Project Title:	214539 Planning Application Land adjacent C1059, Hatfield, Leominster HR6 0SG Proposed residential development of five dwelling houses with associated vehicle access from C1059	**Job Number:**	CWC105
		Date:	25/04/2025
Subject:	Discharge of Conditions 6 and 10 Revision 2		

TABLE OF CONTENTS

1. INTRODUCTION

1.1. Background

Planning approval 214539 Conditions 6 and 10 relate to drainage. These two conditions are repeated below.

The council have agreed that Condition 10 can be discharged. It has however been retained in this version of the report for ease of reference.

CONDITION 6

With the exception of any site clearance and groundwork details of the design of the proposed foul and surface water drainage arrangements shall be submitted to and approved in writing by the Local Planning Authority. The details shall include, but may not be limited to the following: -

- Details of the size and siting of the proposed surface water attenuation features including outfall location;
- Details of the size and siting of the proposed foul water drainage mound feature;
- Relevant calculations where appropriate and;
- Management and maintenance schedules for all drainage infrastructure

The approved scheme shall be implemented before the first use occupation of any of the dwellings herby approved.

Reason: In order to ensure that satisfactory drainage arrangements are provided and to comply with Policies SD3 and SD4 of the Herefordshire Local Plan – Core Strategy and the National Planning Policy Framework.

CONDITION 10

Prior to the first occupation of the development hereby approved, a schedule of management and maintenance of the non-private areas (including proposed orchard) shall be submitted to and approved in writing by the Local Planning Authority.

Maintenance shall be carried out in accordance with the approved schedule.

Reason: To ensure the successful establishment of the approved scheme, Local Planning Authority and in order to conform with policies SS6, LD1 and LD3 of the Herefordshire Local Plan - Core Strategy and the National Planning Policy Framework.

This report version seeks to address the data and detail requests made by the council Land Drainage team in comments made on 14 March 2025. These are summarised as:-

- Condition 10 can be discharged. It has however been retained in this version of the report for ease of reference.
- Condition 6 additional details are required relating to:
    1. Drainage mound setting out co-ordinates should be provided. See Clause 1.2.2 and drawing Drainage Mound Details number CWC105-DR-03 Revision P03.
    2. Further details are required about the pump station, alarms and emergency storage. See Clause 1.2.3 to Clause 1.2.5
    3. Maintenance details are required for the foul pump station. See Clause 1.4.
    4. A dosing chamber or flow buffering system should be included between the pump station and the internal mound distribution pipework. See further details in Clause 1.2.5 and the details of chamber F1007 within the drawings in Appendix A.

All data in this report refers to UK guidance and standards including:

- Herefordshire Council publication and guidance within the SuDS and Foul Drainage Handbook 2018 written by BBLP and WSP. In particular Pumping Station details;
- the Building Regulations 2010 Part H for England as updated in 2015;

- British Standard BS6297 which states Building Research Establishment report Mound Filter Systems, reference BRE478, shall be used for “detailed guidance on the design and construction of mound filters”.

As the foul drainage collection, sewage PTP treatment and further treatment plus disposal in the drainage mound will also be assessed by the EA under a Discharge Permit application, the design uses BS6297 in preference to the other documents.

No international guidance is referenced in this report and we are unsure why the Land Drainage team refer to non UK documentation. This report does not attempt to respond to any international comment, e.g. the North Dakota State University publication.

1.2. Condition 6 Data

Condition 6 requires the provision of data showing the foul and the surface water drainage systems proposed at the site. See drawings included in Appendix A which have been updated as required.

The sewage treatment is achieved via a Graf One2Clean biological package treatment plant (PTP), followed by a drainage mound. As the mound is elevated above ground level the foul flows will be pumped from the PTP into the distribution pipework. The pump station shall be a package unit containing twin pumps operating as Duty and Standby with integral alarms fitted. The alarm system shall as a minimum trigger an on site visual flashing lamps plus an audible alarm. They shall also be capable of sending text messages to any allocated mobile phone numbers. These messages shall detail the state of the system and any alarm condition. It is recommended that the appointed drainage contractor is included within the text message group of contacts.

1.2.1. Surface Water Network and SuDS

As there are no comments from the council it has been assumed that all aspects of the SuDS and surface water network are agreed.

1.2.2. Foul Drainage Mound

As agreed with the council the drainage mound is set out along the contours.

In the previous version of this report Drawing CWC105-DR-01 Rev P02 showed the mound as a rectangular shape as the contours are relatively straight, whereas Drawing CWC105-DR-03 Rev P02 had not been updated to also show the more uniform rectangular shape.

This report ensures that a rectangular mound is shown in every instance, plus it provides the setting out coordinates of the mound corners. The coordinates have also been added to the drawings. The uniform shape is achieved by a minimal amount of earthworks to create finished ground levels of 208.20m along the upslope side and 207.90m on the downslopes side.

As previously agreed with the council the mound design in accordance with British Water Flows and Loads plus BS6297 and the Building Regulations has an upper gravel distribution layer covering a minimum area of 190 sqm and a minimum filter sand basal area of 416 sqm – the drawings use these plan areas.

The mound cross section details and the setting out co-ordinates of the toe of the mound are given below. The co-ordinates have also been added to the drawings, see Appendix A and Figure *1*.

DRAINAGE MOUND SETTING OUT CO-ORDINATES

NW corner X=359563.273 Y=259824.286 Z= 207.90

NE corner X=359599.116 Y=259858.280 Z= 207.90

SW corner X=359569.191 Y=259818.046 Z= 208.20

SE corner X=359605.035 Y=259852.040 Z= 208.20

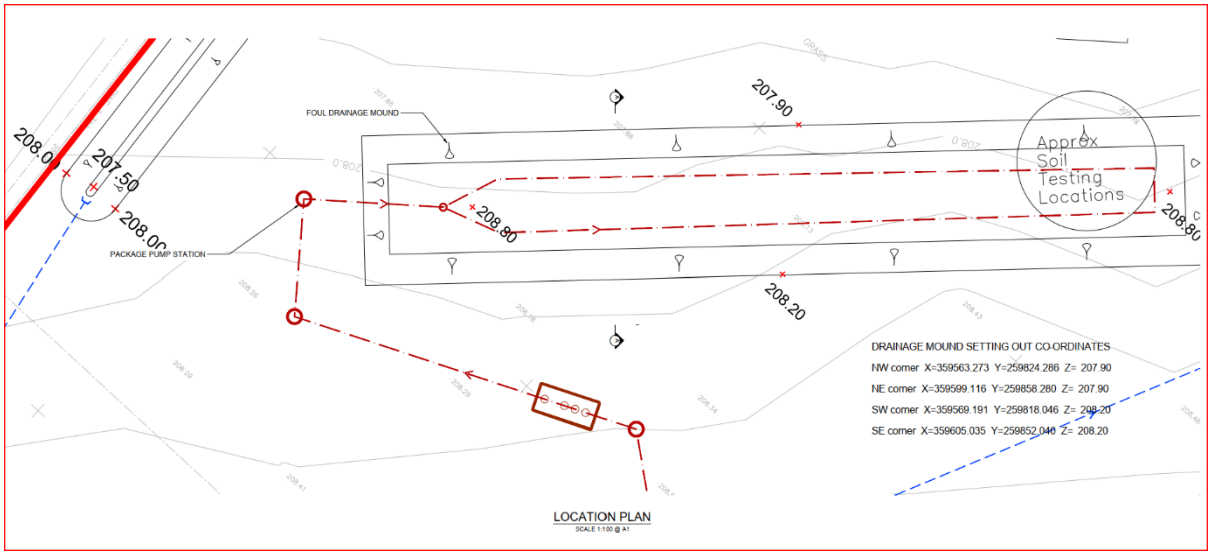


Figure 1: Extract of drawing Drainage Mound Details number CWC105-DR-03 Revision P03.

1.2.3. Pumping of the Foul Flows

Due to the site layout and modest slope, plus the requirements to allocate space to the drainage mound that must be 40m from the ditch at the northern edge of the site, an orchard and a SuDS dry basin, it was not possible to avoid pumping of the foul flows after they have been settled and treated within the PTP.

Having designed multiple pumping stations and systems over the last 40 years, plus supervised the construction of a number, the report author is fully aware of:-

- the need to limit the number of pump starts per hours to ensure longevity;
- the need for provide a robust and durable design approach – which includes a Duty plus a Standby Pump unit;
- To ensure regular switching of the 2 pump units between Duty and Standby – determined in the Control Panel;
- the need to have a minimum of 4 level sensors inside the pimp station which are from bottom to top controlling:-

1) Pump Stop – this is the lowest water level.
2) Duty Pump Start – Pump 1 start level.
3) Standby Pump Start – Pump 2 start level.
4) High Level Alarm – warning level that station contains more effluent than it should.

1.2.4. Emergency Storage

Emergency Storage should be provided above the High Level Alarm.

The requirements for Emergency Storage are set out in the Building Regulations Part H as well as Sewers for Adoption 7th Edition as used by Welsh Water. The larger value is detailed within Clause 2.39 of the Building Regulations Part H where is states 24-hours provision is required. SFA 7th requires 160 litres per dwelling as set out in Clause D4.5. At this site the 24-hours foul flow is 3.15 m^3/day or 3,150 litres.

To achieve this the scheme should include the Marsh Industries 4,500 litre foul pump station, see drawing in Appendix A. It can also be considered that some additional storage will be provided within the PTP.

1.2.5. Pump Operation and Dosing Chamber

BRE478 details many pumping regimes and control philosophies relating to the dose delivered each time the pump station operates, with many only being applicable to American drainage mound systems with small bore pressurised pipes across the entire top of the distribution layer.

At this site the pumps should operate no more than 10 times per day and therefore each pump cycle will transfer a minimum of 315 litres from the wet well into the drainage mound gravity 100mm diameter pipes, determined from 3.15m^3/day total flow, as agreed with the council. At a 5 l/s pump rate the pumps will operate for around 1 minute.

There will be a buffer chamber after the pumps, which also serves as the flow distribution chamber to ensure that there is an equal flow split into the looped perforated pipework laid within the upper gravel distribution layer. The typical detail of such a chamber is shown within the Building Regulation Part H Diagram 1, repeated here as Figure 2. It is shown on the drawings as chamber F1007.

There will be a weir wall inside this chamber to ensure the pumps deliver against a constant head. The weir wall also reduces the forward velocity of the pumped flow before it passes into the minimum two 100mm diameter distribution pipes that allow the effluent into the gravel distribution layer. Each 100mm diameter pipe laid at 1 in 200 can carry 4 l/s. The buffer chamber thus also provides a balancing arrangement if the pumps deliver at a rate faster than the pipework can handle. For these reasons the buffer chamber will be at least 900mm in diameter and 500mm in height.

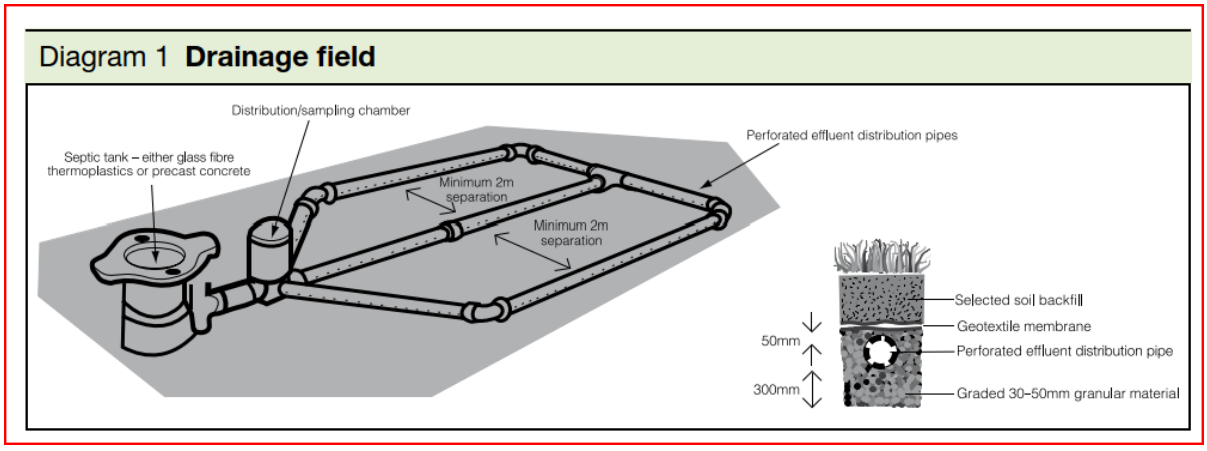


Figure 2: Extract of The Building Regulations Part H – Diagram 1 Drainage Field Pipework

1.3. SuDS Maintenance and Management

Maintenance is required for any drainage system to maintain the performance such that it delivers what the design determined. For the surface water and SuDS system these tasks are as set out below.

