

Drainage Strategy Technical Note

Upper Brook Street, Manchester

UBS-HDR-BB-XX-DN-C-100001

240 Blackfriars Road
May 8, 2025

Document Control

Issue	Date	Status	HDR Author	HDR Approval	Notes
P01	08.05.2025	Issued for planning condition discharge	I McLean	S Marks	

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1 Introduction

HDR have been appointed by Kadans Science Partner Ltd to provide drainage services in relation to a McLaren/Kadans development of the Upper Brook Street Masterplan which consists of a Sci-Tech development in the southern half of the site (Block B) and a PBSA development in the northern half.

Separate drainage strategies have been developed for the Sci-Tech and PBSA developments. This technical note presents both strategies together to facilitate a single submission to be made to discharge planning conditions.

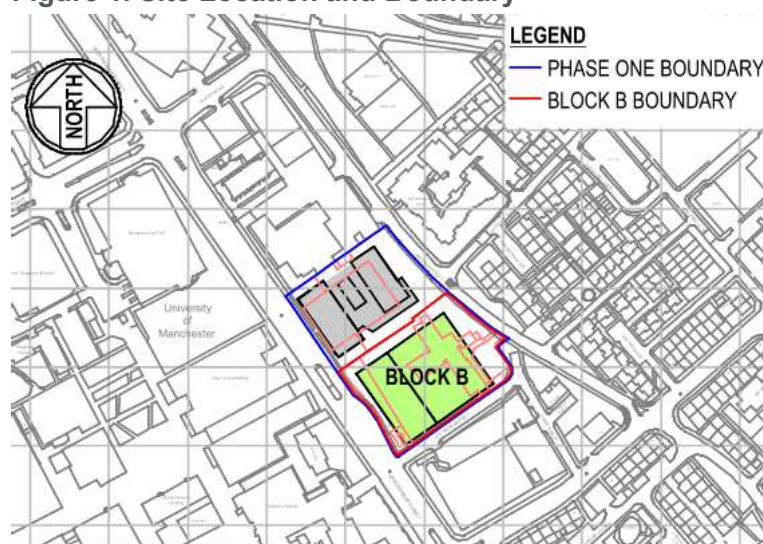
This note has been prepared, alongside a combined drainage strategy drawing (UBS-HDR-BB-XX-DR-C-102100 included in Appendix A) and associated calculations (UBS-HDR-BB-XX-CA-C-100001 included in Appendix B and MAUBS-ROS-ZZ-XX-RP-C-00001 included in Appendix C).

1.1 Site Description

The McLaren/Kadans development forms one element of the wider Upper Brook Street Illustrative Masterplan which can be seen within the submitted Supporting Planning Statement.

The masterplan proposals are being brought forward by Kadans Science Partner, McLaren Property, Property Alliance Group and Moda Living. The masterplan intends to transform the currently vacant sites, re-establishing their important role in the area by re-introducing permeability, public realm, and active community-facing uses at ground floor. The emerging masterplan includes 2.9 acres of new public realm and green spaces, a new public square, as well as a series of high-quality new buildings of varying heights to provide for approximately 700,000ft² of sci-tech accommodation, 1,800 purpose-built student accommodation beds, and 25,000ft² of active ground floor uses.

Figure 1. Site Location and Boundary



The McLaren/Kadans Site (Figure 1) is approximately 1.084 hectares (ha) in size and is located in Manchester, between Upper Brook Street to the southwest, Kincardine Road to the northeast and Cottenham Street to the southeast.

The Site is partially in use as a temporary paid car park. The paid car park is located on a section of the Site which was formerly in use as a Citroën car dealership and is accessed from both Upper Brook Street (UBS) to the southwest and Kincardine Road to the northeast. On this section of the site a PBSA building is proposed, as previously mentioned.

The remainder of the Site designated as Block B and allocated for a Sci-Tech development comprises the former sheltered housing scheme that ceased to be operational in June 2021 and associated landscape and parking areas. The far southwest of the Site is covered by a canopy associated with a disused car showroom.

2 Proposed Surface Water Drainage

2.1 Sci-Tech Development

The Sci-Tech development drainage strategy is based on a betterment of the existing site discharge rate. Through correspondence with UU in March 2024 a rate of 5l/s was agreed to be appropriate for the proposed development. The site will discharge to a new combined sewer manhole via a vortex flow control device set to restrict flows to 5l/s. The site's surface and foul water will then be discharged together into the existing UU combined sewer manhole located in the junction between Cottenham Street and Cabot Street.

Storm water attenuation has been sized using Infodrainage analysis for a 1 in 100-year storm plus an additional 45% allowance for climate change. The attenuation volume required to restrict the site discharge to a rate of 5l/s whilst preventing flooding on site is 240m³.

2.2 PBSA Development

The PBSA drainage strategy is based upon betterment on existing site flow rate, as agreed with both the LLFA and UU at an early stage in design. A flow rate was stipulated by UU at 26l/s, a betterment on existing flow rate. The 26l/s flow rate is to be capped utilising a vortex flow control.

The storm water attenuation has been sized using Infodrainage analysis for a 1 in 100-year storm plus 45% climate change. The attenuation required consists of two below ground attenuation tanks, with potential for ground level raingardens within the landscape. An attenuation tank, totalling 130m³ of storage will serve the proposed development.

The surface water networks discharge to a 525mm dia. combined sewer within the site, the 525mm combined sewer ultimately exits the site via Kincardine Road.

3 Summary

The proposed network has been designed using sustainable techniques while addressing all environmental considerations in conjunction with the landscaping proposals, to provide a robust, sustainable, compliant design. This network developed in agreement with the LLFA provides a betterment to the existing situation but ensures that no neighbouring properties will be affected by the runoff generated by the proposed development.

Appendix A. Combined Drainage Strategy

- [illegible]

• SITE PLAN "SHEPARD ROBSON"
DWG NO.: UBS-SRA-ZZ-00-DR-A-201000 REV P07.

9. SURFACE WATER NETWORK ANALYSIS IS BASED ON FSR METHOD. SIZING OF THE DRAINAGE COMPONENTS FOR 1 IN 100 YRS. 45% CLIMATE CHANGE STORM.

10. SURFACE WATER FLOW FROM SERVICE YARD IS COLLECTED VIA CHANNEL DRAINS.

12. ALL DOWN PIPES TO HAVE RODDING ACCESS BEFORE ENTERING BELOW GROUND.

14. ALL INTERNAL MANHOLES TO HAVE RECESSED COVERS AND TO BE DOUBLE SEALED AND LOCKED. ALL MANHOLES WITHIN HARD PAVED AREAS TO HAVE RECESSED COVERS.

LEGEND

PROPERTY BOUNDARY
PROPOSED SW PIPE

PROPOSED RAIN GARDEN

UNDERDRAIN (PERFORATED PIPE)
PROPOSED RAIN WATER PIPE
RWIP®

PROPOSED SW INSPECTION CHAMBER	PROPOSED SW MAINHOLE
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PROPOSED HYDRO-BRAKE MAINHOLE

LINEAR DRAINAGE CHANNEL

PROPOSED FOUL WATER INFLECTION NUMBER	(TO ARCHITECT'S SPECIFICATION)
1	

PROPOSED FOUL WATER MANHOLE

PROPOSED FOUL WATER PIPE

FG ■ PROPOSED FOUL GULLY
SS/S/P ◆ SUB-STACK / SOIL VENT PIPE

WP	WASTE PIPE
BD	BACKDROP

PROPOSED COMBINED WATER SEWER

EXISTING MANHOLE

— · — · — EXISTING COMBINED SEWER
- - - - - FILTER DRAIN

P01	FIRST ISSUE	24/03/25
Rev	Description	Date

Crawing Status:	STAGE 4 ISSUE	Satisfy	S3
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Client: **VADANC SCIENCE PARTNERS**

Architect:

Project:	
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UPPER BROOK STREET
MANCHESTER

DRAINAGE LAYOUT

UBS-HDR-8B-XX-DR-C-102100

Drawn: IJM	Checked: SM	Date: 24.03.25	Scale @ A1: 1:250
Drawing Number:			Revision:

5	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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Appendix B. Sci-Tech Development Calculations

Upper Brook St.: Drainage Calculations	Date: 17/03/2025		
	Designed by: IJM	Checked by:	Approved By:
Report Details: Type: Inflows Storm Phase: Phase	HDR: 240 Blackfriars Road London		





SWMH02

Type : Catchment Area

Area (ha)	0.054
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Dynamic Sizing	
Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	10
Percentage Impervious (%)	100



SWMH04

Type : Catchment Area

Area (ha)	0.023
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Dynamic Sizing	
Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100



SWMH01

Type : Catchment Area

Area (ha)	0.037
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Dynamic Sizing	
Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	10
Percentage Impervious (%)	100



SWMH08

Type : Catchment Area

Area (ha)	0.049
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Dynamic Sizing	
Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	20
Percentage Impervious (%)	100

Upper Brook St.: Drainage Calculations	Date: 17/03/2025			
	Designed by: IJM	Checked by:	Approved By:	
Report Details: Type: Inflows Storm Phase: Phase	HDR: 240 Blackfriars Road London			



SWMH14

Type : Catchment Area

Area (ha)	0.04
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Dynamic Sizing	
Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	15
Percentage Impervious (%)	100



SWMH09

Type : Catchment Area

Area (ha)	0.056
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Dynamic Sizing	
Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100



SWMH13

Type : Catchment Area

Area (ha)	0.036
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Dynamic Sizing	
Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	10
Percentage Impervious (%)	100



ATT TANK 01

Type : Catchment Area

Area (ha)	0.086
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Dynamic Sizing	
Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Upper Brook St.: Drainage Calculations	Date: 17/03/2025			
	Designed by: IJM	Checked by:	Approved By:	
Report Details: Type: Inflows Storm Phase: Phase	HDR: 240 Blackfriars Road London			



SWMH05

Type : Catchment Area

Area (ha)	0.029
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	10
Percentage Impervious (%)	100



ATT TANK 02

Type : Catchment Area

Area (ha)	0.057
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100



SWMH03

Type : Catchment Area

Area (ha)	0.017
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	10
Percentage Impervious (%)	100

Upper Brook St.: Drainage Calculations	Date: 17/03/2025			
	Designed by: IJM	Checked by:	Approved By:	
Report Details:	HDR:			
Type: Junctions Storm Phase: Phase	240 Blackfriars Road London			

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
SWMH51	Manhole	384823.179	396821.166	38.588	1.032	37.556	Circular	0.600
SWMH52	Manhole	384837.922	396800.261	38.594	0.868	37.726	Circular	0.600
SWMH54	Manhole	384858.755	396814.413	38.618	2.129	36.489	Circular	0.600
SWMH63	Manhole	384865.652	396819.106	38.612	2.179	36.433	Circular	0.600
SWMH55	Manhole	384896.104	396839.870	38.585	2.418	36.167	Circular	1.200
SWMH56	Manhole	384895.753	396845.822	38.601	2.503	36.098	Circular	1.200
SWMH58	Manhole	384805.163	396846.661	38.497	1.149	37.348	Circular	0.600
SWMH59	Manhole	384861.525	396885.380	38.583	2.206	36.377	Circular	0.600
SWMH60	Manhole	384875.351	396871.843	38.579	2.389	36.190	Circular	1.200
SWMH57	Manhole	384897.386	396846.870	38.648	2.988	35.660	Circular	1.500
CWMH51	Manhole	384901.102	396847.336	38.730	3.447	35.283	Circular	1.200
SWMH53	Manhole	384879.774	396828.682	38.600	2.281	36.319	Circular	0.600
SWMH64	Manhole	384837.514	396869.275	38.570	1.681	36.889	Circular	0.600

