Marston Business Park, St Neots

TECHNICAL NOTE

DOCUMENT CONTROL SHEET

Issued by: Burrows Graham Limited
5 Ambassador Place
Stockport Road
Altrincham
Cheshire
WA15 8DB

Tel: +44 (0)161 804 8046

Client: Top Road

Project: Marston Business Park, St Neots

Document No: 30278-BGL-XX-XX-TN-C-00002

Title: Discharge Condition 12 – Surface Water Drainage

Status: P01

Date: 07.05.2025

Prepared By: JB

Checked By: JW

Document Revision Record

Version Number	Date	Revision Details
P01	06.05.2025	Issued for Information
P02	09.05.2025	Revised to suit Planning Consultants comments

Burrows Graham Limited has prepared this report in accordance with the instructions of the above-named Client for their sole and specific use. Any third parties who may use the information contained herein do so at their own risk.

Introduction

Planning permission for the development of the site was granted by Huntingdonshire District Council (HDC) in August 2023, planning application ref. 22/02332/FUL. The planning permission includes the following condition in relation to surface water drainage.

Condition 12

No laying of services, creation of hard surfaces or erection of a building shall commence until a detailed design of the surface water drainage of the site has been submitted to and approved in writing by the Local Planning Authority. Those elements of the surface water drainage system not adopted by a statutory undertaker shall thereafter be maintained and managed in accordance with the approved management and maintenance plan.

The scheme shall be based upon the principles within the agreed Flood Risk Assessment & Drainage Strategy report version 3 prepared by Conisbee (ref 210714/R Fallow) dated 16 May 2023 and shall also include:

- *a) Full calculations detailing the existing surface water runoff rates for the QBAR, 3.3% Annual Exceedance Probability (AEP) (1 in 30) and 1% AEP (1 in 100) storm events;*
- *b) Full results of the proposed drainage system modelling in the above-referenced storm events (as well as 1% AEP plus climate change), inclusive of all collection, conveyance, storage, flow control and disposal elements and including an allowance for urban creep, together with an assessment of system performance;*
- *c) Detailed drawings of the entire proposed surface water drainage system, attenuation and flow control measures, including levels, gradients, dimensions and pipe reference numbers, designed to accord with the CIRIA C753 SuDS Manual (or any equivalent guidance that may supersede or replace it);*
- *d) Full details on SuDS proposals (including location, type, size, depths, side slopes and cross sections);*
- *e) Details of overland flood flow routes in the event of system exceedance, with demonstration that such flows can be appropriately managed on site without increasing flood risk to occupants;*
- *f) Demonstration that the surface water drainage of the site is in accordance with DEFRA non-statutory technical standards for suitable drainage systems;*
- *g) Full details of the maintenance/adoption of the surface water drainage system;*
- *h) Measures taken to prevent pollution of the receiving groundwater and/or surface water.*

The drainage scheme must adhere to the hierarchy of drainage options as outlined in the National Planning Policy Framework Planning Practice Guidance. The drainage scheme shall be installed in accordance with the approved details prior to the first use of the building hereby permitted.

This Technical Note shall be read in conjunction with the Flood Risk Assessment and Drainage Strategy REV 3, produced by Conisbee dated 16 May 2023 approved as part of the original planning permission and referred to in Condition 12.

Surface Water Drainage Strategy

Disposal of surface water

The method for removal of surface water from the site has been selected in accordance with the hierarchy outlined in Building Regulations Part H as summarised below:

- Infiltration to the ground
- Discharge to a watercourse
- Connection to a surface water sewer
- Connection to a combined sewer

Due to the cohesive nature of the soils on site, it is considered that infiltration will not be a suitable means of disposing surface water runoff from the development site.

The nearest watercourse, Hen Brook, is located approximately 170m from site, so discharging directly to this is also not considered a suitable means of disposing surface water runoff.

It is therefore proposed that surface water runoff from the development site will be discharged to the Anglian Water surface water public sewer. This method of discharge is outlined in the Flood Risk Assessment and Drainage Strategy report produced by Conisbee that was approved as part of the original planning permission and referred to in Condition 12.

Surface Water Discharge Rates

The proposed site location is situated on a previous developed land (brownfield). Cambridgeshire Flood and Water SPD states that brownfield sites must reduce the existing runoff rates, providing betterment. Where possible, redevelopments should reinstate greenfield runoff rates.

The Cambridgeshire SWPG states *'Where a complex flow control is proposed the peak runoff rate from the developed site for events up to and including the 1% AEP plus climate change event should not exceed the greenfield equivalent'*.

Greenfield runoff rates for the site have been calculated using the IH124 runoff estimation approach, as summarised below. For greenfield runoff calculations refer to Flood Risk Assessment and Drainage Strategy referenced 210714/ R Fallow that was approved as part of the original planning permission and referred to in Condition 12.

Return Period	Existing Runoff Rate (l/s)	Greenfield Runoff Rate (/s)	Existing Discharge Volume (m^3)
1 in 1 year	39.00	1.81	209.50
1 in 30 years	95.70	5.10	460.40
1 in 100 years	125.00	7.41	598.10

The existing run off rates were determined by the Wallingford Rational Method with a rainstorm of 30 minutes duration; Volumetric runoff coefficient = 1 for impermeable areas, and 0 for permeable areas.

Calculated based on IH124 and 'Rainfall runoff management for developments.

Based on BS8582 Section 9.8

It is proposed to restrict surface water runoff to the greenfield rates set out in the table above, which have been previously approved by the Local Planning Authority.

SuDS Strategy

Sustainable Drainage Systems (SuDS) will be utilised in line with The SuDS Manual (C753) guidance and aim to minimise the impact a development has on the runoff quantity and quality and maximise amenity and biodiversity opportunities.

The management train approach is a fundamental principle of SuDS, it aims to primarily reduce pollution, flow rates and volume of runoff from the site. The main objective is to treat the runoff as close to the source as possible and it is imperative that at least two of the following should be included within the drainage strategy.

- **Prevention** – The use of good site design and rainwater re-use measures to prevent runoff.
- **Source Control** – Controlling the runoff as close to source as possible by using; porous pavements and Filter drains.
- **Site Control** – Use of water management techniques within local area, i.e. detention basins and geo-cellular storage.
- **Regional Control** – Management of water from a number of sites in a specific location, i.e. balancing ponds and wetlands.

The proposed drainage design for this development will incorporate prevention, source control and site control in the form of the following and as shown on the drainage layout in Appendix A:

- Oil separator, removing pollutants attached to silts and debris within surface water runoff.
- Permeable paving
- Filter drains
- Attenuation tanks
- Flow control

Design and Modelling

The drainage design has been analysed using Causeway Flow hydraulic software for the 1 in 1 year, 1 in 30 years and 1 in 100 years return period, with an additional allowance for climate change. FSR rainfall data has been used for storm durations up to 1440 minutes.

Urban creep has not been considered for this development, in line with the Drainage Strategy reference 210714/ R Fallow.

For Causeway Flow surface water calculations, refer to Appendix B

The surface water calculations demonstrate that the drainage system will operate without flooding for storm events up to and including the 1 in 30 years return period, with an additional 35% allowance for climate change.

For the 1 in 100 years return period, with 40% climate change allowance, the calculations indicate small volumes of flooding during critical storm durations. The volume of flooding will be contained on site within the external yards. Refer to Appendix C.

Flow control devices will be incorporated to restrict discharge from the system for all events up to and including the 1 in 100-year rainfall period, including 40% climate change allowance.

Water quality

Table 26.2 of the SuDS Manual (2015) provides pollution hazard indices for different land use classifications. The relevant land uses and associated hazards indices from this table are set out below.

