Zone B, Lakeview Drive, Bicester

Drainage Strategy Technical Note

Curtins Ref: 082005-CUR-03-XX-RP-D-92002

Revision: V03

Issue Date: 09 August 2023

Client Name: Peveril Securities

Client Address: High Edge Court, Heage Belper, Derbyshire, DE56 1BY.

Site Address: Zone B, Lakeview Drive, Bicester.

Curtins
Merchant Exchange
17-19 Whitworth Street West
Manchester, M1 5WG
Tel: 0161 236 2394
www.curtins.com

Control Sheet

Rev	Description	Issued by	Checked	Date
V01	First Draft for Review	PG	JM	20/04/2023
V02	Final	PG	JM	24/04/2023
V03	Planning Issue	KOB	JM	09/08/2023

This report has been prepared for the sole benefit, use, and information for the client. The liability of Curtins with respect to the information contained in the report will not extend to any third party.

Author	*Signature*	*Date*
Paul Graveney BEng (Hons), Ceng, MICE Civil Engineer	[redacted]	09/08/2023

Reviewed	*Signature*	*Date*
Chloé Grimsley BSc (Hons) Principal Engineer	[redacted]	09/08/2023

Authorised	*Signature*	*Date*
Jon Moister **BEng (Hons) CEng MIStructE** Board Director		09/08/2023

Table of contents

1.0 Introduction

1.1 Summary

1.1.1 In 2019 an outline planning application was submitted to Cherwell District Council for the erection of a business park of up to 60,000 sq.m (GEA) of flexible Class B1(a) office / Class B1(b) research & development floorspace; associated vehicle parking, landscaping, highways, infrastructure and earthworks.

1.1.2 Planning approval was granted (ref: 17/02534/OUT) in May 2020 subject to a number of planning conditions relating to the drainage of the development.

1.1.3 This report has been prepared to discharge these conditions for Zone B; Numbers 9, 10 & 14.

1.1.4 The Planning application was supported by a Flood Risk Assessment and separate Drainage Strategy report prepared by Buro Happold.

1.1.5 A number of planning applications have previously been submitted and approved at the site. In 2011 a detailed application was submitted for the adjacent Tesco store to follow on the outline approval for the full site area in 2007. A drainage strategy was submitted with this application that defined a Greenfield runoff rate of 9.47l/s/ha. This rate was subsequently used as part of the Buro Happold strategy in 2017.

2.0 Drainage Strategy

2.1 Existing Drainage Layout

2.1.1 A review of the Buro Happold Engineering Drainage Strategy Report (dated July 2017) has indicated that a separate foul and surface water drainage network was constructed in circa 2016 to serve the full development site.

2.1.2 This encompassed a private surface water sewer in Lakeview Drive to the north and east of the site that flowed in a south easterly direction and outfalled to Langford Brook, plus a Thames Water adopted foul water sewer that flowed in parallel and outfalled to the Thames Water Wastewater treatment works to the southeast of the site.

2.1.3 No further public sewers are observed within or in the vicinity of the proposed site.

2.1.4 Other than the surface water sewer noted in 2.1.2 above, no other existing private drainage exists within the site boundary.

2.2 Existing Runoff Rate

2.2.1 The existing site is currently undeveloped and can be termed as 'Greenfield'.

2.2.2 As discussed in section 1.0, the greenfield rate of 9.47l/s/ha was used in the Tesco development in 2011 and subsequently used in the 2017 drainage strategy report to support the outline application.

2.2.3 This rate will therefore be used as the peak rate for this discharge of condition application.

2.3 Geology

2.3.1 A formal Phase 2 intrusive site investigation has been undertaken at the site by BWB in 2017. This identified topsoil overlying the Weathered Kellaways Clay Member, over Limestone known as the Cornbrash Formation.

2.3.2 Groundwater levels were identified at circa 1.6-1.7m BGL.

2.3.3 The site is not located within a Source Protection Zone.

2.4 Hydrological Assessment

2.4.1 A review of the topographical survey, OS Maps and Environment Agency maps would indicate the closest surface water feature Langford Brook, classed by the EA as main river and located approximately 250m to the southeast of the site and flowing generally south towards the River Thames.

2.4.2 Flowing beyond the south east corner of the site is a small ditch that emanates from beneath the A41 highway and flows south easterly before passing through a small pond and then ultimately outfalling into Langford Brook immediately downstream.

2.5 Sustainable Drainage Strategy

2.5.1 When reviewing the strategy for the disposal of surface water, due cognisance needs to be taken of the hierarchy for discharge as defined current NPPF PPG 080. These are summarised below with the option of draining to the existing watercourse to the south of the site to be taken forward.

Preferred Discharge Location – Into Ground (infiltration)

2.5.2 The Phase 2 intrusive site investigation report identifies that the superficial deposits under the site identified topsoil overlying the Weathered Kellaways Clay Member, over Limestone known as the Cornbrash Formation.

2.5.3 The site is not located within a Groundwater Source Protection Zone.

2.5.4 Based on the underlying geology, infiltration is not considered a viable option for draining the site.

Second Discharge Option – To a Surface Water Body

2.5.5 A small ditch that emanates from beneath the A41 highway and flows south easterly before passing through a small pond and then ultimately outfalling to Langford Brook is located to the south east of the site. Due to this distance, a connection is not considered feasible for this Phase of the development.

Third Discharge Option – To Surface Water Sewer

2.5.6 A dedicated private surface water drainage network has been constructed in Lakeview Drive to the north and east of the site. A number of stubs have previously been constructed to the serve the Zone B development to both the north west and south east of the site. These stubs will be used to serve the development site with discharge at Greenfield rates.

2.6 Proposed Surface Water Drainage Strategy

2.6.1 The surface water drainage for the development is to discharge to the adjacent private surface water drainage network located in Lakeview Drive at a greenfield rate of 9.47l/s/ha and which ultimately outfalls to Langford Brook.

2.6.2 Permeable paving will be included to all the parking areas and a number of geocellular tanks will act at the means of attenuating the peak flows.

2.6.3 Due to space limitations, ponds and swales have been discounted.

2.6.4 The proposed private drainage layout for the new development site will be designed in accordance with BS EN 752: 2008 and Building Regulations part H guidance, i.e. to show no flooding to the 30-year storm return period criterion. Events exceeding this up to and including the 100 year plus a 25% allowance for climate change have been assessed. Flooding from these events is classed as exceedance flooding. The hydraulic model has found a small volume of exceedance flooding that will be retained in the lower lying car park areas.

2.6.5 The proposed drainage strategy drawing for the site has been included within Appendix B.

2.6.6 The supporting surface water calculations have been included within Appendix C.

2.7 Water Quality, Quantity, Amenity & Biodiversity

2.7.1 Water quality has been considered and the following measures have been included within the surface water drainage proposals:

- Runoff from roofs is considered to be clean and will be discharged directly into the surface water network.
- All drainage from the car parking and adjoining road has a medium risk and will pass through the permeable surfacing.
- The yard areas, which are considered at higher risk, will pass through a Class 1 full retention separator.
- Silt will be prevented from entering the system by the use of channels with silt traps and catch pits where required.
- The reduction of water quantity has been considered by reducing site discharge and providing attenuation to control the runoff rates and peak volumes to the downstream network.
- In terms of Amenity and Biodiversity, there are limited areas on this fully developed site to form green SuDS infrastructure to provide amenity and biodiversity areas linked to the drainage strategy.

2.8 Proposed Foul Water Drainage Strategy

2.8.1 A separate foul and surface water system is proposed.

2.8.2 The foul drainage from the development will comprise of downpipes collected by new private foul drainage network around the three proposed buildings and connect to the foul water adopted sewer in Lakeview Drive via the two existing stubs.

2.8.3 A Section 106 Agreement with Thames Water will be agreed as part of the detailed design works.

2.8.4 The proposed drainage strategy drawing is enclosed in Appendix B.

3.0 Drainage Related Planning Condition & Curtins Responses

3.1 Planning Conditions

3.1.1 Detailed below are the drainage condition numbers 9, 10 & 14 in *Italics* with Curtins response in Blue beneath.

Condition 9. Prior to the submission of or to accompany the first application for approval of reserved matters, full details of a surface water drainage strategy (including phasing) for the entire site, detailing all on and off-site drainage works required in relation to the development, shall be submitted to and approved in writing by the Local Planning Authority. Thereafter, the drainage works shall be carried out and completed in accordance with the approved strategy and phasing.

