204
5760 min Summer	1.834	0.0	170.3	2936
7200 min Summer	1.536	0.0	178.3	3672

Cascade Summary of Results for TANK 5.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	50.806	0.056	0.0	1.4	1.4	4.7	O K
10080 min Summer	50.800	0.050	0.0	1.2	1.2	4.1	O K
15 min Winter	51.169	0.419	0.0	2.5	2.5	35.0	O K
30 min Winter	51.300	0.550	0.0	2.5	2.5	46.0	O K
60 min Winter	51.422	0.672	0.0	2.5	2.5	56.2	O K
120 min Winter	51.513	0.763	0.0	2.5	2.5	63.8	O K
180 min Winter	51.532	0.782	0.0	2.5	2.5	65.4	O K
240 min Winter	51.523	0.773	0.0	2.5	2.5	64.6	O K
360 min Winter	51.491	0.741	0.0	2.5	2.5	61.9	O K
480 min Winter	51.452	0.702	0.0	2.5	2.5	58.7	O K
600 min Winter	51.408	0.658	0.0	2.5	2.5	55.0	O K
720 min Winter	51.363	0.613	0.0	2.5	2.5	51.2	O K
960 min Winter	51.271	0.521	0.0	2.5	2.5	43.6	O K
1440 min Winter	51.105	0.355	0.0	2.5	2.5	29.6	O K
2160 min Winter	50.918	0.168	0.0	2.5	2.5	14.1	O K
2880 min Winter	50.845	0.095	0.0	2.4	2.4	8.0	O K
4320 min Winter	50.820	0.070	0.0	1.7	1.7	5.8	O K
5760 min Winter	50.806	0.056	0.0	1.4	1.4	4.6	O K
7200 min Winter	50.797	0.047	0.0	1.2	1.2	3.9	O K
8640 min Winter	50.791	0.041	0.0	1.0	1.0	3.4	O K
10080 min Winter	50.786	0.036	0.0	0.9	0.9	3.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.330	0.0	185.3	4400
10080 min Summer	1.178	0.0	191.4	5136
15 min Winter	136.560	0.0	37.0	18
30 min Winter	91.729	0.0	49.7	32
60 min Winter	58.739	0.0	63.6	62
120 min Winter	36.254	0.0	78.5	118
180 min Winter	26.900	0.0	87.4	174
240 min Winter	21.623	0.0	93.7	228
360 min Winter	15.914	0.0	103.4	282
480 min Winter	12.782	0.0	110.8	360
600 min Winter	10.774	0.0	116.7	434
720 min Winter	9.365	0.0	121.7	508
960 min Winter	7.499	0.0	130.0	652
1440 min Winter	5.473	0.0	142.3	910
2160 min Winter	3.985	0.0	155.4	1236
2880 min Winter	3.178	0.0	165.2	1496
4320 min Winter	2.306	0.0	179.8	2204
5760 min Winter	1.834	0.0	190.7	2936
7200 min Winter	1.536	0.0	199.7	3672
8640 min Winter	1.330	0.0	207.5	4400
10080 min Winter	1.178	0.0	214.3	5144

Cascade Rainfall Details for TANK 5.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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.129