Land Use	Pollution Hazard Level	Total suspended solids (TSS)	Metals	Hydrocarbons
Other roofs (typically commercial/industrial roofs)	Low	0.3	0.2	0.05
Low traffic roads and non-residential car parking with infrequent change	Low	0.5	0.4	0.4
Commercial yard and delivery areas	Medium	0.7	0.6	0.7

Water quality has been considered in line with the approved planning strategy, and the following measures have been included within the surface

water drainage proposals:

- All drainage from car park areas, which are considered low risk, will pass through permeable paving prior to discharging to the main attenuation tank, which will ultimately pass through the Aqua Swirl Oil Separator chamber, providing a second stage of treatment for all runoff from these areas.
- All drainage from service yards, which are considered high risk, will pass through the Aqua Swirl Oil Separator chamber
- All drainage from the site road and other hard surfaces will also pass through the Aqua Swirl Oil Separator chamber
- Silt will be prevented from entering the system by the use of channels with silt traps and catch pits where required.

The following mitigation indices have been identified for the proposed SuDS components from the SuDS Manual.

SuDS Component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Permeable Paving	0.7	0.6	0.7
SDS Aqua-Swirl	0.8	0.5	0.7

Exceedance Flows

In accordance with the DEFRA Non-statutory technical standards for suitable drainage systems, the drainage system has been designed to accommodate the 1 in 100-year return period, with an additional 40% allowance for climate change.

In the event where the capacity of the surface water system is exceeded, surface water will flood from the drainage system but will remain on site.

The hydraulic surface water calculations indicated that flooding would occur in the 1 in 100 years, plus 40% climate change, return period. An exceedance flow route drawings has been provided, demonstrating that the flooded volume is contained on site. Refer to Appendix C.

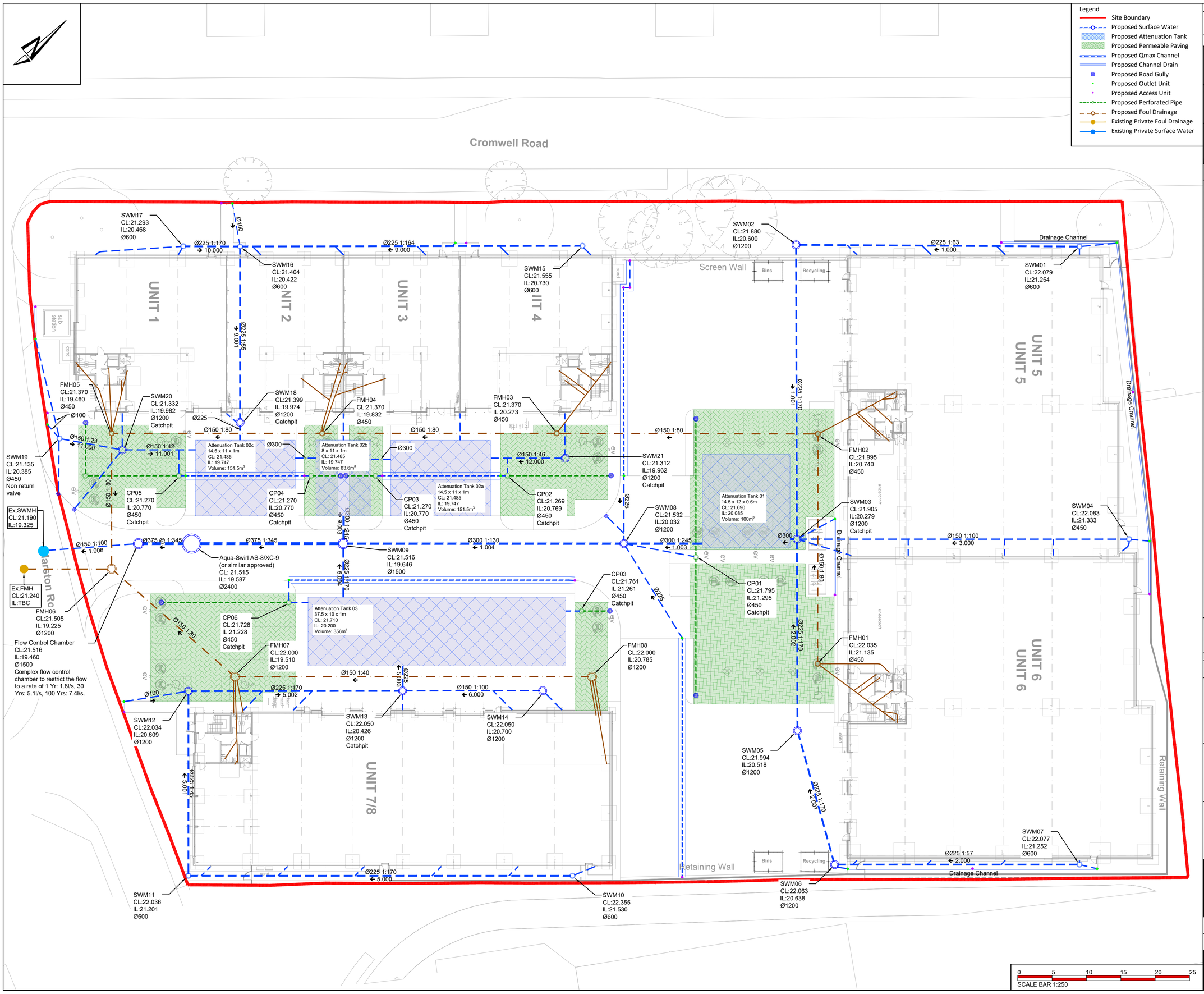
External levels have been designed to prevent flooding of the units, with external levels falling away from the units to a low point in the service yards.

Maintenance

Reference should be made to the Drainage Inspection and Maintenance Schedule in Appendix D, which includes required actions and typical frequencies for all drainage infrastructure serving the development.

The drainage will be managed and maintained by an appointed Management Company.

Appendix A – Drainage Layout



THIS DRAWING IS THE COPYRIGHT OF BURROWS GRAHAM LIMITED.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING

CONSTRUCTION

MAINTENANCE

DEMOLITION

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT

GENERAL NOTES:

