

Bridge Farm, Twyford

7236.TN02 Rev04

MLP

28/10/2024

JOK

28/10/2024

MLP

09/12/2024

1.0 INTRODUCTION

- 1.1. This Technical Note has been produced by Stuart Michael Associates on behalf of Croudace to discharge conditions 25-29 of outline planning permission 212720 to Wokingham Borough Council (WBC).
- 1.2. A pre-application meeting was held with WBC, with the below comments on drainage design which have been addressed through the design. A copy of the comments is also included in **Appendix A**. The LLFA requires more information including the following:

"Applicant is required to follow SuDS hierarchy and If proposing infiltration then evidence should be provided to support results (to BRE 365 standard or similar approved).

If connection to an existing surface water sewer is proposed, we need to understand why other methods of the SuDS hierarchy cannot be implemented and see confirmation from the utilities supplier that their system has got capacity and the connection is acceptable.

Groundwater data confirming seasonal high groundwater levels.

Calculations to demonstrate that any SuDS features have been sized to cater for runoff generated by the 1 in 100 year flood event with a 40% allowance for climate change.

A drainage strategy report and plan indicating the location / sizing of SuDS with the base of any SuDS features located at least 1m above the seasonal high water table level in case of proposed infiltration.

Calculations to show how surface water runoff rates will be constrained to existing rates across all of the relevant return periods, i.e. Qbar, Q1, Q30 and Q100 with climate change.

Details demonstrating which SuDS application has been proposed and how that SuDS for this development would be managed throughout the lifespan of the development and who will be responsible for maintenance.

Any consideration to flow controls and pollution control devices? How are rates being restricted along with minimum and maximum depth of the ground water table across the site.

Explanation to show how exceeding events will be adequately catered for. Also, what considerations are given to overland flows coming on site."

2.0 CONDITION 25

25. The development shall be carried out in accordance with the submitted flood risk assessment (ref 5563.FRA Issue 04 Dated 24.03.2022, produced by Stuart Michael Associates Limited) and the following mitigation measures it details:

1. Finished floor levels shall be set no lower than 35.83 metres above Ordnance Datum (AOD)

2. No development or ground level raising shall take place within the 1% annual probability flood extent with a 35% allowance for climate change as shown in Appendix J of the FRA

These mitigation measures shall be fully implemented prior to occupation and subsequently in accordance with the scheme's timing/phasing arrangements. The measures detailed above shall be retained and maintained thereafter throughout the lifetime of the development.

- 2.1. Proposed finished floor levels are included in **Appendix B**, showing none are set lower than 35.83mAOD.
- 2.2. No development is proposed within the flood extent stated above. See **Figure 1** below which shows the flood extent overlaid on the proposed development, with all located outside the extent.



Figure 1: Figure showing all development is located outside of the modelled flood extent

3.0 CONDITION 26

26. No development shall take place until full details of the drainage system for the site have been submitted to and approved in writing by the LPA. The details shall include:
• ***Results of intrusive ground investigation demonstrating seasonal high groundwater levels for the site and infiltration rates in accordance with BRE365.***

- 3.1. Groundwater monitoring was undertaken at the site between April 2023 and May 2023. Further groundwater monitoring was undertaken on the site between February 2024 and April 2024 by Leap Environmental. **Table 1** below shows the groundwater monitoring results for the 2023 period. **Table 2** below shows the groundwater monitoring results for the 2024 period. **Figure 2** below shows an extract of the locations of testing undertaken.

Table 1: Groundwater monitoring (2023)

Monitoring Well	Depth to Groundwater (mbgl)		
	18/04/23	24/04/23	04/05/23
WS101	Dry	Dry	Dry
WS103	Dry	Dry	Dry
WS105	1.78	1.86	1.94
WS106	1.28	1.41	1.49

Table 2: Groundwater monitoring (2024)

Monitoring Well	Well Depth (m)	Depth to Groundwater (mbgl)		
		26/02/24	19/03/24	23/04/24
WS301	3.0	-	Dry	2.68
WS302	3.0	-	2.97	2.35
WS101	3.0	Dry	Dry	Dry
WS103	3.0	2.98	Dry	Dry
WS105	3.0	1.23	1.70	1.55

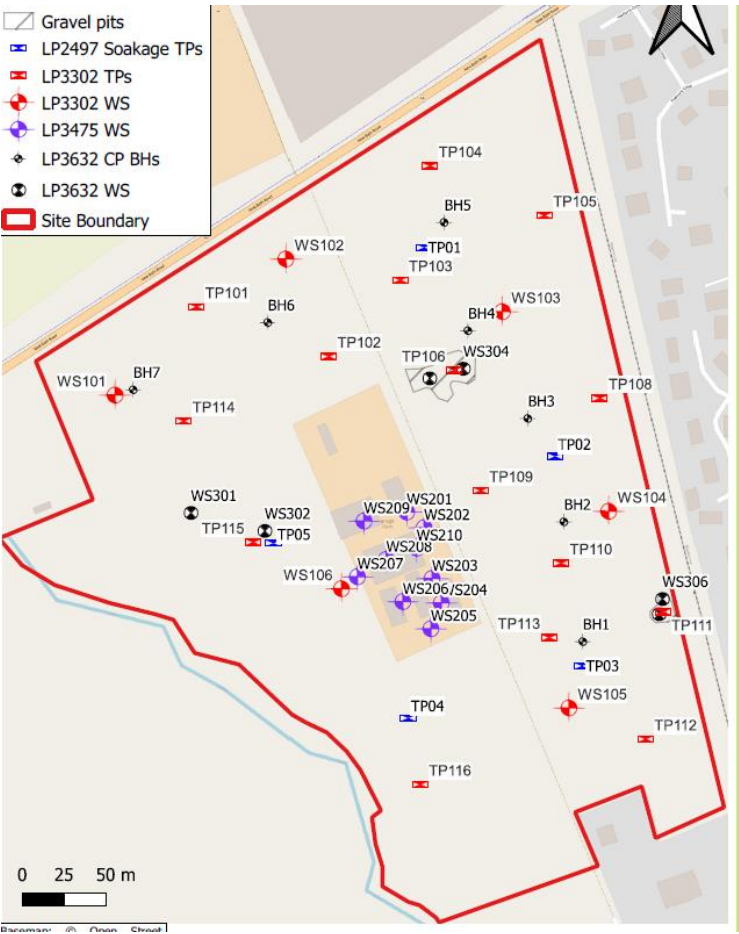


Figure 2: Extract of testing location plan

- 3.2. Groundwater monitoring indicates that groundwater levels across the site vary, with some areas recording relatively high groundwater levels, with the highest level recorded being 1.23mbgl in WS105. WS106 is the closet borehole with groundwater monitoring data to the proposed basin. A max groundwater level encountered within WS106 was 34.11mAOD which would not provide sufficient freeboard between an infiltration basin and groundwater. Therefore, the surface water drainage strategy is based on no infiltration possible across the site due to high groundwater levels and insufficient freeboard between the basin and groundwater levels. The groundwater monitoring results are also included in **Appendix C**.

• Demonstration that the base of SuDS features are at least 1m above seasonal groundwater level.

- 3.3. As stated above, the groundwater levels on the site vary with them occasionally being within 3m of ground level, and therefore 1m between the base of SuDS features and groundwater may not be feasible. Due to the high groundwater levels, SuDS features will be lined with an impermeable membrane which will prevent groundwater ingress/seepage from any local groundwater into the SuDS features.

• Full calculations demonstrating the performance of soakaways or capacity of attenuation features to cater for 1 in 100 year flood event with a 40% allowance for climate change and runoff controlled at Greenfield rates, or preferably better.
• Calculations demonstrating that there will be no flooding of pipes for events up to and including the 1 in 100 year flood event with a 40% allowance for climate change.

- 3.4. It is proposed to discharge surface water at a rate of 2l/s/ha to the existing watercourse located on the western boundary of the site. **Figure 3** below shows the location of the river adjacent to the western site boundary. The LLFA have confirmed that due to the high groundwater levels in the proximity of the site that infiltration is not feasible and that a rate of 2l/s/ha is acceptable. Correspondence with the LLFA is included within **Appendix D**.
- 3.5. Calculations showing there is no flooding for all storm events up to and including the 100yr plus climate change rainfall event are included in **Appendix E**.

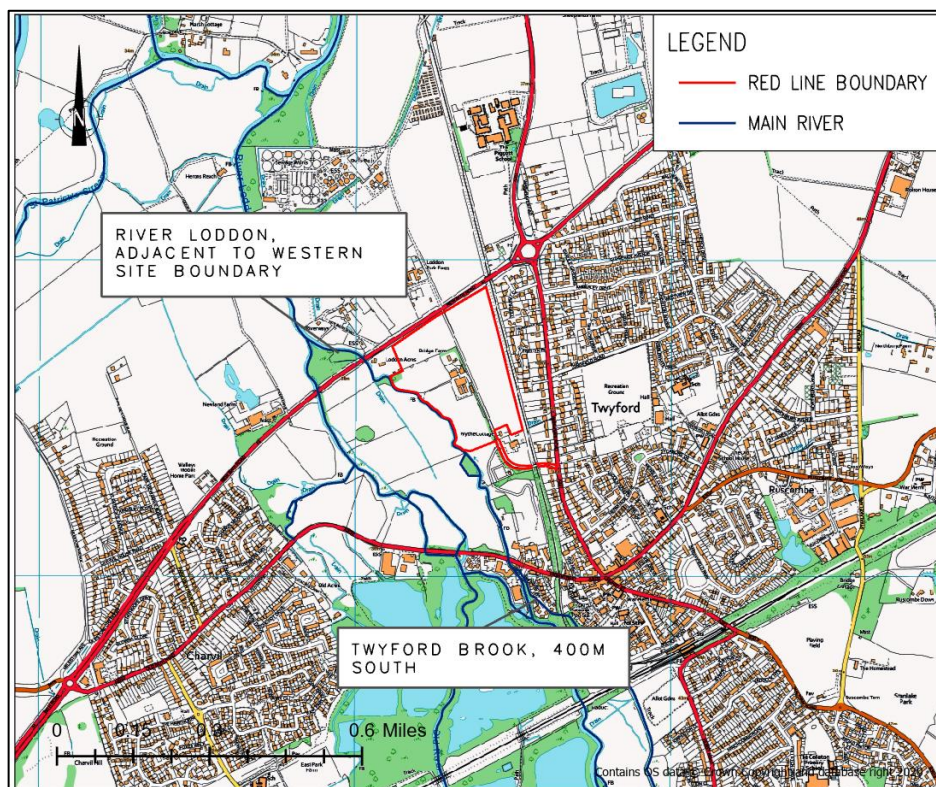


Figure 3: Main River Map

• A drainage strategy plan for the proposed development, including pipe details with invert levels.

- 3.6. The proposed drainage consists of a series of swales, bioretention and a basin. Swales and bioretention are proposed adjacent to roads throughout the development and provide treatment and conveyance of surface water towards the basin. The basin discharges surface water runoff to the watercourse located adjacent to the western boundary. The proposed SuDS Management Train provides sufficient treatment prior to discharge to the watercourse. A drawing showing the drainage strategy is included in **Appendix F**.

• A maintenance arrangement for the SuDS features throughout the lifetime of the development, indicating who will be responsible for the maintenance.

- 3.7. The proposed maintenance and management for all SuDS in public areas, including the bioretention, swales and basin, will be with a private management company. A plan showing who maintenance responsibilities lie with is included within **Appendix G**. Maintenance schedules are also included within **Appendix G**, detailing maintenance activities of all SuDS features.

4.0 CONDITION 27

27. No drainage systems for the infiltration of surface water to the ground are permitted other than with the written consent of the local planning authority. Any proposals for such systems must be supported by an assessment of the risks to controlled waters. The development shall be carried out in accordance with the approved details.

- 4.1. Due to the high groundwater levels found at the site, it is now proposed to discharge surface water to the watercourse located adjacent to the western boundary. See **Figure 3** above for the location of the watercourse.

5.0 CONDITION 28

28. Development shall not take place until an exceedance flow routing plan for flows above the 1 in 100+40% climate change event has been submitted to and approved in writing by the Local Planning Authority. The proposed scheme shall identify exceedance flow routes through the development based on proposed topography with flows being directed to highways and areas of public open space. Flow routes through gardens and other areas in private ownership will not be permitted. The scheme shall subsequently be completed in accordance with the approved details before first occupation of the site.

- 5.1. A plan showing how exceedance routes will be managed through the development for storms in excess of the 1 in 100+40% climate change event is included as **Appendix H**. Flow routes will follow the topography of the site, being directed to highways and areas of public open space and away from dwellings.

6.0 CONDITION 29

29. The layout of the development site and the drainage system should be designed so that natural low-lying areas and overland conveyance pathways are used to manage surface runoff, where appropriate, where they do not pose an unacceptable risk to the new developments or downstream areas/ elsewhere. Where run-off from off-site sources is drained together with the site run-off, the contributing catchment should be modelled as part of the drainage system to take full account of additional flows.

- 6.1. The basin is proposed at the low point of the site, with exceedance and overland flow routes being directed towards the low point, away from the development. Exceedance flow routes will only be used during exceedance flood events. See **Appendix H** for the exceedance flow routes.

Appendix A

LLFA Pre-application meeting Comments

MEMORANDUM

From:	NT		
Service	WBC Drainage	App No:	240727
Address:	Land At Bridge Farm, Bridge Farm Lane, Twyford, Berkshire, RG10 9RU.		
Proposal:	Pre-application consultation for the agreement of details to be submitted in a Reserved Matters application pursuant to outline 212720 the development of 200 dwellings, including 40% affordable housing and associated infrastructure, open space, biodiversity enhancements, landscaping and green infrastructure, following demolition of existing agricultural buildings. Reserved Matters seeking consent are Layout; Appearance; Scale and Landscaping. (Access approved as part of Outline permission.)		
Type of Development:			
Site Visit Made:	No		

Summary Of Recommendations

Comments On Proposal

LLFA received this Pre-application consultation for the agreement of details to be submitted in a Reserved Matters application pursuant to outline 212720 the development of 200 dwellings, including 40% affordable housing and associated infrastructure, open space, biodiversity enhancements, landscaping and green infrastructure, following demolition of existing agricultural buildings. Reserved Matters seeking consent are Layout; Appearance; Scale and Landscaping. (Access approved as part of Outline permission.) on 13th September 2024.

