



CONTRACT: WICKENDEN MANOR

7238

DATE: FEBRUARY 2024

BY: CC

DRAINAGE STRATEGY

ISSUE HISTORY

Revision	Date	Comments
A	27/03/2024	Drainage design amended
B	28/08/2025	Drainage design amended

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Introduction

This drainage strategy has been developed as part of the planning application to show the site is being developed in a sustainable manor.

This report is to accompany TZG Partnership drawings 7238-D001 to D004 (Proposed Drainage Layout), and 7238-D011 (Drainage Details), and its purpose is to support and explain the methodology behind the drainage strategy for the site.

The following sections describes in detail the methods and assumptions behind the drainage strategy and how the site is proposed to drain in a sustainable manor.

Site Description

The site is an existing Manor development located at Chilling Street, Sharpthorne, West Sussex, RH19 4JB. The centre of the site is located at approximately TQ 38842 31956.

Development Proposals

The proposals are for:

- Three storey extension to provide further accommodation, meetings rooms and kitchen
- Extension and change of use of stables to provide further accommodation
- Erection of conservatory to lodge
- New hard surface basketball and tennis court
- Installation of solar panel arrays within the walled garden

Surface Water Drainage Discharge

For new developments there is a requirement to apply sustainable drainage principles (SuDS) to the disposal of surface water from the site. Generally, the aim should be to discharge surface water as high up the following hierarchy of drainage options as reasonably practicable:

1. Into the ground (infiltration);
2. To a surface water body;
3. To a surface water sewer or highway drain;
4. To a combined sewer.

Infiltration

Infiltration is the preferred method of water disposal as this reflects the natural ground conditions, recharges aquifers, lowers the risk of flooding as a result of urbanisation and lowers the chance of ‘flash flooding’.

Intrusive ground investigation has been undertaken, which revealed shallow groundwater, likely due to the shallow bedrock. Infiltration is therefore not a viable means for disposing of surface water. Borehole logs have been included as **Appendix D**.

The bedrock geology local to the development site is identified as the Ashdown Formation - Sandstone and siltstone.

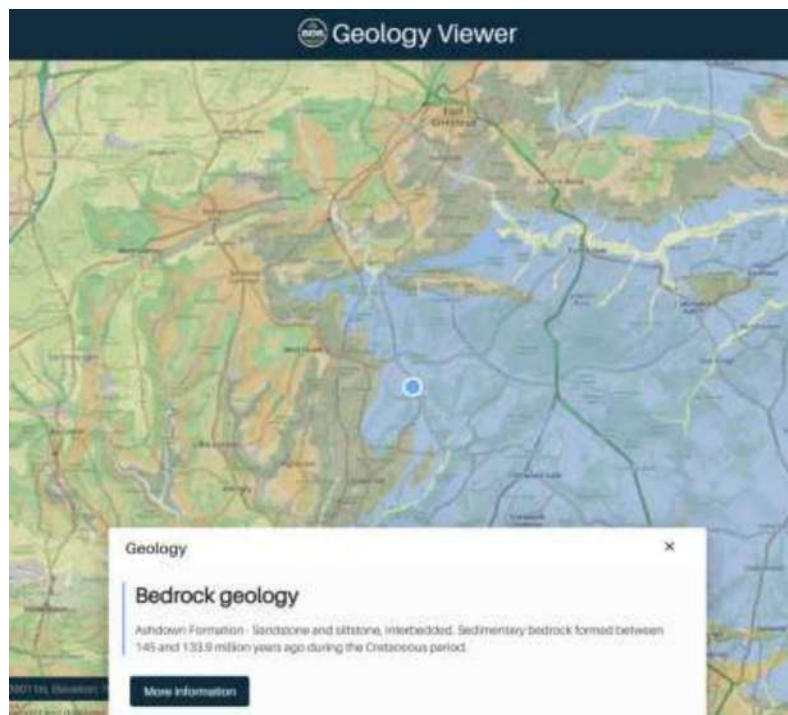


Figure 1 – Geological Map (Source: BGS Maps)

A search of the DEFRA 'Magic Map' shows that the development site is within the vicinity of a 'Source Protection Zone', however infiltration devices are not considered viable. Figure 2 below is an extract from the DEFRA 'Magic Map' showing 'Source Protection Zone' indicatively presented in coloured layers.

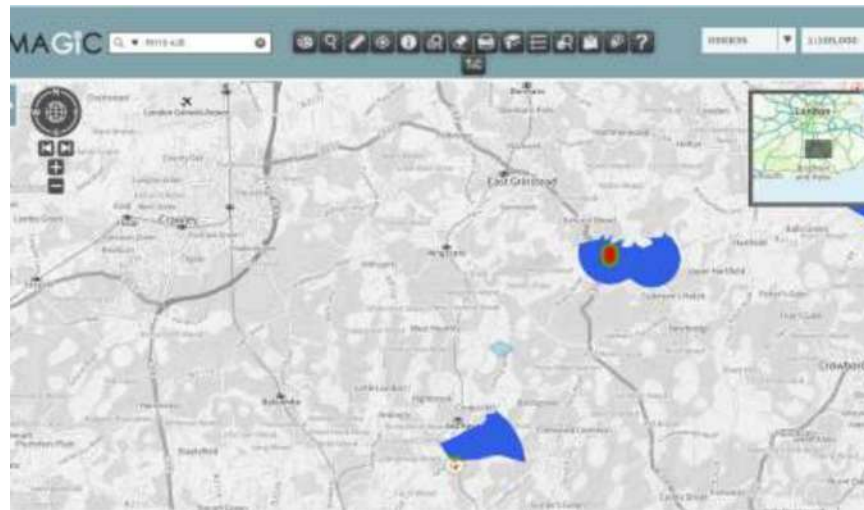


Figure 2 - Source Protection Zones (Source: DEFRA Magic Map)

Alternative Drainage Options

Discharge options for the proposed building have been assessed in accordance with the hierarchical approach set out in CIRIA's The SuDS Manual and The Building Regulations.

Infiltration is not viable, therefore an alternative method for disposing of surface water will need to be identified.

There is watercourse within the curtilage of the site, into which a connection could be made, subject to land drainage consent. Surface water discharge from the proposed development will therefore be via a watercourse.

Drainage Design

Surface Water – Roofs

Roof water will be collected via guttering and directed towards downpipes. The downpipes from the roof water will discharge into a below ground gravity drainage system, which will discharge at a restricted flow into a watercourse. Drawings including a Proposed Drainage Layout and Details have been included in **Appendix A**.

Surface Water – Hard Landscaping

Linear drains will collect runoff from hard landscaping and direct it into a below ground gravity drainage system, which will discharge at a restricted flow into a watercourse. Drawings including a Proposed Drainage Layout and Details have been included in **Appendix A**.

Proposed Site Discharge Rates

Discharge from the proposed development will be restricted as close as is reasonably practicable to greenfield runoff rates, which has been calculated at 2.8 l/s. This would also provide significant betterment to the existing site, as shown below:

Return Periods/Peak Flows and Volumes for Impermeable Surfaces Only	1 in 2 year	1 in 30 year	1 in 100 year
Existing Flow Rate	25.9 l/s	48.1 l/s	78.4 l/s
Proposed Flow Rate	2.2 l/s	2.7 l/s	2.8 l/s
Betterment on Existing Flows	91.5%	94.4%	96.4%

Hydraulic calculations have been included as **Appendix B** which demonstrate that the attenuation has been sized appropriately to ensure no flooding in the critical 1%AEP storm event including a 45% allowance for climate change.

Finished Floor Levels

In line with best practice and in accordance with Building Regulations, the finished ground floor levels will generally be raised 150mm above proposed levels, other than local areas where level access is to be provided.

Maintenance

It is crucial that the elements mentioned in the drainage elements and water quality are maintained to a sufficient standard to ensure that the devices can still function. Generally, the maintenance requirements are either from CIRIA 753, or manufacturer's guidance.

Geo-Cellular Attenuation

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

Figure 3 – Geo-Cellular Attenuation Maintenance Requirements (Source: CIRIA 753)

Foul Water

The existing site is served by a sewage treatment plant, which discharges into the watercourse south of the site. An assessment has been undertaken by Moody Sewage and included as Appendix E. The current system is assessed to have a capacity for 15m³/day of foul flows, with a current environmental permit for the same amount.

The proposed development is calculated to produce a total of 14.25m³/day foul flows, and therefore the existing sewage treatment plant will have sufficient capacity for the proposed foul flows.

The assessment produced by Moody Sewage proposed repairs and maintenance to the existing sewage treatment system, which should be undertaken prior to completion of the proposed development.

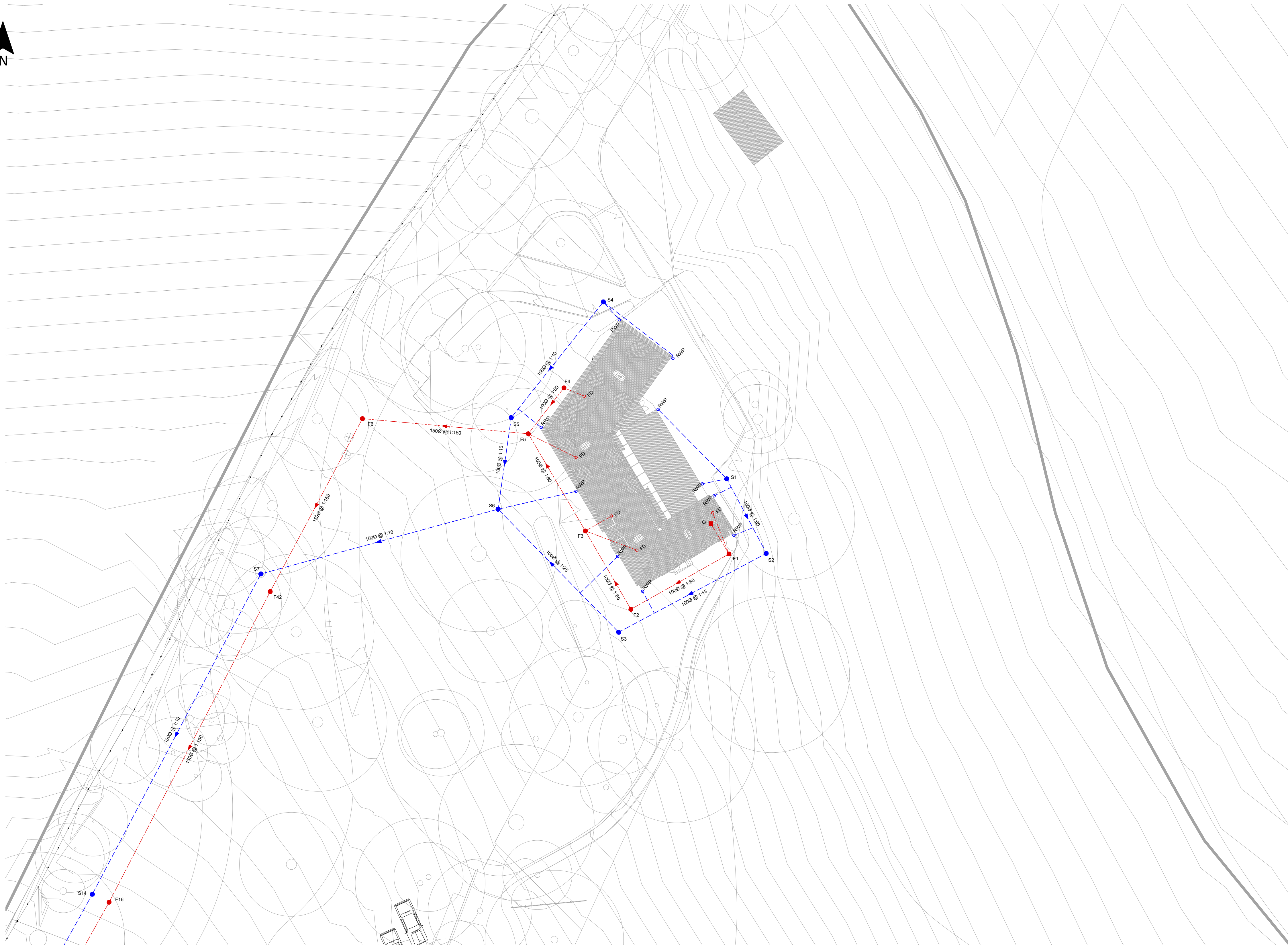
Conclusion

- This drainage strategy document demonstrates that the site can be drained appropriately including the use of a Sustainable Drainage System.
- All storm water, up to and including the 1 in 100 year event + 40% climate change events are stored below ground.
- The proposals do not increase the risk of flooding and are therefore compatible with the requirements of NPPF.
- Infiltration is not viable due to high groundwater.
- A proposed drainage layout can be found on TZG Partnership drawings 7238-D001 to D004.
- Finished floor levels will be set at a minimum of 150mm above existing ground levels. The finished floor levels shown on the drawings are indicative only and are subject to change to suit the specific plot drainage.
- The existing sewage treatment plant has sufficient capacity for the foul flows generated from the proposed development.
- Repairs and maintenance to the existing sewage treatment plant, as recommended by Moody Sewage's assessment report, should be undertaken prior to completion of the proposed development.



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Appendix A - Proposed Drainage Drawings



Proposed Drainage Layout
Scale 1:250

NOTES

1. It is recommended that no work is carried out until Building Regulations approval has been obtained.
2. It is essential that TZG are notified of any discrepancies or subsequent changes prior to them being implemented.
3. Do not scale from this drawing.
4. This drg is to be read in conjunction with the specification and architects drawings.

Drainage Notes

1. All 1000 proposed drainage pipes shown are to be laid at a minimum gradient of 1:80.
2. All 1500 proposed drainage pipes shown are to be laid at a minimum gradient of 1:150.
3. All existing land drains encountered on site during construction are to be re-connected.
4. Temporary protection to be provided to drainage work during construction as necessary.
5. Topographical survey and architectural layout based on third party information.
6. Topographical information taken from a survey to a temporary benchmark/datum, and not Ordnance Datum.
7. Anticipated foul flow rates calculated using discharge unit method to BS EN 12056-2.
8. Drawing to be read in conjunction with Causeway Flow design pack.
9. Pipes to be structured walled to BS EN 13476, Polypropylene to BE EN 1852 or PVC-U to BS EN 1401.
10. Both clay and concrete pipes shall be strength class 120 (100/150mm min crushing strength 28kN/m). Thermoplastic pipes shall have a minimum ring stiffness of SN4.
11. Pipes which run adjacent to buildings shall be installed in strict accordance with Building Regulations Part H, clauses 2.23 to 2.25.
12. Class Z concrete bed and surround to all foul and surface water pipes with less than 900mm cover depth. Type S granular bed and surround to all foul and surface water pipes with greater than 900mm cover depth.
13. All manholes and inspection chambers subject to vehicular trafficking to have D400 load-rated covers and frames to BS EN 124. All manholes and inspection chambers not subject vehicular trafficking to have B125 load-rated covers and frames to BS EN 124.
14. Concrete to be GEN1 unless specified otherwise.
15. The first flexible joint in pipes adjoining a manhole shall be a maximum length of 600mm from the inside face of the manhole, connecting to a rocker pipe. The length of the rocker pipe shall be 600mm.
16. All foul and surface water pipes to be constructed to Building Regulations Part H.
17. Geo-cellular units to be PolyStorm PSM1A or similar approved.
18. Geo-cellular units to be installed in accordance with manufacturer's instructions and specification.
19. Manufacturer to provide structural calculations to relevant industry guidance which confirm the product is suitable for use at the proposed depth and expected loading conditions.