1. This drawing shall be read in conjunction with all the relevant architects, engineers' and service engineers drawings & specifications.
2. All units in millimeters U.O.N. on the drawing. Do not scale off the drawing.
3. All temporary works for formwork, excavations etc., to be the design responsibility of the Contractor.
4. The Contractor shall allow for the protection, temporary and permanent support and diversion works as necessary, to all existing services to the satisfaction of the asset owners.
5. The Contractor shall allow for dealing with surface water run-off into excavations and from groundwater by means of sumps, pumping and de-watering as appropriate, in order to keep the excavation as reasonably dry as possible during the construction of the works.
6. The Contractor is responsible for obtaining all required permits and licenses.
7. All private drainage within the site is to comply with the requirements of the relevant British/European Standard, (including BS EN 752, BS EN 1610, BS EN 295, BS EN 1917, BS5911, BS8000-D & 14 and BS EN 124), and the Building Regulations Part H.
8. Any adoptable drainage is to be in accordance with the requirements of the adopting authority. If in doubt seek clarification.
9. All pipework within chambers are to be laid soffit to soffit (U.O.N). All chamber invert levels are for the outgoing pipe levels. Backdrop pipework shall be connected at soffit to soffit with the backdrop / rodding access level specified.
10. Catchpit invert levels are for the outgoing pipe, pipes to be soffits level, sump level specified separately, All Catchpits are to be built with a 300 sump (U.O.N).
11. Any gradients of drains indicated are indicative only and the Contractor shall install the drains to the specified levels shown for each chamber (U.O.N).
12. Cover levels of the access points are provisional and subject to adjustment on site to suit the finished ground levels.
13. Positions and sizes of above ground foul and surface water drainage connections ("pop-ups") are indicative only. Setting out and confirmation of the internal requirements is the responsibility of the Architect. Contractor to confirm requirement prior to construction.
14. Ø of PCC manholes varies with pipe size, number of connections, depth etc. Minimum sizes are shown on the Burrows Graham Standard Details drawings. Sizes shown on drainage layout and/or manhole schedules take precedence over minimum sizes.
15. Flow control chambers should be built in accordance with the requirement of the manufacturer. Allowance should be made for a 600 sump and double covers and frames on the chambers.
16. Insitu concrete grades to be as stated on the drawings. Design chemical class for all precast concrete products shall be DC4 unless agreed otherwise.
17. All separators shall be in accordance with Building Regulations Part H3-A and with BS EN 858 and be kite-marked / CE- marked in accordingly. The oil alarm system is to be in accordance with Client's requirements. Separators to be installed in accordance with manufacturer's recommendations / requirements (venting, protection etc)
18. All below ground plastic/GRP tanks shall be installed in accordance with the manufacturers instructions / requirements. They shall be provided with sufficient concrete surround to counter floatation and shall have a wall thickness adequate to resist the highest ground water level which could be encountered at their location.
19. All existing drainage/structures to be abandoned shall be broken out and removed from site, the excavation shall be backfilled with a suitable granular material to the required level. Alternatively, deep drains may be cleaned and grouted with a 1:10 cementitious grout, with structures broken down to 1m below proposed finished ground level and infilled with a suitable granular material. Abandoned gullies are to be removed from site and abandoned tails are to be sealed with a 300 thick concrete plug at a depth of 1.0m below proposed finished ground level.
20. Where utility/land drainage trenches etc cross over drainage trenches, the Contractor shall construct an impermeable barrier to prevent groundwater infiltrating into the drainage trench.
21. Design assumes that no sewerage authority sewers or other drainage systems require modification, diversion or abandoning (U.O.N on the drawings)
22. All manholes less than 1.5m deep are considered as none man entry and shall be maintained from ground level.
23. Upon completion of the works, the Contractor shall clean all drainage by jetting, removing all debris from site and the system is to be CCTV surveyed. No debris shall be permitted to enter the existing drainage system.
24. No deep rooting trees/vegetation should be planted within 5.0m of any drainage works.
25. The storage and installation of all proprietary drainage items used are to be strictly in accordance with the manufacturers instructions / requirements.
26. Any works within the public highway to be reinstated to highway authority requirements. All relevant permits/licences must be sought by the contractor prior to the works being undertaken.
27. Statutory Undertakers information, where shown, is indicative only based on supplied records. The contractor shall verify the depth position and nature of the services as necessary in order to construct the works.
28. Drainage channels are to be ACO Qmax in service yards and ACO Multidrain in car parks, or similar approved. Channels are to be sized by the supplier and approved by the Engineer in writing prior to ordering. Drainage channels to be installed to manufacturers' requirements. Design of channels shall be based on a 1 in 30 year storm return period, 15 minute duration. Outlet units on channel drains to include silt traps.
29. All RWP, gully and channel connections shall be Ø150 U.O.N. Waste/soil stack connections shall be Ø100mm. U.O.N and shall have internal above ground rodding eyes or large access fittings in accordance with Building Regulations.
30. All WPC's, SRWP's and RWP's are shown indicatively. Locations shall be confirmed by others.
31. Below ground drainage connections to be provided to all canopy downpipes
    31.1. Ø150mm with concrete bed and surround U.O.N.

REV	DATE	BY	DESCRIPTION	CHKD
P02	25.04.25	JB	Unit 1-4 attenuation tank spilt to accomondate incoming utilities. Foul pop-ups revised to suit MBA drawings.	RJ
P01	17.04.25	JB	Issued for Information	RJ

Burrows Graham

North Office:
5 Ambassador Place, Stockport Road, Altrincham WA15 8DB
Tel: +44 (0)161 804 8046

South Office:
Bourne House, Prince Edward Street, Berkhamsted, Herts HP4 3EZ
Tel: +44 (0)1442 508 402

CLIENT

TOP ROAD

PROJECT

MARSTON BUSINESS PARK
ST NEOTS

DRAWING TITLE

PROPOSED DRAINAGE LAYOUT

BGL PROJECT NUMBER	DRAWING STATUS	OFFICE	
30278	PRELIMINARY	NORTH	
SCALE @ A1	DATE	DRAWN BY	CHECKED BY
1:250	17.04.2025	JB	RJ

DRAWING No: 30278-BGL-XX-XX-DR-C-00210

REV: P02

0 5 10 15 20 25
SCALE BAR 1:250

Appendix B – Surface Water Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
30	35	0	0
100	0	0	0
100	40	0	0

Node Flow Control Chamber Online Orifice Control

Flap Valve	x	Design Depth (m)	2.250	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	1.8		
Invert Level (m)	19.460	Diameter (m)	0.024		

Node SWM19 Online Orifice Control

Flap Valve	✓	Design Depth (m)	0.750	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	39.0		
Invert Level (m)	20.385	Diameter (m)	0.150		

Node Flow Control Chamber Online Orifice Control

Flap Valve	x	Design Depth (m)	1.100	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	6.0		
Invert Level (m)	20.210	Diameter (m)	0.052		

Node CP01 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	21.295	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	
Safety Factor	2.0	Width (m)	43.000	Inf Depth (m)	
Porosity	0.30	Length (m)	20.000		

Flow+ v10.8 Copyright © 1988-2025 Causeway Technologies Ltd

Node CP02 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	20.769	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	
Safety Factor	2.0	Width (m)	20.000	Inf Depth (m)	
Porosity	0.30	Length (m)	12.000		

Node CP03 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	21.261	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	
Safety Factor	2.0	Width (m)	15.000	Inf Depth (m)	
Porosity	0.30	Length (m)	5.000		

Node CP06 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	21.228	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	
Safety Factor	2.0	Width (m)	21.000	Inf Depth (m)	
Porosity	0.30	Length (m)	15.000		

Node CP05 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	20.770	Slope (1:X)	200.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	
Safety Factor	2.0	Width (m)	20.000	Inf Depth (m)	
Porosity	0.30	Length (m)	12.000		

Node Attenuation Tank 02 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	19.747
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	407.0	0.0	1.000	407.0	0.0	1.001	0.0	0.0

Node Attenuation Tank 03 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	20.202
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	375.0	0.0	1.000	375.0	0.0	1.001	0.0	0.0

Node Attenuation Tank 01 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	20.085
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	174.0	0.0	0.600	174.0	0.0	0.601	0.0	0.0