Name	Lock
SWMH51	None
SWMH52	None
SWMH54	None
SWMH63	None
SWMH55	None
SWMH56	None
SWMH58	None
SWMH59	None
SWMH60	None
SWMH57	None
CWMH51	None
SWMH53	None
SWMH64	None

Upper Brook St.: Drainage Calculations	Date: 17/03/2025		
	Designed by: IJM	Checked by:	Approved By:
Report Details: Type: Junctions Storm Phase: Phase	HDR: 240 Blackfriars Road London		



Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
SWMH51	Outlet	S1.001	Free Discharge
SWMH52	Outlet	S1.000	Free Discharge
SWMH54	Outlet	S1.002	Free Discharge
SWMH63	Outlet	S1.003	Free Discharge
SWMH55	Outlet	S1.005	Free Discharge
SWMH56	Outlet	Pipe (1)	Free Discharge
SWMH58	Outlet	S2.000	Free Discharge
SWMH59	Outlet	S2.002	Free Discharge
SWMH60	Outlet	S2.003	Free Discharge
SWMH57	Outlet	S1.007	Hydro-Brake®
	Invert Level (m)	35.660	
	Design Depth (m)	2.800	
	Design Flow (L/s)	5.0	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	☐	
	Unit Reference	CHE-0079-5000-2800-5000	
SWMH53	Outlet	S1.004	Free Discharge
SWMH64	Outlet	S2.001	Free Discharge

Upper Brook St.: Drainage Calculations	Date: 17/03/2025			
	Designed by: IJM	Checked by:	Approved By:	
Report Details: Type: Stormwater Controls Storm Phase: Phase	HDR: 240 Blackfriars Road London			



Attenuation Tank 2

Type : Cellular Storage

Dimensions	
Exceedance Level (m)	38.600
Depth (m)	1.200
Base Level (m)	36.098
Number of Crates Long	51
Number of Crates Wide	8
Number of Crates High	3
Porosity (%)	95
Crate Length (m)	0.5
Crate Width (m)	1
Crate Height (m)	0.4
Total Volume (m³)	233.862

Outlets	
Outlet	
Outgoing Connection	Pipe (2)
Outlet Type	Free Discharge

Upper Brook St.: Drainage Calculations		Date: 17/03/2025			
		Designed by: IJM	Checked by:		Approved By:
Report Details: Type: Inflow Summary Storm Phase: Phase		HDR: 240 Blackfriars Road London			

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
ATT TANK 01	Attenuation Tank 2		Time of Concentration	0.086	100	0	100	0.086
ATT TANK 02	Attenuation Tank 2		Time of Concentration	0.057	100	0	100	0.057
SWMH01	SWMH51		Time of Concentration	0.037	100	0	100	0.037
SWMH02	SWMH52		Time of Concentration	0.054	100	0	100	0.054
SWMH03	SWMH53		Time of Concentration	0.017	100	0	100	0.017
SWMH04	SWMH54		Time of Concentration	0.023	100	0	100	0.023
SWMH05	SWMH55		Time of Concentration	0.029	100	0	100	0.029
SWMH08	SWMH58		Time of Concentration	0.049	100	0	100	0.049
SWMH09	SWMH59		Time of Concentration	0.056	100	0	100	0.056
SWMH13	SWMH63		Time of Concentration	0.036	100	0	100	0.036
SWMH14	SWMH64		Time of Concentration	0.040	100	0	100	0.040
TOTAL		0.0		0.484				0.484

Upper Brook St.: Drainage Calculations	Date: 17/03/2025			
	Designed by: IJM	Checked by:	Approved By:	
Report Details: Type: Rainfall Analysis Criteria	HDR: 240 Blackfriars Road London			

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall	
FSR	Type: FSR
Region	England And Wales
M5-60 (mm)	18.0
Ratio R	0.364
Summer	☒
Winter	☒

Return Period

Return Period (years)	Increase Rainfall (%)
1.0	0.000
30.0	0.000
100.0	45.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
240	480
360	720
480	960
960	1920
1440	2880

Upper Brook St.: Drainage Calculations	Date: 17/03/2025		
	Designed by: IJM	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	HDR: 240 Blackfriars Road London		





Critical Storm Per Item: Rank By: Max. Outflow

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SWMH51	FSR: 100 years: +45 %: 30 mins: Winter	38.588	37.556	37.749	0.193	33.8	0.055	0.000	33.8	31.474	OK
SWMH52	FSR: 100 years: +45 %: 30 mins: Winter	38.594	37.726	37.835	0.109	20.2	0.031	0.000	20.0	18.692	OK
SWMH54	FSR: 100 years: +45 %: 15 mins: Winter	38.618	36.489	36.680	0.191	12.9	0.054	0.000	12.7	5.790	OK
SWMH63	FSR: 100 years: +45 %: 15 mins: Winter	38.612	36.433	36.680	0.247	25.5	0.070	0.000	24.7	14.573	Surcharged
SWMH55	FSR: 100 years: +45 %: 15 mins: Winter	38.585	36.167	36.680	0.513	40.1	0.580	0.000	36.9	24.357	Surcharged
SWMH56	FSR: 100 years: +45 %: 15 mins: Winter	38.601	36.098	36.680	0.582	36.9	0.658	0.000	35.8	23.729	Surcharged
SWMH58	FSR: 100 years: +45 %: 15 mins: Winter	38.497	37.348	37.610	0.262	42.0	0.074	0.000	41.9	35.782	Surcharged
SWMH59	FSR: 100 years: +45 %: 30 mins: Winter	38.583	36.377	37.112	0.735	68.8	0.208	0.000	67.9	80.102	Surcharged
SWMH60	FSR: 100 years: +45 %: 30 mins: Winter	38.579	36.190	36.876	0.686	67.9	0.776	0.000	67.0	78.797	Surcharged
SWMH57	FSR: 100 years: +45 %: 480 mins: Winter	38.648	35.660	38.514	2.854	6.0	5.044	0.000	5.0	205.609	Flood Risk
CWMH51	FSR: 100 years: +45 %: 480 mins: Winter	38.730	35.283	35.310	0.027	5.0	0.000	0.000	5.0	205.582	OK
SWMH53	FSR: 100 years: +45 %: 15 mins: Winter	38.600	36.319	36.680	0.361	30.8	0.102	0.000	29.7	18.002	Surcharged
SWMH64	FSR: 100 years: +45 %: 15 mins: Winter	38.570	36.889	37.333	0.444	53.4	0.126	0.000	53.5	46.009	Surcharged

Upper Brook St.: Drainage Calculations	Date: 17/03/2025			
	Designed by: IJM	Checked by:	Approved By:	
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	HDR: 240 Blackfriars Road London			



Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Attenuation Tank 2	FSR: 100 years: +45 %: 480 mins: Winter	38.515	38.515	2.417	2.417	31.5	233.785	0.000	0.000	6.0	209.736	0.033	OK

Appendix C. PBSA Development Calculations

Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025		
Report Details: Type: Inflows Storm Phase: Phase	Designed by: JT	Checked by:	Approved By:
Roscoe :		 Roscoe CIVIL & STRUCTURAL ENGINEERS INSPIRING BUILT ENVIRONMENTS	



Catchment Area

Type : Catchment Area

Area (ha)	0.099
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (1)

Type : Catchment Area

Area (ha)	0.062
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (2)

Type : Catchment Area

Area (ha)	0.096
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100



Catchment Area (3)

Type : Catchment Area

Area (ha)	0.079
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025		
Report Details: Type: Inflows Storm Phase: Phase	Designed by: JT	Checked by:	Approved By:
Roscoe :			 Roscoe CIVIL & STRUCTURAL ENGINEERS INSPIRING BUILT ENVIRONMENTS



Catchment Area (4)

Type : Catchment Area

Area (ha)	0.121
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission		Date: 27/02/2025	
Report Details: Type: Junctions Storm Phase: Phase		Designed by: JT	Checked by:
		Approved By:	
		Roscoe :	



Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
MH04	Manhole	384798.559	396856.203	38.400	0.760	37.640	Circular	1.200
MH05	Manhole	384819.838	396871.072	38.530	1.147	37.383	Circular	1.200
MH06	Manhole	384845.030	396888.662	38.540	1.361	37.179	Circular	1.200
MH03	Manhole	384847.899	396896.040	38.580	1.942	36.638	Circular	1.200
Outfall	Manhole	384853.378	396902.338	38.730	3.230	35.500	Circular	1.200
FC01	Manhole	384853.478	396899.551	38.880	3.154	35.726	Circular	1.200
MH02	Manhole	384820.397	396930.846	38.575	1.491	37.084	Circular	1.200
MH01	Manhole	384779.405	396903.605	38.600	1.190	37.410	Circular	1.200

Name	Lock
MH04	None
MH05	None
MH06	None
MH03	None
Outfall	None
FC01	None
MH02	None
MH01	None

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
MH04	Inlet	Catchment Area	(None)	No Restriction
MH05	Inlet	04 -> 05	(None)	No Restriction
	Inlet (1)	Catchment Area (1)	(None)	No Restriction
MH06	Inlet	05 -> 06	(None)	No Restriction
	Inlet (1)	Catchment Area (2)	(None)	No Restriction
MH03	Inlet	02 -> 03	(None)	No Restriction
Outfall	Inlet	FC01 -> Outfall	(None)	No Restriction
FC01	Inlet	Tank 1 -> FC01	(None)	No Restriction
MH02	Inlet	01 -> 02	(None)	No Restriction
	Inlet (1)	Catchment Area (4)	(None)	No Restriction
MH01	Inlet	Catchment Area (3)	(None)	No Restriction

Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025		
Report Details: Type: Junctions Storm Phase: Phase	Designed by: JT	Checked by:	Approved By:
	Roscoe :		



Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
MH04	Outlet	04 -> 05	Free Discharge
MH05	Outlet	05 -> 06	Free Discharge
MH06	Outlet	06 -> Tank 1	Free Discharge
MH03	Outlet	03 -> Tank 1	Free Discharge
FC01	Outlet	FC01 -> Outfall	Hydro-Brake®
	Invert Level (m)	35.726	
	Design Depth (m)	2.600	
	Design Flow (L/s)	26.0	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	☐	
	Unit Reference	CHE-0185-2600-2600-2600	
MH02	Outlet	02 -> 03	Free Discharge
MH01	Outlet	01 -> 02	Free Discharge

Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025		
Report Details: Type: Stormwater Controls Storm Phase: Phase	Designed by: JT	Checked by:	Approved By:
Roscoe :			 Roscoe CIVIL & STRUCTURAL ENGINEERS INSPIRING BUILT ENVIRONMENTS