CDM Requirements

Risk - Deep excavation

Control method - Contractor to design trench support to depths shown on drawings and in the manhole schedule, appropriate to the ground conditions.

Risk - Water ingress into excavations, including ground water

Control method - Contractor to specify method of dealing with ingress of water into excavations, in particular if ground water is experienced. Contractor to undertake trench inspections prior to entry into any excavation, and again if left overnight or if conditions change.

Key

- Proposed Surface Water Drainage
- Proposed Linear Drain
- Existing Drainage
- Proposed Foul Drainage
- Proposed Inspection Chamber
- Proposed Manhole
- Rainwater Pipe (with rodding access)
- Foul Drainage Pop-Up (with rodding access)
- Geo-Cellular Attenuation

B	28/08/25	Drainage layout amended
A	02/02/24	Drainage layout amended
REV	DATE	DESCRIPTION
CLIENT		
Netherhall Education Association		
CONTRACT		
Wickenden Manor		
TITLE		
Proposed Drainage Layout 1 of 4		
TZG PARTNERSHIP ENGINEERING CONSULTANTS Orchard House, 114-118 Cherry Orchard Road, Croydon CR0 6BA T: +44(0)20 8661 2127 F: +44(0)20 8667 1328 E: admin@tzgpartnership.com W: www.tzgpartnership.com		
SCALE	1:250@A1	DRAWN CC DATE Jan '24
CONTRACT No.	7238	DRG. No. D001 REVISION B



Proposed Drainage Layout
Scale 1:250

NOTES

1. It is recommended that no work is carried out until Building Regulations approval has been obtained.
2. It is essential that T2G are notified of any discrepancies or subsequent changes prior to them being implemented.
3. Do not scale from this drawing.
4. This drg is to be read in conjunction with the specification and architects drawings.

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1. All 1000 proposed drainage pipes shown are to be laid at a minimum gradient of 1:80.
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8. Drawing to be read in conjunction with Causeway Flow design pack.
9. Pipes to be structured walled to BS EN 13476, Polypropylene to BE EN 1852 or PVC-U to BS EN 1401.
10. Both clay and concrete pipes shall be strength class 120 (100/150mm min crushing strength 28kN/m). Thermoplastic pipes shall have a minimum ring stiffness of SN4.
11. Pipes which run adjacent to buildings shall be installed in strict accordance with Building Regulations Part H, clauses 2.23 to 2.25.
12. Class Z concrete bed and surround to all foul and surface water pipes with less than 900mm cover depth. Type S granular bed and surround to all foul and surface water pipes with greater than 900mm cover depth.
13. All manholes and inspection chambers subject to vehicular trafficking to have D400 load-rated covers and frames to BS EN 124. All manholes and inspection chambers not subject vehicular trafficking to have B125 load-rated covers and frames to BS EN 124.
14. Concrete to be GEN1 unless specified otherwise.
15. The first flexible joint in pipes adjoining a manhole shall be a maximum length of 600mm from the inside face of the manhole, connecting to a rocker pipe. The length of the rocker pipe shall be 600mm.
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Key

