Holroyd Homes (Yorkshire) Ltd

Proposed Residential Development
Hinchcliffe Mill
Water Street
Holmbridge
Homfirth

Drainage Conditions

Prepared by EWE Associates Ltd
Final RevD March 2026

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CLIENT DETAILS

Holroyd Homes (Yorkshire) Ltd
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14 Park Drive (rear of)
Huddersfield
HD1 4EB

CONTRACT

This report describes work commissioned by Holroyd Homes (Yorkshire) Ltd dated 30th September 2025. Holroyd Homes (Yorkshire) Ltd representative for the contract was Mr Jack Holroyd. Lea Favill of EWE Associates Ltd carried out the work.

Date: 6th March 2026

Prepared by: …… …… Lea Favill
Director

REVISION HISTORY

Draft Report Rev0 issued 21st November 2025 - 1No copy issued to Mr Jack Holroyd
Final Report RevA issued 24th November 2025 - 1No copy issued to Mr Jack Holroyd
Final Report RevB issued 9th February 2026 - 1No copy issued to Mr Jack Holroyd
Final Report RevC issued 11th February 2026 - 1No copy issued to Mr Jack Holroyd
Final Report RevD issued 6th March 2026 - 1No copy issued to Mr Jack Holroyd

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APPENDICES:

1. INTRODUCTION

Terms of Reference

This report was commissioned by Holroyd Homes (Yorkshire) Ltd to consider the surface water and foul water drainage for the proposed residential development at Hinchliffe Mill, Holmbridge bear Holmfirth.

The proposal involves the conversion of an existing mill building to provide residential units additional building will be constructed to provide further residential dwellings. The development will also include an access road and parking areas. The drainage issues are being considered as part of the current planning conditions.

Flood Risk Assessment and drainage strategy completed and approved during planning stage have been used within this report.

Approach to the Assessment

For the purposes of this study, the following have been considered: -

- Site level information and proposed finished levels of the buildings and external works.
- Onsite constriction.
- Options available to developer.
- NPPF guidelines with regards to the control of runoff.
- PPG3 pollution prevention guidelines.
- Future adoption and management of drainage system.
- Infiltration rates.
- Flood risk to adjacent land users.

Design Constraints

For the purposes of this study, the following constraints have been applied: -

- The design is based on the proposed layout provided by the client's representative. At this stage no modifications to the layout are proposed.
- The proposal is for residential units. The units will be sold to individual owners as such any drainage features or attenuation structures will be maintained by the individual owner/maintenance company. As such, the primary drainage will remain in private ownership.
- SUDs features are to be recommended where practically possible.
- The River Holme is directly adjacent to the site and the site currently drains into the river. A total discharge rate of 73.1l/s was reported during planning stage into the river. However, the LLFA have requested a restriction of 53.5l/s.

- The existing roofed building will continue to discharge to the River Holme direct as per the planning drainage strategy.
- There is a 300mm diameter foul sewer located within the bed of the River Holme adjacent to the site. The appears to be an existing 150mm diameter cast iron connection into the sewer from the site. The Yorkshire Water sewer plan is provided at Appendix A of this report.
- It is assumed that the minimum design standard is 1 in 100 years plus climate change (40%) as the site is less vulnerable.
- No on site above ground flooding will be acceptable up to and including 1 in 100 years plus climate change (40%) storm.

2. DESIGN OF PROPOSED SURFACE WATER DRAINAGE SYSTEM

Catchment Area

The catchment area was calculated from proposed layout drawing provide by Holroyd Homes (Yorkshire) Ltd. The total impermeable area has been estimated at 5381m² (0.54 hectares).

Drainage Strategy

The proposed drainage strategy is as follows and is illustrated on the drainage layout drawing provided at Appendix B of this report. The site has been split into 3 separate areas with runoff ultimately discharging to the River Holme to the north. The total discharge rate of 53.5l/s has been split between the 3 areas on a pro rata basis.

- Area 1 has an impermeable area of 425m² therefore peak discharge of 3l/s. This area drains directly into a 3 hectare pond. Roofed and paved areas will drain via a piped drainage system into the adjacent pond before being discharged into the River Holme via the existing spill weir and outfall. All attenuation systems will be designed up to and including 1 in 100 year plus climate change 40% event.
- Area 2 has an impermeable area of 2720m² therefore peak discharge of 30.3l/s. This area drains directly into the river. Roofed and paved areas will drain via a piped drainage system into the adjacent River Holme via a new outfall. Some of the paved areas will be drained via a swale before entering the piped system. All attenuation systems will be designed up to and including 1 in 100 year plus climate change 40% event.
- Area 3 has an impermeable area of 1470m² therefore peak discharge of 20l/s. This area drains directly into the river. Roofed and paved areas will drain via a piped drainage system into the adjacent River Holme via a new outfall. All attenuation systems will be designed up to and including 1 in 100 year plus climate change 40% event

Proposed Surface Water Drainage

The proposed development will have a total impermeable area of 4615m² (0.462 hectares). The surface water drainage will discharge to the River Holme at the agreed peak rate of 53.5l/s. The runoff will be attenuated within oversized pipes. Water quality treatment will be provided by under drained swale.

An assessment of the required balance volume for the areas has been made using the estimated post development impermeable areas draining via oversized pipe attenuation to the river. Using WinDes Source Control software developed by Microdrainage the required attenuation has been calculated for the 1 in 100 year plus climate change (40%) event.