Time (mins) From:	To:	Area (ha)
0	4	0.129

Cascade Model Details for TANK 5.srcx

Storage is Online Cover Level (m) 52.250

Cellular Storage Structure

Invert Level (m) 50.750 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

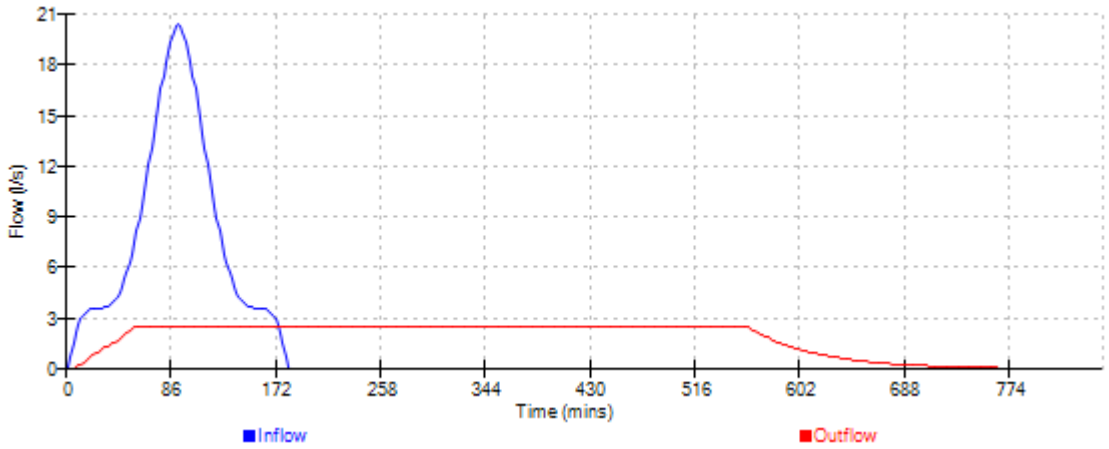
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	88.0	88.0	0.801	0.0	118.4
0.800	88.0	118.4			