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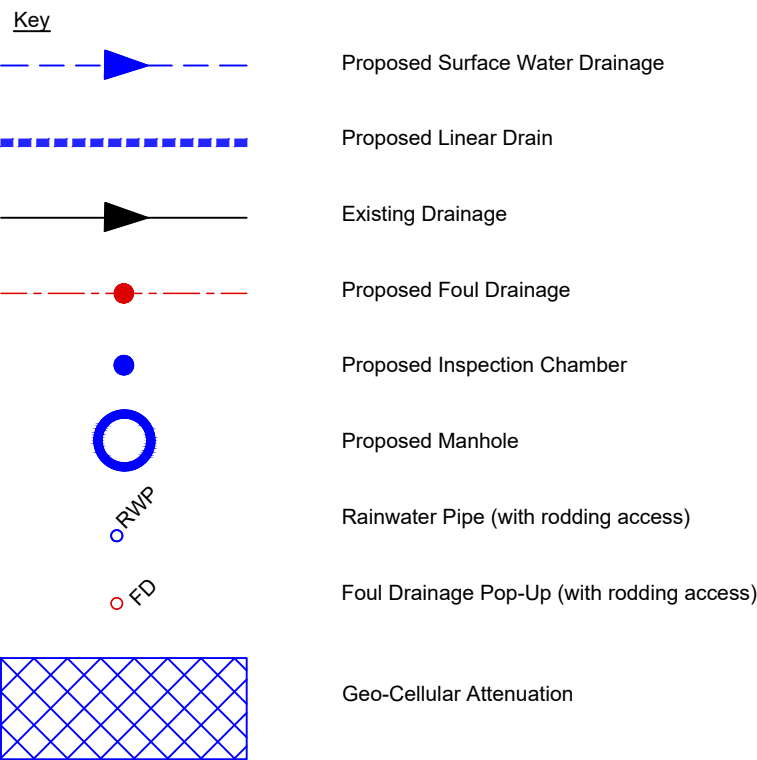
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13. All manholes and inspection chambers subject to vehicular trafficking to have D400 load-rated covers and frames to BS EN 124. All manholes and inspection chambers not subject to vehicular trafficking to have B125 load-rated covers and frames to BS EN 124.
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TITLE	Proposed Drainage Layout 3 of 4
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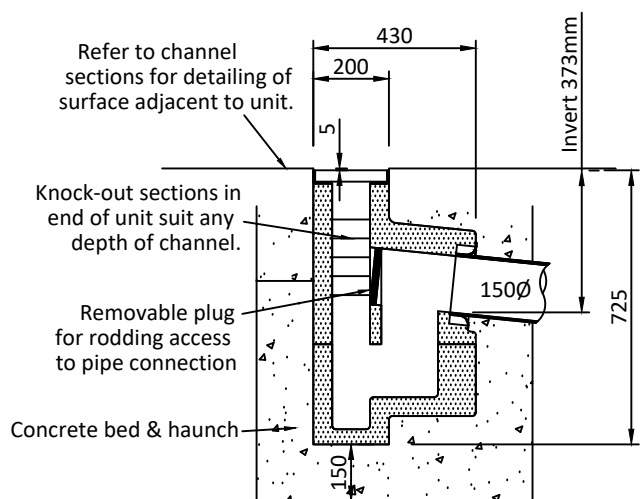
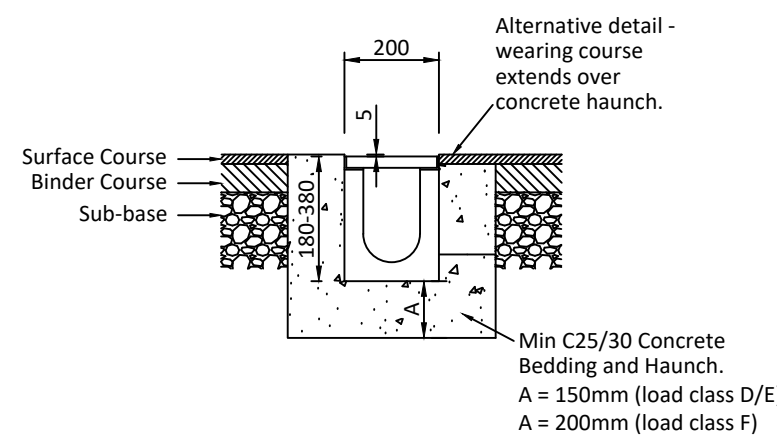
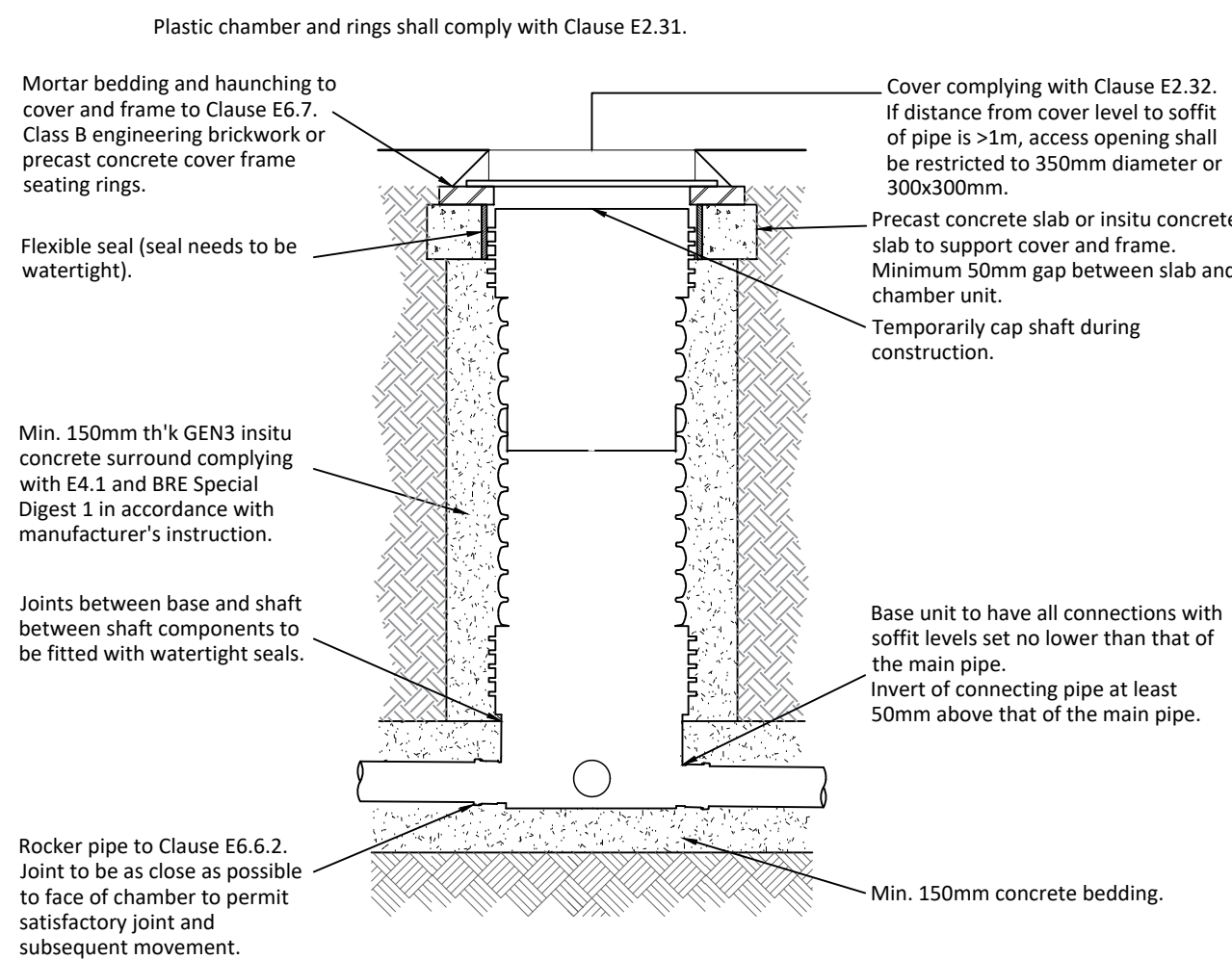
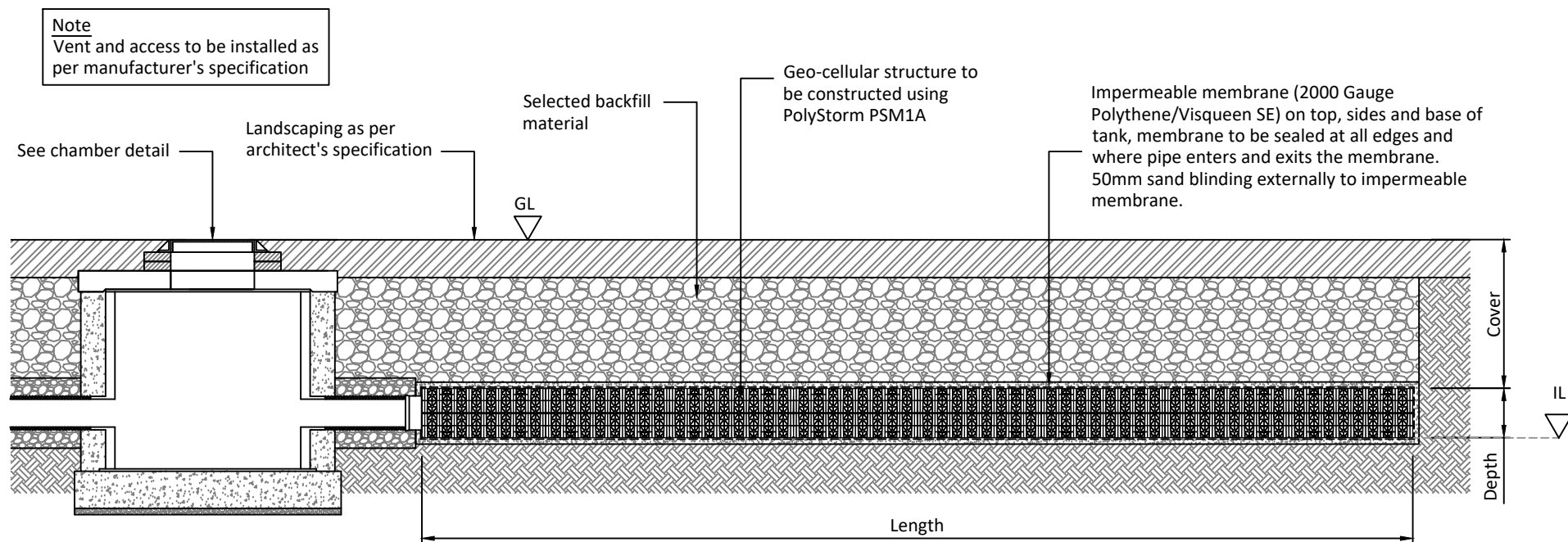
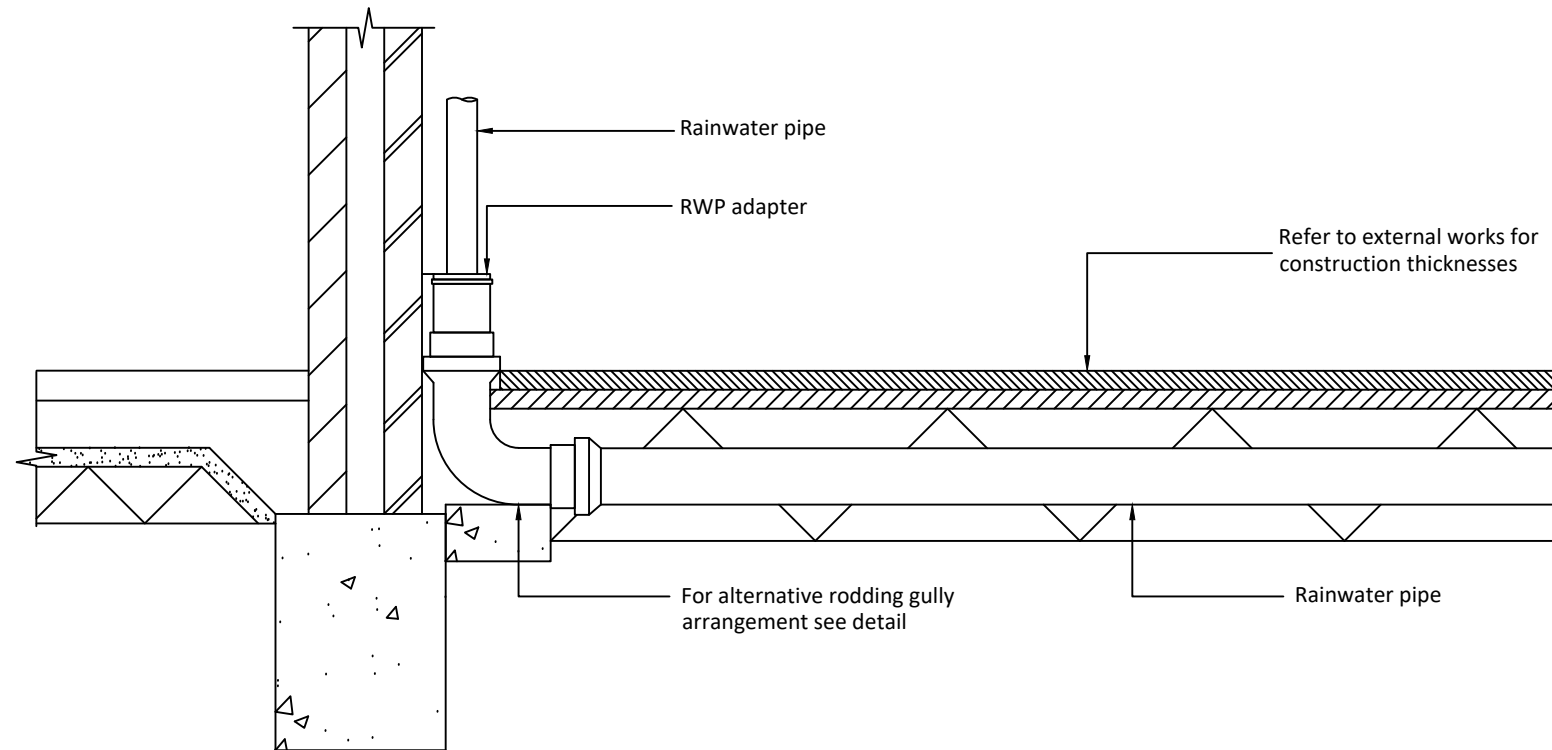
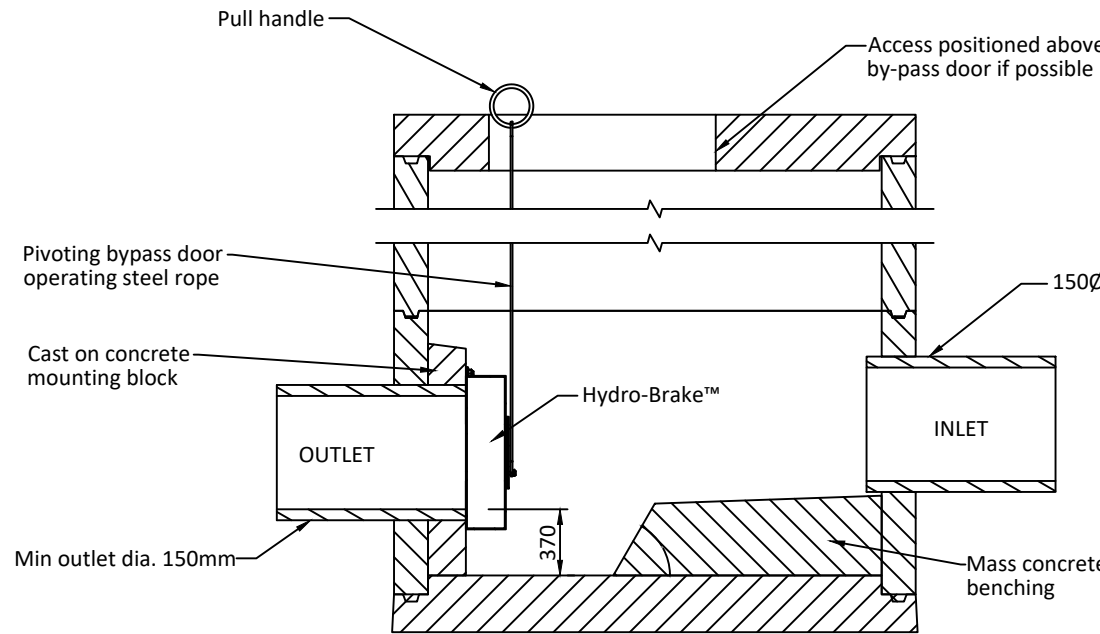
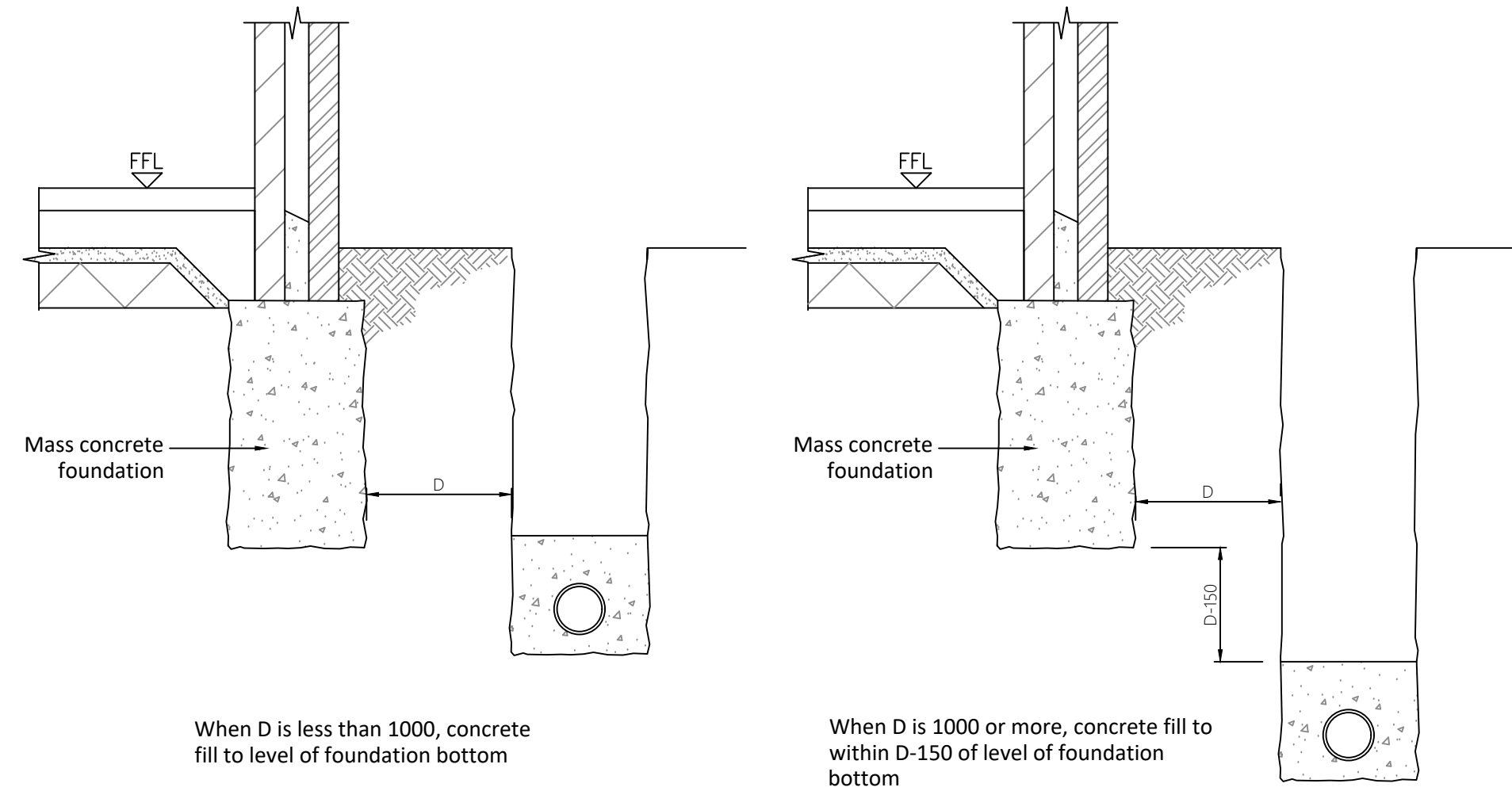
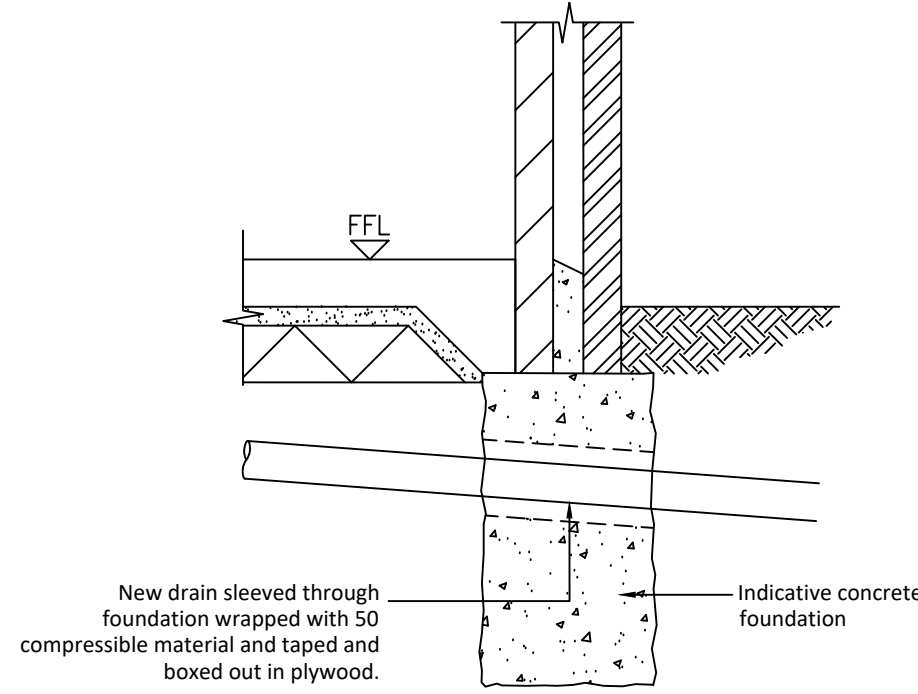
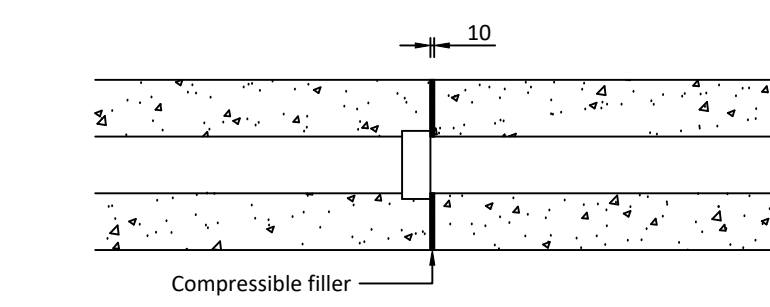
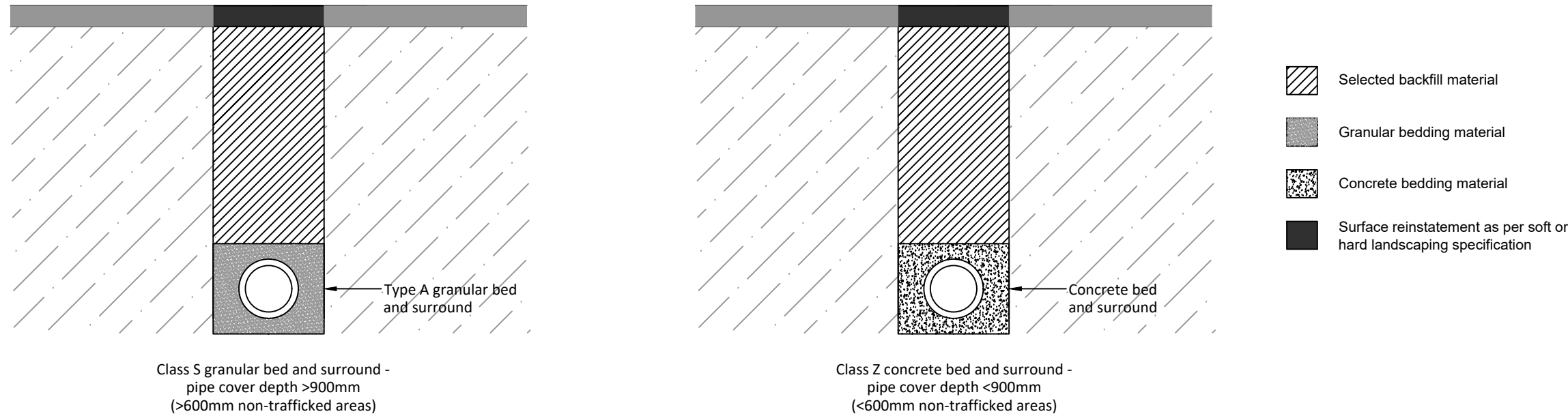
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Proposed Drainage Layout 4 of 4		
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CONTRACT No.	7238	DRG. No. D004
		REVISION A



NOTES

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CDM Requirements

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CLIENT		
Netherhall Education Association		
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Wickenden Manor		
TITLE		
Proposed Drainage Details		
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SCALE	Varies@A1	DRAWN CC
CONTRACT No.	7238	DATE Nov '23
DRG. No.	D011	REVISION

Appendix B - Surface Water Calculations

Calculated by:	Craig Cook
Site name:	Wickenden Manor
Site location:	East Grinstead

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.06921° N
Longitude:	0.02146° W
Reference:	696580944
Date:	Mar 27 2024 13:59

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	0.46
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Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	857	857
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	2.81	2.81
1 in 1 year (l/s):	2.39	2.39
1 in 30 years (l/s):	6.47	6.47
1 in 100 year (l/s):	8.98	8.98
1 in 200 years (l/s):	10.52	10.52