A proposed maintenance schedule is shown in the table below and breaks down the maintenance requirements of the various proposed assets, whilst also meeting the CIRIA C753 SuDS Manual guidance.

Drainage Asset	Responsible Organisation	Maintenance Work	Frequency
Pipework / Manholes	Private Ownership / Management Company	Inspect pipework and clear blockages	Annually or after severe storms.
		Inspect manholes and clear blockages	
		Repair any defects in the network	
		Ensure vegetation is being kept clear of chamber covers to maintain visibility of their location.	
Flow Control Chamber	Private Ownership / Management Company	Inspect structure and remove any excessive silt build-up	Monthly during construction and then annually or after severe storms
		Inspect all pipework	Annually or after severe storms
		Inspect the manhole structure	
		Inspect flow controls and remove any debris. Ensure any moving parts are operating freely, including any pivoting bypass doors, plus the pull mechanism at ground level. Open and reclose any bypass or drain down penstock to ensure it operates correctly.	
		Replace or repair any malfunctioning parts or structures	
		Inspect for evidence of poor operation	6 monthly
		Visually inspect flow control structure to ensure it is operating as per original design data	5 yearly

Attenuation Storage Basin	Private Ownership / Management Company	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) or inside the basin.	Monthly
		Inspect banksides, structures, pipework, etc. for evidence of physical damage	Annually
		Remove sediment from pre-treatment structures and/or internal forebays	
		Repair/rehabilitate inlets, outlets and overflows	As required
		Inspect/check all inlets, outlets and overflows to ensure that they are in good condition and operating as designed	Annually
		Inspect inside the basin, forebay, inlets and outlets for sediment build-up and remove if necessary	Every 5 years or as required

BASINS, PONDS AND WETLANDS	
Regular Maintenance	**Frequency**
Grass Mow grass access paths and verges surrounding basins, ponds and wetlands areas at 35mm-50mm minimum and 75mm maximum or as specified to provide a cared for appearance and allow pedestrian access.	Monthly or as required
Mow rough grass areas for occasional access or habitat reasons at 100mm and maximum 150mm with cuttings removed to wildlife piles	As required 4-6 times annually
Grass areas not required for access may be managed for wildlife interest and to reduce costs. 2 cuts in July and September or 1 cut annually in September or October as specified and cuttings removed to wildlife piles.	Annually or as required
Wet woodland management Follow any detailed landscape specification. Cuttings left in situ or removed to wildlife piles.	Annually or as required
Wetland vegetation Cut (strim) at 100mm with cuttings removed to wildlife piles September - October or Maintain as a mosaic to be cut 25-30% in any one year at 100mm in September or October with cuttings removed to wildlife pile.	Annually or as required
Occasional Tasks	**Frequency**
Where silt accumulates on apron or area in front of inlet or outlet then remove and land apply within design profile of SuDS Where silt accumulates more than 150mm in base of wetland undertake a phased removal of silt subject to Client approval. Confirm whether a liner is present to hold water or prevent pollution of groundwater and protect. Remove silt as instructed but not more than 30% of pond or wetland area at any one time and to an agreed depth but not subsoil layer. Retain as much representative existing vegetation as possible to ensure rapid re-colonisation of open areas. Stack excavated material adjacent to wetland to allow de-watering of silt. Undertake silt removal during September-October to minimise impact on wildlife and ensure re-growth of aquatic vegetation before winter. Spread excavated material on site above SUDS design profile, e.g. top of banks, in accordance with E.A. Waste Exemption Guidance.	Annually or every 3 years as required

Remedial work	Frequency
Although not usually required this may be needed due to damage to liners or control structures.	Undertake as design details or as required

1.4. Foul Maintenance and Management

Maintenance is required for any drainage system to maintain the performance such that it delivers what the design determined. For the foul system these tasks are as set out below.

The foul treatment plant and adjacent pumping station shall be maintained as set out in the manufacturers documentation.

The drainage mound is an earth structure with gravity perforated pipes near the top. Ensure no animals are burrowing into the mound. If there are any signs that the distribution pipes are not fully functional then these can be rodded via the access points. Rodding should be undertaken every 2 year to maintain peak efficiency.

Maintenance of the package treatment plant can usually be undertaken by the manufacturer or their local agent. Alternatively a competent local drainage contractor, such as one that both installs and maintains PTP and pump stations, would offer a local and likely more responsive service. Whichever route the site management team decide upon they should ensure that both regular and emergency attention is included within the contract.

1.5. Condition 10 Data

The mitigation proposals at the site include a small orchard as set out in the report Nutrient Neutral Assessment & Mitigation Strategy, Report Ref: NNAMS/434.

Orchard Maintenance

Overall responsibility for the arranging the care and management of the orchard will remain with the applicant and current landowner. The landowner has the necessary equipment for grass cutting and pruning. The landowner could choose to employ a local competent ground and tree management company to take on the maintenance and monitoring of the orchard area. This is an option, but at all times this management plan must be followed.

Records must be kept throughout the lifespan of the orchard. A minimum of annual inspections shall be undertaken. The records should include but not be limited to the following details; tree type and rootstock purchased, supplier name and details, age/dimensions of the trees, date of planting. The ongoing inspection records should detail the date of the inspection, name of person or persons undertaking the inspection, any pruning or maintenance carried out in the period since the previous inspection and the dates thereof. The records should be kept safely, plus should be provided to the council within 14 days of any request.

Fruiting Trees

All trees should conform to an appropriate British Standard for trees and shrubs. The trees selected should be at least 2 years old and 1m tall.

The orchard will be managed and maintained to produce fruiting bodies relevant to the tree type. After the first 5 years the trees can be maintained as required to meet the then UK climate conditions. This would currently be that the fruiting trees should be pruned in winter between leaf fall and bud burst (between November and early March).

Planting - Year 1 (October to April)

Record tree type purchased, supplier and dimensions of the trees, plus date of planting.

Excavate a hole as recommended by tree supplier, but at least 5-10% wider than root ball of tree and equal to the root ball depth to be dug.

- Fork base and sides of hole to remove soil compaction.
- Plant tree with top of root ball at soil level.
- Excavated soil to be used to backfill around the root ball.
- Tree to be protected by a professional tree guard to prevent animal damage.
- Tree to be staked – with a stake at one third of the height of the tree. Place stake at 45-degree angle and attach to the trunk of the tree using an adjustable tree tie.
- Tree to be watered thoroughly on planting.

To reduce weeds that will compete for moisture, nutrients, space and light with the fruit trees either an area around the tree will be kept bare of vegetation or mulching will be utilised around each tree. The mulch shall cover an area around the tree of at least 1 square metre. The Tree Council recommend for apple trees that: -

“To help the fruit trees to establish it is important to keep the base of the tree largely free of weeds for at least five years. Mulching is the most efficient method of keeping weeds under control. Mulch should be applied immediately after planting, and one application of mulch is usually adequate for a number of years. However the trees will benefit from being remulched in years 2 or 3 and this is best applied early in the year when the ground is moist – but after all weeds have been cleared.

Mulch should be spread to a depth of 50 – 100mm and could be:

- wood chips – although not fresh ones because there is a danger of nitrogen loss from the soil as they degrade;
- composted bark;
- well-rotted lawn clippings – or grass clippings from the previous cut ;
- leaf litter.”

Management – Years 1 to 5 Winter

- Weed around base of trees (1m from base)
- Prune out dead, crossing or broken branches.
- Check tree ties, stakes and guards. Replace if needed.
- Remove and replace any trees that are dead or nearly dead.

Management – Years 1 to 5 Summer

- Check tree ties, stakes and guards. Replace as needed.
- Water trees twice weekly in periods of dry weather where it has not rained for 2 weeks.
- Harvest crop annually

The tree supplier has detailed that pruning in first two years will be to determine a good strong framework and height of trunk. Thereafter, pruning will consist of removing any weak or crossing branches. This will be carried out when the trees are dormant.

Management – Year 5

- Assess trees for establishment success, assess successes, and failures.
- Inspect trees for damage and ill health. Duplicate any tree that is severely damaged or in ill health by planting a new tree offset from the rest.
- Tree stakes and ties to be removed, if no longer required.
- Formative pruning should be carried out to ensure good shape on all trees.

Management – Year 6 to 10

- Annual inspection of trees for damage and ill health. Duplicate any tree that is severely damaged or in ill health by planting a new tree offset from the rest.
- Formative pruning if required.
- Harvest crop annually

Management – Year 10 onwards

- Assess trees for continued success, plus consider any issues.
- Update management approach if required.
- Inspect and where necessary prune trees on an annual basis.
- Harvest crop annually.
- Annual inspection of trees for damage and ill health. Duplicate any tree that is severely damaged or in ill health by planting a new tree offset from the rest.
- Remove any trees that are dead.

MAINTENANCE OF GRASSLAND UNDER ORCHARD

The management of the orchard also includes care of the grassland below and around the trees – with the grass to be mechanically cut as required through-out the year using a small mower. Cutting close to the trees should only be done using hand tools during suitable weather conditions to not negatively affect the orchard trees through ground compaction or root disturbance.

If the grassed areas need to be restored any cultivating of the soil in preparation of reseeding should be limited to a depth of 125mm.

The trees themselves will require pruning, including to promote healthy growth. Smaller cuttings less than 50mm can be left within the orchard or removed. Anything larger than 50mm should be removed.

No fertiliser or mulching will be applied to the grassed areas.

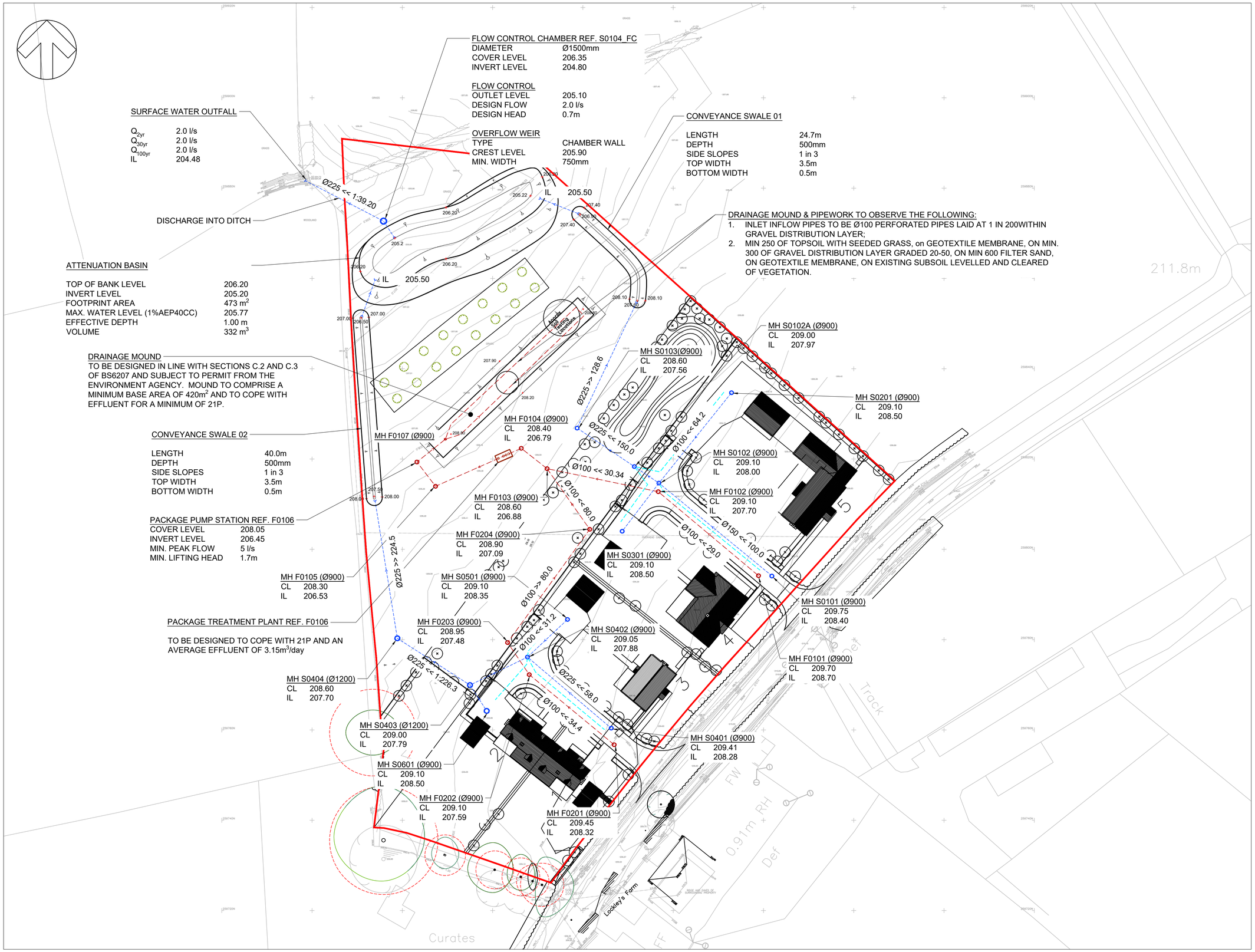
2. CONCLUSIONS

This Technical Note seeks to provide the required data to allow the discharge of Conditions 6 and 10 of planning approval 214539.