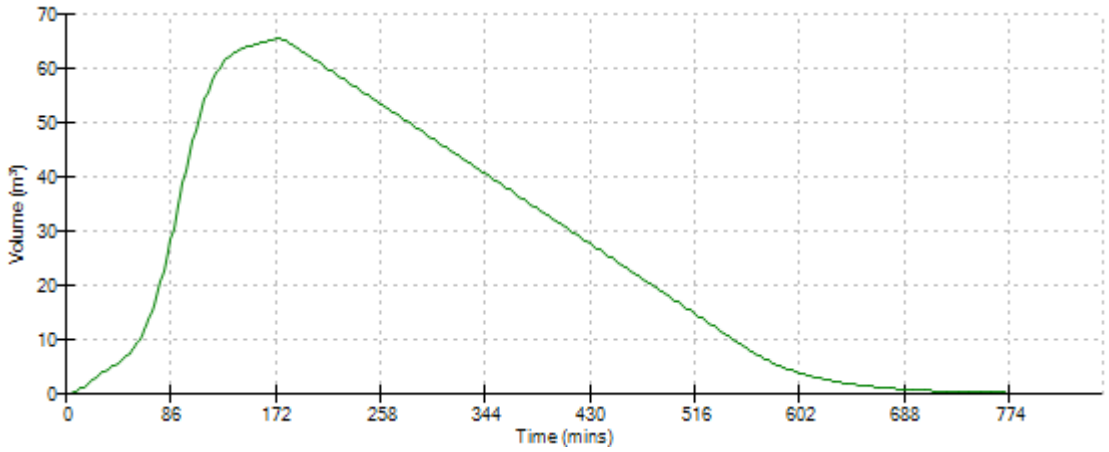
Pump Outflow Control

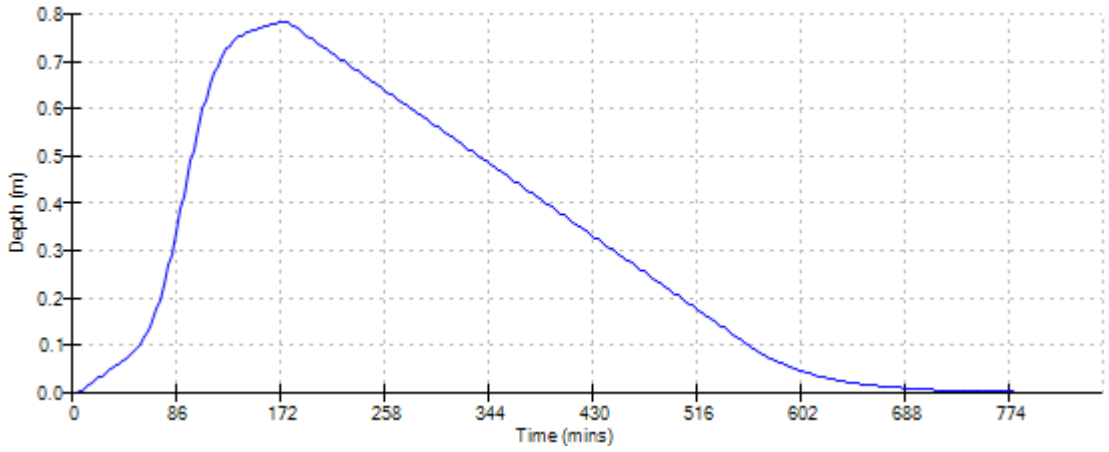
Invert Level (m) 50.750

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.5000	0.900	2.5000	1.700	2.5000	2.500	2.5000
0.200	2.5000	1.000	2.5000	1.800	2.5000	2.600	2.5000
0.300	2.5000	1.100	2.5000	1.900	2.5000	2.700	2.5000
0.400	2.5000	1.200	2.5000	2.000	2.5000	2.800	2.5000
0.500	2.5000	1.300	2.5000	2.100	2.5000	2.900	2.5000
0.600	2.5000	1.400	2.5000	2.200	2.5000	3.000	2.5000
0.700	2.5000	1.500	2.5000	2.300	2.5000		
0.800	2.5000	1.600	2.5000	2.400	2.5000		

Cascade Event: 180 min Winter for TANK 5.srcx







Cascade Summary of Results for TANK 6.srcx

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

Half Drain Time : 545 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	51.923	0.223	0.0	2.5	2.5	61.0	O K
30 min Summer	51.996	0.296	0.0	2.5	2.5	81.1	O K
60 min Summer	52.071	0.371	0.0	2.5	2.5	101.6	O K
120 min Summer	52.141	0.441	0.0	2.5	2.5	120.7	O K
180 min Summer	52.174	0.474	0.0	2.5	2.5	129.6	O K
240 min Summer	52.190	0.490	0.0	2.5	2.5	134.1	O K
360 min Summer	52.207	0.507	0.0	2.5	2.5	138.6	O K
480 min Summer	52.208	0.508	0.0	2.5	2.5	139.0	O K
600 min Summer	52.202	0.502	0.0	2.5	2.5	137.4	O K
720 min Summer	52.195	0.495	0.0	2.5	2.5	135.5	O K
960 min Summer	52.178	0.478	0.0	2.5	2.5	130.9	O K
1440 min Summer	52.141	0.441	0.0	2.5	2.5	120.7	O K
2160 min Summer	52.084	0.384	0.0	2.5	2.5	105.2	O K
2880 min Summer	52.032	0.332	0.0	2.5	2.5	90.8	O K
4320 min Summer	51.944	0.244	0.0	2.5	2.5	66.8	O K
5760 min Summer	51.882	0.182	0.0	2.5	2.5	49.8	O K
7200 min Summer	51.840	0.140	0.0	2.4	2.4	38.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	136.560	0.0	60.6	19
30 min Summer	91.729	0.0	81.8	33
60 min Summer	58.739	0.0	106.8	64
120 min Summer	36.254	0.0	132.0	122
180 min Summer	26.900	0.0	147.0	182
240 min Summer	21.623	0.0	157.6	242
360 min Summer	15.914	0.0	174.0	360
480 min Summer	12.782	0.0	186.3	480
600 min Summer	10.774	0.0	196.3	536
720 min Summer	9.365	0.0	204.7	592
960 min Summer	7.499	0.0	218.5	704
1440 min Summer	5.473	0.0	238.8	966
2160 min Summer	3.985	0.0	262.9	1364
2880 min Summer	3.178	0.0	279.5	1756
4320 min Summer	2.306	0.0	303.6	2468
5760 min Summer	1.834	0.0	323.1	3168
7200 min Summer	1.536	0.0	338.2	3824