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

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)	2.000
Ratio-R	0.400	Preferred Cover Depth (m)	0.600
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.017	4.00	151.120	450	538714.931	131959.676	0.700
S2			151.100	450	538719.485	131951.068	0.844
S3			149.280	450	538702.462	131941.978	0.700
S4	0.017	4.00	151.190	450	538700.701	131980.102	0.700
S5			149.470	450	538690.067	131966.735	0.700
S6			148.340	450	538688.541	131956.173	0.700
S7			144.200	450	538661.159	131948.704	0.700
S8	0.036	4.00	141.950	450	538692.047	131870.613	0.750
S9			141.910	450	538711.874	131863.701	0.919
S10			141.840	450	538715.605	131854.080	0.952
S11			141.670	1200	538716.216	131833.898	1.429
S12	0.036	4.00	141.400	450	538684.689	131845.618	0.750
S14			139.400	450	538641.720	131911.749	0.750
S16	0.027	4.00	139.000	450	538675.941	131897.693	0.750
S19			138.700	450	538649.251	131886.657	0.853
S21			139.000	450	538656.342	131904.953	0.958
S23			137.500	450	538632.854	131881.683	0.750
S24	0.027	4.00	138.000	450	538650.646	131873.240	0.750
S25			129.000	450	538588.726	131790.186	0.750
S26			132.400	450	538605.884	131834.938	0.750
S27	0.018	4.00	125.330	450	538560.630	131724.668	0.700
S28			123.730	1200	538576.078	131721.960	0.825
S29	0.018	4.00	124.100	450	538565.302	131715.003	0.700
S30			123.610	450	538562.806	131699.221	0.700
S31	0.018	4.00	125.480	450	538554.430	131696.887	0.700
S32			125.480	450	538553.538	131690.844	0.803
S33			123.320	450	538570.674	131688.183	0.750
S34			123.200	450	538572.577	131697.663	0.750
S35			123.190	1200	538573.246	131701.281	0.927
S36	0.026	4.00	127.650	450	538651.432	131758.787	0.750
S37			127.650	450	538634.801	131753.057	0.925
S38	0.026	4.00	127.650	450	538661.557	131729.382	0.750
S39			127.650	450	538644.916	131723.652	1.234
S40			124.980	1200	538612.506	131709.030	1.721
S41			122.880	1200	538577.323	131700.665	1.000
S42			122.620	1200	538577.930	131697.716	0.900
S43			122.540	1200	538585.827	131696.703	0.900
S44			124.000	450	538575.358	131727.802	0.750
S45			143.000	1200	538729.040	131799.776	2.974
S46			140.000	1200	538740.129	131760.384	0.825
S47			138.600	1200	538753.499	131719.378	0.825

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S48			136.500	1200	538747.783	131701.267	0.825
S49			133.000	1200	538709.737	131689.313	0.825
S50			129.000	1200	538669.162	131683.997	0.825
S51			125.000	1200	538630.456	131686.847	0.825
S52			124.250	1200	538617.007	131694.360	0.825
S53			135.750	450	538621.287	131874.988	0.750

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)
5.000	S1	S2	9.738	0.600	150.420	150.256	0.164	59.4	100	4.16	50.0
5.001	S2	S3	19.298	0.600	150.256	148.580	1.676	11.5	100	4.30	50.0
5.002	S3	S6	19.882	0.600	148.580	147.640	0.940	21.2	100	4.50	50.0
6.000	S4	S5	17.081	0.600	150.490	148.770	1.720	9.9	100	4.12	50.0
6.001	S5	S6	10.672	0.600	148.770	147.640	1.130	9.4	100	4.19	50.0
5.003	S6	S7	28.382	0.600	147.640	143.500	4.140	6.9	100	4.66	50.0
5.004	S7	S14	41.756	0.600	143.500	138.700	4.800	8.7	100	4.92	50.0
5.005	S14	S53	42.058	0.600	138.650	135.000	3.650	11.5	150	5.16	50.0
7.000	S16	S21	20.900	0.600	138.250	138.042	0.208	100.5	150	4.35	50.0
7.002	S19	S23	17.135	0.600	137.847	136.750	1.097	15.6	150	4.79	50.0
7.001	S21	S19	19.622	0.600	138.042	137.847	0.195	100.6	150	4.67	50.0
8.000	S24	S23	19.694	0.600	137.250	136.750	0.500	39.4	150	4.20	50.0
7.003	S23	S53	13.365	0.600	136.750	135.000	1.750	7.6	150	4.85	50.0
5.006	S53	S26	42.910	0.600	135.000	131.650	3.350	12.8	150	5.41	50.0
5.007	S26	S25	47.928	0.600	131.650	128.250	3.400	14.1	150	5.71	50.0
5.008	S25	S44	63.800	0.600	128.250	123.250	5.000	12.8	150	6.08	50.0
5.009	S44	S28	5.886	0.600	123.250	122.980	0.270	21.8	150	6.13	50.0
9.000	S27	S28	15.684	0.600	124.630	123.030	1.600	9.8	100	4.11	50.0

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)
5.000	1.001	7.9	3.1	0.600	0.744	0.017	0.0	43	0.939
5.001	2.290	18.0	3.1	0.744	0.600	0.017	0.0	28	1.702
5.002	1.686	13.2	3.1	0.600	0.600	0.017	0.0	32	1.366
6.000	2.467	19.4	3.1	0.600	0.600	0.017	0.0	27	1.804
6.001	2.530	19.9	3.1	0.600	0.600	0.017	0.0	27	1.851
5.003	2.971	23.3	6.1	0.600	0.600	0.034	0.0	35	2.499
5.004	2.636	20.7	6.1	0.600	0.600	0.034	0.0	37	2.293
5.005	2.984	52.7	6.1	0.600	0.600	0.034	0.0	34	1.997
7.000	1.002	17.7	4.9	0.600	0.808	0.027	0.0	54	0.856
7.002	2.561	45.3	4.9	0.703	0.600	0.027	0.0	33	1.679
7.001	1.001	17.7	4.9	0.808	0.703	0.027	0.0	54	0.855
8.000	1.608	28.4	4.9	0.600	0.600	0.027	0.0	42	1.205
7.003	3.669	64.8	9.8	0.600	0.600	0.054	0.0	39	2.643
5.006	2.830	50.0	15.9	0.600	0.600	0.088	0.0	58	2.523
5.007	2.697	47.7	15.9	0.600	0.600	0.088	0.0	59	2.428
5.008	2.835	50.1	15.9	0.600	0.600	0.088	0.0	58	2.516
5.009	2.166	38.3	15.9	0.600	0.600	0.088	0.0	67	2.064
9.000	2.483	19.5	3.3	0.600	0.600	0.018	0.0	28	1.846

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)
5.010	S28	S35	20.872	0.600	122.905	122.338	0.567	36.8	225	6.29	50.0
11.000	S29	S30	15.978	0.600	123.400	122.910	0.490	32.6	100	4.20	50.0
11.001	S30	S34	9.894	0.600	122.910	122.500	0.410	24.1	100	4.30	50.0
10.000	S31	S32	6.108	0.600	124.780	124.677	0.103	59.3	100	4.10	50.0
10.001	S32	S33	17.341	0.600	124.677	122.620	2.057	8.4	100	4.21	50.0
10.002	S33	S34	9.669	0.600	122.570	122.450	0.120	80.6	150	4.35	50.0
10.003	S34	S35	3.679	0.600	122.450	122.413	0.037	99.4	150	4.41	50.0
5.011	S35	S41	4.123	0.600	122.263	121.880	0.383	10.8	300	6.30	50.0
1.000	S8	S9	20.997	0.600	141.200	140.991	0.209	100.5	150	4.35	50.0
1.001	S9	S10	10.319	0.600	140.991	140.888	0.103	100.2	150	4.52	50.0
1.002	S10	S11	20.191	0.600	140.888	140.316	0.572	35.3	150	4.72	50.0
2.000	S12	S11	33.635	0.600	140.650	140.316	0.334	100.7	150	4.56	50.0
1.003	S11	S45	36.452	0.600	140.241	140.026	0.215	169.5	225	5.33	50.0
1.004	S45	S46	40.923	0.600	140.026	139.175	0.851	48.1	225	5.69	50.0
1.005	S46	S47	43.131	0.600	139.175	137.775	1.400	30.8	225	5.99	50.0
1.006	S47	S48	18.992	0.600	137.775	135.675	2.100	9.0	225	6.06	50.0
1.007	S48	S49	39.880	0.600	135.675	132.175	3.500	11.4	225	6.23	50.0
1.008	S49	S50	40.922	0.600	132.175	128.175	4.000	10.2	225	6.40	50.0
1.009	S50	S51	38.811	0.600	128.175	124.175	4.000	9.7	225	6.55	50.0
1.010	S51	S52	15.405	0.600	124.175	123.425	0.750	20.5	225	6.64	50.0
1.011	S52	S40	15.345	0.600	123.425	123.334	0.091	168.6	225	6.90	50.0
3.000	S36	S37	17.590	0.600	126.900	126.725	0.175	100.5	150	4.29	50.0
3.001	S37	S39	31.096	0.600	126.725	126.416	0.309	100.6	150	4.81	50.0
4.000	S38	S39	17.600	0.600	126.900	126.416	0.484	36.4	150	4.18	50.0

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)
5.010	2.163	86.0	19.2	0.600	0.627	0.106	0.0	72	1.746
11.000	1.355	10.6	3.3	0.600	0.600	0.018	0.0	38	1.191
11.001	1.578	12.4	3.3	0.600	0.600	0.018	0.0	35	1.326
10.000	1.002	7.9	3.3	0.600	0.703	0.018	0.0	45	0.955
10.001	2.678	21.0	3.3	0.703	0.600	0.018	0.0	27	1.960
10.002	1.121	19.8	3.3	0.600	0.600	0.018	0.0	41	0.832
10.003	1.007	17.8	6.5	0.600	0.627	0.036	0.0	62	0.928
5.011	4.817	340.5	25.7	0.627	0.700	0.142	0.0	55	2.879
1.000	1.002	17.7	6.5	0.600	0.769	0.036	0.0	63	0.927
1.001	1.004	17.7	6.5	0.769	0.802	0.036	0.0	63	0.928
1.002	1.699	30.0	6.5	0.802	1.204	0.036	0.0	47	1.358
2.000	1.001	17.7	6.5	0.600	1.204	0.036	0.0	63	0.926
1.003	1.001	39.8	13.0	1.204	2.749	0.072	0.0	88	0.898
1.004	1.891	75.2	13.0	2.749	0.600	0.072	0.0	63	1.422
1.005	2.365	94.0	13.0	0.600	0.600	0.072	0.0	56	1.667
1.006	4.377	174.0	13.0	0.600	0.600	0.072	0.0	42	2.610
1.007	3.898	155.0	13.0	0.600	0.600	0.072	0.0	44	2.382
1.008	4.114	163.6	13.0	0.600	0.600	0.072	0.0	43	2.484
1.009	4.225	168.0	13.0	0.600	0.600	0.072	0.0	42	2.520
1.010	2.900	115.3	13.0	0.600	0.600	0.072	0.0	51	1.932
1.011	1.004	39.9	13.0	0.600	1.421	0.072	0.0	88	0.900
3.000	1.002	17.7	4.7	0.600	0.775	0.026	0.0	52	0.846
3.001	1.001	17.7	4.7	0.775	1.084	0.026	0.0	52	0.846
4.000	1.674	29.6	4.7	0.600	1.084	0.026	0.0	40	1.225

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)
3.002	S39	S40	35.556	0.600	126.416	123.409	3.007	11.8	150	5.01	50.0
1.012	S40	S41	36.164	0.600	123.259	121.880	1.379	26.2	300	7.09	50.0
1.013	S41	S42	3.011	0.600	121.880	121.720	0.160	18.8	300	7.10	50.0
1.014	S42	S43	7.962	0.600	121.720	121.640	0.080	99.5	300	7.19	50.0

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)
3.002	2.946	52.1	9.4	1.084	1.421	0.052	0.0	43	2.243
1.012	3.082	217.8	22.4	1.421	0.700	0.124	0.0	65	2.015
1.013	3.641	257.3	48.1	0.700	0.600	0.266	0.0	88	2.815
1.014	1.576	111.4	48.1	0.600	0.600	0.266	0.0	137	1.519

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)
5.000	9.738	59.4	100	Circular	151.120	150.420	0.600	151.100	150.256	0.744
5.001	19.298	11.5	100	Circular	151.100	150.256	0.744	149.280	148.580	0.600
5.002	19.882	21.2	100	Circular	149.280	148.580	0.600	148.340	147.640	0.600
6.000	17.081	9.9	100	Circular	151.190	150.490	0.600	149.470	148.770	0.600
6.001	10.672	9.4	100	Circular	149.470	148.770	0.600	148.340	147.640	0.600
5.003	28.382	6.9	100	Circular	148.340	147.640	0.600	144.200	143.500	0.600
5.004	41.756	8.7	100	Circular	144.200	143.500	0.600	139.400	138.700	0.600
5.005	42.058	11.5	150	Circular	139.400	138.650	0.600	135.750	135.000	0.600
7.000	20.900	100.5	150	Circular	139.000	138.250	0.600	139.000	138.042	0.808
7.002	17.135	15.6	150	Circular	138.700	137.847	0.703	137.500	136.750	0.600
7.001	19.622	100.6	150	Circular	139.000	138.042	0.808	138.700	137.847	0.703
8.000	19.694	39.4	150	Circular	138.000	137.250	0.600	137.500	136.750	0.600
7.003	13.365	7.6	150	Circular	137.500	136.750	0.600	135.750	135.000	0.600
5.006	42.910	12.8	150	Circular	135.750	135.000	0.600	132.400	131.650	0.600
5.007	47.928	14.1	150	Circular	132.400	131.650	0.600	129.000	128.250	0.600
5.008	63.800	12.8	150	Circular	129.000	128.250	0.600	124.000	123.250	0.600