The key points detailed in this report are:-

- Drawings of the drainage systems that include plan locations, chamber locations and numbers, sizing of drainage elements plus gradients are included in Appendix A.
- The design report for the Surface Water and SuDS system is given in Appendix B.
- The design report for the Foul system is given in Appendix C.
- The maintenance schedules proposed in this report follow UK best practice plus they have been approved by Herefordshire Council on a number of other schemes.

APPENDIX A - DRAWINGS



GENERAL ARRANGEMENT

SCALE 1:400 @ A1

DO NOT SCALE

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm) AND ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM (mAOD) UNLESS STATED OTHERWISE.
2. THIS DRAWING WAS INFORMED BY SURFACE WATER MANAGEMENT AND FOUL DRAINAGE STRATEGY REF. L0338A.
3. FOR DETAILS OF ATTENUATION BASIN AND FOUL DRAINAGE MOUND REFER TO DRAWING REF. CWC0105-DR-002 AND CWC0105-DR-003.
4. THIS DRAINAGE LAYOUT PLAN IS SUBJECT TO AN INTER-DISCIPLINE STANDARD REVIEW.
5. THIS DRAWING WAS PREPARED FOR SUBMISSION AS PART OF A PLANNING APPLICATION. THE DESIGN SHOULD BE VERIFIED AND APPROVED BY THE CONTRACTOR, PRIOR TO COMMENCEMENT OF WORKS ON SITE.
6. STRUCTURAL FEATURES ASSOCIATED WITH DRAINAGE APPARATUS ARE SUBJECT TO A STRUCTURAL AND/OR GEO-TECHNICAL DESIGN BY CONTRACTOR OR OTHERS.
7. DISCHARGE OF TREATED EFFLUENT INTO GROUND SUBJECT TO PERMIT FROM THE ENVIRONMENT AGENCY.
8. SURFACE WATER RECEPTOR (DITCH) WITHIN OWNERSHIP OF CLIENT.
9. SURFACE WATER FILTER DRAINS TO BE LAID IN GRAVEL TRENCHES. INVERT LEVEL OF GRAVEL TRENCHES TO SUIT A COVER DEPTH BETWEEN 700mm AND 1200mm. ALL PERFORATED PIPES TO BE LINNED WITH PERMEABLE GEOTEXTILE ALONG THE RESPECTIVE PERIMETER.
10. CHMABER OVERFLOW MECHANISM TO CONSIST OF CHAMBER WALL OR OVERFLOW PIPE CONNECTION, AS REQUIRED AND SUBJECT TO ASSESSMENT OF SITE CONSTRAINTS DURING CONSTRUCTION.

KEY:

- SITE BOUNDARY
- ROOT PROTECTION AREA
- +43.93 FINISHED SPOT LEVEL

DRAINAGE PROPOSALS:

- PRIVATE SURFACE WATER NETWORK
- PRIVATE FOUL WATER NETWORK
- SURFACE WATER HEADWALL
- PACKAGED TREATMENT PLANT
- PROP. FILTER DRAIN UNDERNEATH PERMEABLE PAVING

REV	DATE	BY	DESCRIPTION	CHK
P03	25/04/2025	AC	CHAMBER F0106 & F0107 AMENDED	AC
P02	10/01/2025	JG	ISSUE FOR PLANNING	AC
P01	16/11/2024	–	ISSUE FOR COMMENT	AC

CLIENT:
COLIN ANDREWS
WITH
MIKE HARRIES CONSULTANCY & ESTATES LLP

SITE/PROJECT:
RESIDENTIAL DEVELOPMENT
AT
HATFIELD, HR6 0SG

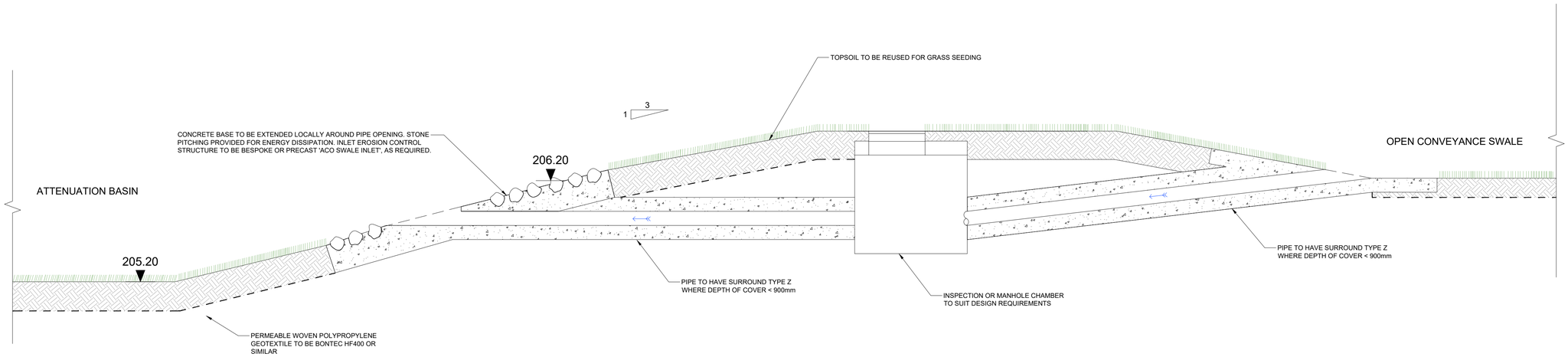
TITLE:
SURFACE & FOUL WATER
DRAINAGE LAYOUT PLAN

SCALE @ A1:	DESIGNED:	CHECKED:
1:400	JG	AC

STATUS: FOR COMMENT ONLY
DATE: JANUARY 2025

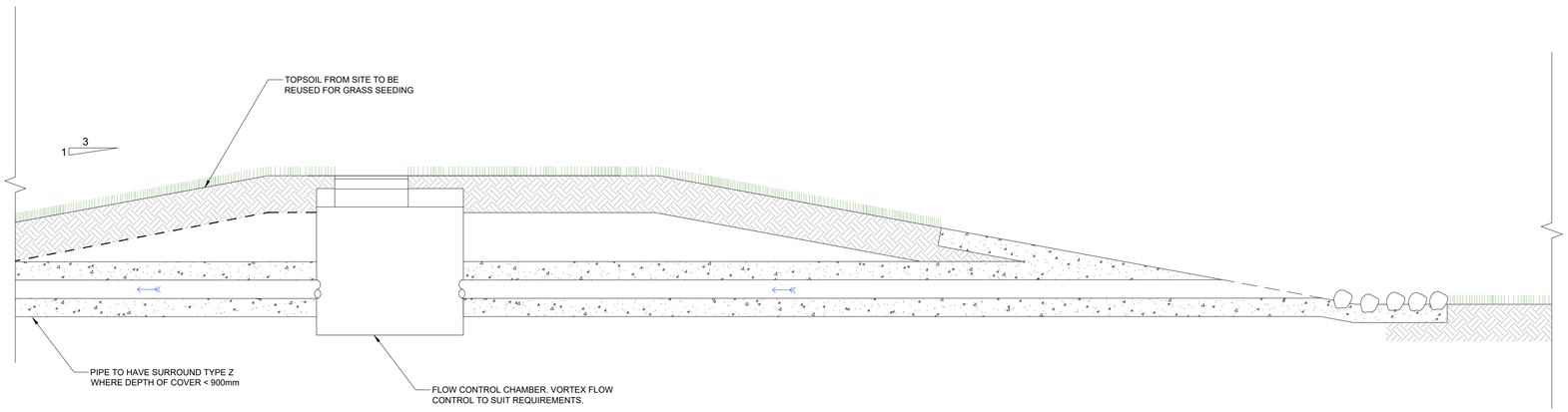
DRAWING No: CWC105-DR-01
REV: P02

CORNER WATER CONSULTING



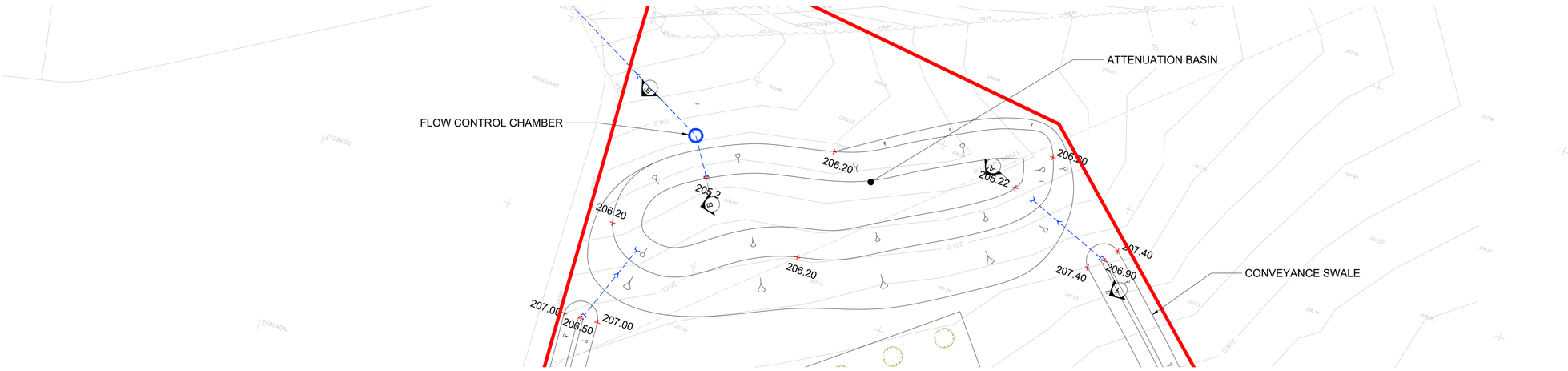
LONG-SECTION AA'

SCALE 1:25 @ A1



LONG-SECTION BB'

SCALE 1:25 @ A1



LOCATION PLAN

SCALE 1:100 @ A1

DO NOT SCALE

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm) AND ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM (mAOD) UNLESS STATED OTHERWISE.
2. THIS DRAWING WAS INFORMED BY SURFACE WATER MANAGEMENT AND FOUL DRAINAGE STRATEGY REF. L0338A.
3. FOR SURFACE AND FOUL WATER DRAINAGE LAYOUT PLAN REFER TO DRAWING REF. CWC0105-DR-001.
4. THIS DRAINAGE LAYOUT PLAN IS SUBJECT TO AN INTER-DISCIPLINE STANDARD REVIEW.
5. THIS DRAWING WAS PREPARED FOR SUBMISSION AS PART OF A PLANNING APPLICATION. THE DESIGN SHOULD BE VERIFIED AND APPROVED BY THE CONTRACTOR, PRIOR TO COMMENCEMENT OF WORKS ON SITE.
6. STRUCTURAL FEATURES ASSOCIATED WITH DRAINAGE APPARATUS ARE SUBJECT TO A STRUCTURAL AND/OR GEO-TECHNICAL DESIGN BY CONTRACTOR OR OTHERS.