The proposed development will increase impermeable surface cover, necessitating drainage measures to prevent off-site flood risk. For greenfield developments, runoff rates and volumes during rainfall events should not exceed those of the greenfield state, with discharge rates not exacerbating flood risk. Road classification determines pavement sub-base thickness requirements, with minimum depths determined by infiltration testing. Pervious paving not only manages runoff but also improves water quality by filtering pollutants. Soakaways, though viable for roof runoff, are less suitable for roads and driveways due to blockage risks, thus recommended in conjunction with pervious paving. Pervious paving, combined with soakaways for roof runoff, fulfills sustainable drainage objectives effectively, making it the preferred choice for surface water management on

the site. Site is in flood zone 1 , 2 and 3 . LLFA requires FRA / Surface water drainage strategy for the entire development.

LLFA requires more information including the following.

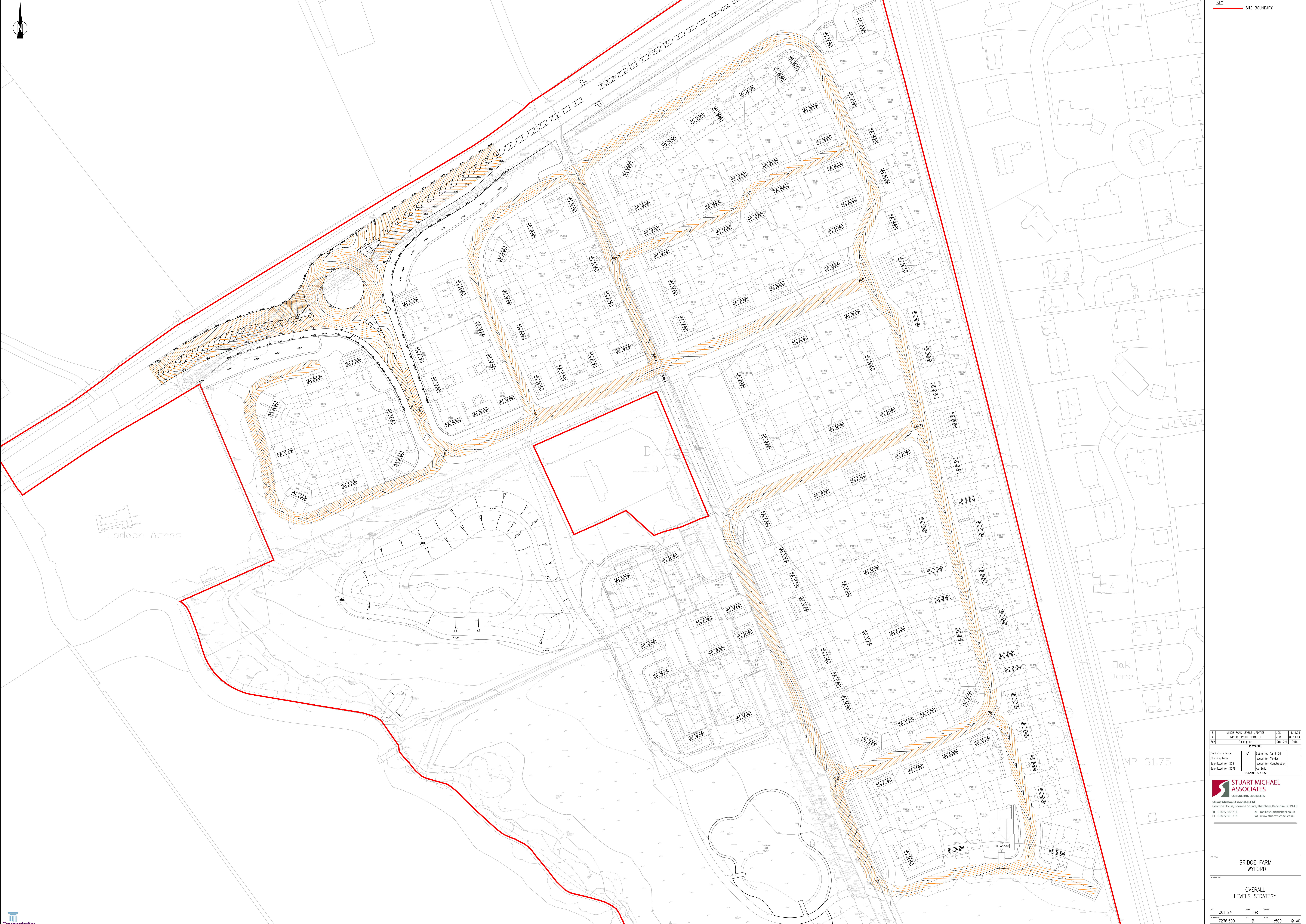
1. Applicant is required to follow SuDS hierarchy and If proposing infiltration then evidence should be provided to support results (to BRE 365 standard or similar approved).
2. If connection to an existing surface water sewer is proposed, we need to understand why other methods of the SuDS hierarchy cannot be implemented and see confirmation from the utilities supplier that their system has got capacity and the connection is acceptable.
3. Groundwater data confirming seasonal high groundwater levels.
4. Calculations to demonstrate that any SuDS features have been sized to cater for runoff generated by the 1 in 100 year flood event with a 40% allowance for climate change.
5. A drainage strategy report and plan indicating the location / sizing of SuDS with the base of any SuDS features located at least 1m above the seasonal high water table level in case of proposed infiltration.
6. Calculations to show how surface water runoff rates will be constrained to existing rates across all of the relevant return periods, i.e. Qbar, Q1, Q30 and Q100 with climate change.
7. Details demonstrating which SuDS application has been proposed and how that SuDS for this development would be managed throughout the lifespan of the development and who will be responsible for maintenance.
8. Any consideration to flow controls and pollution control devices? How are rates being restricted along with minimum and maximum depth of the ground water table across the site.
9. Explanation to show how exceeding events will be adequately catered for. Also, what considerations are given to overland flows coming on site.

It is a mandatory requirement to provide sufficient information relating to the proposed surface water drainage strategy and consideration must be given to the provision of a SuDS. This is to comply with the requirements set out in Technical Guidance to the NPPF and the Non Statutory Technical Standards for Sustainable Drainage. Please note that proposed foul water is a matter that will be dealt by local sewerage authority not LLFA.

Conditions & Reasons (if required)			
Date:	16/09/2024	Signed:	NT

Appendix B

FFL's and Road Levels Drawing



KEY SITE BOUNDARY

B	MINOR ROAD LEVELS UPDATES	JOK	11.11.24
A	MINOR LAYOUT UPDATES	JOK	10.11.24
Rev	Description	Rev	Date
REVISIONS			
Preliminary Issue	✓	Submitted for S104	
Planning Issue		Issued for Tender	
Submitted for S38		Issued for Construction	
Submitted for S278		As Built	
DRAWING STATUS			

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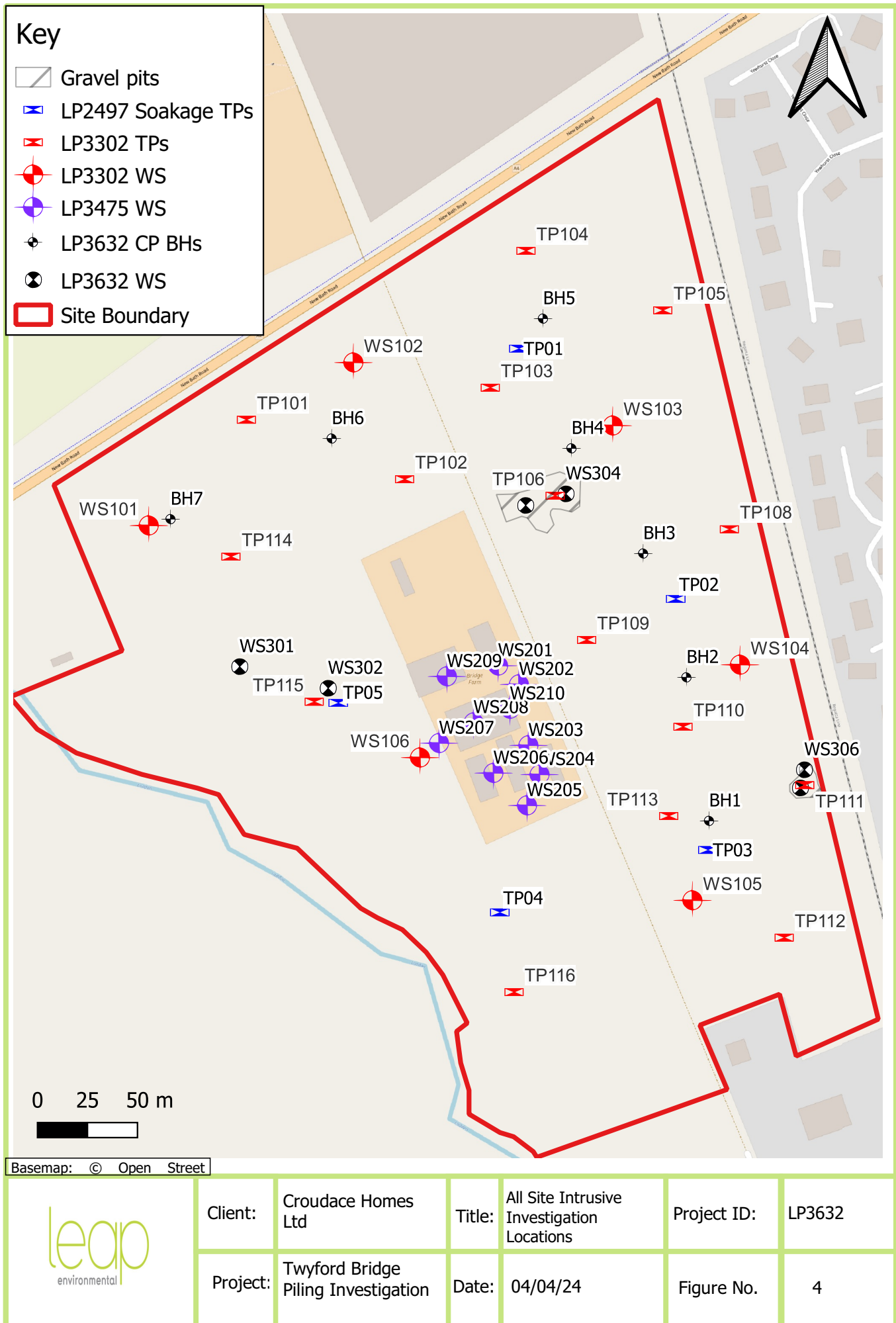
BRIDGE FARM
TWYFORD

OVERALL
LEVELS STRATEGY

DATE: OCT 24 DRAWN: JOK CHECKED: JOK
SCALE: 7236.500 B DATE: 1:500 © A0
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Appendix C

Groundwater Monitoring



Appendix D

Correspondence with LLFA

Megan Potter

From: [REDACTED]
Sent: 24 October 2024 11:44
To: Megan Potter
Subject: RE: General enquiry about discharge rate

Hi Megan,

Thank you for your email.

As infiltration is not achievable due to high groundwater levels and greenfield runoff was calculated at 2.1l/s, an attenuated runoff with controlled discharge at 2l/s will be acceptable.

Please all future correspondences for the application should go via planning.

Kind regards,

Boni.

From: Sirnawaz Khan [REDACTED] **On Behalf Of** Flooding
Sent: 22 October 2024 10:56
To: Flood Risk DC [REDACTED]
Subject: FW: General enquiry about discharge rate

Hi,

I think this is for you.

Best wishes,
Sirnawz

From: Megan Potter [REDACTED] >
Sent: 21 October 2024 15:51
To: Flooding [REDACTED] >
Subject: General enquiry about discharge rate

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External Email

CAUTION: This is an EXTERNAL EMAIL - STOP & THINK before clicking a link or opening attachments.

Good Afternoon,

We are currently working on a drainage strategy for a site located within Twyford. The development has outline permission under reference 212720. The previous strategy was to infiltrate runoff to the ground. However, following groundwater monitoring at the site, high groundwater levels were found and therefore it is not deemed suitable to infiltrate.

Therefore, it is proposed to discharge runoff from the site at a restricted rate of 2l/s/ha. The BFIHOST value for the site provided by FEH point data indicates that there is very high permeability in the ground alongside information contained on the Soilscales website. Low BFIHOST values indicate highly impermeable soils (below 0.2) whilst high

values indicate highly permeable soils (above 0.8). FEH point data for the site indicate a BFIHOST19 value of 0.819 and therefore the Site is expected to be highly permeable. Attached is the FEH point data for the site. However, as stated above and shown on the below groundwater monitoring table, infiltration is not feasible at the site. Based on this further information, the BFIHOST value from the FEH data of the Site is not deemed appropriate to use. The SuDS Manual also states: “For soils with relatively high permeabilities, the 1:1 year runoff rate may be considered too low to be feasible.”

Monitoring well	Well Depth (m)	Depth to groundwater (mbgl)		
		26/02/24	19/03/24	23/04/24
WS301	3.0	-	Dry	2.68
WS302	3.0	-	2.97	2.35
WS101	3.0	Dry	Dry	Dry
WS103	3.0	2.98	Dry	Dry
WS105	3.0	1.23	1.70	1.55

Due to the high permeability, we are getting a runoff rate of 0.6l/s/ha which we consider too low. We have also calculated the greenfield runoff rates using FEH catchment data which provides a rate of 2.1l/s/ha for the 1in1year storm, but we want to be using point data for more accuracy. However, when using point data we have the issue of much lower greenfield rates.

We are looking for confirmation that 2l/s/ha is acceptable in this scenario where permeability is good, but groundwater is high, affecting the runoff rates.