The outputs from calculations using the WinDes Source Control Software developed by Micro Drainage are provided at Appendix C, D and E of this report. Hydrobrake information is provided Appendix H.

Table 2-1: Size of Infiltration Devices for 100yr+CC40% event

Area	Size of Infiltration Device (m)
Area 1 roofed and paved area draining to pond then river 425m2	Oversized pipes with controlled discharge of 3l/s river. Increase in peak runoff volume of 19.9m3 to be stored in 34.7m of 900mm diameter oversized pipes
Area 2 roofed and paved area draining to river 2720m2	Oversized pipes with controlled discharge of 30.3l/s river. Increase in peak runoff volume of 101.4m3 to be stored in series (180m) of 900mm diameter oversized pipes
Area 3 roofed and paved area draining to river 1470m2	Oversized pipes with controlled discharge of 20l/s river. Increase in peak runoff volume of 51.4m3 to be stored in series (90m) of 900mm diameter oversized pipes

Overland Flow

The area to the south is higher than the upper level of the site and there is a small spring which discharge water towards the site. An under drained swale is provided within this area to intercept flows. The runoff is passed through a shallow pond before being a free discharge into the River Holme via a 450mm diameter ripped along the eastern boundary of the site.

Flood Resilience Measures

Consideration should be given to flood proofing non habitable ground floor level to units 5, 6, 7, 8 and 9 to reduce the residual damages if a critical event was to occur. Flood proofing is a technique by which buildings are designed to withstand the effects of flooding. There are two main categories of flood proofing, which are dry proofing and wet proofing.

Dry proofing methods are designed to keep water out of the building, and wet proofing methods are designed to improve the ability of the property to withstand the effects of flooding once the water has entered the building. Both would be required in this case, due to the possible failure of the dry proofing methods.

Where wet proofing is required it is important that a flood response plan should be prepared and practised regularly, so that any contents of the building can be moved to design flood level if required or are built to withstand immersion in water or are designed to be easily replaceable.

The differential pressures across load bearing walls and the flotation effect that will occur during flood events should be taken into account when considering dry proofing techniques. For most existing properties this means that dry flood proofing should only be considered if the expected flood depth is under 0.5m, which in this particular case is expected to be greater than 0.5m depth, as such, dry proofing is unlikely to be successful. It is therefore considered that flooding in excess of 0.5m will cause some damage to the building; however, this is considered to be acceptable.

The table below summarises the recommendations for flood proofing measures which can be incorporated within the design of buildings.

Feature	Considerations To Improve Flood Proofing
External Walls	Careful consideration of materials: use low permeability materials to limit water penetration if dry proofing required. Avoid using timber frame and cavity walls. Consider applying a water resistant coating. Provide fitting for flood boards or other temporary barriers across openings in the walls.
Internal Walls	Avoid use of gypsum plaster and plasterboards; use more flood resistant linings (e.g. hydraulic lime, ceramic tiles). Avoid use of stud partition walls.
Floors	Avoid use of chipboard floors. Use concrete floors with integrated and continuous damp proof membrane and damp proof course. Solid concrete floors are preferable; if a suspended floor is to be used, provide facility for drainage of sub-floor void. Use solid insulation materials.
Fitting, Fixtures and Services	If possible, locate all fittings, fixtures and services above design floor level. Avoid chipboard and MDF. Consider use of removable plastic fittings. Use solid doors treated with waterproof coatings. Avoid using double-glazed window units that may fill with flood water. Use solid wood staircases. Avoid fitted carpets. Locate electrical, gas and telephone equipment and systems above flood level. Fit anti-flooding devices to drainage systems.

3. ADOPTION & MAINTENACE

Adoption & Maintenance

The private drainage and permeable paving will be the responsibility of the private land owners. A management company will be set up on behalf of the owners.

The swale and infiltration basin will be maintained by a management company.

The management company will also be responsible for all shared surface water drainage and from all shared roads and hardstanding.

Construction

The Proposed drainage system is simple in design however, its construction is essential to ensure that the system functions as it has been designed. As such it is recommended that construction inspection check list is adopted during the construction phase of the works to ensure that the drainage system is correctly installed. The inspection checklist is provided at Appendix F of this report and has been taken from the CIRIA Sustainable Drainage Systems Manual.

Swale Maintenance

Following construction regular inspection is recommended. The main concern is to reduce the level of siltation and vegetation within the bed of the swale. It is recommended that this swale is inspected on a 6 monthly basis and the swale is cleared once a year. A log book should be completed which will show the inspection and maintenance history of the system. The log book, site plan and construction check list should form maintenance manual for the system.

The maintenance plan has been tabulated overleaf and will be the responsibility of the appointed management company.

Maintenance Schedule	Required action	Frequency
Monitoring	Inspect swale for debris, siltation and vegetation build-up.	6 Monthly
	Inspect outlet structures	6 monthly
	Inspect swale for deformation	6 monthly
Regular Maintenance	Debris removal from swale bed and headwalls	6 Monthly
	Remove silt and vegetation from swale	12 Monthly
Occasional Maintenance	Repairs to headwalls and bed of swale	12 monthly
Remedial actions	Repair deformation of topsoil once settlement stopped	As required
	Repair deformation of areas adjacent to headwalls once settlement stopped	As required

Manhole Maintenance

The manholes will be private and maintained by a management company.

