



Drainage Strategy Report

Garage Site, The Glebe, West Drayton

Landmark Builders Ltd

QUALITY MANAGEMENT

Job No.	07-0140		
Project	Garage Site, The Glebe, West Drayton		
Location	Garage Site, The Glebe, West Drayton		
Title	Drainage Strategy Report		
Document Ref	DSR/001	Issue/Status	Planning
Date	25 th March 2019		
Prepared by	Steven Griffiths	Signature (for file)	
Checked by	Steven Griffiths	Signature (for file)	
Authorised by	Steven Griffiths	Signature (for file)	

REVISION SCHEDULE

Drainage Strategy Report

Garage Site, The Glebe, West Drayton

Rev	Date	Details	Prepared By	Approved By
A	25.03.2019	First Issue	S. Griffiths	S. Griffiths

CONTRACT

The report describes work commissioned by Landmark Builders Ltd as outlined within fee proposal dated 4th March 2019.

PURPOSE

This document has been prepared as a Drainage Strategy Report for Landmark Builders Ltd. G30 Consulting Ltd accepts no responsibility or liability for any use that is made of this document other than by the Client for the purposes for which it was originally commissioned and prepared.

G30 Consulting Ltd has no liability regarding the use of this report except to Landmark Builders Ltd.

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1. EXECUTIVE SUMMARY

Site Name	Garage Site, The Glebe, West Drayton
Location	Garage Site, The Glebe, West Drayton
Client	Landmark Builders Ltd
Grid Reference	506625, 178890
Area (ha)	0.048 ha
Discharge Rate (l/s)	3.3 l/s
Recommended SuDS	Rainwater harvesting Proprietary treatment systems Trees / vegetation Attenuation storage tanks

2. INTRODUCTION

2.1 General

G30 Consulting Ltd have been commissioned by Landmark Builders Ltd to prepare a Drainage Strategy Report in relation to the proposed residential development at a former garage site at the rear of Drayton Court, The Glebe, West Drayton.

2.2 Description of the Site

The site is located off The Glebe adopted road and is centred about Ordnance Survey Grid reference 506625, 178890. The site occupies an area of approximately 0.048ha.



Figure 1 - Site Location

The site is currently used for private garages which are orientated West to East along the Northern boundary comprising a total of 13 garages. The garages are accessed via a private access off The Glebe with a shared parking / turning facility running parallel to the garages. The access way is hard surfaced and positively drain.

2.3 Topography

At the time of producing this report a topographical survey of the site has not been undertaken to confirm existing levels. Google imagery of the site shows the site to be relatively flat with a slight fall from West to East.



Figure 2 – View from the South West corner across the site



Figure 3 – View from the South East corner across the site

2.4 Geology and Groundwater

At the time of producing this report an intrusive ground investigation report had not been undertaken to confirm ground conditions on site. In the absence of an intrusive ground investigation British Geological

Survey (BGS) 1:50,000 scale geology mapping was reviewed to confirm the geology on site. The details of the underlying geology can be found below and in Figure 2 below:

Bedrock Geology: London Clay Formation - Clay, Silt and Sand. Sedimentary Bedrock formed approximately 48 to 56 million years ago in the Palaeogene Period. Local environment previously dominated by deep seas. These sedimentary rocks are marine in origin. They are detrital and comprise coarse- to fine-grained slurries of debris from the continental shelf flowing into a deep-sea environment, forming distinctively graded beds.

Superficial Deposits: Langley Silt Member - Clay and Silt. Superficial Deposits formed up to 2 million years ago in the Quaternary Period. Local environment previously dominated by windblown deposits (U). These sedimentary deposits are aeolian in origin. They are detrital, comprising medium- to fine-grained materials, forming lenses, beds (and locally) dunes.

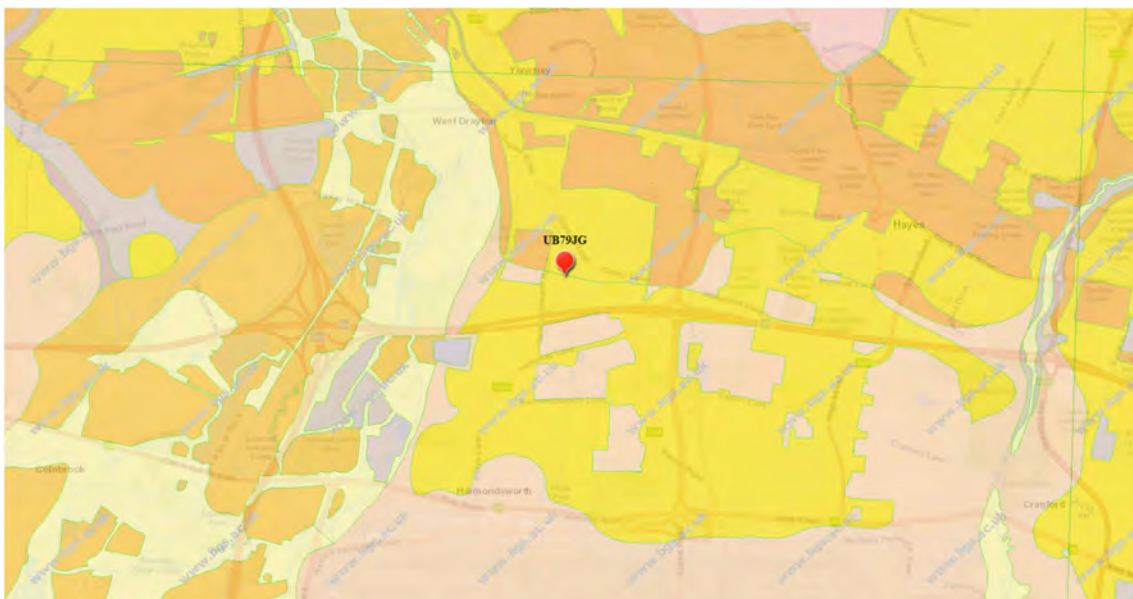


Figure 4 - Underlying Site Geology

In addition to British Geological Survey (BGS) 1:50,000 scale geology mapping historic borehole logs were reviewed. The borehole logs confirmed a topsoil layer beneath which Clay was encountered which continued till the boreholes were abandoned.

Copies of historic borehole logs from near to the site can be found in Appendix A.

2.5 Hydraulic Features

The nearest watercourse to the site is the River Colne which is located approximately 1.15km North West of the site.

2.6 Current Site Drainage

At this time a CCTV drainage survey has not been undertaken of the existing drainage system on site. The site currently fully impermeable benefiting from a drainage system on site which collects surface water runoff from the garage roofs and the external hard surfaced areas. It is assumed the drainage system ultimately outfalls to the Thames Water surface water sewer however this is to be confirmed.

3. PROPOSED DEVELOPMENT

The proposed development requires the demolition of the existing garages and the hard-surfaced access way. In place of the garages 2 new semi-detached residential properties are proposed. As part of the development the existing site access is to be reconstructed to provide vehicular access to the site where a new parking court with 4 parking spaces shall be constructed.

Soft landscaping areas shall be incorporated around the parking court / parking spaces to the front of the development with grassed gardens to the rear of the properties.

A copy of the drawing 2019/D263/P03 – Proposed Site Plan by Hillingdon London Residents Services showing the proposed site arrangement can be found Appendix C.

4. SURFACE WATER DRAINAGE PROPOSAL

4.1 Requirements and Regulations

The means of draining surface water generated by a site is required to mirror the behaviour of the existing site run-off, so far as is practicable, to offset the off-site flood risk that might otherwise be created, or to bypass it entirely.

The following documents have been referred to as part of the development of the drainage strategy to ensure current standards and industry best practice are adhered to:

- Buildings Regulations Part H - Drainage and Waste Disposal
- Sewers for Adoption 6th Ed. - A Design and Construction Guide for Developers- March 2006
- Sewers for Adoption 7th Ed. - A Design and Construction Guide for Developers- August 2012
- CIRIA Report 753 - The SuDS Manual 2015
- BRE Digest 365 - Soakaway Design

In accordance with Building Regulations Part H- Drainage and Waste Disposal, surface water runoff generated by a site should look to discharge to one of the following listed in order of priority:

- An adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable,
- A watercourse; or where that is not reasonably practicable,
- A surface water sewer; or where that is not reasonably practicable,
- A combined water sewer.

4.2 Surface Water Drainage Strategy

In accordance with the surface water hierarchy outlined in Building Regulations Part H, surface water runoff should look to discharge to soakaways or some other adequate infiltration system. At the time of producing this report on site infiltration testing in accordance with BRE 365 had not been undertaken to confirm percolation rates. British Geological Survey mapping and borehole logs confirmed a topsoil layer beneath which Clay was encountered which continued till the boreholes were abandoned.

Due to the cohesive nature of clay it is unlikely infiltration drainage techniques would be suitable within the development and as such has been discounted as the primary method of surface water disposal from the site.

The nearest watercourse to the site is River Colne which is located approximately 1.15km North West of the site. To discharge surface water runoff to the watercourse it would be necessary to cross Third Party land, as such a discharge to the watercourse is not considered feasible.

The nearest adopted drainage system to the site is a Thames Water surface water sewer located within the private entrance to Drayton Court off The Glebe. At this time a CCTV drainage survey has not been undertaken of the existing drainage system on site, however it is assumed the drainage system ultimately outfalls to the Thames Water surface water sewer.

A new surface water drainage system shall be constructed on site which will convey surface water runoff from the residential properties and the new parking court / parking spaces to the outfall into the Thames Water surface water sewer.

Individual SuDs features for the site have been reviewed based on the site characteristics, such as the underlying soil type and geology. As well as the design considerations from the development that may limit the feasibility of certain SuDs features from being implemented. Details of the specific SuDs features selected for the site can be found in Section 4.3.

A private flow control device shall be installed to restricted surface water runoff from the site to pre development rates. Surface water discharge rates from the site shall be discussed further in Section 4.4.

Attenuation storage shall be provided in the form of cellular crates to attenuate surface water runoff for storms, up to and including 1 in 100 years plus 40% Climate Change with a 10080-minute duration. Onsite attenuation requirements shall be discussed further in Section 4.5.

Proposed foul and surface water drainage layout plan, drawing 07-0140-001 can be found in Appendix D.

4.3 Use of SuDs

To ensure the quality of runoff leaving the site is treated to a suitable level, SuDs features have been assessed for their suitability within the proposed development. In accordance with CIRIA Report C753 - The SuDS Manual 2015 features have been considered and their suitability evaluated in relation to the development. Table 1 below details all the SuDS features that have been considered for this site and providing supporting evidence to why each SuDS features type have or have not been deemed suitable.

Table 1 – SuDS Selector Table

SuDS Selector Table		
Feature	Suitable Y / N	Evidence
Rainwater Harvesting	Y	Rainwater harvesting in the form of rainwater butts could be used to provide rainwater reuse for irrigation purposes.
Green Roofs	N	Green roofs are ideally suited to flat roofs, a pitched roof has been proposed and as such is not suitable for the development.
Infiltration Systems	N	Due to the underlying ground conditions infiltration systems are not considered to be suitable.
Proprietary Treatment Systems	Y	Trapped gullies could be used at the bottom of the rainwater downpipes to assist with the removal of sediment.
Filter Strips	N	Due to the site layout filter strips are not considered to be suitable.
Filter Drains	N	Due to the site layout filter drains are not considered to be suitable.
Swales	N	Due to the land take requirements these features are not suitable with the current site layout plan.
Bioretention Systems	N	Due to the land take requirements these features are not suitable with the current site layout plan.
Trees / vegetation	Y	New planting will be incorporated into the development which will assist with the disposal of surface water runoff.
Pervious Pavements	N	Due to the underlying ground conditions pervious pavements are not considered to be suitable.
Attenuation Storage Tanks	Y	Attenuation storage tanks in are to be utilised within the surface water drainage system.
Detention Basins	N	Due to the land take requirements these features are not suitable with the current site layout plan.
Ponds and Wetlands	N	Due to the land take requirements these features are not suitable with the current site layout plan.

4.4 Drainage Discharge and Outfalls

It is assumed that the site discharges surface water runoff to the existing Thames Water surface water sewer within the private entrance to Drayton Court off The Glebe.

A pre-development peak runoff rate for the site has been calculated using the Modified Rational Method. The following equation has been used:

$$Q = CiA$$

Where:

$C = 2.78$

$i = 50 \text{ mm/hr}$

$A = 0.048 \text{ ha}$

A peak pre-development surface water runoff rate of **6.6l/s** has been calculated for the site. Brownfield sites should look to reduce existing discharge rates and as such a 50% reduction is proposed to the pre development peak runoff rate.

Surface water runoff from the site is therefore proposed to discharge at a peak rate of **3.3l/s** for all storm events up to and including 1 in 100 year + 40% climate change, 10080-minute (7 days) duration.

4.5 Storage

Surface water attenuation calculations using XP Solutions MicroDrainage have been undertaken for the surface water drainage system. Based on an impermeable area of 220m² from the residential properties and the private parking court / spaces discharging to the combined water Thames Water sewer approximately 5.6m³ of attenuation storage is required for all storm events up to and including 1 in 100 year + 40% climate change, 10080-minute (7 days) duration.

Attenuation storage shall be provided in the form of cellular crates located beneath the parking court / parking spaces to the front of the site.

Copies of XP Solutions MicroDrainage surface water attenuation calculations can be found in Appendix E.

4.6 Ownership and Maintenance

The private surface water drainage system shall be the responsibility of individual property owners to manage and maintain.

The surface water discharge to the Thames Water sewer shall be approved by Thames Water under a Section 106 application.

Future maintenance schedules for all the proposed SuDS features can be found in Appendix F.

5. FOUL WATER DRAINAGE PROPOSAL

5.1 Requirements and Regulations

The following documents have been referred as part of the development of the drainage strategy for the development to ensure current standards and industry best practices are adhered to:

- Buildings Regulations Part H - Drainage and Waste Disposal
- Sewers for Adoption 6th Ed. - A Design and Construction Guide for Developers- March 2006.
- Sewers for Adoption 7th Ed. - A Design and Construction Guide for Developers- August 2012.

In accordance with Building Regulations Part H - Drainage and Waste Disposal, foul effluent generated by a site should look to discharge to one of the following listed in order of priority:

- A public sewer; or, where that is not reasonably practicable,
- A private sewer communicating with a public sewer; or where that is not reasonably practicable,
- Either a septic tank which has an appropriate form of secondary treatment or another wastewater treatment system; or where that is not reasonably practicable,
- A cesspool

5.2 Foul Water Drainage Strategy

Thames Water are responsible for adopted drainage assets in West Drayton. Thames Water sewer asset record plans confirm the presence of an adopted 225mm dia. combined water sewer within the private entrance to Drayton Court off The Glebe.

Foul water effluent is proposed to discharge to the adopted Thames Water combined water sewer. A new foul water drainage system is to be constructed on site to convey foul water effluent from the properties to the outfall.

Foul effluent is to discharge from the site to the combined water manhole on site at an unrestricted rate.

Proposed foul and surface water drainage layout plan, drawing 07-0140-001 can be found in Appendix D.

5.3 Operations and Management

The private foul water drainage system shall be the responsibility of individual property owners to manage and maintain.

The foul water discharge into the Thames Water sewer shall be approved by Thames Water under a Section 106 application.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Drainage Summary – Surface Water

The disposal of surface water runoff generated by the proposed development has been assessed in accordance with the guidance outlined within Building Regulations Part H – Drainage and Waste Disposal.

The nearest adopted drainage system to the site is a Thames Water surface water sewer located within the private entrance to Drayton Court off The Glebe. At this time a CCTV drainage survey has not been undertaken of the existing drainage system on site, however it is assumed the drainage system ultimately outfalls to the Thames Water surface water sewer.

A new surface water drainage system shall be constructed on site which will convey surface water runoff from the residential properties and the new parking court / parking spaces to the outfall into the Thames Water surface water sewer.

Surface water runoff from the site is proposed to discharge at a peak rate of **3.3l/s** for all storm events up to and including 1 in 100 year + 40% climate change, 10080-minute (7 days) duration.

Based on an impermeable area of 220m² from the residential properties and the private parking court / spaces discharging to the combined water Thames Water sewer approximately 5.6m³ of attenuation storage is required for all storm events up to and including 1 in 100 year + 40% climate change, 10080-minute (7 days) duration.

The private surface water drainage system shall be the responsibility of individual property owners to manage and maintain.

The surface water discharge to the Thames Water sewer shall be approved by Thames Water under a Section 106 application.

6.2 Drainage Summary – Foul Water

The disposal of foul water effluent generated by the proposed development has been assessed in accordance with the guidance outlined within Building Regulations Part H – Drainage and Waste Disposal.

Foul water effluent is proposed to discharge to the adopted Thames Water combined water sewer. A new foul water drainage system is to be constructed on site to convey foul water effluent from the properties to the outfall.

Foul effluent is to discharge from the site to the combined water manhole on site at an unrestricted rate.

The private foul water drainage system shall be the responsibility of individual property owners to manage and maintain.

The foul water discharge into the Thames Water sewer shall be approved by Thames Water under a Section 106 application.

APPENDIX

APPENDIX A – BRITISH GEOLOGICAL SURVEY HISTORIC BOREHOLE LOGS

Norwest Holst Soil Engineering Ltd.

Borehole No. **235**

Contract No. **P9047 (PART 2)**

BOREHOLE LOG

Location **HEATHROW SURFACE ACCESS STUDIES**

Client **HEATHROW AIRPORT LIMITED**

Method of Boring **CABLE PERCUSSION**

Diameter of Borehole **200mm**

Sheet **1** of **2**

Co-ords. **ES06936 N178600**

Ground Level **28.80** m.A.O.D.

Date **14 - 15/3/91**

TQ 07 NE 202

Description of Strata	Legend	Depth Below G.L. (m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/ R.O.D.%	Daily Progress
MADE GROUND: Brown very clayey sand with occasional tarmac fragments, fine to medium sub-angular to angular flint gravel, metal, brick and rootlets. (FILL)		0.70	28.10		0.50-1.00		
Firm friable brown clayey, slightly sandy SILT with occasional black root traces. (BRICK EARTH)					1.00-1.50 1.00-1.45 1.50 1.50-2.00	(30)	
					2.00-2.45	(28)	
		3.00	25.80		2.50 2.50-3.00		
Soft to firm orange brown silty very sandy CLAY with much fine to coarse angular flint gravel. (ALLUVIUM)		3.50	25.30		3.00 3.00-3.45	"17"	
Dense brown very sandy fine to coarse angular to sub-angular flint GRAVEL, with occasional cobbles. (TERRACE GRAVEL)					3.50-4.00 4.00-4.45 4.50-5.00	"31"	
		5.90	22.90		5.00-5.45 5.50-6.00	"33"	
Medium dense brown clayey SAND and fine to coarse angular to rounded assorted GRAVELS, with pockets of soft brown silty clay. (TERRACE GRAVEL)		6.35	22.45	6.30 14/3 6.75 15/3	6.00-6.45	"18"	
Firm grey brown fissured indistinctly laminated silty CLAY. (LONDON CLAY)					7.00-7.45	(90)	
...					7.50		
...					8.50-8.95	(84)	
...					9.00		

Type of Sample

Is S.P.T. ☒ Undisturbed

1c C.P.T. ☒ Vane

0 Jar ☒ Water

● Bulk ☒ Piezometer

Remarks (Observations of Ground Water etc.) (-) U100 blows

Inspection Pit to 1.00m.

Groundwater: 14/3/91: Water added to assist drilling 3.00-6.50m.

pm W.L., 4.80m, casing to 6.30m

15/3/91: am W.L., 4.90m, casing to 6.30m

Sealed with casing at 6.75m

borehole dry on completion

Piezometer installed at 5.40m, as shown (15/3/91)

Water level is subject to normal tidal variations and should not be taken as constant

Contract No. F9047 (PART 2)

BOREHOLE LOG

Location **HEATHROW SURFACE ACCESS STUDIES**

Sheet.....2.....of.....2.....

Client: **HEATHROW AIRPORT LIMITED**

Co-ords. E506936 N178600

Method of Boring CABLE PERCUSSION

Ground Level.....28.80.....m.A.O.D.

Diameter of Borehole.....200mm

Date 14 - 15/3/91

Description of Strata	Legend	Depth Below G.L. (m)	O.D. Level (m)	Casing Depth at Sampling	Sampling and Coring	"N"/R.O.D. %	Daily Progress
Firm grey brown fissured indistinctly laminated silty CLAY. ...below 10.50m Stiff (LONDON CLAY)					10.00-10.45 10.50 11.50-11.95 12.00 13.00-13.45 13.50 14.50-14.95	(90) (95) (115) "31"	
Borehole Complete at 15.00m.		15.00	13.80				
Type of Sample Is S.P.T.  Undisturbed Ic C.P.T.  Vane O Jar  Water ● Bulk  Piezometer Remarks (Observations of Ground Water etc.) (-) U100 blows Water levels are subject to seasonal or tidal variations and should not be taken as constant							

Boring method		PERCUSSION		Location		M4 MOTORWAY HEATHROW SPUR TO M25 INTERCHANGE		Borehole No. 2329	
Boring equipment		DANDO 150		National Grid Reference		E 506571 N 178488		Sheet 1 of 1	
Boring diameter (mm)		200		Contractor		LAING DESIGN AND DEVELOPMENT CENTRE		Date Commenced 8.9.83	
Casing diameter (mm)		200		Contractor's Job Reference		11310301		Ground Level (m) AOD 31.30	
Depth (m)	Sample	In situ test	Date & casing depth (m)	Depth to Water (m)	Strata Thickness (m)	Strata Depth (m)	Strata Description	Level (m) AOD	Legend
0.20	D1		8.9.83				MADE GROUND : Very stiff reddish brown very silty clay, fine to medium gravel, brick and coal fragments, organic matter.		
0.50-0.95	U2	-		DRY					
1.00	D3								
1.00-1.45	U4	-		DRY					
1.50	D5				3.20				
1.70	D6								
2.00-2.45	U7	-		DRY					
2.50	D8					2.70		28.60	
2.70	D9								
3.00-3.45	U10	-		DRY		3.20	MADE GROUND : Topsoil, fine to medium gravel, dead grass, rootlets.	28.10	
3.50	D11						Firm to stiff orange brown with black speckling friable very silty sandy CLAY of low plasticity.		
3.70	D12								
4.00-4.45	U13	-		DRY					
4.50	D14				2.50				
4.70	D15								
5.00-5.45	U16	-		DRY					
5.50	D17					5.50	 with a little gravel.	25.80	
5.70	D18					5.70		25.60	
6.00-6.45	B19	C(2B)	6.00	5.50			Medium dense to dense fine to coarse subangular to subrounded flint GRAVEL with brown fine to coarse sand.		
7.00-7.45	B20	C(53)	7.00	6.70	2.50				
7.60	M29								
8.00-8.45	B21	C(8)	8.00	7.60		8.20		23.10	
8.00-8.20	D22								
8.20	U23			DRY			Firm to stiff reddish brown silty CLAY of high plasticity.	22.70	
8.50-8.95	U23			DRY		8.60			
8.60	D25						Stiff grey fissured silty CLAY of high plasticity.		
9.00	D24				1.80				
9.30	D26								
9.50-9.95	U27			DRY					
10.00	D28			DRY		10.00		21.30	
							BOREHOLE COMPLETED.		
Remarks 1) Water strike at 8.00m, rose to 7.60m in 10 minutes, sealed off by casing at 8.50m. 2) Water added to assist boring from 5.70m to 8.00m.									
Key to symbols & abbreviations in Preface notes									
									Figure

BUCKINGHAM
SOUTH BUCKINGHAM
ETON RD

5000

6000

BUCKINGHAMSHIRE
1928 PW
Gravel & L.D. Rd

79

78

VIEWSLEY AND WEST DRAYTON UD & PH

115 - 140

Harmondsworth

Sipson

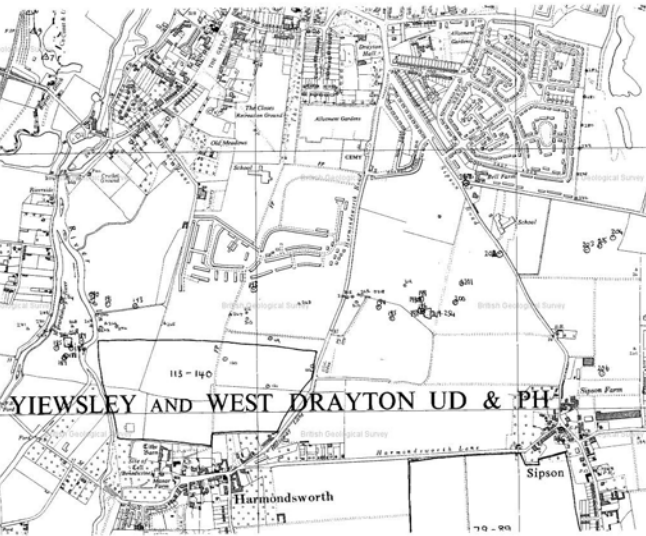
115 - 140

Boring method PERCUSSION		Location M4 MOTORWAY HEATHROW SPUR TO M25 INTERCHANGE		Borehole No. 2328				
Boring equipment DANDO 150		National Grid Reference E 508459 N 178462		Sheet 1 of 2				
Boring diameter (mm) 200		Contractor LAING DESIGN AND DEVELOPMENT CENTRE		Date Commenced 9.9.83				
Casing diameter (mm) 200		Contractor's Job Reference 11310301		Ground Level (m) AOD 31.80				
Depth (m)	Sample	In situ test	Date & casing depth (m)	Depth to Water (m)	Strata Thickness (m)	Strata Description	Level (m) AOD	Legend
0.20	D1		9.9.83			MADE GROUND : Stiff to very stiff orange brown very silty clay, tile fragments.		
0.50-0.95	U2		-	DRY				
1.00	D3				1.00		30.80	
1.00-1.45	U4		-	DRY		MADE GROUND : Stiff grey and brown friable very silty clay, paper and plastic fragments, traces of glass and coal.		
1.50	D5							
1.70	D6							
2.00-2.45	U7		-	DRY				
2.50	D8							
2.70	D9							
3.00-3.45	U10		-	DRY				
3.50	D11							
3.70	D12							
4.00-4.45	U13		-	DRY	9.10			
4.50	D14							
4.70	D15							
5.00-5.35	U16		-	DRY	5.30		26.50	
5.40	D17					MADE GROUND : Clinker, ash, gravel, glass iron fragments.		
6.00-6.45		C(11)	-	DRY				
7.00-7.45		C(14)	7.00	DRY				
7.90	W38		8.00	7.90 DRY				
8.00-8.45		C(19)	12.9.83	8.00 DRY				
					9.10		22.70	
9.00-9.45	B18	C(32)	9.00	7.40	0.70	Dense fine to coarse subangular to subrounded flint GRAVEL with brown fine to coarse sand.	22.00	
9.80	D19				9.80		21.80	
9.90-10.35	U20		9.90	9.80	10.00	Firm to stiff orange brown mottled grey very sandy CLAY with fine to medium gravel.		
						continued.....		
Remarks								
1) Water strike at 8.50m, rose to 7.90m in one hour, and sealed by casing at 10.40m.								
2) Water added to assist boring from 9.10m to 9.80m								
3) Piezometer installed at 9.60m on 12.9.83.								
Key to symbols & abbreviations in Preface notes								
								Figure

[illegible]

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APPENDIX B – THAMES WATER SEWER ASSET RECORD PLANS

Asset location search



Property Searches

GThirty Consulting Ltd
Neepsend Triangle Business Cen Sheffield, Neepsend
Triangle Business Cen

SOUTH YORKSHIRE
S3 8BW

Search address supplied 1
The Glebe
Drayton Court
West Drayton
UB7 9JG

Your reference 07-0140 - Drayton Court Uxbridge

Our reference ALS/ALS Standard/2019_3965982

Search date 8 March 2019

Keeping you up-to-date

Notification of Price Changes

From 1 September 2018 Thames Water Property Searches will be increasing the price of its Asset Location Search in line with RPI at 3.23%.

For further details on the price increase please visit our website: www.thameswater-propertysearches.co.uk
Please note that any orders received with a higher payment prior to the 1 September 2018 will be non-refundable.



Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW
DX 151280 Slough 13



searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk



0845 070 9148



Search address supplied: 1, The Glebe, Drayton Court, West Drayton, UB7 9JG

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This search provides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0845 070 9148, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk

Web: www.thameswater-propertysearches.co.uk

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

With regard to the fresh water supply, this site falls within the boundary of another water company. For more information, please redirect your enquiry to the following address:

Affinity Water Ltd
Tamblin Way
Hatfield
AL10 9EZ
Tel: 0845 7823333



For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

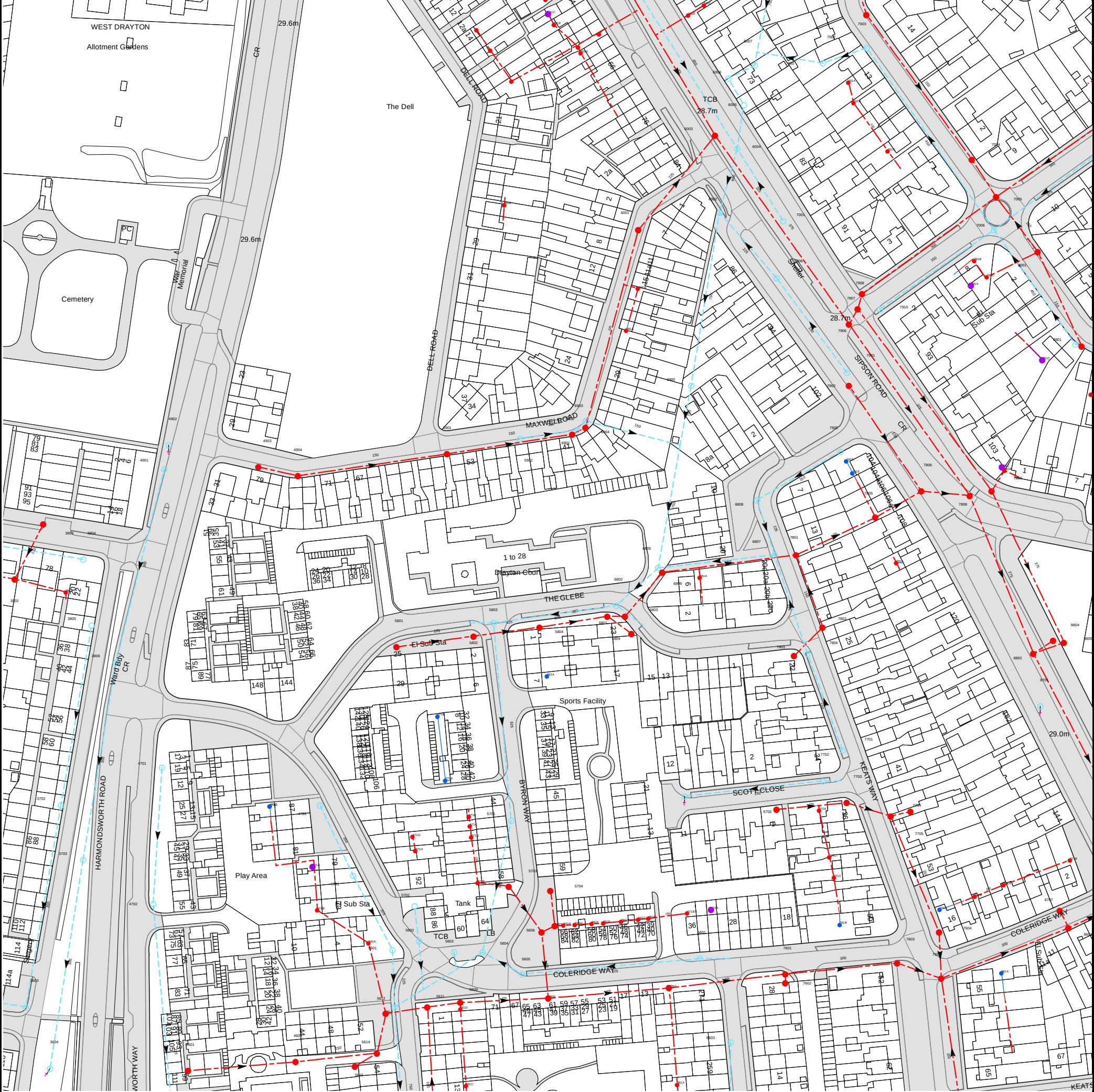
Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2019 3965982



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 506596,178870
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

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

Manhole Reference	Manhole Cover Level	Manhole Invert Level
511F	n/a	n/a
511C	n/a	n/a
511E	n/a	n/a
6901	28.05	26.07
6902	28.04	27.3
6008	n/a	n/a
601A	n/a	n/a
6904	28.16	25.94
6903	28.06	27.28
6111	n/a	n/a
691A	n/a	n/a
691B	n/a	n/a
6001	28.18	25.31
611D	n/a	n/a
6905	28.39	27.06
611C	n/a	n/a
6003	28.67	24.64
6002	28.62	27.16
6006	28.86	27.24
6004	28.7	27.16
6005	28.83	27.2
6007	28.9	27.25
6906	28.5	27.76
7001	28.7	27.36
891C	n/a	n/a
791D	n/a	n/a
7903	28.63	27.94
891A	n/a	n/a
7902	28.68	25.76
7901	28.71	28.11
891C	n/a	n/a
8902	29.02	27.3
8901	28.96	27.74
7906	28.66	24.36
7910	28.86	28.14
7907	n/a	n/a
7908	28.83	24.48
791A	n/a	n/a
791C	n/a	n/a
791B	n/a	n/a
8001	29.05	26.71
7006	29.05	27.7
7005	29.07	24.67
7004	29.04	25.02
8002	29.39	27.74
701C	n/a	n/a
701B	n/a	n/a
701A	n/a	n/a
7002	28.81	27.57
7003	28.79	27.6
7102	28.73	25.71
8003	29.42	24.83
5804	28.28	25.64
581A	n/a	n/a
6801	28.22	25.44
6802	28.24	26.82
6803	28.23	25.42
6804	28.43	27.3
6805	28.28	26.95
6806	28.35	25.26
681A	n/a	n/a
6808	28.4	27.61
6807	28.31	27.47
7803	28.72	26.06
7801	28.18	24.98
7804	28.53	27.59
7802	28.38	25.98
7701	28.76	27.89
791E	n/a	n/a
7805	n/a	n/a
781A	n/a	n/a
7806	28.63	24.55
7808	29.02	24.22
7809	28.86	24.27
891B	n/a	n/a
8802	29.13	24
8701	29	27.95
8804	29.13	28.19
8805	29.16	24.13
5615	27.79	26.33
561A	n/a	n/a
5614	27.66	25.57
5613	27.76	25.42
5601	27.93	26.82
5612	27.73	26.26
5801	28.36	25.86
571G	n/a	n/a
5702	27.93	27.36
571H	n/a	n/a
5602	27.97	27.48
5611	27.84	25.34

Manhole Reference	Manhole Cover Level	Manhole Invert Level
571B	n/a	n/a
571A	n/a	n/a
5603	27.72	26.77
5610	28.15	25.43
5609	27.98	25.26
561C	n/a	n/a
571F	n/a	n/a
571C	n/a	n/a
571D	n/a	n/a
5802	28.23	25.74
571E	n/a	n/a
5604	27.5	26.42
5703	27.77	25.85
5705	n/a	n/a
5605	28.01	26.81
771C	n/a	n/a
761B	n/a	n/a
7703	28.69	25.9
7704	28.73	25.76
7603	28.59	24.51
7705	28.21	26.33
7604	28.86	25.3
771A	n/a	n/a
7605	28.48	24.45
771B	n/a	n/a
861A	n/a	n/a
871A	n/a	n/a
8707	28.67	27.11
8601	28.77	24.23
871B	n/a	n/a
661A	n/a	n/a
6603	28.42	27.52
5608	28.34	25.06
6602	28.6	24.87
7602	28.5	26.38
7601	28.62	24.68
6601	28.3	27.15
5606	n/a	n/a
5607	28.03	25.51
661H	n/a	n/a
661G	n/a	n/a
661F	n/a	n/a
661E	n/a	n/a
661D	n/a	n/a
661C	n/a	n/a
661B	n/a	n/a
671B	n/a	n/a
671A	n/a	n/a
5704	28.09	26.66
771D	n/a	n/a
771E	n/a	n/a
6702	n/a	n/a
6701	n/a	n/a
7702	28.68	27.94
3802	28.65	26.67
3803	29.37	27.29
381A	n/a	n/a
3804	n/a	n/a
4901	29.74	28.52
4902	29.6	28.38
4903	28.86	27.95
4904	28.74	27.74
5901	28.37	26.78
5103	n/a	n/a
5005	n/a	n/a
5803	28.03	26.73
501A	n/a	n/a
5104	n/a	n/a
5902	28.16	27.35
3603	29.55	26.72
3604	n/a	n/a
3702	n/a	n/a
3703	29.89	28.47
3805	n/a	n/a
3806	29.97	28.75
4702	n/a	n/a
4701	n/a	n/a
4601	28.15	27.19
471D	n/a	n/a
471C	n/a	n/a
4602	27.65	25.9
471A	n/a	n/a
471B	n/a	n/a
4703	28.3	27.51
5701	28.16	27.11
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.		



ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

	Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.		Trunk Foul
	Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.		Trunk Surface Water
	Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.		Trunk Combined
	Storm Relief		Bio-solids (Sludge)
	Vent Pipe		Proposed Thames Water Foul Sewer
	Proposed Thames Surface Water Sewer		Foul Rising Main
	Gallery		Combined Rising Main
	Surface Water Rising Main		Proposed Thames Water Rising Main
	Sludge Rising Main		Vacuum

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plans are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
- 5) 'na' or '0' on a manhole level indicates that data is unavailable.