REV	DATE	BY	DESCRIPTION	CHK
P01	16/11/2024	–	ISSUE FOR COMMENT	AC

CLIENT:
COLIN ANDREWS
WITH
MIKE HARRIES CONSULTANCY & ESTATES LLP

SITE/PROJECT:
RESIDENTIAL DEVELOPMENT
AT
HATFIELD, HR6 0SG

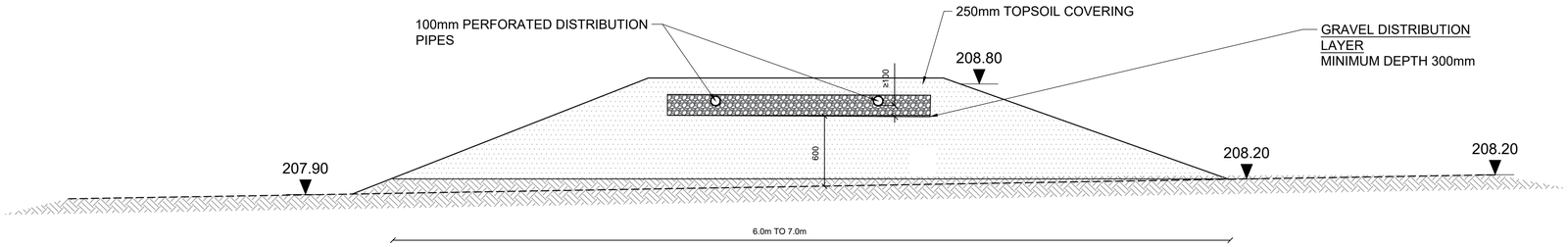
TITLE:
ATTENUATION BASIN
DETAILS

SCALE @ A1:	DESIGNED:	CHECKED:
1:400	JG	AC

STATUS:	DATE:
FOR PLANNING APPROVAL	JANUARY 2025

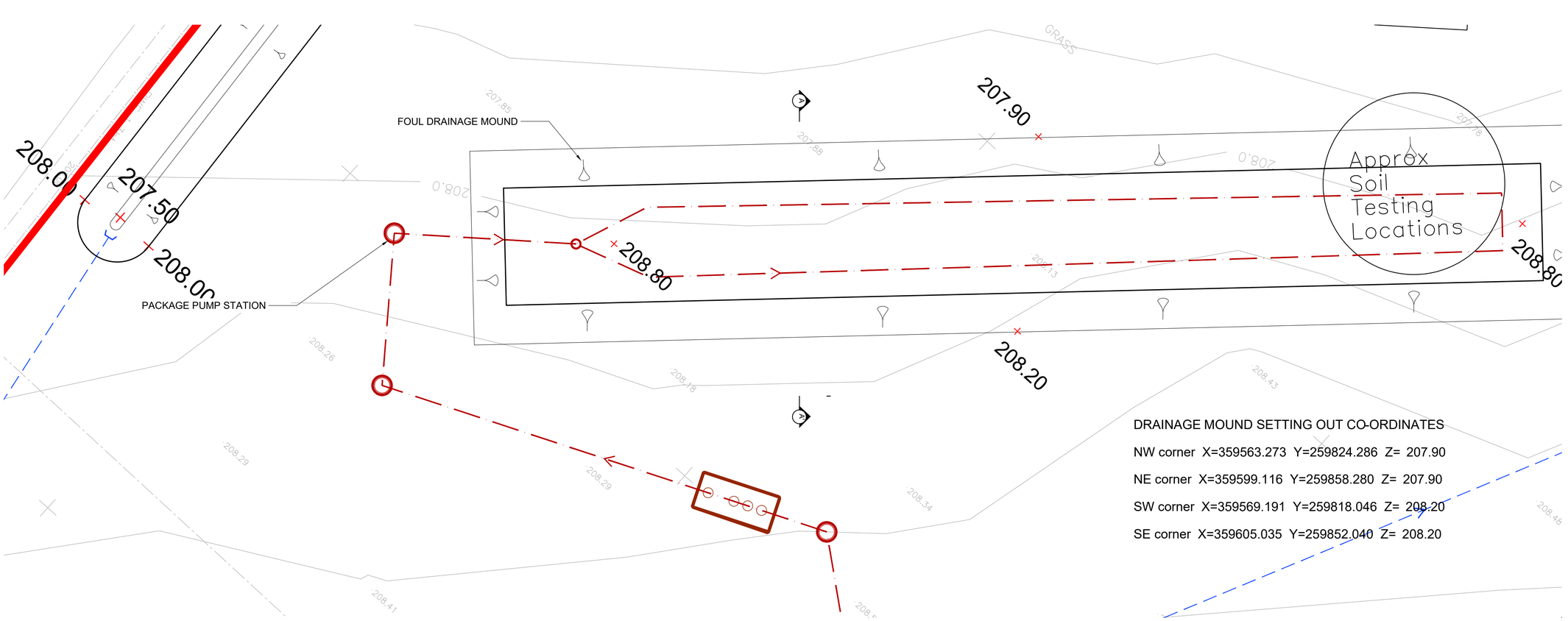
DRAWING No:	REV:
CWC105-DR-02	P01

CORNER WATER CONSULTING



CROSS-SECTION AA'

SCALE 1:25 @ A1



LOCATION PLAN

SCALE 1:100 @ A1

DRAINAGE MOUND SETTING OUT CO-ORDINATES

NW corner X=359563.273 Y=259824.286 Z= 207.90

NE corner X=359599.116 Y=259858.280 Z= 207.90

SW corner X=359569.191 Y=259818.046 Z= 208.20

SE corner X=359605.035 Y=259852.040 Z= 208.20

DO NOT SCALE

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm) AND ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM (mAOD) UNLESS STATED OTHERWISE.
2. THIS DRAWING WAS INFORMED BY SURFACE WATER MANAGEMENT AND FOUL DRAINAGE STRATEGY REF. L0338A.
3. FOR SURFACE AND FOUL WATER DRAINAGE LAYOUT PLAN REFER TO DRAWING REF. CWC0105-DR-001.
4. THIS DRAWING IS SUBJECT TO AN INTER-DISCIPLINE STANDARD REVIEW.
5. THIS DRAWING WAS PREPARED FOR SUBMISSION AS PART OF A PLANNING APPLICATION. THE DESIGN SHOULD BE VERIFIED AND APPROVED BY THE CONTRACTOR, PRIOR TO COMMENCEMENT OF WORKS ON SITE.
6. 6. STRUCTURAL FEATURES ASSOCIATED WITH DRAINAGE APPARATUS ARE SUBJECT TO A STRUCTURAL AND/OR GEO-TECHNICAL DESIGN BY CONTRACTOR OR OTHERS.

REV	DATE	BY	DESCRIPTION	CHK
P03	22/04/2025	AC	DRAINAGE MOUND DETAILS UPDATED	AC
P02	03/01/2025	JG	DRAINAGE MOUND DESIGNED TO SUIT NEW CRITERIA	AC
P01	16/11/2024	–	ISSUE FOR COMMENT	AC

CLIENT:
COLIN ANDREWS
WITH
MIKE HARRIES CONSULTANCY & ESTATES LLP

SITE/PROJECT:
RESIDENTIAL DEVELOPMENT
AT
HATFIELD, HR6 0SG

TITLE:
FOUL DRAINAGE MOUND
DETAILS

SCALE @ A1:	DESIGNED:	CHECKED:
1:400	JG	AC

STATUS:	DATE:
FOR PLANNING APPROVAL	JANUARY 2025

DRAWING No: CWC105-DR-03 REV: P03

CORNER WATER CONSULTING

MH/IC Schedule: Storm Network 1

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Sump (m)	Node Type	MH Type	Connections	Link	IL (m)	Dia (mm)	Link Type
S0101	359641.859	259794.038	209.750	1.350	900		MH/IC	Private		0	5.000	208.400	225	Circular
S0102	359616.810	259814.673	209.100	1.100	900		MH/IC	Private		1	7.000	208.100	100	Circular
										2	6.000	208.100	100	Circular
										3	5.000	208.075	225	Circular
										0	5.001	208.000	225	Circular
S0102A	359612.640	259817.941	209.000	1.035	900		MH/IC	Private		1	8.000	208.778	100	Triple
										2	5.001	207.965	225	Circular
										0	5.002	207.965	225	Circular
S0103	359598.735	259826.880	208.600	0.745	900		MH/IC	Private		1	5.002	207.855	225	Circular
										0	5.003_1	207.855	225	Circular
Gravel_0101	359615.962	259818.009	209.100	0.300			Junction			0	8.000	208.800	100	Triple
SWALE01.01	359612.022	259856.845	208.100	0.500			Junction			1	5.003_1	207.600	225	Circular
										0	5.003	207.600	500	1:3 Swale
SWALE01.04	359610.370	259864.035	208.000	0.500			Junction			1	5.003	207.500	500	1:3 Swale
										0	5.005	207.500	500	1:3 Swale
SWALE01.05	359599.314	259874.185	207.400	0.500			Junction			1	5.005	206.900	500	1:3 Swale
										0	5.006	206.900	225	Circular
outfall	359538.384	259881.636	205.120	0.520	1200		MH/IC	Private		1	1.007	204.600	100	Circular
S0401	359606.269	259760.397	209.405	1.125	900		MH/IC	Private		0	1.000	208.280	225	Circular
S0402	359587.700	259776.135	209.050	1.192	900		MH/IC	Private		1	2.000	207.958	100	Circular
										2	1.000	207.860	225	Circular
										0	1.001	207.858	225	Circular
S0403	359574.981	259769.936	209.000	1.210	1200		MH/IC	Private		1	4.000	208.450	100	Circular
										2	3.000	208.621	100	Double
										3	1.001	207.795	225	Circular
										0	1.002	207.790	225	Circular
SWALE02.01	359553.490	259813.515	208.000	0.500	600		Junction			1	1.003_1	207.545	225	Circular
										0	1.003	207.500	500	1:3 Swale
SWALE02.02	359550.830	259851.447	207.000	0.500	1200		Junction			1	1.003	206.500	500	1:3 Swale
										0	1.004	206.500	225	Circular
S0501	359596.587	259784.517	209.100	0.750	600		MH/IC	Private		0	2.000	208.350	100	Circular
S0201	359632.921	259834.681	209.100	0.600	900		MH/IC	Private		0	6.000	208.500	100	Circular
S0301	359608.159	259804.143	209.100	0.600	900		MH/IC	Private		0	7.000	208.500	100	Circular
S0601	359579.915	259764.354	209.100	0.600	600		MH/IC	Private		0	4.000	208.500	100	Circular
S0404	359559.052	259780.304	208.600	0.905	900		MH/IC	Private		1	1.002	207.706	225	Circular
										0	1.003_1	207.695	225	Circular
Gravel_0102	359587.446	259773.426	209.050	0.300			Junction			0	3.000	208.750	100	Double
BASIN	359575.168	259872.645	206.200	1.000			Junction			1	5.006	205.500	225	Circular
										2	1.004	205.500	225	Circular
										0	1.005	205.200	225	Circular
S0104_FC	359555.843	259872.689	206.350	1.550	1500	0.300	MH/IC	Private		1	1.005	205.100	225	Circular
										0	1.007	205.100	100	Circular

MH/IC Schedule: Foul Network 1

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Node Type	MH Type	Connections	Link	IL (m)	Link Type
F0201	359606.927	259756.732	209.450	1.130	MH/IC	Private		0	1.000	208.320	Circular
F0202	359588.111	259772.260	209.100	1.510	MH/IC	Private		1	1.000	207.590	Circular
								0	1.001	207.590	Circular
F0203	359583.318	259779.355	208.950	1.470	MH/IC	Private		1	1.001	207.480	Circular
								0	1.002	207.480	Circular
F0204	359601.508	259804.445	208.900	1.810	MH/IC	Private		1	1.002	207.090	Circular
								0	1.003	207.090	Circular
F0103	359592.057	259817.874	208.600	1.720	MH/IC	Private		1	2.001	206.880	Circular
								2	1.003	206.880	Circular
								0	1.004	206.880	Circular
F0104	359586.344	259822.379	208.400	1.610	MH/IC	Private		1	1.004	206.790	Circular
								0	1.005	206.790	Circular
F0105	359567.359	259813.973	208.300	1.770	MH/IC	Private		1	1.005	206.530	Circular
								0	1.006	206.530	Circular
F0106	359563.234	259819.346	208.050	1.650	MH/IC	Private		1	1.006	206.450	Circular
								0	1.007	206.450	Circular
F0107	359569.530	259824.394	208.950	0.900	MH/IC	Private		1	1.007	208.450	Circular
								0'	1.008	208.450	Circular
								0	1.008	208.450	Circular
F0101	359638.900	259794.169	209.700	1.000	MH/IC	Private		0	2.000	208.700	Circular
F0102	359616.687	259812.770	209.100	1.400	MH/IC	Private		1	2.000	207.700	Circular
								0	2.001	207.700	Circular