Following construction regular inspection is recommended. The main concern is to reduce the level of siltation and debris within the manholes. It is recommended that the manholes is inspected on a 6 monthly basis and the manholes is cleared once a year. A log book should be completed which will show the inspection and maintenance history of the system. The log book, site plan and construction check list should form maintenance manual for the system.

The maintenance plan has been tabulated overleaf and will be the responsibility of the appointed management company.

Maintenance Schedule	Required action	Frequency
Monitoring	Inspect manholes/gullies for debris, siltation and vegetation build-up.	6 Monthly
	Inspect gullies/manholes	6 monthly
Regular Maintenance	Debris removal from gullies	6 Monthly
	Remove silt and vegetation from manholes	12 Monthly
Occasional Maintenance	Repairs to manholes/pipes	12 monthly
Remedial actions	Repair deformation of topsoil once settlement stopped	As required
	Repair deformation of areas adjacent to headwall once settlement stopped	As required

4. CONSTRUCTION PHASES DRAINAGE

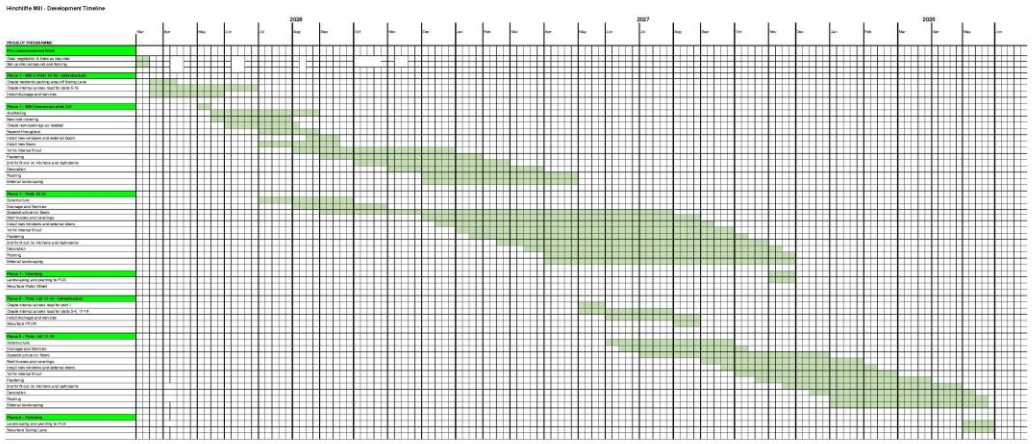
The plan provided at Appendix G shows the surface water drainage which should be installed prior to the main works commencing within the site to control the runoff within the site. The LLFA have requested that bunding and silt fencing is provided to prevent any runoff from construction areas directly entering the River Holme.

5. PHASING OF WORKS

The developer will construct the swales and the drain down under the footpath first to keep the site dry then install everything to the mill and plots 10-16 while we build those plots.

The drainage to plots 1 and 2 and 17-19 will follow as part of phase 2 of the development.

Programme of works provided below.



6. CDM RISK ASSESSMENT FOR OVERSIZED PIPE ATTENUATION ENTRY

The local authority has requested that the risk of entering the attenuation structure are assessed.

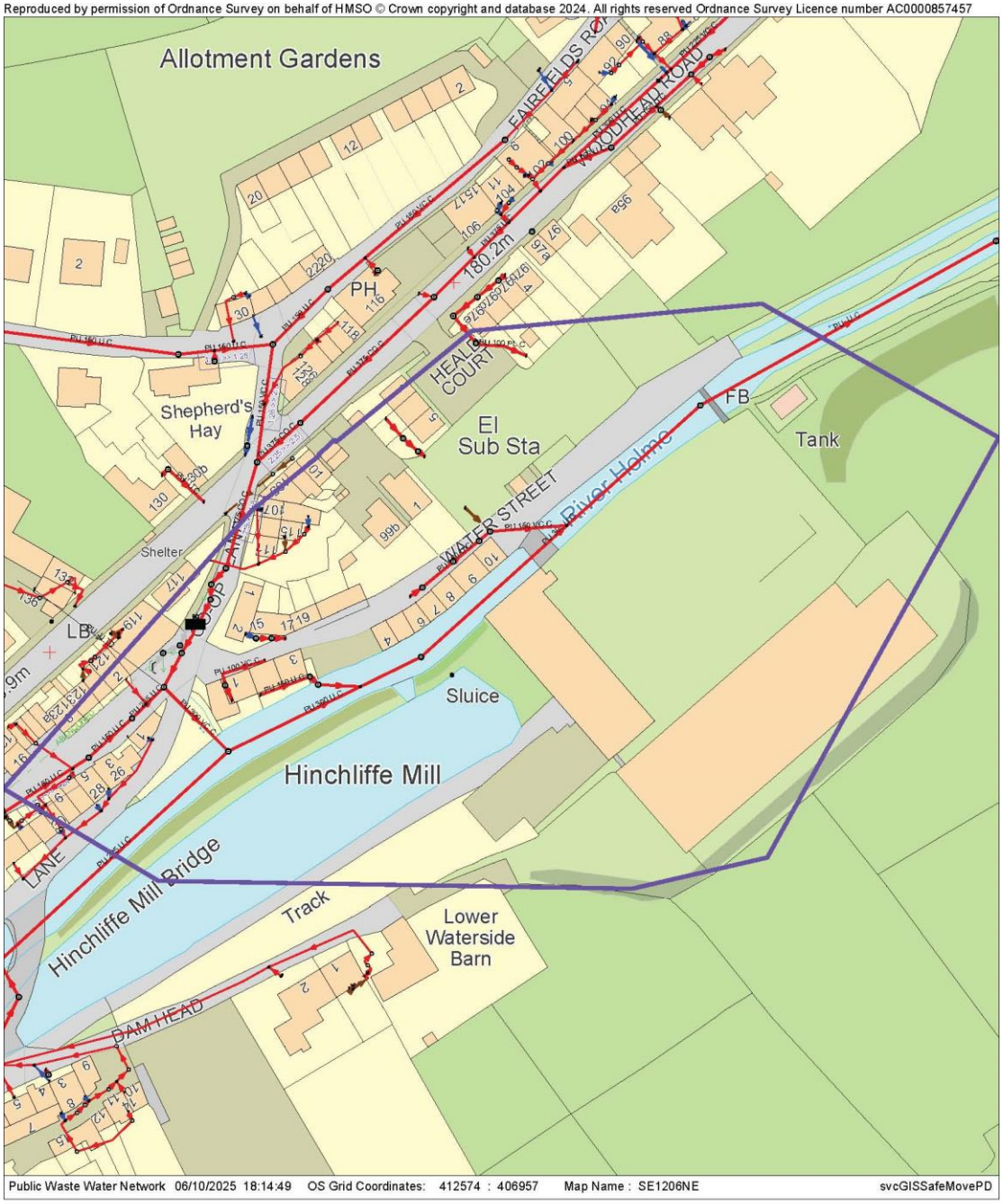
Mechanism	Probability	Severity	Risk	Mitigation
Falling during entry into manhole	low	low	low	Winch to be used to access
Trapped in attenuation pipe 900mm diameter	low	medium	medium	Use tractor mounted CCTV to inspect
Falling during egress from manhole	low	low	low	Winch to be used to access
Drowning within pipes	low	high	medium	Pipes will generally be empty. Limited access to public
Gas within pipe system	low	high	medium	Gas detection equipment prior to entry