Flow+ v10.8 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SWM04	11	21.386	0.053	4.9	0.0084	0.0000	OK
1440 minute winter	1	1170	19.350	0.025	1.1	0.0000	0.0000	OK
1440 minute winter	Flow Control Chamber	1170	20.257	0.797	1.8	1.4090	0.0000	SURCHARGED
1440 minute winter	SWM09	1170	20.257	0.611	7.2	1.0804	0.0000	SURCHARGED
1440 minute winter	SWM08	1170	20.257	0.225	5.3	0.2550	0.0000	OK
1440 minute winter	Attenuation Tank 01	1170	20.257	0.172	3.7	28.5067	0.0000	OK
15 minute winter	SWM03	10	20.430	0.151	64.3	0.1708	0.0000	OK
15 minute winter	SWM05	11	20.613	0.095	14.1	0.1075	0.0000	OK
15 minute winter	SWM06	10	20.734	0.096	14.4	0.1087	0.0000	OK
15 minute winter	SWM07	10	21.293	0.041	5.2	0.0117	0.0000	OK
120 minute winter	Attenuation Tank 03	86	20.259	0.057	11.5	20.2305	0.0000	OK
15 minute winter	SWM13	11	20.586	0.160	33.3	0.1814	0.0000	OK
15 minute winter	SWM12	11	20.682	0.073	9.3	0.0831	0.0000	OK
15 minute winter	SWM11	11	21.254	0.053	9.5	0.0149	0.0000	OK
15 minute winter	SWM10	11	21.558	0.028	1.4	0.0079	0.0000	OK
15 minute winter	SWM14	10	20.732	0.032	1.8	0.0362	0.0000	OK
15 minute summer	CP06	1	21.228	0.000	0.0	0.0000	0.0000	OK
1440 minute winter	Attenuation Tank 02	1170	20.257	0.510	8.8	197.3528	0.0000	SURCHARGED
1440 minute winter	SWM18	1170	20.257	0.283	0.8	0.3205	0.0000	SURCHARGED
15 minute winter	SWM16	11	20.495	0.073	12.7	0.0208	0.0000	OK
15 minute winter	SWM17	10	20.512	0.044	3.4	0.0124	0.0000	OK
15 minute winter	SWM15	11	20.759	0.029	1.5	0.0081	0.0000	OK
1440 minute winter	SWM20	1200	20.258	0.276	0.2	0.3119	0.0000	SURCHARGED
15 minute winter	SWM19	10	20.436	0.051	2.4	0.0080	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	SWM04	3.000	SWM03	4.7	0.848	0.264	0.2673	
1440 minute winter	Flow Control Chamber	1.006	1	1.1	0.548	0.060	0.0261	84.4
1440 minute winter	Flow Control Chamber	Orifice	1	0.8				26.8
1440 minute winter	SWM09	1.005	Flow Control Chamber	1.8	0.096	0.012	3.2878	
1440 minute winter	SWM08	1.004	SWM09	5.3	0.424	0.055	2.5967	
1440 minute winter	Attenuation Tank 01	1.003	SWM08	3.7	0.525	0.053	0.6354	
15 minute winter	SWM03	1.002	Attenuation Tank 01	64.5	2.857	0.462	0.3444	
15 minute winter	SWM05	2.002	SWM03	14.0	0.904	0.353	0.4327	
15 minute winter	SWM06	2.001	SWM05	14.1	0.892	0.354	0.3263	
15 minute winter	SWM07	2.000	SWM06	5.1	0.499	0.074	0.3700	
120 minute winter	Attenuation Tank 03	5.004	SWM09	5.3	0.687	0.133	0.0591	
15 minute winter	SWM13	5.003	Attenuation Tank 03	32.9	1.118	0.827	0.4747	
15 minute winter	SWM12	5.002	SWM13	9.3	0.453	0.234	0.6471	
15 minute winter	SWM11	5.001	SWM12	9.3	1.050	0.120	0.2451	
15 minute winter	SWM10	5.000	SWM11	1.3	0.275	0.033	0.2754	
15 minute winter	SWM14	6.000	SWM13	1.8	0.482	0.100	0.1332	
15 minute summer	CP06	8.000	Attenuation Tank 03	0.0	0.000	0.000	0.0000	
1440 minute winter	Attenuation Tank 02	9.003	SWM09	-6.1	0.244	-0.086	0.4408	
1440 minute winter	SWM18	9.002	Attenuation Tank 02	0.8	0.447	0.014	0.7651	
15 minute winter	SWM16	9.001	SWM18	12.4	1.066	0.176	0.2937	
15 minute winter	SWM17	10.000	SWM16	3.4	0.410	0.085	0.0648	
15 minute winter	SWM15	9.000	SWM16	1.4	0.210	0.035	0.3587	
1440 minute winter	SWM20	11.001	Attenuation Tank 02	0.2	0.056	0.013	0.5808	
15 minute winter	SWM19	Orifice	SWM20	2.4				

Flow+ v10.8 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	CP05	12	20.827	0.057	13.1	1.9791	0.0000	OK
15 minute winter	CP03	13	21.281	0.020	1.1	0.1752	0.0000	OK
1440 minute winter	SWM21	1170	20.258	0.296	0.1	0.3343	0.0000	SURCHARGED
15 minute winter	CP02	12	20.830	0.061	14.8	2.2487	0.0000	OK
15 minute winter	SWM01	10	21.293	0.039	4.4	0.0110	0.0000	OK
15 minute summer	CP01	1	21.295	0.000	0.0	0.0000	0.0000	OK
15 minute winter	SWM02	11	20.688	0.088	13.0	0.0994	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	CP05	13.000	Attenuation Tank 02	9.3	1.507	0.310	0.1497	
15 minute winter	CP03	7.000	Attenuation Tank 03	0.7	0.482	0.037	0.0470	
1440 minute winter	SWM21	12.000	Attenuation Tank 02	0.1	0.030	0.007	0.5786	
15 minute winter	CP02	14.000	Attenuation Tank 02	10.5	1.555	0.349	0.1629	
15 minute winter	SWM01	1.000	SWM02	4.3	0.484	0.065	0.3883	
15 minute summer	CP01	4.000	SWM08	0.0	0.000	0.000	0.0000	
15 minute winter	SWM02	1.001	SWM03	12.4	0.880	0.313	0.5935	

Flow+ v10.8 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SWM04	11	21.423	0.090	12.0	0.0143	0.0000	OK
1440 minute winter	1	1140	19.352	0.027	1.2	0.0000	0.0000	OK
1440 minute winter	Flow Control Chamber	1140	20.551	1.091	4.4	1.9269	0.0000	SURCHARGED
1440 minute winter	SWM09	1140	20.551	0.905	10.1	1.5986	0.0000	SURCHARGED
1440 minute winter	SWM08	1140	20.551	0.519	8.0	0.5869	0.0000	SURCHARGED
1440 minute winter	Attenuation Tank 01	1140	20.551	0.466	7.8	77.0154	0.0000	SURCHARGED
15 minute winter	SWM03	11	20.627	0.348	161.5	0.3933	0.0000	SURCHARGED
15 minute winter	SWM05	12	20.734	0.216	34.2	0.2440	0.0000	OK
15 minute winter	SWM06	11	20.814	0.176	35.4	0.1991	0.0000	OK
15 minute winter	SWM07	10	21.317	0.065	12.7	0.0183	0.0000	OK
1440 minute winter	Attenuation Tank 03	1140	20.551	0.349	7.7	124.2286	0.0000	SURCHARGED
15 minute winter	SWM13	11	20.960	0.534	78.2	0.6042	0.0000	SURCHARGED
15 minute winter	SWM12	11	21.033	0.424	23.1	0.4799	0.0000	SURCHARGED
15 minute winter	SWM11	10	21.285	0.084	23.6	0.0237	0.0000	OK
15 minute winter	SWM10	11	21.573	0.043	3.3	0.0121	0.0000	OK
15 minute winter	SWM14	11	20.969	0.269	4.3	0.3047	0.0000	SURCHARGED
15 minute summer	CP06	1	21.228	0.000	0.0	0.0000	0.0000	OK
1440 minute winter	Attenuation Tank 02	1140	20.551	0.804	13.4	310.7533	0.0000	SURCHARGED
1440 minute winter	SWM18	1140	20.551	0.577	1.8	0.6523	0.0000	SURCHARGED
1440 minute winter	SWM16	1140	20.551	0.129	1.5	0.0364	0.0000	OK
1440 minute winter	SWM17	1140	20.551	0.083	0.4	0.0234	0.0000	OK
15 minute winter	SWM15	11	20.774	0.044	3.7	0.0126	0.0000	OK
1440 minute winter	SWM20	1140	20.551	0.569	0.6	0.6440	0.0000	SURCHARGED
1440 minute winter	SWM19	1110	20.550	0.165	0.3	0.0262	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	SWM04	3.000	SWM03	11.6	1.066	0.653	0.5253	
1440 minute winter	Flow Control Chamber	1.006	1	1.2	0.574	0.070	0.0292	100.4
1440 minute winter	Flow Control Chamber	Orifice	1	3.2				171.2
1440 minute winter	SWM09	1.005	Flow Control Chamber	4.4	0.099	0.028	3.2878	
1440 minute winter	SWM08	1.004	SWM09	7.7	0.467	0.079	2.8747	
1440 minute winter	Attenuation Tank 01	1.003	SWM08	5.5	0.562	0.077	0.9066	
15 minute winter	SWM03	1.002	Attenuation Tank 01	154.4	3.117	1.106	0.8499	
15 minute winter	SWM05	2.002	SWM03	32.9	0.974	0.828	1.0996	
15 minute winter	SWM06	2.001	SWM05	34.2	1.061	0.859	0.7359	
15 minute winter	SWM07	2.000	SWM06	12.5	0.589	0.182	0.7454	
1440 minute winter	Attenuation Tank 03	5.004	SWM09	-3.7	0.573	-0.093	0.3062	
15 minute winter	SWM13	5.003	Attenuation Tank 03	78.0	1.961	1.962	0.6357	
15 minute winter	SWM12	5.002	SWM13	23.8	0.600	0.600	1.2394	
15 minute winter	SWM11	5.001	SWM12	23.1	1.263	0.298	0.7141	
15 minute winter	SWM10	5.000	SWM11	3.2	0.349	0.079	0.5204	
15 minute winter	SWM14	6.000	SWM13	5.8	0.472	0.329	0.3588	
15 minute summer	CP06	8.000	Attenuation Tank 03	0.0	0.000	0.000	0.0000	
1440 minute winter	Attenuation Tank 02	9.003	SWM09	-8.9	0.234	-0.125	0.4408	
1440 minute winter	SWM18	9.002	Attenuation Tank 02	1.8	0.492	0.031	0.7651	
1440 minute winter	SWM16	9.001	SWM18	1.5	0.507	0.021	0.7634	
1440 minute winter	SWM17	10.000	SWM16	0.4	0.174	0.010	0.1426	
15 minute winter	SWM15	9.000	SWM16	3.5	0.282	0.087	0.6519	
1440 minute winter	SWM20	11.001	Attenuation Tank 02	0.6	0.047	0.039	0.5808	
1440 minute winter	SWM19	Orifice	SWM20	0.5				