Best regards,

Megan Potter *Bsc (Hons)*
Assistant Environmental Engineer

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Appendix E

Surface Water Calculations

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.077	5.00	37.900	1500	478385.873	176880.873	1.800
S2	0.064	5.00	38.450	1200	478381.030	176823.865	1.500
S3	0.082	5.00	38.260	1500	478405.554	176834.281	2.260
S4	0.075	5.00	38.500	1500	478415.166	176811.416	2.550
S5	0.068	5.00	38.620	1500	478407.389	176792.004	2.710
S6	0.069	5.00	38.700	1500	478411.499	176776.486	2.820
S7	0.129	5.00	38.140	1500	478362.758	176755.930	2.355
S7A			38.240	1500	478334.288	176743.922	2.510
S8	0.096	5.00	38.050	1500	478359.852	176875.236	1.980
S9	0.065	5.00	38.660	1500	478307.338	176841.152	2.700
S10	0.023	5.00	39.100	1200	478271.658	176820.212	1.500
S11	0.037	5.00	39.000	1500	478281.411	176824.325	3.100
S12	0.058	5.00	38.950	1200	478337.495	176798.666	1.500
S12A			39.140	1200	478305.008	176784.965	1.840
S13	0.077	5.00	39.220	1500	478299.068	176782.460	3.420
S14	0.147	5.00	38.360	1500	478318.185	176737.131	2.660
S15	0.046	5.00	38.980	1200	478246.501	176803.844	1.500
S16	0.119	5.00	38.660	1200	478235.902	176782.097	1.500
S17	0.055	5.00	37.840	1200	478263.097	176717.615	1.500
S18	0.084	5.00	37.850	1500	478264.428	176714.459	2.250
S19	0.106	5.00	37.940	1500	478236.336	176702.612	2.400
S20	0.026	5.00	38.050	1200	478217.802	176709.437	1.500
S21	0.013	5.00	38.100	1500	478225.966	176699.647	2.580
S22	0.030	5.00	37.900	1500	478216.776	176690.869	2.410
S22A	0.052	5.00	37.400	1500	478193.751	176682.121	1.960
S23	0.060	5.00	38.460	1200	478167.550	176737.865	1.500
S24	0.050	5.00	37.960	1200	478138.460	176725.605	1.500
S25	0.033	5.00	36.820	1200	478150.265	176675.908	1.500
S26	0.036	5.00	36.800	1500	478162.659	176670.308	1.850
S27			36.500	1500	478168.324	176647.477	1.650
HW1			36.000		478187.476	176639.243	1.200
S28	0.065	5.00	36.220	2100	478482.199	176515.555	1.550
S29	0.047	5.00	36.360	1800	478453.065	176513.424	1.740
S30	0.031	5.00	36.230	1800	478424.043	176504.113	1.660
S31	0.007	5.00	36.400	1800	478413.539	176510.987	1.850
S32	0.042	5.00	37.300	1500	478398.231	176547.283	2.820
S33	0.173	5.00	37.340	1350	478456.121	176640.918	1.940
S34	0.046	5.00	36.880	1500	478467.912	176595.077	2.260
S35	0.113	5.00	36.840	1500	478466.246	176584.245	2.240
S36	0.054	5.00	36.860	1500	478460.038	176578.288	2.280
S37	0.103	5.00	37.380	1500	478411.106	176557.651	2.895
S38	0.015	5.00	37.500	1500	478398.924	176556.867	3.040

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S39	0.024	5.00	37.680	1500	478390.017	176565.331	3.240
S40	0.144	5.00	37.760	1500	478369.775	176613.328	3.410
S41	0.120	5.00	37.700	1200	478446.995	176676.398	1.550
S42	0.082	5.00	38.020	1200	478439.087	176707.142	2.020
S43	0.082	5.00	38.450	1200	478428.104	176746.837	1.500
S44	0.087	5.00	38.100	1350	478437.107	176711.836	2.280
S45	0.150	5.00	37.520	1350	478389.840	176691.902	1.920
S46	0.048	5.00	37.200	1500	478359.683	176679.183	2.775
S47	0.038	5.00	37.200	1500	478349.943	176670.650	2.800
S48	0.006	5.00	37.300	1500	478350.404	176659.259	2.920
S50	0.108	5.00	37.600	1500	478363.390	176628.467	3.280
S51	0.171	5.00	36.300	1500	478308.339	176605.249	2.080
S52			36.300	1500	478284.942	176619.529	2.130
HW2			36.000		478273.374	176621.910	1.850
Basin			36.000		478225.715	176627.022	2.000
S53			36.000	1500	478222.035	176616.371	2.050
S54			35.450	1200	478209.599	176597.260	1.650
Outfall			35.400	1200	478207.589	176593.371	1.650

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	S3	50.578	0.600	36.100	36.000	0.100	505.8	600	5.78	47.4
2.000	S2	S3	26.644	0.600	36.950	36.300	0.650	41.0	300	5.18	49.7
1.001	S3	S4	24.803	0.600	36.000	35.950	0.050	496.1	600	6.16	46.0
1.002	S4	S5	20.912	0.600	35.950	35.910	0.040	522.8	600	6.49	44.9
1.003	S5	S6	16.053	0.600	35.910	35.880	0.030	535.1	600	6.75	44.1
1.004	S6	S7	52.898	0.600	35.880	35.785	0.095	556.8	600	7.61	41.5
3.000	S8	S9	62.605	0.600	36.070	35.960	0.110	569.1	600	6.03	46.5
3.001	S9	S11	30.909	0.600	35.960	35.900	0.060	515.1	600	6.51	44.9
4.000	S10	S11	10.585	0.600	37.600	36.200	1.400	7.6	300	5.03	50.0
3.002	S11	S13	45.436	0.600	35.900	35.800	0.100	454.4	600	7.18	42.8
8.000	S23	S24	31.568	0.600	36.960	36.460	0.500	63.1	300	5.27	49.4
5.000	S12	S12A	35.258	0.600	37.450	37.300	0.150	235.1	300	5.58	48.2

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.076	304.1	13.2	1.200	1.660	0.077	0.0	84	0.548
2.000	2.462	174.1	11.5	1.200	1.660	0.064	0.0	52	1.413
1.001	1.086	307.1	37.1	1.660	1.950	0.223	0.0	139	0.743
1.002	1.058	299.1	48.4	1.950	2.110	0.298	0.0	162	0.786
1.003	1.045	295.6	58.3	2.110	2.220	0.366	0.0	180	0.821
1.004	1.025	289.7	65.3	2.220	1.755	0.435	0.0	192	0.834
3.000	1.013	286.5	16.1	1.380	2.100	0.096	0.0	95	0.556
3.001	1.066	301.3	26.1	2.100	2.500	0.161	0.0	118	0.664
4.000	5.751	406.5	4.2	1.200	2.500	0.023	0.0	21	1.901
3.002	1.136	321.1	34.2	2.500	2.820	0.221	0.0	131	0.751
8.000	1.982	140.1	10.7	1.200	1.200	0.060	0.0	55	1.181
5.000	1.021	72.2	10.1	1.200	1.540	0.058	0.0	75	0.724

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
3.003	S13	S14	49.195	0.600	35.800	35.700	0.100	492.0	600	7.93	40.6
1.007	S14	S18	58.342	0.600	35.700	35.600	0.100	583.4	600	9.38	37.2
6.000	S15	S16	24.192	0.600	37.480	37.160	0.320	75.6	300	5.22	49.5
6.001	S16	S17	69.982	0.600	37.160	36.340	0.820	85.3	300	5.91	46.9
6.002	S17	S18	3.425	0.600	36.340	35.900	0.440	7.8	300	5.92	46.9
1.008	S18	S19	30.488	0.600	35.600	35.540	0.060	508.1	600	9.85	36.2
1.009	S19	S21	10.786	0.600	35.540	35.520	0.020	539.3	600	10.02	35.9
7.000	S20	S21	12.747	0.600	36.550	35.820	0.730	17.5	300	5.06	50.0
1.010	S21	S22	12.709	0.600	35.520	35.490	0.030	423.6	600	10.20	35.5
1.011	S22	S22A	24.631	0.600	35.490	35.440	0.050	492.6	600	10.58	34.8
8.001	S24	S25	51.080	0.600	36.460	35.320	1.140	44.8	300	5.63	48.0
8.002	S25	S26	13.600	0.600	35.320	35.250	0.070	194.3	300	5.83	47.2
1.013	S26	S27	23.523	0.600	34.950	34.850	0.100	235.2	600	11.02	34.0
1.014	S27	HW1	20.847	0.600	34.850	34.800	0.050	416.9	600	11.31	33.5
10.000	S28	S29	29.212	0.600	34.670	34.620	0.050	584.2	600	5.49	48.5
10.001	S29	S30	30.479	0.600	34.620	34.570	0.050	609.6	600	6.01	46.5
10.002	S30	S31	12.553	0.600	34.570	34.550	0.020	627.7	600	6.22	45.8
10.003	S31	S32	39.392	0.600	34.550	34.480	0.070	562.7	600	6.87	43.7
10.004	S32	S38	9.609	0.600	34.480	34.460	0.020	480.5	600	7.01	43.2
9.000	S33	S34	47.333	0.600	35.400	34.770	0.630	75.1	450	5.34	49.1
9.001	S34	S35	10.959	0.600	34.620	34.600	0.020	548.0	600	5.51	48.4
9.002	S35	S36	8.604	0.600	34.600	34.580	0.020	430.2	600	5.64	48.0
9.003	S36	S37	53.106	0.600	34.580	34.485	0.095	559.0	600	6.50	44.9

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
3.003	1.091	308.4	52.3	2.820	2.060	0.356	0.0	166	0.822
1.007	1.001	282.9	143.6	2.060	1.650	1.067	0.0	303	1.004
6.000	1.810	127.9	8.2	1.200	1.200	0.046	0.0	51	1.030
6.001	1.703	120.4	28.0	1.200	1.200	0.165	0.0	98	1.396
6.002	5.668	400.6	37.3	1.200	1.650	0.220	0.0	61	3.592
1.008	1.073	303.4	179.5	1.650	1.800	1.371	0.0	333	1.116
1.009	1.041	294.4	191.5	1.800	1.980	1.477	0.0	353	1.105
7.000	3.780	267.2	4.7	1.200	1.980	0.026	0.0	27	1.458
1.010	1.177	332.7	194.7	1.980	1.810	1.516	0.0	330	1.220
1.011	1.090	308.2	194.6	1.810	1.360	1.546	0.0	347	1.150
8.001	2.355	166.4	19.1	1.200	1.200	0.110	0.0	68	1.585
8.002	1.124	79.5	24.4	1.200	1.250	0.143	0.0	114	0.993
1.013	1.583	447.6	218.6	1.250	1.050	1.777	0.0	296	1.574
1.014	1.186	335.3	215.4	1.050	0.600	1.777	0.0	351	1.256
10.000	1.000	282.7	11.4	0.950	1.140	0.065	0.0	81	0.498
10.001	0.979	276.7	18.8	1.140	1.060	0.112	0.0	105	0.568
10.002	0.964	272.7	23.7	1.060	1.250	0.143	0.0	118	0.600
10.003	1.019	288.2	23.7	1.250	2.220	0.150	0.0	115	0.625
10.004	1.104	312.2	30.0	2.220	2.440	0.192	0.0	125	0.709
9.000	2.347	373.3	30.7	1.490	1.660	0.173	0.0	87	1.443
9.001	1.033	292.1	38.3	1.660	1.640	0.219	0.0	146	0.724
9.002	1.167	330.1	57.5	1.640	1.680	0.332	0.0	168	0.885
9.003	1.023	289.1	62.6	1.680	2.295	0.386	0.0	188	0.823

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
9.004	S37	S38	12.207	0.600	34.485	34.460	0.025	488.3	600	6.69	44.3
9.005	S38	S39	12.287	0.600	34.460	34.440	0.020	614.4	600	7.22	42.6
9.006	S39	S40	52.091	0.600	34.440	34.350	0.090	578.8	600	8.09	40.2
9.007	S40	S50	16.430	0.600	34.350	34.320	0.030	547.7	600	8.35	39.6
11.000	S41	S42	31.745	0.600	36.150	36.000	0.150	211.6	300	5.49	48.5
11.001	S42	S44	5.095	0.600	36.000	35.970	0.030	169.8	300	5.56	48.2
12.000	S43	S44	36.140	0.600	36.950	35.970	0.980	36.9	300	5.23	49.5
11.002	S44	S45	51.298	0.600	35.820	35.600	0.220	233.2	450	6.21	45.9
11.003	S45	S46	32.729	0.600	35.600	34.575	1.025	31.9	450	6.36	45.4
11.004	S46	S47	12.949	0.600	34.425	34.400	0.025	518.0	600	6.56	44.7
11.005	S47	S48	11.400	0.600	34.400	34.380	0.020	570.0	600	6.75	44.1
9.008	S50	S51	59.747	0.600	34.320	34.220	0.100	597.5	600	9.36	37.3
9.009	S51	S52	27.411	0.600	34.220	34.170	0.050	548.2	600	9.80	36.3
9.010	S52	HW2	11.810	0.600	34.170	34.150	0.020	590.5	600	10.00	35.9
9.011	HW2	Basin	47.932	0.600	34.150	34.000	0.150	319.5	600	10.59	34.8
1.016	Basin	S53	11.269	0.600	34.000	33.950	0.050	225.4	600	11.62	33.0
1.017	S53	S54	22.801	0.600	33.950	33.800	0.150	152.0	225	11.98	32.4
1.018	S54	Outfall	4.378	0.600	33.800	33.750	0.050	87.6	225	12.03	32.4
1.015	HW1	Basin	40.144	0.600	34.800	34.000	0.800	50.2	600	11.50	33.2
1.012	S22A	S26	33.260	0.600	35.440	34.950	0.490	67.9	600	10.77	34.5
5.001	S12A	S13	6.447	0.600	37.300	36.100	1.200	5.4	300	5.59	48.1
1.005	S7	S7A	30.899	0.600	35.785	35.730	0.055	561.8	600	8.11	40.2

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
9.004	1.095	309.6	78.2	2.295	2.440	0.489	0.0	205	0.920
9.005	0.975	275.6	107.2	2.440	2.640	0.696	0.0	259	0.916
9.006	1.005	284.1	104.7	2.640	2.810	0.720	0.0	252	0.932
9.007	1.033	292.1	123.6	2.810	2.680	0.864	0.0	272	0.992
11.000	1.077	76.1	21.0	1.250	1.720	0.120	0.0	108	0.924
11.001	1.203	85.1	35.2	1.720	1.830	0.202	0.0	134	1.149
12.000	2.597	183.6	14.7	1.200	1.830	0.082	0.0	57	1.578
11.002	1.327	211.0	61.5	1.830	1.470	0.371	0.0	166	1.156
11.003	3.607	573.7	85.4	1.470	2.175	0.521	0.0	116	2.622
11.004	1.063	300.5	91.9	2.175	2.200	0.569	0.0	227	0.939
11.005	1.013	286.3	96.7	2.200	2.320	0.607	0.0	239	0.917
9.008	0.989	279.6	213.4	2.680	1.480	1.585	0.0	394	1.084
9.009	1.033	292.0	230.6	1.480	1.530	1.756	0.0	404	1.139
9.010	0.995	281.2	227.9	1.530	1.250	1.756	0.0	412	1.102
9.011	1.357	383.5	220.9	1.250	1.400	1.756	0.0	327	1.402
1.016	1.618	457.4	421.8	1.400	1.450	3.533	0.0	457	1.823
1.017	1.058	42.1	414.2	1.825	1.425	3.533	0.0	225	1.077
1.018	1.398	55.6	413.2	1.425	1.425	3.533	0.0	225	1.424
1.015	3.443	973.4	213.4	0.600	1.400	1.777	0.0	190	2.785
1.012	2.958	836.4	199.2	1.360	1.250	1.598	0.0	198	2.449
5.001	6.825	482.4	10.1	1.540	2.820	0.058	0.0	30	2.782
1.005	1.020	288.4	81.9	1.755	1.910	0.564	0.0	218	0.883