7. DESIGN OF PROPOSED FOUL WATER DRAINAGE SYSTEM

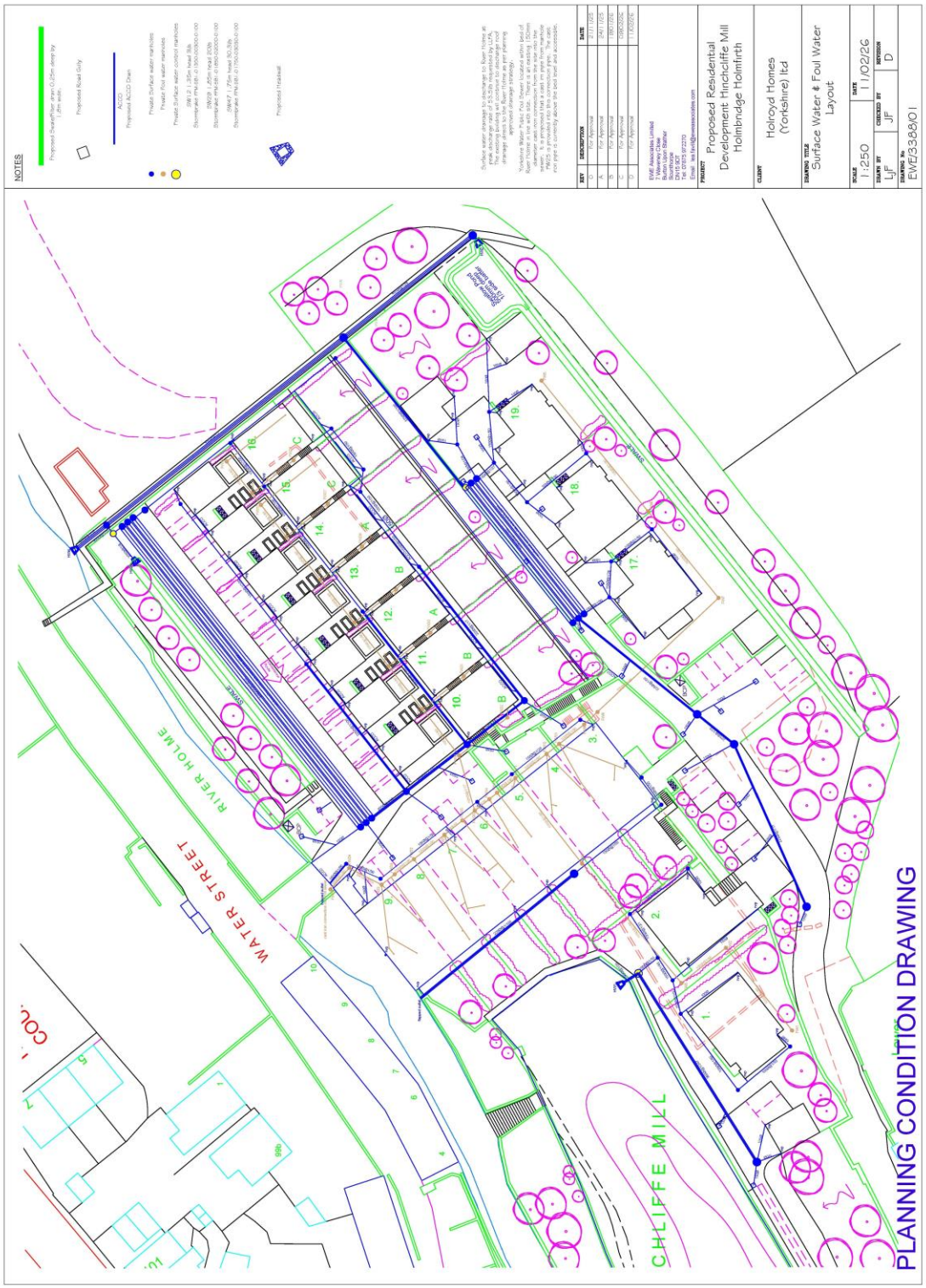
Proposed Foul Drainage System

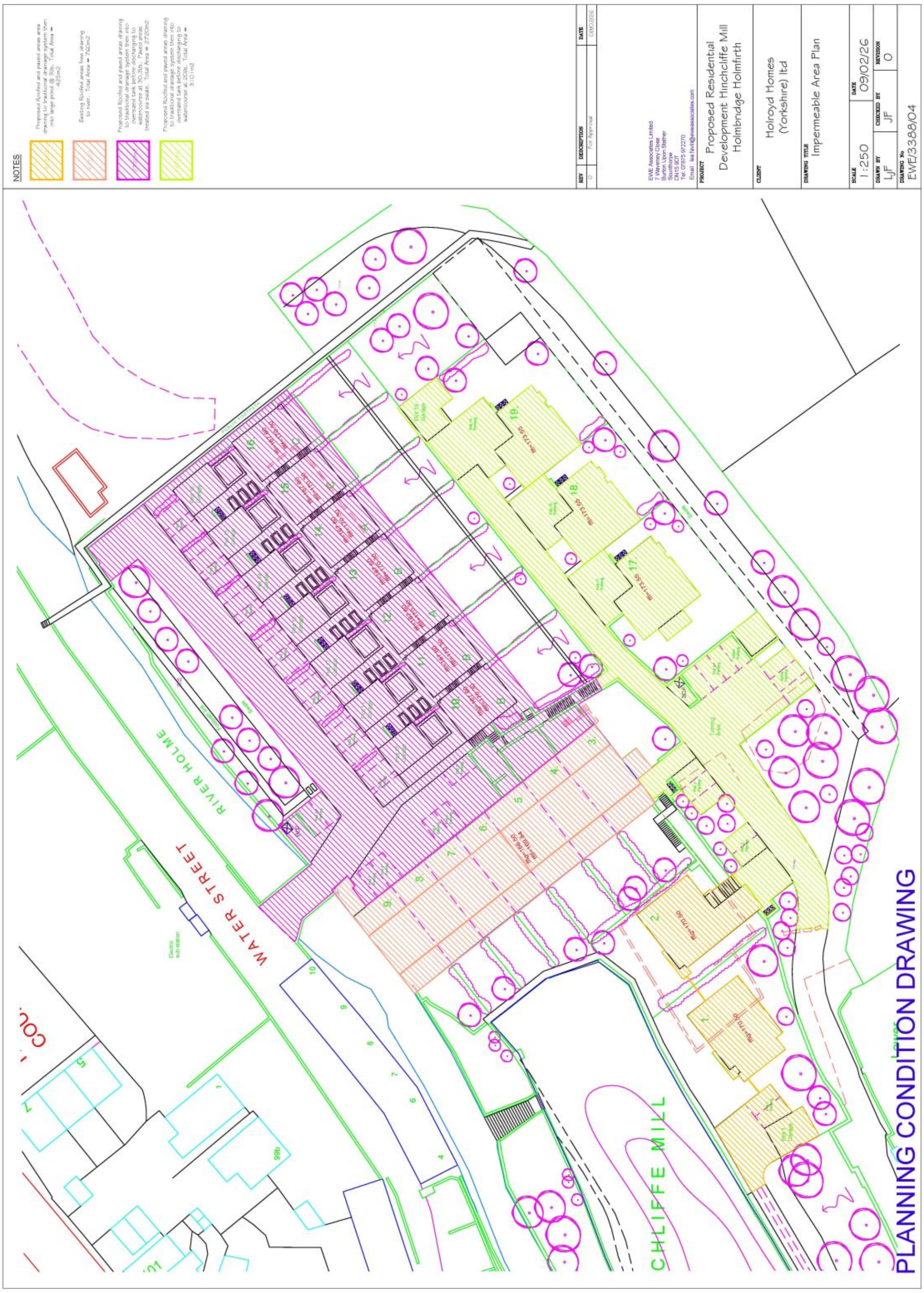
The existing mill building I supported by a foul drainage system which discharges to the Yorkshire Water foul sewer located within the river bed of the River Holme via a cast iron 150mm diameter pipe. It is proposed that this cast iron pipe is used as a point of connection from the new development. The cast iron pipe is visible above the river bed level which should allow access. The proposed onsite foul drainage system will be gravity. The network is sown at Appendix B.