Refer to Curtins drawing 082005-CUR-XX-XX-DR-C-92010 in Appendix B which defines the site wide surface water drainage strategy.

Condition 10. All applications for approval of reserved matters relating to each phase shall be accompanied by details of a surface water drainage scheme for that phase (in accordance with the principles embodied within Sustainable Drainage Systems (SuDS) and the approved surface water drainage strategy for the overall site approved by condition 9). The development shall thereafter be constructed in accordance with the approved surface water drainage scheme and no development shall be occupied within each phase until the approved drainage scheme is completed.

As discussed in Section 2, the SuDS hierarchal approach has been considered with the surface water runoff outfalling to the existing surface water drainage network in Lakeview Drive at a restricted rate of 9.47l/s/ha. Detailed hydraulic calculations have been undertaken up to the 100yr return period event including a 25% allowance for climate change. Refer to the drainage GA plan in Appendix B and the supporting hydraulic calculations in Appendix C.

Condition 14. No development shall take place within each phase until a detailed scheme of foul drainage for the development within that phase has been submitted to, and approved in writing by, the Local Planning Authority. The foul drainage scheme shall be completed in accordance with the approved scheme prior to the occupation of any building within that phase and retained as such thereafter.

Refer to Curtins drawing 082005-CUR-XX-XX-DR-C-92001 in Appendix B which defines the Foul Water Drainage Layout for Zone B.

Appendix A

Proposed Site Plan

BICESTER VILLAGE

A41

McDONALD'S

TESCO
SUPERSTORE

BICESTER SHOPPING
PARK

LAKEVIEW DRIVE

PIONEER WAY

A41 OXFORD ROAD

BICESTER AVENUE
HOME & GARDEN CENTRE

N

0 10 25 50 100m

Bicester Arc
Work.
Live.
Breathe.

SEL Design
Architecture Planning Research

SLADEN ESTATES

PEVERIL SECURITIES

PROJECT
BICESTER ARC

TITLE
ZONE B
SITE LOCATION PLAN

CLIENT
PEVERIL SECURITIES

DRAWN BY	CHECKED BY	DATE
DW		03.04.23

SCALE (@ A1)	PROJECT NUMBER
1:1250	16SK109

DRAWING NUMBER	REV
D100	

TESCO
SUPERSTORE

LAKEVIEW DRIVE

water tank
switch
sub
cycles
bins
bins
bins
plant
cycles
accessible parking
BUILDING A
OFFICE
BUILDING B
R&D FACILITY
cycles
ev parking 2
cycles

Parking:
238 Spaces including 12 Access and 24 EV Charging

N

0 10 25 50m

Bicester Arc
Work.
Live.
Breathe.

B - Parking updated - 7/08/23
A - External plant updated - 25/05/23

SEL Design
Architecture Planning Dream

SLADEN ESTATES
PEVERIL SECURITIES

PROJECT
BICESTER ARC

TITLE
ZONE B
SITE LAYOUT PLAN

CLIENT
PEVERIL SECURITIES

DRAWN BY	CHECKED BY	DATE
DW		03.04.23

SCALE (@ A1)	PROJECT NUMBER
1:500	16SK109

DRAWING NUMBER	REV
D103	B

Appendix B

Curtins Drainage Drawings

GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. DESIGN BASED ON TOPOGRAPHICAL SURVEY AND CCTV SURVEY INFORMATION AVAILABLE AT THE TIME OF DESIGN.
3. ALL EXISTING SEWERS, CONNECTIONS, PIPE SIZES AND INVERT LEVELS TO BE CONFIRMED BY CONTRACTOR PRIOR TO COMMENCEMENT OF WORKS TO ENSURE CONNECTIVITY. ANY VARIANCE FROM THE INFORMATION SHOWN SHOULD BE REPORTED TO THE ENGINEER FOR REVIEW.
4. DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
5. ALL DIMENSIONS ARE IN METRES AND LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS OTHERWISE NOTED.
6. WHERE EXISTING DRAINAGE IS BEING USED, ALLOWANCES SHOULD BE MADE TO REMEDIATE THIS DRAINAGE IN LINE WITH AVAILABLE CCTV SURVEY INFORMATION. IF NO SURVEY IS AVAILABLE, IT IS ADVISED TO OBTAIN ONE PRIOR TO COMMENCEMENT OF WORKS.
7. ALL EXISTING SERVICES TO BE LOCATED PRIOR TO COMMENCEMENT OF ANY DRAINAGE WORKS, AND WHERE NECESSARY PROTECTION OR DIVERSIONS TO BE UNDERTAKEN TO AVOID CONFLICT WITH THE PROPOSED WORK.
8. ALL PIPE DIAMETERS GIVEN ARE NOMINAL INTERNAL PIPE DIAMETERS. THESE ARE TO BE CONFIRMED ONCE A DETAILED CAPACITY CHECK HAS BEEN UNDERTAKEN AT A LATER DESIGN STAGE.
9. OUTFALL CONNECTION(S) SUBJECT TO AGREEMENT WITH THE APPROVING AUTHORITY.

KEY:

- ZONE BOUNDARIES
- EXISTING SURFACE WATER DRAINAGE
- EXISTING TW FOUL WATER SEWER
- EXISTING DITCH / WATERCOURSE
- EXISTING CULVERT
- PROPOSED SURFACE WATER DRAINAGE INFRASTRUCTURE

DRAINAGE STRATEGY BASED ON THE PRINCIPLES OF THE FOLLOWING REPORTS:

- BICESTER OFFICE PARK FLOOD RISK ASSESSMENT BY BURO HAPPOLD (REF: 040031) DATED APRIL 2018
- BICESTER OFFICE PARK DRAINAGE STRATEGY BY BURO HAPPOLD (040031) DATED JULY 2017

ALLOWABLE GREENFIELD DISCHARGE RATES TO BE AGREED WITH THE LLFA.

Rev:	Description:	Date:	By:	Chkd:
P02	MINOR UPDATES TO SUIT CLIENT COMMENTS	21/03/23	PG	JM
P01	ISSUED FOR INFORMATION	20/03/23	PG	JM

curtins
Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG
0161 236 2394
manchester@curtins.com
www.curtins.com
Civils & Structures • Transport Planning • Environmental • Infrastructure • Geotechnical • Conservation & Heritage • Principal Designer
Birmingham • Bristol • Cambridge • Cardiff • Douglas • Dublin • Edinburgh • Glasgow • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