Cascade Summary of Results for TANK 6.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	51.814	0.114	0.0	2.3	2.3	31.1	O K
10080 min Summer	51.798	0.098	0.0	2.2	2.2	26.8	O K
15 min Winter	51.950	0.250	0.0	2.5	2.5	68.5	O K
30 min Winter	52.033	0.333	0.0	2.5	2.5	91.1	O K
60 min Winter	52.118	0.418	0.0	2.5	2.5	114.5	O K
120 min Winter	52.200	0.500	0.0	2.5	2.5	136.7	O K
180 min Winter	52.239	0.539	0.0	2.5	2.5	147.6	O K
240 min Winter	52.260	0.560	0.0	2.5	2.5	153.2	O K
360 min Winter	52.282	0.582	0.0	2.5	2.5	159.1	O K
480 min Winter	52.287	0.587	0.0	2.5	2.5	160.6	O K
600 min Winter	52.283	0.583	0.0	2.5	2.5	159.6	O K
720 min Winter	52.275	0.575	0.0	2.5	2.5	157.2	O K
960 min Winter	52.253	0.553	0.0	2.5	2.5	151.4	O K
1440 min Winter	52.201	0.501	0.0	2.5	2.5	137.2	O K
2160 min Winter	52.109	0.409	0.0	2.5	2.5	112.0	O K
2880 min Winter	52.027	0.327	0.0	2.5	2.5	89.6	O K
4320 min Winter	51.902	0.202	0.0	2.5	2.5	55.3	O K
5760 min Winter	51.829	0.129	0.0	2.3	2.3	35.4	O K
7200 min Winter	51.797	0.097	0.0	2.1	2.1	26.4	O K
8640 min Winter	51.783	0.083	0.0	1.9	1.9	22.8	O K
10080 min Winter	51.774	0.074	0.0	1.7	1.7	20.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
8640 min Summer	1.330	0.0	351.2	4504
10080 min Summer	1.178	0.0	362.2	5152
15 min Winter	136.560	0.0	68.0	18
30 min Winter	91.729	0.0	91.8	33
60 min Winter	58.739	0.0	119.8	62
120 min Winter	36.254	0.0	148.0	120
180 min Winter	26.900	0.0	164.7	180
240 min Winter	21.623	0.0	176.6	238
360 min Winter	15.914	0.0	194.9	352
480 min Winter	12.782	0.0	208.7	462
600 min Winter	10.774	0.0	219.8	572
720 min Winter	9.365	0.0	229.2	672
960 min Winter	7.499	0.0	244.6	762
1440 min Winter	5.473	0.0	267.2	1068
2160 min Winter	3.985	0.0	294.5	1488
2880 min Winter	3.178	0.0	313.1	1872
4320 min Winter	2.306	0.0	340.2	2592
5760 min Winter	1.834	0.0	361.9	3224
7200 min Winter	1.536	0.0	378.9	3808
8640 min Winter	1.330	0.0	393.5	4496
10080 min Winter	1.178	0.0	405.9	5240

Cascade Rainfall Details for TANK 6.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)	20.000	Shortest Storm (mins)	15
Ratio R	0.350	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.245

Time (mins) From:	To:	Area (ha)
0	4	0.245

Cascade Model Details for TANK 6.srcx

Storage is Online Cover Level (m) 53.200

Cellular Storage Structure

Invert Level (m) 51.700 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	288.0	288.0	0.801	0.0	342.4
0.800	288.0	342.4			

Hydro-Brake Optimum® Outflow Control

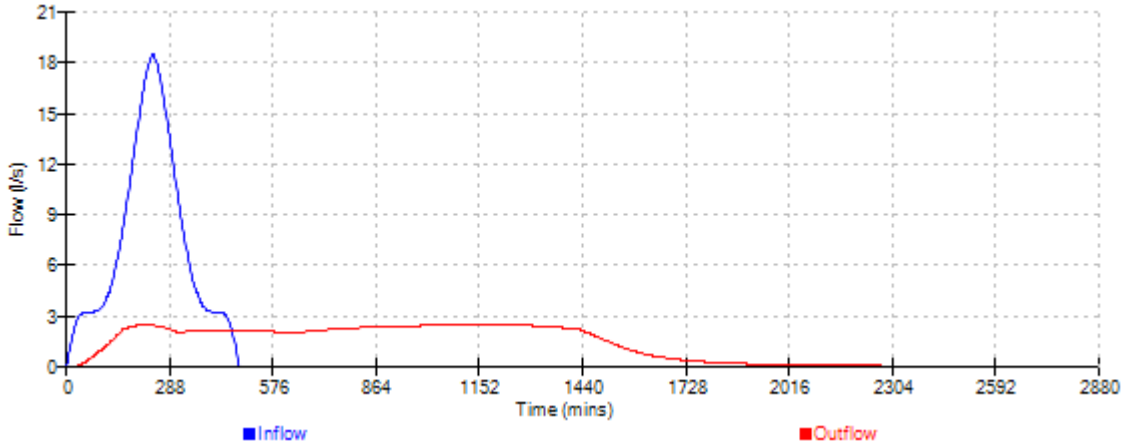
Unit Reference	MD-SHE-0078-2500-0800-2500
Design Head (m)	0.800
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Diameter (mm)	78
Invert Level (m)	51.700
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