Appendix A: - Sewer Plan



Appendix B: - Drainage Drawings




NOTES
Proposed Residential Development Hinchcliffe Mill Holmbridge Holmfirth
Holroyd Homes (Yorkshire) ltd
Impermeable Area Plan
1:250
09/02/26
EWE/3388/04
WATER STREET
RIVER HOLME
PLANNING CONDITION DRAWING

Appendix C: - 1 in 100 year+CC WinDes Calculation Sheets Area 1

EWE Associates Ltd		Page 1
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 06/03/2026 09:26 File area 1 to pond 10...	Designed By Lea Checked By	
Micro Drainage	Source Control W.12.4	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	169.049	0.549	1.9	13.1	O K
30 min Summer	169.116	0.616	2.1	15.2	O K
60 min Summer	169.162	0.662	2.1	16.6	O K
120 min Summer	169.175	0.675	2.2	17.0	O K
180 min Summer	169.172	0.672	2.1	16.9	O K
240 min Summer	169.164	0.664	2.1	16.7	O K
360 min Summer	169.139	0.639	2.1	15.9	O K
480 min Summer	169.110	0.610	2.0	15.0	O K
600 min Summer	169.081	0.581	2.0	14.1	O K
720 min Summer	169.052	0.552	1.9	13.2	O K
960 min Summer	169.012	0.512	1.9	11.9	O K
1440 min Summer	168.937	0.437	1.7	9.5	O K
2160 min Summer	168.844	0.344	1.6	6.6	O K
2880 min Summer	168.757	0.257	1.6	4.1	O K
4320 min Summer	168.589	0.089	1.4	0.5	O K
5760 min Summer	168.573	0.073	1.1	0.3	O K
7200 min Summer	168.565	0.065	0.9	0.2	O K
8640 min Summer	168.559	0.059	0.8	0.2	O K
10080 min Summer	168.555	0.055	0.7	0.2	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	182.907	18
30 min Summer	113.801	32
60 min Summer	70.804	60
120 min Summer	44.053	92
180 min Summer	33.375	126
240 min Summer	27.409	160
360 min Summer	20.765	230
480 min Summer	17.053	298
600 min Summer	14.637	364
720 min Summer	12.920	432
960 min Summer	10.838	560
1440 min Summer	8.461	812
2160 min Summer	6.606	1192
2880 min Summer	5.541	1560
4320 min Summer	3.968	2200
5760 min Summer	3.131	2856
7200 min Summer	2.605	3592
8640 min Summer	2.242	4272
10080 min Summer	1.975	4984

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 06/03/2026 09:26	Designed By Lea	
File area 1 to pond 10...	Checked By	
Micro Drainage	Source Control W.12.4	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Winter	169.104	0.604	2.0	14.9	O K
30 min Winter	169.189	0.689	2.2	17.4	O K
60 min Winter	169.257	0.757	2.3	19.3	O K
120 min Winter	169.277	0.777	2.3	19.9	O K
180 min Winter	169.266	0.766	2.3	19.6	O K
240 min Winter	169.245	0.745	2.3	19.0	O K
360 min Winter	169.194	0.694	2.2	17.6	O K
480 min Winter	169.143	0.643	2.1	16.0	O K
600 min Winter	169.094	0.594	2.0	14.5	O K
720 min Winter	169.049	0.549	1.9	13.1	O K
960 min Winter	168.984	0.484	1.8	11.0	O K
1440 min Winter	168.873	0.373	1.6	7.5	O K
2160 min Winter	168.626	0.126	1.6	1.1	O K
2880 min Winter	168.590	0.090	1.4	0.5	O K
4320 min Winter	168.569	0.069	1.0	0.3	O K
5760 min Winter	168.559	0.059	0.8	0.2	O K
7200 min Winter	168.553	0.053	0.7	0.2	O K
8640 min Winter	168.549	0.049	0.6	0.1	O K
10080 min Winter	168.546	0.046	0.5	0.1	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Winter	182.907	18
30 min Winter	113.801	31
60 min Winter	70.804	58
120 min Winter	44.053	96
180 min Winter	33.375	134
240 min Winter	27.409	174
360 min Winter	20.765	248
480 min Winter	17.053	320
600 min Winter	14.637	390
720 min Winter	12.920	458
960 min Winter	10.838	594
1440 min Winter	8.461	854
2160 min Winter	6.606	1144
2880 min Winter	5.541	1468
4320 min Winter	3.968	2184
5760 min Winter	3.131	2944
7200 min Winter	2.605	3544
8640 min Winter	2.242	4376
10080 min Winter	1.975	5040

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		
Date 06/03/2026 09:26 File area 1 to pond 10...	Designed By Lea Checked By	
Micro Drainage	Source Control W.12.4	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
Site Location	412650 407050 SE 12650 07050
C (1km)	-0.026
D1 (1km)	0.435
D2 (1km)	0.509
D3 (1km)	0.296
E (1km)	0.304
F (1km)	2.525
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time / Area Diagram

Total Area (ha) 0.043

Time (mins)	Area (ha)
0-4	0.043

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 06/03/2026 09:26 File area 1 to pond 10...	Designed By Lea Checked By	
Micro Drainage	Source Control W.12.4	

Model Details

Storage is Online Cover Level (m) 169.800

Pipe Structure

Diameter (m) 0.900 Length (m) 34.700
Slope (1:X) 347.000 Invert Level (m) 168.500

Hydro-Brake® Outflow Control

Design Head (m) 1.350 Hydro-Brake® Type Md4 Invert Level (m) 168.500
Design Flow (l/s) 3.0 Diameter (mm) 58