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.006	S7A	S14	17.476	0.600	35.730	35.700	0.030	582.5	600	8.41	39.5
11.006	S48	S50	33.418	0.600	34.380	34.320	0.060	557.0	600	7.29	42.4

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.006	1.001	283.2	80.5	1.910	2.060	0.564	0.0	218	0.867
11.006	1.024	289.7	94.0	2.320	2.680	0.613	0.0	234	0.919

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	50.578	505.8	600	Circular	37.900	36.100	1.200	38.260	36.000	1.660
2.000	26.644	41.0	300	Circular	38.450	36.950	1.200	38.260	36.300	1.660
1.001	24.803	496.1	600	Circular	38.260	36.000	1.660	38.500	35.950	1.950
1.002	20.912	522.8	600	Circular	38.500	35.950	1.950	38.620	35.910	2.110
1.003	16.053	535.1	600	Circular	38.620	35.910	2.110	38.700	35.880	2.220
1.004	52.898	556.8	600	Circular	38.700	35.880	2.220	38.140	35.785	1.755
3.000	62.605	569.1	600	Circular	38.050	36.070	1.380	38.660	35.960	2.100
3.001	30.909	515.1	600	Circular	38.660	35.960	2.100	39.000	35.900	2.500
4.000	10.585	7.6	300	Circular	39.100	37.600	1.200	39.000	36.200	2.500
3.002	45.436	454.4	600	Circular	39.000	35.900	2.500	39.220	35.800	2.820
8.000	31.568	63.1	300	Circular	38.460	36.960	1.200	37.960	36.460	1.200
5.000	35.258	235.1	300	Circular	38.950	37.450	1.200	39.140	37.300	1.540
3.003	49.195	492.0	600	Circular	39.220	35.800	2.820	38.360	35.700	2.060
1.007	58.342	583.4	600	Circular	38.360	35.700	2.060	37.850	35.600	1.650
6.000	24.192	75.6	300	Circular	38.980	37.480	1.200	38.660	37.160	1.200
6.001	69.982	85.3	300	Circular	38.660	37.160	1.200	37.840	36.340	1.200
6.002	3.425	7.8	300	Circular	37.840	36.340	1.200	37.850	35.900	1.650

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	1500	Manhole	Adoptable	S3	1500	Manhole	Adoptable
2.000	S2	1200	Manhole	Adoptable	S3	1500	Manhole	Adoptable
1.001	S3	1500	Manhole	Adoptable	S4	1500	Manhole	Adoptable
1.002	S4	1500	Manhole	Adoptable	S5	1500	Manhole	Adoptable
1.003	S5	1500	Manhole	Adoptable	S6	1500	Manhole	Adoptable
1.004	S6	1500	Manhole	Adoptable	S7	1500	Manhole	Adoptable
3.000	S8	1500	Manhole	Adoptable	S9	1500	Manhole	Adoptable
3.001	S9	1500	Manhole	Adoptable	S11	1500	Manhole	Adoptable
4.000	S10	1200	Manhole	Adoptable	S11	1500	Manhole	Adoptable
3.002	S11	1500	Manhole	Adoptable	S13	1500	Manhole	Adoptable
8.000	S23	1200	Manhole	Adoptable	S24	1200	Manhole	Adoptable
5.000	S12	1200	Manhole	Adoptable	S12A	1200	Manhole	Adoptable
3.003	S13	1500	Manhole	Adoptable	S14	1500	Manhole	Adoptable
1.007	S14	1500	Manhole	Adoptable	S18	1500	Manhole	Adoptable
6.000	S15	1200	Manhole	Adoptable	S16	1200	Manhole	Adoptable
6.001	S16	1200	Manhole	Adoptable	S17	1200	Manhole	Adoptable
6.002	S17	1200	Manhole	Adoptable	S18	1500	Manhole	Adoptable

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.008	30.488	508.1	600	Circular	37.850	35.600	1.650	37.940	35.540	1.800
1.009	10.786	539.3	600	Circular	37.940	35.540	1.800	38.100	35.520	1.980
7.000	12.747	17.5	300	Circular	38.050	36.550	1.200	38.100	35.820	1.980
1.010	12.709	423.6	600	Circular	38.100	35.520	1.980	37.900	35.490	1.810
1.011	24.631	492.6	600	Circular	37.900	35.490	1.810	37.400	35.440	1.360
8.001	51.080	44.8	300	Circular	37.960	36.460	1.200	36.820	35.320	1.200
8.002	13.600	194.3	300	Circular	36.820	35.320	1.200	36.800	35.250	1.250
1.013	23.523	235.2	600	Circular	36.800	34.950	1.250	36.500	34.850	1.050
1.014	20.847	416.9	600	Circular	36.500	34.850	1.050	36.000	34.800	0.600
10.000	29.212	584.2	600	Circular	36.220	34.670	0.950	36.360	34.620	1.140
10.001	30.479	609.6	600	Circular	36.360	34.620	1.140	36.230	34.570	1.060
10.002	12.553	627.7	600	Circular	36.230	34.570	1.060	36.400	34.550	1.250
10.003	39.392	562.7	600	Circular	36.400	34.550	1.250	37.300	34.480	2.220
10.004	9.609	480.5	600	Circular	37.300	34.480	2.220	37.500	34.460	2.440
9.000	47.333	75.1	450	Circular	37.340	35.400	1.490	36.880	34.770	1.660
9.001	10.959	548.0	600	Circular	36.880	34.620	1.660	36.840	34.600	1.640
9.002	8.604	430.2	600	Circular	36.840	34.600	1.640	36.860	34.580	1.680
9.003	53.106	559.0	600	Circular	36.860	34.580	1.680	37.380	34.485	2.295
9.004	12.207	488.3	600	Circular	37.380	34.485	2.295	37.500	34.460	2.440
9.005	12.287	614.4	600	Circular	37.500	34.460	2.440	37.680	34.440	2.640
9.006	52.091	578.8	600	Circular	37.680	34.440	2.640	37.760	34.350	2.810
9.007	16.430	547.7	600	Circular	37.760	34.350	2.810	37.600	34.320	2.680
11.000	31.745	211.6	300	Circular	37.700	36.150	1.250	38.020	36.000	1.720
11.001	5.095	169.8	300	Circular	38.020	36.000	1.720	38.100	35.970	1.830
12.000	36.140	36.9	300	Circular	38.450	36.950	1.200	38.100	35.970	1.830

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.008	S18	1500	Manhole	Adoptable	S19	1500	Manhole	Adoptable
1.009	S19	1500	Manhole	Adoptable	S21	1500	Manhole	Adoptable
7.000	S20	1200	Manhole	Adoptable	S21	1500	Manhole	Adoptable
1.010	S21	1500	Manhole	Adoptable	S22	1500	Manhole	Adoptable
1.011	S22	1500	Manhole	Adoptable	S22A	1500	Manhole	Adoptable
8.001	S24	1200	Manhole	Adoptable	S25	1200	Manhole	Adoptable
8.002	S25	1200	Manhole	Adoptable	S26	1500	Manhole	Adoptable
1.013	S26	1500	Manhole	Adoptable	S27	1500	Manhole	Adoptable
1.014	S27	1500	Manhole	Adoptable	HW1		Junction	
10.000	S28	2100	Manhole	Adoptable	S29	1800	Manhole	Adoptable
10.001	S29	1800	Manhole	Adoptable	S30	1800	Manhole	Adoptable
10.002	S30	1800	Manhole	Adoptable	S31	1800	Manhole	Adoptable
10.003	S31	1800	Manhole	Adoptable	S32	1500	Manhole	Adoptable
10.004	S32	1500	Manhole	Adoptable	S38	1500	Manhole	Adoptable
9.000	S33	1350	Manhole	Adoptable	S34	1500	Manhole	Adoptable
9.001	S34	1500	Manhole	Adoptable	S35	1500	Manhole	Adoptable
9.002	S35	1500	Manhole	Adoptable	S36	1500	Manhole	Adoptable
9.003	S36	1500	Manhole	Adoptable	S37	1500	Manhole	Adoptable
9.004	S37	1500	Manhole	Adoptable	S38	1500	Manhole	Adoptable
9.005	S38	1500	Manhole	Adoptable	S39	1500	Manhole	Adoptable
9.006	S39	1500	Manhole	Adoptable	S40	1500	Manhole	Adoptable
9.007	S40	1500	Manhole	Adoptable	S50	1500	Manhole	Adoptable
11.000	S41	1200	Manhole	Adoptable	S42	1200	Manhole	Adoptable
11.001	S42	1200	Manhole	Adoptable	S44	1350	Manhole	Adoptable
12.000	S43	1200	Manhole	Adoptable	S44	1350	Manhole	Adoptable

Pipeline Schedule

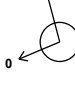
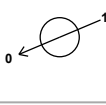
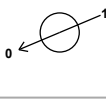
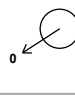
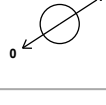
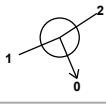
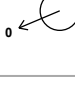
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
11.002	51.298	233.2	450	Circular	38.100	35.820	1.830	37.520	35.600	1.470
11.003	32.729	31.9	450	Circular	37.520	35.600	1.470	37.200	34.575	2.175
11.004	12.949	518.0	600	Circular	37.200	34.425	2.175	37.200	34.400	2.200
11.005	11.400	570.0	600	Circular	37.200	34.400	2.200	37.300	34.380	2.320
9.008	59.747	597.5	600	Circular	37.600	34.320	2.680	36.300	34.220	1.480
9.009	27.411	548.2	600	Circular	36.300	34.220	1.480	36.300	34.170	1.530
9.010	11.810	590.5	600	Circular	36.300	34.170	1.530	36.000	34.150	1.250
9.011	47.932	319.5	600	Circular	36.000	34.150	1.250	36.000	34.000	1.400
1.016	11.269	225.4	600	Circular	36.000	34.000	1.400	36.000	33.950	1.450
1.017	22.801	152.0	225	Circular	36.000	33.950	1.825	35.450	33.800	1.425
1.018	4.378	87.6	225	Circular	35.450	33.800	1.425	35.400	33.750	1.425
1.015	40.144	50.2	600	Circular	36.000	34.800	0.600	36.000	34.000	1.400
1.012	33.260	67.9	600	Circular	37.400	35.440	1.360	36.800	34.950	1.250
5.001	6.447	5.4	300	Circular	39.140	37.300	1.540	39.220	36.100	2.820
1.005	30.899	561.8	600	Circular	38.140	35.785	1.755	38.240	35.730	1.910
1.006	17.476	582.5	600	Circular	38.240	35.730	1.910	38.360	35.700	2.060
11.006	33.418	557.0	600	Circular	37.300	34.380	2.320	37.600	34.320	2.680

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
11.002	S44	1350	Manhole	Adoptable	S45	1350	Manhole	Adoptable
11.003	S45	1350	Manhole	Adoptable	S46	1500	Manhole	Adoptable
11.004	S46	1500	Manhole	Adoptable	S47	1500	Manhole	Adoptable
11.005	S47	1500	Manhole	Adoptable	S48	1500	Manhole	Adoptable
9.008	S50	1500	Manhole	Adoptable	S51	1500	Manhole	Adoptable
9.009	S51	1500	Manhole	Adoptable	S52	1500	Manhole	Adoptable
9.010	S52	1500	Manhole	Adoptable	HW2		Junction	
9.011	HW2		Junction		Basin		Junction	
1.016	Basin		Junction		S53	1500	Manhole	Adoptable
1.017	S53	1500	Manhole	Adoptable	S54	1200	Manhole	Adoptable
1.018	S54	1200	Manhole	Adoptable	Outfall	1200	Manhole	Adoptable
1.015	HW1		Junction		Basin		Junction	
1.012	S22A	1500	Manhole	Adoptable	S26	1500	Manhole	Adoptable
5.001	S12A	1200	Manhole	Adoptable	S13	1500	Manhole	Adoptable
1.005	S7	1500	Manhole	Adoptable	S7A	1500	Manhole	Adoptable
1.006	S7A	1500	Manhole	Adoptable	S14	1500	Manhole	Adoptable
11.006	S48	1500	Manhole	Adoptable	S50	1500	Manhole	Adoptable

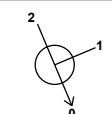
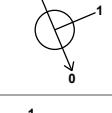
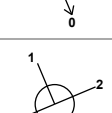
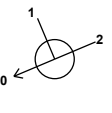
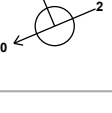
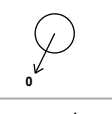
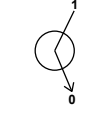
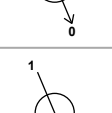
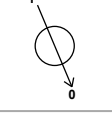
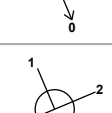
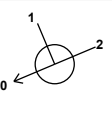
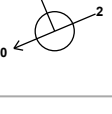
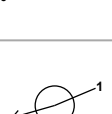
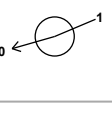
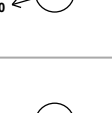
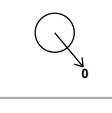
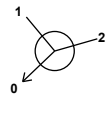
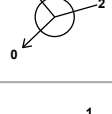
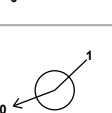
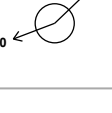
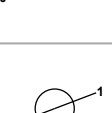
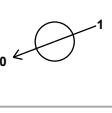
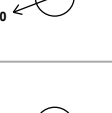
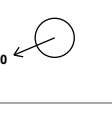
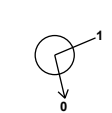
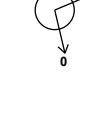
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S1	478385.873	176880.873	37.900	1.800	1500		0	1.000	36.100	600