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
5.000	S1	450	Manhole	Adoptable	S2	450	Manhole	Adoptable
5.001	S2	450	Manhole	Adoptable	S3	450	Manhole	Adoptable
5.002	S3	450	Manhole	Adoptable	S6	450	Manhole	Adoptable
6.000	S4	450	Manhole	Adoptable	S5	450	Manhole	Adoptable
6.001	S5	450	Manhole	Adoptable	S6	450	Manhole	Adoptable
5.003	S6	450	Manhole	Adoptable	S7	450	Manhole	Adoptable
5.004	S7	450	Manhole	Adoptable	S14	450	Manhole	Adoptable
5.005	S14	450	Manhole	Adoptable	S53	450	Manhole	Adoptable
7.000	S16	450	Manhole	Adoptable	S21	450	Manhole	Adoptable
7.002	S19	450	Manhole	Adoptable	S23	450	Manhole	Adoptable
7.001	S21	450	Manhole	Adoptable	S19	450	Manhole	Adoptable
8.000	S24	450	Manhole	Adoptable	S23	450	Manhole	Adoptable
7.003	S23	450	Manhole	Adoptable	S53	450	Manhole	Adoptable
5.006	S53	450	Manhole	Adoptable	S26	450	Manhole	Adoptable
5.007	S26	450	Manhole	Adoptable	S25	450	Manhole	Adoptable
5.008	S25	450	Manhole	Adoptable	S44	450	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)
5.009	5.886	21.8	150	Circular	124.000	123.250	0.600	123.730	122.980	0.600
9.000	15.684	9.8	100	Circular	125.330	124.630	0.600	123.730	123.030	0.600
5.010	20.872	36.8	225	Circular	123.730	122.905	0.600	123.190	122.338	0.627
11.000	15.978	32.6	100	Circular	124.100	123.400	0.600	123.610	122.910	0.600
11.001	9.894	24.1	100	Circular	123.610	122.910	0.600	123.200	122.500	0.600
10.000	6.108	59.3	100	Circular	125.480	124.780	0.600	125.480	124.677	0.703
10.001	17.341	8.4	100	Circular	125.480	124.677	0.703	123.320	122.620	0.600
10.002	9.669	80.6	150	Circular	123.320	122.570	0.600	123.200	122.450	0.600
10.003	3.679	99.4	150	Circular	123.200	122.450	0.600	123.190	122.413	0.627
5.011	4.123	10.8	300	Circular	123.190	122.263	0.627	122.880	121.880	0.700
1.000	20.997	100.5	150	Circular	141.950	141.200	0.600	141.910	140.991	0.769
1.001	10.319	100.2	150	Circular	141.910	140.991	0.769	141.840	140.888	0.802
1.002	20.191	35.3	150	Circular	141.840	140.888	0.802	141.670	140.316	1.204
2.000	33.635	100.7	150	Circular	141.400	140.650	0.600	141.670	140.316	1.204
1.003	36.452	169.5	225	Circular	141.670	140.241	1.204	143.000	140.026	2.749
1.004	40.923	48.1	225	Circular	143.000	140.026	2.749	140.000	139.175	0.600
1.005	43.131	30.8	225	Circular	140.000	139.175	0.600	138.600	137.775	0.600
1.006	18.992	9.0	225	Circular	138.600	137.775	0.600	136.500	135.675	0.600
1.007	39.880	11.4	225	Circular	136.500	135.675	0.600	133.000	132.175	0.600
1.008	40.922	10.2	225	Circular	133.000	132.175	0.600	129.000	128.175	0.600
1.009	38.811	9.7	225	Circular	129.000	128.175	0.600	125.000	124.175	0.600
1.010	15.405	20.5	225	Circular	125.000	124.175	0.600	124.250	123.425	0.600
1.011	15.345	168.6	225	Circular	124.250	123.425	0.600	124.980	123.334	1.421
3.000	17.590	100.5	150	Circular	127.650	126.900	0.600	127.650	126.725	0.775
3.001	31.096	100.6	150	Circular	127.650	126.725	0.775	127.650	126.416	1.084

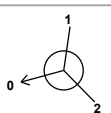
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
5.009	S44	450	Manhole	Adoptable	S28	1200	Manhole	Adoptable
9.000	S27	450	Manhole	Adoptable	S28	1200	Manhole	Adoptable
5.010	S28	1200	Manhole	Adoptable	S35	1200	Manhole	Adoptable
11.000	S29	450	Manhole	Adoptable	S30	450	Manhole	Adoptable
11.001	S30	450	Manhole	Adoptable	S34	450	Manhole	Adoptable
10.000	S31	450	Manhole	Adoptable	S32	450	Manhole	Adoptable
10.001	S32	450	Manhole	Adoptable	S33	450	Manhole	Adoptable
10.002	S33	450	Manhole	Adoptable	S34	450	Manhole	Adoptable
10.003	S34	450	Manhole	Adoptable	S35	1200	Manhole	Adoptable
5.011	S35	1200	Manhole	Adoptable	S41	1200	Manhole	Adoptable
1.000	S8	450	Manhole	Adoptable	S9	450	Manhole	Adoptable
1.001	S9	450	Manhole	Adoptable	S10	450	Manhole	Adoptable
1.002	S10	450	Manhole	Adoptable	S11	1200	Manhole	Adoptable
2.000	S12	450	Manhole	Adoptable	S11	1200	Manhole	Adoptable
1.003	S11	1200	Manhole	Adoptable	S45	1200	Manhole	Adoptable
1.004	S45	1200	Manhole	Adoptable	S46	1200	Manhole	Adoptable
1.005	S46	1200	Manhole	Adoptable	S47	1200	Manhole	Adoptable
1.006	S47	1200	Manhole	Adoptable	S48	1200	Manhole	Adoptable
1.007	S48	1200	Manhole	Adoptable	S49	1200	Manhole	Adoptable
1.008	S49	1200	Manhole	Adoptable	S50	1200	Manhole	Adoptable
1.009	S50	1200	Manhole	Adoptable	S51	1200	Manhole	Adoptable
1.010	S51	1200	Manhole	Adoptable	S52	1200	Manhole	Adoptable
1.011	S52	1200	Manhole	Adoptable	S40	1200	Manhole	Adoptable
3.000	S36	450	Manhole	Adoptable	S37	450	Manhole	Adoptable
3.001	S37	450	Manhole	Adoptable	S39	450	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)
4.000	17.600	36.4	150	Circular	127.650	126.900	0.600	127.650	126.416	1.084
3.002	35.556	11.8	150	Circular	127.650	126.416	1.084	124.980	123.409	1.421
1.012	36.164	26.2	300	Circular	124.980	123.259	1.421	122.880	121.880	0.700
1.013	3.011	18.8	300	Circular	122.880	121.880	0.700	122.620	121.720	0.600
1.014	7.962	99.5	300	Circular	122.620	121.720	0.600	122.540	121.640	0.600

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
4.000	S38	450	Manhole	Adoptable	S39	450	Manhole	Adoptable
3.002	S39	450	Manhole	Adoptable	S40	1200	Manhole	Adoptable
1.012	S40	1200	Manhole	Adoptable	S41	1200	Manhole	Adoptable
1.013	S41	1200	Manhole	Adoptable	S42	1200	Manhole	Adoptable
1.014	S42	1200	Manhole	Adoptable	S43	1200	Manhole	Adoptable

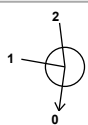
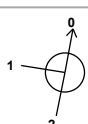
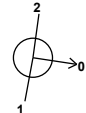
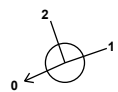
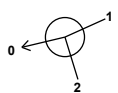
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S1	538714.931	131959.676	151.120	0.700	450		0	5.000	150.420	100
S2	538719.485	131951.068	151.100	0.844	450		1	5.000	150.256	100
							0	5.001	150.256	100
S3	538702.462	131941.978	149.280	0.700	450		1	5.001	148.580	100
							0	5.002	148.580	100
S4	538700.701	131980.102	151.190	0.700	450		0	6.000	150.490	100
S5	538690.067	131966.735	149.470	0.700	450		1	6.000	148.770	100
							0	6.001	148.770	100
S6	538688.541	131956.173	148.340	0.700	450		1	6.001	147.640	100
							2	5.002	147.640	100
							0	5.003	147.640	100
S7	538661.159	131948.704	144.200	0.700	450		1	5.003	143.500	100
							0	5.004	143.500	100
S8	538692.047	131870.613	141.950	0.750	450		0	1.000	141.200	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S9	538711.874	131863.701	141.910	0.919	450		1	1.000	140.991	150
							0	1.001	140.991	150
S10	538715.605	131854.080	141.840	0.952	450		1	1.001	140.888	150
							0	1.002	140.888	150
S11	538716.216	131833.898	141.670	1.429	1200		1	2.000	140.316	150
							2	1.002	140.316	150
							0	1.003	140.241	225
S12	538684.689	131845.618	141.400	0.750	450					
							0	2.000	140.650	150
S14	538641.720	131911.749	139.400	0.750	450		1	5.004	138.700	100
							0	5.005	138.650	150
S16	538675.941	131897.693	139.000	0.750	450					
							0	7.000	138.250	150
S19	538649.251	131886.657	138.700	0.853	450		1	7.001	137.847	150
							0	7.002	137.847	150
S21	538656.342	131904.953	139.000	0.958	450		1	7.000	138.042	150
							0	7.001	138.042	150
S23	538632.854	131881.683	137.500	0.750	450		1	8.000	136.750	150
							2	7.002	136.750	150
							0	7.003	136.750	150
S24	538650.646	131873.240	138.000	0.750	450					
							0	8.000	137.250	150
S25	538588.726	131790.186	129.000	0.750	450		1	5.007	128.250	150
							0	5.008	128.250	150
S26	538605.884	131834.938	132.400	0.750	450		1	5.006	131.650	150
							0	5.007	131.650	150
S27	538560.630	131724.668	125.330	0.700	450					
							0	9.000	124.630	100

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S28	538576.078	131721.960	123.730	0.825	1200		1	9.000	123.030	100
							2	5.009	122.980	150
							0	5.010	122.905	225
S29	538565.302	131715.003	124.100	0.700	450		0	11.000	123.400	100
S30	538562.806	131699.221	123.610	0.700	450		1	11.000	122.910	100
							0	11.001	122.910	100
S31	538554.430	131696.887	125.480	0.700	450		0	10.000	124.780	100
S32	538553.538	131690.844	125.480	0.803	450		1	10.000	124.677	100
							0	10.001	124.677	100
S33	538570.674	131688.183	123.320	0.750	450		1	10.001	122.620	100
							0	10.002	122.570	150
S34	538572.577	131697.663	123.200	0.750	450		1	11.001	122.500	100
							2	10.002	122.450	150
							0	10.003	122.450	150
S35	538573.246	131701.281	123.190	0.927	1200		1	10.003	122.413	150
							2	5.010	122.338	225
							0	5.011	122.263	300
S36	538651.432	131758.787	127.650	0.750	450		0	3.000	126.900	150
S37	538634.801	131753.057	127.650	0.925	450		1	3.000	126.725	150
							0	3.001	126.725	150
S38	538661.557	131729.382	127.650	0.750	450		0	4.000	126.900	150
S39	538644.916	131723.652	127.650	1.234	450		1	4.000	126.416	150
							2	3.001	126.416	150
							0	3.002	126.416	150
S40	538612.506	131709.030	124.980	1.721	1200		1	3.002	123.409	150
							2	1.011	123.334	225
							0	1.012	123.259	300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S41	538577.323	131700.665	122.880	1.000	1200	1	5.011	121.880	300
						2	1.012	121.880	300
						0	1.013	121.880	300
S42	538577.930	131697.716	122.620	0.900	1200	1	1.013	121.720	300
						0	1.014	121.720	300
S43	538585.827	131696.703	122.540	0.900	1200	1	1.014	121.640	300
						0	1.014	121.640	300
S44	538575.358	131727.802	124.000	0.750	450	1	5.008	123.250	150
						0	5.009	123.250	150
S45	538729.040	131799.776	143.000	2.974	1200	1	1.003	140.026	225
						0	1.004	140.026	225
S46	538740.129	131760.384	140.000	0.825	1200	1	1.004	139.175	225
						0	1.005	139.175	225
S47	538753.499	131719.378	138.600	0.825	1200	1	1.005	137.775	225
						0	1.006	137.775	225
S48	538747.783	131701.267	136.500	0.825	1200	1	1.006	135.675	225
						0	1.007	135.675	225
S49	538709.737	131689.313	133.000	0.825	1200	1	1.007	132.175	225
						0	1.008	132.175	225
S50	538669.162	131683.997	129.000	0.825	1200	1	1.008	128.175	225
						0	1.009	128.175	225
S51	538630.456	131686.847	125.000	0.825	1200	1	1.009	124.175	225
						0	1.010	124.175	225
S52	538617.007	131694.360	124.250	0.825	1200	1	1.010	123.425	225
						0	1.011	123.425	225
S53	538621.287	131874.988	135.750	0.750	450	1	7.003	135.000	150
						2	5.005	135.000	150
						0	5.006	135.000	150

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	20.000	Additional Storage (m ³ /ha)	20.0
Ratio-R	0.400	Starting Level (m)	
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 %)
2	0	0	0
30	0	0	0
100	45	0	0

Node S41 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	121.880	Product Number	CTL-SHE-0080-2800-1000-2800
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.8	Min Node Diameter (mm)	1200

Node S41 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	121.880	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	13.000	Number Required	1
Porosity	0.95	Pit Length (m)	32.000		

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	150.470	0.050	3.3	0.0323	0.0000	OK
15 minute summer	S2	10	150.285	0.029	3.3	0.0046	0.0000	OK
15 minute winter	S3	10	148.614	0.034	3.3	0.0054	0.0000	OK
15 minute winter	S4	10	150.519	0.029	3.3	0.0184	0.0000	OK
15 minute winter	S5	10	148.798	0.028	3.3	0.0044	0.0000	OK
15 minute summer	S6	10	147.677	0.037	6.6	0.0058	0.0000	OK
15 minute winter	S7	10	143.539	0.039	6.6	0.0062	0.0000	OK
15 minute summer	S8	10	141.267	0.067	6.9	0.0744	0.0000	OK
15 minute summer	S9	10	141.061	0.070	6.9	0.0111	0.0000	OK
15 minute winter	S10	10	140.938	0.050	6.9	0.0080	0.0000	OK
15 minute winter	S11	10	140.336	0.095	13.7	0.1075	0.0000	OK
15 minute winter	S12	10	140.716	0.066	6.9	0.0738	0.0000	OK
15 minute winter	S14	10	138.686	0.036	6.5	0.0057	0.0000	OK
15 minute summer	S16	10	138.307	0.057	5.2	0.0497	0.0000	OK
15 minute winter	S19	10	137.881	0.034	5.2	0.0055	0.0000	OK
15 minute summer	S21	10	138.103	0.061	5.2	0.0096	0.0000	OK
15 minute winter	S23	10	136.791	0.041	10.4	0.0065	0.0000	OK
15 minute summer	S24	10	137.295	0.045	5.2	0.0396	0.0000	OK
15 minute winter	S25	11	128.310	0.060	16.7	0.0095	0.0000	OK
15 minute winter	S26	11	131.713	0.063	16.6	0.0100	0.0000	OK
15 minute winter	S27	10	124.659	0.029	3.5	0.0197	0.0000	OK
15 minute winter	S28	11	122.981	0.076	19.7	0.0857	0.0000	OK
15 minute winter	S29	10	123.441	0.041	3.5	0.0275	0.0000	OK
15 minute summer	S30	10	122.948	0.038	3.5	0.0060	0.0000	OK
15 minute winter	S31	10	124.833	0.053	3.5	0.0353	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	S1	5.000	S2	3.3	1.146	0.420	0.0283	
15 minute summer	S2	5.001	S3	3.3	1.552	0.184	0.0411	
15 minute winter	S3	5.002	S6	3.3	1.333	0.249	0.0492	
15 minute winter	S4	6.000	S5	3.3	1.831	0.170	0.0308	
15 minute winter	S5	6.001	S6	3.3	1.529	0.166	0.0232	
15 minute summer	S6	5.003	S7	6.6	2.438	0.283	0.0769	
15 minute winter	S7	5.004	S14	6.5	2.317	0.315	0.1176	
15 minute summer	S8	1.000	S9	6.9	0.890	0.390	0.1629	
15 minute summer	S9	1.001	S10	6.9	1.055	0.390	0.0678	
15 minute winter	S10	1.002	S11	6.9	1.358	0.229	0.1022	
15 minute winter	S11	1.003	S45	13.5	1.066	0.339	0.4639	
15 minute winter	S12	2.000	S11	6.8	0.930	0.386	0.2470	
15 minute winter	S14	5.005	S53	6.5	1.343	0.123	0.2055	
15 minute summer	S16	7.000	S21	5.2	0.817	0.294	0.1331	
15 minute winter	S19	7.002	S23	5.2	1.510	0.114	0.0589	
15 minute summer	S21	7.001	S19	5.2	1.087	0.294	0.0952	
15 minute winter	S23	7.003	S53	10.4	2.000	0.160	0.0697	
15 minute summer	S24	8.000	S23	5.2	1.266	0.183	0.0816	
15 minute winter	S25	5.008	S44	16.8	2.126	0.335	0.5051	
15 minute winter	S26	5.007	S25	16.7	2.479	0.351	0.3240	
15 minute winter	S27	9.000	S28	3.5	1.855	0.179	0.0296	
15 minute winter	S28	5.010	S35	19.5	1.715	0.227	0.2378	
15 minute winter	S29	11.000	S30	3.5	1.225	0.329	0.0457	
15 minute summer	S30	11.001	S34	3.5	1.324	0.283	0.0262	
15 minute winter	S31	10.000	S32	3.5	1.185	0.445	0.0182	