Status: INFORMATION

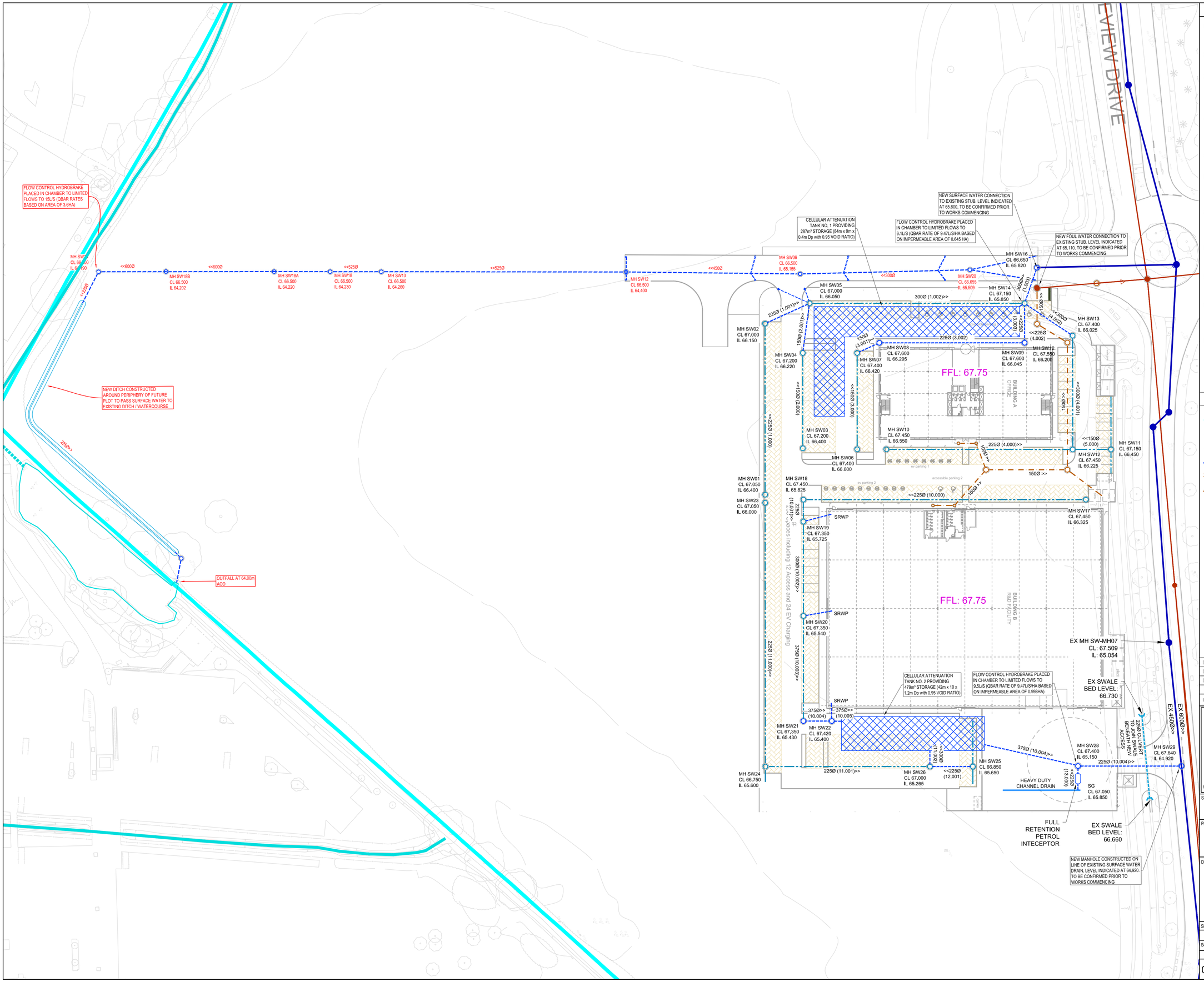
Project: LAKEVIEW DRIVE, BICESTER

Drg Title: SURFACE WATER DRAINAGE STRATEGY PLAN

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1 / A3	20/03/23	PG	PG	JM

Scale: 1:1250

Project No:	Originator:	Volume:	Level:	Type:	Role:	Category / Number:	Rev:
082005	CUR	00	XX	DR	C	92010	P02



GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. DESIGN BASED ON TOPOGRAPHICAL SURVEY AND CCTV SURVEY INFORMATION AVAILABLE AT THE TIME OF DESIGN.
3. ALL EXISTING SEWERS, CONNECTIONS, PIPE SIZES AND INVERT LEVELS TO BE CONFIRMED BY CONTRACTOR PRIOR TO COMMENCEMENT OF WORKS TO ENSURE CONNECTIVITY. ANY VARIANCE FROM THE INFORMATION SHOWN SHOULD BE REPORTED TO THE ENGINEER FOR REVIEW.
4. DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
5. ALL DIMENSIONS ARE IN METRES AND LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS OTHERWISE NOTED.
6. WHERE EXISTING DRAINAGE IS BEING USED, ALLOWANCES SHOULD BE MADE TO REMEDIATE THIS DRAINAGE IN LINE WITH AVAILABLE CCTV SURVEY INFORMATION. IF NO SURVEY IS AVAILABLE, IT IS ADVISED TO OBTAIN ONE PRIOR TO COMMENCEMENT OF WORKS.
7. ALL EXISTING SERVICES TO BE LOCATED PRIOR TO COMMENCEMENT OF ANY DRAINAGE WORKS, AND WHERE NECESSARY PROTECTION OR DIVERSIONS TO BE UNDERTAKEN TO AVOID CONFLICT WITH THE PROPOSED WORK.
8. ALL RAINWATER AND FOUL POP UPS LOCATIONS AND SIZES INDICATIVE ONLY AND TO BE CONFIRMED BY THE ARCHITECT AND M&E ENGINEER.
9. COVER LEVELS, GULLY POSITIONS, AND BUILDINGS LOCATION ARE APPROXIMATE AND SHALL BE CONFIRMED BY ARCHITECT/ LANDSCAPE ARCHITECT.
10. ALL PIPE DIAMETERS GIVEN ARE NOMINAL INTERNAL PIPE DIAMETERS. THESE ARE TO BE CONFIRMED ONCE A DETAILED CAPACITY CHECK HAS BEEN UNDERTAKEN AT A LATER DESIGN STAGE.
11. OUTFALL CONNECTION(S) SUBJECT TO AGREEMENT WITH THE APPROVING AUTHORITY.

KEY:

- SITE BOUNDARY
- EXISTING SURFACE WATER DRAINAGE
- EXISTING FOUL WATER SEWER
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED RISING MAIN
- PROPOSED FOUL WATER DRAINAGE

Rev:	Description:	Date:	By:	Chkd:
P04	DRAWING EXTENTS AMENDED	10/08/23	EBR	KoB
P03	ROAD DRAINAGE AMENDED	08/08/23	EBR	KoB
P02	ACCESS ROAD ADDED TO PLAN	03/10/22	PG	JM
P01	ISSUED FOR INFORMATION	01/09/22	PG	JM

curtins
Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG
0161 236 2394
manchester@curtins.com
www.curtins.com
Civils & Structures • Transport Planning • Environmental • Infrastructure • Geotechnical • Conservation & Heritage • Principal Designer
Birmingham • Bristol • Cambridge • Cardiff • Douglas • Dublin • Edinburgh • Glasgow • Kendal • Leeds • Liverpool • London • Manchester • Nottingham

Status: INFORMATION

Project: LAKEVIEW DRIVE, BICESTER

Drg Title: DRAWING STRATEGY PLAN

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1 / A3	01/09/22	PG	PG	JM

Scale: 1:500

Project No:	Originator:	Volume:	Level:	Type:	Role:	Category / Number:	Rev:
082005	CUR	00	XX	DR	C	92001	P04

\\mats\24Projects\082001 - 083000\82005 - Bicester\04-Production\4A-Models-Drawings\CUC4D\82005-CUR-00-XX-DR-C-92001-P04.dwg

Appendix C

Hydraulic Calculations

	Bicester Phase 2 Northern Plot V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Nort...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.405	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.307	4-8	0.200

Total Area Contributing (ha) = 0.507

Total Pipe Volume (m³) = 16.607

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	49.000	0.250	196.0	0.065	4.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	13.000	0.100	130.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	27.000	0.180	150.0	0.059	4.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	14.000	0.170	82.4	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	4.88	66.400	0.065	0.0	0.0	0.0	0.93	37.0	8.8
1.001	50.00	5.07	66.150	0.065	0.0	0.0	0.0	1.15	45.5	8.8
2.000	50.00	4.55	66.400	0.059	0.0	0.0	0.0	0.82	14.5	8.0
2.001	50.00	4.76	66.220	0.059	0.0	0.0	0.0	1.11	19.6	8.0

	Bicester Phase 2 Northern Plot V2 21.04.23	Micro Drainage
Date 21/04/2023 File Bicester Phase 2 - Nort...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.002	62.000	0.200	310.0	0.100	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.000	27.000	0.180	150.0	0.022	4.00	0.0	0.600	o	150	Pipe/Conduit	
3.001	7.000	0.050	140.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.002	42.000	0.250	168.0	0.070	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.003	11.000	0.195	56.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.000	54.000	0.250	216.0	0.130	4.00	0.0	0.600	o	225	Pipe/Conduit	
5.000	10.000	0.070	142.9	0.041	4.00	0.0	0.600	o	150	Pipe/Conduit	
4.001	32.000	0.200	160.0	0.020	0.00	0.0	0.600	o	300	Pipe/Conduit	
4.002	15.000	0.250	60.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
6.000	4.000	0.020	200.0	0.000	4.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	10.000	0.050	200.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.002	50.00	6.23	66.050	0.224	0.0	0.0	0.0	0.89	62.7	30.3
3.000	50.00	4.55	66.600	0.022	0.0	0.0	0.0	0.82	14.5	3.0
3.001	50.00	4.69	66.420	0.022	0.0	0.0	0.0	0.85	15.0	3.0
3.002	50.00	5.38	66.295	0.092	0.0	0.0	0.0	1.01	40.0	12.5
3.003	50.00	5.49	66.045	0.092	0.0	0.0	0.0	1.74	69.4	12.5
4.000	50.00	5.02	66.550	0.130	0.0	0.0	0.0	0.89	35.2	17.6
5.000	50.00	4.20	66.450	0.041	0.0	0.0	0.0	0.84	14.8	5.6
4.001	50.00	5.45	66.225	0.191	0.0	0.0	0.0	1.24	87.7	25.9
4.002	50.00	5.57	66.025	0.191	0.0	0.0	0.0	2.03	143.7	25.9
6.000	50.00	4.06	65.900	0.000	0.0	0.0	0.0	1.11	78.3	0.0
1.003	50.00	6.41	65.850	0.507	0.0	0.0	0.0	0.92	36.6«	68.7