Attenuation tank 1

Type : Tank

Dimensions

Exceedence Level (m)	37.780
Depth (m)	2.000
Base Level (m)	35.780
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:x)	0.00
Total Volume (m³)	130.000

Depth (m)	Area (m²)	Volume (m³)
0.000	65.00	0.000
2.000	65.00	130.000

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	06 -> Tank 1 03 -> Tank 1
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Tank 1 -> FC01
Outlet Type	Free Discharge

Advanced

Perimeter	Circular
Length (m)	13.116

Upper Brook St:	Date:		
Drainage Calculations	27/02/2025		
100yr + 45%CC	Designed by:	Checked by:	Approved By:
Gateway 2 Submission	JT		
Report Details:	Roscoe :		
Type: Network Design Criteria			
Storm Phase: Phase			



Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

Pipe Options

Lock Slope Options	None
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:x)	500.00
Max. Slope (1:x)	40.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Pipe Size Library

Default

Add. Increment (mm)	75
---------------------	----

Diameter (mm)	Min. Slope (1:x)	Max. Slope (1:x)
100	0.00	0.00
150	0.00	0.00

Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025		
Report Details: Type: Network Design Criteria Storm Phase: Phase	Designed by: JT	Checked by:	Approved By:
Roscoe :		 Roscoe CIVIL & STRUCTURAL ENGINEERS INSPIRING BUILT ENVIRONMENTS	

Manhole Options

Apply Offset	☐
Synchronise Manhole Invert Levels	☒

Manhole Size Library

Default

Diameter / Width

Connection (mm)	Diameter / Length (m)	Width (m)
0	1.200	0.000
375	1.350	0.000
500	1.500	0.000
750	1.800	0.000

Additional Sizing

Connection (mm)	900
Diameter / Length (m)	0.900
Width (m)	0.000

Depth

Depth (m)	Diameter / Length (m)	Width (m)
0.000	1.050	0.000
1.500	1.200	0.000

Access

Depth (m)	Ladder Protrusion (mm)
0.000	130
3.000	230

Benching Requirements

Landing Width (mm)	500
Benching Width (mm)	225

Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025		
	Designed by: JT	Checked by:	Approved By:
Report Details: Type: Outfall Details Storm Phase: Phase	Roscoe :		


Roscoe
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INSPIRING BUILT ENVIRONMENTS

Outfalls

Outfall	Outfall Type	Fixed Surcharged Level (m)	Level Curve
Outfall	Free Discharge		

Upper Brook St:	Date:		
Drainage Calculations	27/02/2025		
100yr + 45%CC	Designed by:	Checked by:	Approved By:
Gateway 2 Submission	JT		
Report Title:	Roscoe :		
Rainfall Analysis Criteria			



Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025		
Report Details: Type: Inflows Summary Storm Phase: Phase	Designed by: JT	Checked by:	Approved By:
Roscoe :			



Critical Storm

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow (m³)
Catchment Area	FSR: 100 years: +45 %: 15 mins: Winter	0.10	55.1	25.446
Catchment Area (1)	FSR: 100 years: +45 %: 15 mins: Winter	0.06	34.7	16.054
Catchment Area (2)	FSR: 100 years: +45 %: 15 mins: Winter	0.10	53.2	24.585
Catchment Area (3)	FSR: 100 years: +45 %: 15 mins: Winter	0.08	44.1	20.360
Catchment Area (4)	FSR: 100 years: +45 %: 15 mins: Winter	0.12	67.5	31.185

Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025		
Report Details: Type: Junctions Summary Storm Phase: Phase	Designed by: JT	Checked by:	Approved By:
Roscoe :			 Roscoe CIVIL & STRUCTURAL ENGINEERS INSPIRING BUILT ENVIRONMENTS



Critical Storm

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH04	FSR: 100 years: +45 %: 15 mins: Winter	38.40 0	37.64 0	37.911	0.271	55.1	0.306	0.000	50.6	25.451	Surcharged
MH05	FSR: 100 years: +45 %: 60 mins: Winter	38.53 0	37.38 3	37.757	0.374	45.9	0.423	0.000	45.9	71.386	Surcharged
MH06	FSR: 100 years: +45 %: 60 mins: Winter	38.54 0	37.17 9	37.755	0.576	73.1	0.651	0.000	73.1	113.568	Surcharged
MH03	FSR: 100 years: +45 %: 60 mins: Winter	38.58 0	36.63 8	37.754	1.116	55.1	1.262	0.000	54.8	87.069	Surcharged
Outfall	FSR: 100 years: +45 %: 480 mins: Winter	38.73 0	35.50 0	35.556	0.056	24.5	0.000	0.000	24.5	355.998	OK
FC01	FSR: 100 years: +45 %: 60 mins: Winter	38.88 0	35.72 6	37.748	2.022	25.5	2.287	0.000	24.4	128.725	Surcharged
MH02	FSR: 100 years: +45 %: 60 mins: Winter	38.57 5	37.08 4	37.758	0.674	57.0	0.763	0.000	55.1	88.423	Surcharged
MH01	FSR: 100 years: +45 %: 60 mins: Winter	38.60 0	37.41 0	37.762	0.352	22.5	0.398	0.000	22.5	34.886	Surcharged

Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission		Date: 27/02/2025			
		Designed by: JT	Checked by:	Approved By:	
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		Roscoe :			



Critical Storm

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Attenuation tank 1	FSR: 100 years: +45 %: 60 mins: Winter	37.752	37.752	1.972	1.972	126.4	128.206	0.000	0.000	25.5	130.230	1	OK

Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025		
Report Details: Type: Connections Summary Storm Phase: Phase	Designed by: JT	Checked by:	Approved By:
Roscoe :			 Roscoe CIVIL & STRUCTURAL ENGINEERS INSPIRING BUILT ENVIRONMENTS



Critical Storm

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
04 -> 05	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	MH04	MH05	38.4	37.911	0.225	25.451	1.3	0.98	50.6	Surcharged
05 -> 06	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	MH05	MH06	38.5	37.616	0.175	41.488	1.9	0.91	82.7	OK
06 -> Tank 1	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	MH06	Attenuation tank 1	38.5	37.295	0.300	66.007	2.4	0.33	135.1	OK
Tank 1 -> FC01	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	Attenuation tank 1	FC01	37.8	37.364	0.300	60.222	0.5	0.23	26.7	Surcharged
FC01 -> Outfall	FSR: 100 years: +45 %: 480 mins: Winter	Pipe	FC01	Outfall	38.9	36.873	0.061	355.998	2.4	0.08	24.5	Surcharged
01 -> 02	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	MH01	MH02	38.6	37.587	0.213	18.183	1.0	0.93	39.1	OK
02 -> 03	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	MH02	MH03	38.6	37.342	0.300	51.173	2.3	0.93	103.2	OK
03 -> Tank 1	FSR: 100 years: +45 %: 15 mins: Winter	Pipe	MH03	Attenuation tank 1	38.6	37.232	0.300	48.651	1.8	0.25	102.3	Surcharged

Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025		
	Designed by: JT	Checked by:	Approved By:
Report Details: Type: Phase Management Storm Phase: Phase	Roscoe :		



Roscoe
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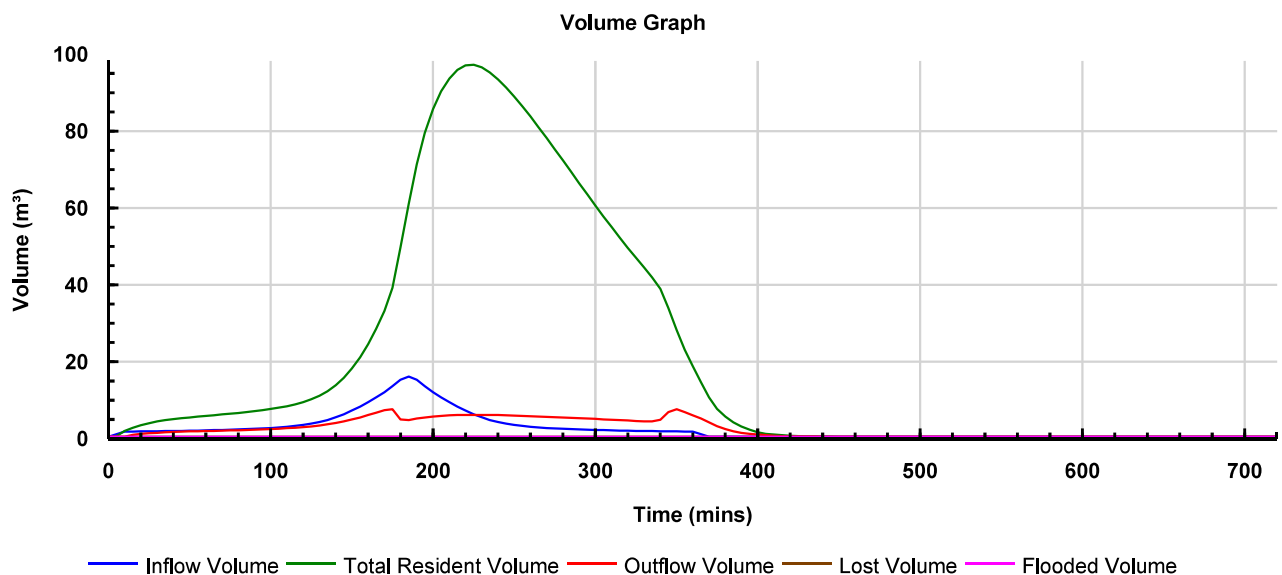
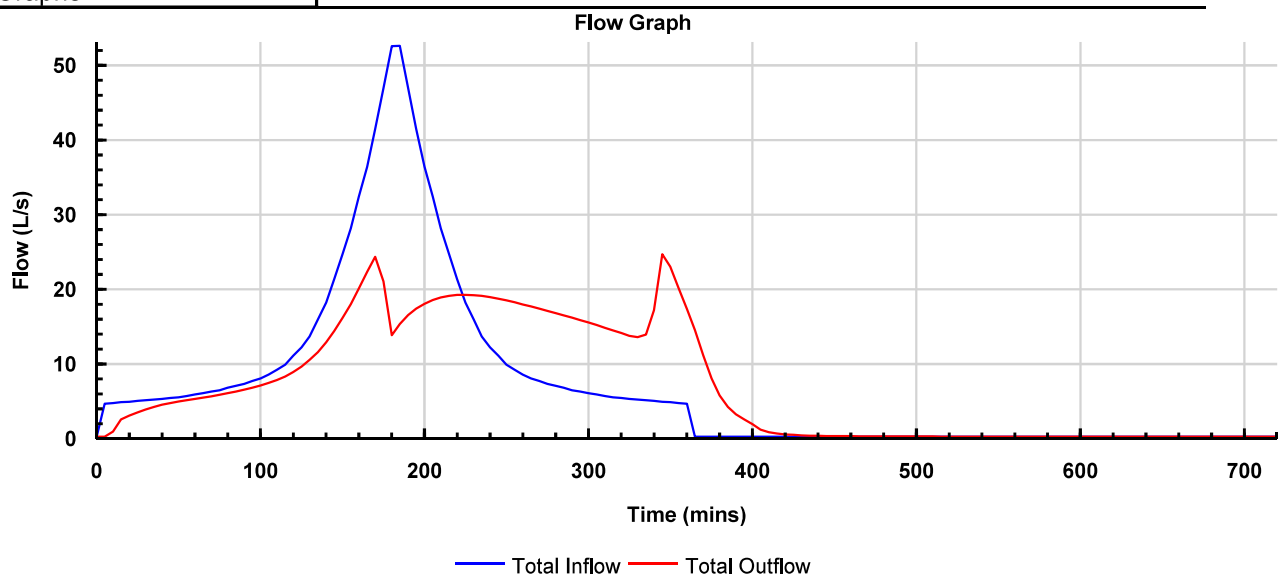