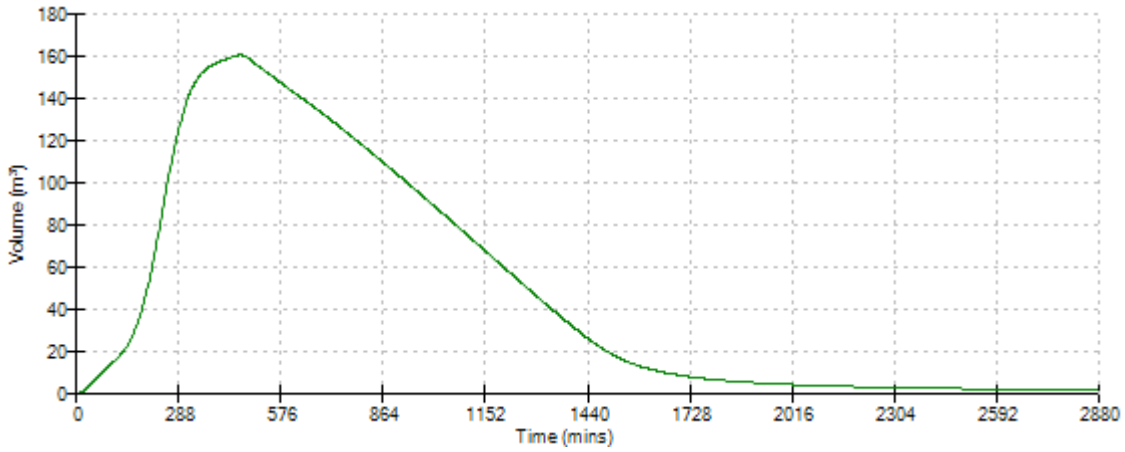
Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.800	2.5
Flush-Flo™	0.236	2.5
Kick-Flo®	0.508	2.0
Mean Flow over Head Range	-	2.2

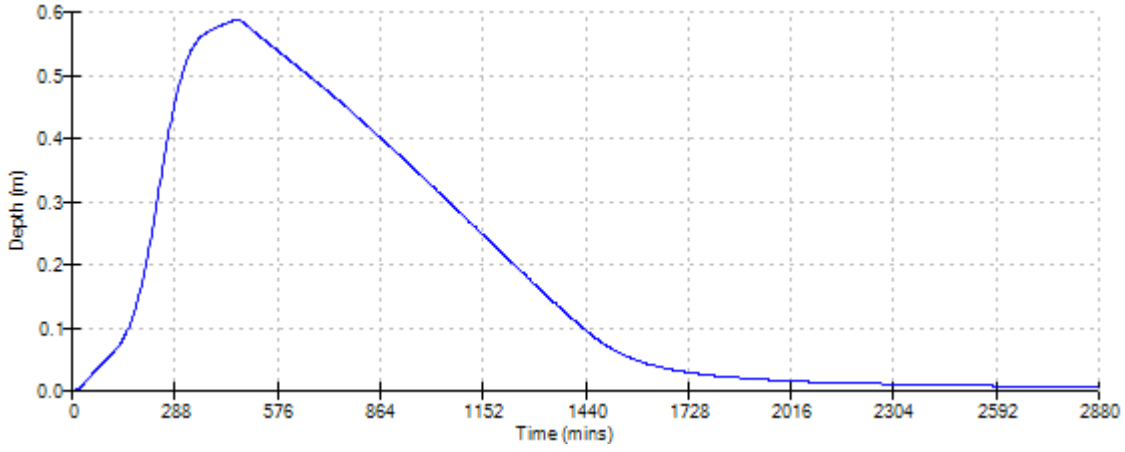
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.2	1.200	3.0	3.000	4.6	7.000	6.8
0.200	2.5	1.400	3.2	3.500	4.9	7.500	7.0
0.300	2.5	1.600	3.4	4.000	5.2	8.000	7.3
0.400	2.4	1.800	3.6	4.500	5.5	8.500	7.5
0.500	2.1	2.000	3.8	5.000	5.8	9.000	7.7
0.600	2.2	2.200	4.0	5.500	6.1	9.500	7.9
0.800	2.5	2.400	4.1	6.000	6.3		
1.000	2.8	2.600	4.3	6.500	6.6		