	Bicester Phase 2 Northern Plot V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Nort...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	SW01	67.050	66.400	0.425	Open Manhole	450
1.001	o	225	SW02	67.000	66.150	0.625	Open Manhole	450
2.000	o	150	SW03	67.200	66.400	0.650	Open Manhole	450
2.001	o	150	SW04	67.200	66.220	0.830	Open Manhole	450
1.002	o	300	SW05	67.000	66.050	0.650	Open Manhole	1200
3.000	o	150	SW06	67.400	66.600	0.650	Open Manhole	450
3.001	o	150	SW07	67.400	66.420	0.830	Open Manhole	450
3.002	o	225	SW08	67.600	66.295	1.080	Open Manhole	1200
3.003	o	225	SW09	67.600	66.045	1.330	Open Manhole	1200
4.000	o	225	SW10	67.450	66.550	0.675	Open Manhole	1200
5.000	o	150	SW11	67.150	66.450	0.550	Open Manhole	450
4.001	o	300	SW12	67.450	66.225	0.925	Open Manhole	1200
4.002	o	300	SW13	67.400	66.025	1.075	Open Manhole	1200
6.000	o	300	TANK	67.150	65.900	0.950	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	49.000	196.0	SW02	67.000	66.150	0.625	Open Manhole	450
1.001	13.000	130.0	SW05	67.000	66.050	0.725	Open Manhole	1200
2.000	27.000	150.0	SW04	67.200	66.220	0.830	Open Manhole	450
2.001	14.000	82.4	SW05	67.000	66.050	0.800	Open Manhole	1200
1.002	62.000	310.0	SW14	67.150	65.850	1.000	Open Manhole	1500
3.000	27.000	150.0	SW07	67.400	66.420	0.830	Open Manhole	450
3.001	7.000	140.0	SW08	67.600	66.370	1.080	Open Manhole	1200
3.002	42.000	168.0	SW09	67.600	66.045	1.330	Open Manhole	1200
3.003	11.000	56.4	SW14	67.150	65.850	1.075	Open Manhole	1500
4.000	54.000	216.0	SW12	67.450	66.300	0.925	Open Manhole	1200
5.000	10.000	142.9	SW12	67.450	66.380	0.920	Open Manhole	1200
4.001	32.000	160.0	SW13	67.400	66.025	1.075	Open Manhole	1200
4.002	15.000	60.0	SW14	67.150	65.775	1.075	Open Manhole	1500
6.000	4.000	200.0	SW14	67.150	65.880	0.970	Open Manhole	1500

	Bicester Phase 2 Northern Plot V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Nort...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.003	o	225	SW14	67.150	65.850	1.075	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.003	10.000	200.0	ex Drainage	67.000	65.800	0.975	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.003	ex Drainage	67.000	65.800	65.800	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	8
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.405		

	Bicester Phase 2 Northern Plot V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Nort...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

Online Controls for Storm

Hydro-Brake® Optimum Manhole: SW14, DS/PN: 1.003, Volume (m³): 8.1

Unit Reference	MD-SHE-0101-4800-1200-4800
Design Head (m)	1.200
Design Flow (l/s)	4.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	101
Invert Level (m)	65.850
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	4.8
Flush-Flo™	0.359	4.8
Kick-Flo®	0.748	3.9
Mean Flow over Head Range	-	4.2

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.3	1.200	4.8	3.000	7.4	7.000	11.0
0.200	4.5	1.400	5.2	3.500	7.9	7.500	11.4
0.300	4.8	1.600	5.5	4.000	8.4	8.000	11.7
0.400	4.8	1.800	5.8	4.500	8.9	8.500	12.1
0.500	4.7	2.000	6.1	5.000	9.4	9.000	12.4
0.600	4.5	2.200	6.4	5.500	9.8	9.500	12.7
0.800	4.0	2.400	6.6	6.000	10.2		
1.000	4.4	2.600	6.9	6.500	10.6		

	Bicester Phase 2 Northern Plot V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Nort...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

Storage Structures for Storm

Porous Car Park Manhole: SW02, DS/PN: 1.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	50.0
Max Percolation (l/s)	69.4	Slope (1:X)	200.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	66.650	Cap Volume Depth (m)	0.250

Porous Car Park Manhole: SW04, DS/PN: 2.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	30.0
Max Percolation (l/s)	83.3	Slope (1:X)	200.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	66.850	Cap Volume Depth (m)	0.250

Porous Car Park Manhole: SW07, DS/PN: 3.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	30.0
Max Percolation (l/s)	41.7	Slope (1:X)	200.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	67.050	Cap Volume Depth (m)	0.250

Porous Car Park Manhole: SW11, DS/PN: 5.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	25.0
Max Percolation (l/s)	34.7	Slope (1:X)	200.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	66.800	Cap Volume Depth (m)	0.250

Porous Car Park Manhole: SW12, DS/PN: 4.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	55.0
Max Percolation (l/s)	76.4	Slope (1:X)	200.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	67.100	Cap Volume Depth (m)	0.250

Porous Car Park Manhole: SW13, DS/PN: 4.002

Infiltration Coefficient Base (m/hr)	0.00000	Max Percolation (l/s)	30.6
Membrane Percolation (mm/hr)	1000	Safety Factor	2.0

	Bicester Phase 2 Northern Plot V2 21.04.23	Micro Drainage
Date 21/04/2023 File Bicester Phase 2 - Nort...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

Porous Car Park Manhole: SW13, DS/PN: 4.002

Porosity	0.30	Slope (1:X)	200.0
Invert Level (m)	67.050	Depression Storage (mm)	5
Width (m)	5.0	Evaporation (mm/day)	3
Length (m)	22.0	Cap Volume Depth (m)	0.250

Cellular Storage Manhole: TANK, DS/PN: 6.000

Invert Level (m)	65.900	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	433.5	433.5	5.200	0.0	466.9
0.400	433.5	466.8	5.600	0.0	466.9
0.401	0.0	466.9	6.000	0.0	466.9
1.200	0.0	466.9	6.400	0.0	466.9
1.600	0.0	466.9	6.800	0.0	466.9
2.000	0.0	466.9	7.200	0.0	466.9
2.400	0.0	466.9	7.600	0.0	466.9
2.800	0.0	466.9	8.000	0.0	466.9
3.200	0.0	466.9	8.400	0.0	466.9
3.600	0.0	466.9	8.800	0.0	466.9
4.000	0.0	466.9	9.200	0.0	466.9
4.400	0.0	466.9	9.600	0.0	466.9
4.800	0.0	466.9	10.000	0.0	466.9

Porous Car Park Manhole: SW14, DS/PN: 1.003

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	55.0
Max Percolation (l/s)	76.4	Slope (1:X)	200.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	66.800	Cap Volume Depth (m)	0.250

	Bicester Phase 2 Northern Plot V2 21.04.23	Micro Drainage
Date 21/04/2023 File Bicester Phase 2 - Nort...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	8
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.405
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 25

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	SW01	15 Winter	1	+0%	30/15 Summer	100/15 Winter		
1.001	SW02	15 Winter	1	+0%	30/15 Summer	100/180 Winter		
2.000	SW03	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
2.001	SW04	15 Winter	1	+0%	30/15 Summer			
1.002	SW05	15 Winter	1	+0%	30/15 Summer	100/180 Winter		
3.000	SW06	15 Winter	1	+0%	100/15 Summer			
3.001	SW07	15 Winter	1	+0%	30/15 Summer			
3.002	SW08	15 Winter	1	+0%	30/15 Summer			
3.003	SW09	15 Winter	1	+0%	30/15 Summer			
4.000	SW10	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
5.000	SW11	15 Summer	1	+0%	30/15 Summer			
4.001	SW12	15 Winter	1	+0%	30/15 Summer			
4.002	SW13	15 Winter	1	+0%	30/15 Summer			
6.000	TANK	120 Winter	1	+0%	100/30 Summer			
1.003	SW14	15 Winter	1	+0%	1/15 Summer			