Phase
FSR: 100 years: Increase Rainfall (%): +45: 360 mins: Summer

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
Outfall			24.5	296.882
TOTAL	52.6	296.995	24.5	296.882

Graphs



Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025		
	Designed by: JT	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Roscoe :		

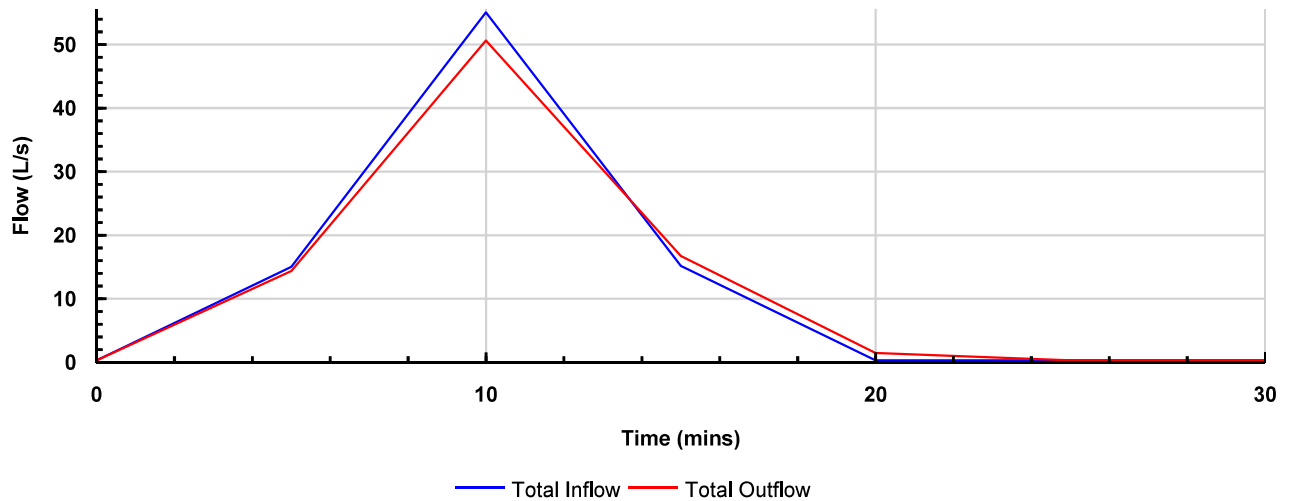


MH04
Critical Storm: FSR: 100 years: Increase Rainfall (%): +45: 15 mins: Winter

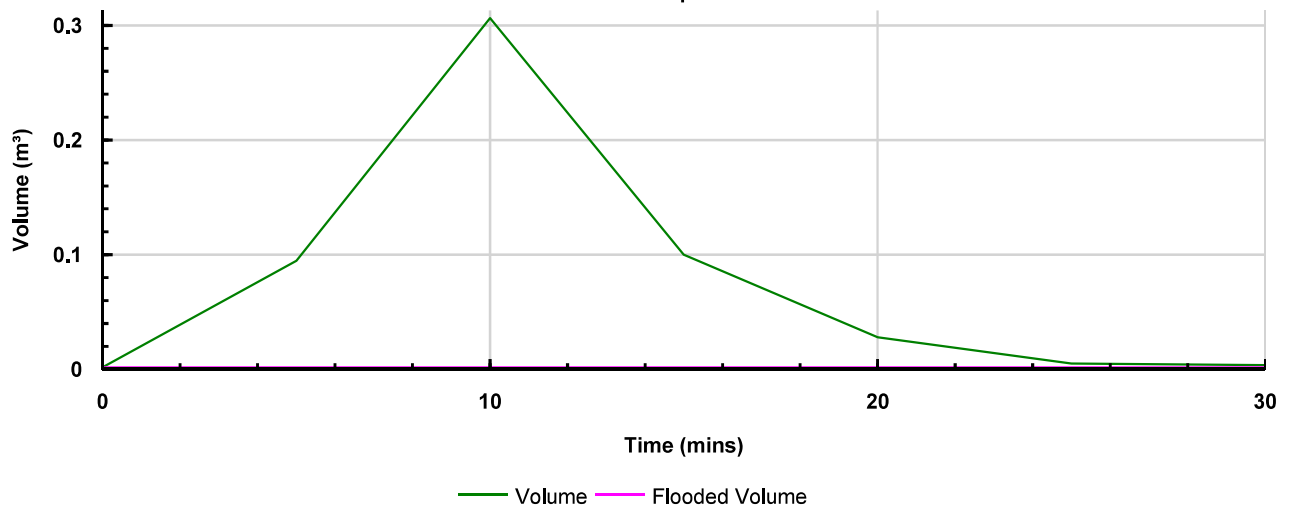
Type : Manhole

Graphs

Flow Graph

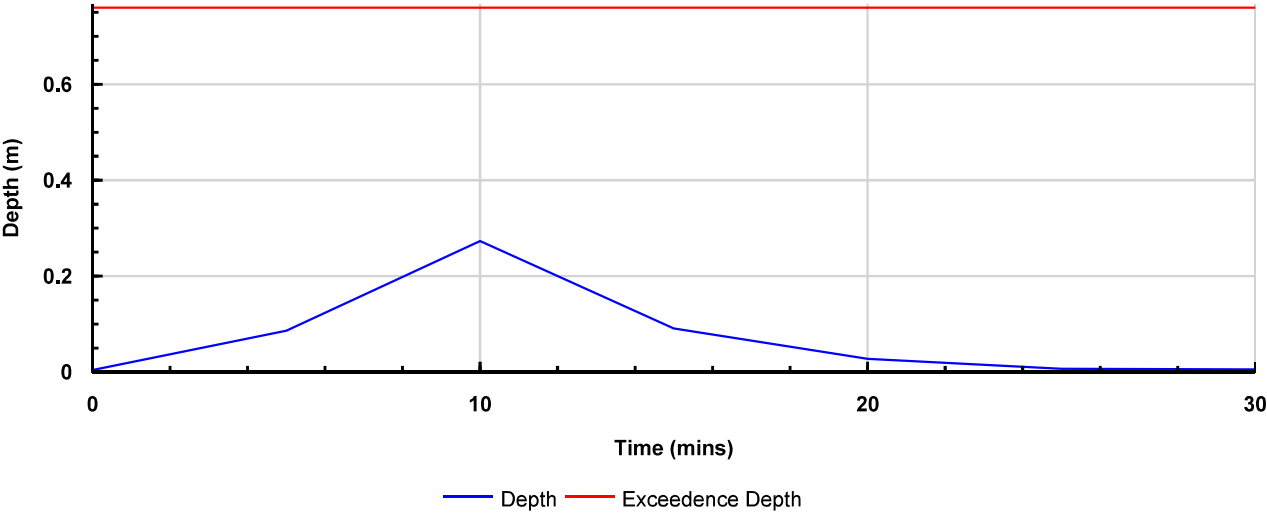


Volume Graph



Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025			 Roscoe CIVIL & STRUCTURAL ENGINEERS INSPIRING BUILT ENVIRONMENTS
Report Details: Type: Junction Results Storm Phase: Phase	Designed by: JT	Checked by:	Approved By:	
	Roscoe :			

Depth Graph



Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025			
Report Details:	Designed by: JT	Checked by:	Approved By:	
Type: Junction Results Storm Phase: Phase	Roscoe :			