Flow+ v10.8 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	CP05	12	20.869	0.099	32.2	4.9503	0.0000	OK
15 minute winter	CP03	13	21.292	0.031	2.6	0.4247	0.0000	OK
1440 minute winter	SWM21	1140	20.551	0.589	0.3	0.6658	0.0000	SURCHARGED
15 minute winter	CP02	12	20.877	0.107	36.2	5.5828	0.0000	OK
15 minute winter	SWM01	10	21.315	0.061	10.8	0.0172	0.0000	OK
15 minute summer	CP01	1	21.295	0.000	0.0	0.0000	0.0000	OK
15 minute winter	SWM02	11	20.750	0.150	32.0	0.1697	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	CP05	13.000	Attenuation Tank 02	23.1	1.884	0.769	0.2969	
15 minute winter	CP03	7.000	Attenuation Tank 03	1.7	0.641	0.096	0.0922	
1440 minute winter	SWM21	12.000	Attenuation Tank 02	0.3	0.020	0.019	0.5786	
15 minute winter	CP02	14.000	Attenuation Tank 02	25.9	1.922	0.862	0.3260	
15 minute winter	SWM01	1.000	SWM02	10.6	0.592	0.162	0.7539	
15 minute summer	CP01	4.000	SWM08	0.0	0.000	0.000	0.0000	
15 minute winter	SWM02	1.001	SWM03	30.8	0.925	0.776	1.4271	

Flow+ v10.8 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SWM04	11	21.445	0.112	16.2	0.0178	0.0000	OK
960 minute winter	1	915	19.353	0.028	1.4	0.0000	0.0000	OK
960 minute winter	Flow Control Chamber	915	20.793	1.333	5.6	2.3559	0.0000	SURCHARGED
960 minute winter	SWM09	915	20.794	1.148	14.7	2.0278	0.0000	SURCHARGED
960 minute winter	SWM08	915	20.794	0.762	13.6	0.8617	0.0000	SURCHARGED
960 minute winter	Attenuation Tank 01	915	20.794	0.709	17.9	99.2627	0.0000	SURCHARGED
15 minute winter	SWM03	11	20.918	0.639	201.4	0.7228	0.0000	SURCHARGED
15 minute winter	SWM05	12	21.128	0.610	40.9	0.6901	0.0000	SURCHARGED
15 minute winter	SWM06	12	21.286	0.648	47.8	0.7330	0.0000	SURCHARGED
15 minute winter	SWM07	10	21.328	0.076	17.1	0.0214	0.0000	OK
960 minute winter	Attenuation Tank 03	915	20.794	0.592	14.0	210.7695	0.0000	SURCHARGED
15 minute winter	SWM13	11	21.231	0.805	100.3	0.9105	0.0000	SURCHARGED
15 minute winter	SWM12	11	21.310	0.701	30.7	0.7932	0.0000	SURCHARGED
15 minute winter	SWM11	12	21.375	0.174	31.8	0.0493	0.0000	OK
15 minute winter	SWM10	11	21.580	0.050	4.5	0.0140	0.0000	OK
15 minute winter	SWM14	11	21.257	0.557	5.8	0.6299	0.0000	SURCHARGED
15 minute summer	CP06	1	21.228	0.000	0.0	0.0000	0.0000	OK
960 minute winter	Attenuation Tank 02	915	20.794	1.047	20.0	386.8433	0.0000	SURCHARGED
960 minute winter	SWM18	915	20.794	0.820	3.3	0.9271	0.0000	SURCHARGED
960 minute winter	SWM16	915	20.794	0.372	2.7	0.1052	0.0000	SURCHARGED
960 minute winter	SWM17	915	20.794	0.326	0.7	0.0922	0.0000	SURCHARGED
960 minute winter	SWM15	915	20.794	0.064	0.3	0.0180	0.0000	OK
960 minute winter	SWM20	915	20.794	0.811	1.4	0.9178	0.0000	SURCHARGED
960 minute winter	SWM19	915	20.793	0.408	0.5	0.0649	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	SWM04	3.000	SWM03	15.7	1.126	0.882	0.6720	
960 minute winter	Flow Control Chamber	1.006	1	1.4	0.592	0.077	0.0314	79.2
960 minute winter	Flow Control Chamber	Orifice	1	4.2				173.5
960 minute winter	SWM09	1.005	Flow Control Chamber	5.6	0.138	0.035	3.2878	
960 minute winter	SWM08	1.004	SWM09	13.6	0.554	0.140	2.8747	
960 minute winter	Attenuation Tank 01	1.003	SWM08	8.1	0.621	0.115	0.9066	
15 minute winter	SWM03	1.002	Attenuation Tank 01	199.9	3.156	1.431	0.8674	
15 minute winter	SWM05	2.002	SWM03	41.7	1.049	1.050	1.1078	
15 minute winter	SWM06	2.001	SWM05	40.9	1.075	1.028	0.8101	
15 minute winter	SWM07	2.000	SWM06	16.9	0.607	0.245	0.9002	
960 minute winter	Attenuation Tank 03	5.004	SWM09	-7.1	0.645	-0.179	0.3062	
15 minute winter	SWM13	5.003	Attenuation Tank 03	100.4	2.525	2.526	0.6357	
15 minute winter	SWM12	5.002	SWM13	35.1	0.883	0.884	1.2394	
15 minute winter	SWM11	5.001	SWM12	30.7	1.270	0.397	0.9761	
15 minute winter	SWM10	5.000	SWM11	4.3	0.353	0.108	1.0918	
15 minute winter	SWM14	6.000	SWM13	6.5	0.485	0.371	0.3588	
15 minute summer	CP06	8.000	Attenuation Tank 03	0.0	0.000	0.000	0.0000	
960 minute winter	Attenuation Tank 02	9.003	SWM09	-13.4	-0.323	-0.188	0.4408	
960 minute winter	SWM18	9.002	Attenuation Tank 02	3.2	0.704	0.057	0.7651	
960 minute winter	SWM16	9.001	SWM18	2.7	0.550	0.038	0.9953	
960 minute winter	SWM17	10.000	SWM16	0.7	0.223	0.018	0.3091	
960 minute winter	SWM15	9.000	SWM16	0.3	0.117	0.007	1.2389	
960 minute winter	SWM20	11.001	Attenuation Tank 02	1.0	0.478	0.064	0.5808	
960 minute winter	SWM19	Orifice	SWM20	0.9				