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S32	10	124.705	0.028	3.5	0.0045	0.0000	OK
15 minute summer	S33	10	122.613	0.043	3.5	0.0068	0.0000	OK
15 minute summer	S34	10	122.523	0.073	7.0	0.0116	0.0000	OK
15 minute summer	S35	9	122.376	0.112	25.8	0.1272	0.0000	OK
15 minute summer	S36	10	126.956	0.056	5.0	0.0476	0.0000	OK
15 minute summer	S37	10	126.782	0.057	5.0	0.0091	0.0000	OK
15 minute summer	S38	10	126.942	0.042	5.0	0.0360	0.0000	OK
15 minute winter	S39	10	126.461	0.045	10.0	0.0072	0.0000	OK
15 minute winter	S40	12	123.332	0.073	20.7	0.0829	0.0000	OK
360 minute winter	S41	264	121.977	0.097	6.9	38.3515	0.0000	OK
360 minute winter	S42	264	121.750	0.030	2.2	0.0342	0.0000	OK
360 minute winter	S43	264	121.669	0.029	2.2	0.0000	0.0000	OK
15 minute winter	S44	11	123.328	0.078	16.8	0.0124	0.0000	OK
15 minute winter	S45	11	140.092	0.066	13.5	0.0751	0.0000	OK
15 minute winter	S46	11	139.237	0.062	13.7	0.0698	0.0000	OK
15 minute winter	S47	11	137.818	0.043	13.5	0.0482	0.0000	OK
15 minute winter	S48	12	135.720	0.045	13.4	0.0512	0.0000	OK
15 minute winter	S49	12	132.219	0.044	13.4	0.0501	0.0000	OK
15 minute winter	S50	12	128.218	0.043	13.5	0.0486	0.0000	OK
15 minute winter	S51	12	124.227	0.052	13.5	0.0584	0.0000	OK
15 minute winter	S52	13	123.518	0.093	13.4	0.1057	0.0000	OK
15 minute winter	S53	10	135.060	0.060	16.8	0.0096	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	S32	10.001	S33	3.5	1.961	0.166	0.0310	
15 minute summer	S33	10.002	S34	3.5	0.558	0.177	0.0611	
15 minute summer	S34	10.003	S35	7.0	0.883	0.393	0.0292	
15 minute summer	S35	5.011	S41	26.3	3.203	0.077	0.0504	
15 minute summer	S36	3.000	S37	5.0	0.828	0.283	0.1066	
15 minute summer	S37	3.001	S39	5.0	0.945	0.282	0.1644	
15 minute summer	S38	4.000	S39	5.0	1.207	0.169	0.0748	
15 minute winter	S39	3.002	S40	9.9	2.250	0.190	0.1563	
15 minute winter	S40	1.012	S41	20.9	2.794	0.096	0.2951	
360 minute winter	S41	Hydro-Brake®	S42	2.2				
360 minute winter	S42	1.014	S43	2.2	0.618	0.020	0.0287	43.1
15 minute winter	S44	5.009	S28	16.6	1.928	0.433	0.0506	
15 minute winter	S45	1.004	S46	13.7	1.470	0.182	0.3807	
15 minute winter	S46	1.005	S47	13.5	1.943	0.144	0.3026	
15 minute winter	S47	1.006	S48	13.4	2.467	0.077	0.1029	
15 minute winter	S48	1.007	S49	13.4	2.400	0.087	0.2231	
15 minute winter	S49	1.008	S50	13.5	2.508	0.083	0.2207	
15 minute winter	S50	1.009	S51	13.5	2.231	0.080	0.2353	
15 minute winter	S51	1.010	S52	13.4	1.505	0.116	0.1715	
15 minute winter	S52	1.011	S40	13.3	0.884	0.333	0.2308	
15 minute winter	S53	5.006	S26	16.6	2.462	0.331	0.2891	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.91%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	10	150.496	0.076	6.2	0.0489	0.0000	OK
15 minute summer	S2	10	150.297	0.041	6.2	0.0065	0.0000	OK
15 minute winter	S3	10	148.629	0.049	6.2	0.0077	0.0000	OK
15 minute summer	S4	10	150.530	0.040	6.2	0.0259	0.0000	OK
15 minute winter	S5	10	148.809	0.038	6.2	0.0061	0.0000	OK
15 minute summer	S6	10	147.692	0.052	12.4	0.0083	0.0000	OK
15 minute winter	S7	10	143.557	0.057	12.4	0.0090	0.0000	OK
15 minute summer	S8	10	141.301	0.101	13.2	0.1130	0.0000	OK
15 minute summer	S9	10	141.095	0.104	13.2	0.0165	0.0000	OK
15 minute winter	S10	10	140.960	0.072	13.2	0.0115	0.0000	OK
15 minute winter	S11	10	140.380	0.139	26.3	0.1575	0.0000	OK
15 minute winter	S12	10	140.749	0.099	13.2	0.1110	0.0000	OK
15 minute winter	S14	10	138.699	0.049	12.3	0.0078	0.0000	OK
15 minute summer	S16	10	138.333	0.083	9.9	0.0728	0.0000	OK
15 minute winter	S19	10	137.895	0.048	9.9	0.0076	0.0000	OK
15 minute summer	S21	10	138.130	0.088	9.9	0.0140	0.0000	OK
15 minute winter	S23	10	136.807	0.057	19.8	0.0090	0.0000	OK
15 minute summer	S24	10	137.314	0.064	9.9	0.0563	0.0000	OK
15 minute winter	S25	11	128.337	0.087	31.6	0.0138	0.0000	OK
15 minute winter	S26	10	131.742	0.092	31.8	0.0147	0.0000	OK
15 minute summer	S27	10	124.671	0.041	6.6	0.0278	0.0000	OK
15 minute winter	S28	11	123.015	0.110	37.4	0.1242	0.0000	OK
15 minute winter	S29	10	123.460	0.060	6.6	0.0405	0.0000	OK
15 minute winter	S30	10	122.964	0.053	6.6	0.0085	0.0000	OK
15 minute summer	S31	10	124.861	0.081	6.6	0.0542	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	5.000	S2	6.2	1.312	0.788	0.0455	
15 minute summer	S2	5.001	S3	6.2	1.833	0.345	0.0653	
15 minute winter	S3	5.002	S6	6.2	1.567	0.468	0.0787	
15 minute summer	S4	6.000	S5	6.2	2.173	0.320	0.0488	
15 minute winter	S5	6.001	S6	6.2	1.807	0.312	0.0368	
15 minute summer	S6	5.003	S7	12.4	2.849	0.532	0.1236	
15 minute winter	S7	5.004	S14	12.3	2.719	0.595	0.1893	
15 minute summer	S8	1.000	S9	13.2	1.031	0.746	0.2688	
15 minute summer	S9	1.001	S10	13.2	1.230	0.745	0.1104	
15 minute winter	S10	1.002	S11	13.2	1.608	0.439	0.1656	
15 minute winter	S11	1.003	S45	26.0	1.258	0.653	0.7533	
15 minute winter	S12	2.000	S11	13.1	1.082	0.740	0.4073	
15 minute winter	S14	5.005	S53	12.3	1.560	0.233	0.3323	
15 minute summer	S16	7.000	S21	9.9	0.958	0.559	0.2161	
15 minute winter	S19	7.002	S23	9.9	1.813	0.219	0.0936	
15 minute summer	S21	7.001	S19	9.9	1.282	0.560	0.1524	
15 minute winter	S23	7.003	S53	19.8	2.353	0.305	0.1128	
15 minute summer	S24	8.000	S23	9.9	1.500	0.349	0.1309	
15 minute winter	S25	5.008	S44	31.8	2.398	0.636	0.8541	
15 minute winter	S26	5.007	S25	31.6	2.900	0.663	0.5250	
15 minute summer	S27	9.000	S28	6.6	2.200	0.338	0.0471	
15 minute winter	S28	5.010	S35	37.3	2.021	0.434	0.3857	
15 minute winter	S29	11.000	S30	6.6	1.438	0.620	0.0733	
15 minute winter	S30	11.001	S34	6.6	1.469	0.533	0.0457	
15 minute summer	S31	10.000	S32	6.6	1.345	0.839	0.0294	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.91%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S32	10	124.717	0.040	6.6	0.0063	0.0000	OK
15 minute summer	S33	10	122.630	0.060	6.6	0.0095	0.0000	OK
15 minute summer	S34	10	122.561	0.111	13.2	0.0176	0.0000	OK
15 minute winter	S35	7	122.398	0.135	49.5	0.1527	0.0000	OK
15 minute winter	S36	10	126.982	0.081	9.5	0.0694	0.0000	OK
15 minute summer	S37	10	126.807	0.082	9.5	0.0131	0.0000	OK
15 minute summer	S38	9	126.960	0.060	9.5	0.0509	0.0000	OK
15 minute winter	S39	10	126.480	0.064	19.0	0.0102	0.0000	OK
15 minute winter	S40	11	123.360	0.101	40.4	0.1147	0.0000	OK
240 minute winter	S41	232	122.067	0.187	17.2	74.2239	0.0000	OK
240 minute winter	S42	232	121.753	0.033	2.7	0.0377	0.0000	OK
240 minute winter	S43	232	121.672	0.032	2.7	0.0000	0.0000	OK
15 minute winter	S44	11	123.380	0.130	31.8	0.0206	0.0000	OK
15 minute winter	S45	11	140.120	0.094	26.0	0.1065	0.0000	OK
15 minute winter	S46	11	139.263	0.088	26.2	0.0990	0.0000	OK
15 minute winter	S47	11	137.835	0.060	26.2	0.0678	0.0000	OK
15 minute winter	S48	11	135.738	0.063	26.1	0.0717	0.0000	OK
15 minute winter	S49	11	132.236	0.061	25.9	0.0695	0.0000	OK
15 minute winter	S50	12	128.235	0.060	25.7	0.0673	0.0000	OK
15 minute winter	S51	12	124.247	0.072	25.9	0.0818	0.0000	OK
15 minute winter	S52	12	123.566	0.141	26.0	0.1595	0.0000	OK
15 minute winter	S53	10	135.088	0.088	32.1	0.0140	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	S32	10.001	S33	6.6	2.331	0.314	0.0491	
15 minute summer	S33	10.002	S34	6.6	0.640	0.333	0.0988	
15 minute summer	S34	10.003	S35	13.2	1.021	0.741	0.0475	
15 minute winter	S35	5.011	S41	49.9	3.571	0.147	0.0640	
15 minute winter	S36	3.000	S37	9.5	0.967	0.537	0.1731	
15 minute summer	S37	3.001	S39	9.5	1.114	0.537	0.2654	
15 minute summer	S38	4.000	S39	9.5	1.416	0.321	0.1204	
15 minute winter	S39	3.002	S40	18.9	2.679	0.363	0.2508	
15 minute winter	S40	1.012	S41	41.1	3.149	0.188	0.5275	
240 minute winter	S41	Hydro-Brake®	S42	2.7				
240 minute winter	S42	1.014	S43	2.7	0.654	0.024	0.0329	59.1
15 minute winter	S44	5.009	S28	31.6	2.150	0.826	0.0860	
15 minute winter	S45	1.004	S46	26.2	1.743	0.348	0.6140	
15 minute winter	S46	1.005	S47	26.2	2.317	0.278	0.4902	
15 minute winter	S47	1.006	S48	26.1	2.959	0.150	0.1674	
15 minute winter	S48	1.007	S49	25.9	2.890	0.167	0.3574	
15 minute winter	S49	1.008	S50	25.7	3.016	0.157	0.3502	
15 minute winter	S50	1.009	S51	25.9	2.681	0.154	0.3761	
15 minute winter	S51	1.010	S52	26.0	1.583	0.226	0.2864	
15 minute winter	S52	1.011	S40	25.7	1.031	0.645	0.3831	
15 minute winter	S53	5.006	S26	31.8	2.872	0.635	0.4747	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.18%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	150.764	0.344	11.7	0.2220	0.0000	SURCHARGED
15 minute winter	S2	11	150.312	0.056	10.9	0.0090	0.0000	OK
15 minute winter	S3	11	148.651	0.071	10.9	0.0113	0.0000	OK
15 minute summer	S4	10	150.549	0.059	11.7	0.0379	0.0000	OK
15 minute summer	S5	10	148.825	0.055	11.7	0.0088	0.0000	OK
15 minute winter	S6	10	147.720	0.080	22.4	0.0127	0.0000	OK
15 minute winter	S7	12	143.664	0.164	22.3	0.0260	0.0000	SURCHARGED
15 minute winter	S8	10	141.668	0.468	24.8	0.5242	0.0000	FLOOD RISK
15 minute winter	S9	11	141.242	0.251	23.3	0.0400	0.0000	SURCHARGED
15 minute winter	S10	11	140.987	0.099	23.2	0.0158	0.0000	OK
15 minute winter	S11	11	140.488	0.247	45.0	0.2794	0.0000	SURCHARGED
15 minute winter	S12	11	141.061	0.411	24.8	0.4596	0.0000	SURCHARGED
15 minute summer	S14	11	138.717	0.067	21.7	0.0107	0.0000	OK
15 minute winter	S16	10	138.421	0.171	18.6	0.1507	0.0000	SURCHARGED
15 minute summer	S19	10	137.913	0.066	17.8	0.0104	0.0000	OK
15 minute summer	S21	10	138.182	0.140	17.6	0.0223	0.0000	OK
15 minute winter	S23	11	136.832	0.081	36.5	0.0130	0.0000	OK
15 minute summer	S24	10	137.345	0.095	18.6	0.0835	0.0000	OK
15 minute winter	S25	13	128.365	0.115	47.5	0.0183	0.0000	OK
15 minute winter	S26	13	132.240	0.589	50.6	0.0937	0.0000	FLOOD RISK
15 minute summer	S27	10	124.691	0.061	12.4	0.0409	0.0000	OK
15 minute winter	S28	10	123.049	0.144	56.5	0.1627	0.0000	OK
15 minute winter	S29	11	123.664	0.264	12.4	0.1776	0.0000	SURCHARGED
15 minute winter	S30	11	123.035	0.125	11.4	0.0199	0.0000	SURCHARGED
15 minute winter	S31	10	125.102	0.322	12.4	0.2169	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	S1	5.000	S2	10.9	1.564	1.382	0.0602	
15 minute winter	S2	5.001	S3	10.9	2.100	0.605	0.1013	
15 minute winter	S3	5.002	S6	10.9	1.794	0.824	0.1237	
15 minute summer	S4	6.000	S5	11.7	2.537	0.604	0.0788	
15 minute summer	S5	6.001	S6	11.7	2.164	0.589	0.0593	
15 minute winter	S6	5.003	S7	22.3	3.169	0.954	0.2013	
15 minute winter	S7	5.004	S14	21.6	3.017	1.043	0.3158	
15 minute winter	S8	1.000	S9	23.3	1.322	1.314	0.3696	
15 minute winter	S9	1.001	S10	23.2	1.411	1.307	0.1546	
15 minute winter	S10	1.002	S11	23.2	1.657	0.773	0.3026	
15 minute winter	S11	1.003	S45	43.0	1.384	1.081	1.1494	
15 minute winter	S12	2.000	S11	22.5	1.279	1.272	0.5921	
15 minute summer	S14	5.005	S53	21.7	1.578	0.412	0.5306	
15 minute winter	S16	7.000	S21	17.8	1.061	1.005	0.3628	
15 minute summer	S19	7.002	S23	17.9	2.104	0.394	0.1458	
15 minute summer	S21	7.001	S19	17.8	1.393	1.007	0.2407	
15 minute winter	S23	7.003	S53	36.5	2.629	0.562	0.1829	
15 minute summer	S24	8.000	S23	18.6	1.742	0.655	0.2104	
15 minute winter	S25	5.008	S44	46.7	2.732	0.932	1.0230	
15 minute winter	S26	5.007	S25	47.5	3.066	0.996	0.7685	
15 minute summer	S27	9.000	S28	12.4	2.558	0.636	0.0760	
15 minute winter	S28	5.010	S35	56.4	2.212	0.656	0.5321	
15 minute winter	S29	11.000	S30	11.4	1.530	1.067	0.1250	
15 minute winter	S30	11.001	S34	11.1	1.485	0.896	0.0774	
15 minute winter	S31	10.000	S32	11.8	1.724	1.503	0.0370	