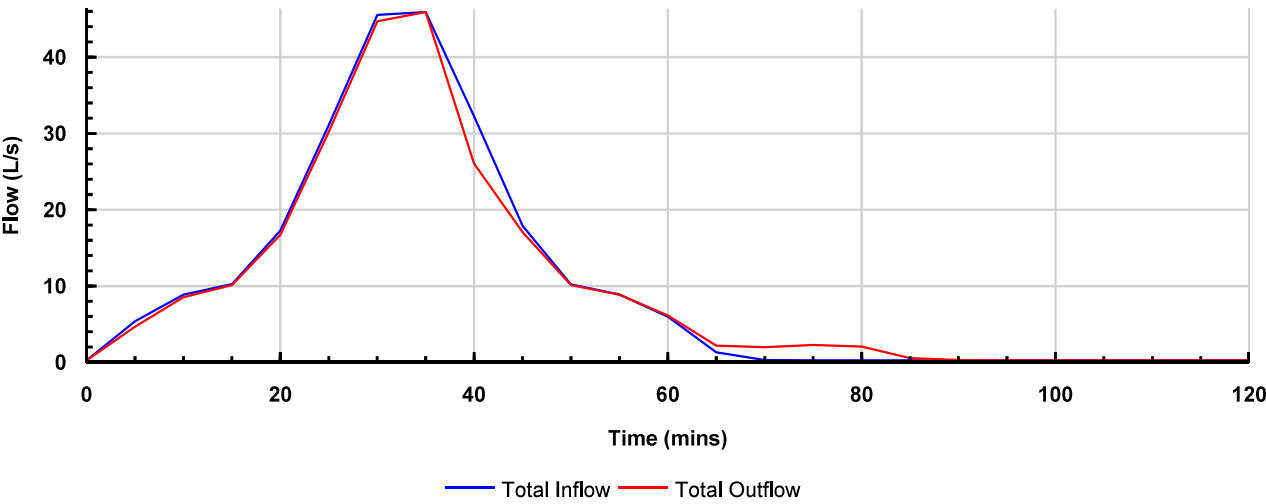


MH05
Critical Storm: FSR: 100 years: Increase Rainfall (%): +45: 60 mins: Winter

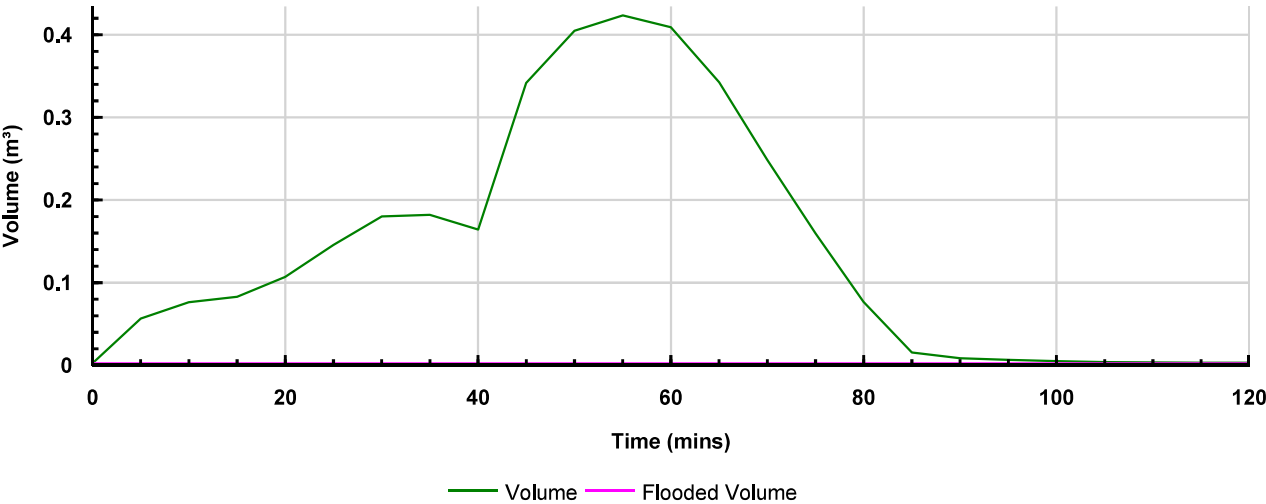
Type : Manhole

Graphs

Flow Graph

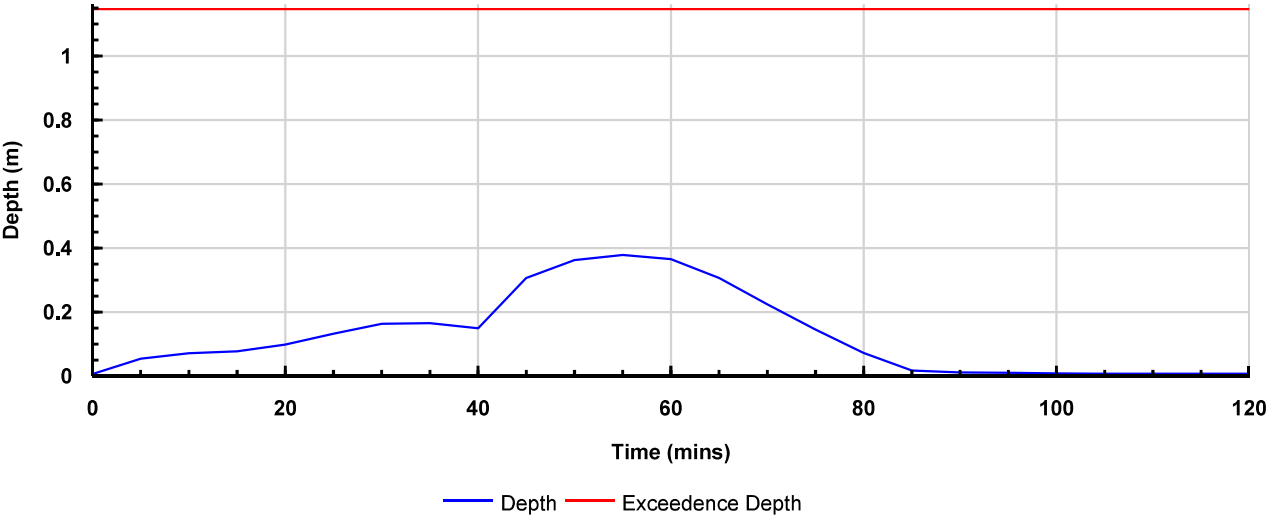


Volume Graph



Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025			
Report Details: Type: Junction Results Storm Phase: Phase	Designed by: JT	Checked by:	Approved By:	
	Roscoe :			

Depth Graph



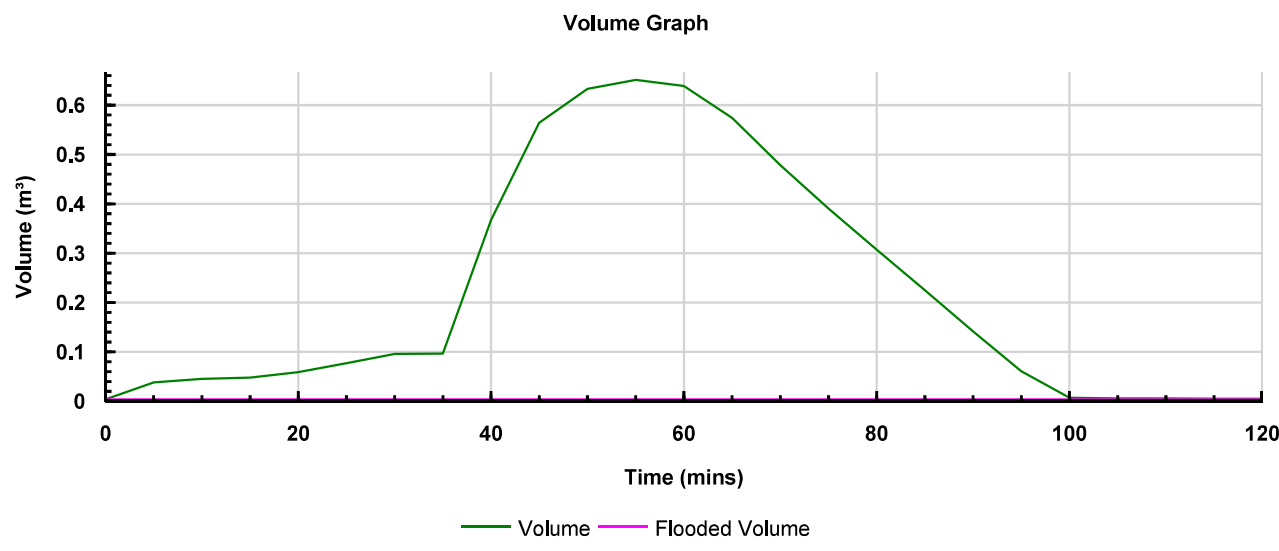
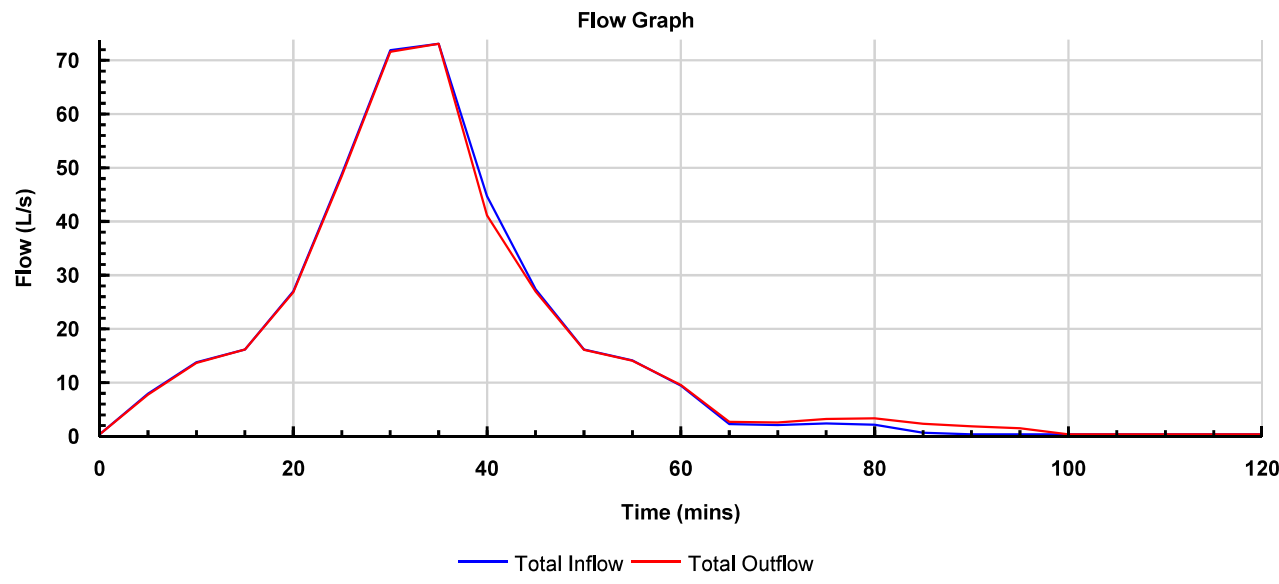
Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025		
	Designed by: JT	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Roscoe :		



MH06
Critical Storm: FSR: 100 years: Increase Rainfall (%): +45: 60 mins: Winter

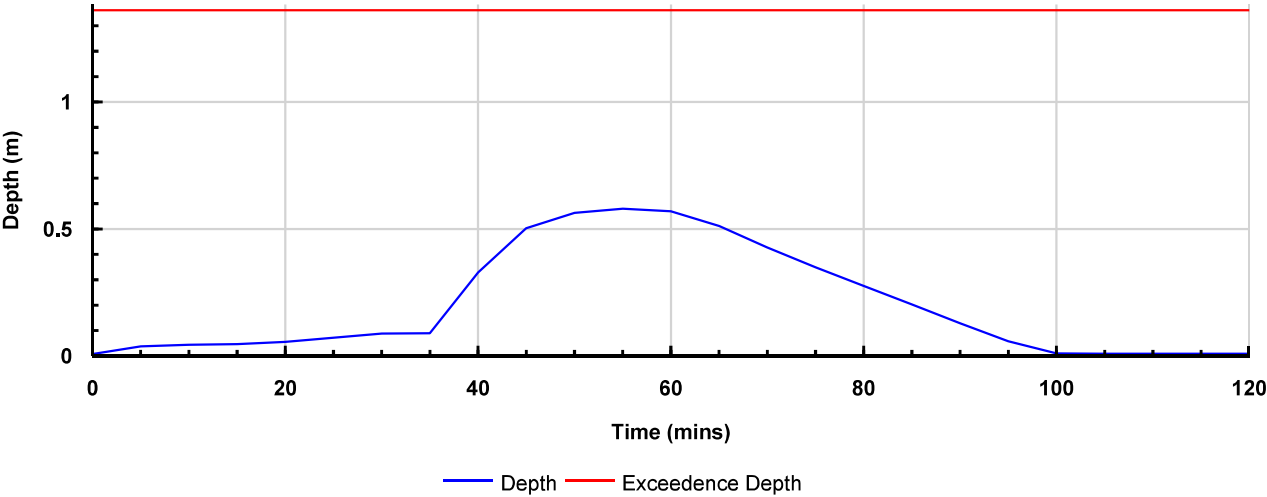
Type : Manhole

Graphs



Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025			 Roscoe CIVIL & STRUCTURAL ENGINEERS INSPIRING BUILT ENVIRONMENTS
Report Details: Type: Junction Results Storm Phase: Phase	Designed by: JT	Checked by:	Approved By:	
	Roscoe :			

Depth Graph



Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025			
Report Details:	Designed by: JT	Checked by:	Approved By:	
Type: Junction Results Storm Phase: Phase	Roscoe :			