Pipeline Schedule: Storm Network 1

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth	DS CL (m)	DS IL (m)	DS Depth	US Node	Dia (mm)	Sump (m)	Node Type	MH Type	DS Node	Dia (mm)	Sump (m)	Node Type	MH Type
5.000	32.454	99.9	225	Circular	209.750	208.400	1.200	209.100	208.075	0.875	S0101	900		MH/IC	Private	S0102	900		MH/IC	Private
5.001	5.298	151.4	225	Circular	209.100	208.000	0.875	209.000	207.965	0.810	S0102	900		MH/IC	Private	S0102A	900		MH/IC	Private
5.003_1	32.790	128.6	225	Circular	208.600	207.855	0.520	208.100	207.600	0.275	S0103	900		MH/IC	Private	SWALE01.01			Junction	
5.003	7.377	73.8	500	1:3 Swale	208.100	207.600	0.000	208.000	207.500	0.000	SWALE01.01			Junction		SWALE01.04			Junction	
5.005	15.009	25.0	500	1:3 Swale	208.000	207.500	0.000	207.400	206.900	0.000	SWALE01.04			Junction		SWALE01.05			Junction	
5.006	24.195	17.3	225	Circular	207.400	206.900	0.275	206.200	205.500	0.475	SWALE01.05			Junction		BASIN			Junction	
1.000	24.341	58.0	225	Circular	209.405	208.280	0.900	209.050	207.860	0.965	S0401	900		MH/IC	Private	S0402	900		MH/IC	Private
2.000	12.216	31.2	100	Circular	209.100	208.350	0.650	209.050	207.958	0.992	S0501	600		MH/IC	Private	S0402	900		MH/IC	Private
6.000	25.688	64.2	100	Circular	209.100	208.500	0.500	209.100	208.100	0.900	S0201	900		MH/IC	Private	S0102	900		MH/IC	Private
7.000	13.628	34.1	100	Circular	209.100	208.500	0.500	209.100	208.100	0.900	S0301	900		MH/IC	Private	S0102	900		MH/IC	Private
4.000	7.450	149.0	100	Circular	209.100	208.500	0.500	209.000	208.450	0.450	S0601	600		MH/IC	Private	S0403	1200		MH/IC	Private
3.000	12.944	100.3	100	Double	209.050	208.750	0.200	209.000	208.621	0.279	Gravel_0102			Junction		S0403	1200		MH/IC	Private
1.001	14.149	224.6	225	Circular	209.050	207.858	0.967	209.000	207.795	0.980	S0402	900		MH/IC	Private	S0403	1200		MH/IC	Private
1.002	19.006	226.3	225	Circular	209.000	207.790	0.985	208.600	207.706	0.669	S0403	1200		MH/IC	Private	S0404	900		MH/IC	Private
1.003_1	33.674	224.5	225	Circular	208.600	207.695	0.680	208.000	207.545	0.230	S0404	900		MH/IC	Private	SWALE02.01	-		Junction	
1.003	72.260	72.3	500	1:3 Swale	208.000	207.500	0.000	207.000	206.500	0.000	SWALE02.01	-		Junction		SWALE02.02	-		Junction	
1.004	32.382	32.4	225	Circular	207.000	206.500	0.275	206.200	205.500	0.475	SWALE02.02	-		Junction		BASIN			Junction	
1.005	19.325	193.3	225	Circular	206.350	205.200	0.775	206.350	205.100	0.875	BASIN			Junction		S0104_FC	1500	0.300	MH/IC	Private
1.007	19.618	39.2	100	Circular	206.200	205.100	1.000	205.120	204.600	0.420	S0104_FC	1500	0.300	MH/IC	Private	outfall	1200		MH/IC	Private
8.000	3.323	151.0	100	Triple	209.100	208.800	0.200	209.000	208.778	0.122	Gravel_0101			Junction		S0102A	900		MH/IC	Private
5.002	16.554	150.5	225	Circular	209.000	207.965	0.810	208.600	207.855	0.520	S0102A	900		MH/IC	Private	S0103	900		MH/IC	Private

Pipeline Schedule: Foul Network 1

Link	Length (m)	Slope (1:X)	Link Type	US CL (m)	US IL (m)	DS CL (m)	DS IL (m)	US Node	Node Type	MH Type	DS Node	Node Type	MH Type
1.000	24.396	34.4	Circular	209.450	208.320	209.100	207.590	F0201	MH/IC	-	F0202	MH/IC	-
1.001	8.562	80.0	Circular	209.100	207.590	208.950	207.480	F0202	MH/IC	-	F0203	MH/IC	-
1.002	30.990	80.0	Circular	208.950	207.480	208.900	207.090	F0203	MH/IC	-	F0204	MH/IC	-
1.003	16.421	80.0	Circular	208.900	207.090	208.600	206.880	F0204	MH/IC	-	F0103	MH/IC	-
1.004	7.276	80.0	Circular	208.600	206.880	208.400	206.790	F0103	MH/IC	-	F0104	MH/IC	-
1.005	20.763	80.0	Circular	208.400	206.790	208.300	206.530	F0104	MH/IC	-	F0105	MH/IC	-
1.006	6.774	80.0	Circular	208.300	206.530	208.050	206.450	F0105	MH/IC	-	F0106	MH/IC	-
1.007	8.070	-3.9	Circular	208.050	206.450	208.800	208.450	F0106	MH/IC	-	F0107	MH/IC	-
1.008	8.901	200.0	Circular	208.800	208.450	208.800	-	F0107	MH/IC	-	DRAINAGE MOUND	MH/IC	-
2.000	28.973	29.0	Circular	209.700	208.700	209.100	207.700	F0101	MH/IC	-	F0102	MH/IC	-
2.001	25.153	30.3	Circular	209.100	207.700	208.600	206.880	F0102	MH/IC	-	F0103	MH/IC	-

DO NOT SCALE

NOTES:

1. ALL DIMENSIONS ARE IN METERS (m) AND ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM (mAOD) UNLESS STATED OTHERWISE.
2. THE PIPELINE AND MANHOLE SCHEDULES SHOWN IN THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH DRAINAGE LAYOUT PLAN REV. CWC105-DR-01.

REV	DATE	BY	DESCRIPTION	CHK
P02	25/04/2025	AC	F1007 CL & DIAMETER AMENDED	AC
P01	03/01/2025	JG	ISSUE FOR COMMENT	AC

CLIENT:
COLIN ANDREWS
WITH
MIKE HARRIES CONSULTANCY & ESTATES LLP

SITE/PROJECT:
RESIDENTIAL DEVELOPMENT
AT
HATFIELD, HR6 0SG

TITLE:
SURFACE & FOUL WATER
MANHOLE & PIPELINE SCHEDULES

SCALE @ A1:	DESIGNED:	CHECKED:
-	JG	AC

STATUS:	DATE:
FOR PLANNING APPROVAL	JANUARY 2025

DRAWING No: CWC105-DR-04 REV: P02

CORNER WATER CONSULTING

APPENDIX B – SWMP DESIGN AND CALCULATIONS

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	0.900
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
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)
S0101	0.048	5.00	209.750	900	359641.859	259794.038	1.350
S0102			209.100	900	359616.810	259814.673	1.100
S0102A			209.000	900	359612.640	259817.941	1.035
S0103			208.600	900	359598.735	259826.880	0.745
Gravel_0101	0.061	5.00	209.100		359615.962	259818.009	0.300
SWALE01.01			208.100	600	359612.022	259856.845	0.500
SWALE01.04			208.000	600	359610.370	259864.035	0.500
SWALE01.05			207.400	600	359599.314	259874.185	0.500
outfall			205.120	1200	359538.384	259881.636	0.520
S0401	0.027	5.00	209.405	900	359606.269	259760.397	1.125
S0402	0.029	5.00	209.050	900	359587.700	259776.135	1.192
S0403			209.000	1200	359574.981	259769.936	1.210
SWALE02.01			208.000	600	359553.490	259813.515	0.500
SWALE02.02			207.000	600	359550.830	259851.447	0.500
S0501	0.015	5.00	209.100	600	359596.587	259784.517	0.750
S0201	0.006	5.00	209.100	900	359632.921	259834.681	0.600
S0301	0.004	5.00	209.100	900	359608.159	259804.143	0.600
S0601		5.00	209.100	600	359579.915	259764.354	0.600
S0404			208.600	900	359559.052	259780.304	0.905
Gravel_0102	0.017	5.00	209.050		359587.446	259773.426	0.300
BASIN			206.200		359575.168	259872.645	1.000
S0104_FC			206.350	1500	359555.843	259872.689	1.550

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	S0101	S0102	32.454	0.600	208.400	208.075	0.325	99.9	225	5.41	50.0
5.001	S0102	S0102A	5.298	0.600	208.000	207.965	0.035	151.4	225	5.53	50.0
5.003_1	S0103	SWALE01.01	32.790	0.600	207.855	207.600	0.255	128.6	225	6.26	50.0
5.003	SWALE01.01	SWALE01.04	7.377	0.030	207.600	207.500	0.100	73.8	500	6.34	50.0
5.005	SWALE01.04	SWALE01.05	15.009	0.030	207.500	206.900	0.600	25.0	500	6.43	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)
5.000	1.308	52.0	6.6	1.125	0.800	0.048	0.0
5.001	1.060	42.2	7.8	0.875	0.810	0.058	0.0
5.003_1	1.151	45.8	16.1	0.520	0.275	0.119	0.0
5.003	1.566	1370.6	16.1	0.000	0.000	0.119	0.0
5.005	2.690	2353.8	16.1	0.000	0.000	0.119	0.0

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)
5.006	SWALE01.05	BASIN	24.195	0.030	206.900	205.500	1.400	17.3	225	6.78	50.0
1.000	S0401	S0402	24.341	0.600	208.280	207.860	0.420	58.0	225	5.24	50.0
2.000	S0501	S0402	12.216	0.600	208.350	207.958	0.392	31.2	100	5.15	50.0
6.000	S0201	S0102	25.688	0.600	208.500	208.100	0.400	64.2	100	5.44	50.0
7.000	S0301	S0102	13.628	0.600	208.500	208.100	0.400	34.1	100	5.17	50.0
4.000	S0601	S0403	7.450	0.600	208.500	208.450	0.050	150.0	100	5.20	50.0
3.000	Gravel_0102	S0403	12.944	0.600	208.750	208.621	0.129	100.3	100	5.28	50.0
1.001	S0402	S0403	14.149	0.600	207.858	207.795	0.063	225.0	225	5.51	50.0
1.002	S0403	S0404	19.006	0.600	207.790	207.706	0.084	225.0	225	5.87	50.0
1.003_1	S0404	SWALE02.01	33.674	0.600	207.695	207.545	0.150	225.0	225	6.52	50.0
1.003	SWALE02.01	SWALE02.02	72.260	0.600	207.500	206.500	1.000	72.3	500	6.82	50.0
1.004	SWALE02.02	BASIN	32.382	0.600	206.500	205.500	1.000	32.4	225	7.06	50.0
1.005	BASIN	S0104_FC	19.325	0.600	205.200	205.100	0.100	193.3	225	7.40	50.0
1.007	S0104_FC	outfall	19.618	0.600	205.100	204.600	0.500	39.2	225	7.56	50.0
8.000	Gravel_0101	S0102A	3.323	0.600	208.800	208.778	0.022	151.0	100	5.09	50.0
5.002	S0102A	S0103	16.554	0.600	207.965	207.855	0.110	150.5	225	5.79	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)
5.006	1.177	46.8	16.1	0.275	0.475	0.119	0.0
1.000	1.721	68.4	3.7	0.900	0.965	0.027	0.0
2.000	1.387	10.9	2.1	0.650	0.992	0.015	0.0
6.000	0.962	7.6	0.8	0.500	0.900	0.006	0.0
7.000	1.326	10.4	0.5	0.500	0.900	0.004	0.0
4.000	0.625	4.9	0.0	0.500	0.450	0.000	0.0
3.000	0.767	12.1	2.3	0.200	0.279	0.017	0.0
1.001	0.867	34.5	9.7	0.967	0.980	0.072	0.0
1.002	0.867	34.5	12.0	0.985	0.669	0.089	0.0
1.003_1	0.867	34.5	12.0	0.680	0.230	0.089	0.0
1.003	3.998	3498.2	12.0	0.000	0.000	0.089	0.0
1.004	2.307	91.7	12.0	0.275	0.475	0.089	0.0
1.005	0.937	37.2	28.1	0.775	1.025	0.207	0.0
1.007	2.094	83.3	28.1	1.025	0.295	0.207	0.0
8.000	0.623	14.7	8.3	0.200	0.122	0.061	0.0
5.002	1.063	42.3	16.1	0.810	0.520	0.119	0.0