Flow+ v10.8 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	CP05	12	20.893	0.123	43.4	6.7261	0.0000	OK
15 minute winter	CP03	12	21.298	0.037	3.5	0.5540	0.0000	OK
960 minute winter	SWM21	915	20.794	0.832	0.5	0.9407	0.0000	SURCHARGED
15 minute winter	CP02	13	20.907	0.138	48.9	7.7659	0.0000	OK
15 minute winter	SWM01	10	21.325	0.071	14.5	0.0201	0.0000	OK
15 minute summer	CP01	1	21.295	0.000	0.0	0.0000	0.0000	OK
15 minute winter	SWM02	12	21.169	0.569	43.3	0.6431	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	CP05	13.000	Attenuation Tank 02	30.8	1.938	1.025	0.4001	
15 minute winter	CP03	7.000	Attenuation Tank 03	2.4	0.707	0.135	0.1172	
960 minute winter	SWM21	12.000	Attenuation Tank 02	0.5	0.352	0.032	0.5786	
15 minute winter	CP02	14.000	Attenuation Tank 02	32.3	1.929	1.076	0.4129	
15 minute winter	SWM01	1.000	SWM02	14.3	0.609	0.218	1.0409	
15 minute summer	CP01	4.000	SWM08	0.0	0.000	0.000	0.0000	
15 minute winter	SWM02	1.001	SWM03	38.0	0.956	0.959	1.6720	

Flow+ v10.8 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	SWM04	11	21.442	0.109	15.6	0.0173	0.0000	OK
960 minute winter	1	915	19.353	0.028	1.3	0.0000	0.0000	OK
960 minute winter	Flow Control Chamber	915	20.723	1.263	5.3	2.2313	0.0000	SURCHARGED
960 minute winter	SWM09	915	20.723	1.077	15.0	1.9031	0.0000	SURCHARGED
960 minute winter	SWM08	915	20.723	0.691	13.0	0.7819	0.0000	SURCHARGED
960 minute winter	Attenuation Tank 01	915	20.723	0.638	18.7	99.2627	0.0000	SURCHARGED
15 minute winter	SWM03	11	20.862	0.583	194.5	0.6596	0.0000	SURCHARGED
15 minute winter	SWM05	12	21.061	0.543	39.4	0.6145	0.0000	SURCHARGED
15 minute winter	SWM06	12	21.208	0.570	45.9	0.6441	0.0000	SURCHARGED
15 minute winter	SWM07	10	21.326	0.074	16.4	0.0209	0.0000	OK
960 minute winter	Attenuation Tank 03	915	20.723	0.521	13.7	185.6292	0.0000	SURCHARGED
15 minute winter	SWM13	11	21.203	0.777	98.1	0.8786	0.0000	SURCHARGED
15 minute winter	SWM12	11	21.287	0.678	28.3	0.7670	0.0000	SURCHARGED
15 minute winter	SWM11	12	21.340	0.139	30.7	0.0393	0.0000	OK
15 minute winter	SWM10	11	21.579	0.049	4.3	0.0138	0.0000	OK
15 minute winter	SWM14	11	21.226	0.526	6.6	0.5953	0.0000	SURCHARGED
15 minute summer	CP06	1	21.228	0.000	0.0	0.0000	0.0000	OK
960 minute winter	Attenuation Tank 02	915	20.723	0.976	20.4	377.3889	0.0000	SURCHARGED
960 minute winter	SWM18	915	20.723	0.749	3.1	0.8472	0.0000	SURCHARGED
960 minute winter	SWM16	915	20.723	0.301	2.6	0.0852	0.0000	SURCHARGED
960 minute winter	SWM17	915	20.723	0.255	0.7	0.0722	0.0000	SURCHARGED
15 minute winter	SWM15	11	20.781	0.051	4.7	0.0143	0.0000	OK
960 minute winter	SWM20	915	20.723	0.741	1.1	0.8383	0.0000	SURCHARGED
960 minute winter	SWM19	915	20.723	0.338	0.5	0.0537	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	SWM04	3.000	SWM03	15.1	1.120	0.848	0.6500	
960 minute winter	Flow Control Chamber	1.006	1	1.3	0.587	0.075	0.0308	77.7
960 minute winter	Flow Control Chamber	Orifice	1	3.9				163.8
960 minute winter	SWM09	1.005	Flow Control Chamber	5.3	0.134	0.033	3.2878	
960 minute winter	SWM08	1.004	SWM09	13.0	0.531	0.134	2.8747	
960 minute winter	Attenuation Tank 01	1.003	SWM08	8.2	0.611	0.115	0.9066	
15 minute winter	SWM03	1.002	Attenuation Tank 01	193.0	3.152	1.382	0.8674	
15 minute winter	SWM05	2.002	SWM03	40.2	1.011	1.011	1.1078	
15 minute winter	SWM06	2.001	SWM05	39.4	1.066	0.991	0.8101	
15 minute winter	SWM07	2.000	SWM06	16.2	0.602	0.235	0.8942	
960 minute winter	Attenuation Tank 03	5.004	SWM09	-7.0	0.631	-0.177	0.3062	
15 minute winter	SWM13	5.003	Attenuation Tank 03	98.3	2.473	2.474	0.6357	
15 minute winter	SWM12	5.002	SWM13	33.9	0.853	0.854	1.2394	
15 minute winter	SWM11	5.001	SWM12	28.3	1.256	0.365	0.8787	
15 minute winter	SWM10	5.000	SWM11	4.2	0.352	0.105	0.8853	
15 minute winter	SWM14	6.000	SWM13	6.7	0.474	0.382	0.3588	
15 minute summer	CP06	8.000	Attenuation Tank 03	0.0	0.000	0.000	0.0000	
960 minute winter	Attenuation Tank 02	9.003	SWM09	-13.7	-0.311	-0.193	0.4408	
960 minute winter	SWM18	9.002	Attenuation Tank 02	3.0	0.707	0.053	0.7651	
960 minute winter	SWM16	9.001	SWM18	2.6	0.569	0.037	0.9953	
960 minute winter	SWM17	10.000	SWM16	0.7	0.223	0.018	0.3091	
15 minute winter	SWM15	9.000	SWM16	4.6	0.300	0.113	0.7909	
960 minute winter	SWM20	11.001	Attenuation Tank 02	1.0	0.480	0.064	0.5808	
960 minute winter	SWM19	Orifice	SWM20	0.8				

Flow+ v10.8 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	CP05	12	20.890	0.120	41.8	6.4582	0.0000	OK
15 minute winter	CP03	12	21.297	0.036	3.4	0.5334	0.0000	OK
960 minute winter	SWM21	915	20.723	0.761	0.5	0.8608	0.0000	SURCHARGED
15 minute winter	CP02	12	20.901	0.132	47.0	7.3645	0.0000	OK
15 minute winter	SWM01	10	21.324	0.070	14.0	0.0197	0.0000	OK
15 minute summer	CP01	1	21.295	0.000	0.0	0.0000	0.0000	OK
15 minute winter	SWM02	12	21.098	0.498	41.6	0.5628	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	CP05	13.000	Attenuation Tank 02	30.2	1.944	1.003	0.3949	
15 minute winter	CP03	7.000	Attenuation Tank 03	2.3	0.696	0.128	0.1129	
960 minute winter	SWM21	12.000	Attenuation Tank 02	0.5	0.354	0.032	0.5786	
15 minute winter	CP02	14.000	Attenuation Tank 02	32.0	1.922	1.065	0.4095	
15 minute winter	SWM01	1.000	SWM02	13.8	0.600	0.211	1.0353	
15 minute summer	CP01	4.000	SWM08	0.0	0.000	0.000	0.0000	
15 minute winter	SWM02	1.001	SWM03	36.5	0.918	0.921	1.6720	