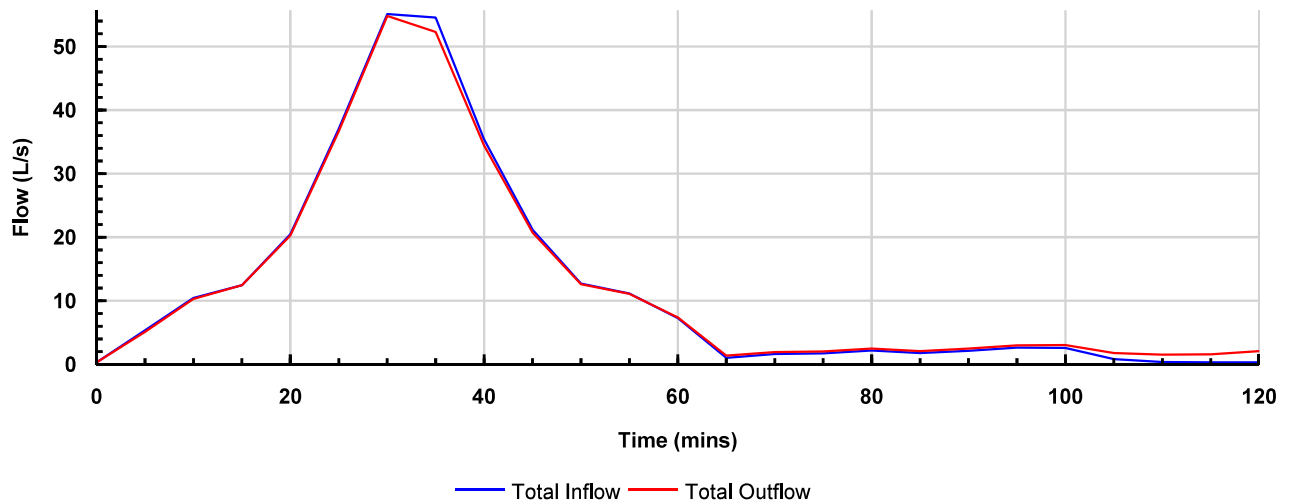


MH03
Critical Storm: FSR: 100 years: Increase Rainfall (%): +45: 60 mins: Winter

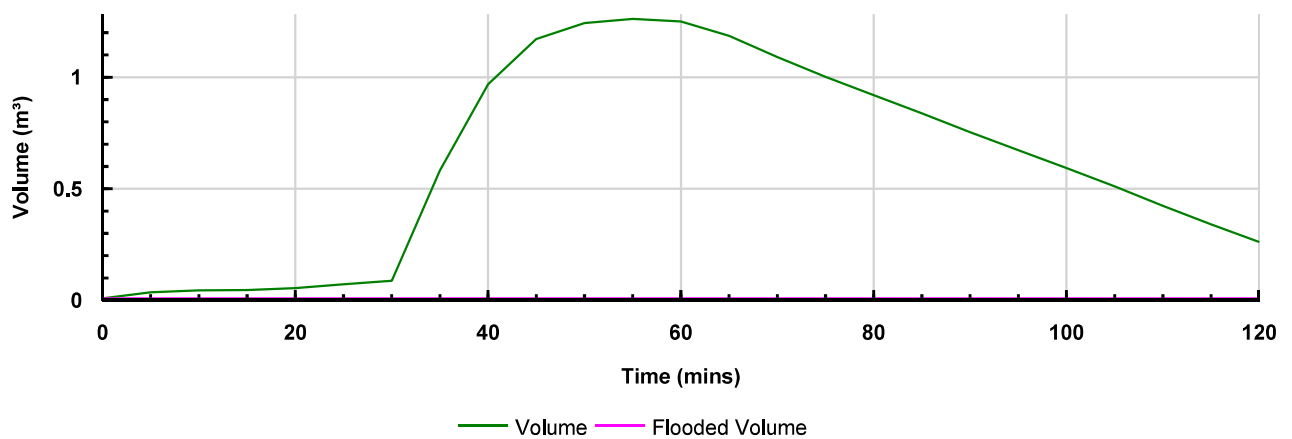
Type : Manhole

Graphs

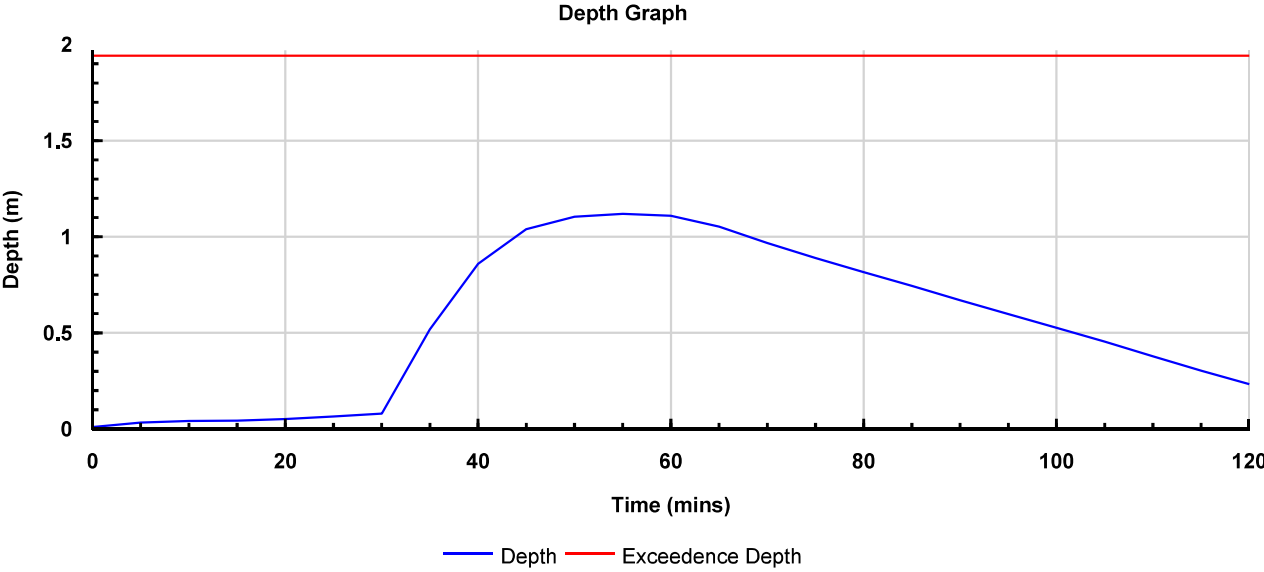
Flow Graph



Volume Graph



Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025		
	Designed by: JT	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Roscoe :		



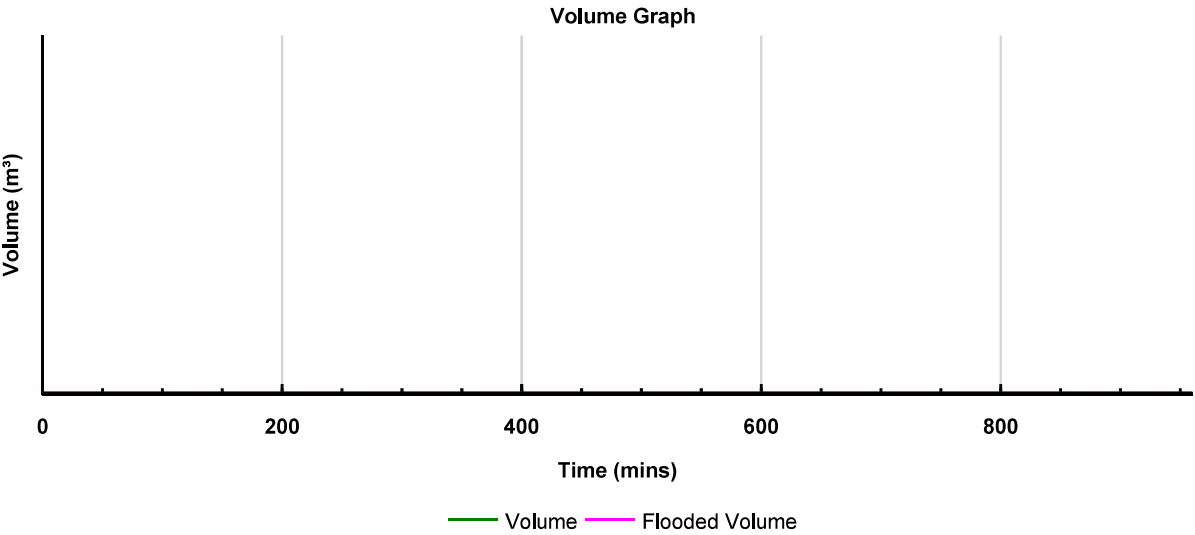
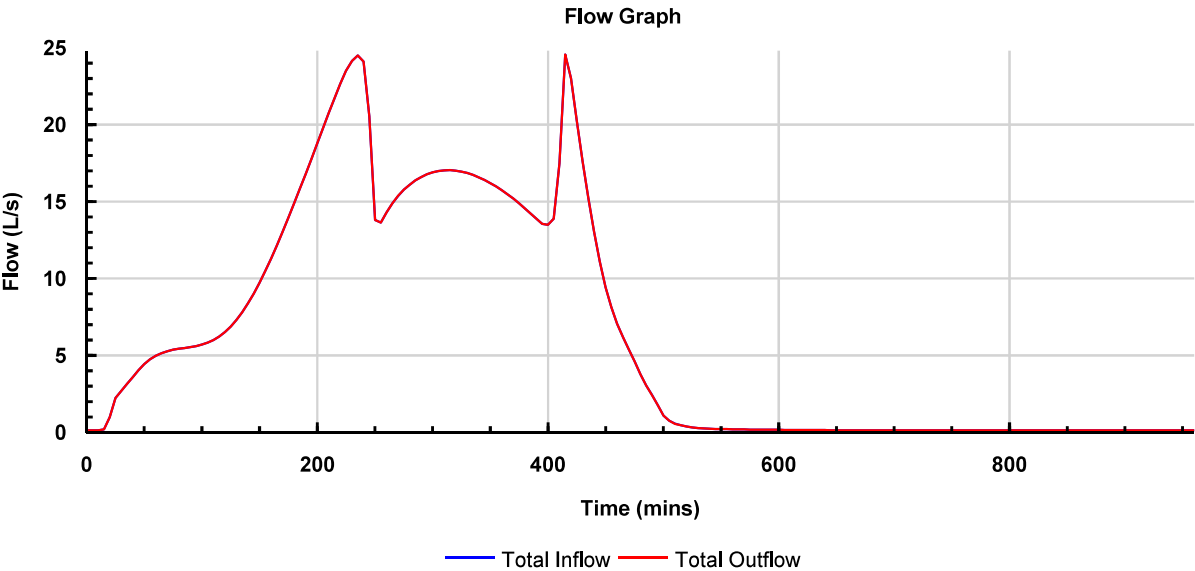
Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025		
	Designed by: JT	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Roscoe :		