Sewer Fittings

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

	Air Valve
	Dam Chase
	Fitting
	Meter
	Vent Column

Operational Controls

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

	Control Valve
	Drop Pipe
	Ancillary
	Weir

End Items

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

	Outfall
	Undefined End
	Inlet

Other Symbols

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

	Public/Private Pumping Station
	Change of characteristic indicator (C.O.C.I.)
	Invert Level
	Summit

Areas

Lines denoting areas of underground surveys, etc.

	Agreement
	Operational Site
	Chamber
	Tunnel
	Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

	Foul Sewer		Surface Water Sewer
	Combined Sewer		Gully
	Culverted Watercourse		Proposed
			Abandoned Sewer

- 6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment 14 days from due date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service, or will be held to be invalid.
4. Thames Water does not accept post-dated cheques-any cheques received will be processed for payment on date of receipt.
5. In case of dispute TWUL's terms and conditions shall apply.
6. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
7. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
8. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800

If you are unhappy with our service you can speak to your original goods or customer service provider. If you are not satisfied with the response, your complaint will be reviewed by the Customer Services Director. You can write to her at: Thames Water Utilities Ltd. PO Box 492, Swindon, SN38 8TU.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0121 345 1000 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

Credit Card	BACS Payment	Telephone Banking	Cheque
Call 0845 070 9148 quoting your invoice number starting CBA or ADS / OSS	Account number 90478703 Sort code 60-00-01 A remittance advice must be sent to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW. or email ps.billing@thameswater.co.uk	By calling your bank and quoting: Account number 90478703 Sort code 60-00-01 and your invoice number	Made payable to ' Thames Water Utilities Ltd ' Write your Thames Water account number on the back. Send to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW or by DX to 151280 Slough 13

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.



Search Code

IMPORTANT CONSUMER PROTECTION INFORMATION

This search has been produced by Thames Water Property Searches, Clearwater Court, Vastern Road, Reading RG1 8DB, which is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

The Search Code:

- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom
- sets out minimum standards which firms compiling and selling search reports have to meet
- promotes the best practise and quality standards within the industry for the benefit of consumers and property professionals
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.

By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

The Code's core principles

Firms which subscribe to the Search Code will:

- display the Search Code logo prominently on their search reports
- act with integrity and carry out work with due skill, care and diligence
- at all times maintain adequate and appropriate insurance to protect consumers
- conduct business in an honest, fair and professional manner
- handle complaints speedily and fairly
- ensure that products and services comply with industry registration rules and standards and relevant laws
- monitor their compliance with the Code

Complaints

If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme (TPOs). The Ombudsman can award compensation of up to £5,000 to you if the Ombudsman finds that you have suffered actual loss and/or aggravation, distress or inconvenience as a result of your search provider failing to keep to the code.

Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.

TPOs Contact Details

The Property Ombudsman scheme
Milford House
43-55 Milford Street
Salisbury
Wiltshire SP1 2BP
Tel: 01722 333306
Fax: 01722 332296
Web site: www.tpos.co.uk
Email: admin@tpos.co.uk

You can get more information about the PCCB from www.propertycodes.org.uk

PLEASE ASK YOUR SEARCH PROVIDER IF YOU WOULD LIKE A COPY OF THE SEARCH CODE

APPENDIX C – DRAWING 2019/D263/P03 – PROPOSED SITE PLAN



NOTES

The Contractor must verify all dimensions at the site before setting out, commencing work, or making any shop drawings. Any discrepancies must be reported to the Contract Administrator before proceeding.

DO NOT SCALE FROM THIS DRAWING

SCHEDULE OF ACCOMMODATION :

2 HOUSES TOTAL:

PLOT 1:
1no x 3 Bed 4 Person House @ 84m²
Single Storey with Loft Dormers
Rear Garden Amenity Plot 1 = 104m²
Parking 2 spaces (1 potential DDA)

PLOT 2
1no x 3 Bed 5 Person House@ 99m²
2 Storey.
Rear Garden Amenity Plot 2 = 82m²
Parking 2 spaces (1 potential DDA)

B	Schedule of accommodation amended to reflect plans	ST	01.11.18
A	Boundary amended to reflect topographical survey, tree added and amenity areas amended	ST	28.09.18
Rev	Revision notes	Initials	Date

HILLINGDON
LONDON

RESIDENTS SERVICES, CAPITAL PROGRAMME AND PLANNED WORKS
2E/10, CIVIC CENTRE, LUXBRIDGE, MIDDLESEX, UB8 1UW
Tel: 01895 250 111
Fax: 01895 277 224

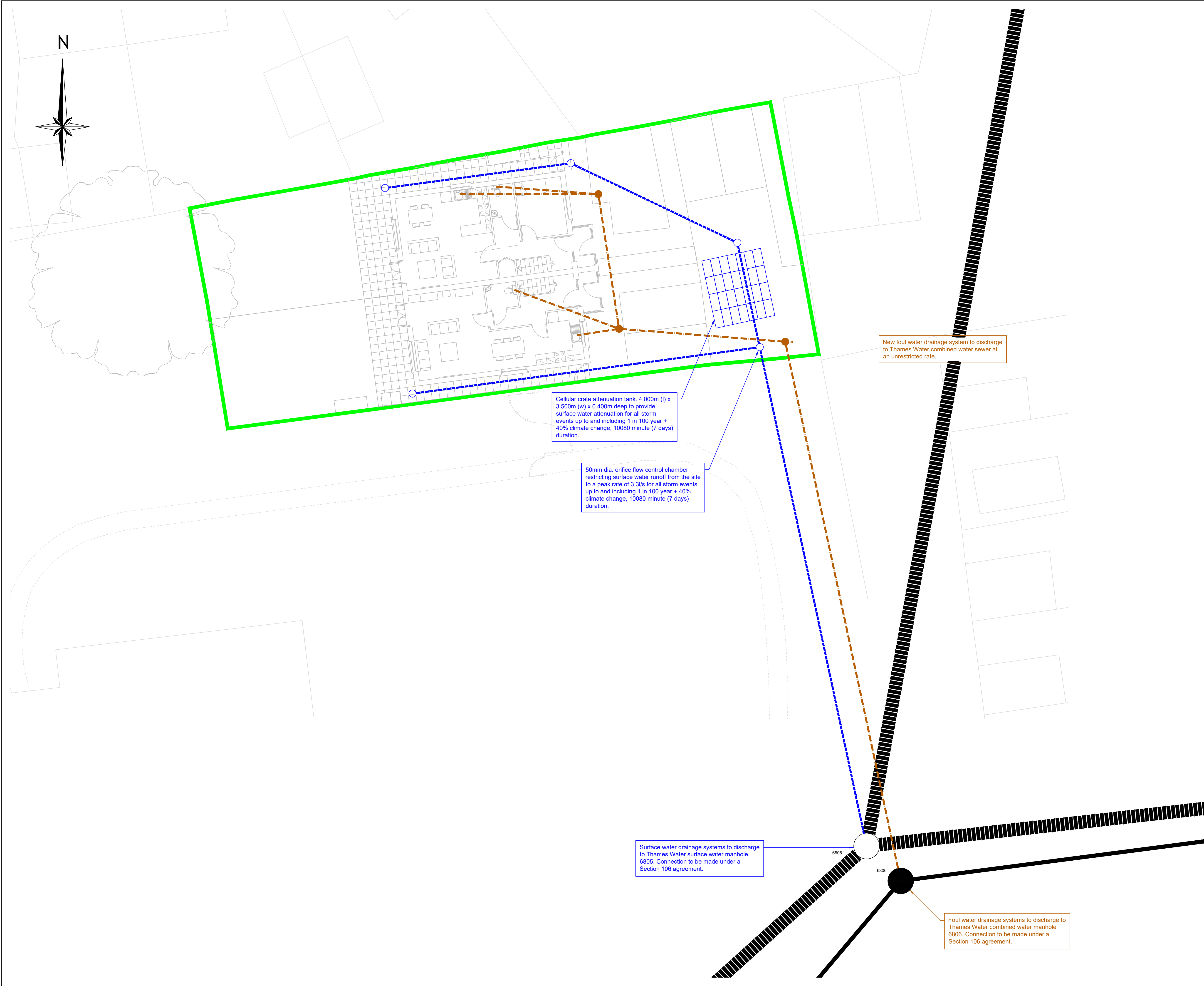
PROJECT
GARAGES SITE AT REAR OF DRAYTON COURT
THE GLEBE, WEST DRAYTON
UB7 9JE

DESCRIPTION
PROPOSED SITE PLAN

SCALE 1:200 @ A3	DRAWN BY SAM	CHECKED BY SV	DATE 15/09/18
DRAWING No. 2019/D263/P03			REV. B

APPENDIX D – DRAWING 07-0140-001 – FOUL AND SURFACE WATER

DRAINAGE LAYOUT



G30 Consulting Ltd

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Copying of these plans in full or in part is not permitted unless the written consent of G30 Consulting Ltd is obtained.

General Notes

1. Do not scale this drawing.
2. All dimensions are in millimeters unless stated otherwise.
3. This drawing is to be read in conjunction with all other relevant drawings & specifications.
4. All proprietary items to be installed in strict compliance with manufacturers instructions and recommendations.
5. No works shall commence on site until approval has been obtained from all relevant Agencies / Authorities.
6. All dimensions referred to in this drawing must be verified.

Key

- Site Boundary
- Existing combined water drain
- Existing combined water manhole
- Existing surface water drain
- Existing surface water manhole
- Proposed surface water drain
- Proposed surface water manhole - 450mm dia. PPIC
- ACO
- Proposed surface water channel drain
- Proposed surface water cellular crate attenuation tank
- Proposed foul water drain
- Proposed foul water manhole - 450mm dia. PPIC

P1	First Issue	25.03.2019
Revision	Description	Date

PRELIMINARY



G30
CONSULTING

Unit 7, Neepsend Triangle Business Centre, 1 Burton Road,
Sheffield, South Yorkshire, S3 8BW
W: www.g30consulting.com
E: enquiries@g30consulting.com
T: 0114 349 2720

Project		
Landmark Builder Ltd Former Garage Site, Drayton Court, The Glebe, West Drayton		
Title		
Foul and Surface Water Drainage Layout		

Drawn by	Checked by	Paper Size
SG	SG	A1
Drawing Number	Revision	Scale
07-0140-001	P1	1:100
		Date
		25.03.2019

APPENDIX E – XP SOLUTIONS MICRODRAINAGE ATTENUATION

CALCULATIONS

G30 Consulting Ltd		Page 1
Unit 6 Neepsend Triangle Business 1 Burton Road Sheffield S3 8BW	Garage Site, The Glebe West Drayton Surface Water Attenuation	
Date 25/03/2019 File CELLULAR CRATE ATTENUATION	Designed by S. Griffiths Checked by S. Griffiths	
XP Solutions	Source Control 2017.1.2	

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

Half Drain Time : 18 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	9.273	0.273	0.0	2.6	2.6	3.6	O K
30 min Summer	9.329	0.329	0.0	2.9	2.9	4.4	O K
60 min Summer	9.334	0.334	0.0	2.9	2.9	4.4	O K
120 min Summer	9.294	0.294	0.0	2.7	2.7	3.9	O K
180 min Summer	9.251	0.251	0.0	2.5	2.5	3.3	O K
240 min Summer	9.215	0.215	0.0	2.3	2.3	2.9	O K
360 min Summer	9.164	0.164	0.0	1.9	1.9	2.2	O K
480 min Summer	9.131	0.131	0.0	1.7	1.7	1.7	O K
600 min Summer	9.109	0.109	0.0	1.5	1.5	1.4	O K
720 min Summer	9.093	0.093	0.0	1.4	1.4	1.2	O K
960 min Summer	9.074	0.074	0.0	1.2	1.2	1.0	O K
1440 min Summer	9.059	0.059	0.0	0.9	0.9	0.8	O K
2160 min Summer	9.048	0.048	0.0	0.6	0.6	0.6	O K
2880 min Summer	9.042	0.042	0.0	0.5	0.5	0.6	O K
4320 min Summer	9.034	0.034	0.0	0.4	0.4	0.4	O K
5760 min Summer	9.029	0.029	0.0	0.3	0.3	0.4	O K
7200 min Summer	9.027	0.027	0.0	0.2	0.2	0.4	O K
8640 min Summer	9.025	0.025	0.0	0.2	0.2	0.3	O K
10080 min Summer	9.024	0.024	0.0	0.2	0.2	0.3	O K
15 min Winter	9.308	0.308	0.0	2.8	2.8	4.1	O K
30 min Winter	9.370	0.370	0.0	3.1	3.1	4.9	O K
60 min Winter	9.365	0.365	0.0	3.0	3.0	4.9	O K
120 min Winter	9.298	0.298	0.0	2.7	2.7	4.0	O K
180 min Winter	9.236	0.236	0.0	2.4	2.4	3.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	138.153	0.0	5.7	23
30 min Summer	90.705	0.0	7.5	31
60 min Summer	56.713	0.0	9.4	48
120 min Summer	34.246	0.0	11.3	80
180 min Summer	25.149	0.0	12.4	110
240 min Summer	20.078	0.0	13.2	142
360 min Summer	14.585	0.0	14.4	202
480 min Summer	11.622	0.0	15.3	260
600 min Summer	9.738	0.0	16.1	320
720 min Summer	8.424	0.0	16.7	380
960 min Summer	6.697	0.0	17.7	496
1440 min Summer	4.839	0.0	19.2	736
2160 min Summer	3.490	0.0	20.7	1100
2880 min Summer	2.766	0.0	21.9	1468
4320 min Summer	1.989	0.0	23.6	2188
5760 min Summer	1.573	0.0	24.9	2896
7200 min Summer	1.311	0.0	25.9	3632
8640 min Summer	1.129	0.0	26.8	4336
10080 min Summer	0.994	0.0	27.6	5104
15 min Winter	138.153	0.0	6.4	23
30 min Winter	90.705	0.0	8.4	32
60 min Winter	56.713	0.0	10.5	50
120 min Winter	34.246	0.0	12.7	82
180 min Winter	25.149	0.0	13.9	114

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Unit 6 Neepsend Triangle Business 1 Burton Road Sheffield S3 8BW	Garage Site, The Glebe West Drayton Surface Water Attenuation	
Date 25/03/2019 File CELLULAR CRATE ATTENUATION	Designed by S. Griffiths Checked by S. Griffiths	
XP Solutions	Source Control 2017.1.2	

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

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
240 min Winter	9.190	0.190	0.0	2.1	2.1	2.5	O K
360 min Winter	9.132	0.132	0.0	1.7	1.7	1.8	O K
480 min Winter	9.100	0.100	0.0	1.4	1.4	1.3	O K
600 min Winter	9.080	0.080	0.0	1.2	1.2	1.1	O K
720 min Winter	9.069	0.069	0.0	1.1	1.1	0.9	O K
960 min Winter	9.059	0.059	0.0	0.9	0.9	0.8	O K
1440 min Winter	9.048	0.048	0.0	0.6	0.6	0.6	O K
2160 min Winter	9.040	0.040	0.0	0.5	0.5	0.5	O K
2880 min Winter	9.034	0.034	0.0	0.4	0.4	0.4	O K
4320 min Winter	9.028	0.028	0.0	0.3	0.3	0.4	O K
5760 min Winter	9.025	0.025	0.0	0.2	0.2	0.3	O K
7200 min Winter	9.023	0.023	0.0	0.2	0.2	0.3	O K
8640 min Winter	9.021	0.021	0.0	0.1	0.1	0.3	O K
10080 min Winter	9.020	0.020	0.0	0.1	0.1	0.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
240 min Winter	20.078	0.0	14.8	146
360 min Winter	14.585	0.0	16.2	206
480 min Winter	11.622	0.0	17.2	264
600 min Winter	9.738	0.0	18.0	320
720 min Winter	8.424	0.0	18.7	378
960 min Winter	6.697	0.0	19.8	500
1440 min Winter	4.839	0.0	21.5	740
2160 min Winter	3.490	0.0	23.2	1100
2880 min Winter	2.766	0.0	24.5	1428
4320 min Winter	1.989	0.0	26.5	2140
5760 min Winter	1.573	0.0	27.9	2864
7200 min Winter	1.311	0.0	29.1	3552
8640 min Winter	1.129	0.0	30.0	4400
10080 min Winter	0.994	0.0	30.9	5136

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.022

Time (mins)	Area	Time (mins)	Area	Time (mins)	Area
From: To:	(ha)	From: To:	(ha)	From: To:	(ha)
0 5	0.008	5 10	0.007	10 15	0.007

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Model Details

Storage is Online Cover Level (m) 10.000

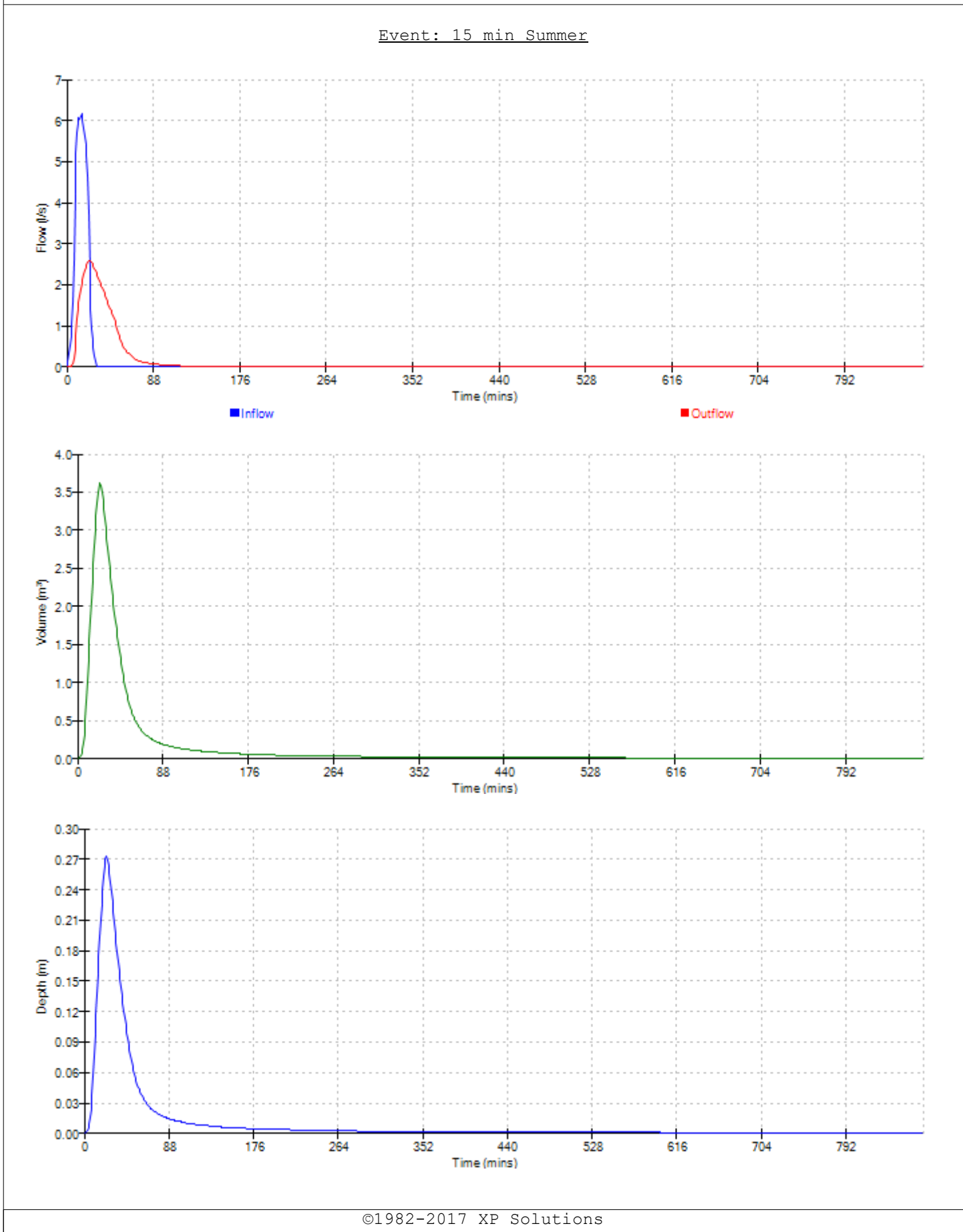
Cellular Storage Structure

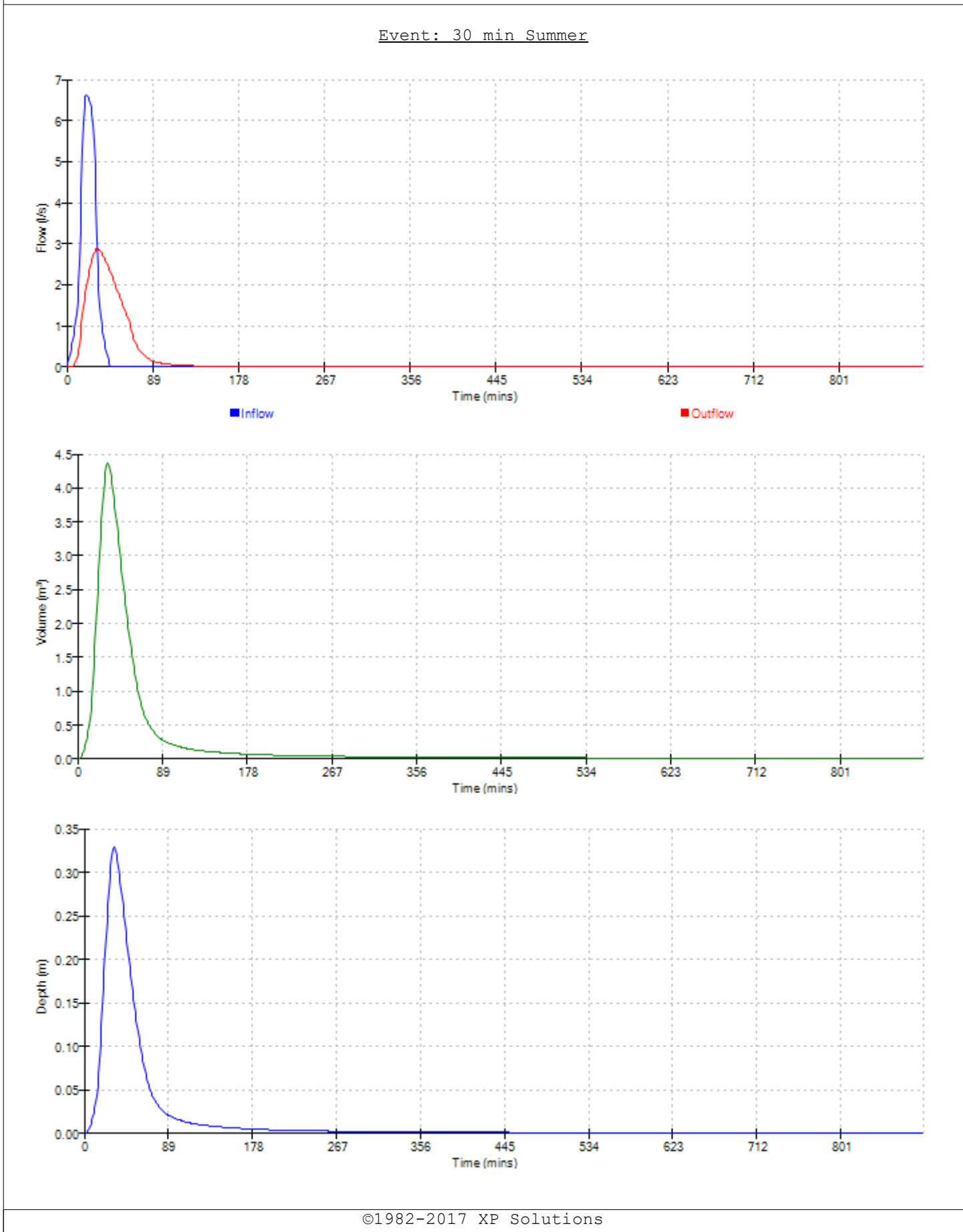
Invert Level (m) 9.000 Safety Factor 1.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	14.0	14.0	0.400	14.0	20.0	0.401	0.0	20.0

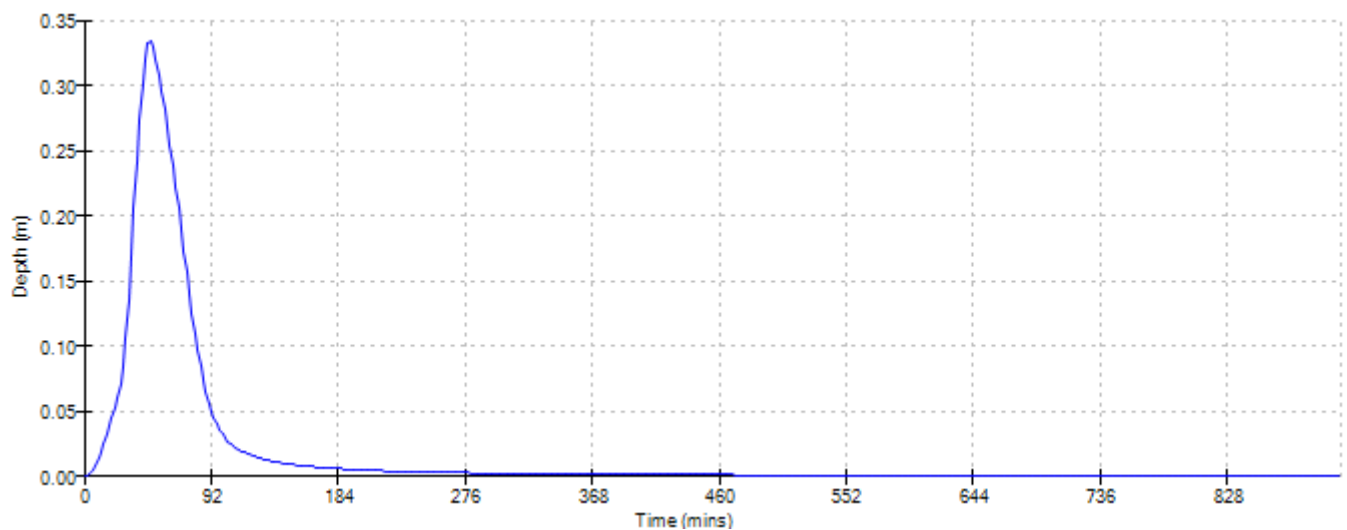
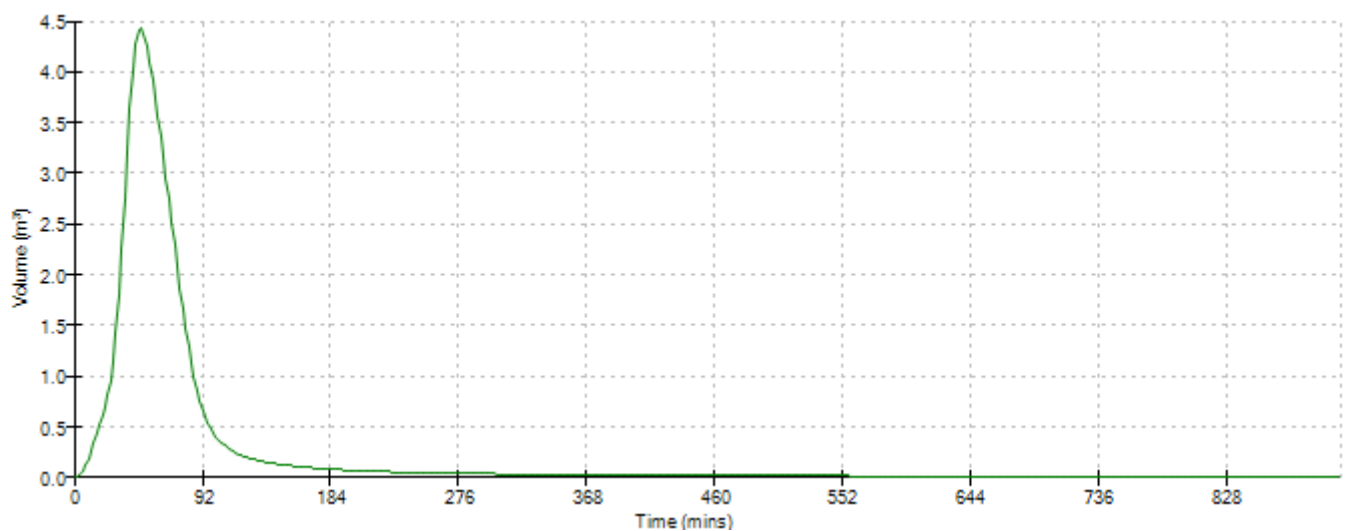
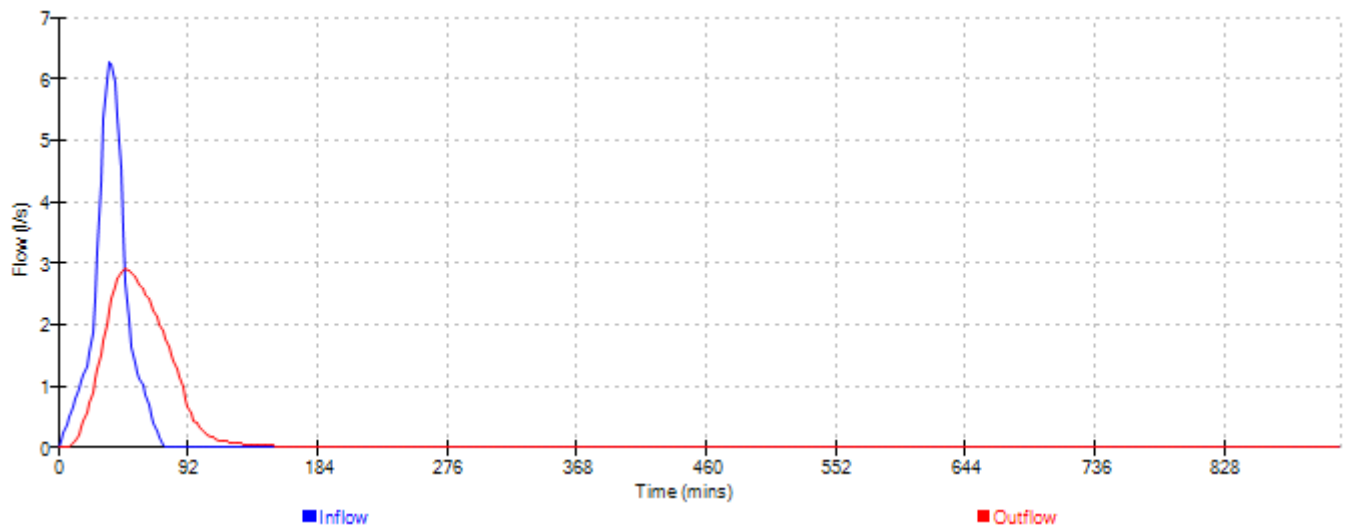
Orifice Outflow Control

Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 9.000

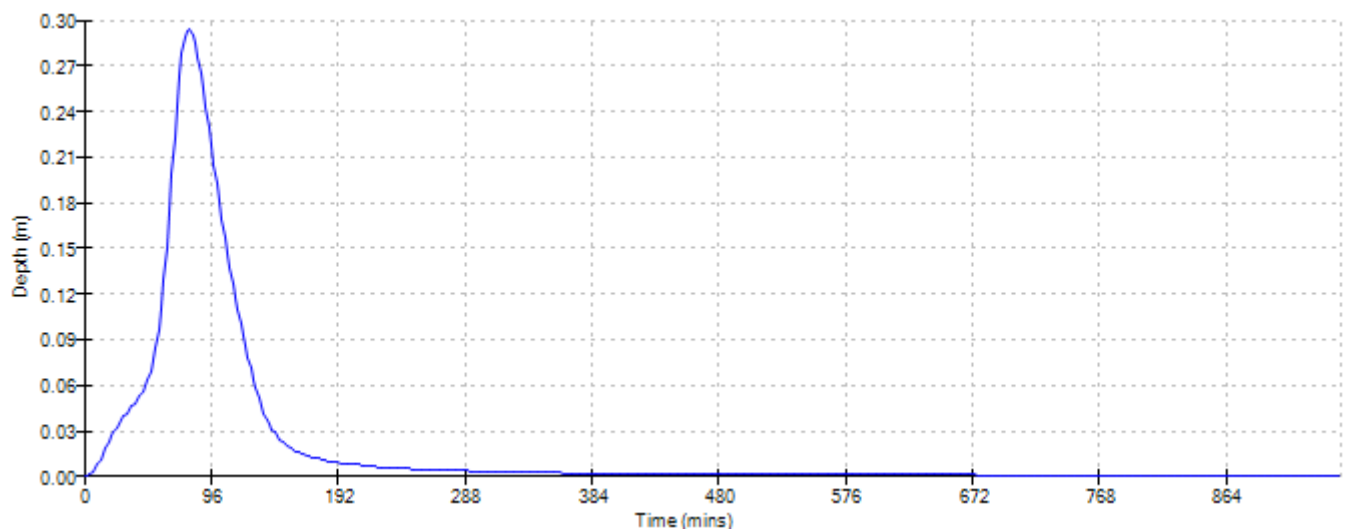
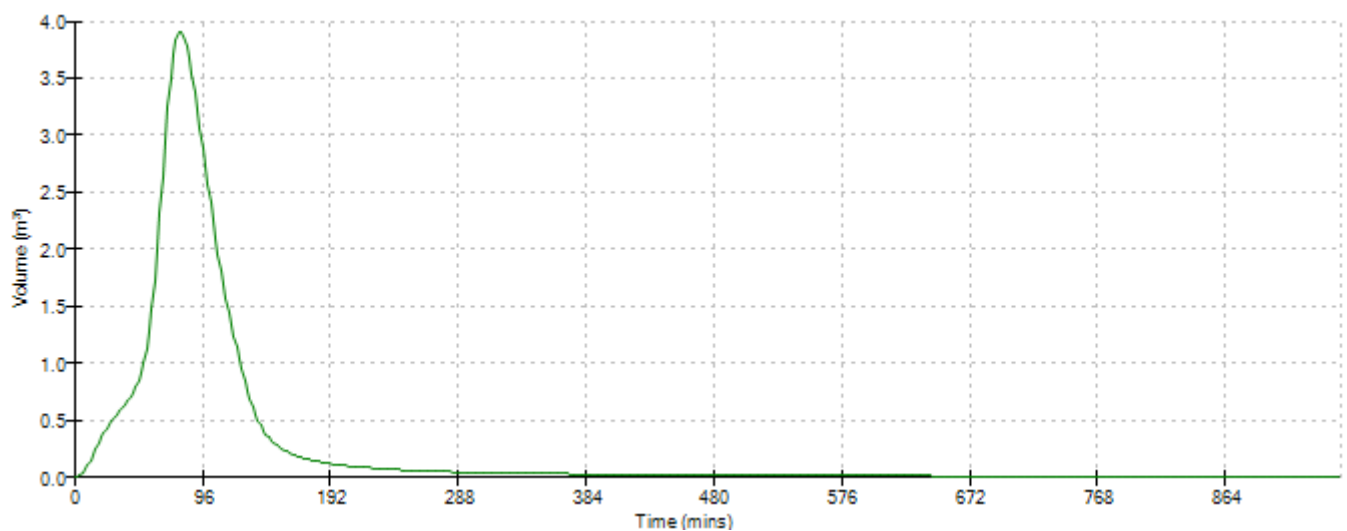
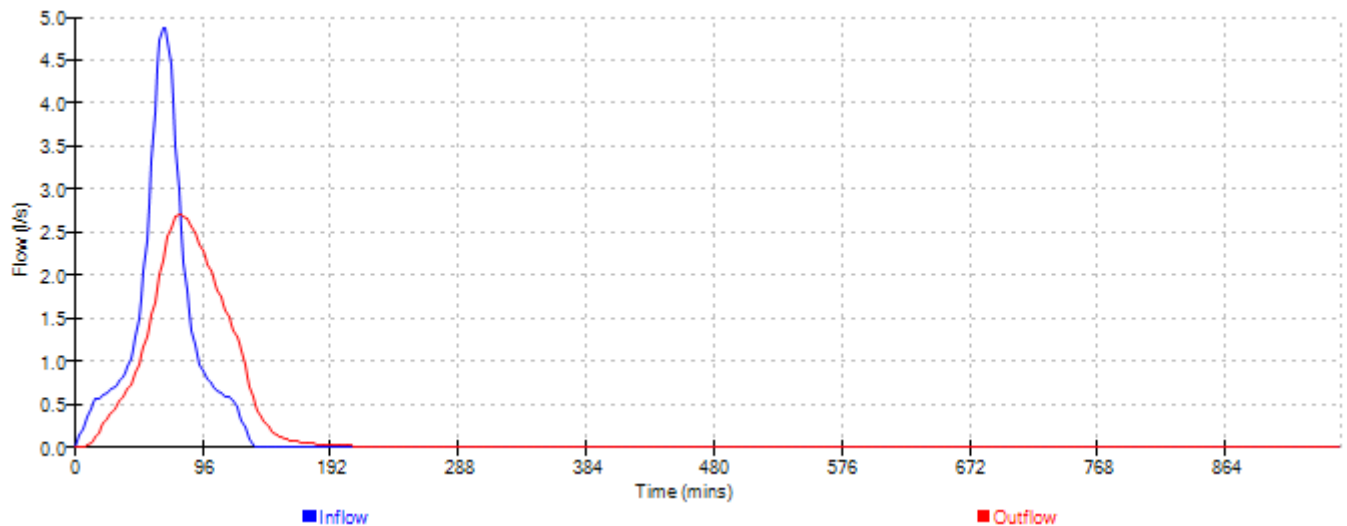