Flow+ v10.8 Copyright © 1988-2025 Causeway Technologies Ltd

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	SWM04	22	22.075	0.742	16.9	0.1179	0.0000	FLOOD RISK
960 minute winter	1	885	19.355	0.030	1.6	0.0000	0.0000	OK
960 minute winter	Flow Control Chamber	810	21.270	1.810	7.4	3.1975	0.0000	FLOOD RISK
960 minute winter	SWM09	810	21.269	1.623	27.6	2.8685	0.0000	FLOOD RISK
30 minute winter	SWM08	21	21.515	1.483	186.2	1.6768	0.0000	FLOOD RISK
30 minute winter	Attenuation Tank 01	21	21.691	1.606	209.4	99.2627	0.2436	FLOOD
30 minute winter	SWM03	21	21.880	1.601	211.3	1.8107	0.0000	FLOOD RISK
30 minute winter	SWM05	22	21.978	1.460	44.0	1.6516	0.0000	FLOOD RISK
30 minute winter	SWM06	22	22.062	1.424	48.4	1.6104	0.0000	FLOOD RISK
30 minute winter	SWM07	21	22.077	0.825	17.8	0.2335	0.2952	FLOOD
960 minute winter	Attenuation Tank 03	810	21.270	1.068	29.1	356.4281	0.0000	SURCHARGED
15 minute winter	SWM13	11	21.611	1.185	124.5	1.3405	0.0000	SURCHARGED
15 minute winter	SWM12	12	21.784	1.175	39.8	1.3286	0.0000	FLOOD RISK
15 minute winter	SWM11	12	21.920	0.719	40.0	0.2035	0.0000	FLOOD RISK
15 minute winter	SWM10	12	21.942	0.412	17.5	0.1165	0.0000	SURCHARGED
15 minute winter	SWM14	11	21.663	0.963	8.9	1.0886	0.0000	SURCHARGED
960 minute winter	CP06	840	21.269	0.041	0.5	1.0756	0.0000	OK
960 minute winter	Attenuation Tank 02	855	21.275	1.528	23.5	386.8433	0.0000	FLOOD RISK
960 minute winter	SWM18	825	21.271	1.297	4.1	1.4666	0.0000	FLOOD RISK
960 minute winter	SWM16	870	21.271	0.849	3.4	0.2403	0.0000	FLOOD RISK
960 minute winter	SWM17	870	21.272	0.804	0.9	0.2274	0.0000	FLOOD RISK
960 minute winter	SWM15	855	21.271	0.541	0.4	0.1530	0.0000	FLOOD RISK
960 minute winter	SWM20	870	21.271	1.289	1.6	1.4575	0.0000	FLOOD RISK
1440 minute winter	SWM19	990	21.135	0.750	0.5	0.1193	3.0600	FLOOD

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	SWM04	3.000	SWM03	16.9	1.108	0.951	0.8506	
960 minute winter	Flow Control Chamber	1.006	1	1.6	0.619	0.090	0.0350	89.3
960 minute winter	Flow Control Chamber	Orifice	1	5.7				240.1
960 minute winter	SWM09	1.005	Flow Control Chamber	7.4	0.139	0.047	3.2878	
30 minute winter	SWM08	1.004	SWM09	170.3	2.419	1.758	2.8747	
30 minute winter	Attenuation Tank 01	1.003	SWM08	121.4	1.725	1.711	0.9066	
30 minute winter	SWM03	1.002	Attenuation Tank 01	209.4	2.974	1.499	0.8674	
30 minute winter	SWM05	2.002	SWM03	42.7	1.073	1.074	1.1078	
30 minute winter	SWM06	2.001	SWM05	44.0	1.106	1.106	0.8101	
30 minute winter	SWM07	2.000	SWM06	16.6	0.595	0.240	1.3918	
960 minute winter	Attenuation Tank 03	5.004	SWM09	-21.7	0.634	-0.545	0.3062	
15 minute winter	SWM13	5.003	Attenuation Tank 03	125.2	3.148	3.149	0.6357	
15 minute winter	SWM12	5.002	SWM13	42.8	1.076	1.077	1.2394	
15 minute winter	SWM11	5.001	SWM12	39.8	1.251	0.514	1.0674	
15 minute winter	SWM10	5.000	SWM11	15.5	0.450	0.390	2.2273	
15 minute winter	SWM14	6.000	SWM13	9.3	0.531	0.532	0.3588	
960 minute winter	CP06	8.000	Attenuation Tank 03	0.7	0.090	0.040	0.0773	
960 minute winter	Attenuation Tank 02	9.003	SWM09	-12.4	-0.374	-0.173	0.4408	
960 minute winter	SWM18	9.002	Attenuation Tank 02	4.0	0.752	0.070	0.7651	
960 minute winter	SWM16	9.001	SWM18	3.4	0.550	0.048	0.9953	
960 minute winter	SWM17	10.000	SWM16	0.9	0.245	0.023	0.3091	
960 minute winter	SWM15	9.000	SWM16	0.4	0.131	0.010	2.0126	
960 minute winter	SWM20	11.001	Attenuation Tank 02	1.3	0.451	0.089	0.5808	
1440 minute winter	SWM19	Orifice	SWM20	0.9				

Flow+ v10.8 Copyright © 1988-2025 Causeway Technologies Ltd

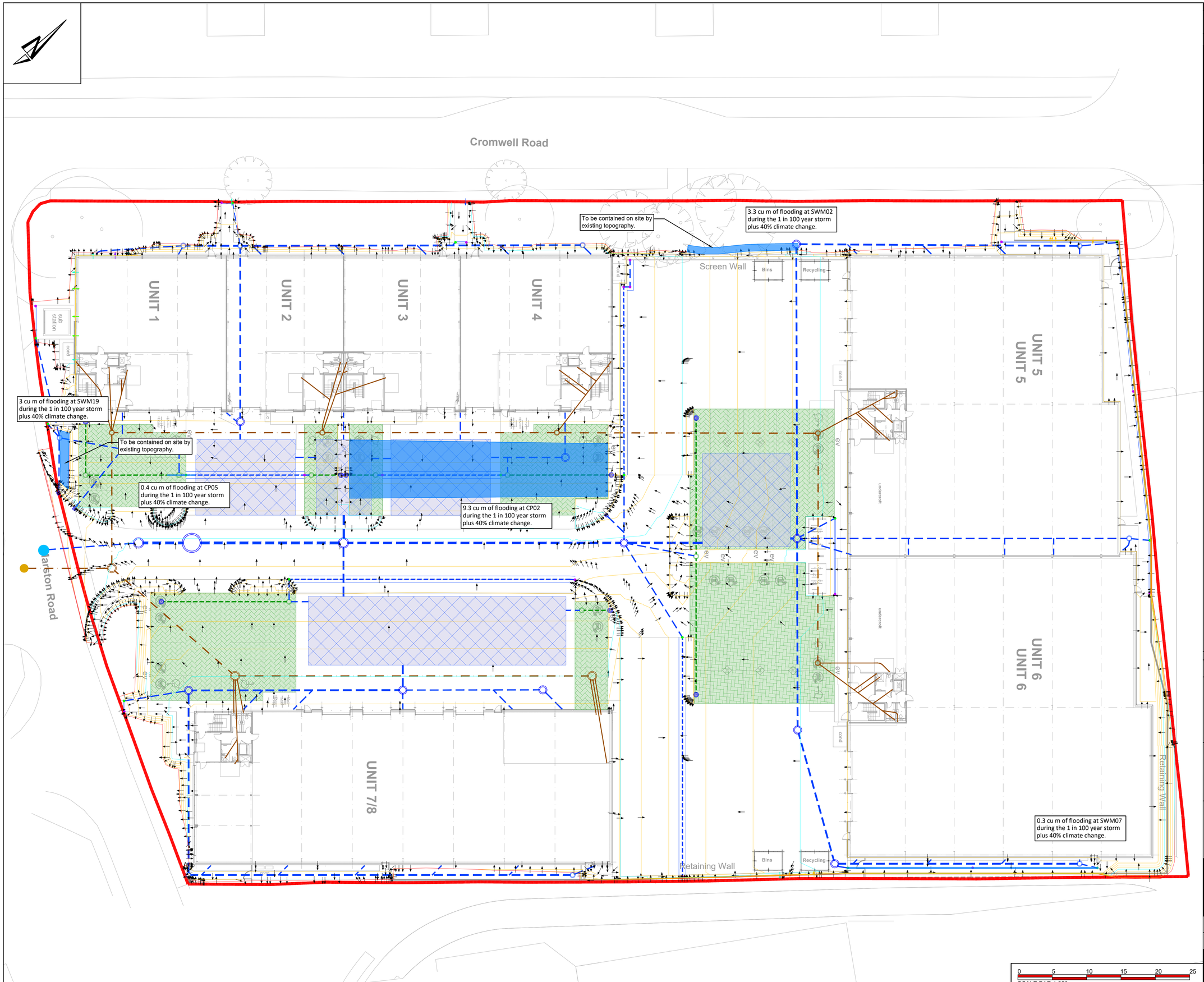
Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	CP05	825	21.270	0.500	4.7	33.8430	0.4041	FLOOD
15 minute winter	CP03	12	21.305	0.044	4.7	0.7177	0.0000	OK
960 minute winter	SWM21	870	21.271	1.309	0.6	1.4801	0.0000	FLOOD RISK
960 minute winter	CP02	810	21.269	0.500	4.6	33.8430	9.2612	FLOOD
30 minute winter	SWM01	21	22.053	0.799	15.2	0.2261	0.0000	FLOOD RISK
30 minute winter	CP01	24	21.340	0.045	15.6	2.6609	0.0000	OK
30 minute winter	SWM02	21	21.880	1.280	45.2	1.4477	3.2642	FLOOD