	Bicester Phase 2 Northern Plot V2 21.04.23	Micro Drainage
Date 21/04/2023 File Bicester Phase 2 - Nort...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01	66.480	-0.145	0.000	0.26		9.2	OK	1
1.001	SW02	66.301	-0.074	0.000	0.22		8.6	OK	3
2.000	SW03	66.487	-0.063	0.000	0.63		8.6	OK	5
2.001	SW04	66.312	-0.058	0.000	0.48		8.5	OK	
1.002	SW05	66.288	-0.062	0.000	0.38		22.7	OK	3
3.000	SW06	66.649	-0.101	0.000	0.23		3.2	OK	
3.001	SW07	66.471	-0.099	0.000	0.25		3.2	OK	
3.002	SW08	66.380	-0.140	0.000	0.30		11.3	OK	
3.003	SW09	66.255	-0.015	0.000	0.18		10.8	OK	
4.000	SW10	66.672	-0.103	0.000	0.55		18.5	OK	3
5.000	SW11	66.522	-0.078	0.000	0.47		6.2	OK	
4.001	SW12	66.339	-0.186	0.000	0.30		24.3	OK	
4.002	SW13	66.263	-0.062	0.000	0.18		22.2	OK	
6.000	TANK	65.989	-0.211	0.000	0.08		3.8	OK	
1.003	SW14	66.238	0.163	0.000	0.16		4.8	SURCHARGED	

	Bicester Phase 2 Northern Plot V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Nort...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	8
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.405
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 25

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	SW01	15 Winter	30	+0%	30/15 Summer	100/15 Winter		
1.001	SW02	15 Winter	30	+0%	30/15 Summer	100/180 Winter		
2.000	SW03	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
2.001	SW04	15 Winter	30	+0%	30/15 Summer			
1.002	SW05	15 Winter	30	+0%	30/15 Summer	100/180 Winter		
3.000	SW06	15 Winter	30	+0%	100/15 Summer			
3.001	SW07	15 Winter	30	+0%	30/15 Summer			
3.002	SW08	15 Winter	30	+0%	30/15 Summer			
3.003	SW09	15 Winter	30	+0%	30/15 Summer			
4.000	SW10	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
5.000	SW11	15 Winter	30	+0%	30/15 Summer			
4.001	SW12	15 Winter	30	+0%	30/15 Summer			
4.002	SW13	15 Winter	30	+0%	30/15 Summer			
6.000	TANK	180 Winter	30	+0%	100/30 Summer			
1.003	SW14	15 Winter	30	+0%	1/15 Summer			

	Bicester Phase 2 Northern Plot V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Nort...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01	66.734	0.109	0.000	0.56		19.9	SURCHARGED	1
1.001	SW02	66.664	0.289	0.000	0.45		17.7	SURCHARGED	3
2.000	SW03	67.036	0.486	0.000	1.18		16.3	FLOOD RISK	5
2.001	SW04	66.781	0.411	0.000	0.91		16.4	SURCHARGED	
1.002	SW05	66.640	0.290	0.000	0.96		57.3	SURCHARGED	3
3.000	SW06	66.683	-0.067	0.000	0.58		8.0	OK	
3.001	SW07	66.612	0.042	0.000	0.55		7.1	SURCHARGED	
3.002	SW08	66.602	0.082	0.000	0.75		28.5	SURCHARGED	
3.003	SW09	66.492	0.222	0.000	0.44		25.5	SURCHARGED	
4.000	SW10	66.979	0.204	0.000	1.20		40.5	SURCHARGED	3
5.000	SW11	66.751	0.151	0.000	1.12		14.8	SURCHARGED	
4.001	SW12	66.715	0.190	0.000	0.59		47.2	SURCHARGED	
4.002	SW13	66.602	0.277	0.000	0.40		48.0	SURCHARGED	
6.000	TANK	66.187	-0.013	0.000	0.09		4.4	OK	
1.003	SW14	66.431	0.356	0.000	0.16		4.8	SURCHARGED	

	Bicester Phase 2 Northern Plot V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Nort...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	8
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.405
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 25

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	SW01	15 Winter	100	+25%	30/15 Summer	100/15 Winter		
1.001	SW02	240 Winter	100	+25%	30/15 Summer	100/180 Winter		
2.000	SW03	15 Winter	100	+25%	30/15 Summer	100/15 Summer		
2.001	SW04	240 Winter	100	+25%	30/15 Summer			
1.002	SW05	240 Winter	100	+25%	30/15 Summer	100/180 Winter		
3.000	SW06	15 Winter	100	+25%	100/15 Summer			
3.001	SW07	15 Winter	100	+25%	30/15 Summer			
3.002	SW08	15 Winter	100	+25%	30/15 Summer			
3.003	SW09	180 Winter	100	+25%	30/15 Summer			
4.000	SW10	15 Winter	100	+25%	30/15 Summer	100/15 Summer		
5.000	SW11	180 Winter	100	+25%	30/15 Summer			
4.001	SW12	180 Winter	100	+25%	30/15 Summer			
4.002	SW13	180 Winter	100	+25%	30/15 Summer			
6.000	TANK	180 Winter	100	+25%	100/30 Summer			
1.003	SW14	180 Winter	100	+25%	1/15 Summer			

	Bicester Phase 2 Northern Plot V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Nort...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01	67.050	0.425	0.009	0.94		33.2	FLOOD	1
1.001	SW02	67.003	0.628	2.712	0.17		6.8	FLOOD	3
2.000	SW03	67.203	0.653	2.700	1.35		18.7	FLOOD	5
2.001	SW04	67.006	0.636	0.000	0.35		6.2	FLOOD RISK	
1.002	SW05	67.003	0.653	3.459	0.39		23.4	FLOOD	3
3.000	SW06	67.211	0.461	0.000	0.77		10.7	FLOOD RISK	
3.001	SW07	67.096	0.526	0.000	0.96		12.3	SURCHARGED	
3.002	SW08	67.079	0.559	0.000	1.09		41.4	SURCHARGED	
3.003	SW09	67.006	0.736	0.000	0.21		12.1	SURCHARGED	
4.000	SW10	67.452	0.677	2.348	1.50		50.7	FLOOD	3
5.000	SW11	67.014	0.414	0.000	0.41		5.4	FLOOD RISK	
4.001	SW12	67.011	0.486	0.000	0.31		25.1	SURCHARGED	
4.002	SW13	67.007	0.682	0.000	0.21		25.0	SURCHARGED	
6.000	TANK	67.003	0.803	0.000	0.00		0.1	FLOOD RISK	
1.003	SW14	67.003	0.928	0.000	0.16		4.8	FLOOD RISK	

	Bicester Phase 2 - South Plots V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Sout...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.404	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.542	4-8	1.004	8-12	0.017

Total Area Contributing (ha) = 1.563

Total Pipe Volume (m³) = 27.669

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
10.000	81.000	0.500	162.0	0.093	4.00	0.0	0.600	o	225	Pipe/Conduit	
10.001	5.000	0.050	100.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
10.002	27.000	0.150	180.0	0.146	0.00	0.0	0.600	o	300	Pipe/Conduit	
10.003	29.000	0.400	72.5	0.230	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
10.000	50.00	5.32	66.450	0.093	0.0	0.0	0.0	1.02	40.7	12.6
10.001	50.00	5.38	65.950	0.093	0.0	0.0	0.0	1.31	52.0	12.6
10.002	50.00	5.77	65.825	0.239	0.0	0.0	0.0	1.17	82.6	32.4
10.003	50.00	6.03	65.675	0.469	0.0	0.0	0.0	1.85	130.7	63.5