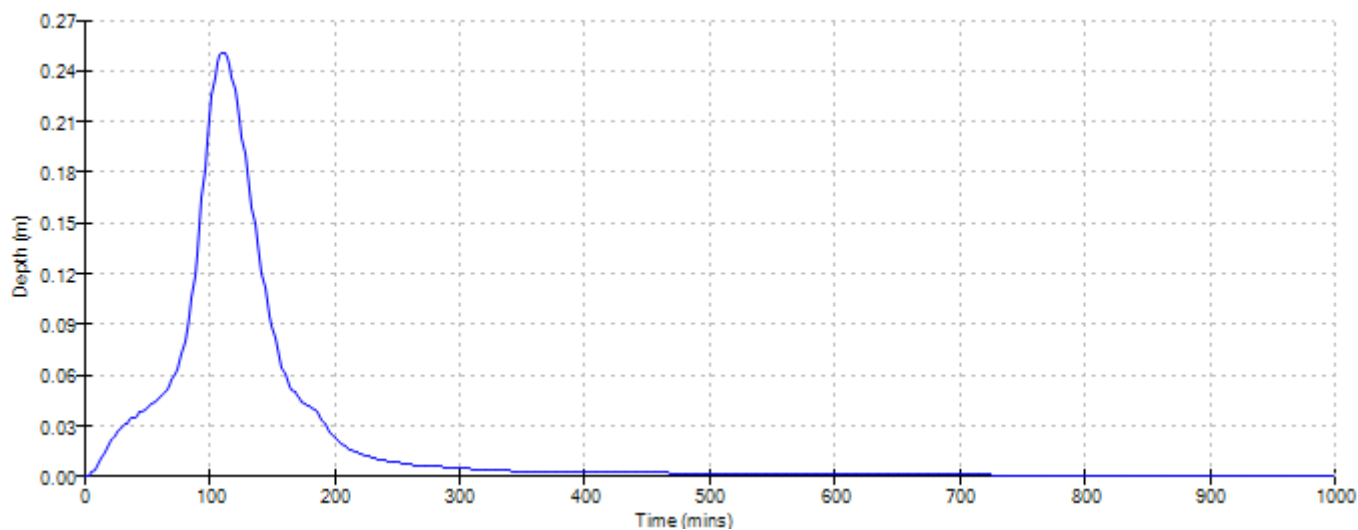
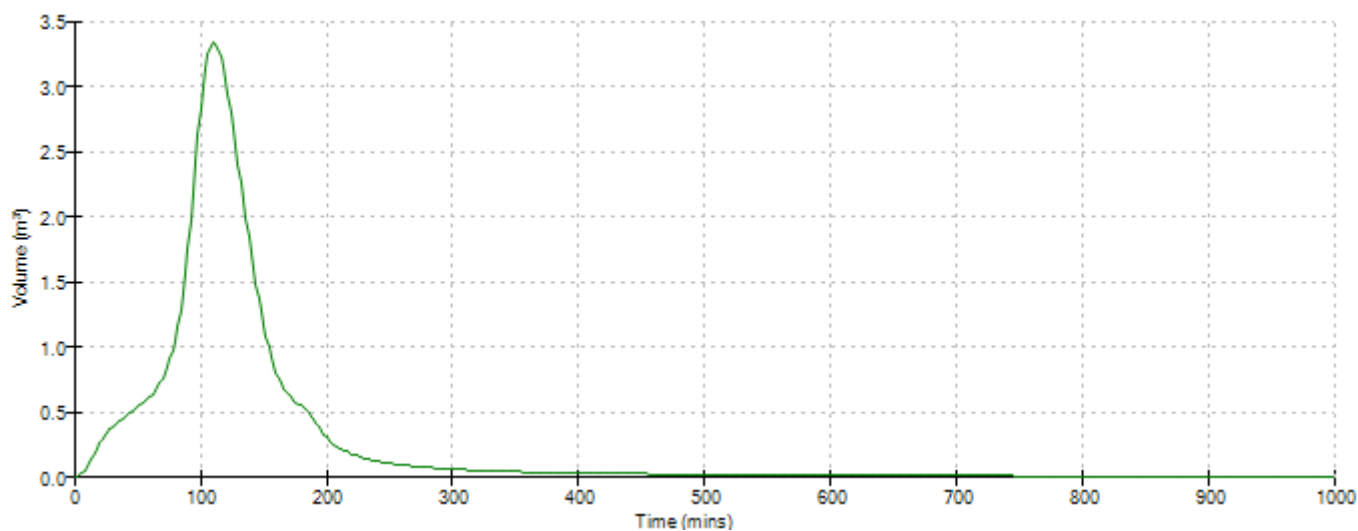
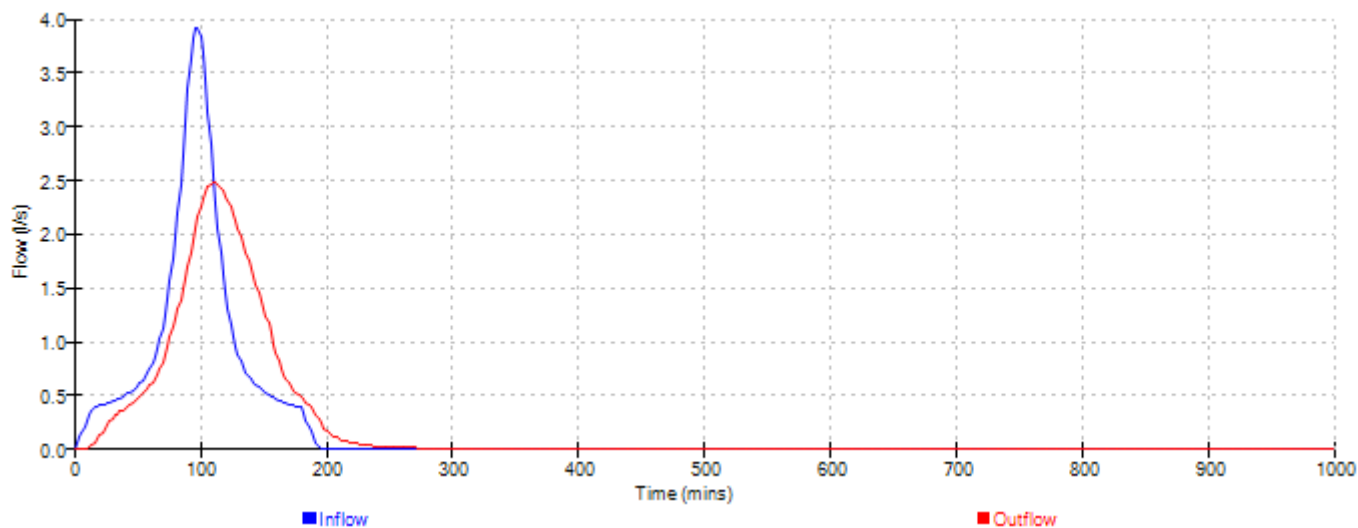
Event: 60 min Summer



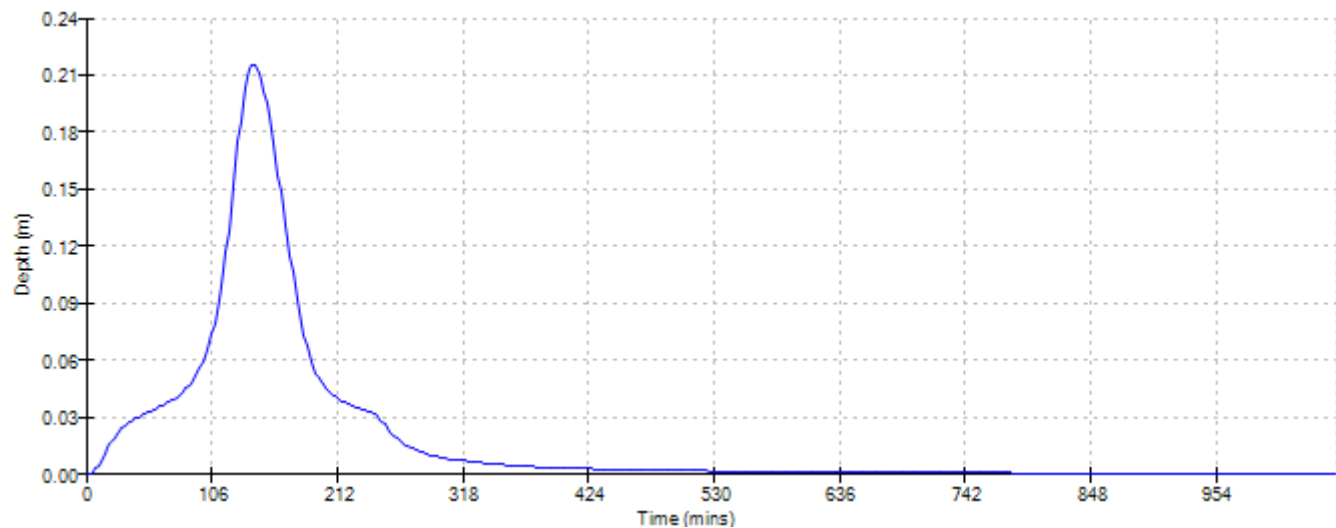
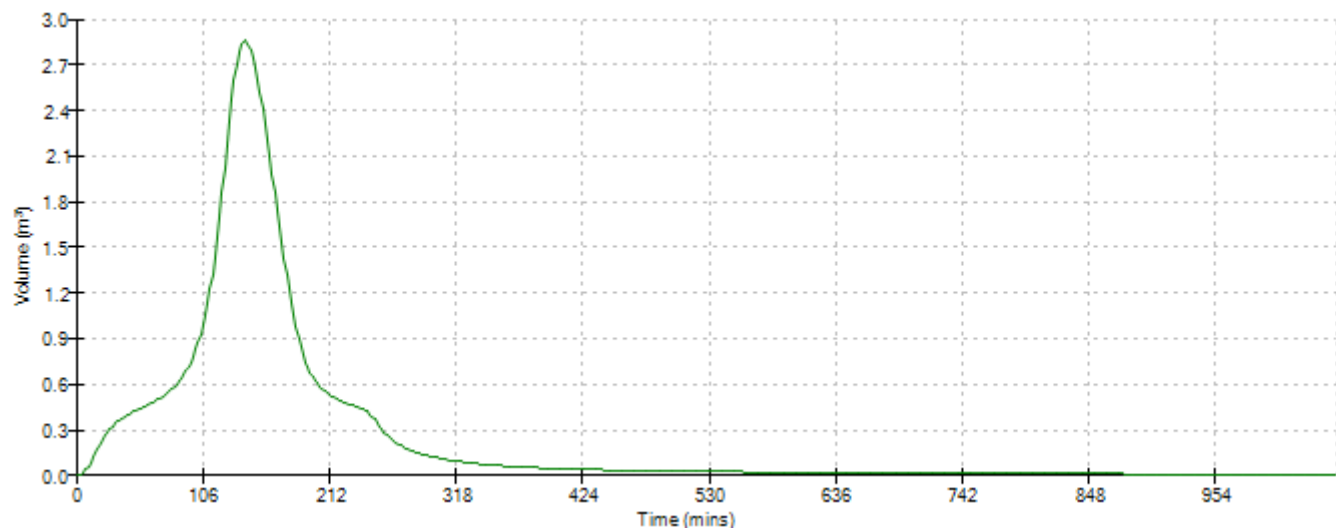
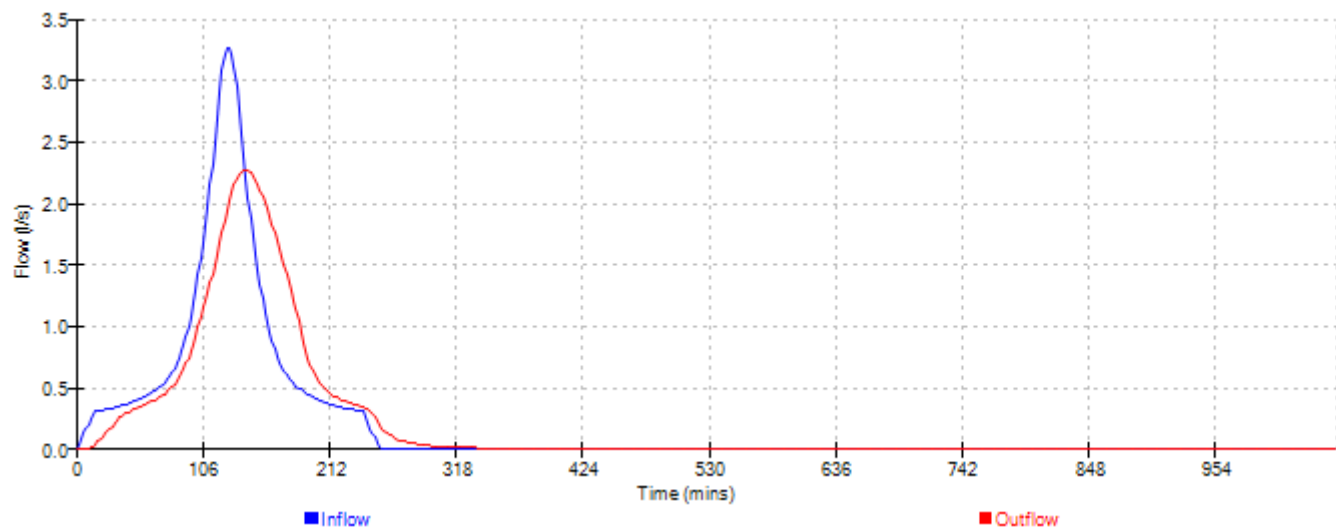
Event: 120 min Summer



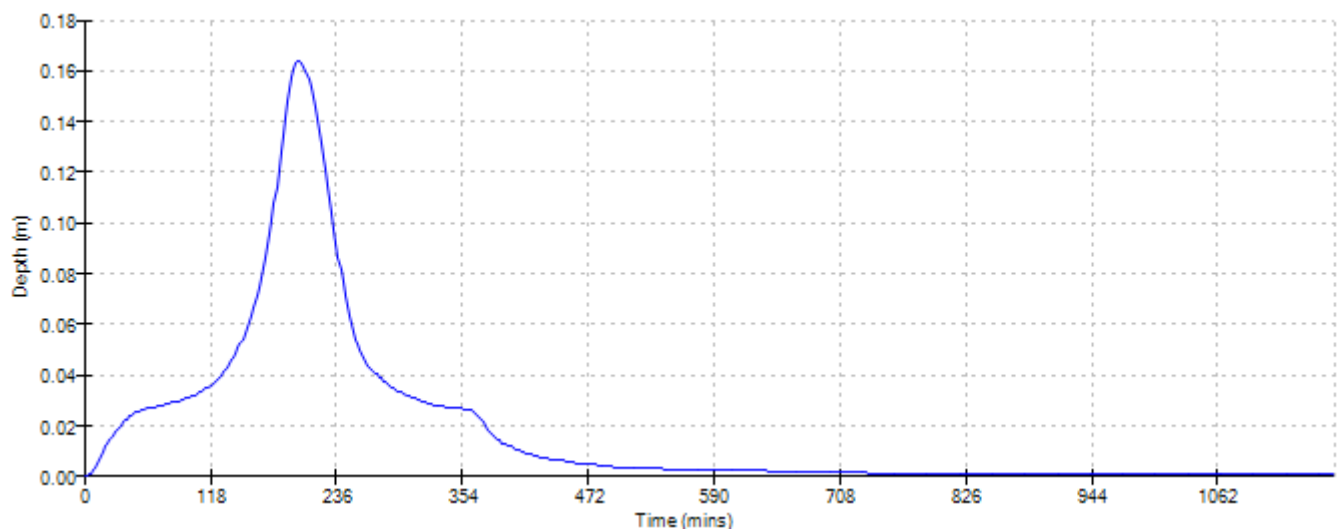
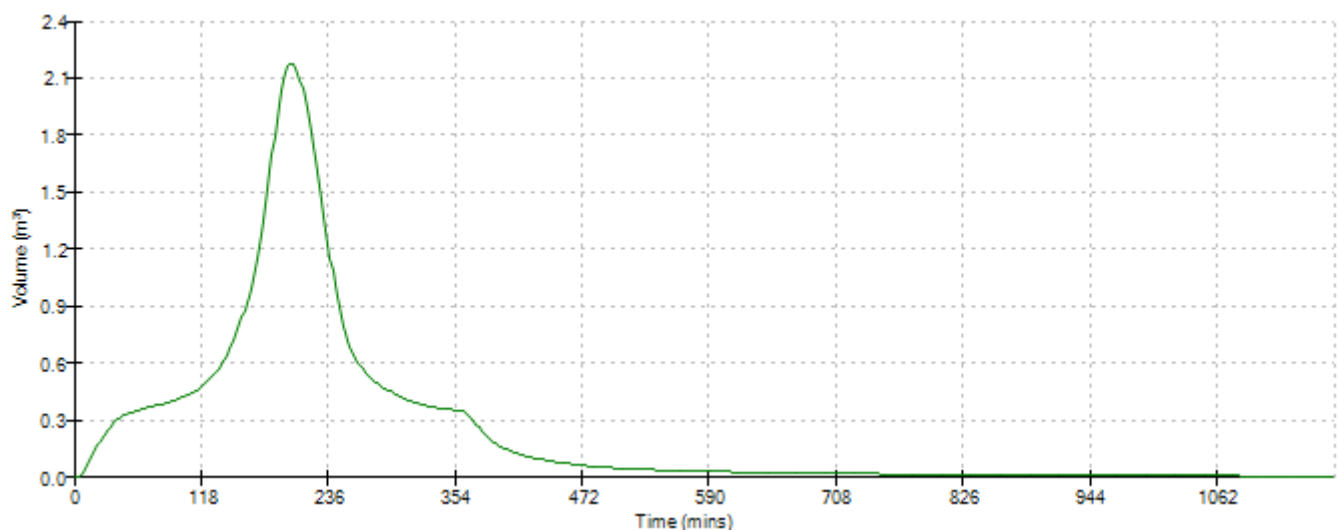
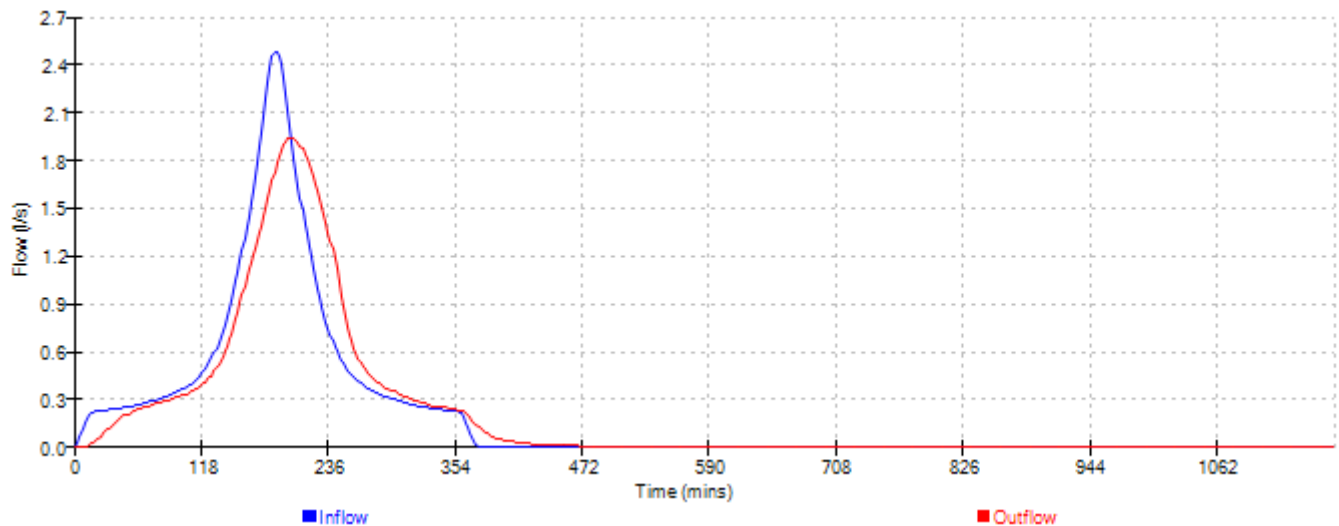
Event: 180 min Summer



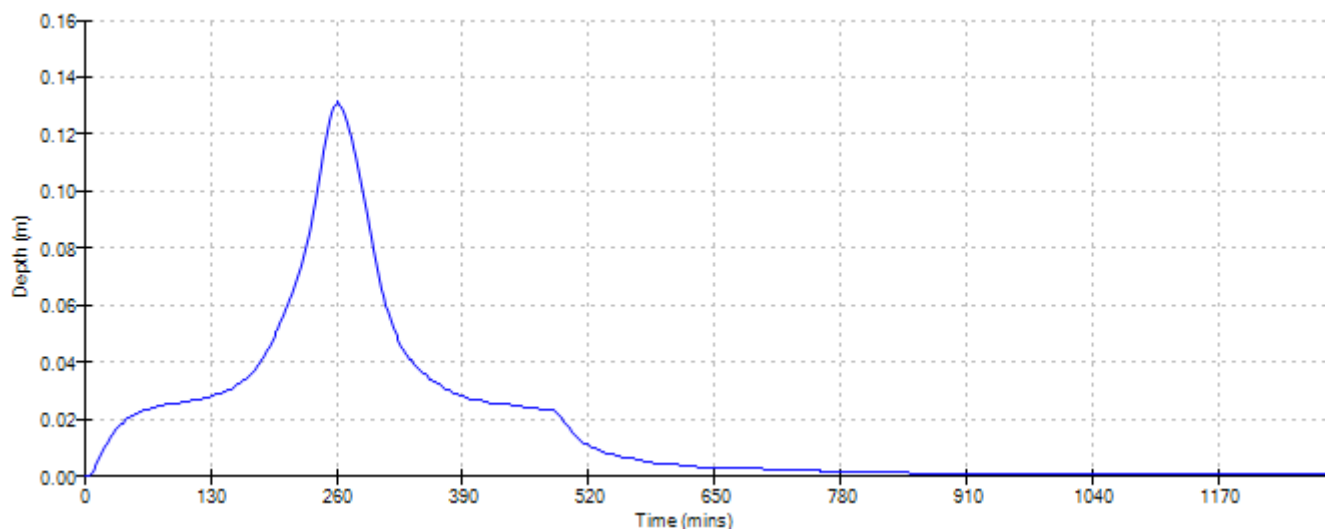
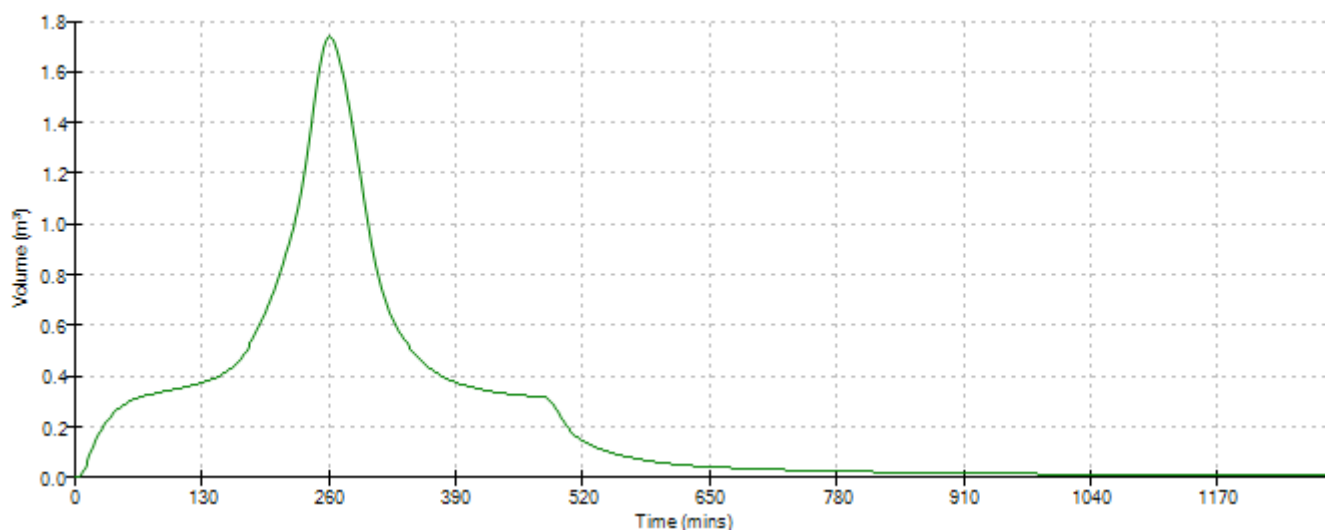
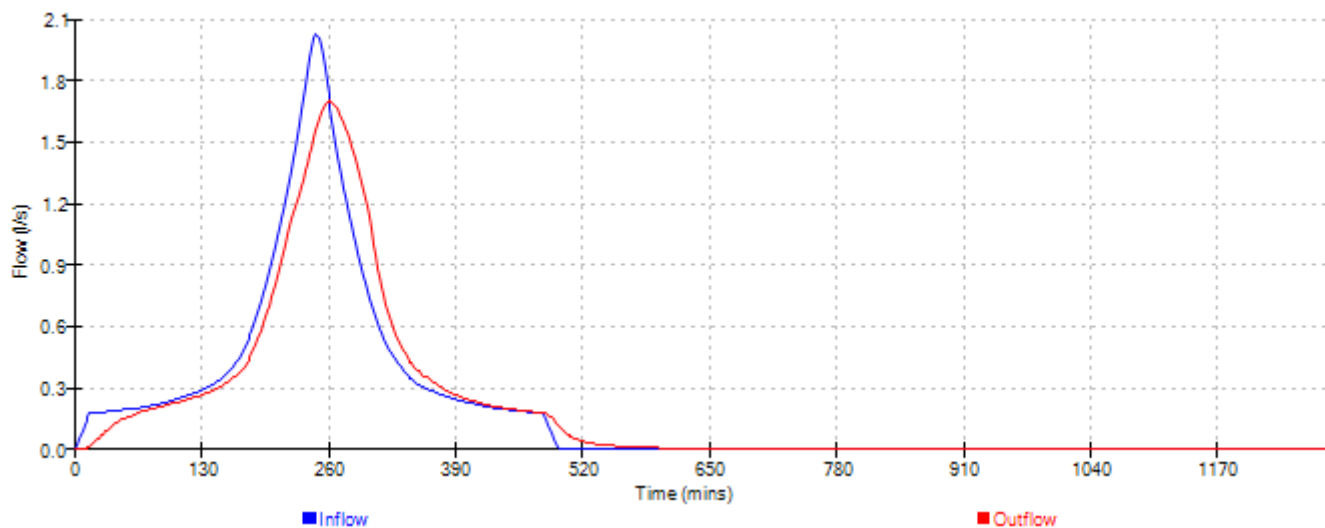
Event: 240 min Summer



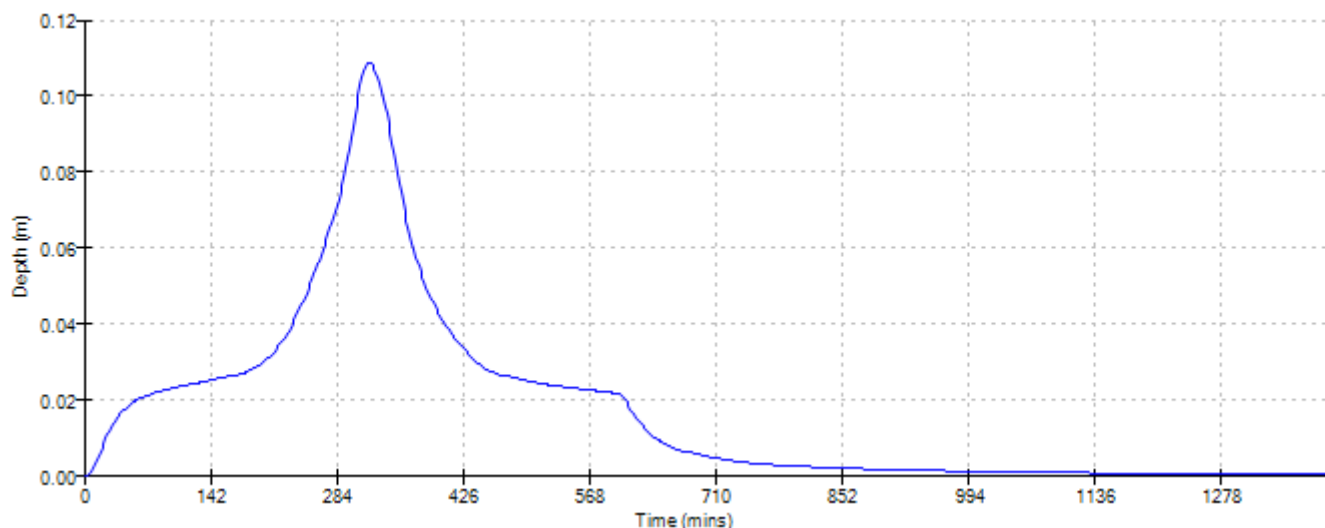
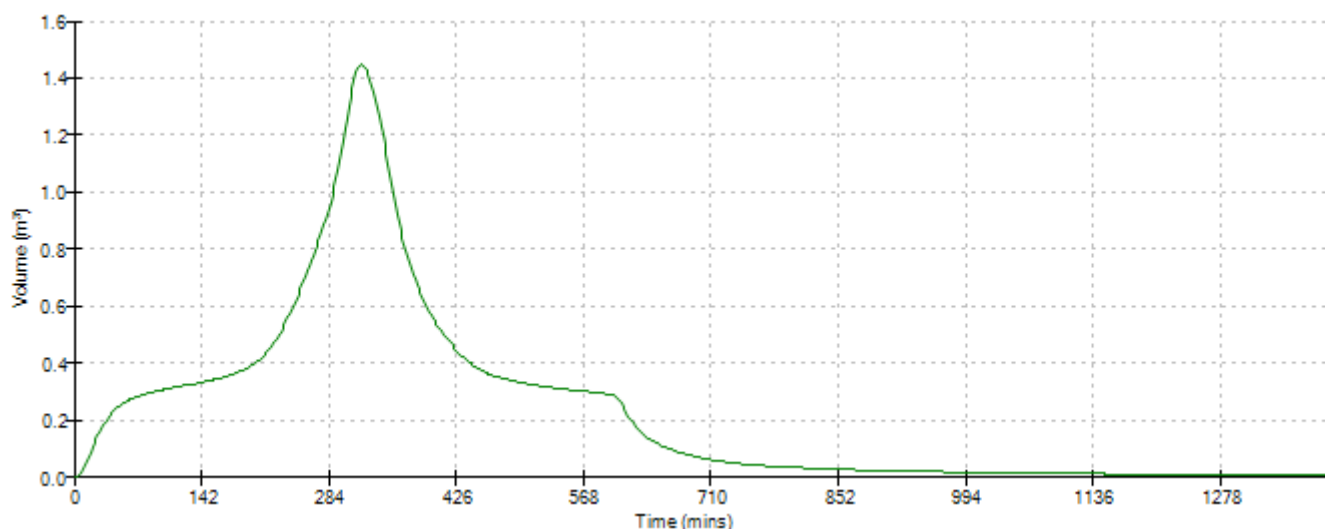
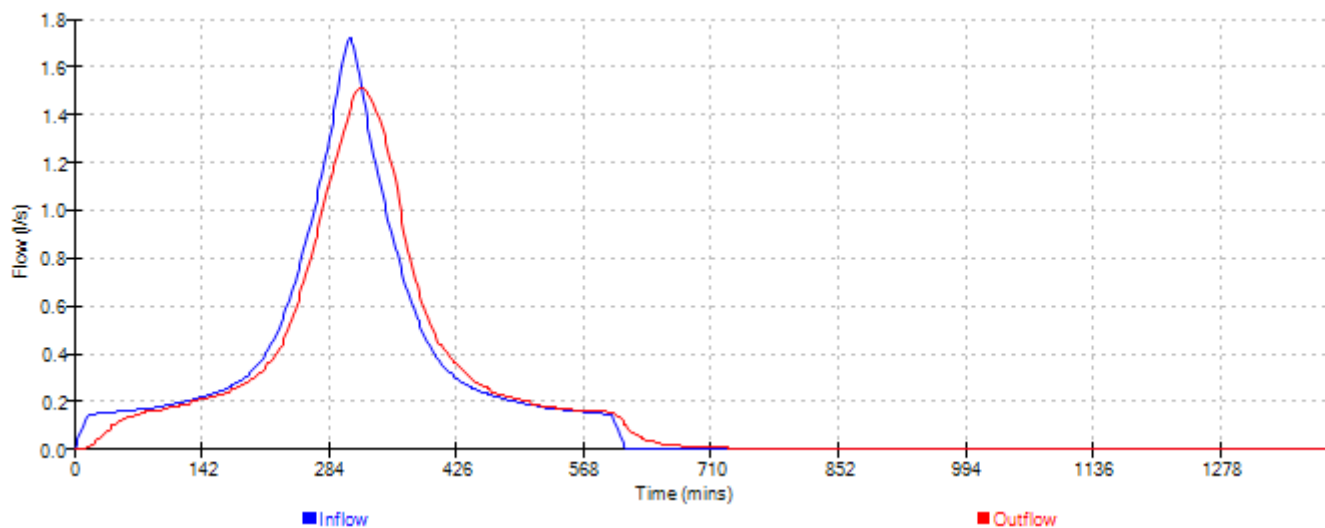
Event: 360 min Summer