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.5	1.200	2.9	3.000	4.6	7.000	7.0
0.200	1.3	1.400	3.1	3.500	4.9	7.500	7.2
0.300	1.5	1.600	3.3	4.000	5.3	8.000	7.4
0.400	1.7	1.800	3.5	4.500	5.6	8.500	7.7
0.500	1.9	2.000	3.7	5.000	5.9	9.000	7.9
0.600	2.0	2.200	3.9	5.500	6.2	9.500	8.1
0.800	2.3	2.400	4.1	6.000	6.4		
1.000	2.6	2.600	4.2	6.500	6.7		

Appendix D: - 1 in 100 year+CC WinDes Calculation Sheets Area 2

EWE Associates Ltd		Page 1
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 10/02/2026 09:45	Designed By Lea	
File area 2 to river 1...	Checked By	
Micro Drainage	Source Control W.12.4	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	165.087	0.637	21.1	76.5	O K
30 min Summer	165.141	0.691	21.1	84.8	O K
60 min Summer	165.159	0.709	21.1	87.5	O K
120 min Summer	165.141	0.691	21.1	84.8	O K
180 min Summer	165.105	0.655	21.1	79.3	O K
240 min Summer	165.066	0.616	21.1	73.0	O K
360 min Summer	164.987	0.537	21.1	60.2	O K
480 min Summer	164.914	0.464	21.1	48.4	O K
600 min Summer	164.854	0.404	21.1	38.8	O K
720 min Summer	164.805	0.355	20.8	31.3	O K
960 min Summer	164.747	0.297	19.9	22.7	O K
1440 min Summer	164.680	0.230	17.5	13.9	O K
2160 min Summer	164.633	0.183	14.4	8.6	O K
2880 min Summer	164.608	0.158	12.3	6.1	O K
4320 min Summer	164.571	0.121	8.8	3.2	O K
5760 min Summer	164.551	0.101	7.0	2.1	O K
7200 min Summer	164.539	0.089	5.8	1.6	O K
8640 min Summer	164.530	0.080	5.0	1.2	O K
10080 min Summer	164.523	0.073	4.4	1.0	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	182.907	17
30 min Summer	113.801	30
60 min Summer	70.804	48
120 min Summer	44.053	82
180 min Summer	33.375	116
240 min Summer	27.409	150
360 min Summer	20.765	214
480 min Summer	17.053	276
600 min Summer	14.637	334
720 min Summer	12.920	392
960 min Summer	10.838	508
1440 min Summer	8.461	738
2160 min Summer	6.606	1100
2880 min Summer	5.541	1468
4320 min Summer	3.968	2176
5760 min Summer	3.131	2864
7200 min Summer	2.605	3608
8640 min Summer	2.242	4376
10080 min Summer	1.975	4968

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 10/02/2026 09:45	Designed By Lea	
File area 2 to river 1...	Checked By	
Micro Drainage	Source Control W.12.4	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Winter	165.158	0.708	21.1	87.4	O K
30 min Winter	165.235	0.785	21.5	98.2	O K
60 min Winter	165.260	0.810	21.7	101.4	O K
120 min Winter	165.219	0.769	21.4	96.1	O K
180 min Winter	165.152	0.702	21.1	86.4	O K
240 min Winter	165.082	0.632	21.1	75.6	O K
360 min Winter	164.951	0.501	21.1	54.4	O K
480 min Winter	164.843	0.393	21.1	37.1	O K
600 min Winter	164.769	0.319	20.4	25.9	O K
720 min Winter	164.719	0.269	19.1	19.0	O K
960 min Winter	164.669	0.219	16.9	12.5	O K
1440 min Winter	164.622	0.172	13.5	7.4	O K
2160 min Winter	164.589	0.139	10.6	4.5	O K
2880 min Winter	164.571	0.121	8.9	3.3	O K
4320 min Winter	164.545	0.095	6.4	1.8	O K
5760 min Winter	164.530	0.080	5.0	1.2	O K
7200 min Winter	164.521	0.071	4.2	0.9	O K
8640 min Winter	164.514	0.064	3.6	0.8	O K
10080 min Winter	164.509	0.059	3.2	0.6	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Winter	182.907	17
30 min Winter	113.801	30
60 min Winter	70.804	50
120 min Winter	44.053	88
180 min Winter	33.375	126
240 min Winter	27.409	162
360 min Winter	20.765	226
480 min Winter	17.053	284
600 min Winter	14.637	338
720 min Winter	12.920	392
960 min Winter	10.838	504
1440 min Winter	8.461	736
2160 min Winter	6.606	1100
2880 min Winter	5.541	1468
4320 min Winter	3.968	2192
5760 min Winter	3.131	2920
7200 min Winter	2.605	3656
8640 min Winter	2.242	4400
10080 min Winter	1.975	4992

EWE Associates Ltd		Page 3
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 10/02/2026 09:45 File area 2 to river 1...	Designed By Lea Checked By	
Micro Drainage	Source Control W.12.4	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
Site Location	412650 407050 SE 12650 07050
C (1km)	-0.026
D1 (1km)	0.435
D2 (1km)	0.509
D3 (1km)	0.296
E (1km)	0.304
F (1km)	2.525
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time / Area Diagram

Total Area (ha) 0.272

Time (mins)	Area (ha)
0-4	0.272

EWE Associates Ltd		Page 4
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		
Date 10/02/2026 09:45 File area 2 to river 1...	Designed By Lea Checked By	
Micro Drainage	Source Control W.12.4	