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	32.454	99.9	225	Circular	209.750	208.400	1.125	209.100	208.075	0.800
5.001	5.298	151.4	225	Circular	209.100	208.000	0.875	209.000	207.965	0.810
5.003_1	32.790	128.6	225	Circular	208.600	207.855	0.520	208.100	207.600	0.275
5.003	7.377	73.8	500	1:3 Swale	208.100	207.600	0.000	208.000	207.500	0.000

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
5.000	S0101	900	Manhole	Adoptable	S0102	900	Manhole	Adoptable
5.001	S0102	900	Manhole	Adoptable	S0102A	900	Manhole	Adoptable
5.003_1	S0103	900	Manhole	Adoptable	SWALE01.01	600	Manhole	Adoptable
5.003	SWALE01.01	600	Manhole	Adoptable	SWALE01.04	600	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)
5.005	15.009	25.0	500	1:3 Swale	208.000	207.500	0.000	207.400	206.900	0.000
5.006	24.195	17.3	225	Circular	207.400	206.900	0.275	206.200	205.500	0.475
1.000	24.341	58.0	225	Circular	209.405	208.280	0.900	209.050	207.860	0.965
2.000	12.216	31.2	100	Circular	209.100	208.350	0.650	209.050	207.958	0.992
6.000	25.688	64.2	100	Circular	209.100	208.500	0.500	209.100	208.100	0.900
7.000	13.628	34.1	100	Circular	209.100	208.500	0.500	209.100	208.100	0.900
4.000	7.450	150.0	100	Circular	209.100	208.500	0.500	209.000	208.450	0.450
3.000	12.944	100.3	100	Double	209.050	208.750	0.200	209.000	208.621	0.279
1.001	14.149	225.0	225	Circular	209.050	207.858	0.967	209.000	207.795	0.980
1.002	19.006	225.0	225	Circular	209.000	207.790	0.985	208.600	207.706	0.669
1.003_1	33.674	225.0	225	Circular	208.600	207.695	0.680	208.000	207.545	0.230
1.003	72.260	72.3	500	1:3 Swale	208.000	207.500	0.000	207.000	206.500	0.000
1.004	32.382	32.4	225	Circular	207.000	206.500	0.275	206.200	205.500	0.475
1.005	19.325	193.3	225	Circular	206.200	205.200	0.775	206.350	205.100	1.025
1.007	19.618	39.2	225	Circular	206.350	205.100	1.025	205.120	204.600	0.295
8.000	3.323	151.0	100	Triple	209.100	208.800	0.200	209.000	208.778	0.122
5.002	16.554	150.5	225	Circular	209.000	207.965	0.810	208.600	207.855	0.520

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
5.005	SWALE01.04	600	Manhole	Adoptable	SWALE01.05	600	Manhole	Adoptable
5.006	SWALE01.05	600	Manhole	Adoptable	BASIN		Junction	
1.000	S0401	900	Manhole	Adoptable	S0402	900	Manhole	Adoptable
2.000	S0501	600	Manhole	Adoptable	S0402	900	Manhole	Adoptable
6.000	S0201	900	Manhole	Adoptable	S0102	900	Manhole	Adoptable
7.000	S0301	900	Manhole	Adoptable	S0102	900	Manhole	Adoptable
4.000	S0601	600	Manhole	Adoptable	S0403	1200	Manhole	Adoptable
3.000	Gravel_0102		Junction		S0403	1200	Manhole	Adoptable
1.001	S0402	900	Manhole	Adoptable	S0403	1200	Manhole	Adoptable
1.002	S0403	1200	Manhole	Adoptable	S0404	900	Manhole	Adoptable
1.003_1	S0404	900	Manhole	Adoptable	SWALE02.01	600	Manhole	Adoptable
1.003	SWALE02.01	600	Manhole	Adoptable	SWALE02.02	600	Manhole	Adoptable
1.004	SWALE02.02	600	Manhole	Adoptable	BASIN		Junction	
1.005	BASIN		Junction		S0104_FC	1500	Manhole	Adoptable
1.007	S0104_FC	1500	Manhole	Adoptable	outfall	1200	Manhole	Adoptable
8.000	Gravel_0101		Junction		S0102A	900	Manhole	Adoptable
5.002	S0102A	900	Manhole	Adoptable	S0103	900	Manhole	Adoptable

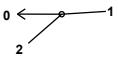
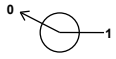
Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S0101	359641.859	259794.038	209.750	1.350	900				
						0	5.000	208.400	225
S0102	359616.810	259814.673	209.100	1.100	900		1	7.000	208.100	100
							2	6.000	208.100	100
							3	5.000	208.075	225
							0	5.001	208.000	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S0102A	359612.640	259817.941	209.000	1.035	900	1	8.000	208.778	100
						2	5.001	207.965	225
						0	5.002	207.965	225
S0103	359598.735	259826.880	208.600	0.745	900	1	5.002	207.855	225
						0	5.003_1	207.855	225
Gravel_0101	359615.962	259818.009	209.100	0.300		0	8.000	208.800	100
SWALE01.01	359612.022	259856.845	208.100	0.500	600	1	5.003_1	207.600	225
						0	5.003	207.600	500
SWALE01.04	359610.370	259864.035	208.000	0.500	600	1	5.003	207.500	500
						0	5.005	207.500	500
SWALE01.05	359599.314	259874.185	207.400	0.500	600	1	5.005	206.900	500
						0	5.006	206.900	225
outfall	359538.384	259881.636	205.120	0.520	1200	1	1.007	204.600	225
S0401	359606.269	259760.397	209.405	1.125	900	0	1.000	208.280	225
S0402	359587.700	259776.135	209.050	1.192	900	1	2.000	207.958	100
						2	1.000	207.860	225
						0	1.001	207.858	225
S0403	359574.981	259769.936	209.000	1.210	1200	1	4.000	208.450	100
						2	3.000	208.621	100
						3	1.001	207.795	225
						0	1.002	207.790	225
SWALE02.01	359553.490	259813.515	208.000	0.500	600	1	1.003_1	207.545	225
						0	1.003	207.500	500
SWALE02.02	359550.830	259851.447	207.000	0.500	600	1	1.003	206.500	500
						0	1.004	206.500	225
S0501	359596.587	259784.517	209.100	0.750	600	0	2.000	208.350	100

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S0201	359632.921	259834.681	209.100	0.600	900		0 6.000	208.500	100
S0301	359608.159	259804.143	209.100	0.600	900		0 7.000	208.500	100
S0601	359579.915	259764.354	209.100	0.600	600		0 4.000	208.500	100
S0404	359559.052	259780.304	208.600	0.905	900		1 1.002 0 1.003_1	207.706 207.695	225 225
Gravel_0102	359587.446	259773.426	209.050	0.300			0 3.000	208.750	100
BASIN	359575.168	259872.645	206.200	1.000			1 5.006 2 1.004 0 1.005	205.500 205.500 205.200	225 225 225
S0104_FC	359555.843	259872.689	206.350	1.550	1500		1 1.005 0 1.007	205.100 205.100	225 225

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	✓	Check Discharge Rate(s)	x
Rainfall Events	Singular	Drain Down Time (mins)	240	Check Discharge Volume	x
Summer CV	0.900	Additional Storage (m³/ha)	0.0		
Analysis Speed	Normal	Starting Level (m)			

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	0	0
30	0	0	0
30	35	10	0
100	0	0	0
100	45	10	0

Node S0104_FC Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	205.100	Product Number	CTL-SHE-0070-2000-0800-2000
Design Depth (m)	0.800	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	0

Node BASIN Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	205.200
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	190.2	0.0	1.000	473.0	0.0

Node Gravel_0102 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00360	Invert Level (m)	208.750	Slope (1:X)	64.5
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	2	Depth (m)	0.200
Safety Factor	2.0	Width (m)	9.800	Inf Depth (m)	0.200
Porosity	0.30	Length (m)	42.500		

Node Gravel_0101 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00360	Invert Level (m)	208.800	Slope (1:X)	64.5
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	3	Depth (m)	0.200
Safety Factor	2.0	Width (m)	13.400	Inf Depth (m)	0.200
Porosity	0.30	Length (m)	45.000		

Results for 2 year Critical Storm Duration. Lowest mass balance: 98.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S0101	10	208.458	0.058	7.5	0.0367	0.0000	OK
15 minute summer	S0102	11	208.084	0.084	8.6	0.0536	0.0000	OK
15 minute summer	S0102A	11	208.073	0.108	17.8	0.0685	0.0000	OK
15 minute summer	S0103	11	207.958	0.103	17.9	0.0655	0.0000	OK
15 minute summer	Gravel_0101	10	208.860	0.060	9.4	0.1399	0.0000	OK
15 minute summer	SWALE01.01	11	207.677	0.077	18.0	0.0219	0.0000	OK
15 minute summer	SWALE01.04	12	207.556	0.056	17.8	0.0158	0.0000	OK
15 minute summer	SWALE01.05	12	206.996	0.096	17.7	0.0271	0.0000	OK
15 minute summer	outfall	1	204.600	0.000	2.0	0.0000	0.0000	OK
15 minute summer	S0401	10	208.318	0.037	4.2	0.0238	0.0000	OK
15 minute summer	S0402	10	207.949	0.091	11.0	0.0581	0.0000	OK
15 minute summer	S0403	11	207.892	0.102	13.4	0.1149	0.0000	OK
15 minute summer	SWALE02.01	12	207.537	0.037	13.2	0.0105	0.0000	OK
15 minute summer	SWALE02.02	13	206.556	0.056	13.1	0.0158	0.0000	OK
15 minute summer	S0501	10	208.383	0.033	2.4	0.0092	0.0000	OK
15 minute summer	S0201	11	208.523	0.023	0.9	0.0144	0.0000	OK
15 minute summer	S0301	10	208.516	0.016	0.6	0.0101	0.0000	OK
15 minute summer	S0601	1	208.500	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S0404	12	207.794	0.099	13.4	0.0627	0.0000	OK
15 minute summer	Gravel_0102	10	208.782	0.031	2.6	0.0316	0.0000	OK
360 minute summer	BASIN	248	205.309	0.109	8.3	22.3767	0.0000	OK
240 minute summer	S0104_FC	160	205.320	0.220	5.5	0.3891	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	S0101	5.000	S0102	7.3	0.922	0.140	0.2566	
15 minute summer	S0102	5.001	S0102A	8.7	0.539	0.207	0.0856	
15 minute summer	S0102A	5.002	S0103	17.9	0.985	0.425	0.3017	
15 minute summer	S0103	5.003_1	SWALE01.01	18.0	1.212	0.393	0.4876	
15 minute summer	Gravel_0101	8.000	S0102A	9.2	0.648	0.627	0.0472	
15 minute summer	Gravel_0101	Infiltration		0.0				
15 minute summer	SWALE01.01	5.003	SWALE01.04	17.8	0.597	0.013	0.2228	
15 minute summer	SWALE01.04	5.005	SWALE01.05	17.7	0.523	0.008	0.5613	
15 minute summer	SWALE01.05	5.006	BASIN	17.5	1.088	0.373	0.3885	
15 minute summer	S0401	1.000	S0402	4.2	0.460	0.061	0.2312	
15 minute summer	S0402	1.001	S0403	10.8	0.699	0.314	0.2220	
15 minute summer	S0403	1.002	S0404	13.4	0.805	0.389	0.3167	
15 minute summer	SWALE02.01	1.003	SWALE02.02	13.1	0.809	0.004	1.3133	
15 minute summer	SWALE02.02	1.004	BASIN	12.2	1.603	0.133	0.2456	
15 minute summer	S0501	2.000	S0402	2.4	1.090	0.218	0.0266	
15 minute summer	S0201	6.000	S0102	0.8	0.633	0.111	0.0339	
15 minute summer	S0301	7.000	S0102	0.6	0.698	0.053	0.0108	
15 minute summer	S0601	4.000	S0403	0.0	0.000	0.000	0.0000	
15 minute summer	S0404	1.003_1	SWALE02.01	13.2	0.814	0.383	0.5471	
15 minute summer	Gravel_0102	3.000	S0403	2.5	0.607	0.210	0.0541	
15 minute summer	Gravel_0102	Infiltration		0.0				
360 minute summer	BASIN	1.005	S0104_FC	5.8	0.257	0.156	0.5645	
240 minute summer	S0104_FC	Hydro-Brake®	outfall	2.0				36.4