	Bicester Phase 2 - South Plots V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Sout...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
11.000	4.000	0.050	80.0	0.000	4.00	0.0	0.600	o	375	Pipe/Conduit	
10.004	27.000	0.125	216.0	0.146	0.00	0.0	0.600	o	375	Pipe/Conduit	
12.000	87.000	1.075	80.9	0.098	4.00	0.0	0.600	o	225	Pipe/Conduit	
13.000	35.000	0.350	100.0	0.080	4.00	0.0	0.600	o	150	Pipe/Conduit	
13.001	16.000	0.725	22.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
14.000	15.000	0.125	120.0	0.123	4.00	0.0	0.600	o	225	Pipe/Conduit	
14.001	34.000	0.200	170.0	0.080	0.00	0.0	0.600	o	300	Pipe/Conduit	
14.002	19.000	0.300	63.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
10.005	5.000	0.030	166.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
10.006	60.000	0.350	171.4	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
15.000	28.000	0.200	140.0	0.137	4.00	0.0	0.600	o	225	Pipe/Conduit	
15.001	17.000	0.100	170.0	0.230	0.00	0.0	0.600	o	300	Pipe/Conduit	
15.002	19.000	0.100	190.0	0.137	0.00	0.0	0.600	o	375	Pipe/Conduit	
16.000	47.000	0.400	117.5	0.063	4.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
11.000	50.00	4.03	65.250	0.000	0.0	0.0	0.0	2.03	223.9	0.0
10.004	50.00	6.39	65.200	0.615	0.0	0.0	0.0	1.23	135.7	83.3
12.000	50.00	5.00	66.200	0.098	0.0	0.0	0.0	1.45	57.8	13.3
13.000	50.00	4.58	66.200	0.080	0.0	0.0	0.0	1.00	17.8	10.8
13.001	50.00	4.68	65.775	0.080	0.0	0.0	0.0	2.80	111.2	10.8
14.000	50.00	4.21	65.850	0.123	0.0	0.0	0.0	1.19	47.4	16.7
14.001	50.00	4.68	65.650	0.203	0.0	0.0	0.0	1.20	85.0	27.5
14.002	50.00	4.84	65.450	0.203	0.0	0.0	0.0	1.98	139.9	27.5
10.005	50.00	6.50	65.075	0.996	0.0	0.0	0.0	0.78	13.7«	134.9
10.006	50.00	7.81	65.045	0.996	0.0	0.0	0.0	0.76	13.5«	134.9
15.000	50.00	4.42	65.250	0.137	0.0	0.0	0.0	1.10	43.9	18.6
15.001	50.00	4.66	64.975	0.367	0.0	0.0	0.0	1.20	85.0	49.7
15.002	50.00	4.90	64.800	0.504	0.0	0.0	0.0	1.31	144.8	68.2
16.000	50.00	4.85	65.550	0.063	0.0	0.0	0.0	0.93	16.4	8.5

	Bicester Phase 2 - South Plots V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Sout...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
17.000	5.000	0.001	5000.0	0.000	4.00	0.0	0.600	o	375	Pipe/Conduit	
15.003	11.000	0.100	110.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
10.007	38.000	0.180	211.1	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
17.000	50.00	4.34	64.750	0.000	0.0	0.0	0.0	0.25	27.3	0.0
15.003	50.00	5.09	64.700	0.567	0.0	0.0	0.0	0.96	16.9«	76.8
10.007	50.00	8.73	64.695	1.563	0.0	0.0	0.0	0.69	12.2«	211.6

	Bicester Phase 2 - South Plots V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Sout...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
10.000	o	225	SW15	67.450	66.450	0.775	Open Manhole	1200
10.001	o	225	SW16	67.350	65.950	1.175	Open Manhole	1200
10.002	o	300	SW17	67.350	65.825	1.225	Open Manhole	1200
10.003	o	300	SW18	67.350	65.675	1.375	Open Manhole	1200
11.000	o	375	TANK 1	67.050	65.250	1.425	Open Manhole	1500
10.004	o	375	SW19	67.350	65.200	1.775	Open Manhole	1500
12.000	o	225	SW20	67.050	66.200	0.625	Open Manhole	1200
13.000	o	150	RE	67.000	66.200	0.650	Open Manhole	300
13.001	o	225	SW21	67.000	65.775	1.000	Open Manhole	1200
14.000	o	225	CD	67.050	65.850	0.975	Open Manhole	300
14.001	o	300	SW22	66.850	65.650	0.900	Open Manhole	1200
14.002	o	300	SW23	66.850	65.450	1.100	Open Manhole	1200
10.005	o	150	SW24	66.550	65.075	1.325	Open Manhole	1500
10.006	o	150	SW25	66.095	65.045	0.900	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
10.000	81.000	162.0	SW16	67.350	65.950	1.175	Open Manhole	1200
10.001	5.000	100.0	SW17	67.350	65.900	1.225	Open Manhole	1200
10.002	27.000	180.0	SW18	67.350	65.675	1.375	Open Manhole	1200
10.003	29.000	72.5	SW19	67.350	65.275	1.775	Open Manhole	1500
11.000	4.000	80.0	SW19	67.350	65.200	1.775	Open Manhole	1500
10.004	27.000	216.0	SW24	66.550	65.075	1.100	Open Manhole	1500
12.000	87.000	80.9	SW24	66.550	65.125	1.200	Open Manhole	1500
13.000	35.000	100.0	SW21	67.000	65.850	1.000	Open Manhole	1200
13.001	16.000	22.1	SW24	66.550	65.050	1.275	Open Manhole	1500
14.000	15.000	120.0	SW22	66.850	65.725	0.900	Open Manhole	1200
14.001	34.000	170.0	SW23	66.850	65.450	1.100	Open Manhole	1200
14.002	19.000	63.3	SW24	66.550	65.150	1.100	Open Manhole	1500
10.005	5.000	166.7	SW25	66.095	65.045	0.900	Open Manhole	1200
10.006	60.000	171.4	SW31	65.800	64.695	0.955	Open Manhole	1200

	Bicester Phase 2 - South Plots V2 21.04.23	Micro Drainage
Date 21/04/2023 File Bicester Phase 2 - Sout...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
15.000	o	225	SW26	66.750	65.250	1.275	Open Manhole	1200
15.001	o	300	SW27	66.750	64.975	1.475	Open Manhole	1200
15.002	o	375	SW28	66.750	64.800	1.575	Open Manhole	1500
16.000	o	150	SW29	66.450	65.550	0.750	Open Manhole	1200
17.000	o	375	TANK 2	66.500	64.750	1.375	Open Manhole	300
15.003	o	150	SW30	66.450	64.700	1.600	Open Manhole	1500
10.007	o	150	SW31	65.800	64.695	0.955	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
15.000	28.000	140.0	SW27	66.750	65.050	1.475	Open Manhole	1200
15.001	17.000	170.0	SW28	66.750	64.875	1.575	Open Manhole	1500
15.002	19.000	190.0	SW30	66.450	64.700	1.375	Open Manhole	1500
16.000	47.000	117.5	SW30	66.450	65.150	1.150	Open Manhole	1500
17.000	5.000	5000.0	SW30	66.450	64.749	1.326	Open Manhole	1500
15.003	11.000	110.0	SW31	65.800	64.600	1.050	Open Manhole	1200
10.007	38.000	211.1	Existing SW	65.600	64.515	0.935	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
10.007	Existing SW	65.600	64.515	64.515	0	0

	Bicester Phase 2 - South Plots V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Sout...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	7
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.404		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: SW24, DS/PN: 10.005, Volume (m³): 10.7

Unit Reference	MD-SHE-0136-9500-1400-9500
Design Head (m)	1.400
Design Flow (l/s)	9.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	136
Invert Level (m)	65.075
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.400	9.5
Flush-Flo™	0.412	9.5
Kick-Flo®	0.879	7.6
Mean Flow over Head Range	-	8.3

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.9	1.200	8.8	3.000	13.6	7.000	20.4
0.200	8.7	1.400	9.5	3.500	14.7	7.500	21.1
0.300	9.3	1.600	10.1	4.000	15.6	8.000	21.8
0.400	9.5	1.800	10.7	4.500	16.5	8.500	22.4
0.500	9.4	2.000	11.2	5.000	17.4	9.000	23.0
0.600	9.3	2.200	11.8	5.500	18.2	9.500	23.7
0.800	8.4	2.400	12.3	6.000	19.0		
1.000	8.1	2.600	12.7	6.500	19.7		

Hydro-Brake® Optimum Manhole: SW30, DS/PN: 15.003, Volume (m³): 6.3

Unit Reference	MD-SHE-0099-5400-1700-5400
Design Head (m)	1.700
Design Flow (l/s)	5.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	99
Invert Level (m)	64.700
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

	Bicester Phase 2 - South Plots V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Sout...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