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.18%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S32	10	124.731	0.054	11.8	0.0086	0.0000	OK
15 minute winter	S33	11	122.699	0.129	11.8	0.0205	0.0000	OK
15 minute winter	S34	11	122.654	0.204	22.4	0.0324	0.0000	SURCHARGED
15 minute winter	S35	6	122.436	0.172	78.4	0.1950	0.0000	OK
15 minute winter	S36	10	127.042	0.142	17.9	0.1206	0.0000	OK
15 minute winter	S37	10	126.858	0.133	17.8	0.0212	0.0000	OK
15 minute summer	S38	9	126.988	0.088	17.9	0.0747	0.0000	OK
15 minute winter	S39	10	126.510	0.094	35.5	0.0149	0.0000	OK
15 minute summer	S40	11	123.393	0.134	71.4	0.1521	0.0000	OK
360 minute winter	S41	352	122.280	0.400	23.4	158.4675	0.0000	SURCHARGED
60 minute winter	S42	54	121.754	0.034	2.8	0.0383	0.0000	OK
60 minute winter	S43	54	121.673	0.033	2.8	0.0000	0.0000	OK
15 minute winter	S44	14	123.726	0.476	46.7	0.0757	0.0000	FLOOD RISK
15 minute winter	S45	12	140.154	0.128	43.0	0.1447	0.0000	OK
15 minute winter	S46	12	139.292	0.117	43.5	0.1325	0.0000	OK
15 minute winter	S47	12	137.854	0.079	43.4	0.0891	0.0000	OK
15 minute winter	S48	12	135.758	0.083	43.3	0.0940	0.0000	OK
15 minute winter	S49	12	132.256	0.081	43.2	0.0914	0.0000	OK
15 minute winter	S50	13	128.253	0.077	43.1	0.0876	0.0000	OK
15 minute winter	S51	13	124.270	0.095	43.2	0.1075	0.0000	OK
15 minute winter	S52	13	123.652	0.227	43.3	0.2572	0.0000	SURCHARGED
15 minute winter	S53	12	135.750	0.750	58.0	0.1192	0.0000	FLOOD RISK

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	S32	10.001	S33	11.9	2.600	0.565	0.0913	
15 minute winter	S33	10.002	S34	11.7	0.669	0.592	0.1631	
15 minute winter	S34	10.003	S35	22.4	1.272	1.257	0.0630	
15 minute winter	S35	5.011	S41	78.7	3.769	0.231	0.1175	
15 minute winter	S36	3.000	S37	17.8	1.074	1.005	0.2969	
15 minute winter	S37	3.001	S39	17.6	1.252	0.996	0.4377	
15 minute summer	S38	4.000	S39	17.9	1.636	0.605	0.1961	
15 minute winter	S39	3.002	S40	35.3	3.107	0.679	0.4044	
15 minute summer	S40	1.012	S41	71.8	3.456	0.330	0.9038	
360 minute winter	S41	Hydro-Brake®	S42	2.8				
60 minute winter	S42	1.014	S43	2.8	0.661	0.025	0.0338	45.9
15 minute winter	S44	5.009	S28	46.6	2.649	1.218	0.1036	
15 minute winter	S45	1.004	S46	43.5	1.971	0.579	0.9037	
15 minute winter	S46	1.005	S47	43.4	2.622	0.462	0.7168	
15 minute winter	S47	1.006	S48	43.3	3.376	0.249	0.2439	
15 minute winter	S48	1.007	S49	43.2	3.308	0.279	0.5208	
15 minute winter	S49	1.008	S50	43.1	3.465	0.263	0.5087	
15 minute winter	S50	1.009	S51	43.2	3.088	0.257	0.5437	
15 minute winter	S51	1.010	S52	43.3	1.741	0.376	0.4290	
15 minute winter	S52	1.011	S40	43.0	1.156	1.078	0.5574	
15 minute winter	S53	5.006	S26	50.6	3.041	1.012	0.7554	

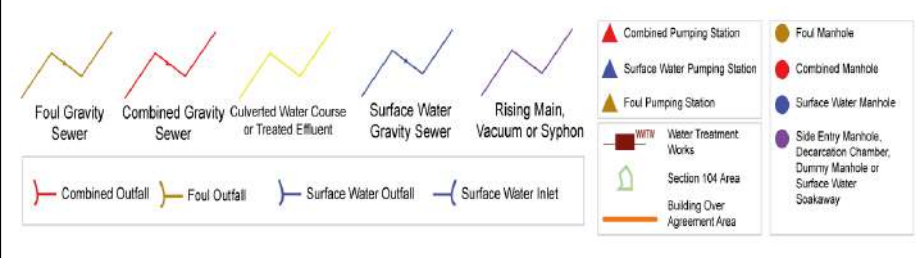
Appendix C - Thames Water Sewer Map



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WARNING: BAC pipes are constructed of Bonded Asbestos Cement.

WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement.

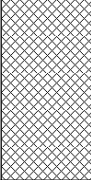
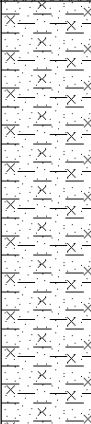


nc29ltd@gmail.com
1



Appendix D – Borehole Logs

 Risk Management Risk Management Limited Unit 10 Coopers Place Combe Lane Godalming Surrey GU8 5SZ		Borehole Log				Borehole No. BH1 Sheet 1 of 1										
Project No. RML 8673		Coordinates:		Drilling Technique: Light Percussion Rig		Level (m):										
Site Address: Wickenden Manor, Chilling Street, East Grinstead, West Sussex, RH19 4JB		Date: 04/01/2024		Diameter (mm): 131		Scale: 1:25										
	Stratum Description	Legend	Depth (m)	Level (m)	Samples and In Situ Testing				Water Strikes	Well						
					Depth (m)	Sample Type	Test Type	Results								
1 2 3 4 5	Grass over Topsoil		0.12		0.15	D1	SPT	N=6 (2,1/1,2,2,1)								
	Orange-brown silty sandy CLAY with roots. with grey mottling from 1.50m depth with occasional fragments of sandstone from 2.00m depth Borehole terminated at 2.60m depth				0.50	D2										
					1.00	D3										
					1.50	D4										
					2.00	D5										
					2.50	D6					SPT	50 (11,16/50 for 95mm)				
					2.60											
Remarks: Service pit excavated to 1.00m depth. Water seepage noted from 0.10m depth. Borehole terminated at 2.60m depth owing to SPT 'N' values in excess of 50.					KEY D = Disturbed Sample U = Undisturbed Sample B = Bulk Sample W = Water Sample CPT = Cone Penetration Test SPT = Standard Penetration Test V = Vane Test PP = Pocket Penetrometer MEXE = Insitu CBR test											

 Risk Management Limited Unit 10 Coopers Place Combe Lane Godalming Surrey GU8 5SZ		Borehole Log				Borehole No. BH2 Sheet 1 of 1				
Project No. RML 8673		Coordinates:			Drilling Technique: Light Percussion Rig		Level (m):			
Site Address: Wickenden Manor, Chilling Street, East Grinstead, West Sussex, RH19 4JB			Date: 04/01/2024		Diameter (mm): 131		Scale: 1:25			
	Stratum Description	Legend	Depth (m)	Level (m)	Samples and In Situ Testing				Water Strikes	Well
					Depth (m)	Sample Type	Test Type	Results		
1	MADE GROUND (crushed brick, concrete and gravel).		0.60		0.15	D1	SPT	N=9 (2,3/3,2,2,2)		
					D2					
					D3					
					D4					
					D5					
2	Orange-brown mottled grey silty sandy CLAY.		2.00		1.00	D3	SPT	N=54 (11,14/14,16,11,13)		
					D4					
					D5					
					D5					
					D5					
3	with occasional fragments of sandstone from 1.30m depth									
4	Borehole terminated at 2.00m depth									
5										

Remarks:

Service pit excavated to 1.00m depth. Groundwater not noted during boring.. Borehole terminated at 2.60m depth owing to SPT 'N' values in excess of 50.

KEY

D = Disturbed Sample

U = Undisturbed Sample

B = Bulk Sample

W = Water Sample

CPT = Cone Penetration Test

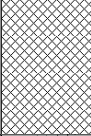
SPT = Standard Penetration Test

V = Vane Test

PP = Pocket Penetrometer

MEXE = Insitu CBR test



 Risk Management Risk Management Limited Unit 10 Coopers Place Combe Lane Godalming Surrey GU8 5SZ		Borehole Log				Borehole No. BH3 Sheet 1 of 1				
Project No. RML 8673		Coordinates:		Drilling Technique: Light Percussion Rig		Level (m):				
Site Address: Wickenden Manor, Chilling Street, East Grinstead, West Sussex, RH19 4JB		Date: 03/01/2024		Diameter (mm): 131		Scale: 1:25				
	Stratum Description	Legend	Depth (m)	Level (m)	Samples and In Situ Testing				Water Strikes	Well
					Depth (m)	Sample Type	Test Type	Results		
1	MADE GROUND (crushed brick fill).		0.45		0.15	D1	SPT	N=9 (2,2/2,3,2,2)		
	Orange-brown mottled grey silty sandy CLAY.				0.50	D2				
					1.00	D3				
					1.50	D4				
					2.00	D5				
					2.50	D6				
					3.00	D7				
2	becoming very sandy from 1.60m depth									
3	with fragments of sandstone from 2.80m depth									
	Borehole terminated at 3.00m depth									
4										
5										
Remarks: Service pit excavated to 1.00m depth. Water seepage noted from 0.10m depth. Borehole terminated at 2.60m depth owing to SPT 'N' values in excess of 50.					KEY D = Disturbed Sample U = Undisturbed Sample B = Bulk Sample W = Water Sample CPT = Cone Penetration Test SPT = Standard Penetration Test V = Vane Test PP = Pocket Penetrometer MEXE = Insitu CBR test					

Appendix E – Sewage Treatment Plant Assessment



POUND HILL,
POUND LANE,
UCKFIELD,
FRAMFIELD,
EAST SUSSEX,
TN22 5RR
01825 890294

THE SEWAGE FACILITIES AT

Wickenden Manor, Chilling Street, Sharpthorne, RH19 4JB.

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1) CLIENT BRIEF

- a) To carry out a survey with recommendations on the sewage facilities at Wickenden Manor, Chilling Street, Sharpthorne, RH19 4JB.
- b) The date of the survey was on the 4th of January 2024.
 - i) The findings are based on the condition of the existing facilities at the time of the survey.

2) SITE AND SYSTEM OVERVIEW

- a) The site consists of a main property with multiple occupancies.
- b) Sewage produced from within the properties is connected by a network of sewers that terminates into a Sewage Treatment Plant.
- c) The sewage management facilities consist of the following parts:-
 - i) A primary settlement/ septic tank located at the bottom of the site.
 - 1) The volume of the tank is estimated at 30,000 litres.
 - 2) A more accurate size of the system can be achieved by emptying it if required.
 - ii) A discharge pipe from the primary tank passing into a small pumping station.
 - (1) The working volume of the pumping station is 650 litres.
 - iii) A discharge pipe from the pumping station to an above ground biological clinker filter.
 - (1) The filter contains approximately 40 cubic metres of clinker.
 - iv) A discharge pipe from the clinker filter bed passing into a humus tank.
 - (1) The volume of the humus tank is approximately 7,000 litres.
 - v) A discharge pipe from the hummus tank passing into a culvert.
 - vi) A final point of discharge into the stream.

3) FLOW AND LOADINGS

- a) It has been confirmed that the sewage produced from this location is classified as domestic.
- b) Some surface water enters the foul sewers.
 - i) It is recommended that surface water is kept separate from the foul sewers as it can dramatically affect the performance of sewage management facilities.

c) The current consented discharge amount for this system is as follows:-

	Consented Discharge Amount
Sewage produced per day (litres)	15000
Biochemical Oxygen Demand per day (grams)	5180
Ammonia per day (grams)	664
Population Equivalent Flow in terms of amount	83
Population Equivalent Flow in terms of sewage strength	83

4) CURRENT SITE STATUS

a) The current methods of managing the sewage **are not in breach** of the Environmental Laws due to:

i) The production of a visually high quality effluent passing into the stream.