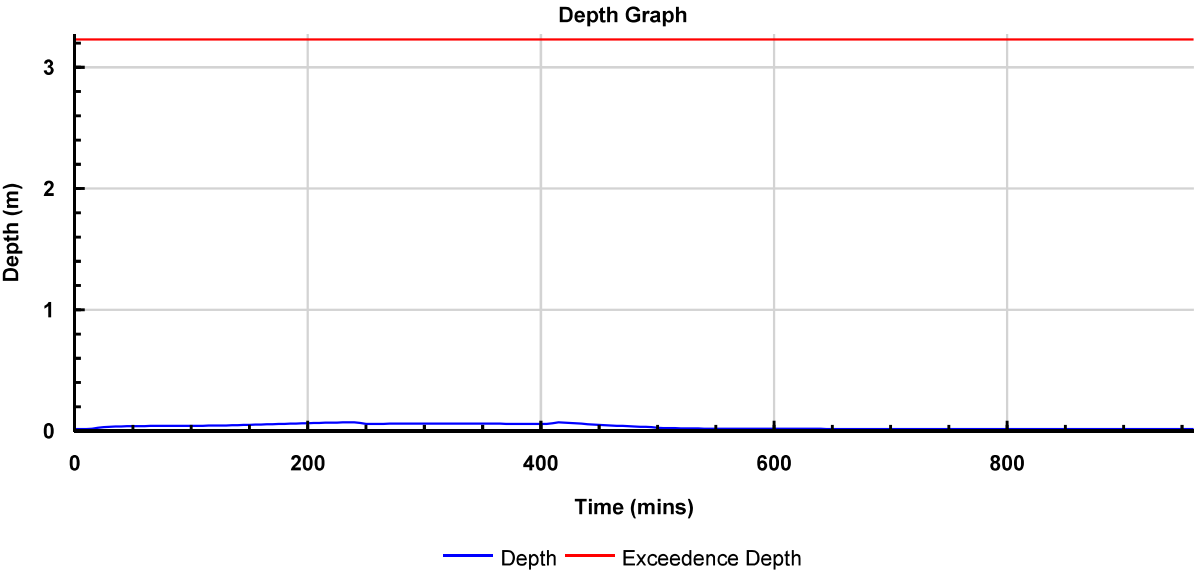
Outfall
Critical Storm: FSR: 100 years: Increase Rainfall (%): +45: 480 mins: Winter

Type : Manhole

Graphs



Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025			 Roscoe CIVIL & STRUCTURAL ENGINEERS INSPIRING BUILT ENVIRONMENTS
Report Details: Type: Junction Results Storm Phase: Phase	Designed by: JT	Checked by:	Approved By:	
	Roscoe :			



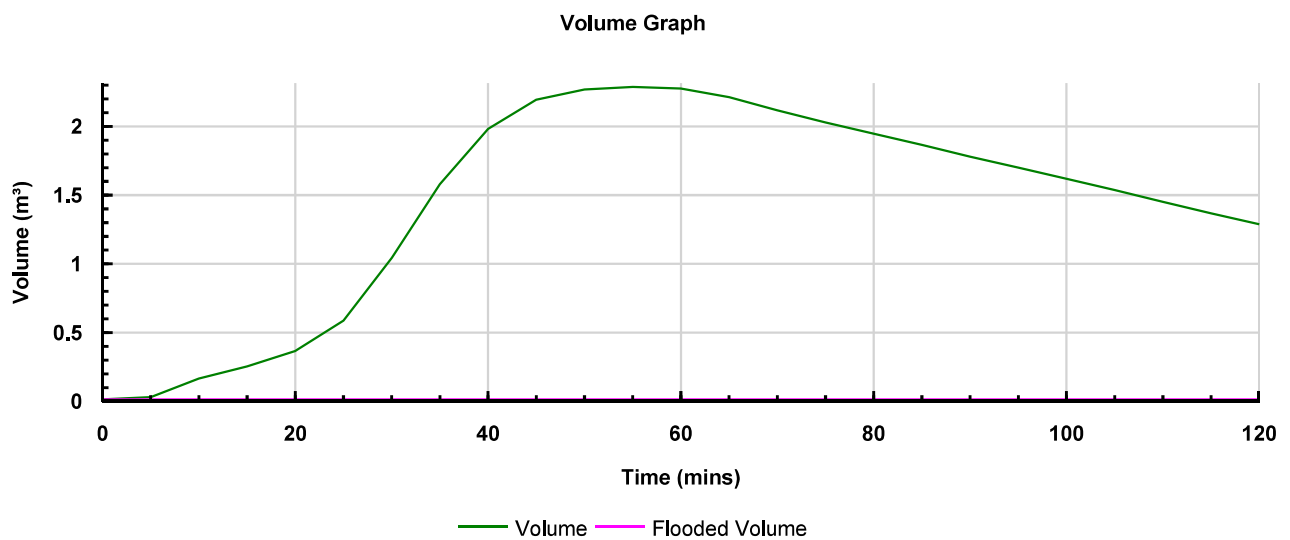
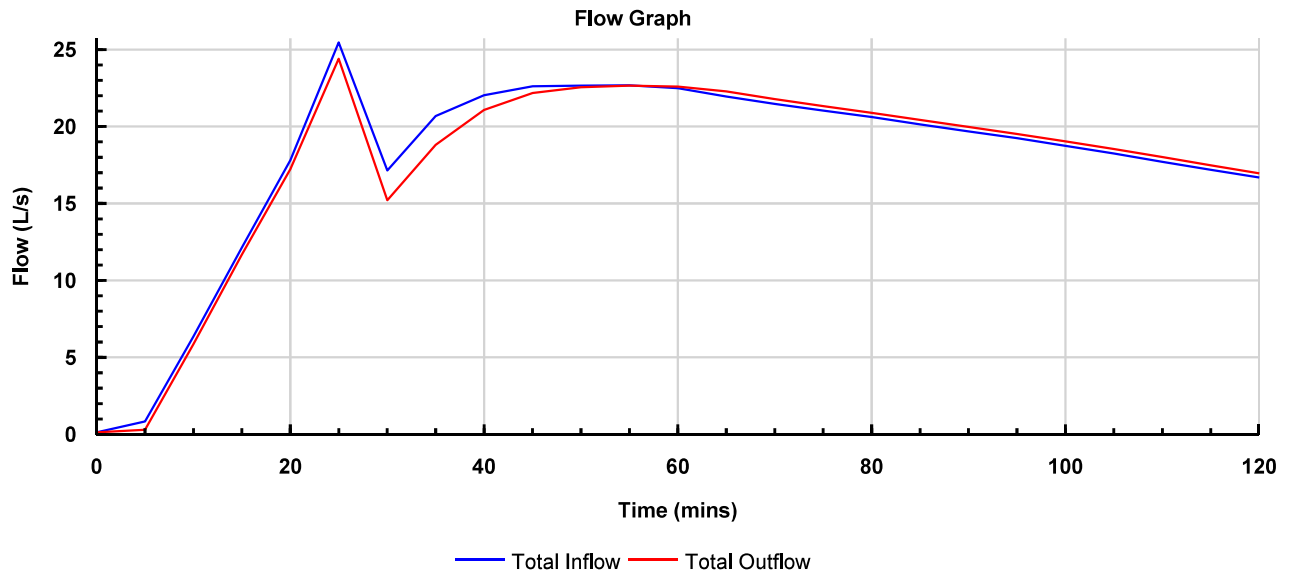
Upper Brook St:	Date: 27/02/2025		
Drainage Calculations	Designed by:	Checked by:	Approved By:
100yr + 45%CC	JT		
Gateway 2 Submission	Roscoe :		
Report Details:			
Type: Junction Results			
Storm Phase: Phase			



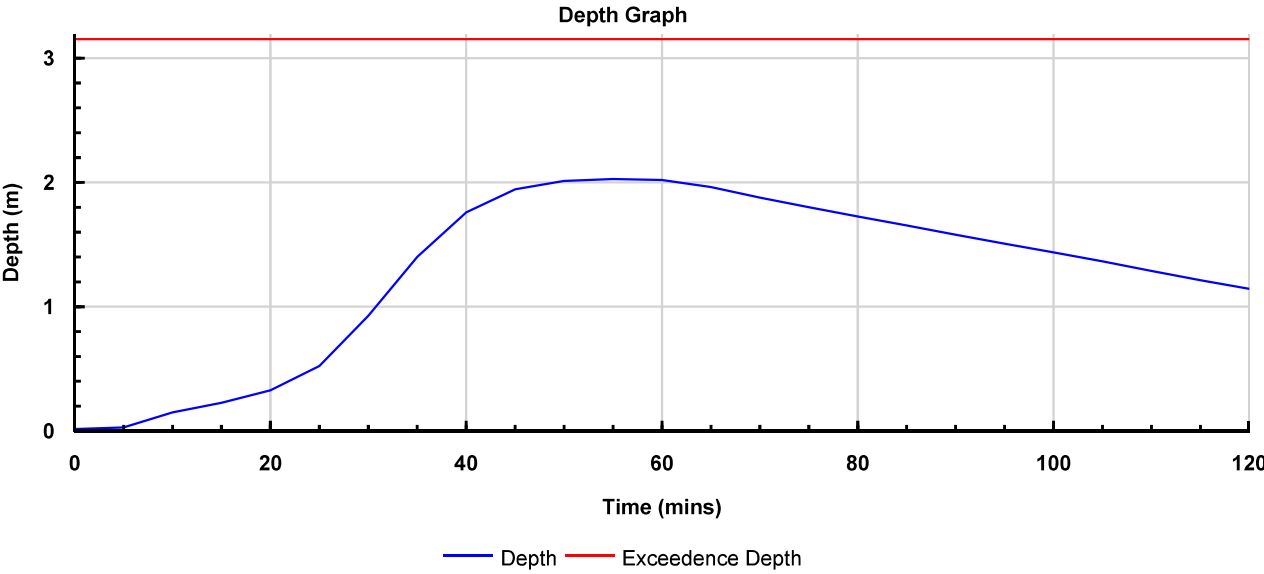
FC01
Critical Storm: FSR: 100 years: Increase Rainfall (%): +45: 60 mins: Winter

Type : Manhole

Graphs



Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025			
Report Details: Type: Junction Results Storm Phase: Phase	Designed by: JT	Checked by:	Approved By:	
	Roscoe :			



Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025		
	Designed by: JT	Checked by:	Approved By:
Report Details: Type: Junction Results Storm Phase: Phase	Roscoe :		