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S0101	10	208.495	0.095	18.6	0.0604	0.0000	OK
15 minute summer	S0102	11	208.191	0.191	22.1	0.1213	0.0000	OK
15 minute summer	S0102A	11	208.178	0.213	43.1	0.1355	0.0000	OK
15 minute summer	S0103	11	208.038	0.183	42.9	0.1161	0.0000	OK
15 minute summer	Gravel_0101	11	208.930	0.130	23.4	0.6408	0.0000	FLOOD RISK
15 minute summer	SWALE01.01	12	207.715	0.115	42.7	0.0325	0.0000	OK
15 minute summer	SWALE01.04	12	207.587	0.087	42.8	0.0245	0.0000	OK
15 minute summer	SWALE01.05	13	207.068	0.168	42.9	0.0474	0.0000	OK
15 minute summer	outfall	1	204.600	0.000	2.0	0.0000	0.0000	OK
15 minute summer	S0401	10	208.339	0.059	10.4	0.0374	0.0000	OK
15 minute summer	S0402	11	208.029	0.171	27.3	0.1088	0.0000	OK
15 minute summer	S0403	11	207.979	0.189	32.7	0.2135	0.0000	OK
15 minute summer	SWALE02.01	12	207.559	0.059	32.1	0.0168	0.0000	OK
15 minute summer	SWALE02.02	13	206.591	0.091	32.1	0.0258	0.0000	OK
15 minute summer	S0501	10	208.403	0.053	5.9	0.0149	0.0000	OK
15 minute summer	S0201	10	208.537	0.037	2.2	0.0233	0.0000	OK
15 minute summer	S0301	10	208.525	0.025	1.4	0.0157	0.0000	OK
15 minute summer	S0601	1	208.500	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S0404	11	207.874	0.179	32.7	0.1140	0.0000	OK
15 minute summer	Gravel_0102	10	208.802	0.052	6.5	0.0841	0.0000	OK
240 minute summer	BASIN	244	205.459	0.259	22.1	58.8419	0.0000	SURCHARGED
240 minute summer	S0104_FC	244	205.459	0.359	6.1	0.6344	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	S0101	5.000	S0102	18.5	1.137	0.356	0.5770	
15 minute summer	S0102	5.001	S0102A	20.8	0.589	0.494	0.1982	
15 minute summer	S0102A	5.002	S0103	42.9	1.161	1.015	0.6080	
15 minute summer	S0103	5.003_1	SWALE01.01	42.7	1.536	0.933	0.8984	
15 minute summer	Gravel_0101	8.000	S0102A	22.3	0.952	1.517	0.0750	
15 minute summer	Gravel_0101	Infiltration		0.1				
15 minute summer	SWALE01.01	5.003	SWALE01.04	42.8	0.769	0.031	0.4152	
15 minute summer	SWALE01.04	5.005	SWALE01.05	42.9	0.606	0.018	1.2692	
15 minute summer	SWALE01.05	5.006	BASIN	41.9	1.325	0.895	0.7644	
15 minute summer	S0401	1.000	S0402	10.3	0.541	0.151	0.4874	
15 minute summer	S0402	1.001	S0403	26.4	0.821	0.767	0.4749	
15 minute summer	S0403	1.002	S0404	32.7	0.997	0.949	0.6410	
15 minute summer	SWALE02.01	1.003	SWALE02.02	32.1	0.981	0.009	2.6063	
15 minute summer	SWALE02.02	1.004	BASIN	30.8	2.076	0.336	0.4812	
15 minute summer	S0501	2.000	S0402	5.9	1.318	0.541	0.0609	
15 minute summer	S0201	6.000	S0102	2.2	0.717	0.286	0.1289	
15 minute summer	S0301	7.000	S0102	1.4	0.813	0.132	0.0608	
15 minute summer	S0601	4.000	S0403	0.0	0.000	0.000	0.0000	
15 minute summer	S0404	1.003_1	SWALE02.01	32.1	1.031	0.931	1.0446	
15 minute summer	Gravel_0102	3.000	S0403	6.3	0.772	0.524	0.1061	
15 minute summer	Gravel_0102	Infiltration		0.0				
240 minute summer	BASIN	1.005	S0104_FC	6.1	0.232	0.165	0.7686	
240 minute summer	S0104_FC	Hydro-Brake®	outfall	2.0				49.9

Results for 30 year +35% CC +10% A Critical Storm Duration. Lowest mass balance: 98.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S0101	12	208.541	0.141	27.6	0.0898	0.0000	OK
15 minute summer	S0102	12	208.499	0.499	32.7	0.3175	0.0000	SURCHARGED
15 minute summer	S0102A	12	208.477	0.512	56.9	0.3254	0.0000	SURCHARGED
15 minute summer	S0103	12	208.230	0.375	55.5	0.2383	0.0000	SURCHARGED
15 minute summer	Gravel_0101	11	209.000	0.200	34.7	1.5024	0.0000	FLOOD RISK
15 minute summer	SWALE01.01	12	207.728	0.128	55.2	0.0363	0.0000	OK
15 minute summer	SWALE01.04	13	207.598	0.098	55.1	0.0277	0.0000	OK
15 minute summer	SWALE01.05	15	207.158	0.258	55.2	0.0731	0.0000	FLOOD RISK
15 minute summer	outfall	1	204.600	0.000	2.0	0.0000	0.0000	OK
15 minute summer	S0401	10	208.352	0.072	15.4	0.0458	0.0000	OK
15 minute summer	S0402	11	208.267	0.409	40.2	0.2599	0.0000	SURCHARGED
15 minute summer	S0403	11	208.172	0.382	45.9	0.4320	0.0000	SURCHARGED
15 minute summer	SWALE02.01	12	207.570	0.070	45.0	0.0199	0.0000	OK
15 minute summer	SWALE02.02	13	206.611	0.111	44.9	0.0314	0.0000	OK
15 minute summer	S0501	12	208.492	0.142	8.8	0.0401	0.0000	SURCHARGED
15 minute summer	S0201	10	208.546	0.046	3.3	0.0291	0.0000	OK
15 minute summer	S0301	10	208.530	0.030	2.1	0.0193	0.0000	OK
15 minute summer	S0601	1	208.500	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S0404	12	207.996	0.301	45.3	0.1912	0.0000	SURCHARGED
15 minute summer	Gravel_0102	10	208.818	0.068	9.7	0.1401	0.0000	OK
480 minute summer	BASIN	464	205.609	0.409	19.7	101.4853	0.0000	SURCHARGED
480 minute summer	S0104_FC	464	205.609	0.509	5.9	0.8992	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	S0101	5.000	S0102	27.4	1.156	0.526	1.0707	
15 minute summer	S0102	5.001	S0102A	25.7	0.660	0.609	0.2107	
15 minute summer	S0102A	5.002	S0103	55.5	1.396	1.313	0.6584	
15 minute summer	S0103	5.003_1	SWALE01.01	55.2	1.579	1.205	1.0353	
15 minute summer	Gravel_0101	8.000	S0102A	31.2	1.331	2.128	0.0772	
15 minute summer	Gravel_0101	Infiltration		0.1				
15 minute summer	SWALE01.01	5.003	SWALE01.04	55.1	0.827	0.040	0.4966	
15 minute summer	SWALE01.04	5.005	SWALE01.05	55.2	0.611	0.023	2.3695	
15 minute summer	SWALE01.05	5.006	BASIN	49.7	1.341	1.061	0.9048	
15 minute summer	S0401	1.000	S0402	15.3	0.576	0.224	0.6171	
15 minute summer	S0402	1.001	S0403	36.5	0.917	1.057	0.5627	
15 minute summer	S0403	1.002	S0404	45.3	1.138	1.312	0.7559	
15 minute summer	SWALE02.01	1.003	SWALE02.02	44.9	1.031	0.013	3.4807	
15 minute summer	SWALE02.02	1.004	BASIN	43.5	2.265	0.474	0.6218	
15 minute summer	S0501	2.000	S0402	8.3	1.307	0.765	0.0956	
15 minute summer	S0201	6.000	S0102	3.2	0.702	0.429	0.1454	
15 minute summer	S0301	7.000	S0102	2.1	0.787	0.200	0.0670	
15 minute summer	S0601	4.000	S0403	0.0	0.000	0.000	0.0000	
15 minute summer	S0404	1.003_1	SWALE02.01	45.0	1.157	1.306	1.2353	
15 minute summer	Gravel_0102	3.000	S0403	9.4	0.843	0.783	0.1451	
15 minute summer	Gravel_0102	Infiltration		0.0				
480 minute summer	BASIN	1.005	S0104_FC	5.9	0.280	0.157	0.7686	
480 minute summer	S0104_FC	Hydro-Brake®	outfall	2.0				69.2

Results for 100 year Critical Storm Duration. Lowest mass balance: 98.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S0101	9	208.506	0.106	23.7	0.0672	0.0000	OK
15 minute summer	S0102	12	208.346	0.346	28.2	0.2202	0.0000	SURCHARGED
15 minute summer	S0102A	12	208.327	0.362	51.8	0.2300	0.0000	SURCHARGED
15 minute summer	S0103	12	208.129	0.274	50.8	0.1742	0.0000	SURCHARGED
15 minute summer	Gravel_0101	11	208.971	0.171	29.8	1.0956	0.0000	FLOOD RISK
15 minute summer	SWALE01.01	12	207.722	0.122	49.2	0.0345	0.0000	OK
15 minute summer	SWALE01.04	13	207.593	0.093	49.0	0.0262	0.0000	OK
15 minute summer	SWALE01.05	14	207.096	0.195	49.0	0.0553	0.0000	OK
15 minute summer	outfall	1	204.600	0.000	2.0	0.0000	0.0000	OK
15 minute summer	S0401	10	208.347	0.067	13.3	0.0424	0.0000	OK
15 minute summer	S0402	11	208.136	0.278	34.9	0.1769	0.0000	SURCHARGED
15 minute summer	S0403	11	208.061	0.271	40.5	0.3067	0.0000	SURCHARGED
15 minute summer	SWALE02.01	12	207.566	0.066	39.2	0.0186	0.0000	OK
15 minute summer	SWALE02.02	13	206.602	0.102	39.2	0.0289	0.0000	OK
15 minute summer	S0501	11	208.413	0.063	7.5	0.0177	0.0000	OK
15 minute summer	S0201	10	208.542	0.042	2.8	0.0266	0.0000	OK
15 minute summer	S0301	10	208.528	0.028	1.8	0.0178	0.0000	OK
15 minute summer	S0601	1	208.500	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S0404	12	207.931	0.236	39.9	0.1499	0.0000	SURCHARGED
15 minute summer	Gravel_0102	10	208.811	0.061	8.3	0.1140	0.0000	OK
360 minute summer	BASIN	360	205.542	0.342	20.4	81.6772	0.0000	SURCHARGED
360 minute summer	S0104_FC	360	205.542	0.442	5.8	0.7811	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	S0101	5.000	S0102	23.6	1.160	0.454	0.9336	
15 minute summer	S0102	5.001	S0102A	24.3	0.611	0.577	0.2107	
15 minute summer	S0102A	5.002	S0103	50.8	1.277	1.201	0.6584	
15 minute summer	S0103	5.003_1	SWALE01.01	49.2	1.573	1.075	1.0121	
15 minute summer	Gravel_0101	8.000	S0102A	27.5	1.171	1.872	0.0768	
15 minute summer	Gravel_0101	Infiltration		0.1				
15 minute summer	SWALE01.01	5.003	SWALE01.04	49.0	0.800	0.036	0.4565	
15 minute summer	SWALE01.04	5.005	SWALE01.05	49.0	0.613	0.021	1.5878	
15 minute summer	SWALE01.05	5.006	BASIN	47.9	1.346	1.024	0.8607	
15 minute summer	S0401	1.000	S0402	13.2	0.563	0.193	0.6033	
15 minute summer	S0402	1.001	S0403	32.4	0.852	0.938	0.5627	
15 minute summer	S0403	1.002	S0404	39.9	1.019	1.157	0.7555	
15 minute summer	SWALE02.01	1.003	SWALE02.02	39.2	1.018	0.011	3.0891	
15 minute summer	SWALE02.02	1.004	BASIN	37.8	2.187	0.412	0.5594	
15 minute summer	S0501	2.000	S0402	7.5	1.337	0.685	0.0793	
15 minute summer	S0201	6.000	S0102	2.8	0.720	0.366	0.1404	
15 minute summer	S0301	7.000	S0102	1.8	0.755	0.171	0.0655	
15 minute summer	S0601	4.000	S0403	0.0	0.000	0.000	0.0000	
15 minute summer	S0404	1.003_1	SWALE02.01	39.2	1.054	1.137	1.1990	
15 minute summer	Gravel_0102	3.000	S0403	8.1	0.817	0.672	0.1283	
15 minute summer	Gravel_0102	Infiltration		0.0				
360 minute summer	BASIN	1.005	S0104_FC	5.8	0.267	0.155	0.7686	
360 minute summer	S0104_FC	Hydro-Brake®	outfall	2.0				60.8