(1) A formal sample can be taken if required.

ii) There is currently an active Environmental Permit:-

(1) The permit number is P.3663/S/P/91.

(2) The permit was granted on the 4th November 1992.

(3) The permit allows the discharge of up to 15 cubic metres of treated effluent per day which must not contain in excess of:-

(a) 30 mg/l Biochemical Oxygen Demand.

(b) 45 mg/l Suspended Solids.

(c) 20 mg/l Ammoniacal Nitrogen as N.

Breach(es) of Environmental Laws are a prosecutable offence, enforced by the Environment Agency. Prosecution can result in the waste producers or owners receiving significant fines if not resolved correctly.

5) SYSTEM OBSERVATIONS

- a) The system at Wickenden Manor has been maintained by Moody Sewage for many years and has always produced a high quality effluent with regular weekly maintenance.
 - i) Weekly maintenance at present is not being carried out by Moody Sewage and is now undertaken by the staff at Wickenden Manor.
- b) On inspection the sewage treatment facilities were producing a visually good effluent with all aspects of the system working.
- c) The feed inspection chambers do not have scum lines or signs of any historical blockages.
- d) The feed inspection chambers appear to be in a reasonable condition with inspection covers that are clean with no significant corrosion or deterioration.



- e) The main management system is based around a traditional clinker filter bed sewage management facility.
- f) Sewage flows from the property and into the primary tank.
- g) The tank is constructed from GRP, does not appear to have any leaks, and appears to be in a reasonable condition.
- h) This tank was repaired due to a split in the side of the tank by Moody Sewage some years ago.



- i) The tank has an approximate capacity of 30,000 litres, which would make it suitable for successful solids retention for up to 150 people.

The Facts! - Septic Tanks

- A Septic Tank's main function is to separate the heavy solids from the liquid. It's recommended by both us, and the Environment Agency, that solids should be removed by tanker at least once a year.
- Septic tanks do not produce dischargeable effluent of sufficient quality, as required by Law to pass into watercourse, ditch or onto land. At best, it produces a biological breakdown of sewage that could result in a discharge being only 20% cleaner.
- The discharging liquid (which is still approximately 80% raw sewage) from the tank will flow via the outlet pipe and will either then discharge or flow into a further stage of treatment.

- j) The effluent from the septic tank flows into a rudimentary pumping station located at the side of the enclosure.
- k) The pumping station is fitted with a single effluent dosing pump which moves the sewage up and onto the clinker filter bed.
- l) On inspection the system was operational, however the control float which actuates the recirculation pump requires replacement as the cable has become stiff and its performance reduced.



- m) The discharge pipe from the pumping station passes across and up and onto the biological filter.
- n) **This pipe is too small bore and due to the growth of bacteria within the actual discharge pipe does require urgent attention so that the flow between the pumping station and filter is not heavily restricted.**
- o) The filter bed itself was in an operational condition however, **the level of discharge over the bed requires improvement.**



The Facts! - Clinker Beds

- A clinker filter bed is predominantly the main part of any treatment system in terms of "cleaning" the sewage. Its principle is as follows:-
- The volume of stone are stacked in a pile, typically within a brick built container. The stones are packed in such away that air can easily pass around them.
- Settled sewage is then dosed over the filter bed allowing the sewage to pass down and through the clinker (stones).
- Bacteria grows on the clinker and digest the "foulness" in the sewage before it is collected at the bottom of the filter.
- The process is completely aerobic; meaning the air freely flows in between the clinker and down to the lower levels, usually by dedicated air pipes at the side of the bed.
- Once the sewage has passed through the filter, the final effluent is then settled one last time in a tank called a humus tank to remove any sludge particles.

p) The bed itself is constructed from a brick surround and is rendered.

q) Sewage is distributed over the clinker using a rotational Monojet system.

i) The distribution is operational but could be improved.

r) The system has sufficient venting from dedicated pipe work around the edge.

s) The treated effluent from the filter then flows through to a substantial humus chamber which is fitted with a recirculation pump.



- i) Recirculation is installed on systems so that there is a constant flow passing through the biological filters at all times and helps prevent negative effects from surge flows.
- ii) The recirculation system was operational on inspection.
- t) The discharging effluent passes out and into the culvert Into a stream which was confirmed by a dye test.



- u) **To conclude, on inspection the system was operating reasonably and producing a visually good effluent however there are some issues that need to be addressed.**
 - i) If required a sample can be taken from the effluent for formal testing.
 - v) Taking all into consideration, the system at Wickenden Manor should continue to be adequate to treat the current consented flow rates by design.

6) ENVIRONMENTAL PERMIT AND DISCHARGE INVESTIGATION

a) The site currently has an active Environmental Permit.

The Facts! - Environmental Permits

- Waste water, sewage management and discharges are governed by the Environmental Permitting Regulations 2014 and are enforced by the Environment Agency.
- You require by Law an Environmental Permit for the discharge of sewage or treated effluent from a septic tank or sewage treatment plant.
- There are exceptions as defined by the General Binding Rules for small sewage discharges, effective from 1st January 2015. This is applicable to everyone who has a septic tank or sewage treatment plant. An example of the General Binding Rules for small sewage discharges can be provided on request.

7) REQUIRED SOLUTIONS

a) SOLUTION 1

To supply and install a new control float for the recirculation system operation.

Cost of works	
Estimated Cost of Works	£195.00
VAT @ 20.0%	£39.00
Estimate Total	£234.00

b) SOLUTION 2 (Urgent)

To supply and install a new 63mm MDPE pipe passing from the pumping station passing up to the biological filter together with new accessible distribution pipe work into the filter tray.

- i) An alliance of 25 metres of pipework are included within this illustration.
- ii) In addition the pipework passing up and over the filter will be changed so that it can be taken apart for maintenance purposes.
- iii) The operation of the MonoJet system will be optimised.
- iv) This works is estimated to take up to 2 days to complete.

Cost of works	
Estimated Cost of Works	£5,290.00
VAT @ 20.0%	£1,058.00
Estimate Total	£6,348.00

ALL RECOMMENDED SOLUTIONS FROM MOODY SEWAGE LIMITED ARE FULLY GUARANTEED AND INDEMNITY BACKED. THIS MEANS AS LONG AS THE SYSTEM IS REGULARLY SERVICED AND EMPTIED THEN MOODY SEWAGE WILL GUARANTEE THE SYSTEM (SUBJECT TO CONDITIONS).

MOODY SEWAGE DOES NOT PROVIDE A WARRANTY ON ANY EXISTING SEWAGE MANAGEMENT FACILITIES THAT ARE UTILISED WITHIN ANY SOLUTION.

8) OTHER CONSIDERATIONS

i) Excess soil is to be spread to site, unless otherwise instructed by the client:-

- 1) A third party waste company can be arranged by Moody Sewage or the client for the collection of the soil.
 - 2) Fees for soil removal remain the responsibility of the client and are paid in addition direct to the relevant third party company.
- ii) There is no allowance for any additional finishing materials such as topsoil or turf. This can be brought to site at additional cost if required.

iii) Trench support or excavation bracing is not included in any estimate:-

- (1) If this is required once works has started, the cost will be brought to the clients attention and charged over and above any estimate sum.
- (2) Alternatively test holes can be carried out prior to the installation. On completion the enclosed estimates will then be updated.
 - (a) The cost for this works will be £2,100.00 plus VAT.

iv) All efforts are made so that the estimate of works are as accurate as possible and are based on all the available knowledge collected at the time of the report.

- 1) In some circumstances it is possible that due to unforeseen conditions or variations of specifications, further work may be required at additional cost to the estimate.
- 2) This works will be reported to the client prior to implementation.
- 3) Any additional days over and above the estimated will be charged at cost, being £600.00 plus VAT per day.

9) PAYMENT TERMS

A 45% deposit of of the sum is payable on instruction, followed payment of 50% 5 days before commencement and a final completion payment **due on the final day of the works:**

	Solution 1	Solution 2
Deposit: 45%	£105.30	£2,856.60
Commencement of Work: 50%	£117.00	£3,174.00
Estimated Final Completion Payment	£11.70	£317.40
Total Installation Costs	£234.00	£6,348.00

10)TERMS AND CONDITIONS

Moody Sewage Ltd (We/Us/The Company) of Pound Hill, Pound Lane, Framfield, Uckfield, East Sussex, TN22 5RR will undertake the completion of work as detailed in this contract for (You/The Client), subject to the following Terms and Conditions:

- a) **Planning Permission and Regulations:** Planning permission and/or building regulation approval can be obtained by Moody Sewage Limited on request from the client. Any professional or local authority fees incurred as part of the process are the responsibility of the client.
- b) **Underground Services:** All underground services (e.g electricity cables or gas pipes) **must** be identified to Moody Sewage Ltd prior to work commencing. In the event of an unidentified service being damaged, the repair (including any loss) remains the responsibility of the client.
- c) **Access:** Any necessary easement and rights of access remain the responsibility of the client unless otherwise agreed.
- d) **Excess and Waste Soil:** Excess or waste soil will be spread to site at a location chosen by the client. If excess soil cannot be spread to site then Moody Sewage will help arrange for its removal and any additional cost incurred will be charge to the client, in addition to the contractual sum outline.
- e) **Removal of liquid or other waste materials.** If liquid waste or other types of waste needs to be removed from site, this can be arranged by Moody Sewage, which will be charged to the client, in additional to the sum outlined.
- f) **Labour & Materials:** The sum is an estimate for the allowance of this works based on all the available knowledge at the time of preparation. Any variations to the planned worked (for example but not explicit to) as a result of client request, unforeseen conditions or changes to site between the time of estimation and installation, will be charged in addition to the original estimate sum. In either event, any additional work being required and the costs will be brought to the clients attention before implementation.
- g) **Deposit & Payments:** A deposit of **45% of the estimated cost of works** is payable on instruction. A payment of **50% of the estimated cost of works**, is to be paid five working days before commencement of work. Upon completion of the work, a final payment of **5% of the estimated cost of works plus any additional costs incurred are to be paid on the final day.**

- h) **Delays to Work:** If the commencement of works is delayed by events outside of Moody Sewage's control for a period exceeding 6 months from order, Moody Sewage may review the estimate to ensure that the cost of parts, materials, plant and labour are up to date.
- i) **Installed Equipment:** The installed equipment including any plant, cabling, electromechanical, mechanical, tanks, and aggregates remain the property of Moody Sewage Limited until the balance of the works is settled in full. Moody Sewage reserve the right to remove any of the above in the event of not receiving payment in full.
- j) **Cancellation of Agreement.** If work is cancelled by the client, the deposit is not refundable.
- k) **Payment Details:** Deposit and payments for the Installation work are solely to be made by Payment Card (Debit or Credit).
- l) This illustration of works and recommendation are valid for 28 days from the date provided.

11) OUR WARRANTIES

- a) All recommended solution designs by Moody Sewage Limited are fully Guaranteed and Indemnified. for the lifetime of the recommended service, maintenance and tankering schedule. This is subject to the conditions in item 12.d and 12.e below.
- c) **Parts and Labour** are fully warranted and guaranteed by Moody Sewage Ltd for a period of 12 months from the completion date - subject to regular servicing, emptying and correct usage as recommended and undertaken by Moody Sewage Ltd.
- d) **Existing facilities and Tanks.** Moody Sewage does not provide a warranty on any existing sewage management facilities and/or existing facilities that are used within any solution.
- e) **Exclusions to the warranty** will be incurred in the event of one or all of the following:
 - 1. Abuse or incorrect operation of the system, including usage over and above the original design specification.
 - 2. Accidental Damage by the client or third party.
 - 3. Natural Disasters such: flooding, subsidence, erosion, storm damage etc.
 - 4. Electrical failure, due to lack of power supply as a result of power cuts, or from the a faulty electrical system within the supporting property.
 - 5. Theft or third party interjections.
 - 6. Existing facility, e.g Pipework Septic Tanks/Holding tanks and treatment facilities.

12) TANKERING & SERVICING AGREEMENT

The Moody Sewage Ltd warranty on Parts and Labour for systems the Company installs are only valid when regular Servicing and Emptying is undertaken by Moody Sewage, as the recommended requirements.

Servicing

The system is to be serviced, as a minimum as per the recommendations and price advised within the report.

Tankering/Emptying

The system is to be emptied, as a minimum each year or unless advised within the report..

Our charges for Emptying:

1. **£11.00** per 100 gallons of sewage removed - a minimum charge of **£160.00** for up to 900 gallons applies.
2. Surcharges (where applicable):
 - a) £75.00 for additional pipe if the distance between Tanker and tank is greater than 50 metres
 - b) £60.00 for every additional onsite half hour over the first hour

VAT is not chargeable on Household waste. Businesses are subject to an additional charge of VAT at 20%

System Owner Responsibility: It is the responsibility of the you the owner to ensure that the system is safe for all concerned.

In the event of an Exclusion (see warranty section), or beyond the 12 months Parts and Labour warranty, the costs for repairs, renewal and/or reconstruction will remain with you, The Client.

The client will be advised on how the system is performing and if it's a danger to the environment. Responsibility for compliance with Environmental Standards as set by the Law is with you the owner.

Making Changes: We may have to change our prices for both Tankering and Servicing from time to time, due to factors that are outside our control. Such as additional cost due to changing regulations, Water Company disposal costs or for other reasons.

However, if we do increase our prices, we promise to notify you in advance of any change. We will assume your acceptance of the price changes if you do not contact us, to say otherwise, before the start date that the new prices take effect.

Payment: Payments can be made either by Debit/Credit Card, or by Direct Debit. Payment details must be provided in advance of any work being undertaken. Payments will only be taken by either Direct Debit or Card once the work has been completed. Late payment renders you The Client liable to a surcharge of 5% per month on all outstanding charges, at the discretion of The Company.

Cancellation: If for any reason you wish to cancel The Contract for Servicing and Tankering, please provide confirmation in writing to The Company's Pound Hill address, or by email: info@moodysewage.com.

We just ask that you provide at least 30 Days before the next scheduled visit, and any outstanding charges will need to be paid, before the cancellation can be completed.

Please note: if the event that you cancel your Servicing and/or Emptying contract, we will be unable to guarantee the quality of the effluent or provide a warrantee on Parts and Labour with the 12 month following completion.

The Company can cancel The Contact at their discretion at any time, if this happens, we will aim to give you at least 30 days' notice. If we feel our colleagues have been threatened, or are subject to any unpleasant behaviour, we will cancel The Contract without notice.

Your Data: We promise to take the upmost care of your data, and to never sell it to a third party. For more information, please visit www.moodysewage.com/privacy

From time to time, we'd love to update you about our product and services that we provide. Please tick the box(es) below to show which form of communication you would prefer to be contacted by:

By Post ☐ Email ☐ Phone ☐ SMS/Text ☐

13) CONFIRMATION AND ACCEPTANCE OF WORKS - INSTALLATION

I confirm that I have selected option: , and instruct Moody Sewage Ltd to carry out the proposed recommendations as per the Report and supporting Terms and Conditions.

Signature: _____

Print Name _____

Date _____

JDH25012024