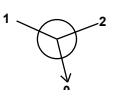
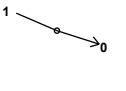
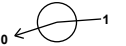
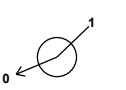
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S2	478381.030	176823.865	38.450	1.500	1200		0	2.000	36.950	300
S3	478405.554	176834.281	38.260	2.260	1500		1	2.000	36.300	300
							2	1.000	36.000	600
							0	1.001	36.000	600
S4	478415.166	176811.416	38.500	2.550	1500		1	1.001	35.950	600
							0	1.002	35.950	600
S5	478407.389	176792.004	38.620	2.710	1500		1	1.002	35.910	600
							0	1.003	35.910	600
S6	478411.499	176776.486	38.700	2.820	1500		1	1.003	35.880	600
							0	1.004	35.880	600
S7	478362.758	176755.930	38.140	2.355	1500		1	1.004	35.785	600
							0	1.005	35.785	600
S7A	478334.288	176743.922	38.240	2.510	1500		1	1.005	35.730	600
							0	1.006	35.730	600
S8	478359.852	176875.236	38.050	1.980	1500		0	3.000	36.070	600
S9	478307.338	176841.152	38.660	2.700	1500		1	3.000	35.960	600
							0	3.001	35.960	600
S10	478271.658	176820.212	39.100	1.500	1200		0	4.000	37.600	300
S11	478281.411	176824.325	39.000	3.100	1500		1	4.000	36.200	300
							2	3.001	35.900	600
							0	3.002	35.900	600
S12	478337.495	176798.666	38.950	1.500	1200		0	5.000	37.450	300
							1	5.000	37.300	300
S12A	478305.008	176784.965	39.140	1.840	1200		0	5.001	37.300	300

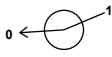
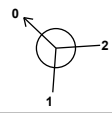
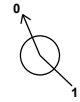
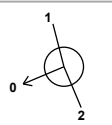
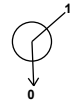
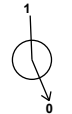
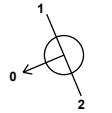
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S13	478299.068	176782.460	39.220	3.420	1500		1 5.001 36.100 300		
							2 3.002 35.800 600		
							0 3.003 35.800 600		
S14	478318.185	176737.131	38.360	2.660	1500		1 3.003 35.700 600		
							2 1.006 35.700 600		
							0 1.007 35.700 600		
S15	478246.501	176803.844	38.980	1.500	1200		0 6.000 37.480 300		
S16	478235.902	176782.097	38.660	1.500	1200		1 6.000 37.160 300		
							0 6.001 37.160 300		
S17	478263.097	176717.615	37.840	1.500	1200		1 6.001 36.340 300		
							0 6.002 36.340 300		
S18	478264.428	176714.459	37.850	2.250	1500		1 6.002 35.900 300		
							2 1.007 35.600 600		
							0 1.008 35.600 600		
S19	478236.336	176702.612	37.940	2.400	1500		1 1.008 35.540 600		
							0 1.009 35.540 600		
S20	478217.802	176709.437	38.050	1.500	1200		0 7.000 36.550 300		
S21	478225.966	176699.647	38.100	2.580	1500		1 7.000 35.820 300		
							2 1.009 35.520 600		
							0 1.010 35.520 600		
S22	478216.776	176690.869	37.900	2.410	1500		1 1.010 35.490 600		
							0 1.011 35.490 600		
S22A	478193.751	176682.121	37.400	1.960	1500		1 1.011 35.440 600		
							0 1.012 35.440 600		
S23	478167.550	176737.865	38.460	1.500	1200		0 8.000 36.960 300		
S24	478138.460	176725.605	37.960	1.500	1200		1 8.000 36.460 300		
							0 8.001 36.460 300		

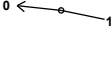
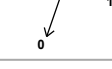
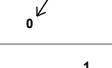
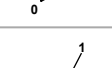
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S25	478150.265	176675.908	36.820	1.500	1200		1 8.001	35.320	300
S26	478162.659	176670.308	36.800	1.850	1500		0 8.002	35.320	300
							1 8.002	35.250	300
							2 1.012	34.950	600
S27	478168.324	176647.477	36.500	1.650	1500		0 1.013	34.950	600
							1 1.013	34.850	600
							0 1.014	34.850	600
HW1	478187.476	176639.243	36.000	1.200			1 1.014	34.800	600
S28	478482.199	176515.555	36.220	1.550	2100		0 1.015	34.800	600
							0 10.000	34.670	600
							1 10.000	34.620	600
S29	478453.065	176513.424	36.360	1.740	1800		0 10.001	34.620	600
							1 10.001	34.570	600
							0 10.002	34.570	600
S30	478424.043	176504.113	36.230	1.660	1800		1 10.002	34.550	600
							0 10.003	34.550	600
							1 10.003	34.480	600
S31	478413.539	176510.987	36.400	1.850	1800		0 10.004	34.480	600
							0 9.000	35.400	450
							1 9.000	34.770	450
S32	478398.231	176547.283	37.300	2.820	1500		0 9.001	34.620	600
							1 9.001	34.600	600
							0 9.002	34.600	600
S33	478456.121	176640.918	37.340	1.940	1350		1 9.002	34.580	600
S34	478467.912	176595.077	36.880	2.260	1500		0 9.003	34.580	600
							0 9.003	34.580	600
							1 9.003	34.580	600
S35	478466.246	176584.245	36.840	2.240	1500		1 9.003	34.580	600
S36	478460.038	176578.288	36.860	2.280	1500		0 9.003	34.580	600
							0 9.003	34.580	600
							1 9.003	34.580	600

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S37	478411.106	176557.651	37.380	2.895	1500	 1	9.003	34.485	600
						0	9.004	34.485	600
S38	478398.924	176556.867	37.500	3.040	1500	 1	10.004	34.460	600
						2	9.004	34.460	600
						0	9.005	34.460	600
S39	478390.017	176565.331	37.680	3.240	1500	 1	9.005	34.440	600
						0	9.006	34.440	600
S40	478369.775	176613.328	37.760	3.410	1500	 1	9.006	34.350	600
						0	9.007	34.350	600
S41	478446.995	176676.398	37.700	1.550	1200	 1			
						0	11.000	36.150	300
S42	478439.087	176707.142	38.020	2.020	1200	 1	11.000	36.000	300
						0	11.001	36.000	300
S43	478428.104	176746.837	38.450	1.500	1200	 1			
						0	12.000	36.950	300
S44	478437.107	176711.836	38.100	2.280	1350	 1	12.000	35.970	300
						2	11.001	35.970	300
						0	11.002	35.820	450
S45	478389.840	176691.902	37.520	1.920	1350	 1	11.002	35.600	450
						0	11.003	35.600	450
S46	478359.683	176679.183	37.200	2.775	1500	 1	11.003	34.575	450
						0	11.004	34.425	600
S47	478349.943	176670.650	37.200	2.800	1500	 1	11.004	34.400	600
						0	11.005	34.400	600
S48	478350.404	176659.259	37.300	2.920	1500	 1	11.005	34.380	600
						0	11.006	34.380	600
S50	478363.390	176628.467	37.600	3.280	1500	 1	11.006	34.320	600
						2	9.007	34.320	600
						0	9.008	34.320	600

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S51	478308.339	176605.249	36.300	2.080	1500		1 9.008	34.220	600
						0	9.009	34.220	600
S52	478284.942	176619.529	36.300	2.130	1500		1 9.009	34.170	600
						0	9.010	34.170	600
HW2	478273.374	176621.910	36.000	1.850			1 9.010	34.150	600
						0	9.011	34.150	600
Basin	478225.715	176627.022	36.000	2.000			1 9.011	34.000	600
						2 1.015	34.000	600	
						0	1.016	34.000	600
S53	478222.035	176616.371	36.000	2.050	1500		1 1.016	33.950	600
						0	1.017	33.950	225
S54	478209.599	176597.260	35.450	1.650	1200		1 1.017	33.800	225
						0	1.018	33.800	225
Outfall	478207.589	176593.371	35.400	1.650	1200		1 1.018	33.750	225

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0
Summer CV	1.000	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	1.000	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	10	0
30	0	10	0
100	40	10	0

Node S53 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Downstream Link	1.017	Sump Available	✓
Replaces Downstream Link	x	Product Number	CTL-SHE-0114-7000-1650-7000
Invert Level (m)	33.950	Min Outlet Diameter (m)	0.150
Design Depth (m)	1.650	Min Node Diameter (mm)	1200
Design Flow (l/s)	7.0		

Node Basin Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	34.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	1486.0	0.0	2.000	3644.0	0.0

Node S7A Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	36.600
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	8

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	160.0	0.0	0.800	160.0	0.0	0.900	0.0	0.0

Node S46 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	34.600
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	8

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	260.0	0.0	1.600	260.0	0.0	1.650	0.0	0.0

Node S28 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	34.750
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	23

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	70.0	0.0	0.400	70.0	0.0	0.500	0.0	0.0

Results for 2 year +10% A Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	11	36.184	0.084	13.9	0.2270	0.0000	OK
15 minute summer	S2	10	37.003	0.053	11.5	0.1093	0.0000	OK
15 minute summer	S3	11	36.157	0.157	39.1	0.4021	0.0000	OK
15 minute summer	S4	12	36.136	0.186	49.9	0.4486	0.0000	OK
15 minute summer	S5	12	36.113	0.203	59.8	0.4718	0.0000	OK
15 minute summer	S6	12	36.086	0.206	69.7	0.4746	0.0000	OK
15 minute summer	S7	13	36.049	0.264	87.7	0.7858	0.0000	OK
15 minute summer	S7A	13	36.034	0.304	79.8	0.5376	0.0000	OK
15 minute summer	S8	11	36.166	0.096	17.3	0.2714	0.0000	OK
15 minute summer	S9	11	36.083	0.123	27.8	0.2834	0.0000	OK
15 minute summer	S10	10	37.622	0.022	4.1	0.0319	0.0000	OK
15 minute summer	S11	13	36.032	0.132	36.8	0.2686	0.0000	OK
15 minute summer	S12	10	37.533	0.083	10.5	0.1653	0.0000	OK
15 minute summer	S12A	11	37.332	0.032	10.3	0.0359	0.0000	OK
15 minute summer	S13	13	36.029	0.229	58.2	0.5185	0.0000	OK
15 minute summer	S14	13	36.024	0.324	137.2	0.9661	0.0000	OK
15 minute summer	S15	10	37.531	0.051	8.3	0.0924	0.0000	OK
15 minute summer	S16	10	37.266	0.106	29.7	0.3046	0.0000	OK
15 minute summer	S17	11	36.416	0.076	38.7	0.1479	0.0000	OK
15 minute summer	S18	13	35.965	0.365	168.7	0.9437	0.0000	OK
15 minute summer	S19	13	35.909	0.369	176.6	1.0099	0.0000	OK
15 minute summer	S20	10	36.578	0.028	4.7	0.0425	0.0000	OK
15 minute summer	S21	13	35.858	0.338	180.9	0.6350	0.0000	OK
15 minute summer	S22	13	35.787	0.297	184.0	0.6056	0.0000	OK
15 minute summer	S22A	13	35.643	0.203	188.8	0.4770	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 summer	S1	1.000	S3	13.4	0.343	0.044	2.0819	
15 minute summer	S2	2.000	S3	11.3	1.385	0.065	0.2180	
15 minute summer	S3	1.001	S4	37.0	0.566	0.121	1.6424	
15 minute summer	S4	1.002	S5	48.1	0.614	0.161	1.6552	
15 minute summer	S5	1.003	S6	58.3	0.700	0.197	1.3613	
15 minute summer	S6	1.004	S7	68.1	0.703	0.235	5.3458	
15 minute summer	S7	1.005	S7A	79.8	0.693	0.277	4.0635	
15 minute summer	S7A	1.006	S14	75.0	0.524	0.265	2.6085	
15 minute summer	S8	3.000	S9	16.6	0.482	0.058	2.2080	
15 minute summer	S9	3.001	S11	26.5	0.611	0.088	1.3440	
15 minute summer	S10	4.000	S11	4.1	1.840	0.010	0.0235	
15 minute summer	S11	3.002	S13	35.5	0.606	0.111	3.2916	
15 minute summer	S12	5.000	S12A	10.3	1.093	0.142	0.3507	
15 minute summer	S12A	5.001	S13	10.3	2.697	0.021	0.0246	
15 minute summer	S13	3.003	S14	44.2	0.543	0.143	6.2482	
15 minute summer	S14	1.007	S18	131.3	0.809	0.464	9.7536	
15 minute summer	S15	6.000	S16	8.2	0.559	0.064	0.3648	
15 minute summer	S16	6.001	S17	29.1	1.613	0.242	1.2686	
15 minute summer	S17	6.002	S18	38.8	3.148	0.097	0.0423	
15 minute summer	S18	1.008	S19	167.4	0.928	0.552	5.5007	
15 minute summer	S19	1.009	S21	177.3	1.027	0.602	1.8617	
15 minute summer	S20	7.000	S21	4.7	1.432	0.017	0.0463	
15 minute summer	S21	1.010	S22	181.4	1.199	0.545	1.9222	
15 minute summer	S22	1.011	S22A	184.3	1.664	0.598	2.7423	
15 minute summer	S22A	1.012	S26	189.3	1.594	0.226	4.0058	