Results for 100 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 98.60%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S0101	12	209.033	0.633	37.7	0.4023	0.0000	SURCHARGED
15 minute summer	S0102	12	208.919	0.918	40.6	0.5842	0.0000	FLOOD RISK
15 minute summer	S0102A	12	208.881	0.916	70.9	0.5828	0.0000	FLOOD RISK
15 minute summer	S0103	13	208.495	0.639	70.3	0.4067	0.0000	FLOOD RISK
15 minute summer	Gravel_0101	12	209.079	0.279	47.5	2.9227	0.0000	FLOOD RISK
15 minute summer	SWALE01.01	13	207.742	0.142	69.0	0.0401	0.0000	OK
15 minute summer	SWALE01.04	13	207.609	0.109	69.1	0.0308	0.0000	OK
15 minute summer	SWALE01.05	16	207.364	0.464	69.1	0.1313	0.0000	FLOOD RISK
15 minute summer	outfall	1	204.600	0.000	2.0	0.0000	0.0000	OK
15 minute summer	S0401	12	208.657	0.377	21.2	0.2399	0.0000	SURCHARGED
15 minute summer	S0402	12	208.626	0.768	49.1	0.4883	0.0000	SURCHARGED
15 minute summer	S0403	12	208.482	0.692	59.5	0.7831	0.0000	SURCHARGED
15 minute summer	SWALE02.01	12	207.579	0.079	57.8	0.0225	0.0000	OK
15 minute summer	SWALE02.02	13	206.629	0.129	57.1	0.0365	0.0000	OK
15 minute summer	S0501	12	208.993	0.643	12.0	0.1819	0.0000	FLOOD RISK
15 minute summer	S0201	13	208.972	0.472	4.5	0.3000	0.0000	FLOOD RISK
15 minute summer	S0301	12	208.931	0.431	3.5	0.2743	0.0000	FLOOD RISK
15 minute summer	S0601	1	208.500	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S0404	12	208.184	0.489	57.8	0.3108	0.0000	SURCHARGED
15 minute summer	Gravel_0102	11	208.843	0.093	13.3	0.2557	0.0000	OK
480 minute summer	BASIN	488	205.764	0.564	27.0	152.2547	0.0000	SURCHARGED
480 minute summer	S0104_FC	488	205.764	0.664	5.5	1.1728	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	S0101	5.000	S0102	34.0	1.175	0.653	1.2907	
15 minute summer	S0102	5.001	S0102A	31.6	0.795	0.750	0.2107	
15 minute summer	S0102A	5.002	S0103	70.3	1.767	1.662	0.6584	
15 minute summer	S0103	5.003_1	SWALE01.01	69.0	1.888	1.507	1.0834	
15 minute summer	Gravel_0101	8.000	S0102A	39.4	1.680	2.685	0.0780	
15 minute summer	Gravel_0101	Infiltration		0.1				
15 minute summer	SWALE01.01	5.003	SWALE01.04	69.1	0.881	0.050	0.5845	
15 minute summer	SWALE01.04	5.005	SWALE01.05	69.1	0.607	0.029	6.1126	
15 minute summer	SWALE01.05	5.006	BASIN	52.9	1.342	1.130	0.9151	
15 minute summer	S0401	1.000	S0402	19.8	0.632	0.289	0.9681	
15 minute summer	S0402	1.001	S0403	46.9	1.178	1.359	0.5627	
15 minute summer	S0403	1.002	S0404	57.8	1.454	1.677	0.7559	
15 minute summer	SWALE02.01	1.003	SWALE02.02	57.1	1.064	0.016	4.3576	
15 minute summer	SWALE02.02	1.004	BASIN	55.4	2.398	0.605	0.7489	
15 minute summer	S0501	2.000	S0402	9.8	1.333	0.903	0.0956	
15 minute summer	S0201	6.000	S0102	4.3	0.728	0.575	0.2010	
15 minute summer	S0301	7.000	S0102	4.0	0.770	0.385	0.1066	
15 minute summer	S0601	4.000	S0403	0.0	0.000	0.000	0.0082	
15 minute summer	S0404	1.003_1	SWALE02.01	57.8	1.456	1.675	1.2918	
15 minute summer	Gravel_0102	3.000	S0403	12.6	0.878	1.049	0.1861	
15 minute summer	Gravel_0102	Infiltration		0.0				
480 minute summer	BASIN	1.005	S0104_FC	5.5	0.224	0.148	0.7686	
480 minute summer	S0104_FC	Hydro-Brake®	outfall	2.0				73.2

APPENDIX C – FOUL DESIGN AND CALCULATIONS

Design Settings

Frequency of use (kDU)	0.50	Minimum Velocity (m/s)	1.00
Flow per dwelling per day (l/day)	4000	Connection Type	Level Soffits
Domestic Flow (l/s/ha)	0.0	Minimum Backdrop Height (m)	0.200
Industrial Flow (l/s/ha)	0.0	Preferred Cover Depth (m)	1.200
Additional Flow (%)	0	Include Intermediate Ground	✓

Nodes

Name	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
F0201	209.450	1200	359606.927	259756.732	1.000
F0202	209.100	1200	359588.111	259772.260	1.360
F0203	208.950	1200	359583.318	259779.355	1.310
F0204	208.900	1200	359601.508	259804.445	1.650
F0103	208.600	1200	359592.057	259817.874	1.560
F0104	208.400	1200	359586.344	259822.379	1.460
F0105	208.300	1200	359567.359	259813.973	1.620
F0106	208.050		359563.234	259819.346	1.650
F0107	208.950	900	359569.530	259824.394	0.500
DRAINAGE MOUND	208.800		359576.352	259830.111	0.400
F0101	209.700	1200	359638.900	259794.169	1.000
F0102	209.100	1200	359616.687	259812.770	1.400

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
1.000	F0201	F0202	24.396	1.500	208.450	207.740	0.710	34.4	100
1.001	F0202	F0203	8.562	1.500	207.740	207.640	0.100	85.6	100
1.002	F0203	F0204	30.990	1.500	207.640	207.250	0.390	79.5	100
1.003	F0204	F0103	16.421	1.500	207.250	207.040	0.210	78.2	100
1.004	F0103	F0104	7.276	1.500	207.040	206.940	0.100	72.8	100
1.005	F0104	F0105	20.763	1.500	206.940	206.680	0.260	79.9	100
1.006	F0105	F0106	6.774	1.500	206.680	206.400	0.280	24.2	100
1.007	F0106	F0107	8.070	1.500	206.400	208.450	-2.050	-3.9	
1.008	F0107	DRAINAGE MOUND	8.901	1.500	208.450	208.400	0.050	178.0	
2.000	F0101	F0102	28.973	1.500	208.700	207.700	1.000	29.0	100
2.001	F0102	F0103	25.153	1.500	207.700	207.040	0.660	38.1	100

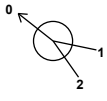
Name	Pro Vel @ 1/3 Q (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Dwellings (ha)	Σ Units (ha)	Σ Add Inflow (ha)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	0.000	1.138	8.9	0.0	0.900	1.260	0.000	0	0.0	0.0	0	0.000
1.001	0.000	0.719	5.6	0.0	1.260	1.210	0.000	0	0.0	0.0	0	0.000
1.002	0.000	0.746	5.9	0.0	1.210	1.550	0.000	0	0.0	0.0	0	0.000
1.003	0.000	0.752	5.9	0.0	1.550	1.460	0.000	0	0.0	0.0	0	0.000
1.004	0.000	0.780	6.1	0.0	1.460	1.360	0.000	0	0.0	0.0	0	0.000
1.005	0.000	0.744	5.8	0.0	1.360	1.520	0.000	0	0.0	0.0	0	0.000
1.006	0.000	1.357	10.7	0.0	1.520	1.550	0.000	0	0.0	0.0	0	0.000
1.007		1.000		0.0			0.000	0	0.0	0.0		
1.008		1.000		0.0			0.000	0	0.0	0.0		
2.000	0.000	1.239	9.7	0.0	0.900	1.300	0.000	0	0.0	0.0	0	0.000
2.001	0.000	1.080	8.5	0.0	1.300	1.460	0.000	0	0.0	0.0	0	0.000

Pipeline Schedule

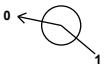
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	24.396	34.4	100	Circular	209.450	208.450	0.900	209.100	207.740	1.260
1.001	8.562	85.6	100	Circular	209.100	207.740	1.260	208.950	207.640	1.210
1.002	30.990	79.5	100	Circular	208.950	207.640	1.210	208.900	207.250	1.550
1.003	16.421	78.2	100	Circular	208.900	207.250	1.550	208.600	207.040	1.460
1.004	7.276	72.8	100	Circular	208.600	207.040	1.460	208.400	206.940	1.360
1.005	20.763	79.9	100	Circular	208.400	206.940	1.360	208.300	206.680	1.520
1.006	6.774	24.2	100	Circular	208.300	206.680	1.520	208.050	206.400	1.550
1.007	8.070	-3.9		Circular	208.050	206.400		208.950	208.450	
1.008	8.901	178.0		Circular	208.950	208.450		208.800	208.400	
2.000	28.973	29.0	100	Circular	209.700	208.700	0.900	209.100	207.700	1.300
2.001	25.153	38.1	100	Circular	209.100	207.700	1.300	208.600	207.040	1.460

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	F0201	1200	Manhole	Adoptable	F0202	1200	Manhole	Adoptable
1.001	F0202	1200	Manhole	Adoptable	F0203	1200	Manhole	Adoptable
1.002	F0203	1200	Manhole	Adoptable	F0204	1200	Manhole	Adoptable
1.003	F0204	1200	Manhole	Adoptable	F0103	1200	Manhole	Adoptable
1.004	F0103	1200	Manhole	Adoptable	F0104	1200	Manhole	Adoptable
1.005	F0104	1200	Manhole	Adoptable	F0105	1200	Manhole	Adoptable
1.006	F0105	1200	Manhole	Adoptable	F0106		Manhole	Adoptable
1.007	F0106		Manhole	Adoptable	F0107	900	Manhole	Adoptable
1.008	F0107	900	Manhole	Adoptable	DRAINAGE MOUND		Manhole	Adoptable
2.000	F0101	1200	Manhole	Adoptable	F0102	1200	Manhole	Adoptable
2.001	F0102	1200	Manhole	Adoptable	F0103	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
F0201	359606.927	259756.732	209.450	1.000	1200				
						0	1.000	208.450	100
F0202	359588.111	259772.260	209.100	1.360	1200		1.000	207.740	100
						0	1.001	207.740	100
F0203	359583.318	259779.355	208.950	1.310	1200		1.001	207.640	100
						0	1.002	207.640	100
F0204	359601.508	259804.445	208.900	1.650	1200		1.002	207.250	100
						0	1.003	207.250	100
F0103	359592.057	259817.874	208.600	1.560	1200		2.001	207.040	100
							1.003	207.040	100
						0	1.004	207.040	100

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
F0104	359586.344	259822.379	208.400	1.460	1200	1	1.004	206.940	100
									
						0	1.005	206.940	100
F0105	359567.359	259813.973	208.300	1.620	1200	1	1.005	206.680	100
									
						0	1.006	206.680	100
F0106	359563.234	259819.346	208.050	1.650		1	1.006	206.400	100
									
						0	1.007	206.400	
F0107	359569.530	259824.394	208.950	0.500	900	1	1.007	208.450	
									
						0	1.008	208.450	
DRAINAGE MOUND	359576.352	259830.111	208.800	0.400		1	1.008	208.400	
									
F0101	359638.900	259794.169	209.700	1.000	1200				
						0	2.000	208.700	100
F0102	359616.687	259812.770	209.100	1.400	1200	1	2.000	207.700	100
									
						0	2.001	207.700	100

Simulation Settings

Analysis Speed	Normal	Drain Down Time (mins)	240
Skip Steady State	✓	Foul Event Duration (mins)	

Storm Durations

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

Corner Water Consulting

Registered office:

1 Cricklade Court,

Cricklade Street,

Swindon SN1 3EY

Registered in England

13675352

Contact

info@cornerwaterconsulting.co.uk