Hydro-Brake® Optimum Manhole: SW30, DS/PN: 15.003, Volume (m³): 6.3

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.700	5.4
Flush-Flo™	0.432	5.0
Kick-Flo®	0.886	4.0
Mean Flow over Head Range	-	4.5

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.3	1.200	4.6	3.000	7.0	7.000	10.5
0.200	4.5	1.400	4.9	3.500	7.6	7.500	10.9
0.300	4.9	1.600	5.2	4.000	8.1	8.000	11.2
0.400	5.0	1.800	5.5	4.500	8.5	8.500	11.5
0.500	5.0	2.000	5.8	5.000	9.0	9.000	11.8
0.600	4.9	2.200	6.1	5.500	9.4	9.500	12.2
0.800	4.4	2.400	6.3	6.000	9.8		
1.000	4.2	2.600	6.6	6.500	10.1		

	Bicester Phase 2 - South Plots V2 21.04.23	Micro Drainage
Date 21/04/2023 File Bicester Phase 2 - Sout...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

Storage Structures for Storm

Porous Car Park Manhole: SW16, DS/PN: 10.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	80.0
Max Percolation (l/s)	111.1	Slope (1:X)	200.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	67.000	Cap Volume Depth (m)	0.250

Cellular Storage Manhole: TANK 1, DS/PN: 11.000

Invert Level (m)	65.250	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	540.0	540.0	5.200	0.0	614.4
0.400	540.0	577.2	5.600	0.0	614.4
0.800	540.0	614.4	6.000	0.0	614.4
0.801	0.0	614.4	6.400	0.0	614.4
1.600	0.0	614.4	6.800	0.0	614.4
2.000	0.0	614.4	7.200	0.0	614.4
2.400	0.0	614.4	7.600	0.0	614.4
2.800	0.0	614.4	8.000	0.0	614.4
3.200	0.0	614.4	8.400	0.0	614.4
3.600	0.0	614.4	8.800	0.0	614.4
4.000	0.0	614.4	9.200	0.0	614.4
4.400	0.0	614.4	9.600	0.0	614.4
4.800	0.0	614.4	10.000	0.0	614.4

Porous Car Park Manhole: SW21, DS/PN: 13.001

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	10.0
Membrane Percolation (mm/hr)	1000	Length (m)	35.0
Max Percolation (l/s)	97.2	Slope (1:X)	200.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	66.650	Cap Volume Depth (m)	0.250

Porous Car Park Manhole: SW23, DS/PN: 14.002

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	35.0
Max Percolation (l/s)	48.6	Slope (1:X)	200.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	66.500	Cap Volume Depth (m)	0.250

	Bicester Phase 2 - South Plots V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Sout...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

Porous Car Park Manhole: SW24, DS/PN: 10.005

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	87.0
Max Percolation (l/s)	120.8	Slope (1:X)	200.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	66.200	Cap Volume Depth (m)	0.250

Cellular Storage Manhole: TANK 2, DS/PN: 17.000

Invert Level (m)	64.750	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	330.0	330.0	5.200	0.0	388.2
0.400	330.0	359.1	5.600	0.0	388.2
0.800	330.0	388.1	6.000	0.0	388.2
0.801	0.0	388.2	6.400	0.0	388.2
1.600	0.0	388.2	6.800	0.0	388.2
2.000	0.0	388.2	7.200	0.0	388.2
2.400	0.0	388.2	7.600	0.0	388.2
2.800	0.0	388.2	8.000	0.0	388.2
3.200	0.0	388.2	8.400	0.0	388.2
3.600	0.0	388.2	8.800	0.0	388.2
4.000	0.0	388.2	9.200	0.0	388.2
4.400	0.0	388.2	9.600	0.0	388.2
4.800	0.0	388.2	10.000	0.0	388.2

Porous Car Park Manhole: SW30, DS/PN: 15.003

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	5.0
Membrane Percolation (mm/hr)	1000	Length (m)	50.0
Max Percolation (l/s)	69.4	Slope (1:X)	200.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	66.100	Cap Volume Depth (m)	0.250

	Bicester Phase 2 - South Plots V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Sout...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	7
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.404
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 25

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
10.000	SW15	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
10.001	SW16	15 Winter	1	+0%	30/15 Summer			
10.002	SW17	15 Winter	1	+0%	30/15 Summer			
10.003	SW18	15 Winter	1	+0%	30/15 Summer			
11.000	TANK 1	60 Winter	1	+0%	30/60 Winter			
10.004	SW19	15 Winter	1	+0%	1/15 Summer			
12.000	SW20	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
13.000	RE	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
13.001	SW21	15 Summer	1	+0%	30/15 Summer			
14.000	CD	15 Summer	1	+0%	30/15 Summer	100/15 Summer		
14.001	SW22	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
14.002	SW23	15 Winter	1	+0%	1/15 Summer			
10.005	SW24	15 Winter	1	+0%	1/15 Summer	100/240 Winter		
10.006	SW25	15 Summer	1	+0%				
15.000	SW26	15 Winter	1	+0%	30/15 Summer	100/15 Summer		
15.001	SW27	15 Winter	1	+0%	1/15 Summer			
15.002	SW28	15 Winter	1	+0%	1/15 Summer			
16.000	SW29	15 Winter	1	+0%	30/15 Summer	100/15 Summer		

	Bicester Phase 2 - South Plots V2 21.04.23	Micro Drainage
Date 21/04/2023 File Bicester Phase 2 - Sout...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
10.000	SW15	66.542	-0.133	0.000	0.32		12.7	OK	4
10.001	SW16	66.049	-0.126	0.000	0.40		12.8	OK	
10.002	SW17	65.957	-0.168	0.000	0.40		29.4	OK	
10.003	SW18	65.820	-0.155	0.000	0.47		55.6	OK	
11.000	TANK 1	65.390	-0.235	0.000	0.08		8.5	OK	
10.004	SW19	65.692	0.117	0.000	0.13		15.9	SURCHARGED	
12.000	SW20	66.278	-0.147	0.000	0.24		13.7	OK	2
13.000	RE	66.293	-0.057	0.000	0.70		11.9	OK	5
13.001	SW21	65.827	-0.173	0.000	0.12		11.8	OK	
14.000	CD	65.955	-0.120	0.000	0.44		18.4	OK	3
14.001	SW22	65.831	-0.119	0.000	0.33		25.8	OK	2
14.002	SW23	65.793	0.043	0.000	0.22		27.0	SURCHARGED	
10.005	SW24	65.751	0.526	0.000	0.88		9.5	SURCHARGED	1
10.006	SW25	65.139	-0.056	0.000	0.72		9.5	OK	
15.000	SW26	65.393	-0.082	0.000	0.50		20.2	OK	3
15.001	SW27	65.351	0.076	0.000	0.56		40.8	SURCHARGED	
15.002	SW28	65.254	0.079	0.000	0.47		56.2	SURCHARGED	
16.000	SW29	65.633	-0.067	0.000	0.59		9.4	OK	3

	Bicester Phase 2 - South Plots V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Sout...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
17.000	TANK 2	240 Winter	1	+0%	30/60 Winter				64.932
15.003	SW30	15 Winter	1	+0%	1/15 Summary				65.149
10.007	SW31	30 Winter	1	+0%	1/15 Summer				64.912

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
17.000	TANK 2	-0.193	0.000	0.04		3.2	OK	
15.003	SW30	0.299	0.000	0.31		4.8	SURCHARGED	
10.007	SW31	0.067	0.000	1.19		14.0	SURCHARGED	

	Bicester Phase 2 - South Plots V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Sout...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	7
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.404
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 25

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
10.000	SW15	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
10.001	SW16	15 Winter	30	+0%	30/15 Summer			
10.002	SW17	15 Winter	30	+0%	30/15 Summer			
10.003	SW18	15 Winter	30	+0%	30/15 Summer			
11.000	TANK 1	180 Winter	30	+0%	30/60 Winter			
10.004	SW19	15 Winter	30	+0%	1/15 Summer			
12.000	SW20	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
13.000	RE	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
13.001	SW21	15 Winter	30	+0%	30/15 Summer			
14.000	CD	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
14.001	SW22	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
14.002	SW23	15 Winter	30	+0%	1/15 Summer			
10.005	SW24	15 Winter	30	+0%	1/15 Summer	100/240 Winter		
10.006	SW25	60 Winter	30	+0%				
15.000	SW26	15 Winter	30	+0%	30/15 Summer	100/15 Summer		
15.001	SW27	15 Winter	30	+0%	1/15 Summer			
15.002	SW28	15 Winter	30	+0%	1/15 Summer			
16.000	SW29	15 Winter	30	+0%	30/15 Summer	100/15 Summer		