Results for 2 year +10% A Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S23	10	37.016	0.056	10.8	0.1119	0.0000	OK
15 minute summer	S24	11	36.528	0.068	19.7	0.1275	0.0000	OK
15 minute summer	S25	11	35.443	0.123	25.2	0.1988	0.0000	OK
15 minute summer	S26	13	35.277	0.327	211.8	0.7181	0.0000	OK
15 minute summer	S27	14	35.160	0.310	213.9	0.5484	0.0000	OK
15 minute summer	HW1	13	35.015	0.215	220.5	0.0000	0.0000	OK
15 minute summer	S28	11	34.750	0.080	11.7	0.3701	0.0000	OK
15 minute summer	S29	13	34.744	0.124	19.6	0.3879	0.0000	OK
15 minute summer	S30	13	34.741	0.171	23.9	0.5040	0.0000	OK
15 minute summer	S31	13	34.739	0.189	19.6	0.4975	0.0000	OK
15 minute summer	S32	13	34.735	0.255	22.4	0.5348	0.0000	OK
15 minute summer	S33	10	35.488	0.088	31.2	0.2983	0.0000	OK
15 minute summer	S34	11	34.812	0.192	38.7	0.4256	0.0000	OK
15 minute summer	S35	11	34.803	0.203	57.9	0.5821	0.0000	OK
15 minute summer	S36	11	34.781	0.201	66.9	0.4596	0.0000	OK
15 minute summer	S37	12	34.746	0.261	83.8	0.6655	0.0000	OK
15 minute summer	S38	13	34.733	0.273	93.2	0.5131	0.0000	OK
15 minute summer	S39	13	34.709	0.269	94.1	0.5190	0.0000	OK
15 minute summer	S40	13	34.669	0.319	109.1	0.8604	0.0000	OK
15 minute summer	S41	10	36.257	0.107	21.6	0.3033	0.0000	OK
15 minute summer	S42	11	36.151	0.151	36.0	0.3064	0.0000	OK
15 minute summer	S43	10	37.008	0.058	14.8	0.1351	0.0000	OK
15 minute summer	S44	11	35.997	0.177	65.4	0.4010	0.0000	OK
15 minute summer	S45	11	35.727	0.127	91.4	0.3985	0.0000	OK
15 minute summer	S46	14	34.664	0.239	100.2	16.5393	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 summer	S23	8.000	S24	10.7	1.018	0.076	0.3319	
15 minute summer	S24	8.001	S25	19.3	1.025	0.116	1.0029	
15 minute summer	S25	8.002	S26	25.0	0.966	0.315	0.3525	
15 minute summer	S26	1.013	S27	213.9	1.415	0.478	3.5571	
15 minute summer	S27	1.014	HW1	220.5	1.873	0.658	2.4606	
15 minute summer	HW1	1.015	Basin	216.0	4.784	0.222	2.0196	
15 minute summer	S28	10.000	S29	11.1	0.409	0.039	0.8798	
15 minute summer	S29	10.001	S30	18.6	0.496	0.067	1.6392	
15 minute summer	S30	10.002	S31	18.3	0.551	0.067	0.8911	
15 minute summer	S31	10.003	S32	20.7	0.297	0.072	3.7490	
15 minute summer	S32	10.004	S38	27.6	0.286	0.088	1.1493	
15 minute summer	S33	9.000	S34	30.4	1.428	0.081	1.0104	
15 minute summer	S34	9.001	S35	38.3	0.483	0.131	0.8841	
15 minute summer	S35	9.002	S36	57.6	0.707	0.175	0.7153	
15 minute summer	S36	9.003	S37	66.1	0.708	0.229	5.2649	
15 minute summer	S37	9.004	S38	76.0	0.735	0.245	1.4753	
15 minute summer	S38	9.005	S39	90.7	0.785	0.329	1.5193	
15 minute summer	S39	9.006	S40	93.5	0.681	0.329	7.1522	
15 minute summer	S40	9.007	S50	107.5	0.695	0.368	2.5416	
15 minute summer	S41	11.000	S42	21.2	0.731	0.279	0.9232	
15 minute summer	S42	11.001	S44	35.4	1.076	0.417	0.1678	
15 minute summer	S43	12.000	S44	14.5	1.551	0.079	0.3383	
15 minute summer	S44	11.002	S45	65.6	1.401	0.311	2.4147	
15 minute summer	S45	11.003	S46	91.9	2.613	0.160	1.1517	
15 minute summer	S46	11.004	S47	50.6	0.671	0.168	1.4310	

Results for 2 year +10% A Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S47	14	34.659	0.259	53.4	0.5343	0.0000	OK
15 minute summer	S48	14	34.653	0.273	52.8	0.4953	0.0000	OK
15 minute summer	S50	13	34.647	0.327	149.0	0.8152	0.0000	OK
15 minute summer	S51	13	34.552	0.332	166.4	1.1863	0.0000	OK
960 minute winter	S52	930	34.518	0.348	26.8	0.6147	0.0000	OK
960 minute winter	HW2	930	34.518	0.368	26.6	0.0000	0.0000	OK
960 minute winter	Basin	930	34.518	0.518	53.8	914.2701	0.0000	OK
960 minute winter	S53	930	34.518	0.568	8.0	1.0034	0.0000	SURCHARGED
960 minute winter	S54	1035	33.859	0.059	7.0	0.0669	0.0000	OK
960 minute winter	Outfall	1035	33.804	0.054	7.0	0.0000	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 summer	S47	11.005	S48	52.7	0.745	0.184	1.3744	
15 minute summer	S48	11.006	S50	55.7	0.614	0.192	4.6866	
15 minute summer	S50	9.008	S51	147.2	0.941	0.527	9.4666	
15 minute summer	S51	9.009	S52	163.8	1.103	0.561	4.0824	
960 minute winter	S52	9.010	HW2	26.6	0.721	0.095	2.0697	
960 minute winter	HW2	9.011	Basin	26.2	0.860	0.068	10.5382	
960 minute winter	Basin	1.016	S53	8.0	0.119	0.017	3.0123	
960 minute winter	S53	1.017	S54	7.0	0.799	0.166	0.1998	
960 minute winter	S54	1.018	Outfall	7.0	0.900	0.126	0.0340	385.1

Results for 30 year +10% A Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	S1	21	36.592	0.492	47.8	1.3326	0.0000	OK
15 minute summer	S2	10	37.044	0.094	34.5	0.1935	0.0000	OK
30 minute summer	S3	21	36.570	0.570	93.9	1.4631	0.0000	OK
15 minute summer	S4	13	36.577	0.627	124.9	1.5138	0.0000	SURCHARGED
15 minute summer	S5	13	36.590	0.680	144.8	1.5759	0.0000	SURCHARGED
15 minute summer	S6	13	36.600	0.720	164.0	1.6595	0.0000	SURCHARGED
15 minute summer	S7	13	36.636	0.851	194.9	2.5283	0.0000	SURCHARGED
15 minute summer	S7A	13	36.589	0.859	155.2	1.5180	0.0000	SURCHARGED
15 minute summer	S8	13	36.583	0.513	96.5	1.4540	0.0000	OK
15 minute summer	S9	13	36.588	0.628	109.2	1.4425	0.0000	SURCHARGED
15 minute summer	S10	10	37.637	0.037	12.4	0.0544	0.0000	OK
15 minute summer	S11	13	36.600	0.700	124.2	1.4201	0.0000	SURCHARGED
15 minute summer	S12	10	37.597	0.147	31.2	0.2913	0.0000	OK
15 minute summer	S12A	9	37.353	0.053	30.7	0.0598	0.0000	OK
15 minute summer	S13	13	36.570	0.770	143.3	1.7419	0.0000	SURCHARGED
15 minute summer	S14	13	36.559	0.859	303.0	2.5629	0.0000	SURCHARGED
15 minute summer	S15	10	37.568	0.088	24.8	0.1596	0.0000	OK
15 minute summer	S16	10	37.362	0.202	88.7	0.5811	0.0000	OK
15 minute summer	S17	11	36.521	0.181	117.2	0.3508	0.0000	OK
15 minute summer	S18	13	36.384	0.784	400.4	2.0298	0.0000	SURCHARGED
30 minute summer	S19	21	36.222	0.682	418.6	1.8689	0.0000	SURCHARGED
15 minute summer	S20	10	36.596	0.046	14.0	0.0701	0.0000	OK
30 minute summer	S21	21	36.130	0.610	433.9	1.1458	0.0000	SURCHARGED
30 minute summer	S22	21	36.003	0.513	446.0	1.0464	0.0000	OK
30 minute summer	S22A	21	35.804	0.364	463.7	0.8546	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)
30 minute summer	S1	1.000	S3	41.2	0.366	0.135	13.2507	
15 minute summer	S2	2.000	S3	34.1	1.882	0.196	1.0375	
30 minute summer	S3	1.001	S4	80.3	0.586	0.261	6.9238	
15 minute summer	S4	1.002	S5	108.2	0.682	0.362	5.8904	
15 minute summer	S5	1.003	S6	126.9	0.793	0.429	4.5218	
15 minute summer	S6	1.004	S7	137.7	0.740	0.475	14.9002	
15 minute summer	S7	1.005	S7A	155.2	0.749	0.538	8.7035	
15 minute summer	S7A	1.006	S14	157.8	0.560	0.557	4.9226	
15 minute summer	S8	3.000	S9	-56.1	0.628	-0.196	16.8493	
15 minute summer	S9	3.001	S11	97.3	0.711	0.323	8.7064	
15 minute summer	S10	4.000	S11	12.4	2.501	0.031	0.3882	
15 minute summer	S11	3.002	S13	118.3	0.640	0.368	12.7983	
15 minute summer	S12	5.000	S12A	30.7	1.522	0.425	0.7433	
15 minute summer	S12A	5.001	S13	30.5	3.526	0.063	0.2500	
15 minute summer	S13	3.003	S14	144.6	0.563	0.469	13.8571	
15 minute summer	S14	1.007	S18	307.3	1.091	1.086	16.4336	
15 minute summer	S15	6.000	S16	24.6	0.729	0.192	0.8199	
15 minute summer	S16	6.001	S17	87.9	2.005	0.730	3.2606	
15 minute summer	S17	6.002	S18	114.1	3.542	0.285	0.1967	
15 minute summer	S18	1.008	S19	392.7	1.394	1.294	8.5878	
30 minute summer	S19	1.009	S21	423.7	1.504	1.439	3.0382	
15 minute summer	S20	7.000	S21	14.0	1.708	0.052	0.4915	
30 minute summer	S21	1.010	S22	438.3	1.599	1.318	3.4196	
30 minute summer	S22	1.011	S22A	450.3	2.042	1.461	5.3576	
30 minute summer	S22A	1.012	S26	459.7	1.838	0.550	7.6540	

Results for 30 year +10% A Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S23	10	37.057	0.097	32.3	0.1960	0.0000	OK
15 minute summer	S24	10	36.581	0.121	58.9	0.2261	0.0000	OK
15 minute summer	S25	11	35.686	0.366	76.0	0.5905	0.0000	SURCHARGED
30 minute summer	S26	20	35.609	0.659	528.6	1.4460	0.0000	SURCHARGED
30 minute summer	S27	22	35.369	0.519	526.7	0.9171	0.0000	OK
15 minute summer	HW1	12	35.143	0.343	547.9	0.0000	0.0000	OK
30 minute summer	S28	22	35.032	0.362	83.6	20.3544	0.0000	OK
30 minute summer	S29	22	35.021	0.401	68.8	1.2592	0.0000	OK
30 minute summer	S30	22	35.011	0.441	56.9	1.3039	0.0000	OK
30 minute summer	S31	22	35.007	0.457	60.0	1.2010	0.0000	OK
30 minute summer	S32	22	34.996	0.516	69.4	1.0804	0.0000	OK
15 minute summer	S33	10	35.550	0.150	93.2	0.5094	0.0000	OK
15 minute summer	S34	11	35.049	0.429	117.2	0.9505	0.0000	OK
15 minute summer	S35	11	35.041	0.441	167.9	1.2661	0.0000	OK
15 minute summer	S36	12	35.025	0.445	191.1	1.0184	0.0000	OK
30 minute summer	S37	22	34.995	0.510	217.9	1.2999	0.0000	OK
30 minute summer	S38	22	34.993	0.533	215.6	0.9991	0.0000	OK
30 minute summer	S39	22	34.982	0.542	184.0	1.0454	0.0000	OK
960 minute winter	S40	960	34.973	0.623	25.7	1.6793	0.0000	SURCHARGED
15 minute summer	S41	11	36.465	0.315	64.7	0.8935	0.0000	SURCHARGED
15 minute summer	S42	11	36.342	0.342	105.1	0.6929	0.0000	SURCHARGED
15 minute summer	S43	10	37.049	0.099	44.2	0.2312	0.0000	OK
15 minute summer	S44	11	36.159	0.339	193.1	0.7697	0.0000	OK
15 minute summer	S45	10	35.835	0.235	272.6	0.7399	0.0000	OK
30 minute summer	S46	22	34.979	0.554	282.1	94.9404	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 summer	S23	8.000	S24	32.0	1.380	0.229	0.7342	
15 minute summer	S24	8.001	S25	58.2	1.298	0.350	2.4735	
15 minute summer	S25	8.002	S26	69.2	1.174	0.870	0.9577	
30 minute summer	S26	1.013	S27	526.7	1.910	1.177	6.3556	
30 minute summer	S27	1.014	HW1	551.7	2.698	1.645	4.2988	
15 minute summer	HW1	1.015	Basin	552.2	5.911	0.567	5.0064	
30 minute summer	S28	10.000	S29	-55.1	-0.492	-0.195	5.5173	
30 minute summer	S29	10.001	S30	51.1	0.422	0.185	6.4355	
30 minute summer	S30	10.002	S31	59.2	0.476	0.217	2.8395	
30 minute summer	S31	10.003	S32	64.7	0.365	0.224	9.6125	
30 minute summer	S32	10.004	S38	73.2	0.342	0.235	2.5084	
15 minute summer	S33	9.000	S34	92.4	1.684	0.248	3.5157	
15 minute summer	S34	9.001	S35	108.2	0.601	0.370	2.3975	
15 minute summer	S35	9.002	S36	163.3	0.875	0.495	1.9169	
15 minute summer	S36	9.003	S37	183.8	0.826	0.636	12.6750	
30 minute summer	S37	9.004	S38	208.4	0.900	0.673	3.1712	
30 minute summer	S38	9.005	S39	172.4	0.785	0.626	3.2693	
30 minute summer	S39	9.006	S40	172.5	0.721	0.607	14.3101	
960 minute winter	S40	9.007	S50	24.9	0.432	0.085	4.6280	
15 minute summer	S41	11.000	S42	63.0	0.895	0.828	2.2355	
15 minute summer	S42	11.001	S44	105.6	1.512	1.241	0.3399	
15 minute summer	S43	12.000	S44	43.9	1.695	0.239	1.2016	
15 minute summer	S44	11.002	S45	195.5	1.875	0.927	5.4242	
15 minute summer	S45	11.003	S46	277.5	3.384	0.484	3.2561	
30 minute summer	S46	11.004	S47	138.7	0.624	0.462	3.5494	