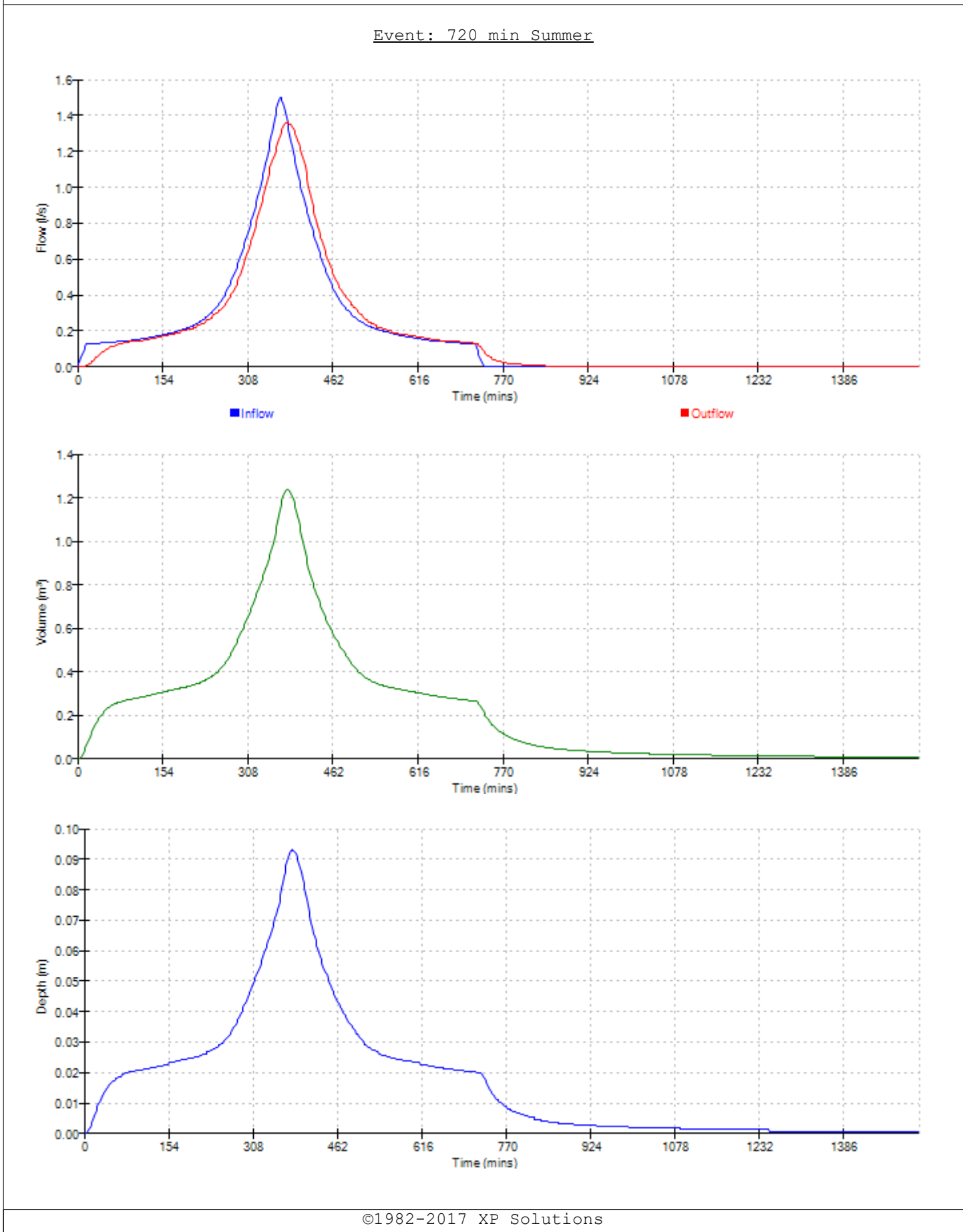


Event: 480 min Summer

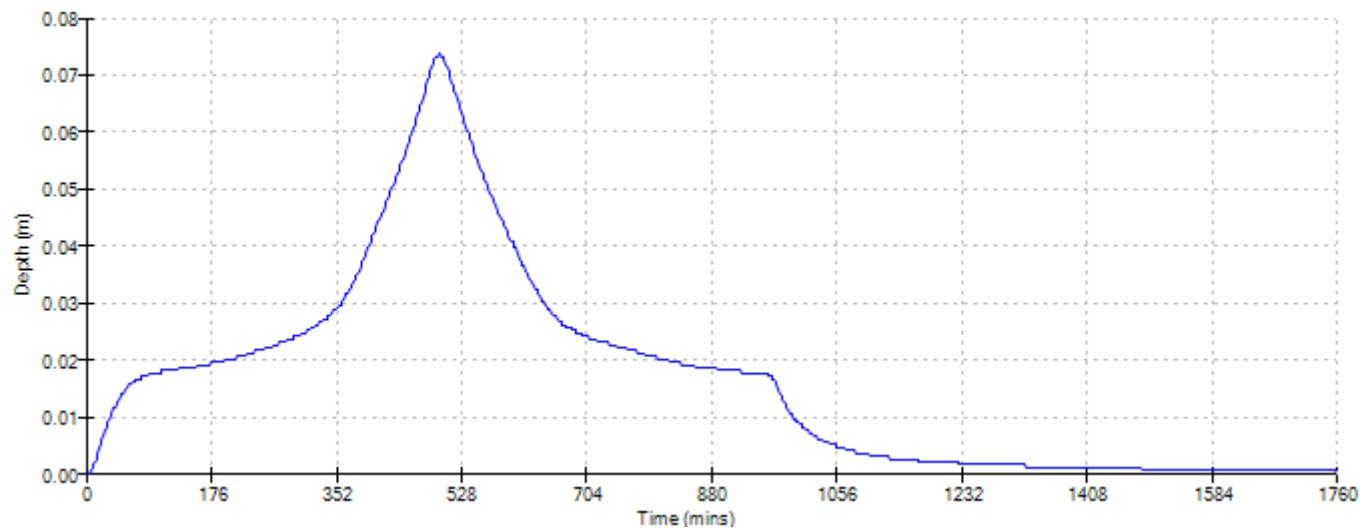
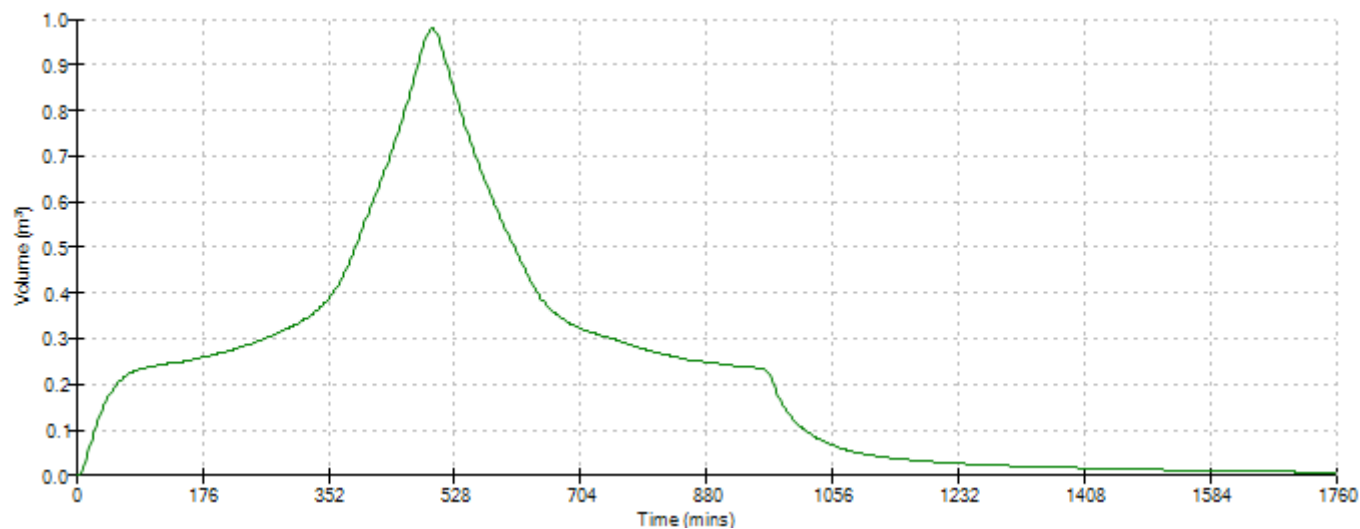
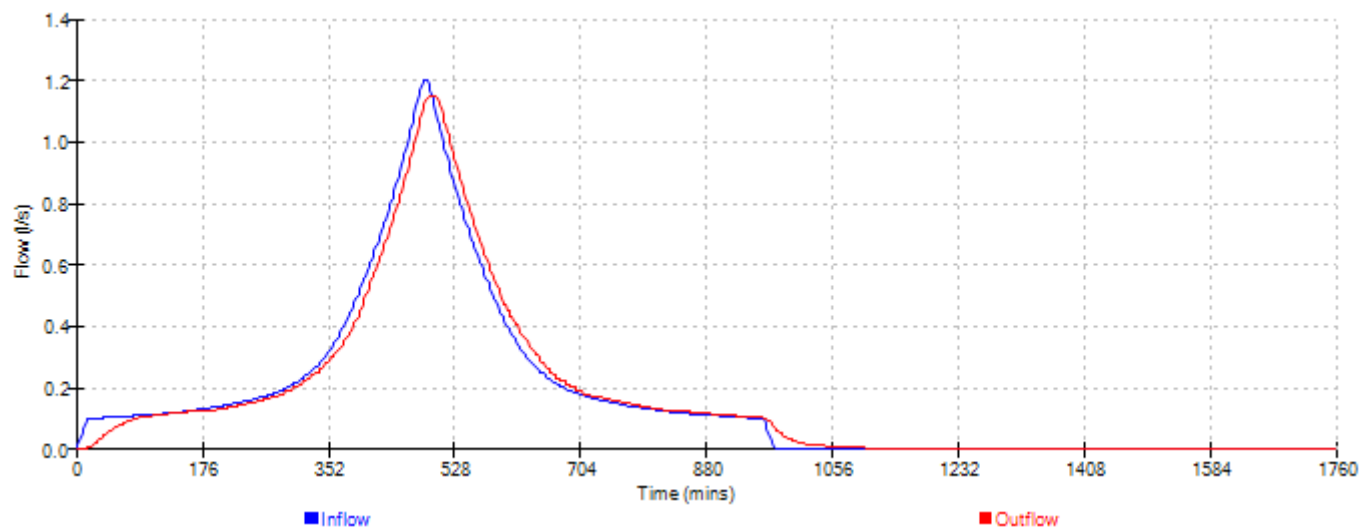


Event: 600 min Summer

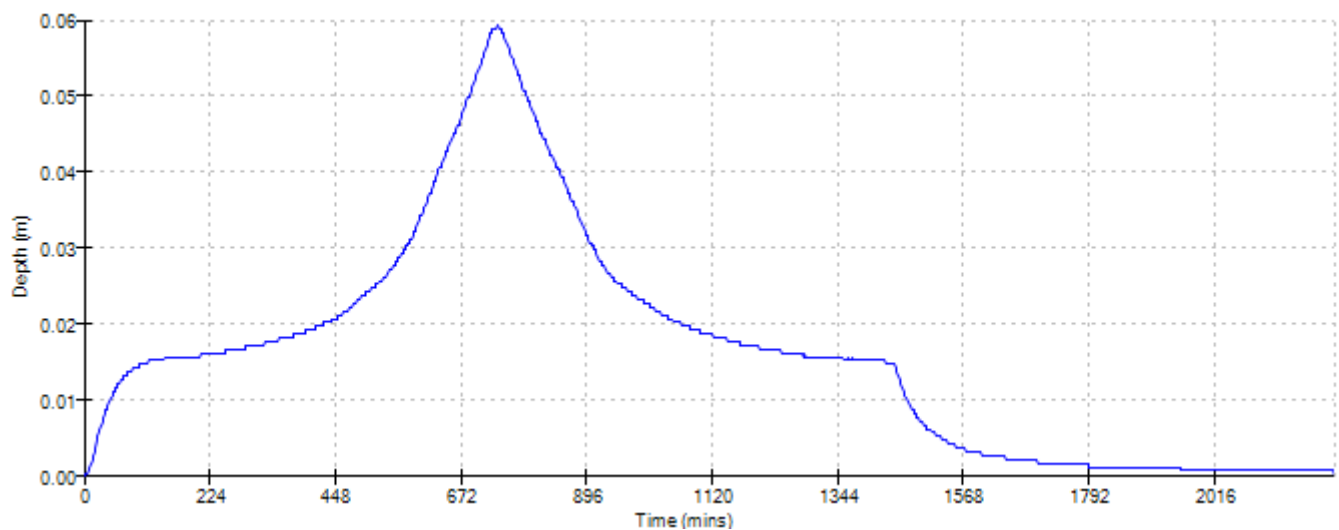
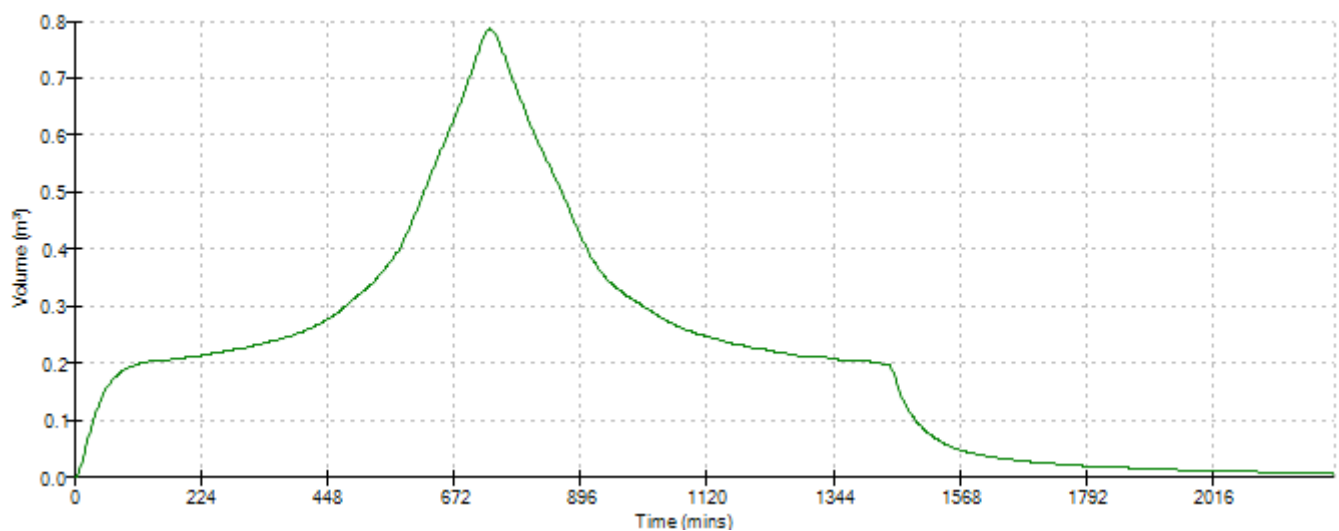
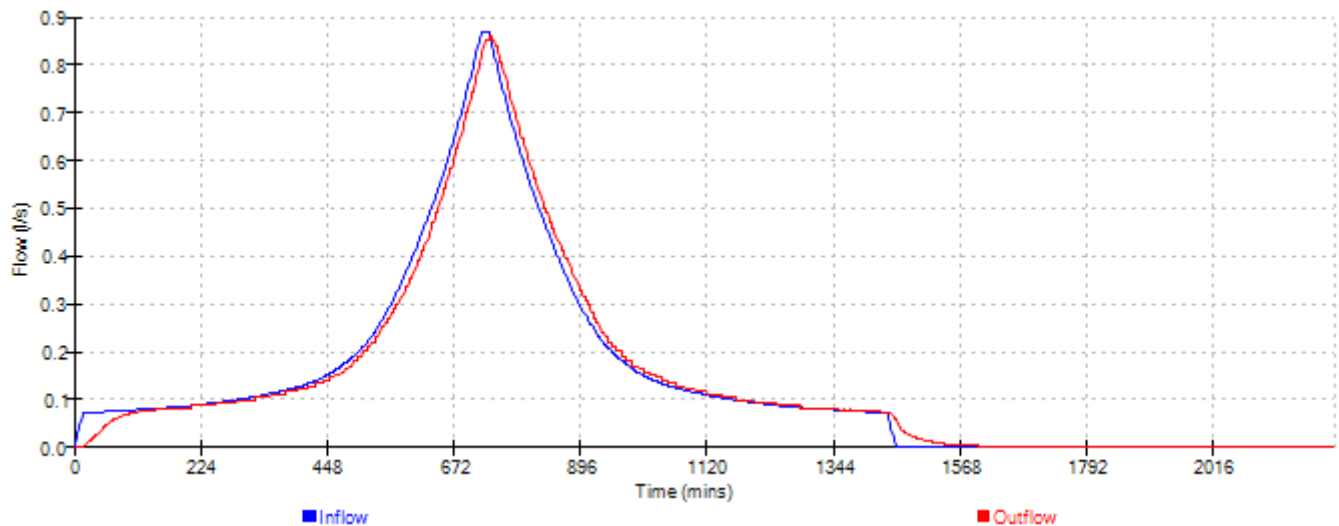




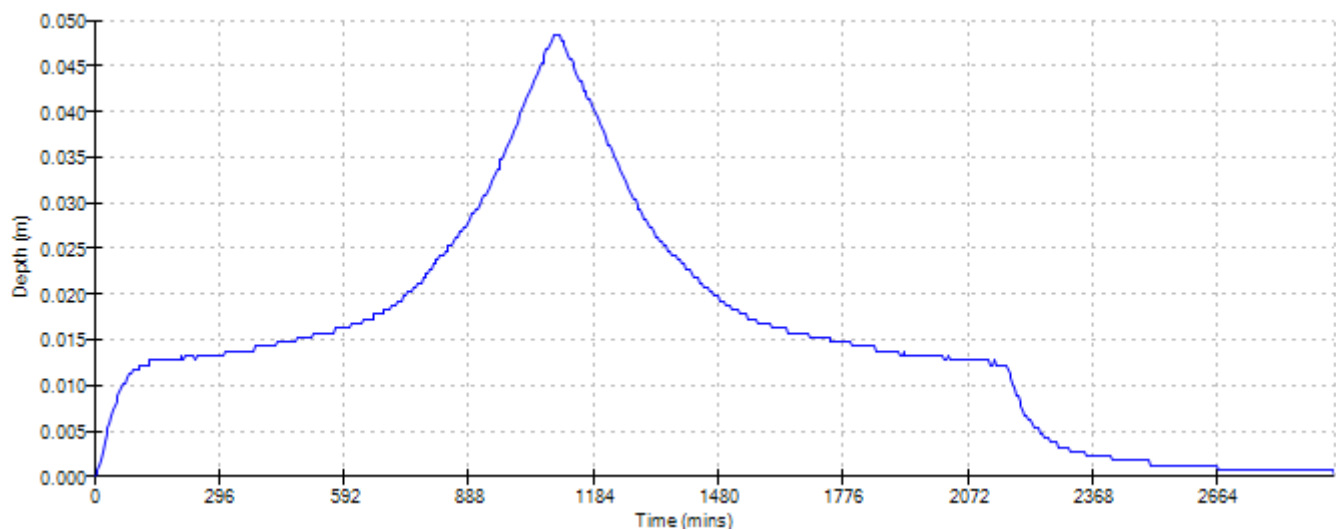
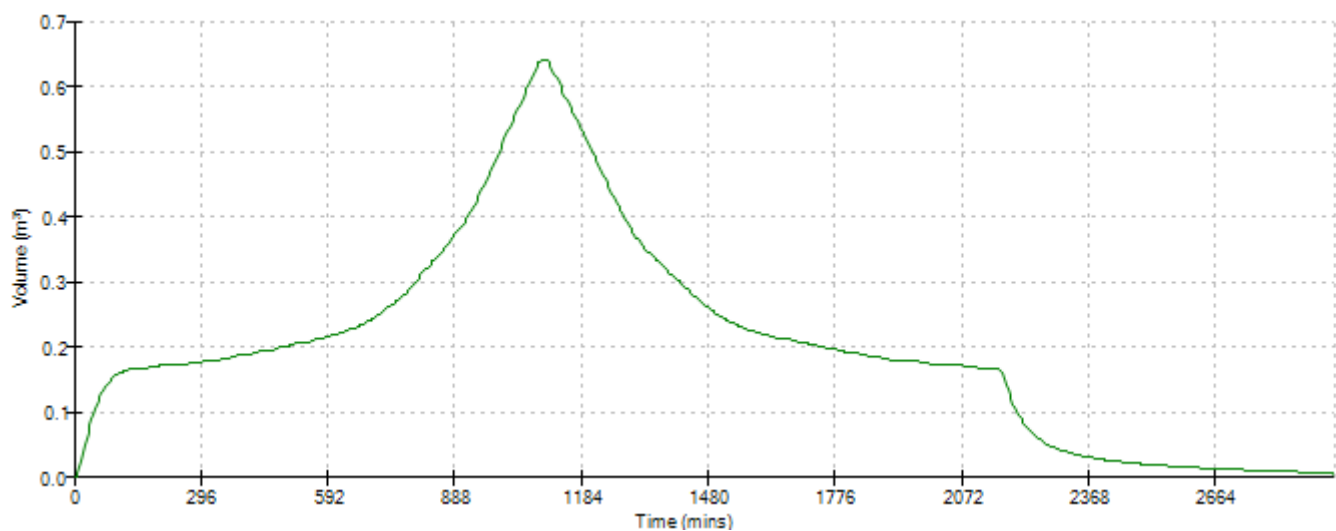
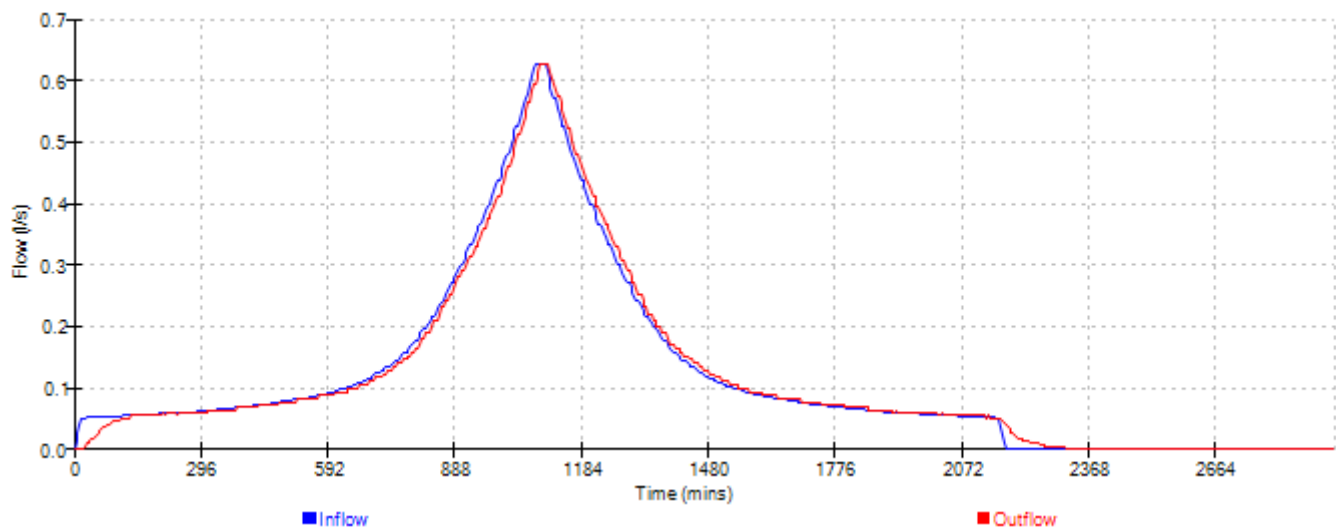
Event: 960 min Summer



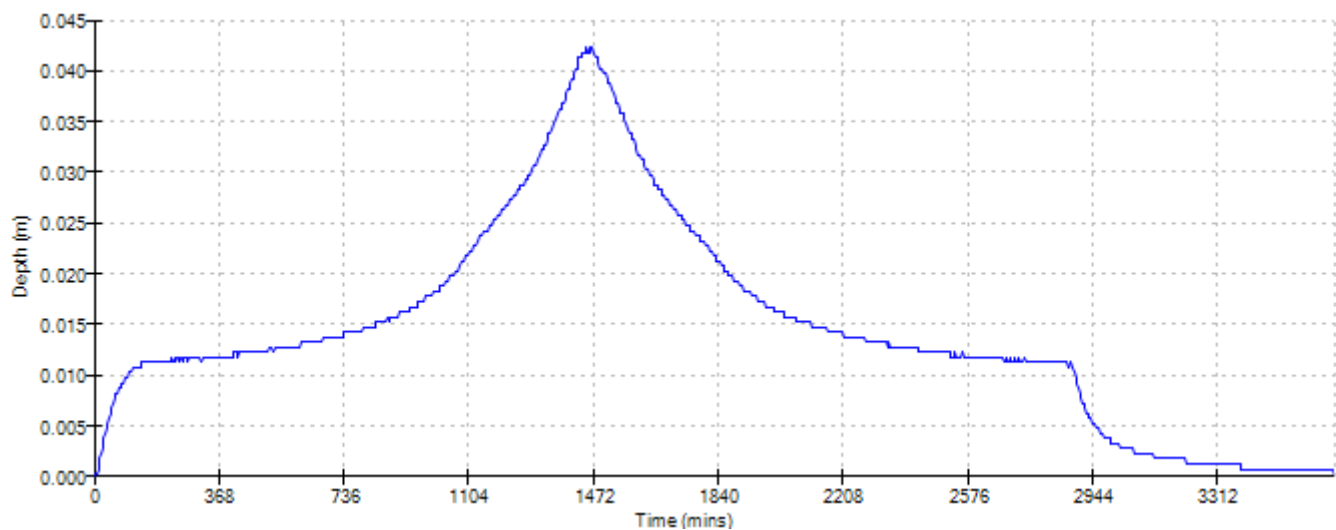
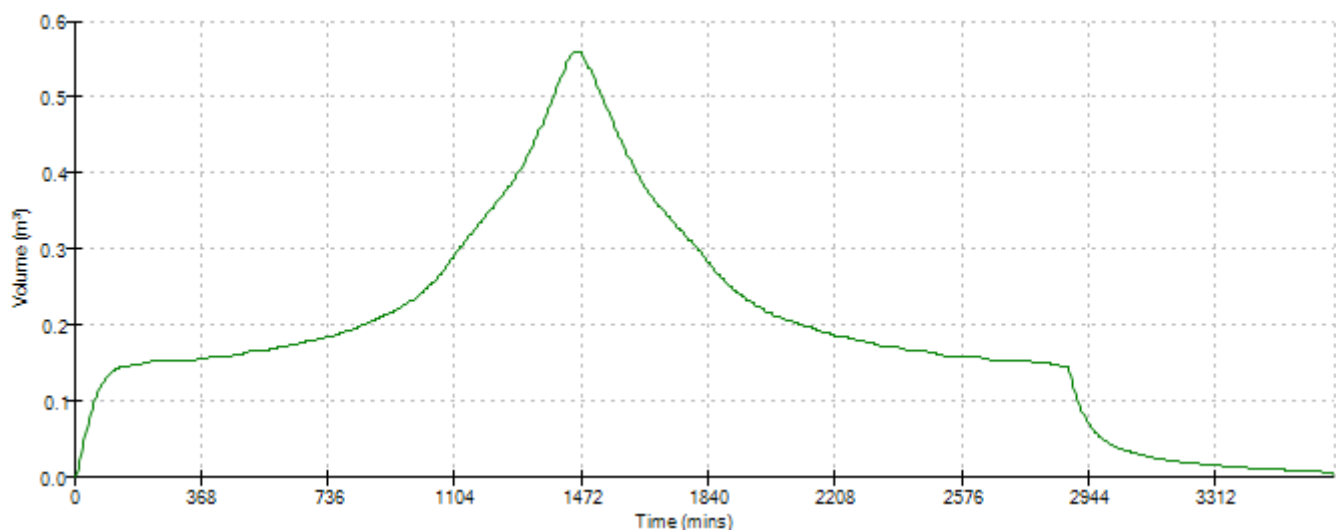
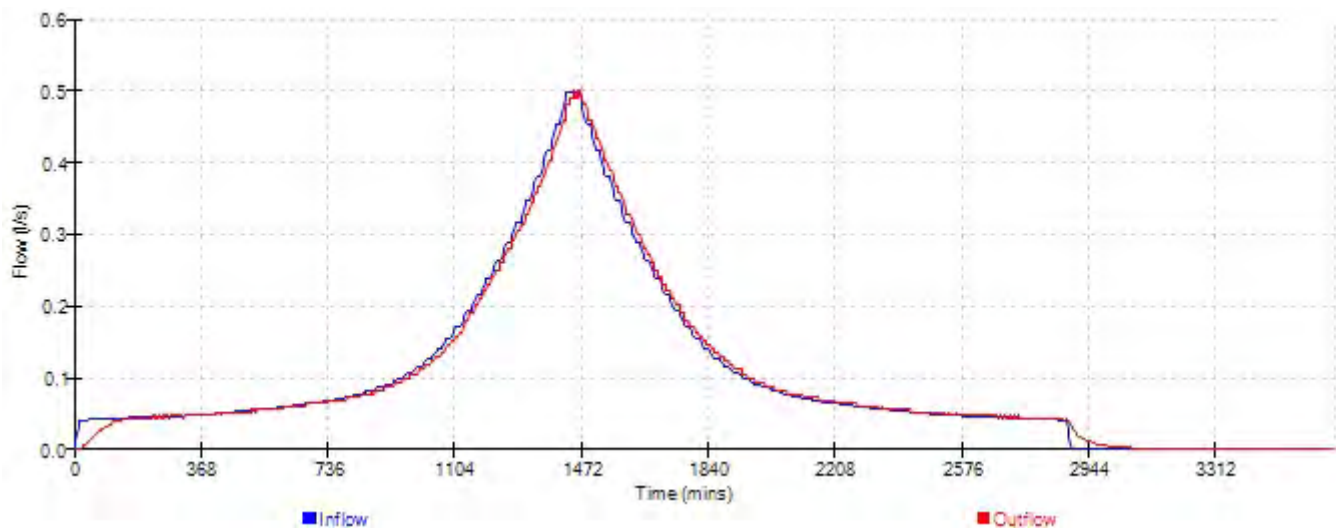
Event: 1440 min Summer



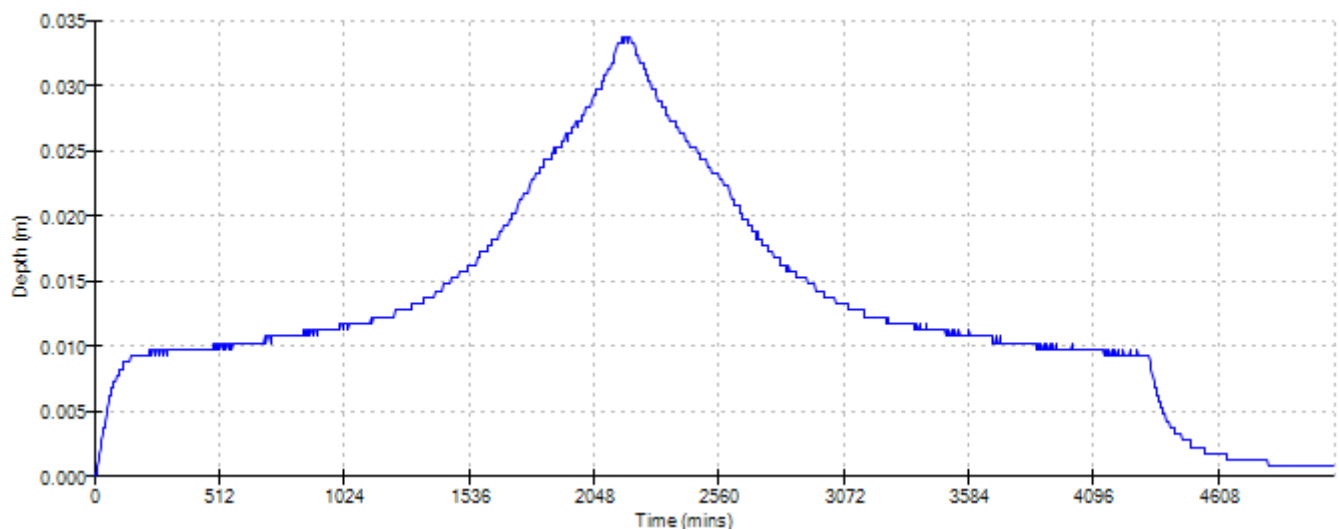
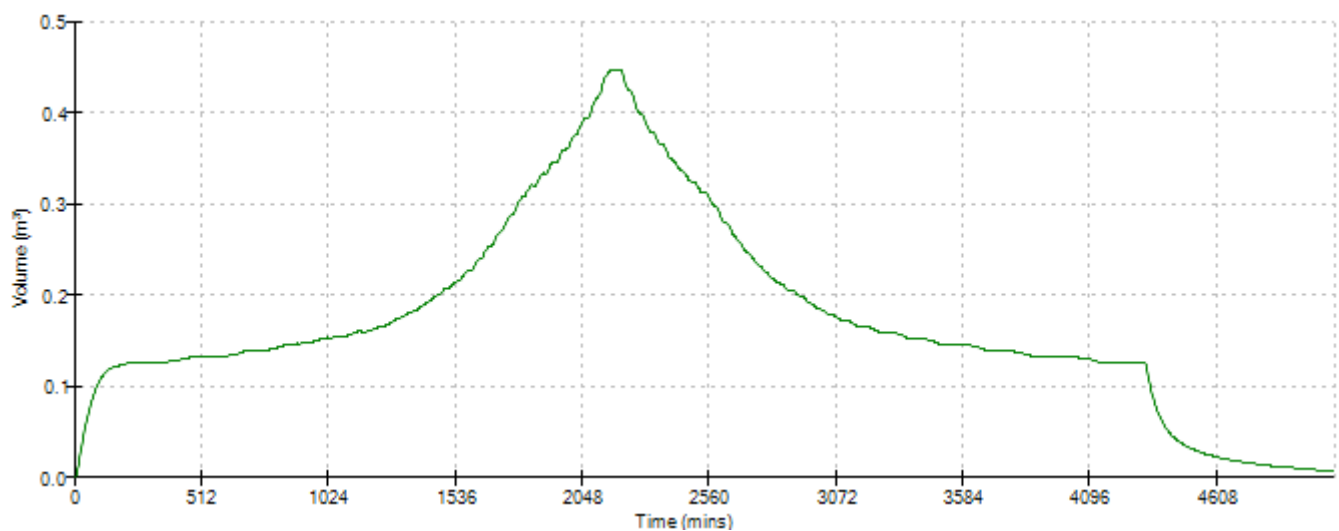
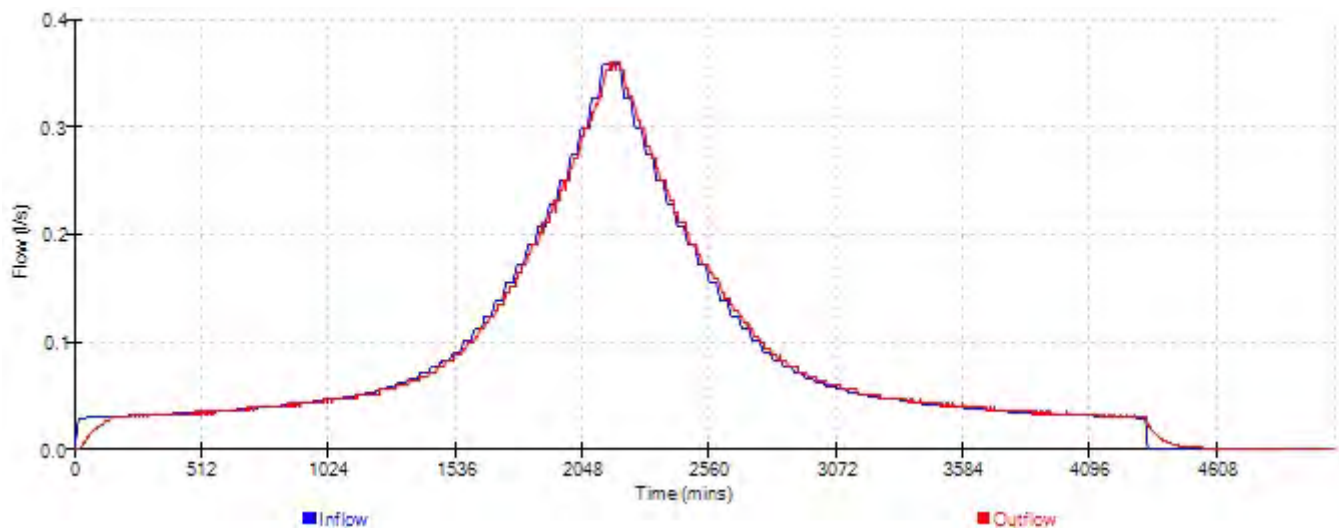
Event: 2160 min Summer



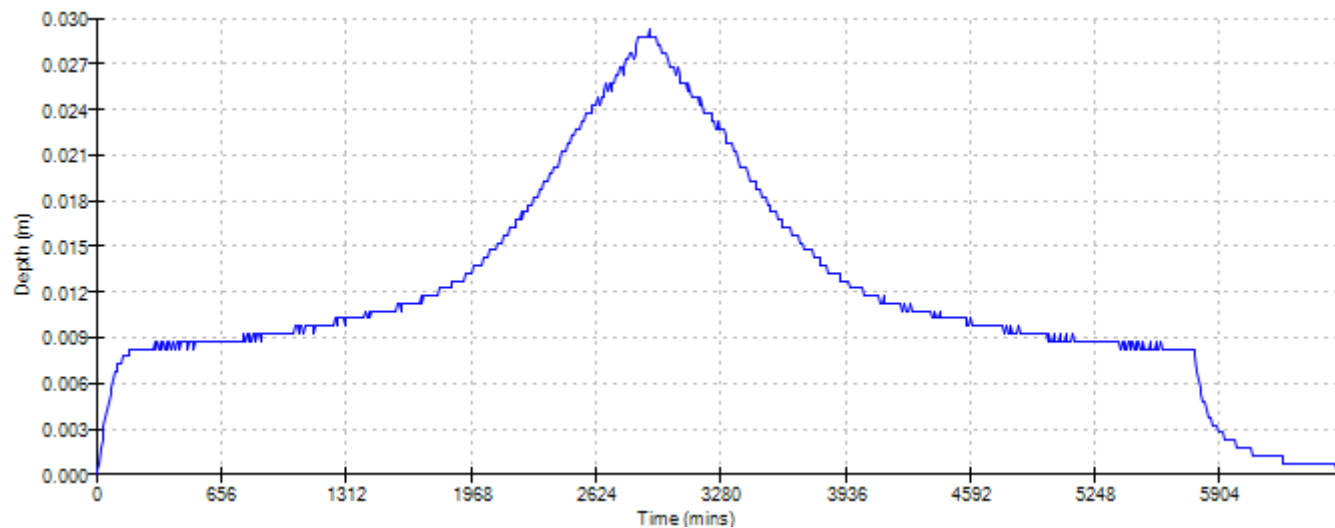
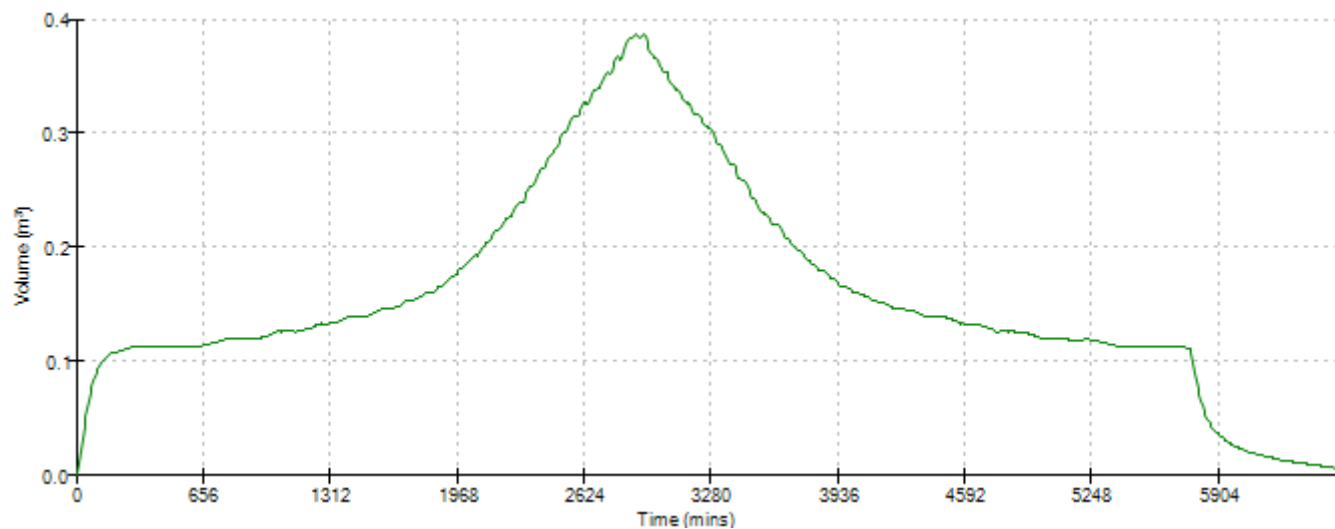
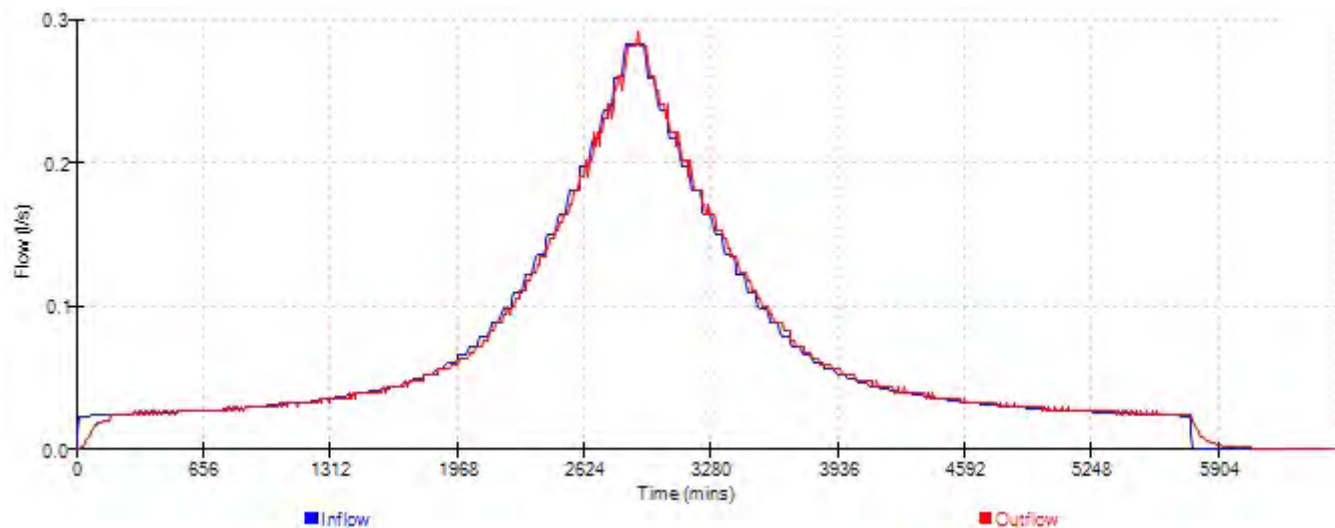
Event: 2880 min Summer