Cascade Event: 480 min Winter for TANK 6.srcx







APPENDIX 2 – APPROVED PLANS RELATING TO PLANNING PERMISSION REF. GOR/475/70

GO|R 475|70|2883

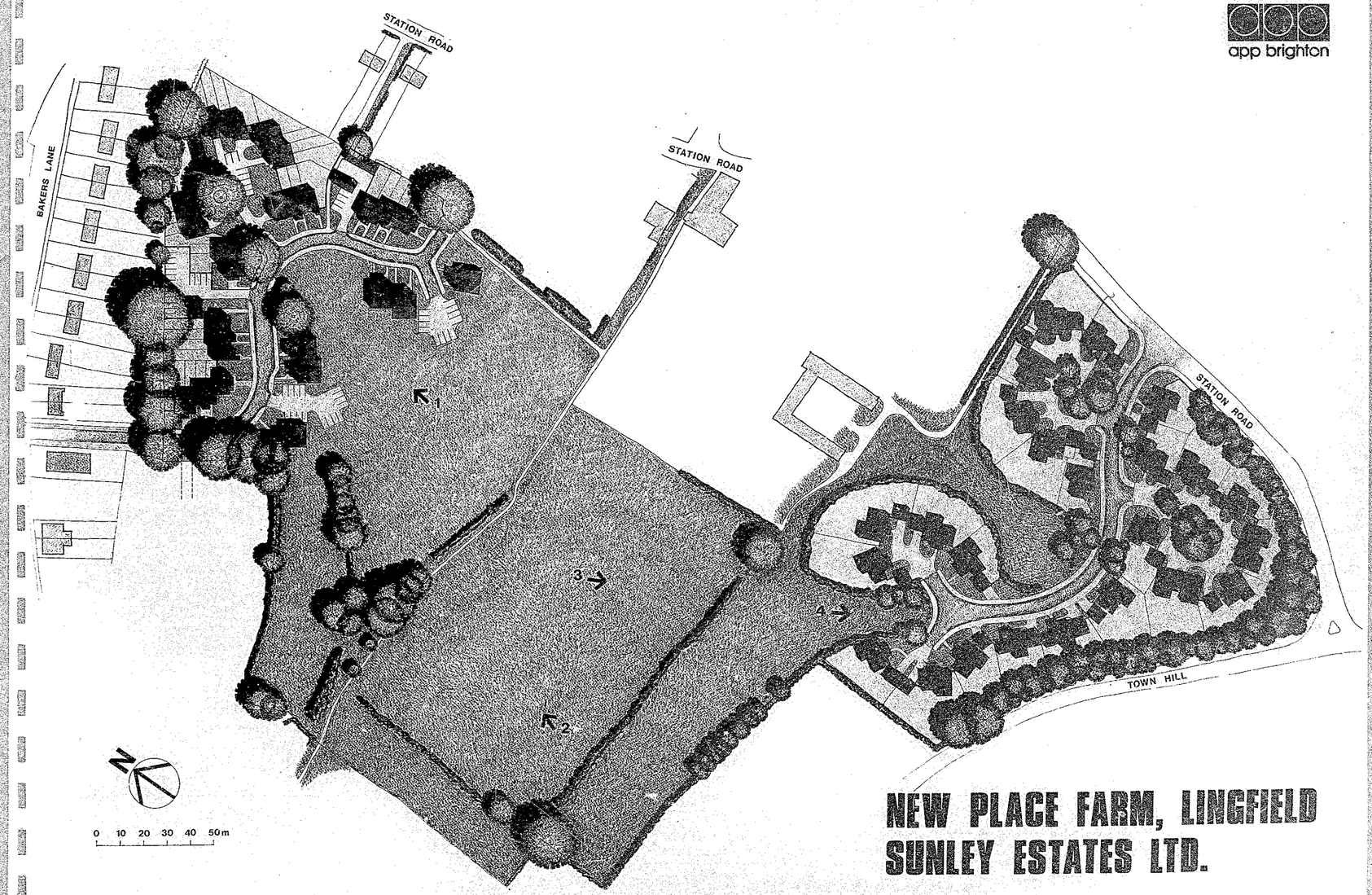
(6)

PROPOSED HOUSING AT NEW PLACE FARM, LINGFIELD SUNLEY ESTATES LTD.

apc architecture

A2 A3 A4 A3 A4 A2

app brighton



NEW PLACE FARM, LINGFIELD
SUNLEY ESTATES LTD.