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute winter	CP05	13.000	Attenuation Tank 02	3.7	0.862	0.123	0.4257	
15 minute winter	CP03	7.000	Attenuation Tank 03	3.4	0.779	0.191	0.1505	
960 minute winter	SWM21	12.000	Attenuation Tank 02	0.5	0.309	0.038	0.5786	
960 minute winter	CP02	14.000	Attenuation Tank 02	4.1	0.899	0.136	0.4252	
30 minute winter	SWM01	1.000	SWM02	18.2	0.603	0.278	1.6395	
30 minute winter	CP01	4.000	SWM08	-15.6	-1.366	-0.879	0.1276	
30 minute winter	SWM02	1.001	SWM03	37.4	0.940	0.943	1.6720	

Flow+ v10.8 Copyright © 1988-2025 Causeway Technologies Ltd

Appendix C – Exceedance Flow Route



THIS DRAWING IS THE COPYRIGHT OF BURROWS GRAHAM LIMITED.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING

CONSTRUCTION

MAINTENANCE

DEMOLITION

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT

GENERAL NOTES:

1. This drawing shall be read in conjunction with all the relevant architects, engineers' and service engineers drawings & specifications.
2. All units in millimeters U.O.N. on the drawing.
3. Do Not Scale off the drawing.

DRAWING NOTES:

1. This drawing is to be read in conjunction with '30278-BGL-XX-XX-DR-C-00200 - Proposed Finished Levels' and '30278-BGL-XX-XX-DR-C-00210 - Proposed Drainage Layout'.
2. Drawing indicates the locations of on site flooding during the 1 in 100 year + 40% climate change storm event. Extent of flooding demonstrated by solid blue hatch.

REV	DATE	BY	DESCRIPTION	CHKD
P01	07.05.25	JB	Issued for Information	RJ

Burrows Graham

North Office:
5 Ambassador Place, Stockport Road, Altrincham WA15 8DB
Tel: +44 (0)161 804 8046

South Office:
Bourne House, Prince Edward Street, Berkhamsted, Herts HP4 3EZ
Tel: +44 (0)1442 508 402

CLIENT

TOP ROAD

PROJECT

MARSTON BUSINESS PARK
ST NEOTS

DRAWING TITLE

EXCEEDANCE FLOW ROUTE

BGL PROJECT NUMBER	DRAWING STATUS	OFFICE	
30278	PRELIMINARY	NORTH	
SCALE @ A1	DATE	DRAWN BY	CHECKED BY
1:250	07.05.2025	JB	RJ

DRAWING No

30278-BGL-XX-XX-DR-C-00211

REV

P01

Appendix D – Maintenance Schedule

Maintenance schedule (it is the responsibility of the client/tenant or nominated management company to carry out the maintenance outlined in this table)	Required action	Typical frequency
Below Ground Drainage Pipes, Manholes, etc		
Regular maintenance	Lift covers and inspect manholes for evidence of debris and silt deposits and evidence of blockages (standing water). Carry out CCTV survey if required	Quarterly
Remedial actions	High pressure jetting and/or remove minor blockages and silt build up Replace broken access covers, remove major blockages, repair structurally defective pipework	As required – 20% loss of pipe cross-section As required
Flow control chamber		
Regular maintenance	Lift covers and inspect chamber fore evidence of debris and silt deposits and evidence of blockages. Test bypass door operating correctly.	Quarterly
Remedial actions	High pressure jetting and or remove minor blockages and silt build up Replace broken access covers, remove major blockages, repair/replace defective flow control devices	As required As required
Linear channel drains and gullies		
Regular maintenance	Lift access covers and inspect for silt/debris accumulation	Quarterly
Remedial actions	Replace broken access covers, gratings High pressure jetting and/or remove minor blockages and silt build up	Annually As required
Rainwater pipes		
Regular maintenance	Inspect rainwater goods for evidence of leaking pipework	Monthly (or as required)
Occasional maintenance	Remove rodding eyes and carry out high pressure jetting to remove any debris	Quarterly
Remedial actions	Replace cracked / leaking pipework	As required
Permeable Paving		
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Annually
Occasional maintenance	Stabilise and mow contributing and advanced areas Removal of weeds or management using glyphosate applied directly into weeds by an applicator rather than spraying.	As required Annually/As required
Remedial actions	Remediate any landscaping which through vegetation maintenance or soil slip, has been raised to within 50mm of the level of paving. Remedial work to any depressions rutting and cracked or broken blocks considered detrimental to the structure performance or a hazard to users and replace lost jointing material. Rehabilitation of surface and upper structure by remedial sweeping.	As required As required Every 10 to 15 years
Monitoring	Initial inspection Inspect for evidence of poor operation and/or weed growth – if required take remedial actions. Inspect silt accumulation rates and establish appropriate brushing frequencies. Monitor inspection chambers	Quarterly Quarterly Annually Annually

Below Ground Attenuation Tanks		
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually.
	Remove debris from the catchment surface (where it may cause risks to performance).	Monthly
Remedial actions	Repair/rehabilitate inlets, outlets, overflows and vents.	As required
Monitoring	Inspect/check all inlets, outlets, overflows and vents to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of the tank for sediment build up and remove if necessary.	Every 5 years or as required
Treatment System		
Routine maintenance	Remove litter and debris and inspect sediment, oil and grease accumulation.	Six monthly
	Change filter media.	As recommended by manufacturer
	Remove sediment, oil, grease and floatables.	As necessary – indicated by system inspections or immediately following significant spill.
Remedial actions	Replace malfunctioning parts or structures.	As required
Monitoring	Inspect for evidence of poor operation.	Six monthly
	Inspect filter media and establish appropriate replacement frequencies.	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies.	Monthly for six months, then every six months