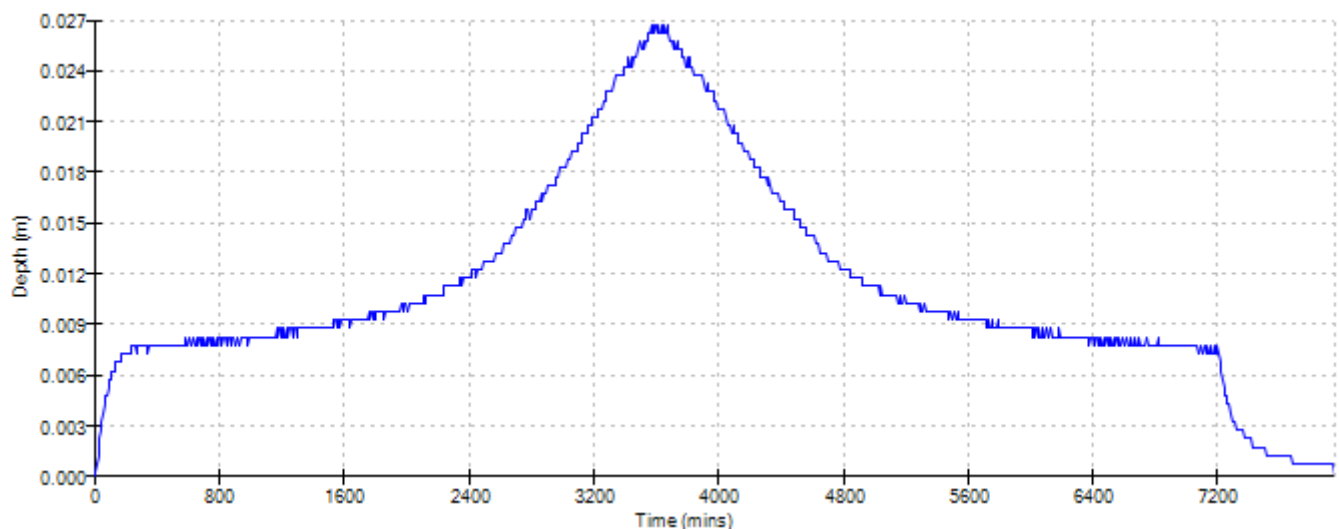
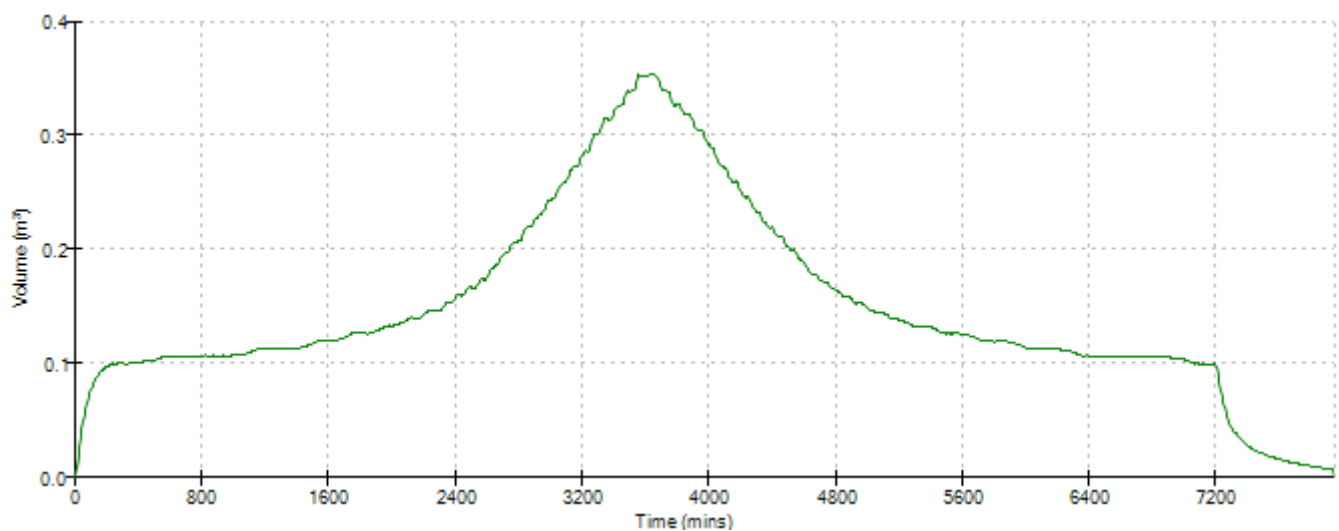
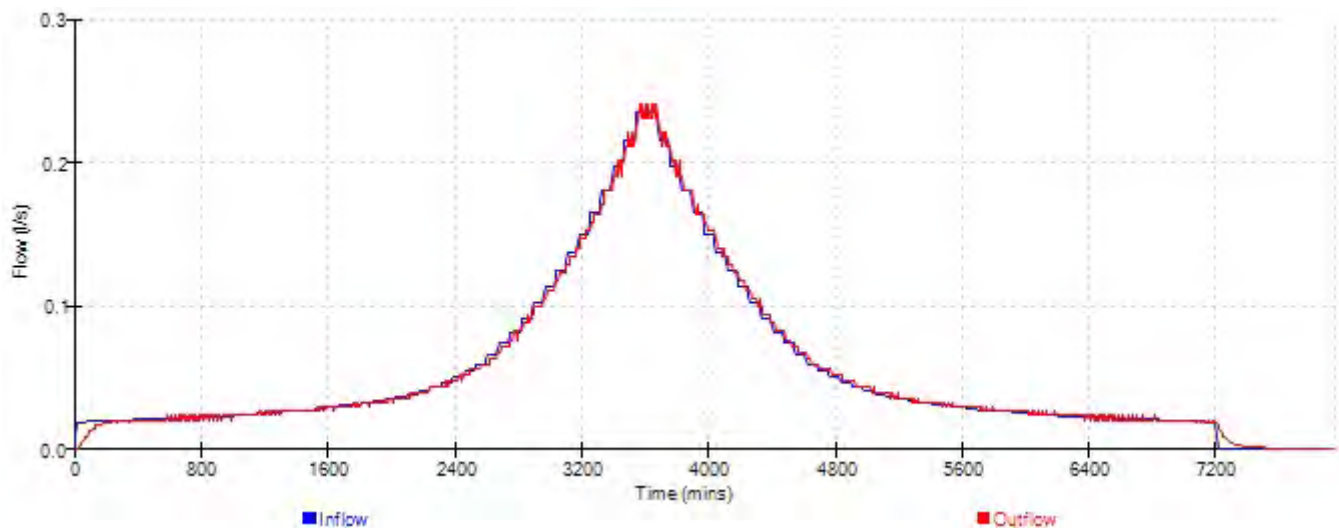
Event: 4320 min Summer



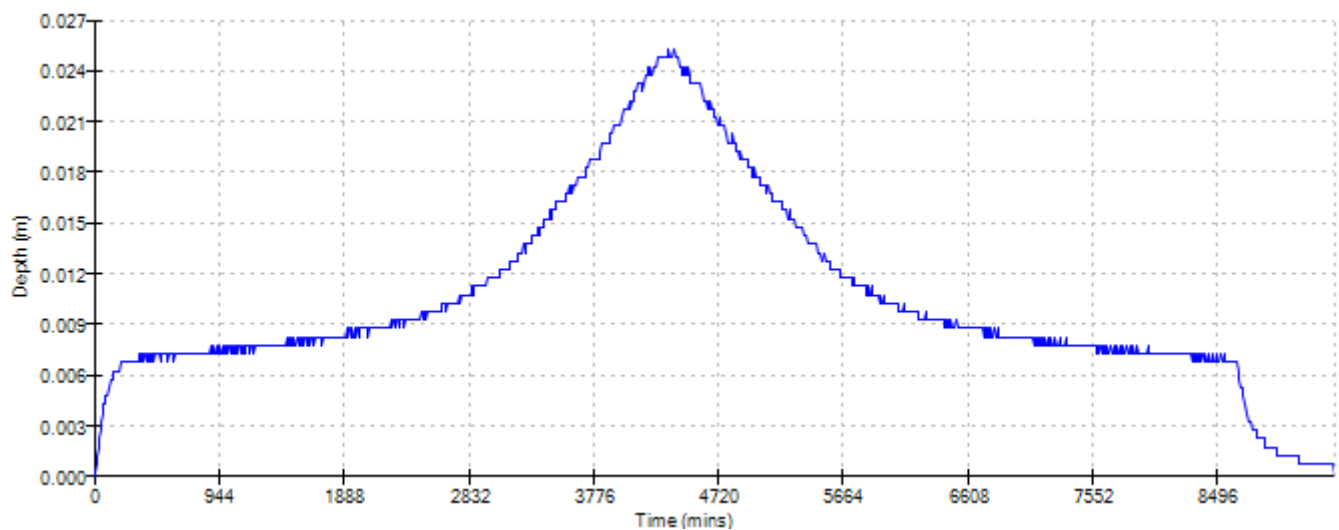
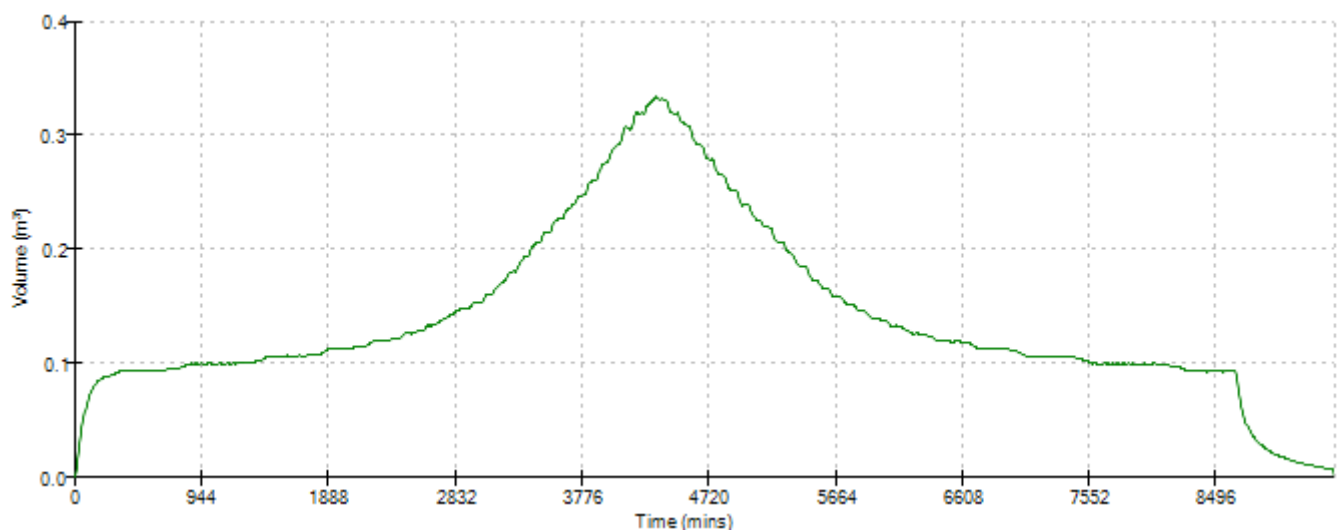
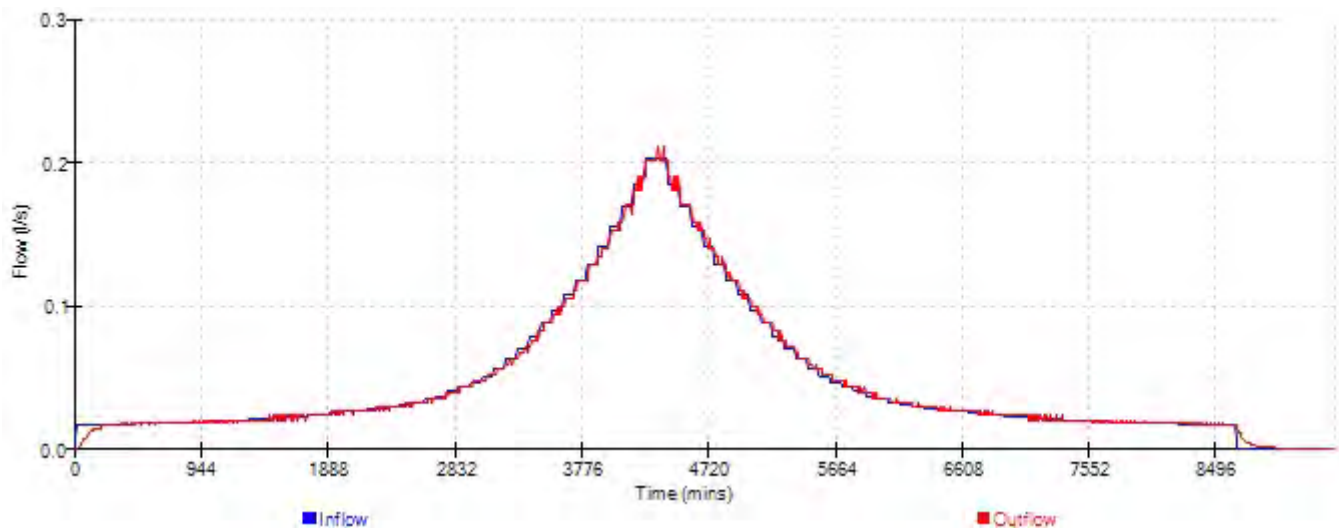
Event: 5760 min Summer



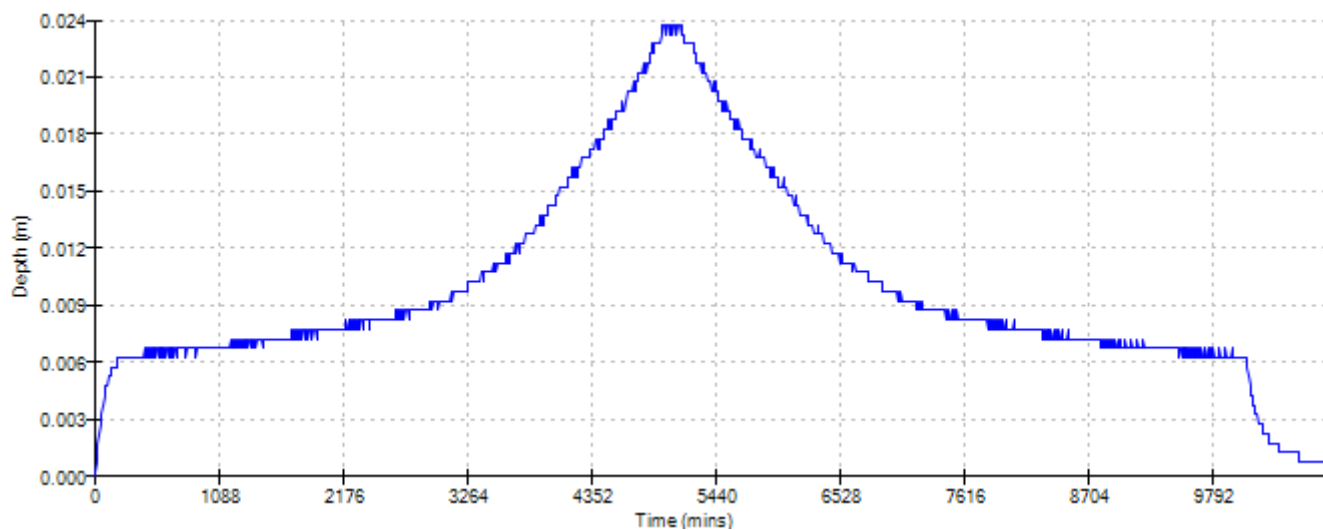
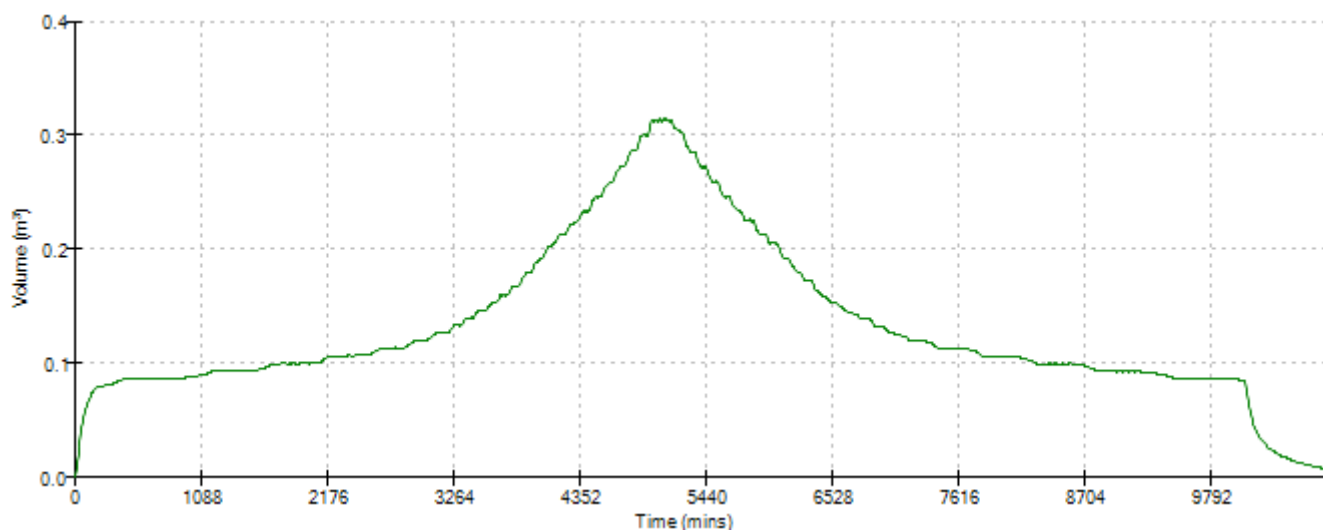
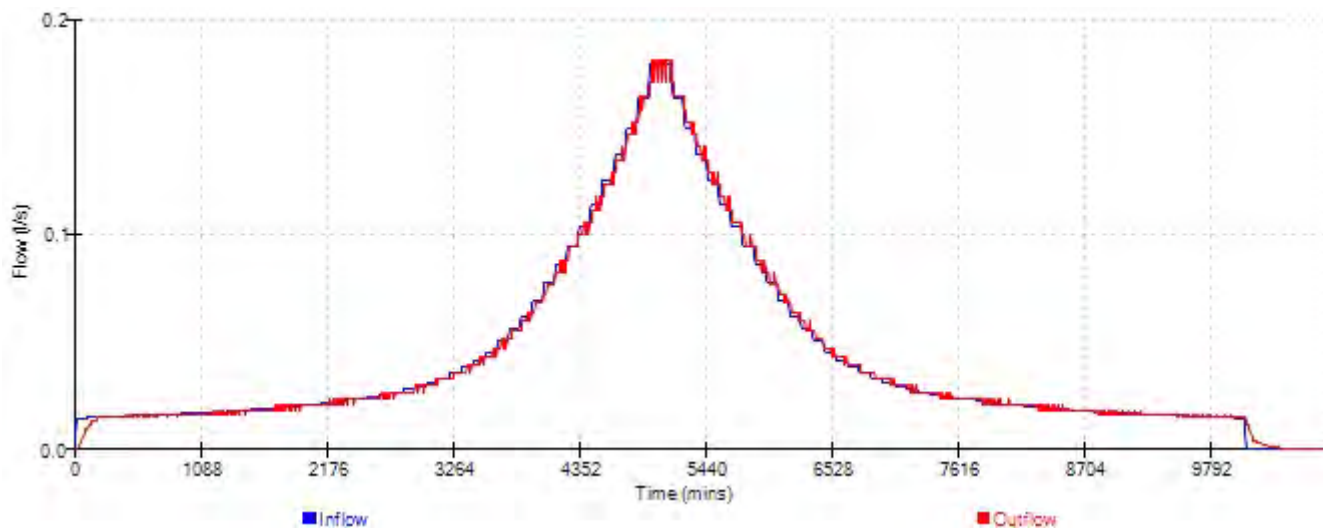
Event: 7200 min Summer

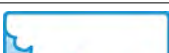


Event: 8640 min Summer

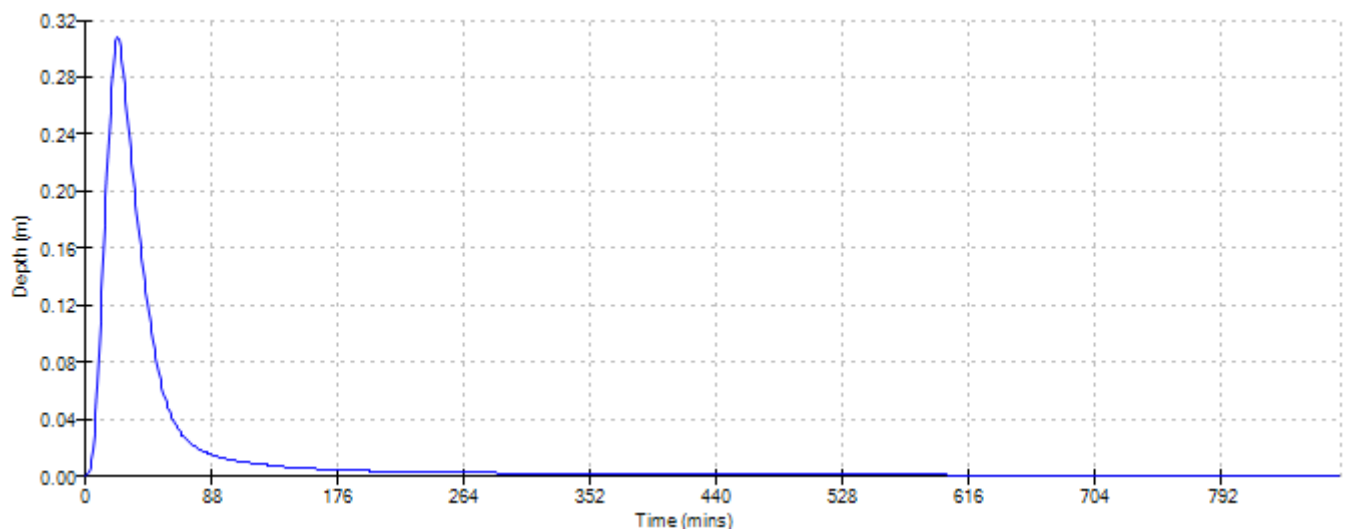
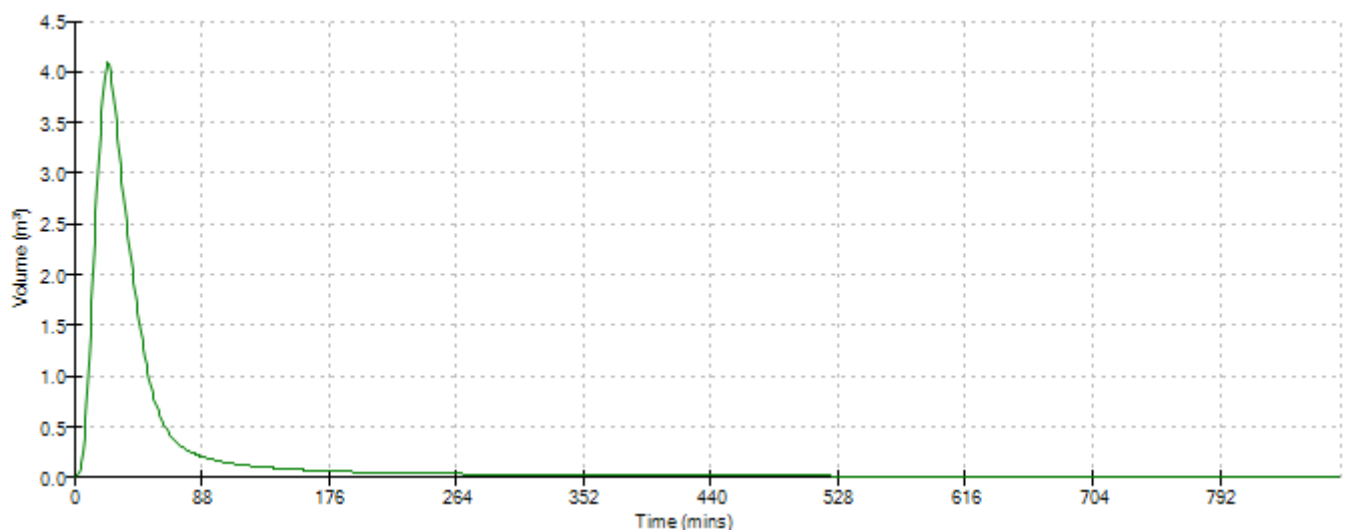
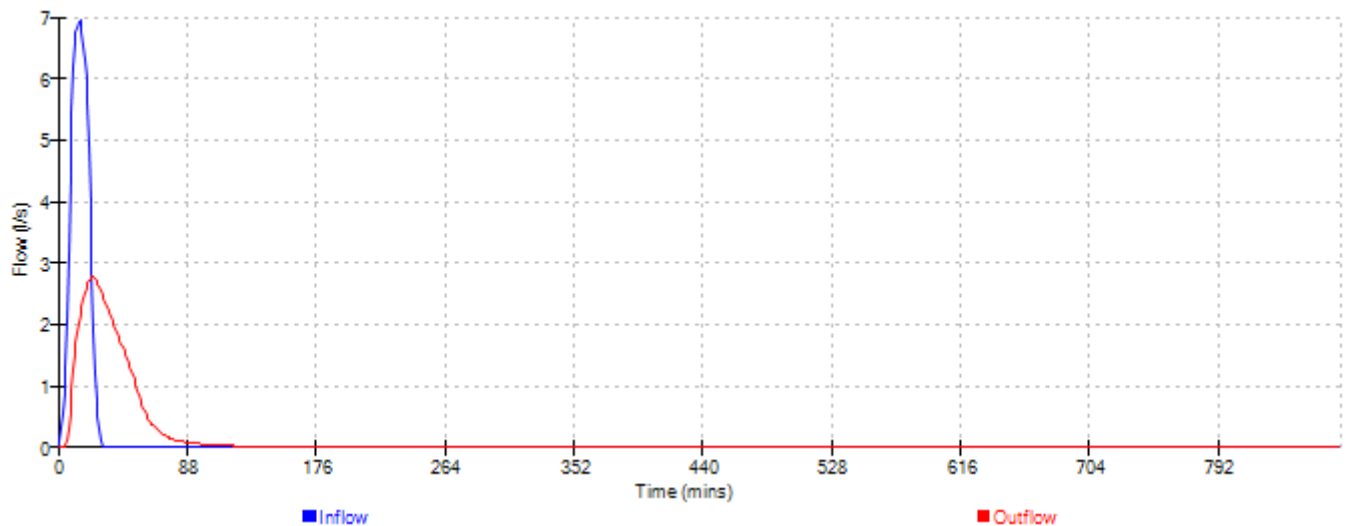


Event: 10080 min Summer

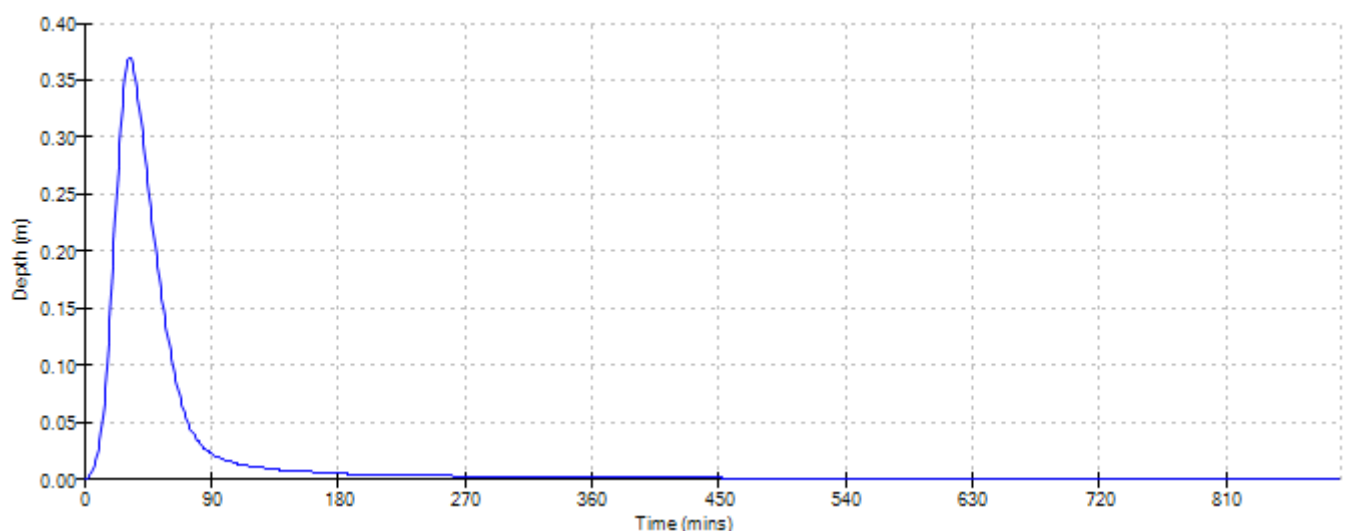
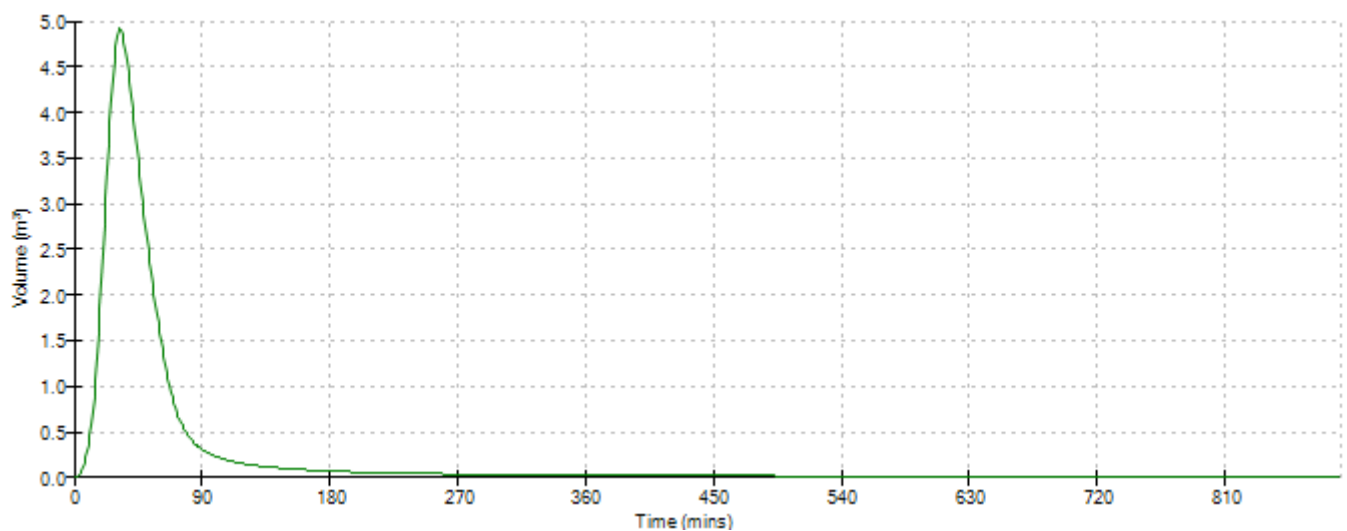
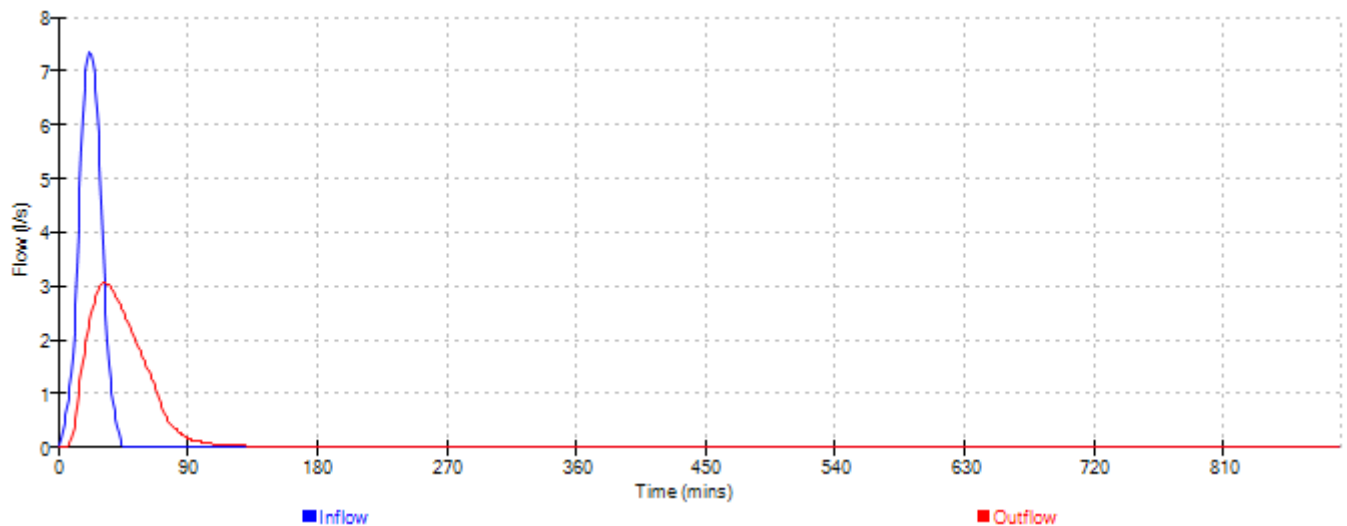