Results for 30 year +10% A Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	S47	960	34.973	0.573	18.9	1.1836	0.0000	OK
960 minute winter	S48	960	34.973	0.593	18.7	1.0743	0.0000	OK
960 minute winter	S50	960	34.973	0.653	46.1	1.6270	0.0000	SURCHARGED
960 minute winter	S51	960	34.973	0.753	50.1	2.6925	0.0000	SURCHARGED
960 minute winter	S52	960	34.973	0.803	48.8	1.4188	0.0000	SURCHARGED
960 minute winter	HW2	960	34.973	0.823	48.2	0.0000	0.0000	SURCHARGED
960 minute winter	Basin	960	34.973	0.973	101.4	1956.6760	0.0000	SURCHARGED
1440 minute summer	S53	1470	34.978	1.028	18.9	1.8158	0.0000	SURCHARGED
1440 minute winter	S54	690	33.859	0.059	7.0	0.0669	0.0000	OK
120 minute winter	Outfall	74	33.804	0.054	7.0	0.0000	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)
960 minute winter	S47	11.005	S48	18.5	0.487	0.065	3.1825	
960 minute winter	S48	11.006	S50	18.2	0.364	0.063	9.4036	
960 minute winter	S50	9.008	S51	44.7	0.637	0.160	16.8294	
960 minute winter	S51	9.009	S52	48.8	0.664	0.167	7.7211	
960 minute winter	S52	9.010	HW2	48.2	0.750	0.171	3.3266	
960 minute winter	HW2	9.011	Basin	47.4	1.020	0.124	13.5014	
960 minute winter	Basin	1.016	S53	7.6	0.122	0.017	3.1742	
1440 minute summer	S53	1.017	S54	7.0	0.799	0.166	0.1996	
1440 minute winter	S54	1.018	Outfall	7.0	0.900	0.126	0.0340	540.5

Results for 100 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	S1	22	37.819	1.719	73.4	4.6545	0.0000	FLOOD RISK
30 minute summer	S2	22	37.787	0.837	56.2	1.7323	0.0000	SURCHARGED
30 minute summer	S3	21	37.821	1.821	269.6	4.6714	0.0000	SURCHARGED
30 minute summer	S4	21	37.802	1.852	230.7	4.4718	0.0000	SURCHARGED
30 minute summer	S5	22	37.774	1.864	283.6	4.3232	0.0000	SURCHARGED
30 minute summer	S6	22	37.770	1.890	341.2	4.3565	0.0000	SURCHARGED
30 minute summer	S7	22	37.751	1.966	465.1	5.8430	0.0000	SURCHARGED
30 minute summer	S7A	22	37.701	1.971	741.1	132.7585	0.0000	SURCHARGED
30 minute summer	S8	22	37.706	1.636	113.7	4.6362	0.0000	SURCHARGED
30 minute summer	S9	21	37.653	1.693	225.5	3.8893	0.0000	SURCHARGED
30 minute summer	S10	22	37.695	0.095	20.2	0.1398	0.0000	OK
30 minute summer	S11	22	37.707	1.807	210.4	3.6681	0.0000	SURCHARGED
30 minute summer	S12	22	37.811	0.361	50.9	0.7162	0.0000	SURCHARGED
30 minute summer	S12A	22	37.723	0.423	50.9	0.4789	0.0000	SURCHARGED
30 minute summer	S13	22	37.722	1.922	347.0	4.3469	0.0000	SURCHARGED
30 minute summer	S14	22	37.689	1.989	507.7	5.9331	0.0000	SURCHARGED
15 minute summer	S15	12	38.510	1.030	44.8	1.8594	0.0000	SURCHARGED
15 minute summer	S16	12	38.480	1.320	152.5	3.7954	0.0000	FLOOD RISK
30 minute summer	S17	21	37.520	1.180	164.7	2.2876	0.0000	SURCHARGED
30 minute summer	S18	22	37.401	1.801	563.3	4.6609	0.0000	SURCHARGED
30 minute summer	S19	21	37.129	1.589	601.3	4.3518	0.0000	SURCHARGED
30 minute summer	S20	21	36.980	0.430	22.8	0.6499	0.0000	SURCHARGED
30 minute summer	S21	21	36.944	1.424	611.4	2.6737	0.0000	SURCHARGED
30 minute summer	S22	21	36.726	1.236	621.1	2.5218	0.0000	SURCHARGED
30 minute summer	S22A	21	36.403	0.963	642.6	2.2642	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)
30 minute summer	S1	1.000	S3	69.3	0.355	0.228	14.2467	
30 minute summer	S2	2.000	S3	51.5	1.927	0.296	1.8763	
30 minute summer	S3	1.001	S4	164.9	0.585	0.537	6.9864	
30 minute summer	S4	1.002	S5	224.0	0.795	0.749	5.8904	
30 minute summer	S5	1.003	S6	280.6	0.996	0.949	4.5218	
30 minute summer	S6	1.004	S7	351.9	1.249	1.215	14.9002	
30 minute summer	S7	1.005	S7A	454.9	1.615	1.577	8.7035	
30 minute summer	S7A	1.006	S14	366.1	1.300	1.293	4.9226	
30 minute summer	S8	3.000	S9	87.2	0.561	0.304	17.6344	
30 minute summer	S9	3.001	S11	-173.7	-0.621	-0.576	8.7064	
30 minute summer	S10	4.000	S11	31.8	2.431	0.078	0.4743	
30 minute summer	S11	3.002	S13	233.5	0.829	0.727	12.7983	
30 minute summer	S12	5.000	S12A	50.9	1.739	0.706	2.4828	
30 minute summer	S12A	5.001	S13	51.1	3.121	0.106	0.4540	
30 minute summer	S13	3.003	S14	378.7	1.345	1.228	13.8571	
30 minute summer	S14	1.007	S18	460.0	1.633	1.626	16.4336	
15 minute summer	S15	6.000	S16	41.8	0.797	0.327	1.7036	
15 minute summer	S16	6.001	S17	129.8	2.020	1.078	4.9281	
30 minute summer	S17	6.002	S18	160.6	3.072	0.401	0.2412	
30 minute summer	S18	1.008	S19	564.9	2.006	1.862	8.5878	
30 minute summer	S19	1.009	S21	600.3	2.131	2.039	3.0382	
30 minute summer	S20	7.000	S21	22.7	1.407	0.085	0.8976	
30 minute summer	S21	1.010	S22	610.8	2.169	1.836	3.5798	
30 minute summer	S22	1.011	S22A	621.1	2.205	2.015	6.9380	
30 minute summer	S22A	1.012	S26	641.7	2.278	0.767	9.3686	

Results for 100 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S23	10	37.096	0.136	58.5	0.2739	0.0000	OK
15 minute summer	S24	11	36.677	0.217	106.9	0.4046	0.0000	OK
15 minute summer	S25	12	36.265	0.945	131.7	1.5265	0.0000	SURCHARGED
15 minute summer	S26	12	36.020	1.070	752.0	2.3479	0.0000	SURCHARGED
1440 minute winter	S27	1410	35.571	0.721	68.1	1.2738	0.0000	SURCHARGED
1440 minute winter	HW1	1410	35.569	0.769	72.4	0.0000	0.0000	SURCHARGED
30 minute summer	S28	20	36.117	1.447	208.1	36.3028	0.0000	FLOOD RISK
30 minute summer	S29	20	36.173	1.553	228.3	4.8758	0.0000	FLOOD RISK
30 minute summer	S30	20	36.118	1.548	211.1	4.5771	0.0000	FLOOD RISK
30 minute summer	S31	20	36.096	1.546	200.9	4.0628	0.0000	SURCHARGED
30 minute summer	S32	20	36.075	1.595	202.0	3.3425	0.0000	SURCHARGED
30 minute summer	S33	20	36.346	0.946	151.9	3.2095	0.0000	SURCHARGED
30 minute summer	S34	20	36.258	1.638	186.9	3.6286	0.0000	SURCHARGED
30 minute summer	S35	20	36.249	1.649	266.7	4.7362	0.0000	SURCHARGED
30 minute summer	S36	20	36.225	1.645	299.2	3.7645	0.0000	SURCHARGED
30 minute summer	S37	20	36.133	1.648	387.2	4.2025	0.0000	SURCHARGED
30 minute summer	S38	20	36.071	1.611	430.4	3.0215	0.0000	SURCHARGED
30 minute summer	S39	20	35.966	1.526	450.5	2.9452	0.0000	SURCHARGED
30 minute summer	S40	21	35.704	1.354	546.7	3.6501	0.0000	SURCHARGED
15 minute summer	S41	11	37.397	1.247	117.0	3.5335	0.0000	SURCHARGED
15 minute summer	S42	11	36.998	0.998	187.7	2.0209	0.0000	SURCHARGED
15 minute summer	S43	10	37.087	0.137	79.9	0.3191	0.0000	OK
15 minute summer	S44	11	36.665	0.845	345.5	1.9185	0.0000	SURCHARGED
15 minute summer	S45	12	35.985	0.385	486.2	1.2117	0.0000	OK
30 minute summer	S46	23	35.673	1.248	683.9	267.9409	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 summer	S23	8.000	S24	58.2	1.563	0.416	1.3283	
15 minute summer	S24	8.001	S25	100.4	1.525	0.603	3.1928	
15 minute summer	S25	8.002	S26	126.9	1.803	1.597	0.9577	
15 minute summer	S26	1.013	S27	751.7	2.669	1.679	6.6259	
1440 minute winter	S27	1.014	HW1	72.4	1.402	0.216	5.8721	
1440 minute winter	HW1	1.015	Basin	78.8	1.687	0.081	11.3077	
30 minute summer	S28	10.000	S29	-151.0	-0.716	-0.534	8.2284	
30 minute summer	S29	10.001	S30	-187.0	-0.708	-0.676	8.5852	
30 minute summer	S30	10.002	S31	-183.9	-0.653	-0.674	3.5359	
30 minute summer	S31	10.003	S32	-194.8	-0.692	-0.676	11.0958	
30 minute summer	S32	10.004	S38	-165.1	-0.586	-0.529	2.7066	
30 minute summer	S33	9.000	S34	146.5	1.633	0.393	7.4996	
30 minute summer	S34	9.001	S35	167.9	0.596	0.575	3.0869	
30 minute summer	S35	9.002	S36	251.8	0.894	0.763	2.4236	
30 minute summer	S36	9.003	S37	296.9	1.054	1.027	14.9588	
30 minute summer	S37	9.004	S38	383.6	1.362	1.239	3.4384	
30 minute summer	S38	9.005	S39	435.1	1.545	1.578	3.4610	
30 minute summer	S39	9.006	S40	454.5	1.614	1.600	14.6728	
30 minute summer	S40	9.007	S50	546.8	1.941	1.872	4.6280	
15 minute summer	S41	11.000	S42	111.4	1.582	1.464	2.2355	
15 minute summer	S42	11.001	S44	187.9	2.668	2.209	0.3588	
15 minute summer	S43	12.000	S44	79.5	1.734	0.433	1.8372	
15 minute summer	S44	11.002	S45	346.8	2.204	1.643	7.7650	
15 minute summer	S45	11.003	S46	478.5	3.632	0.834	4.9542	
30 minute summer	S46	11.004	S47	271.0	0.962	0.902	3.6474	

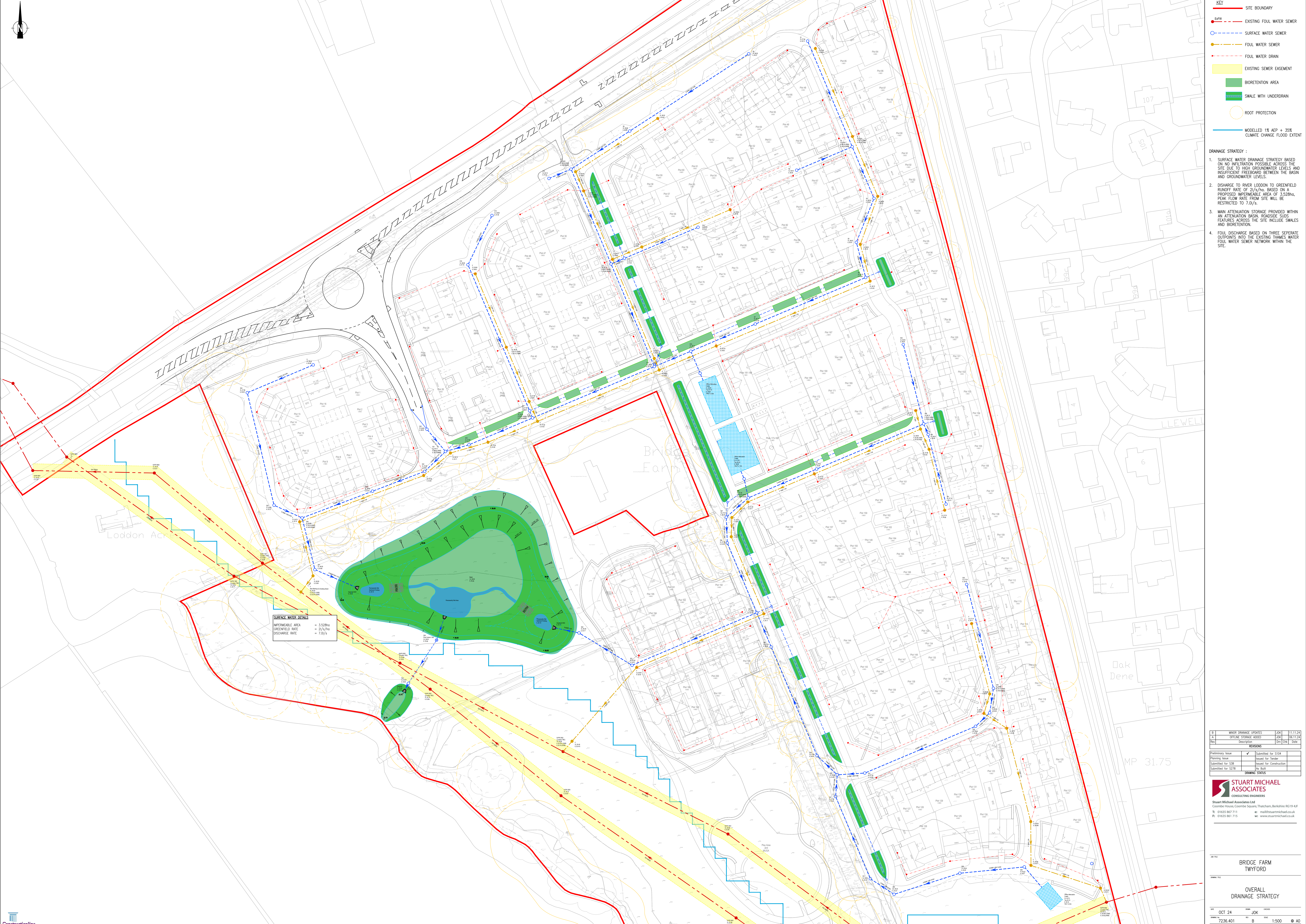
Results for 100 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute summer	S47	23	35.650	1.250	276.2	2.5816	0.0000	SURCHARGED
30 minute summer	S48	23	35.625	1.245	278.5	2.2554	0.0000	SURCHARGED
30 minute summer	S50	22	35.590	1.270	615.9	3.1652	0.0000	SURCHARGED
1440 minute winter	S51	1440	35.565	1.345	46.1	4.8091	0.0000	SURCHARGED
1440 minute winter	S52	1440	35.565	1.395	46.0	2.4647	0.0000	SURCHARGED
1440 minute winter	HW2	1440	35.565	1.415	45.9	0.0000	0.0000	SURCHARGED
1440 minute winter	Basin	1440	35.565	1.565	124.1	3646.5540	0.0000	SURCHARGED
2160 minute winter	S53	2100	35.576	1.626	17.6	2.8740	0.0000	SURCHARGED
720 minute winter	S54	285	33.859	0.059	7.0	0.0669	0.0000	OK
720 minute winter	Outfall	285	33.804	0.054	7.0	0.0000	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)
30 minute summer	S47	11.005	S48	277.7	0.986	0.970	3.2111	
30 minute summer	S48	11.006	S50	279.8	0.993	0.966	9.4131	
30 minute summer	S50	9.008	S51	525.3	1.865	1.879	16.8294	
1440 minute winter	S51	9.009	S52	46.0	0.563	0.158	7.7211	
1440 minute winter	S52	9.010	HW2	45.9	0.618	0.163	3.3266	
1440 minute winter	HW2	9.011	Basin	45.9	0.992	0.120	13.5014	
1440 minute winter	Basin	1.016	S53	17.8	0.118	0.039	3.1742	
2160 minute winter	S53	1.017	S54	7.0	0.799	0.166	0.1997	
720 minute winter	S54	1.018	Outfall	7.0	0.900	0.126	0.0340	338.2