	Bicester Phase 2 - South Plots V2 21.04.23	Micro Drainage
Date 21/04/2023 File Bicester Phase 2 - Sout...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
10.000	SW15	66.916	0.241	0.000	0.67		26.5	SURCHARGED	4
10.001	SW16	66.734	0.559	0.000	1.19		37.4	SURCHARGED	
10.002	SW17	66.679	0.554	0.000	0.86		63.7	SURCHARGED	
10.003	SW18	66.565	0.590	0.000	1.05		124.6	SURCHARGED	
11.000	TANK 1	65.709	0.084	0.000	0.09		9.6	SURCHARGED	
10.004	SW19	66.094	0.519	0.000	0.18		21.7	SURCHARGED	
12.000	SW20	66.520	0.095	0.000	0.51		29.0	SURCHARGED	2
13.000	RE	66.906	0.556	0.000	1.31		22.5	FLOOD RISK	5
13.001	SW21	66.277	0.277	0.000	0.28		27.4	SURCHARGED	
14.000	CD	66.642	0.567	0.000	0.94		39.2	SURCHARGED	3
14.001	SW22	66.531	0.581	0.000	0.80		62.7	SURCHARGED	2
14.002	SW23	66.401	0.651	0.000	0.51		61.7	SURCHARGED	
10.005	SW24	66.236	1.011	0.000	0.87		9.5	SURCHARGED	1
10.006	SW25	65.139	-0.056	0.000	0.72		9.5	OK	
15.000	SW26	66.039	0.564	0.000	1.09		44.6	SURCHARGED	3
15.001	SW27	65.798	0.523	0.000	1.66		120.3	SURCHARGED	
15.002	SW28	65.511	0.336	0.000	1.37		165.4	SURCHARGED	
16.000	SW29	65.928	0.228	0.000	1.22		19.4	SURCHARGED	3

	Bicester Phase 2 - South Plots V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Sout...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
17.000	TANK 2	240 Winter	30	+0%	30/60 Winter				65.226
15.003	SW30	15 Winter	30	+0%	1/15 Summer				65.315
10.007	SW31	240 Winter	30	+0%	1/15 Summer				64.926

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
17.000	TANK 2	0.101	0.000	0.07		5.3	SURCHARGED	
15.003	SW30	0.465	0.000	0.33		5.0	SURCHARGED	
10.007	SW31	0.081	0.000	1.22		14.4	SURCHARGED	

	Bicester Phase 2 - South Plots V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Sout...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	7
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.404
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 25

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
10.000	SW15	15 Winter	100	+25%	30/15 Summer	100/15 Summer		
10.001	SW16	15 Winter	100	+25%	30/15 Summer			
10.002	SW17	15 Winter	100	+25%	30/15 Summer			
10.003	SW18	15 Summer	100	+25%	30/15 Summer			
11.000	TANK 1	240 Winter	100	+25%	30/60 Winter			
10.004	SW19	240 Winter	100	+25%	1/15 Summer			
12.000	SW20	15 Winter	100	+25%	30/15 Summer	100/15 Summer		
13.000	RE	15 Winter	100	+25%	30/15 Summer	100/15 Summer		
13.001	SW21	240 Winter	100	+25%	30/15 Summer			
14.000	CD	15 Winter	100	+25%	30/15 Summer	100/15 Summer		
14.001	SW22	15 Winter	100	+25%	30/15 Summer	100/15 Summer		
14.002	SW23	15 Winter	100	+25%	1/15 Summer			
10.005	SW24	240 Winter	100	+25%	1/15 Summer	100/240 Winter		
10.006	SW25	1440 Summer	100	+25%				
15.000	SW26	15 Winter	100	+25%	30/15 Summer	100/15 Summer		
15.001	SW27	15 Winter	100	+25%	1/15 Summer			
15.002	SW28	360 Winter	100	+25%	1/15 Summer			
16.000	SW29	15 Winter	100	+25%	30/15 Summer	100/15 Summer		

	Bicester Phase 2 - South Plots V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Sout...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
10.000	SW15	67.453	0.778	3.228	0.72		28.5	FLOOD	4
10.001	SW16	67.246	1.071	0.000	2.31		72.9	FLOOD RISK	
10.002	SW17	67.316	1.191	0.000	1.16		86.3	FLOOD RISK	
10.003	SW18	67.223	1.248	0.000	1.45		171.7	FLOOD RISK	
11.000	TANK 1	66.555	0.930	0.000	0.08		8.5	SURCHARGED	
10.004	SW19	66.555	0.980	0.000	0.08		10.1	SURCHARGED	
12.000	SW20	67.051	0.626	0.817	0.74		41.6	FLOOD	2
13.000	RE	67.005	0.655	4.711	1.55		26.5	FLOOD	5
13.001	SW21	66.552	0.552	0.000	0.09		8.4	SURCHARGED	
14.000	CD	67.052	0.977	2.262	1.29		53.7	FLOOD	3
14.001	SW22	66.850	0.900	0.295	1.23		95.7	FLOOD	2
14.002	SW23	66.627	0.877	0.000	0.72		87.7	FLOOD RISK	
10.005	SW24	66.550	1.325	0.256	0.88		9.5	FLOOD	1
10.006	SW25	65.139	-0.056	0.000	0.72		9.5	OK	
15.000	SW26	66.754	1.279	4.063	1.87		76.1	FLOOD	3
15.001	SW27	66.589	1.314	0.000	2.35		170.7	FLOOD RISK	
15.002	SW28	66.362	1.187	0.000	0.31		37.1	SURCHARGED	
16.000	SW29	66.451	0.751	1.110	1.62		25.7	FLOOD	3

	Bicester Phase 2 - South Plots V2 21.04.23	
Date 21/04/2023 File Bicester Phase 2 - Sout...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
17.000	TANK 2	360 Winter	100	+25%	30/60 Winter				66.359
15.003	SW30	360 Winter	100	+25%	1/15 Summer				66.359
10.007	SW31	1440 Winter	100	+25%	1/15 Summer				64.931

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
17.000	TANK 2	1.234	0.000	0.06		4.8	FLOOD RISK	
15.003	SW30	1.509	0.000	0.33		5.0	FLOOD RISK	
10.007	SW31	0.086	0.000	1.23		14.5	SURCHARGED	

Our Locations

Birmingham
2 The Wharf
Bridge Street
Birmingham
B1 2JS
T. 0121 643 4694
birmingham@curtins.com

Bristol
Quayside
40-58 Hotwell Road
Bristol
BS8 4UQ
T. 0117 302 7560
bristol@curtins.com

Cardiff
3 Cwrt-y-Parc
Earlswood Road
Cardiff
CF14 5GH
T. 029 2068 0900
cardiff@curtins.com

Douglas
Varley House
29-31 Duke Street
Douglas
Isle of Man
IM1 2AZ
T. 01624 624 585
douglas@curtins.com

Dublin
39 Fitzwilliam Square
Dublin 2
Ireland
T. 00353 1 507 9447
dublin@curtins.com

Edinburgh
1a Belford Road
Edinburgh
EH4 3BL
T. 0131 225 2175
edinburgh@curtins.com

Glasgow
Queens House
29 St Vincent Place
Glasgow
G1 2DT
T. 0141 319 8777
glasgow@curtins.com

Kendal
28 Lowther Street
Kendal
Cumbria
LA9 4DH
T. 01539 724 823
kendal@curtins.com

Leeds
Rose Wharf
Ground Floor
Leeds
L29 8EE
T. 0113 274 8509
leeds@curtins.com

Liverpool
Curtin House
Columbus Quay
Riverside Drive
Liverpool
L3 4DB
T. 0151 726 2000
liverpool@curtins.com

London
40 Compton Street
London
EC1V 0BD
T. 020 7324 2240
london@curtins.com

Manchester
Merchant Exchange
17-19 Whitworth Street West
Manchester
M1 5WG
T. 0161 236 2394
manchester@curtins.com

Nottingham
56 The Ropewalk
Nottingham
NG1 5DW
T. 0115 941 5551
nottingham@curtins.com

Registered in England and Wales number: 2054159
Registered office: Curtin House, Columbus Quay, Riverside Drive, Liverpool L3 4DB