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Unit 6 Neepsend Triangle Business 1 Burton Road Sheffield S3 8BW	Garage Site, The Glebe West Drayton Surface Water Attenuation	
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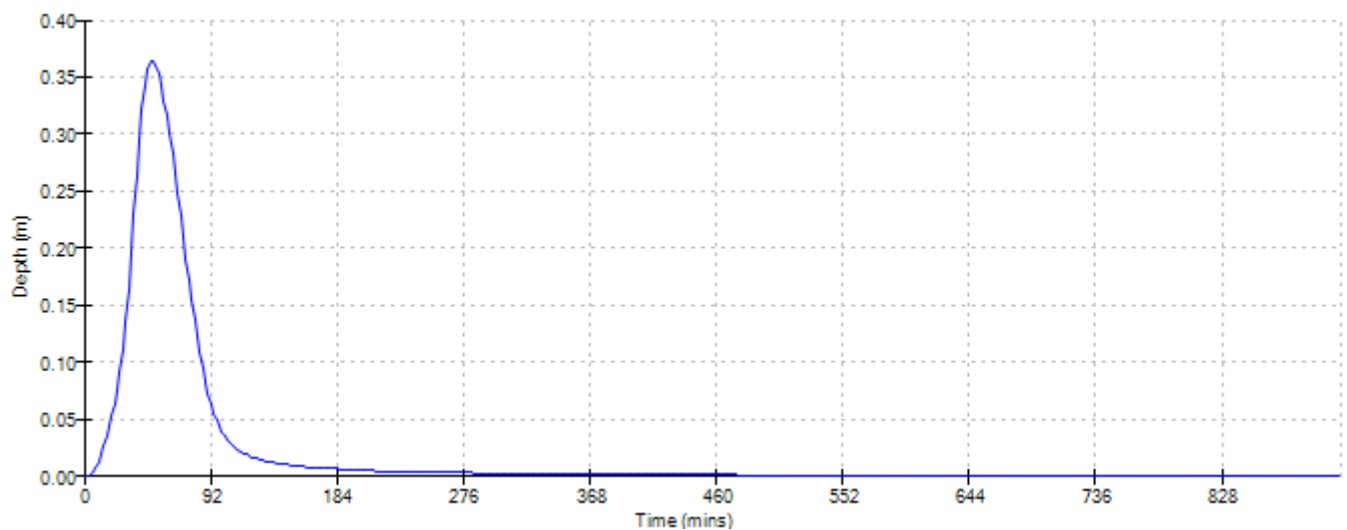
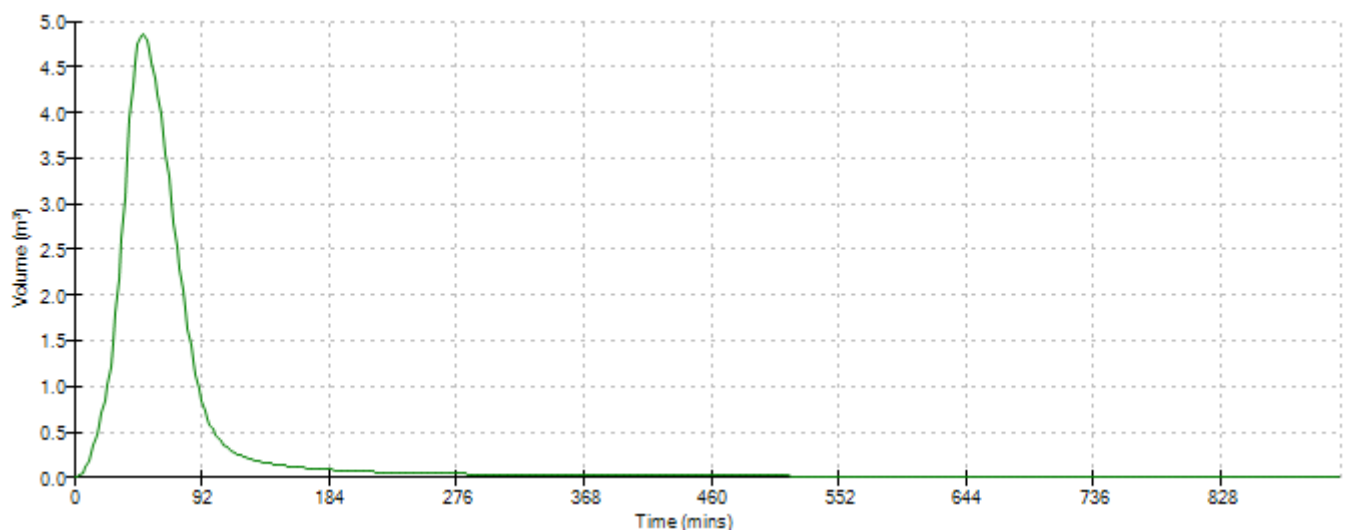
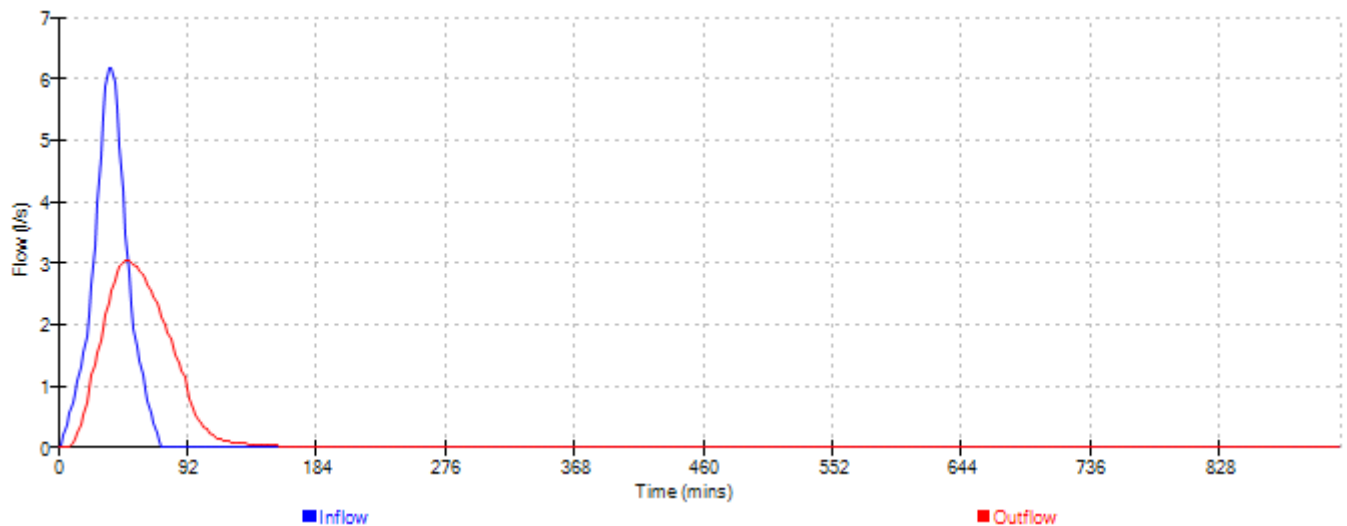
Event: 15 min Winter



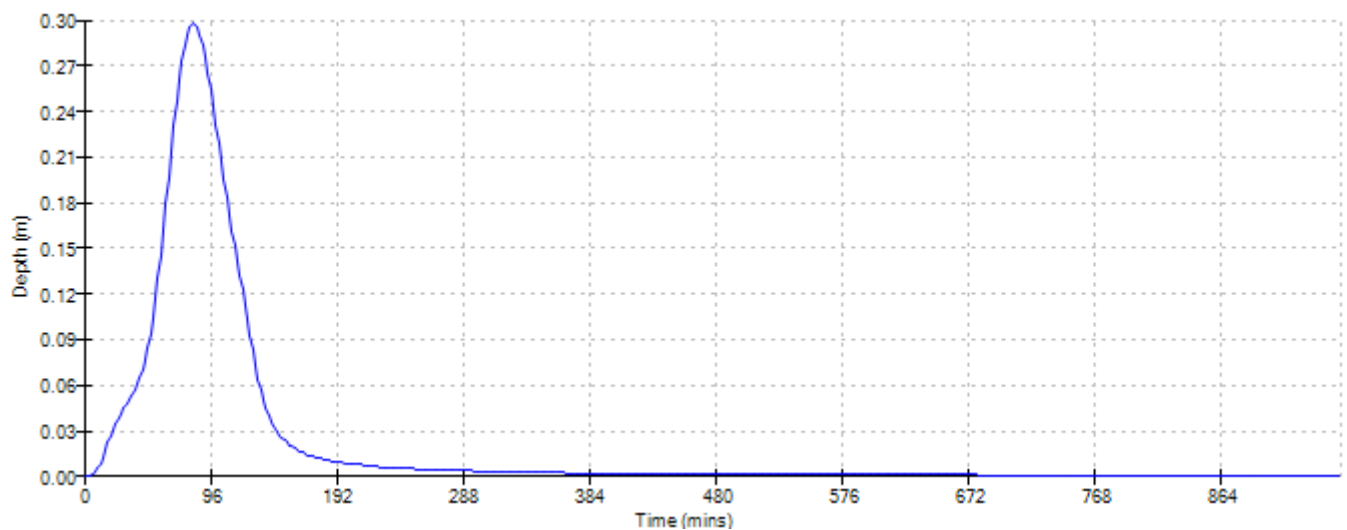
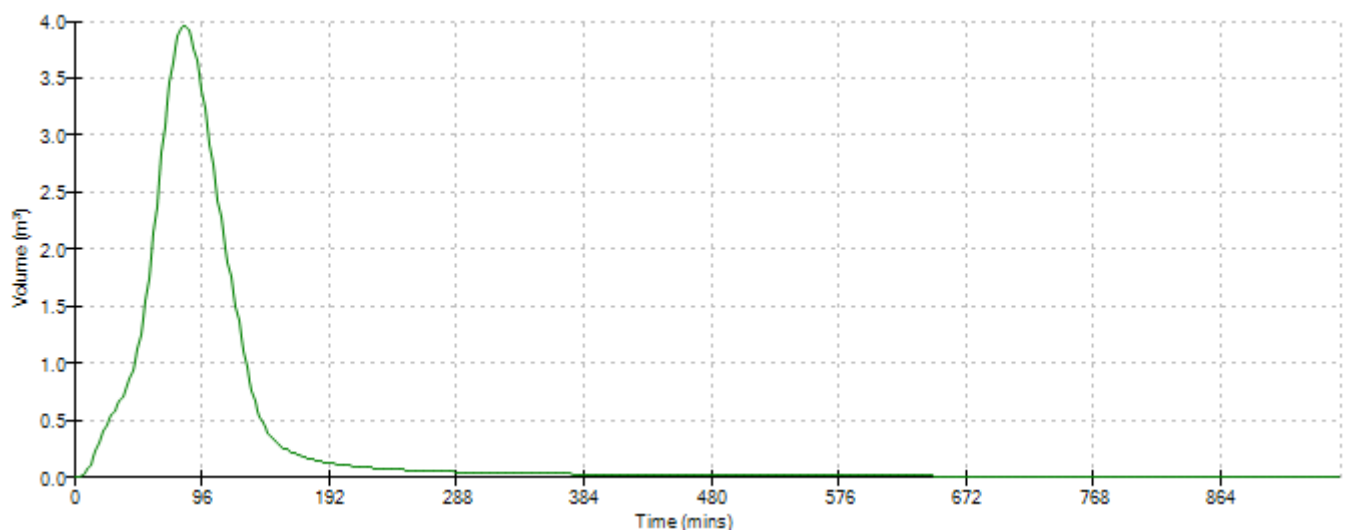
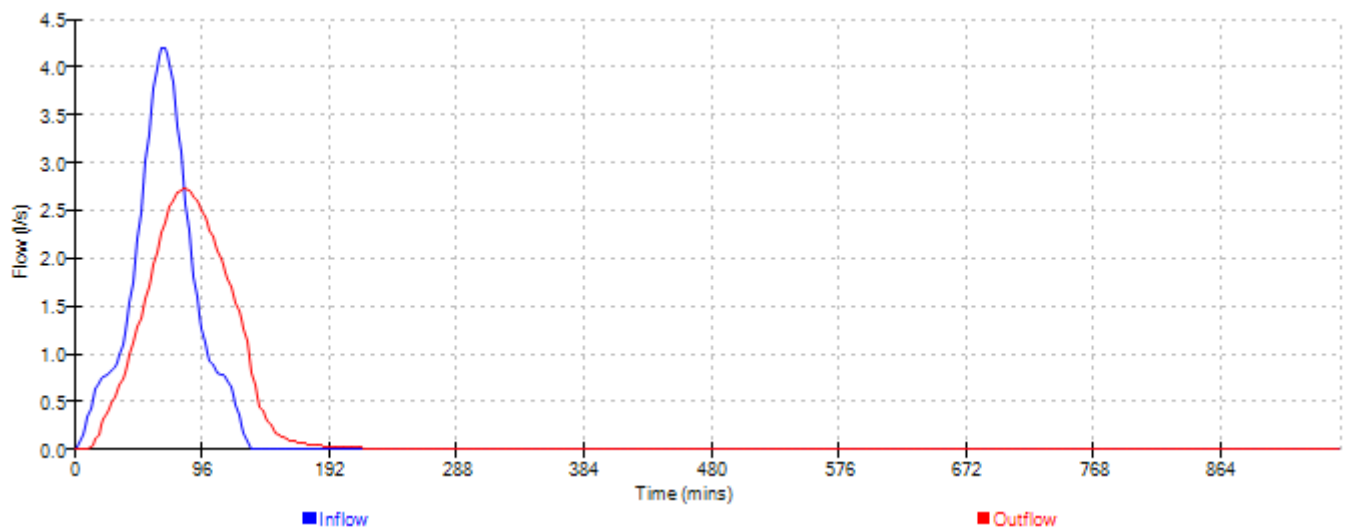
Event: 30 min Winter



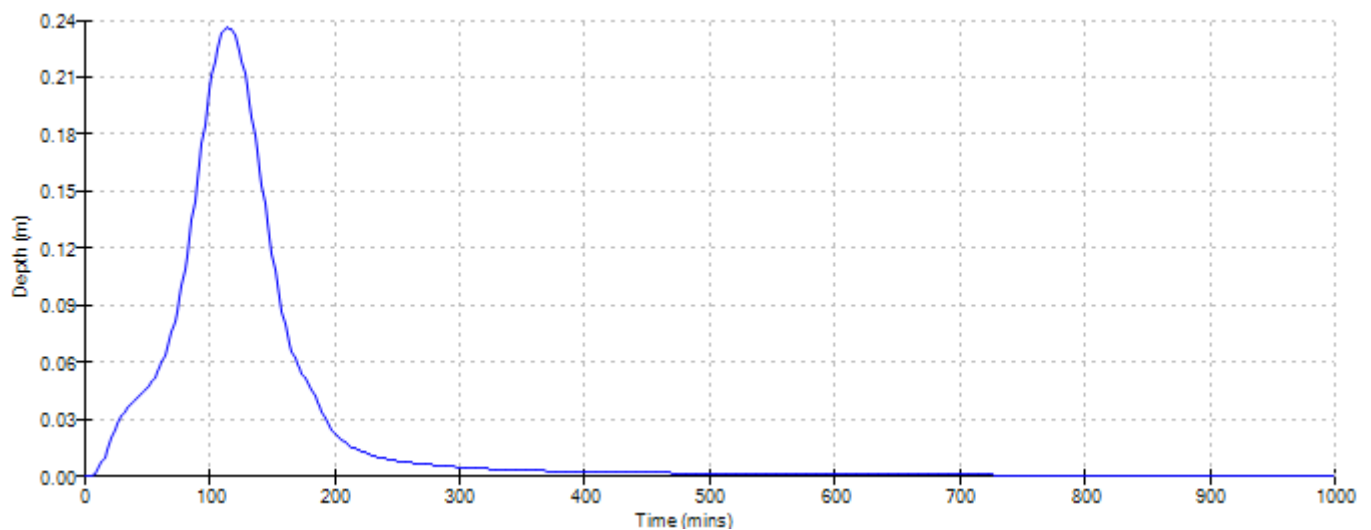
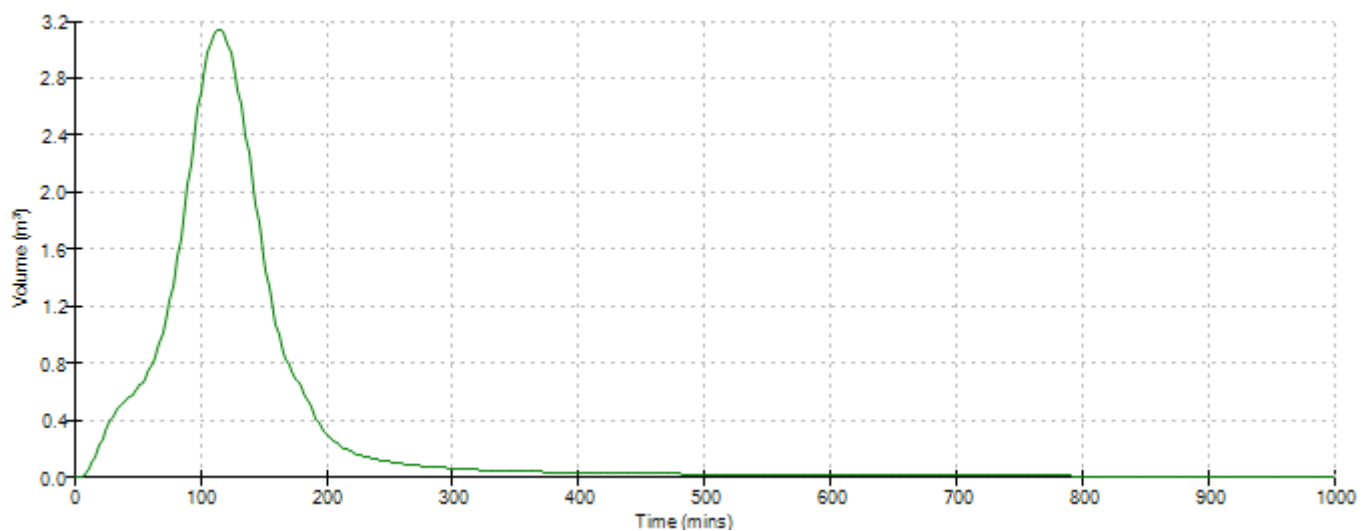
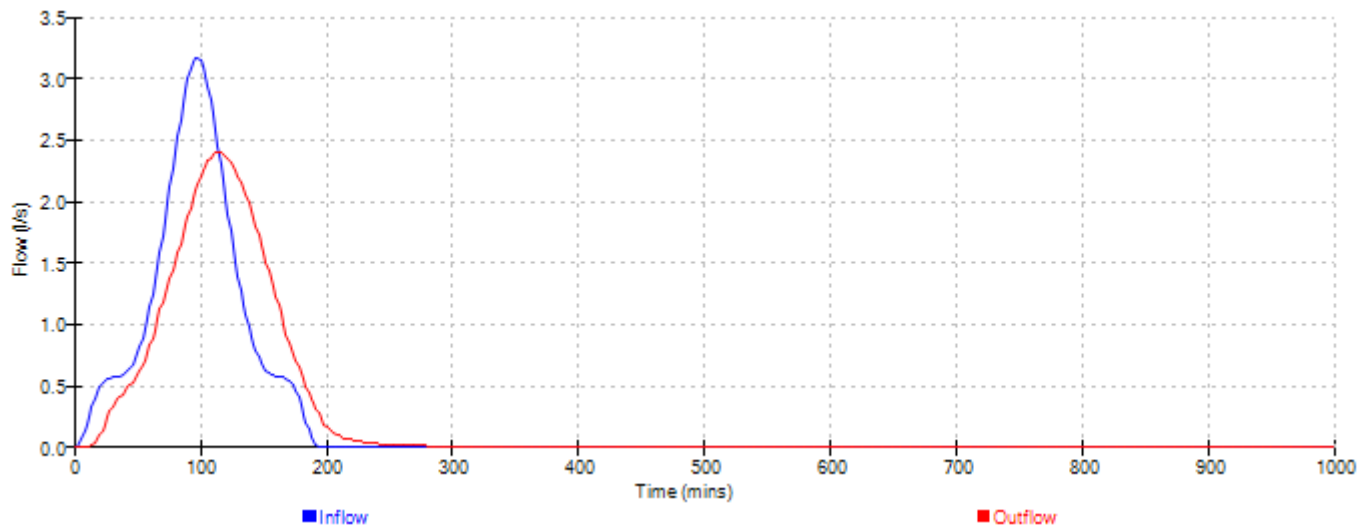
Event: 60 min Winter



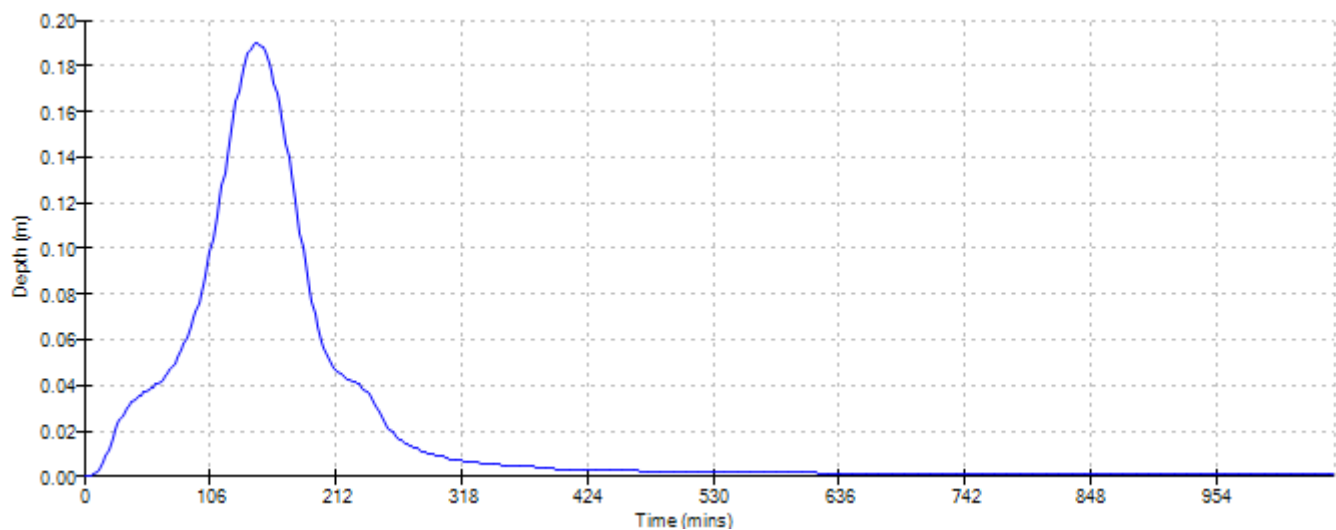
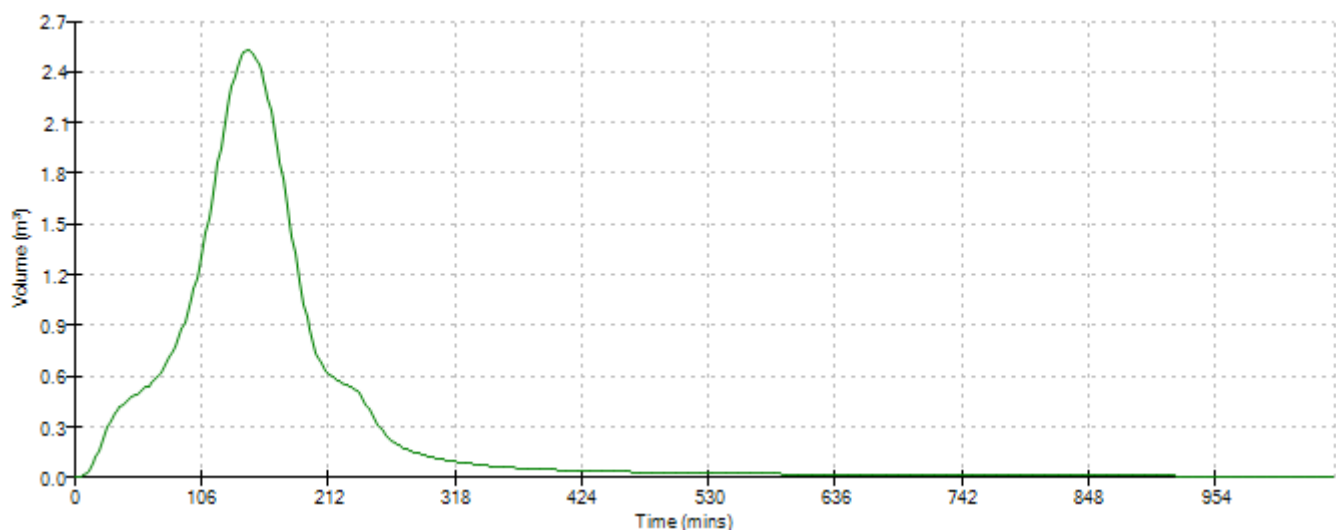
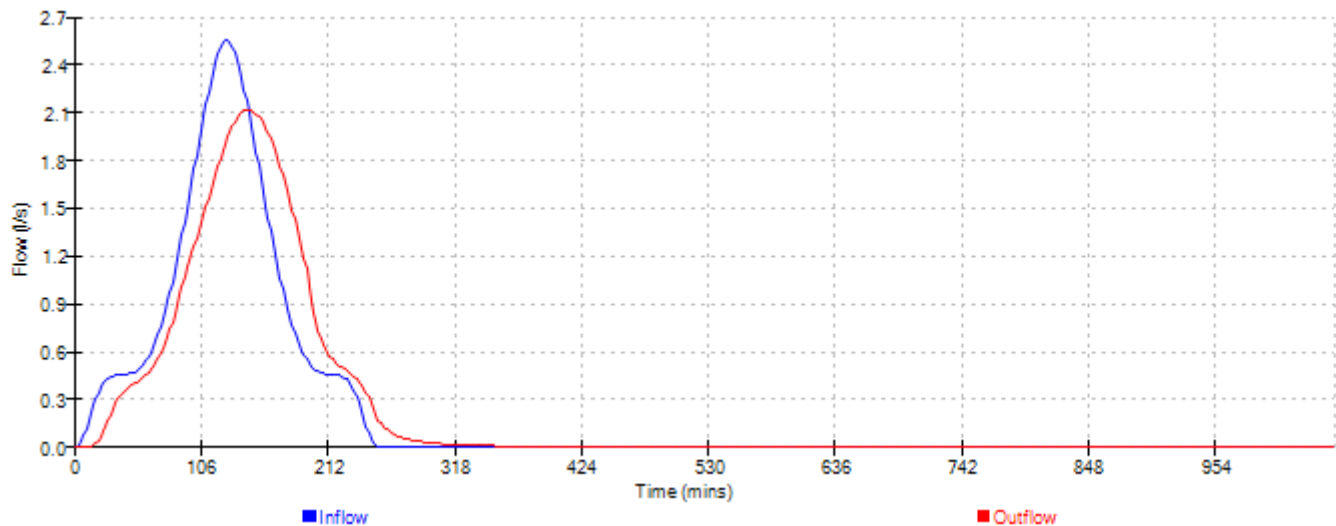
Event: 120 min Winter



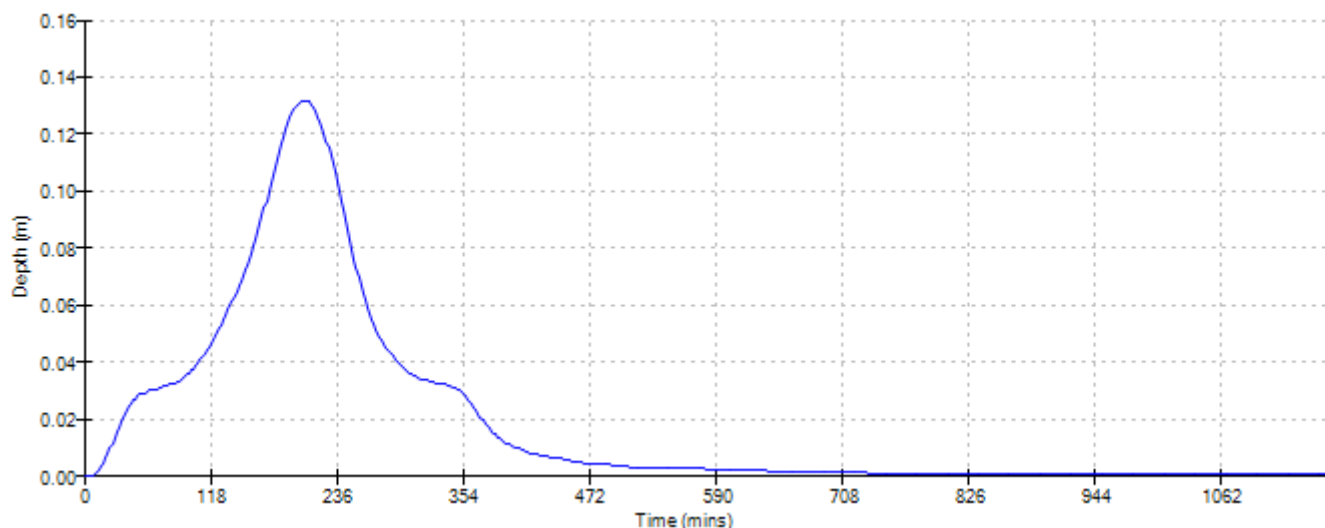
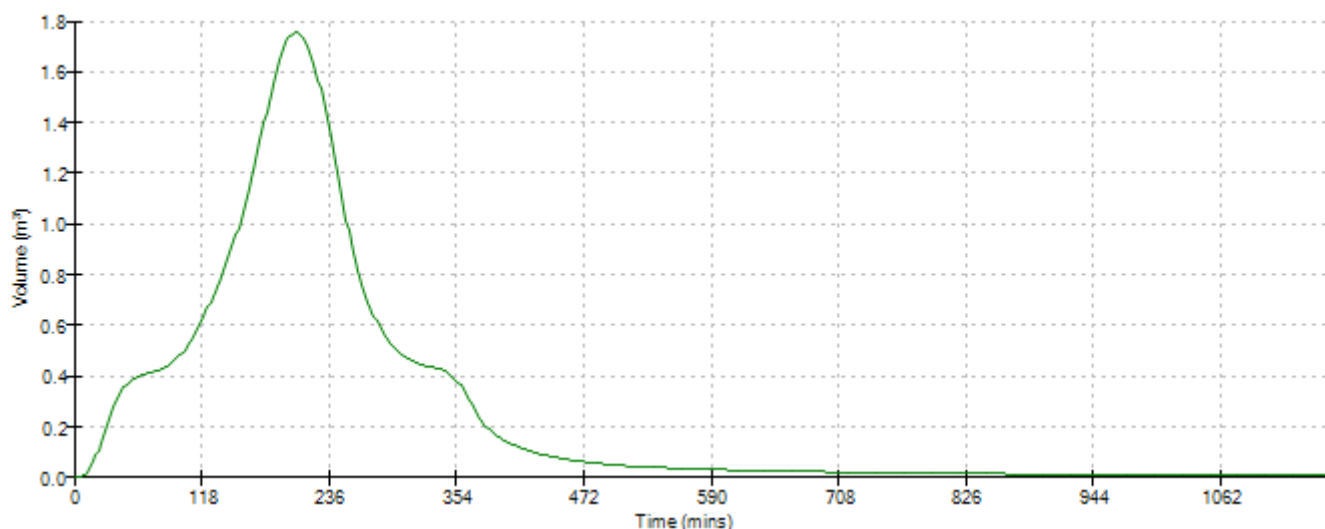
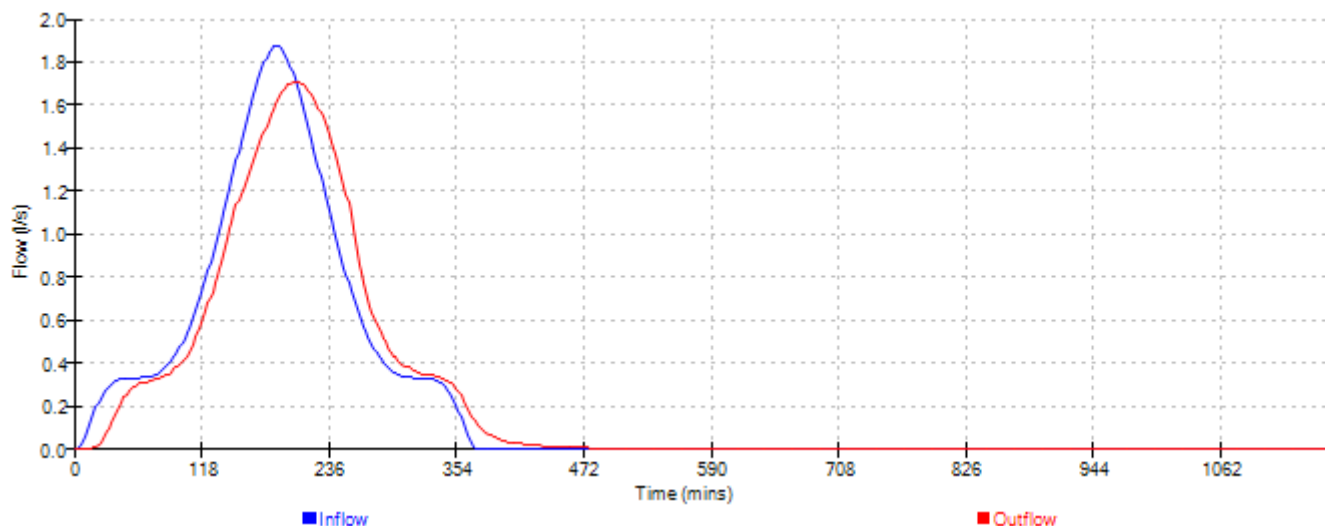
Event: 180 min Winter



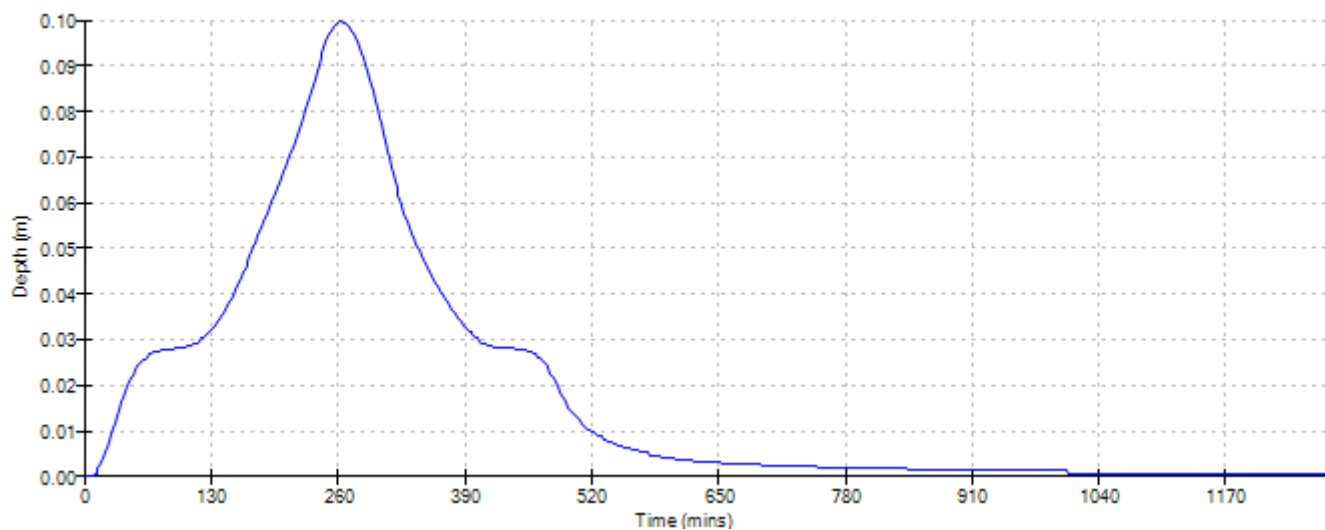
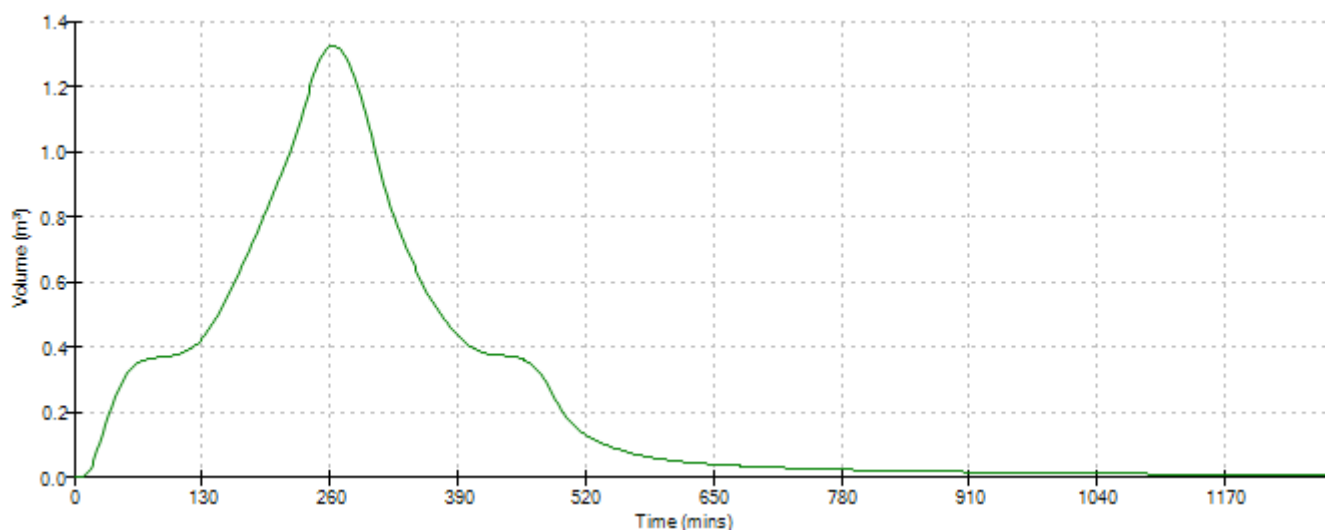
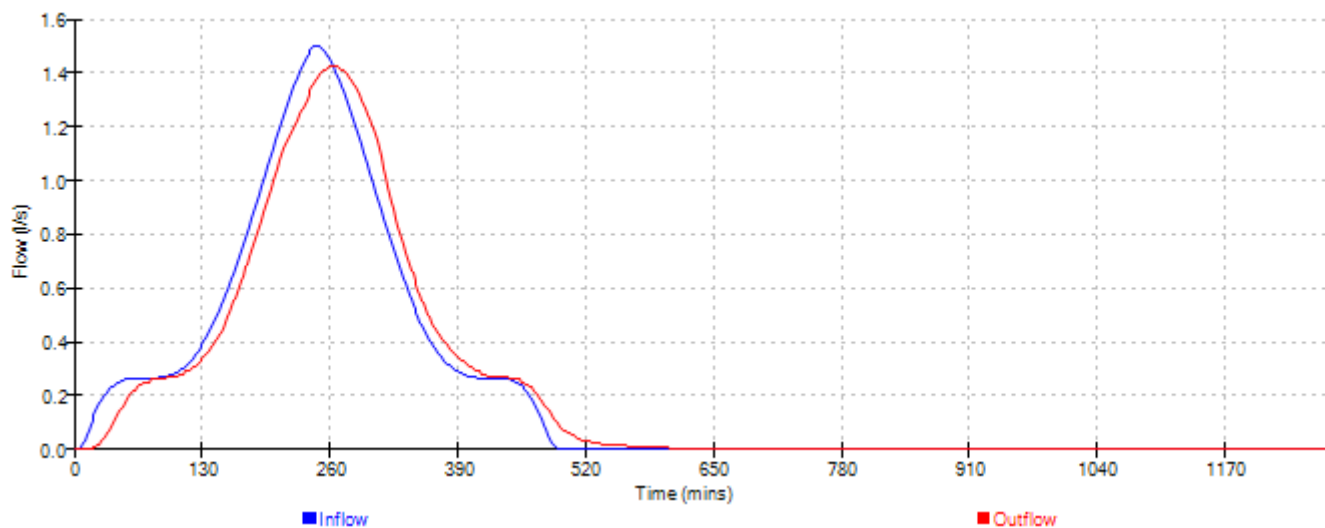
Event: 240 min Winter