Scale	10mm	1inch	6inches	150mm
1:50	0.5 metres	2ft	1 metre	3 metres
1:100	1 metre	4 ft	2m	6m
1:200	2m	8 ft	4m	12m
1:500	5m	20ft	10m	30m
1:1250	12.5m	50ft	25m	75m
1:2500	25m	100ft	50m	150m
1:10560	105.6m	422ft	211m	633m
1:10000	100m	400ft	200m	600m
1/8" to 1ft	–	8ft	4m	12m
1/4" to 1ft	–	4ft	2m	6m

0 1 2 3 4 5 6 INCHES
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 MILLIMETRES

A2 A3 A4 10·5 7·5 mm in 7·5 A4 10·5 A3 A2 15

Scale	10mm	1inch	6inches	150mm
1:50	0.5 metres	25ft	25ft	7.5metres
1:100	1 metre	50ft	150ft	15m
1:200	2m	100ft	300ft	30m
1:500	5m	16.7ft	1500ft	75m
1:1250	12.5m	42ft	2500ft	187.5m
1:2500	25m	104ft	0.25 miles	375m
1:10560	105.6m	264ft	1mile	1584m
1:10000	100m	833ft	1666yards	1500m
1/8" to 1ft	-	8ft	48ft	-
1/4" to 1ft	-	4ft	24ft	-

0 1 2 3 4 5 6 INCHES

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 MILLIMETRES

NEW PLACE FARM LINGFIELD: VIEW 1

NEW PLACE FARM LINGFIELD: VIEW 2

Scale	10mm	1inch	6inches	150mm
1:50	0.5 metres	2ft	2ft	7.5metres
1:100	1 metre	4.2ft	5ft	15m
1:200	2m	8.3ft	10ft	30m
1:500	5m	16.7ft	20ft	75m
1:1250	12.5m	42ft	50ft	187.5m
1:2500	25m	208ft	625ft	375m
1:10560	105.6m	880ft	0.25miles	1.5km
1:10000	100m	833ft	1666yards	1.5km
1/8" to 1ft	-	8ft	48ft	1500m
1/4" to 1ft	-	4ft	24ft	-

NEW PLACE FARM LINGFIELD: VIEW 3

Scale	10mm	1inch	6inches	150mm
1:50	0.5 metre	4.2ft	25ft	7.5metres
1:100	1metre	8.3ft	50ft	15m
1:200	2m	16.7ft	100ft	30m
1:500	5m	42ft	250ft	75m
1:1250	12.5m	104ft	625ft	187.5m
1:2500	25m	208ft	0.12miles	375m
1:10560	105.6m	880ft	1mile	1584m
1:10000	100m	833ft	1666yards	1500m
1/8" to 1ft	–	8ft	48ft	–
1/4" to 1ft	–	4ft	24ft	–

0 1 2 3 4 5 6 INCHES

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 MILLIMETRES

NEW PLACE FARM LINGFIELD: VIEW 4

Scale	10mm	6inches	150mm
1:50	0.5 metres	4.2ft	7.5metres
1:100	1 metre	8.3ft	15m
1:200	2m	16.7ft	30m
1:500	5m	42ft	75m
1:1250	12.5m	104ft	187.5m
1:2500	25m	208ft	375m
1:10560	105.6m	880ft	1584m
1:10000	100m	833ft	1500m
1/8" to 1ft	-	8ft	-
1/4" to 1ft	-	4ft	-

0 1 2 3 4 5 6 INCHES

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 MILLIMETRES

10·5 A3 | 7·5 A4 | 0 10 20 30 40 50 60 70 80 90 100 mm | 0 1 2 3 4 in | 7·5 A4 | 10·5 A3 | 15 A2