Appendix F

Drainage Strategy Drawing



- KEY**
- SITE BOUNDARY
 - EXISTING FOUL WATER SEWER
 - SURFACE WATER SEWER
 - FOUL WATER SEWER
 - FOUL WATER DRAIN
 - EXISTING SEWER EASEMENT
 - BIORETENTION AREA
 - SWALE WITH UNDERGRAIN
 - ROOT PROTECTION
 - MODELLED 1% AEP + 35% CLIMATE CHANGE FLOOD EXTENT

- DRAINAGE STRATEGY :**
- SURFACE WATER DRAINAGE STRATEGY BASED ON NO INFILTRATION POSSIBLE ACROSS THE SITE DUE TO HIGH GROUNDWATER LEVELS AND INSUFFICIENT FREEBOARD BETWEEN THE BASIN AND GROUNDWATER LEVELS.
 - DISCHARGE TO RIVER LODDON TO GREENFIELD RUNOFF RATE OF 2l/s/ha, BASED ON A PROPOSED IMPERMEABLE AREA OF 3.528ha. PEAK FLOW RATE FROM SITE WILL BE RESTRICTED TO 7.0l/s.
 - MAIN ATTENUATION STORAGE PROVIDED WITHIN AN ATTENUATION BASIN. ROADSIDE SLOPS FEATURES ACROSS THE SITE INCLUDE SWALES AND BIORETENTION.
 - FOUL DISCHARGE BASED ON THREE SEPARATE OUTFALLS INTO THE EXISTING THAMES WATER FOUL WATER SEWER NETWORK WITHIN THE SITE.

SURFACE WATER DETAILS
IMPERMEABLE AREA
= 3.528ha
GREENFIELD RATE
= 2l/s/ha
DISCHARGE RATE
= 7.0l/s

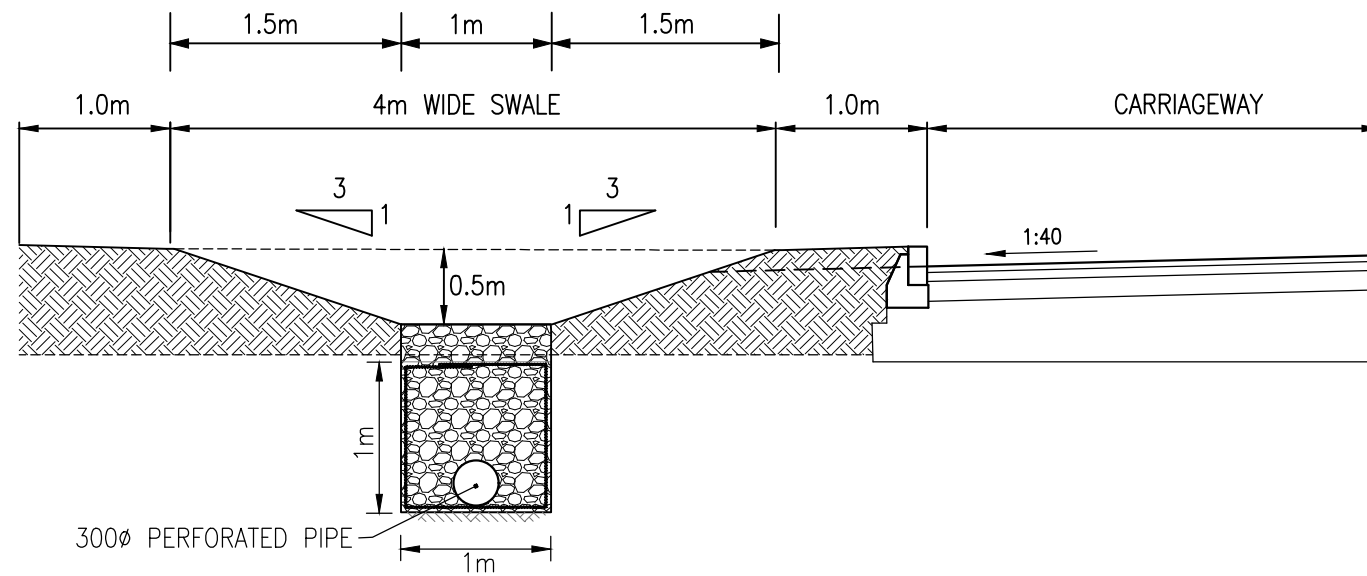
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1.1	OUTLINE STORAGE ADDED	JOK	10.11.24
1.2	DESCRIPTION	DN1 C24	DN6
REVISIONS:			
1.3	PRELIMINARY ISSUE	✓	Submitted for S104
1.4	Planning Issue	✓	Issued for tender
1.5	Submitted for S38	✓	Issued for Construction
1.6	Submitted for S278	✓	Issued for Construction

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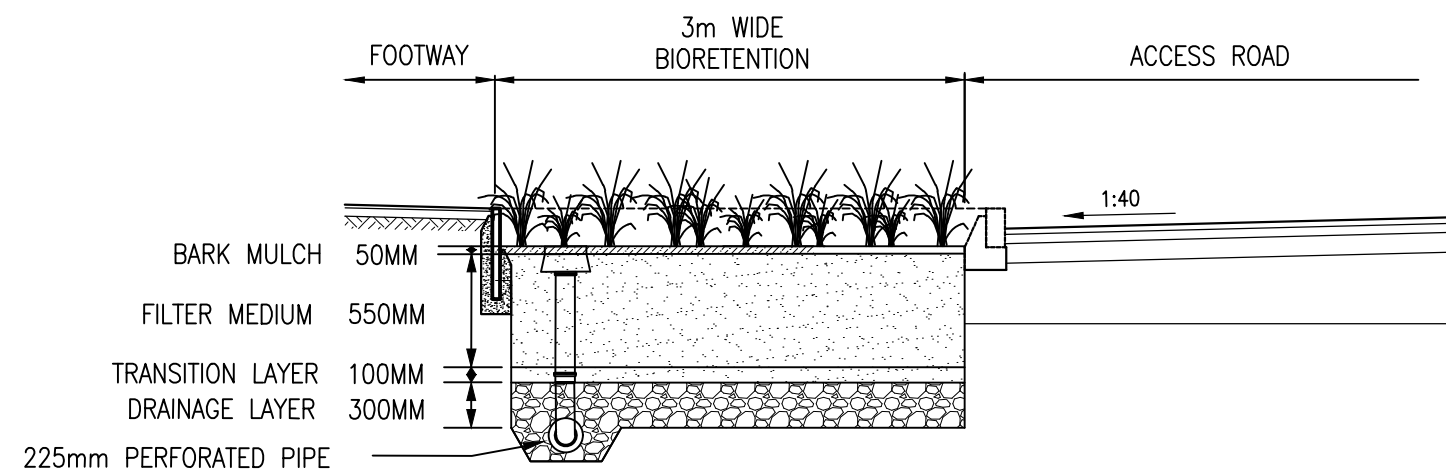
BRIDGE FARM
TWYFORD

OVERALL
DRAINAGE STRATEGY

DATE: OCT 24 DRAWN: JOK CHECKED: JOK
SCALE: 7236.401 B 1:500
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DRY SWALE DETAIL



BIORETENTION DETAIL



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JOB TITLE

BRIDGE FARM
TWYFORD

DRAWING TITLE

SUDS CONSTRUCTION DETAILS

Rev	Description	Drn	Chk	Date
REVISIONS				
Preliminary	✓	Approval	Tender	Const.
DRAWING STATUS				
DATE	OCT 24	DRAWN	JOK	CHECKED
DRAWING No.	7236.406	REV	SCALE	1:50 @ A3
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Appendix G

SuDS Maintenance Plan



KEY

SITE BOUNDARY

MAINTAINED BY PRIVATE MANAGEMENT COMPANY

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JOB TITLE

BRIDGE FARM
TWYFORD

ISSUED FOR

SUDS FEATURES MAINTENANCE

A	UPDATED TO SUIT DRAINAGE STRATEGY	MLP	JOK	11.11.24	DATE	OCT 24	DRAWN	MLP	CHECKED	JOK	ISSUE CHECKED
Rev	Description	Dwn	Chk	Date	DRAWING No.	7236.403	REV	A	SCALE	1:1000	© A1
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Table 18.3 Operation and maintenance requirements for bioretention systems

Maintenance Schedule	Required action	Frequency
Regular Inspections	Inspect infiltration surfaces for sitting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary.	Quarterly
	Check operation of underdrains by inspection of flows after rain.	Annually
	Assess plants for disease, infection, poor growth, invasive species etc and replace as necessary.	Quarterly
	Inspect inlets and outlets for blockage.	Quarterly
Regular maintenance	Remove litter and surface debris and weeds.	Quarterly (or more frequently for tardiness or aesthetic reasons)
	Reolace any plants, to maintain planting density.	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays.	Quarterly to biannually
Occasional maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required.	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and	As required.
Remedial actions	Remove and replace filter medium and vegetation above.	As required (but likely to be > 20 years)

Table 17.1 Operation and maintenance requirements for swales

Maintenance Schedule	Required action	Frequency
Regular maintenance	Remove litter and debris	Monthly (or as required).
	Cut grass - to retain grass height within specified design range.	Monthly (during growing season), or as required.
	Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required).
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly (or when required).
	Inspect vegetation coverage	Monthly (for 6 months, quarterly for 2 years, then half yearly)
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Re-seed areas of poor vegetation growth. Alter plant types to better suit conditions, if required.	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseeding.	As required.
	Re-level uneven surfaces and reinstate design levels.	As required.
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface.	As required.
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip.	As required.
	Remove and dispose of oils or petrol residues using safe standard practices.	As required.

Table 22.1 Operation and maintenance requirements for detention basins

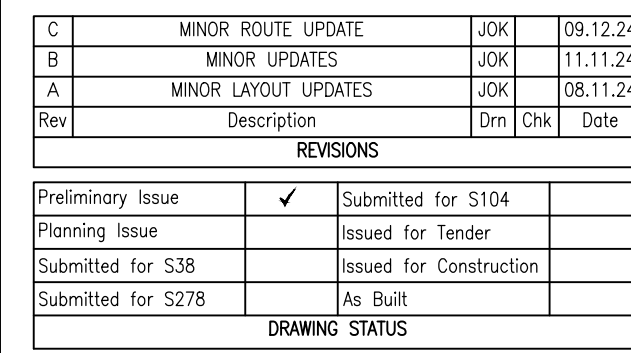
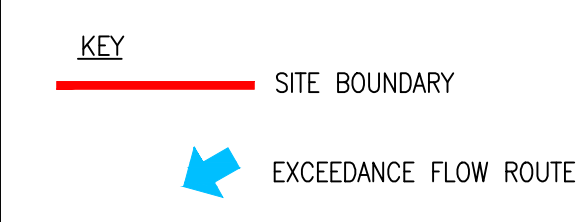
Maintenance Schedule	Required action	Frequency
Regular maintenance	Remove litter and debris.	Monthly.
	Cut grass - for spillways and access routes.	Monthly (during growing season), or as required.
	Cut grass - meadow grass in and around basin.	Half yearly (spring - before nesting season, and autumn).
	Manage other vegetation and remove nuisance plants.	Monthly (at start, then as required).
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage.	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year, then annually as required).
	Check any penstocks and other mechanical devices	Annually.
	Tidy all dead growth before start of growing season.	Annually.
	Remove sediment from inlets, outlet and forebay.	Annually (or as required).
	Manage wetland plants in outlet pool - where provided.	Annually.
Occasional maintenance	Re-seed areas of poor vegetation growth.	As required.
	Prune and trim trees and remove cuttings.	Every 2 years, or as required.
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided).
Remedial actions	Repair erosion or other damage by re-seeding or re-turfing.	As required.
	Realignment of rip-rap.	As required.
	Repair / rehabilitation of inlets, outlets and overflows.	As required.
	Re-level uneven surfaces and reinstate design levels.	As required.

Table 21.3 Operation and maintenance requirements for attenuation storage tanks

Maintenance Schedule	Required action	Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 2 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank	Annually
	Remove sediment from pre-treatment structures and/ or internal forebays.	Annually (or as required)
Remedial actions	Repair/rehabilitate inlets, outlets, overflows and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and	Annually
	Survey inside of tank for sediment build-up and remove if necessary.	Every 5 years or as required

Appendix H

Exceedance Flow Routes Drawing



BRIDGE FARM
TWYFORD

DATE	DRAWN	CHECKED
OCT 24	MLP	JOK
DRAWING No.	REV	SCALE
7236.402	C	1:500

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