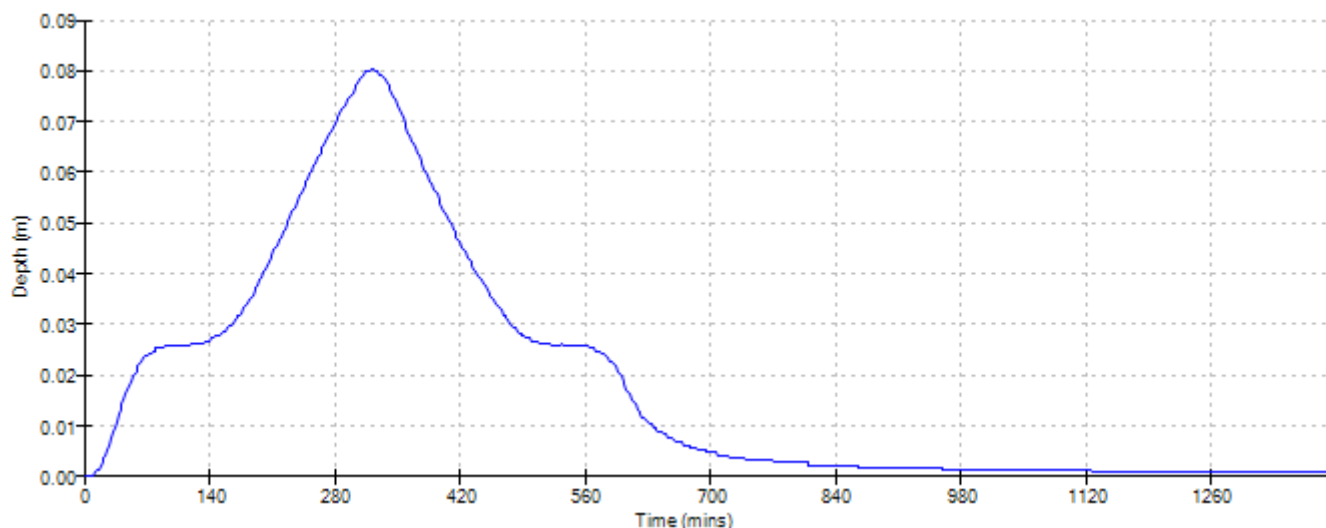
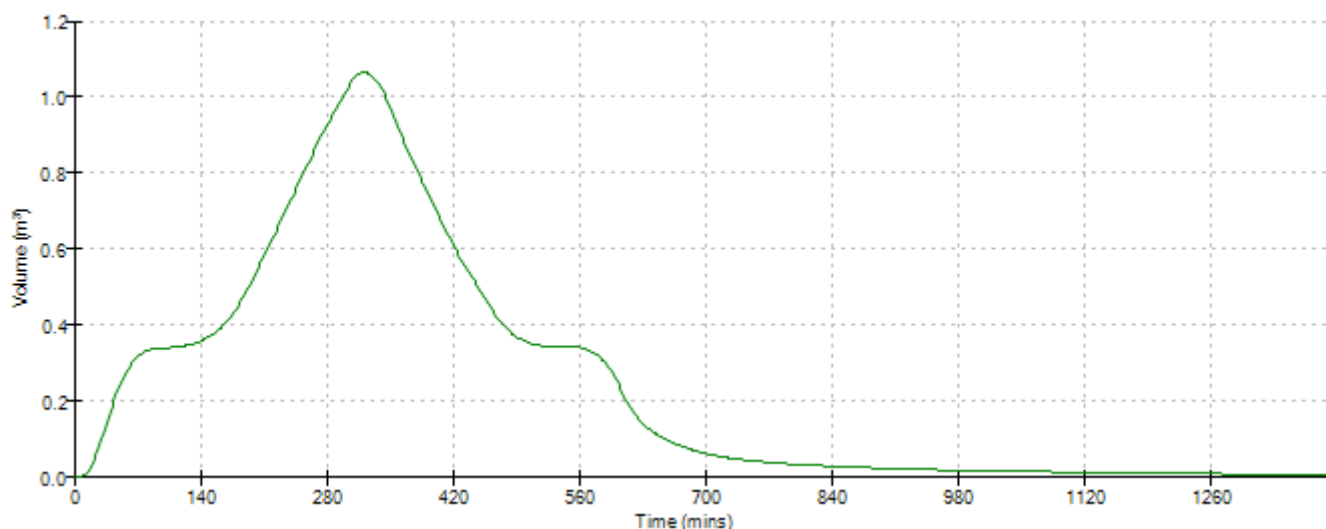
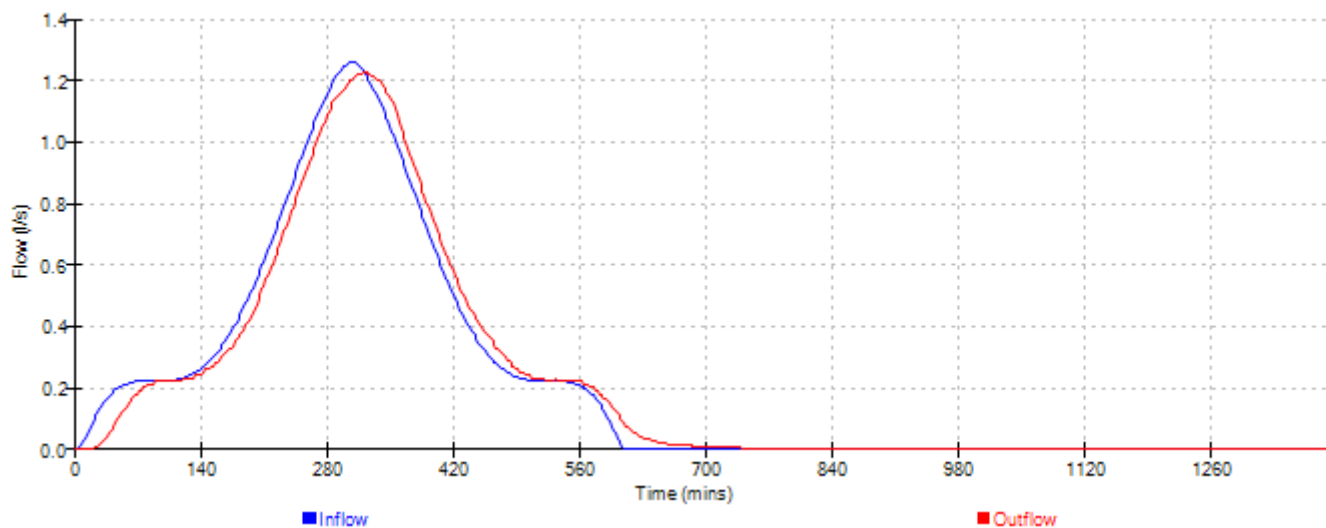
Event: 360 min Winter



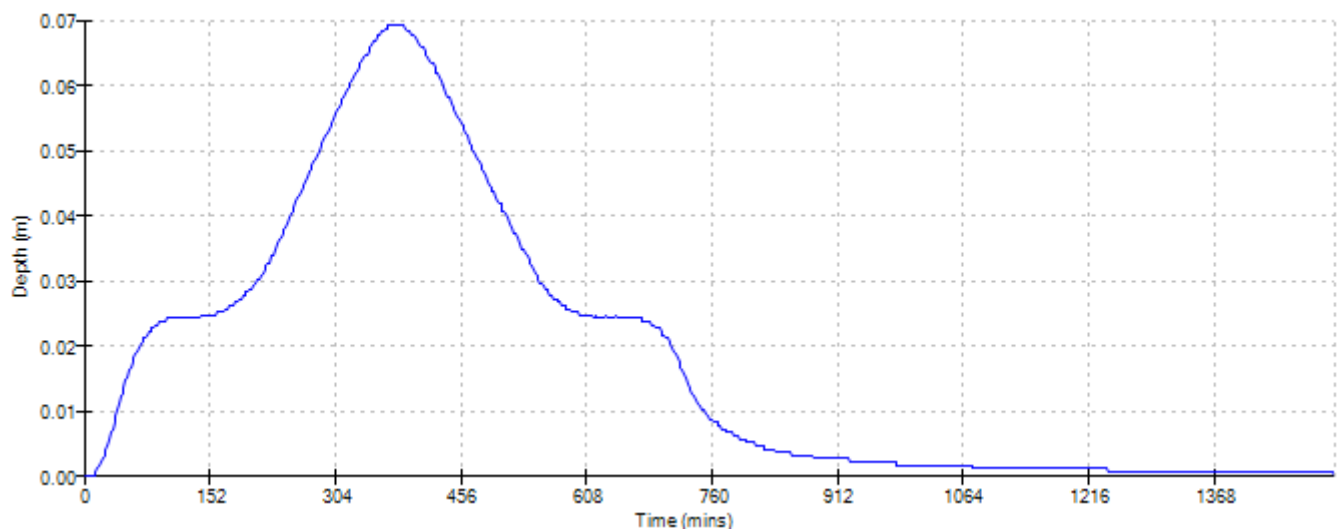
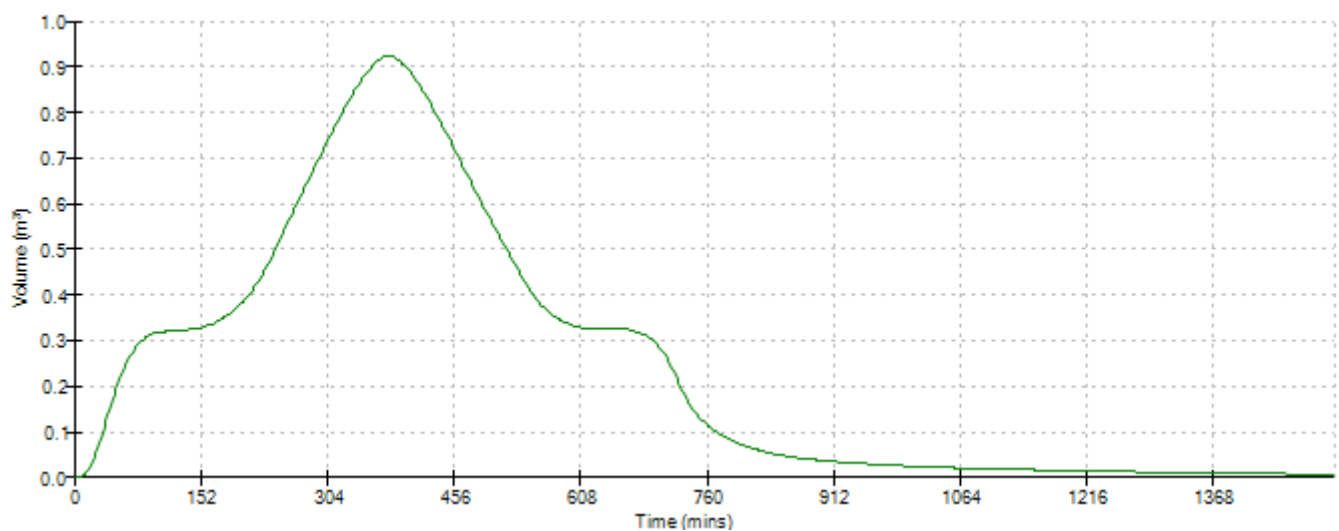
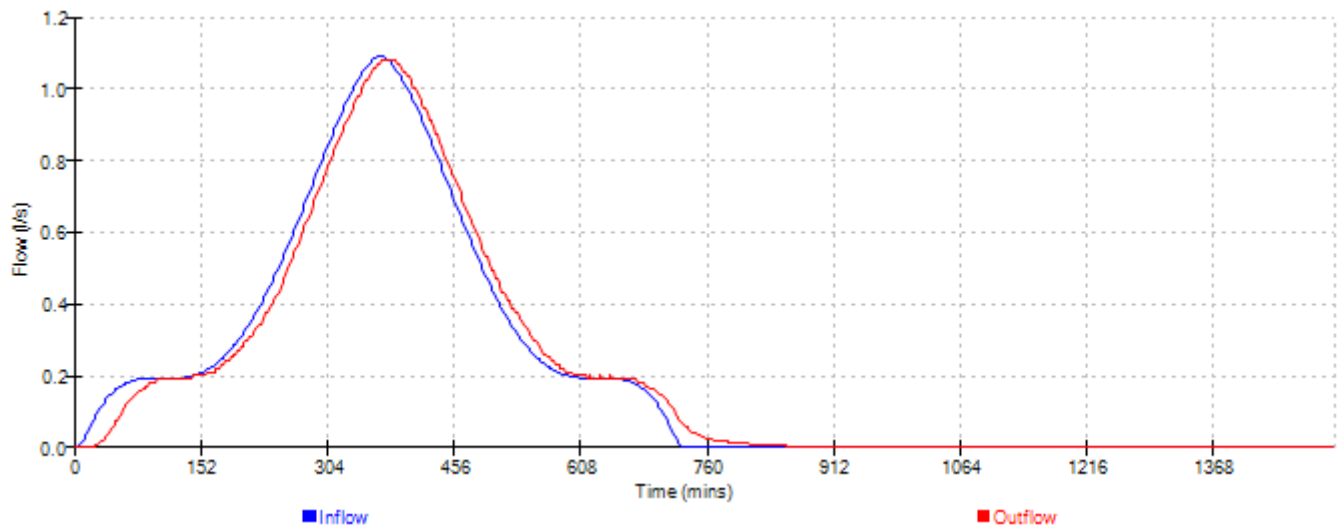
Event: 480 min Winter



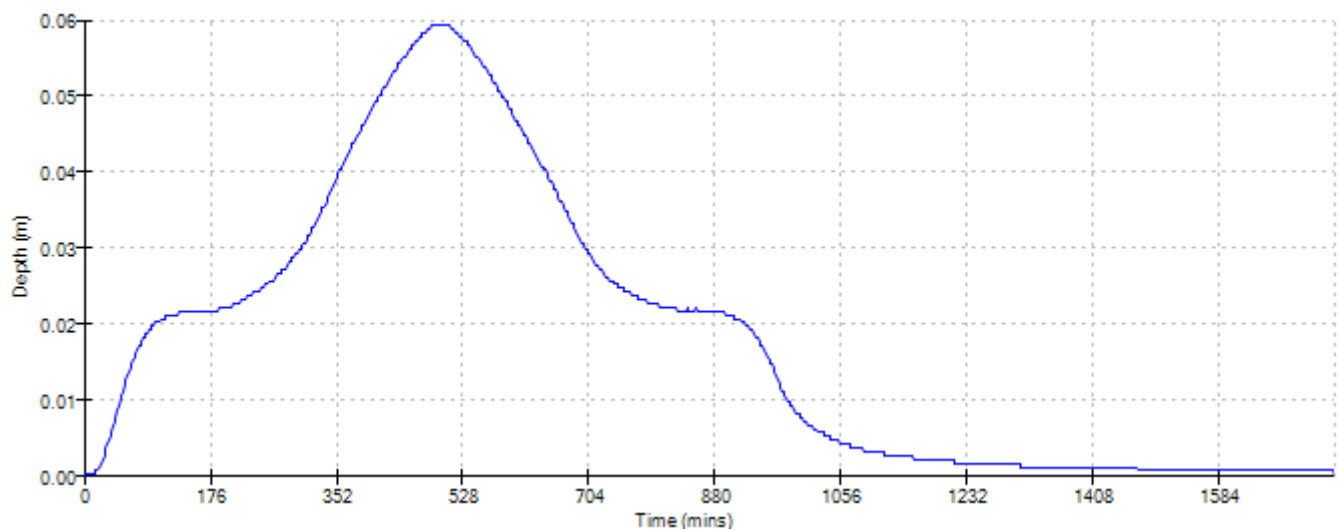
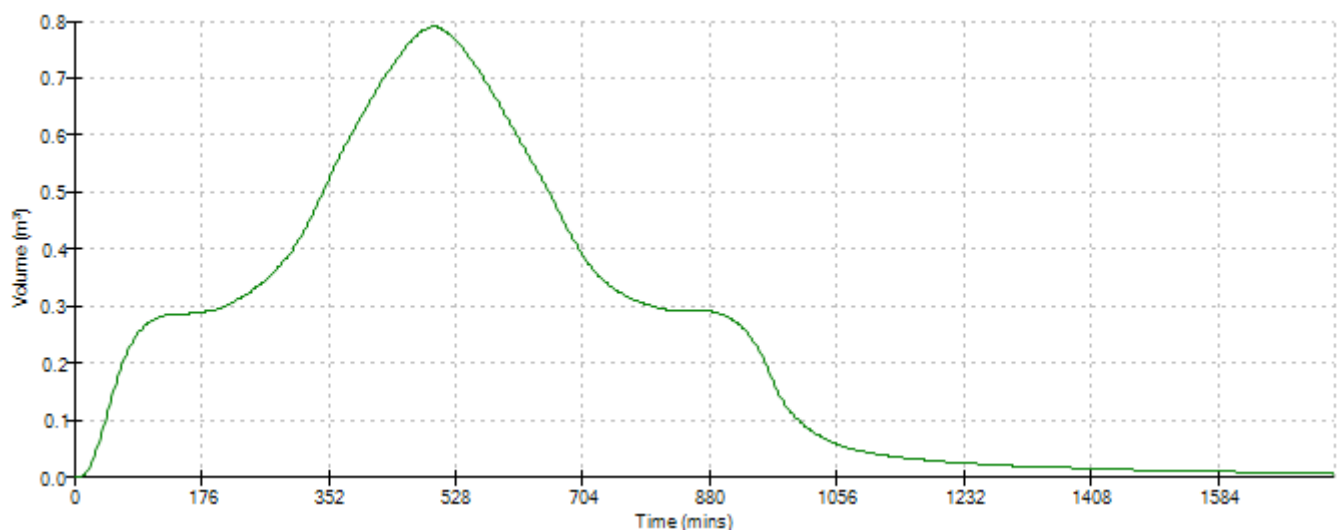
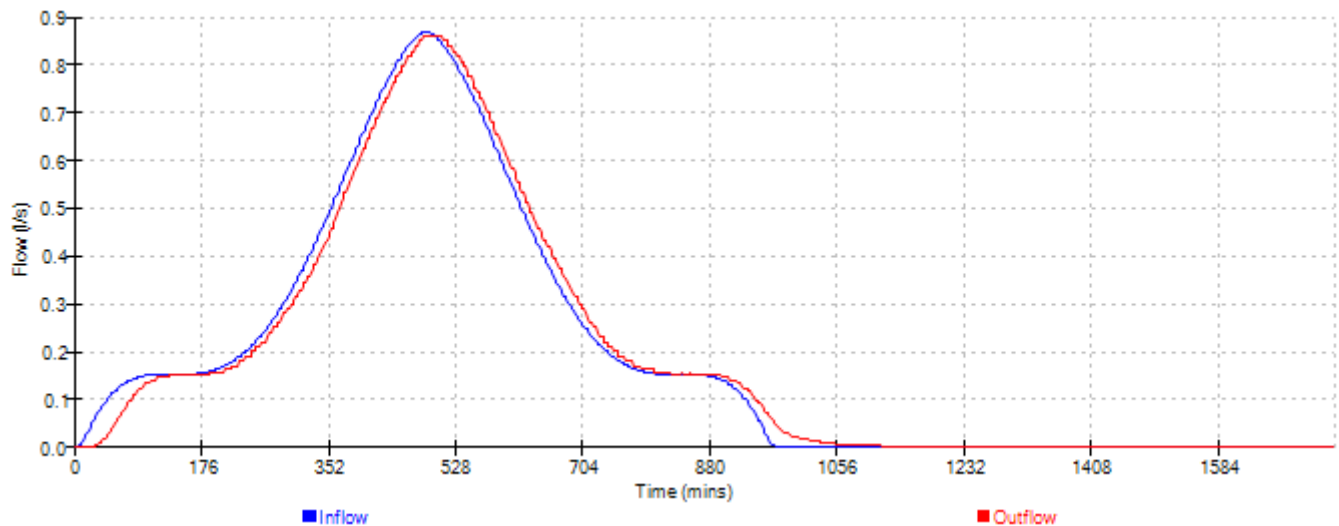
Event: 600 min Winter



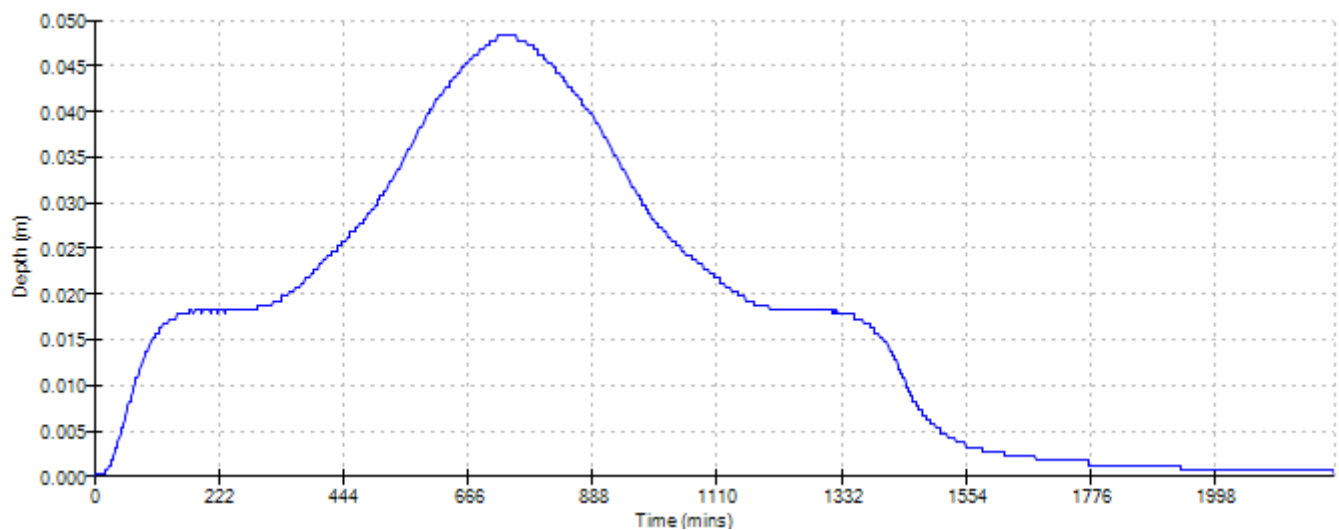
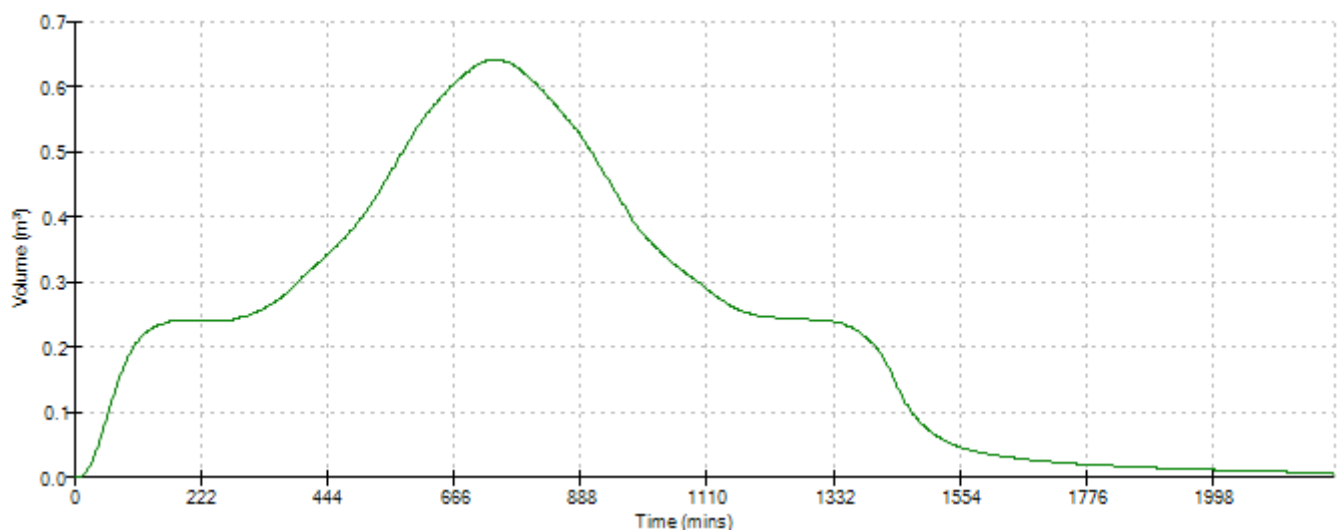
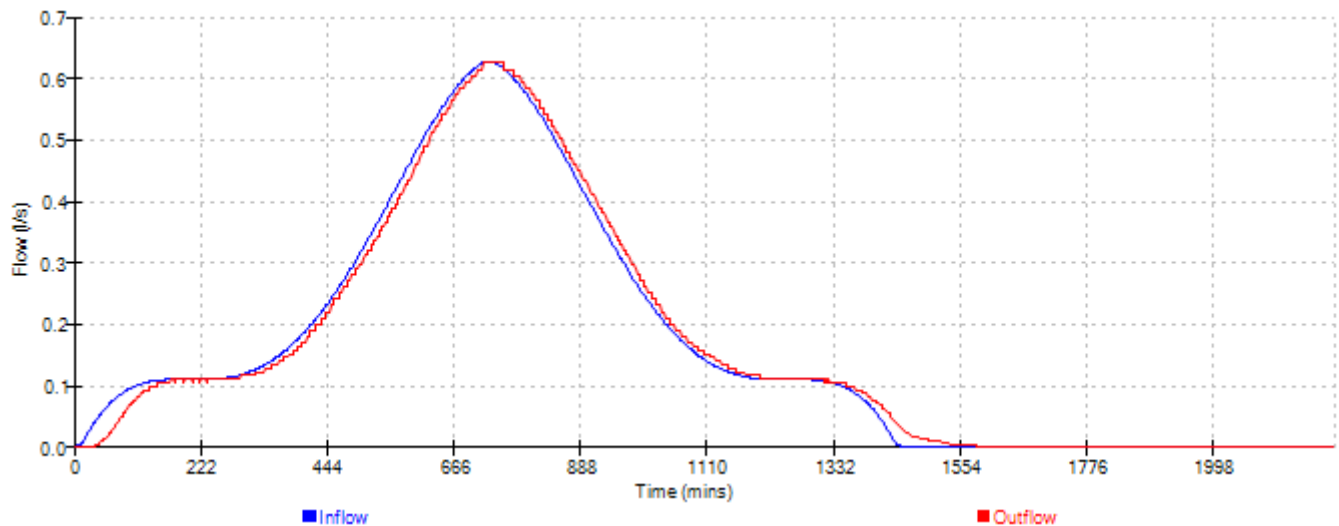
Event: 720 min Winter



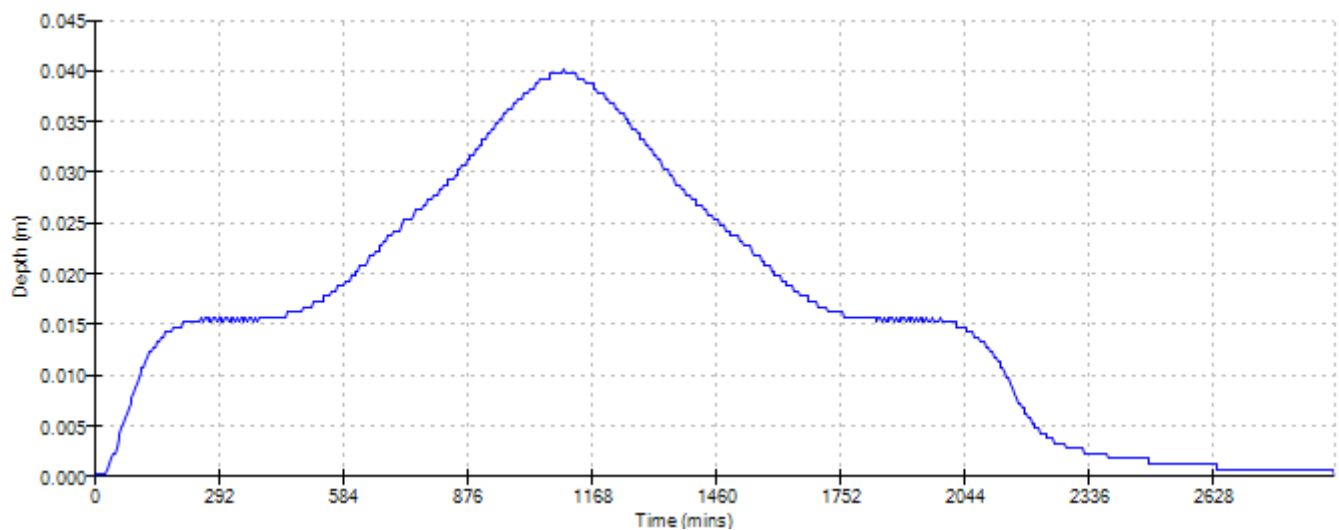
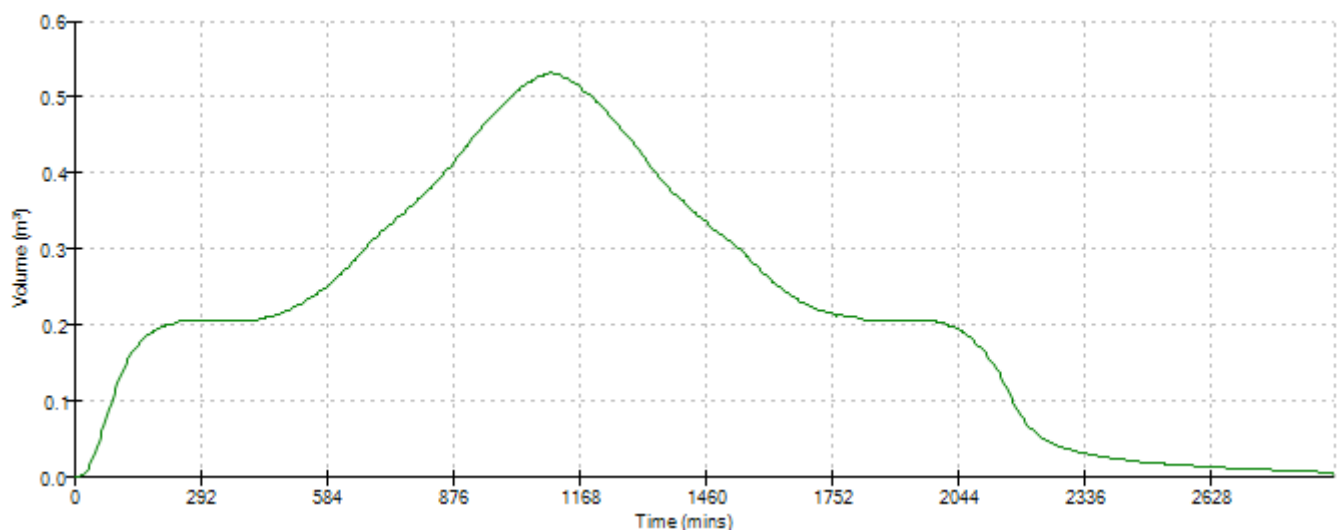
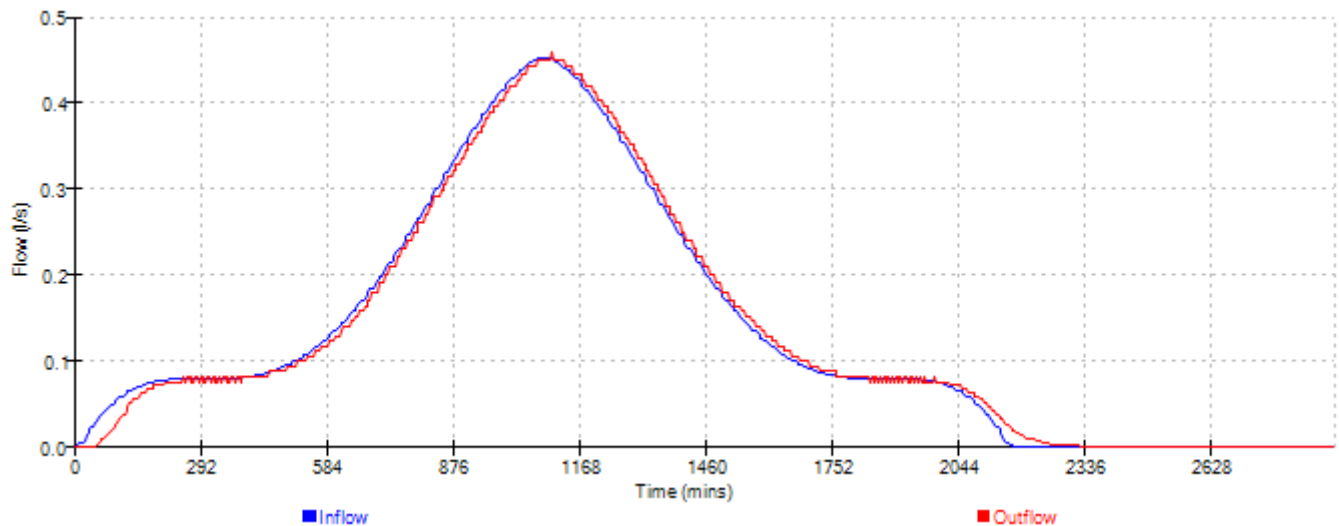
Event: 960 min Winter