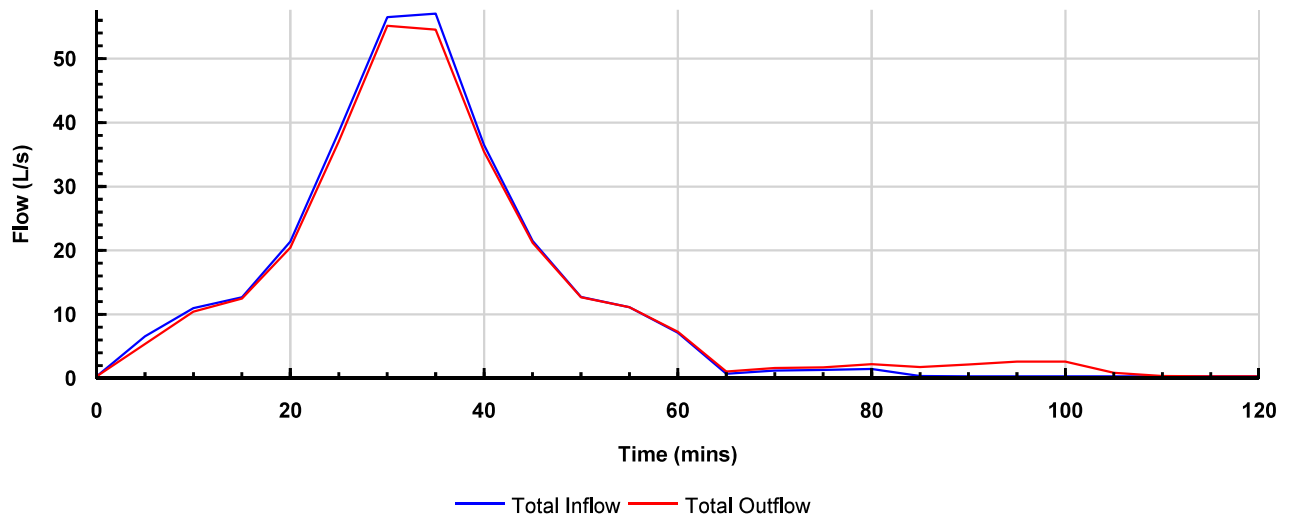


MH02
Critical Storm: FSR: 100 years: Increase Rainfall (%): +45: 60 mins: Winter

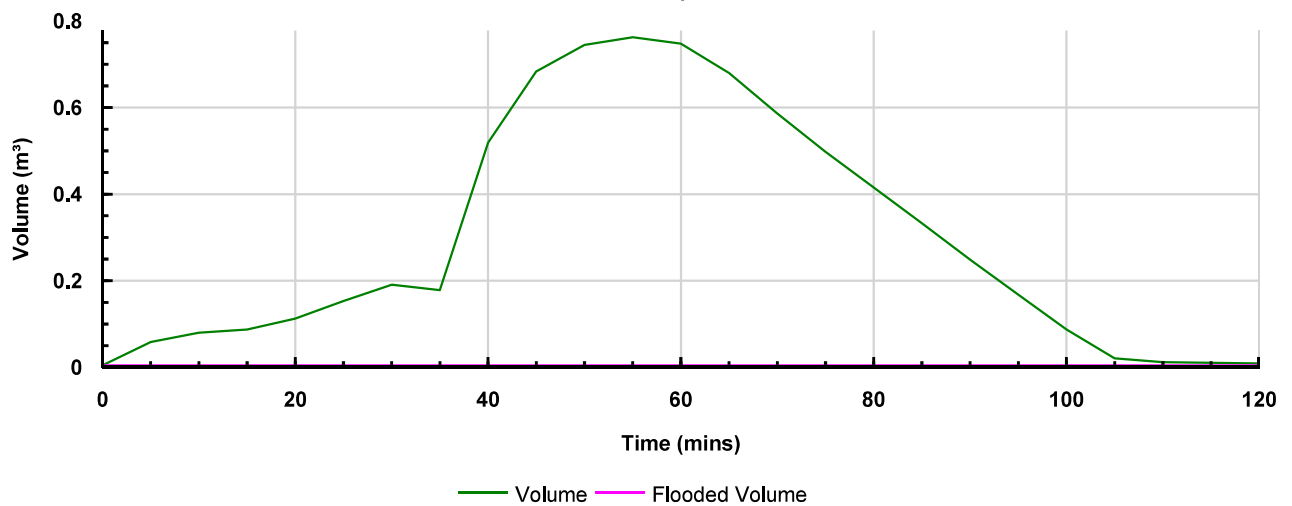
Type : Manhole

Graphs

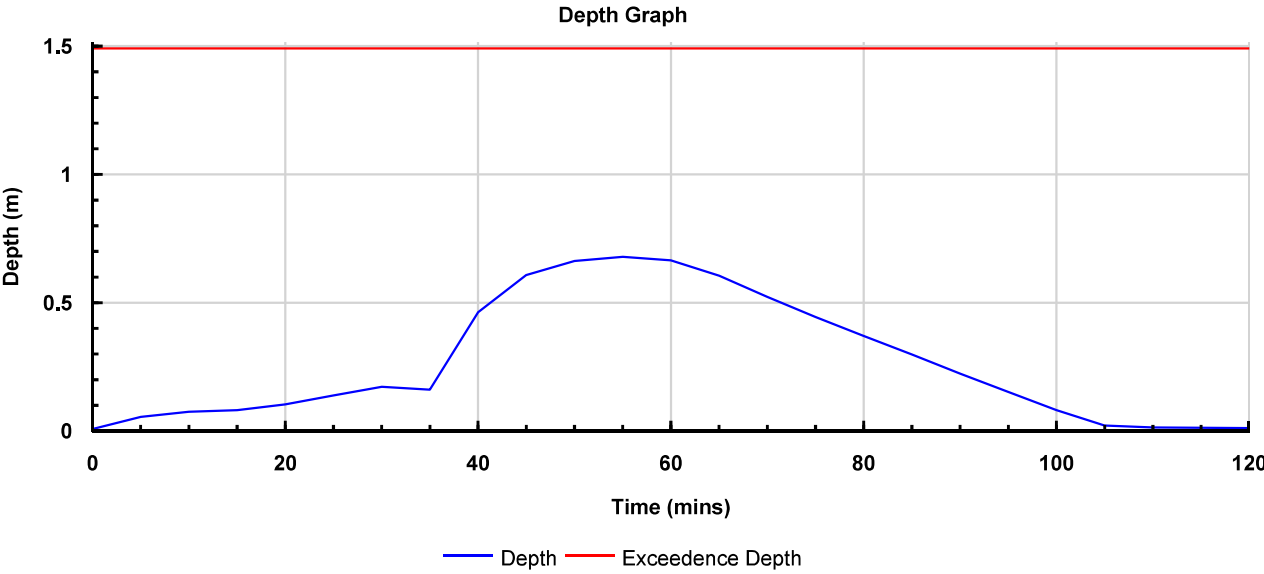
Flow Graph



Volume Graph



Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025			 Roscoe CIVIL & STRUCTURAL ENGINEERS INSPIRING BUILT ENVIRONMENTS
Report Details: Type: Junction Results Storm Phase: Phase	Designed by: JT	Checked by:	Approved By:	
	Roscoe :			



Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025			
Report Details:	Designed by: JT	Checked by:	Approved By:	
Type: Junction Results Storm Phase: Phase	Roscoe :			

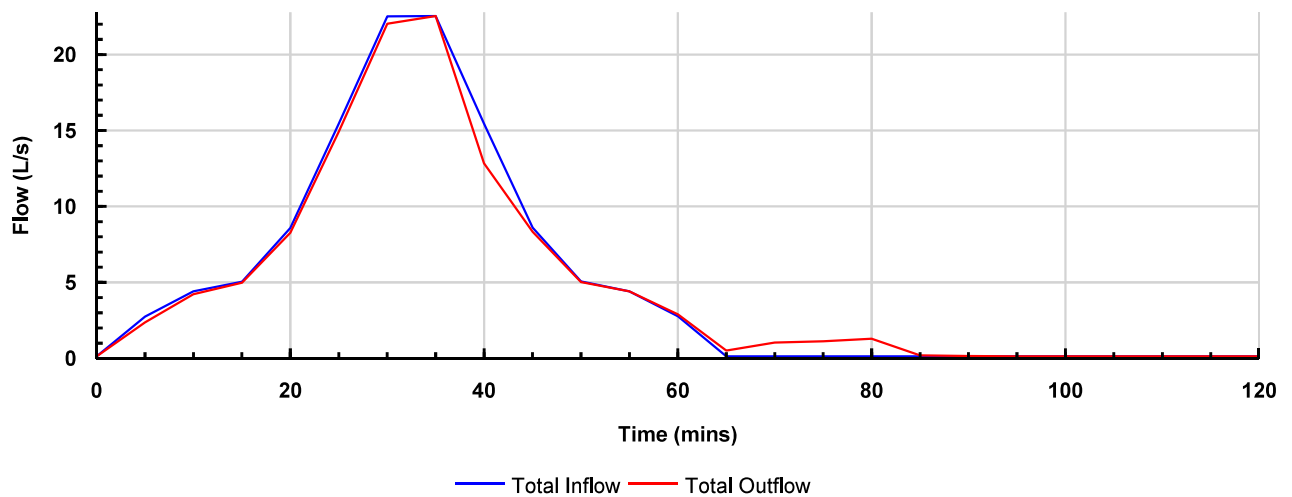


MH01
Critical Storm: FSR: 100 years: Increase Rainfall (%): +45: 60 mins: Winter

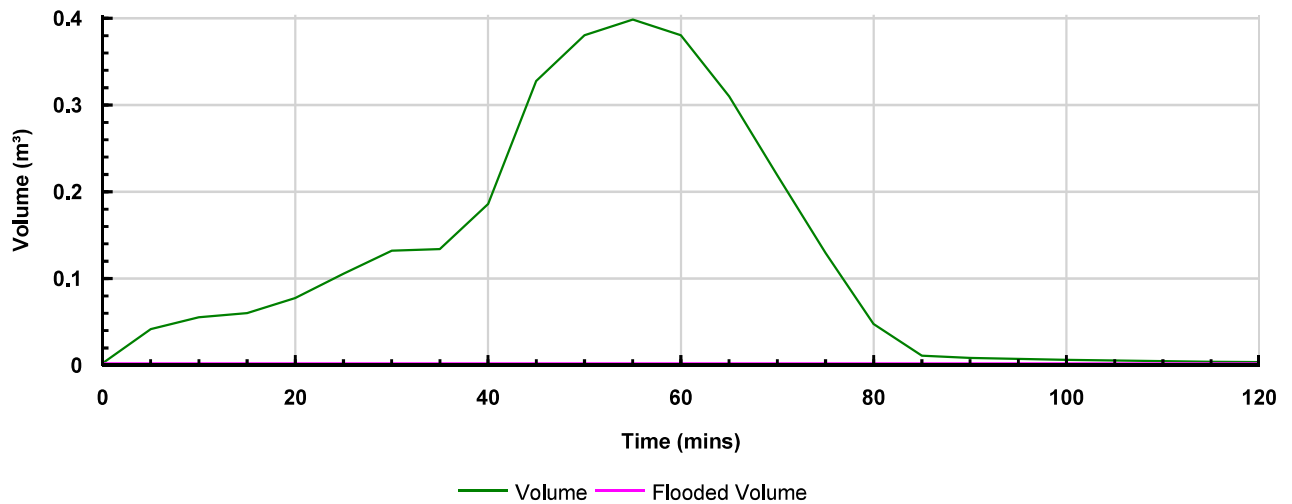
Type : Manhole

Graphs

Flow Graph



Volume Graph



Upper Brook St: Drainage Calculations 100yr + 45%CC Gateway 2 Submission	Date: 27/02/2025			 Roscoe CIVIL & STRUCTURAL ENGINEERS INSPIRING BUILT ENVIRONMENTS
Report Details: Type: Junction Results Storm Phase: Phase	Designed by: JT	Checked by:	Approved By:	
	Roscoe :			