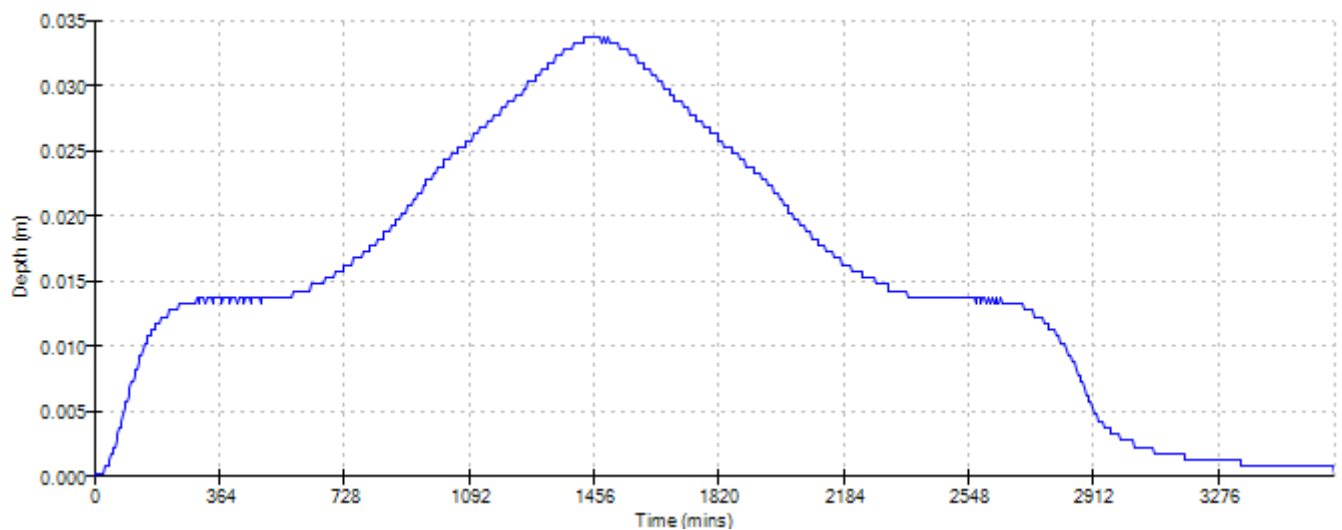
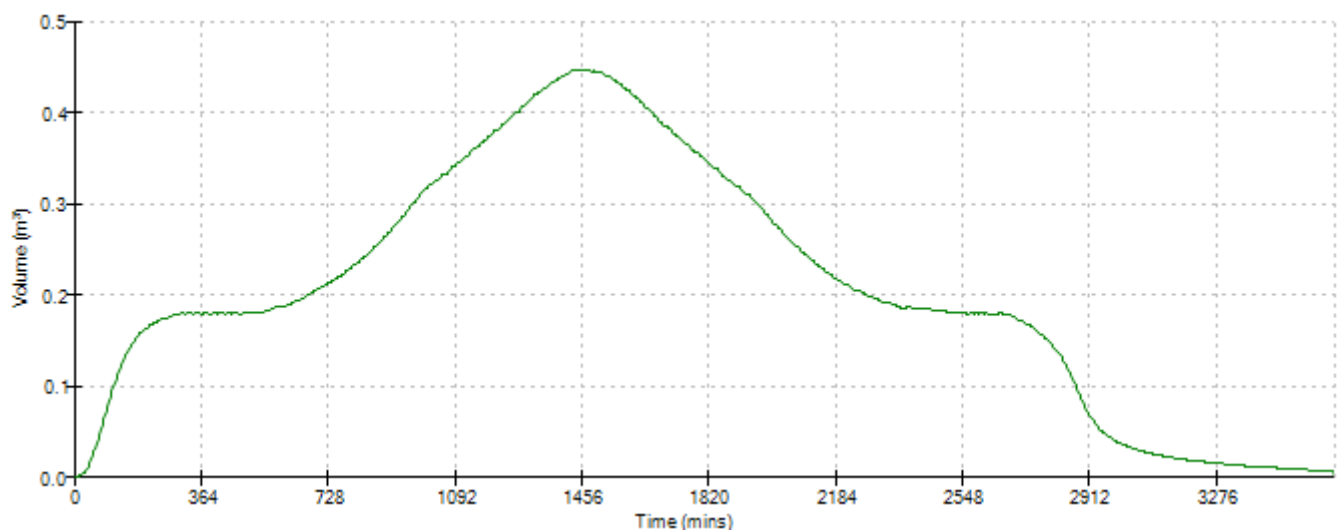
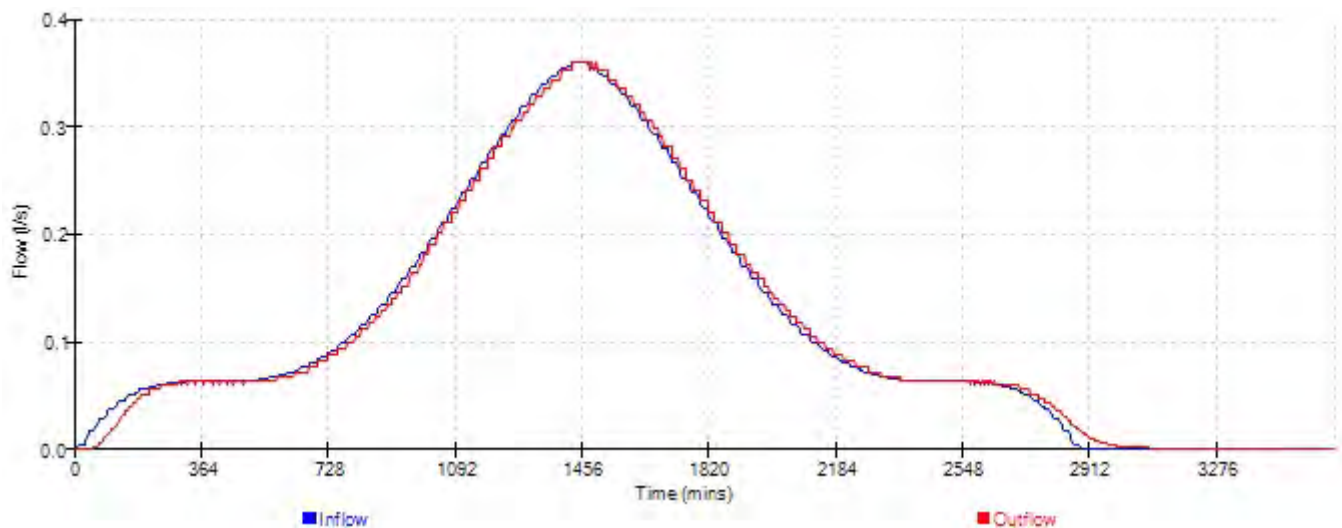
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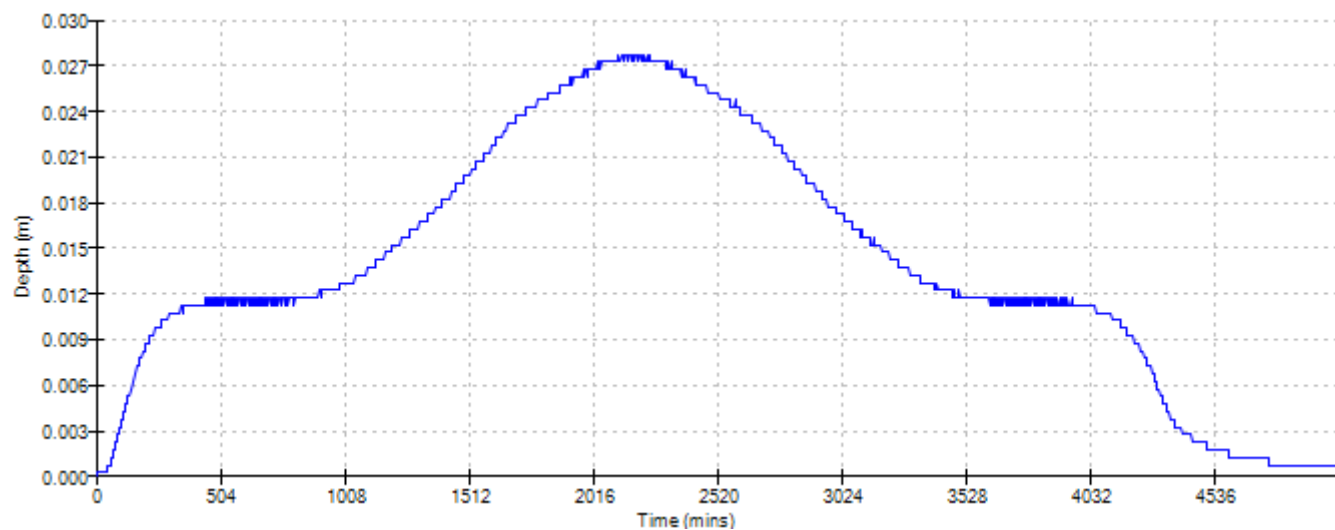
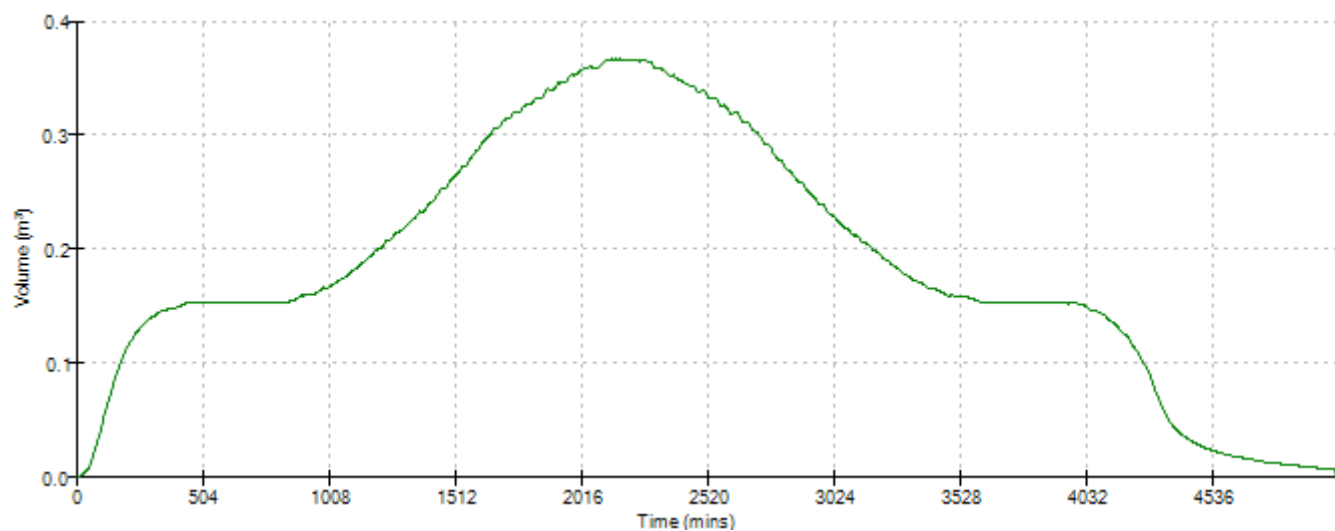
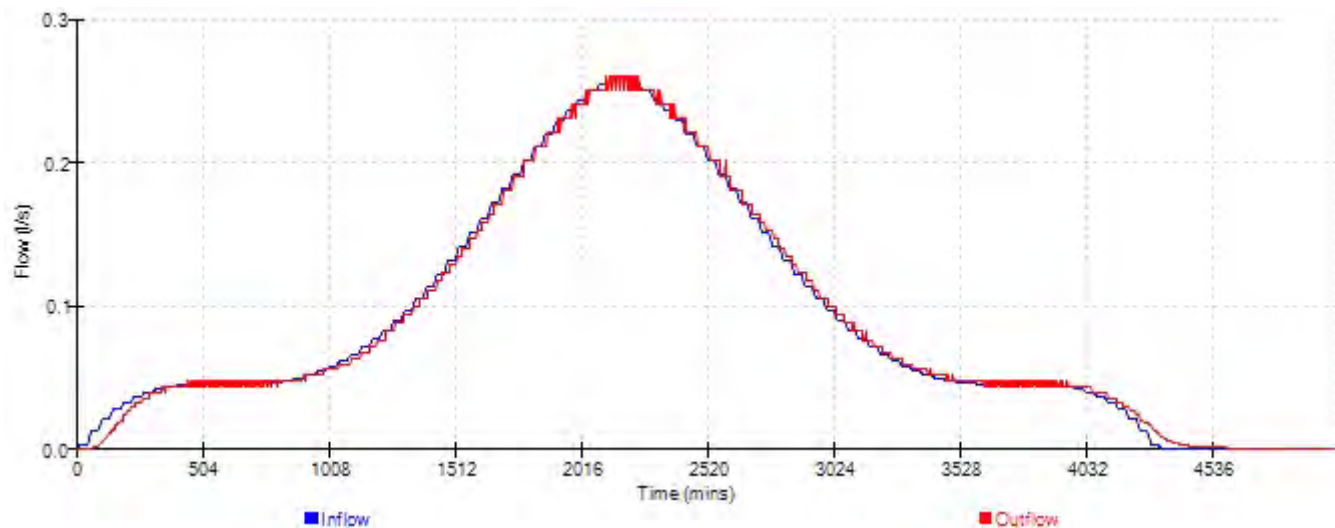
Event: 2160 min Winter



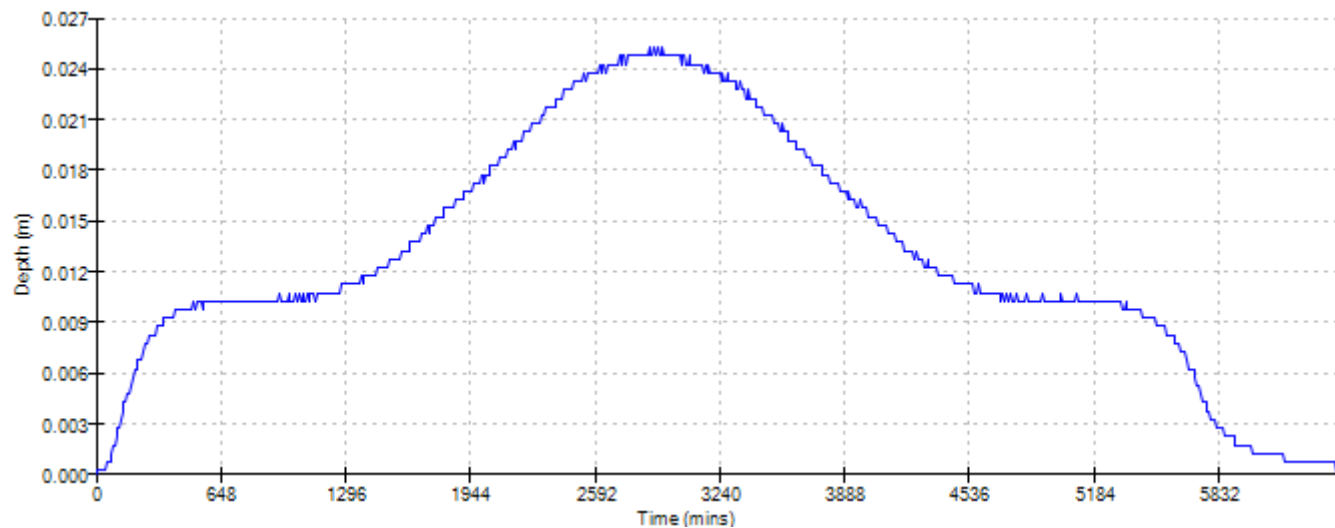
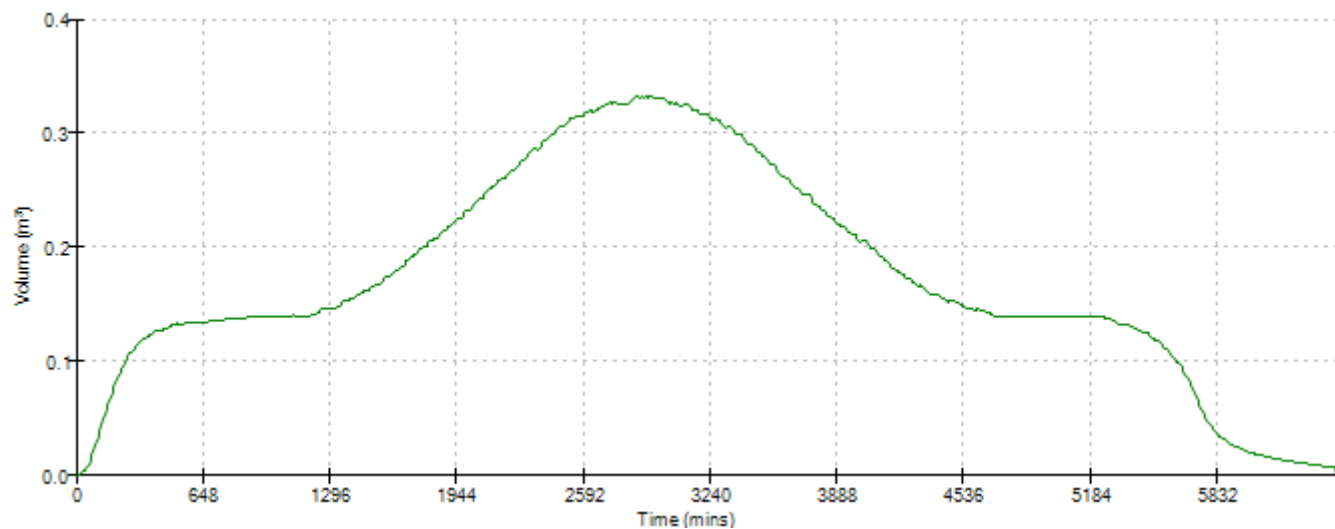
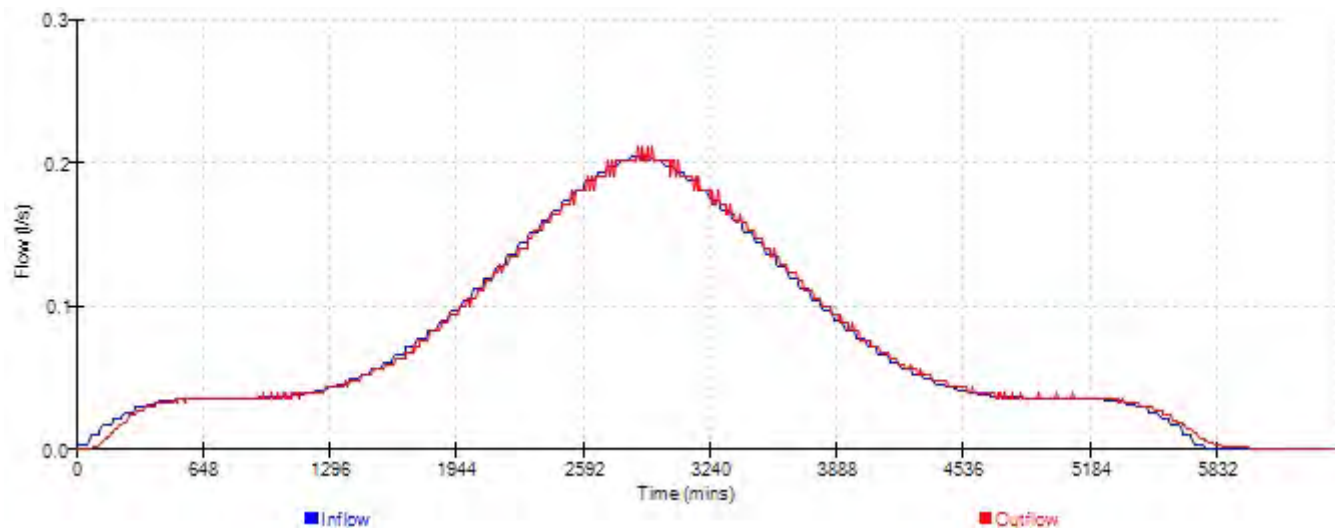
Event: 2880 min Winter



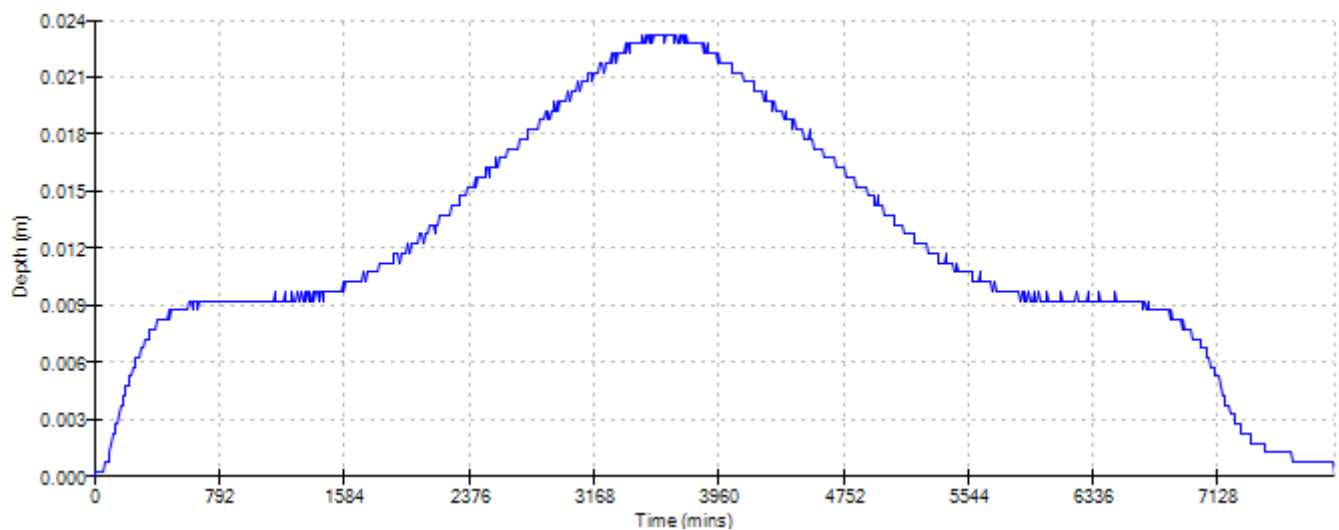
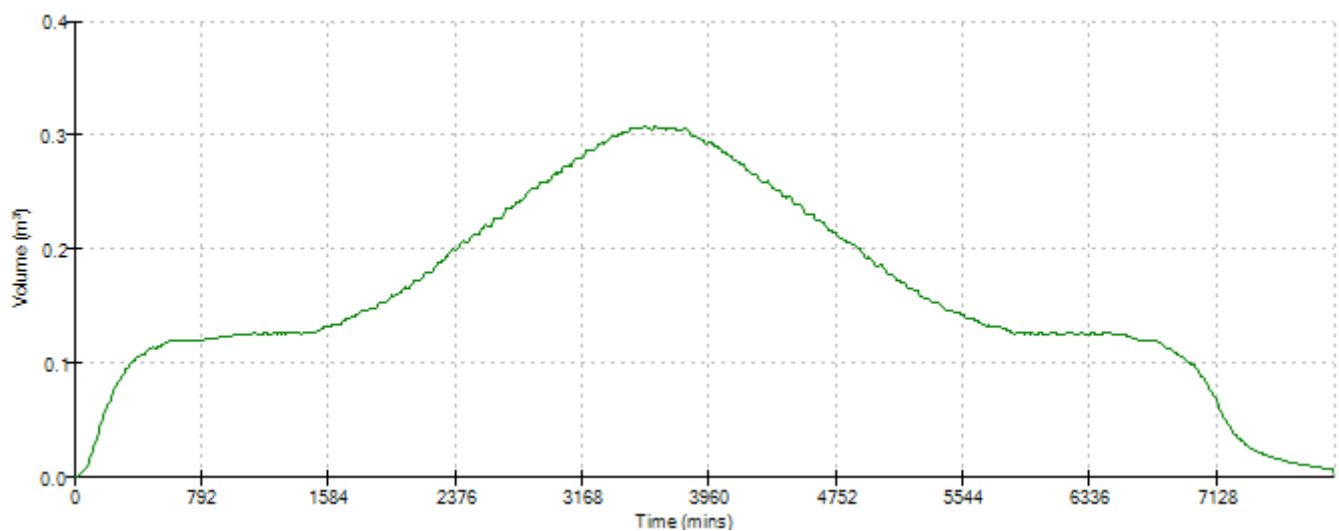
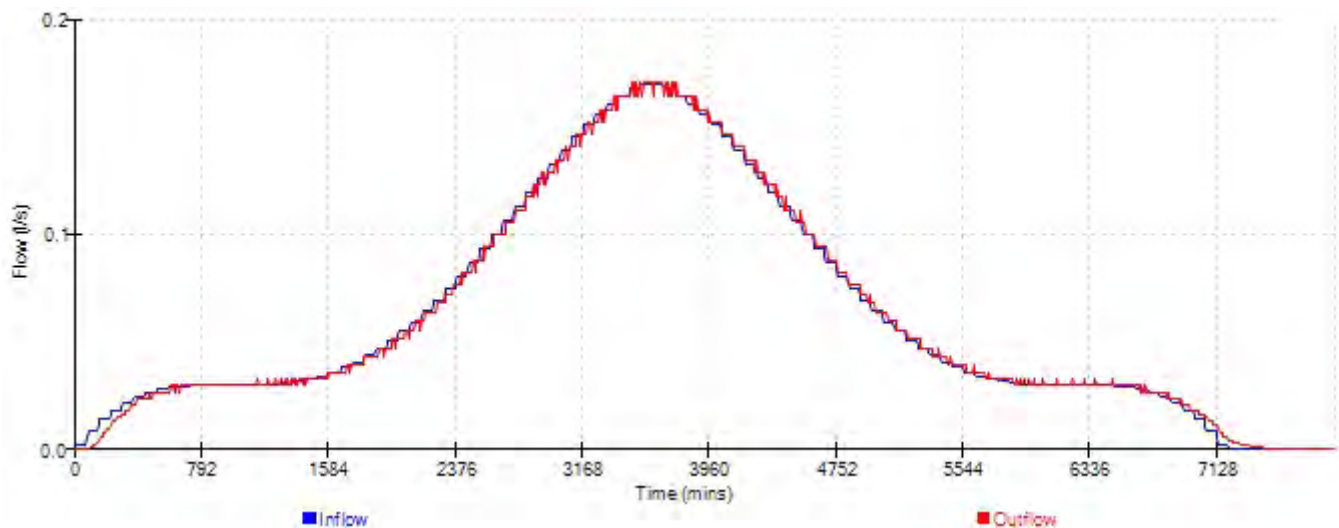
Event: 4320 min Winter



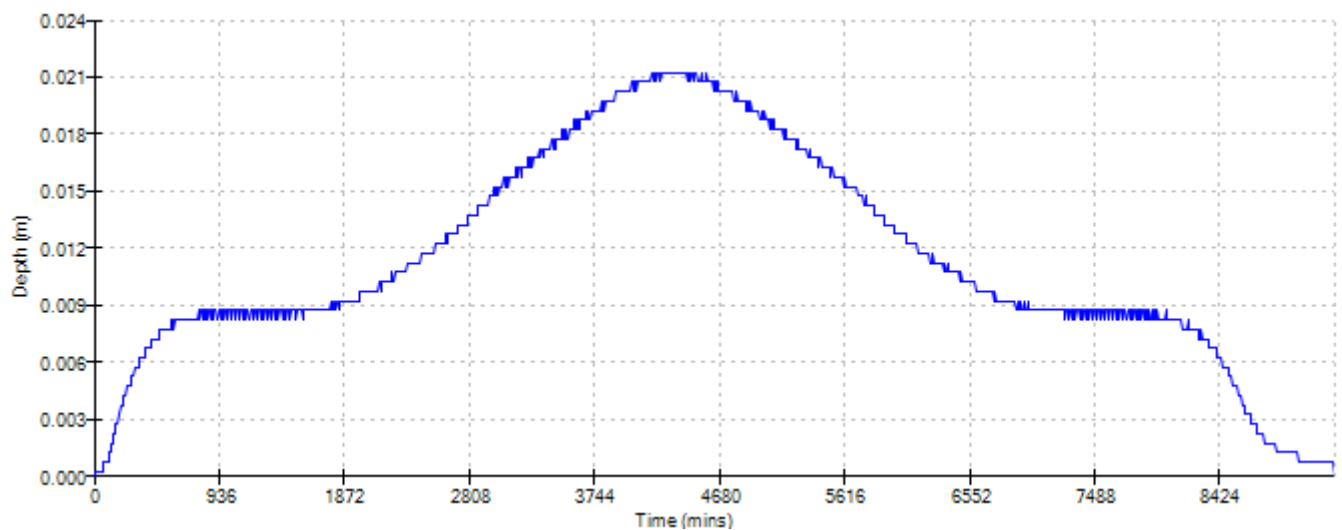
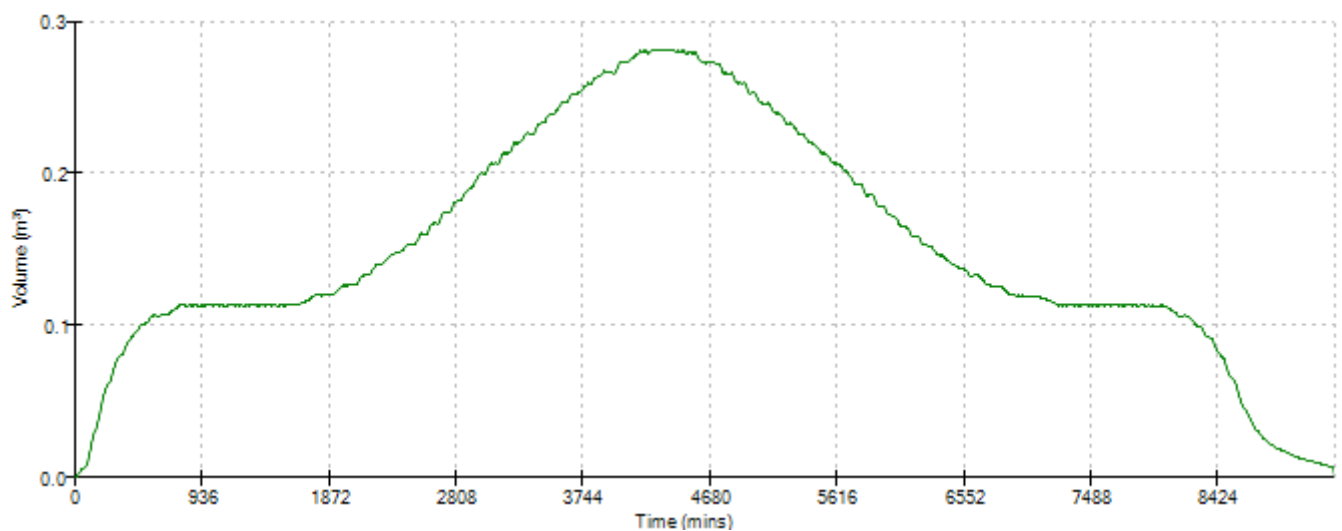
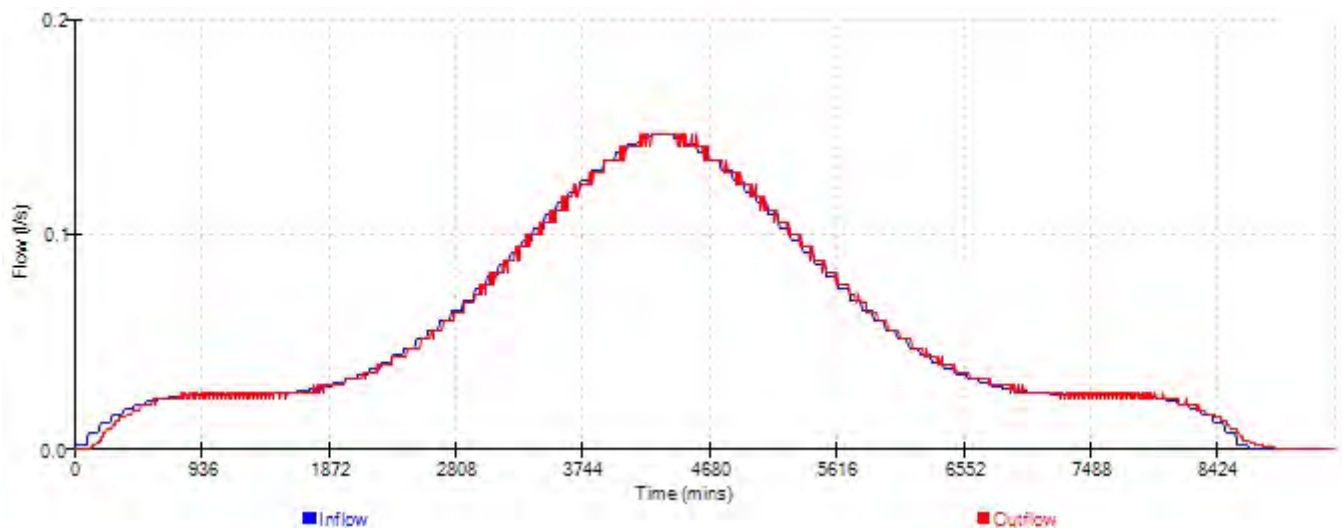
Event: 5760 min Winter



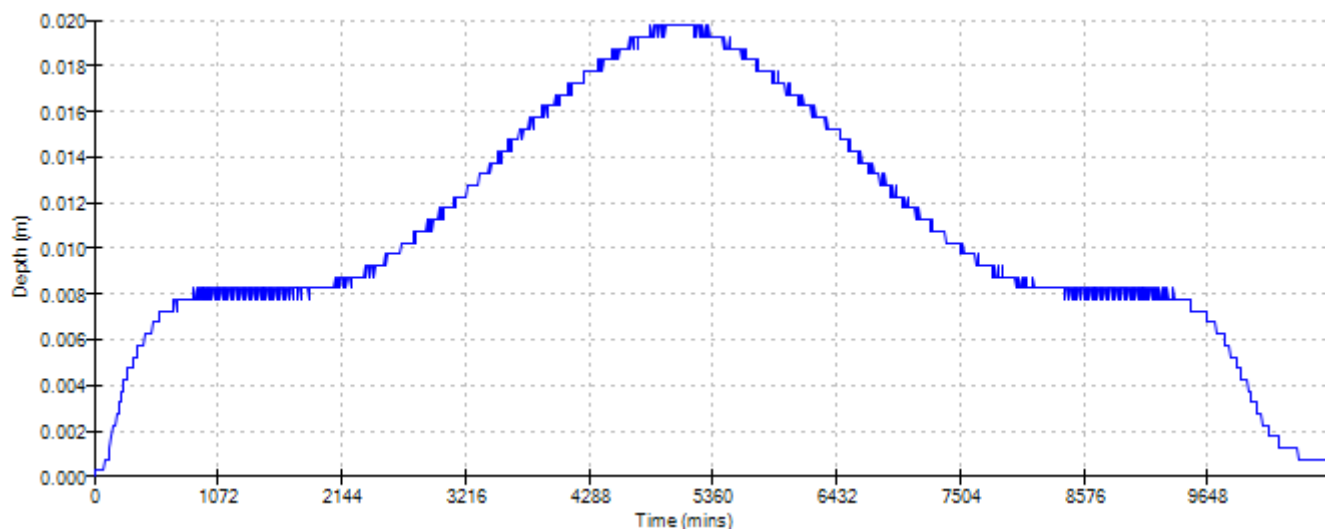
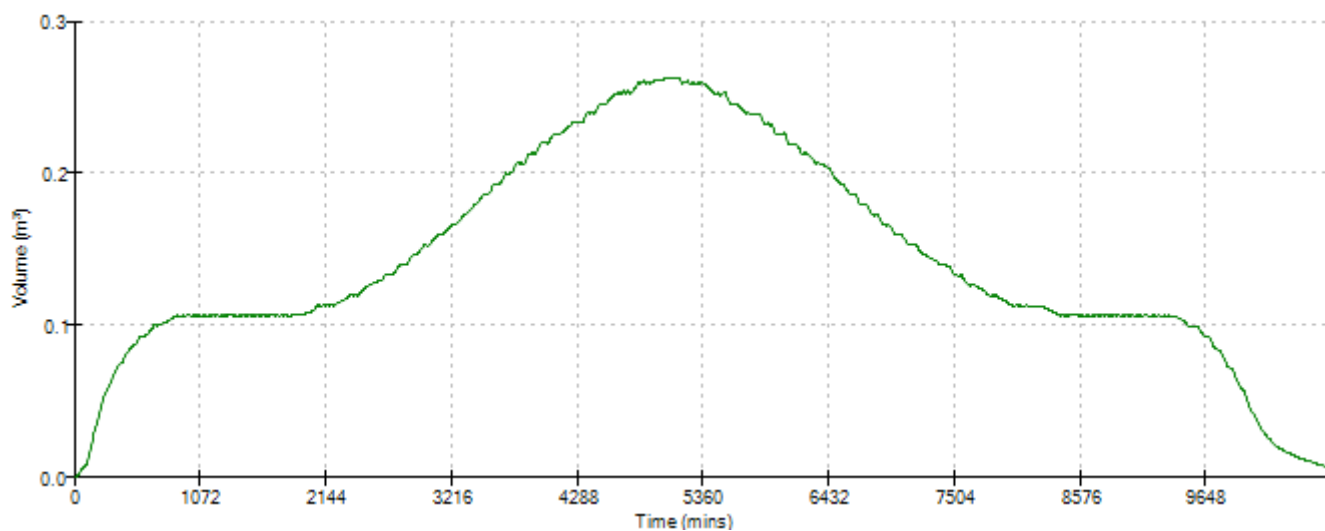
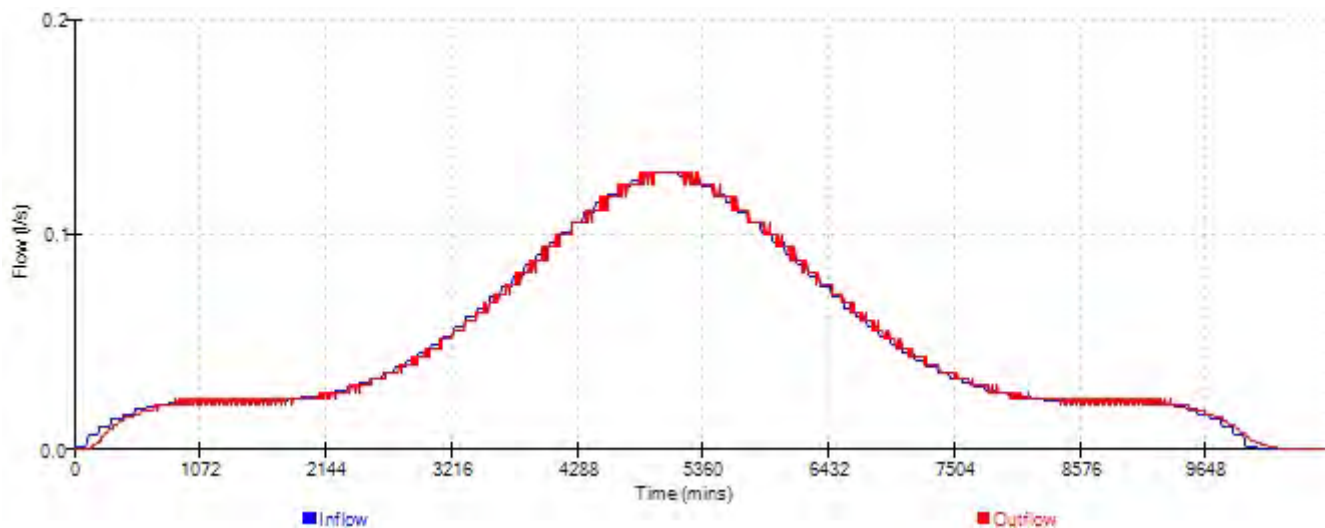
Event: 7200 min Winter



Event: 8640 min Winter



Event: 10080 min Winter



APPENDIX F – SUDS FEATURE FUTURE MAINTENANCE SCHEDULES

Operation and maintenance requirements for Rainwater Harvesting (Waterbutts)		
Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Inspection of the tank for debris and sediment build-up, inlets/outlets/withdrawal devices, overflow areas, pumps, filters.	Annually (and following poor performance)
	Cleaning of tank inlets, outlets, gutters, withdrawal devices and roof drain filters of silts and other debris.	Annually (and following poor performance)
Occasional maintenance	Cleaning and/or replacement of any filters.	Three monthly (or as required)
Remedial actions	Repair of overflow erosion damage or damage to tank	As required
	Pump repairs	As required

Maintenance procedures must be carried out as per CIRIA guidance C753 - The SuDS Manual page 229.

Operation and maintenance requirements for Proprietary Treatment Systems		
Maintenance Schedule	Required Action	Typical Frequency
Regular Inspections	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary- indicated by system inspections or immediately following significant spill
Regular Maintenance	Replacement of any filters	Three monthly (or as required)
Remedial Actions	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

Maintenance procedures must be carried out as per CIRIA guidance C753 - The SuDS Manual page 287.

Operation and maintenance requirements for Trees		
Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris.	Monthly (or as required)
	Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required).
Occasional maintenance	Check tree health and manage tree appropriately.	Annually
	Remove silt build-up from inlets and surface and replace mulch as necessary.	Annually, or as required.
	Water.	As required (in periods of drought).
Monitoring	Inspect silt accumulation rates and establish appropriate removal frequencies.	Half yearly

Maintenance procedures must be carried out as per CIRIA guidance C753 - The SuDS Manual page 382.

Operation and maintenance requirements for Attenuation Storage Tanks		
Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually.
	Remove debris from the catchment surface (where it may cause risks to performance).	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockages by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and / or internal forebays.	Annually, or as required
Remedial actions	Repair / rehabilitate inlets, outlets, overflows and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tank for sediment build-up and remove if necessary.	Every 5 years or as required.

Maintenance procedures must be carried out as per CIRIA guidance C753 - The SuDS Manual page 468.