Model Details

Storage is Online Cover Level (m) 166.500

Double Pipe Structure

Diameter (m) 0.900 Length (m) 90.000
Slope (1:X) 600.000 Invert Level (m) 164.450

Hydro-Brake® Outflow Control

Design Head (m) 1.750 Diameter (mm) 195
Design Flow (l/s) 30.3 Invert Level (m) 164.450
Hydro-Brake® Type Md5 SW Only

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.9	1.200	25.2	3.000	39.6	7.000	60.4
0.200	15.6	1.400	27.1	3.500	42.7	7.500	62.6
0.300	19.9	1.600	28.9	4.000	45.7	8.000	64.6
0.400	21.0	1.800	30.7	4.500	48.5	8.500	66.6
0.500	20.9	2.000	32.3	5.000	51.1	9.000	68.5
0.600	20.7	2.200	33.9	5.500	53.6	9.500	70.4
0.800	21.6	2.400	35.4	6.000	56.0		
1.000	23.2	2.600	36.8	6.500	58.2		

Appendix E: - 1 in 100 year+CC WinDes Calculation Sheets Area 3

EWE Associates Ltd		Page 1
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 06/03/2026 10:10 File area 3 to swale 1...	Designed By Lea Checked By	
Micro Drainage	Source Control W.12.4	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m^3)	Status
15 min Summer	172.854	0.654	12.4	40.2	O K
30 min Summer	172.899	0.699	12.7	43.7	O K
60 min Summer	172.908	0.708	12.7	44.3	O K
120 min Summer	172.879	0.679	12.6	42.1	O K
180 min Summer	172.837	0.637	12.3	38.8	O K
240 min Summer	172.793	0.593	12.1	35.2	O K
360 min Summer	172.704	0.504	12.1	27.9	O K
480 min Summer	172.622	0.422	12.1	21.3	O K
600 min Summer	172.553	0.353	12.1	15.8	O K
720 min Summer	172.500	0.300	12.0	11.9	O K
960 min Summer	172.440	0.240	11.4	7.8	O K
1440 min Summer	172.380	0.180	9.9	4.3	O K
2160 min Summer	172.341	0.141	7.9	2.5	O K
2880 min Summer	172.321	0.121	6.7	1.7	O K
4320 min Summer	172.292	0.092	4.8	1.0	O K
5760 min Summer	172.278	0.078	3.8	0.7	O K
7200 min Summer	172.268	0.068	3.1	0.5	O K
8640 min Summer	172.262	0.062	2.7	0.4	O K
10080 min Summer	172.256	0.056	2.4	0.3	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	182.907	17
30 min Summer	113.801	29
60 min Summer	70.804	46
120 min Summer	44.053	80
180 min Summer	33.375	114
240 min Summer	27.409	148
360 min Summer	20.765	212
480 min Summer	17.053	274
600 min Summer	14.637	330
720 min Summer	12.920	386
960 min Summer	10.838	502
1440 min Summer	8.461	736
2160 min Summer	6.606	1100
2880 min Summer	5.541	1464
4320 min Summer	3.968	2184
5760 min Summer	3.131	2856
7200 min Summer	2.605	3584
8640 min Summer	2.242	4368
10080 min Summer	1.975	5000

EWE Associates Ltd		Page 2
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 06/03/2026 10:10 File area 3 to swale 1...	Designed By Lea Checked By	
Micro Drainage	Source Control W.12.4	

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Winter	172.930	0.730	12.9	46.0	O K
30 min Winter	172.999	0.799	13.3	50.8	O K
60 min Winter	173.007	0.807	13.4	51.4	O K
120 min Winter	172.947	0.747	13.0	47.3	O K
180 min Winter	172.871	0.671	12.5	41.5	O K
240 min Winter	172.795	0.595	12.2	35.5	O K
360 min Winter	172.650	0.450	12.1	23.5	O K
480 min Winter	172.528	0.328	12.1	14.0	O K
600 min Winter	172.452	0.252	11.6	8.6	O K
720 min Winter	172.407	0.207	10.8	5.8	O K
960 min Winter	172.367	0.167	9.3	3.6	O K
1440 min Winter	172.331	0.131	7.3	2.1	O K
2160 min Winter	172.307	0.107	5.7	1.3	O K
2880 min Winter	172.293	0.093	4.8	1.0	O K
4320 min Winter	172.273	0.073	3.4	0.6	O K
5760 min Winter	172.262	0.062	2.7	0.4	O K
7200 min Winter	172.255	0.055	2.3	0.3	O K
8640 min Winter	172.249	0.049	2.0	0.3	O K
10080 min Winter	172.246	0.046	1.7	0.2	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Winter	182.907	17
30 min Winter	113.801	30
60 min Winter	70.804	48
120 min Winter	44.053	88
180 min Winter	33.375	124
240 min Winter	27.409	160
360 min Winter	20.765	224
480 min Winter	17.053	278
600 min Winter	14.637	330
720 min Winter	12.920	384
960 min Winter	10.838	494
1440 min Winter	8.461	734
2160 min Winter	6.606	1084
2880 min Winter	5.541	1440
4320 min Winter	3.968	2160
5760 min Winter	3.131	2856
7200 min Winter	2.605	3552
8640 min Winter	2.242	4280
10080 min Winter	1.975	5072

EWE Associates Ltd		Page 3
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		
Date 06/03/2026 10:10 File area 3 to swale 1...	Designed By Lea Checked By	
Micro Drainage	Source Control W.12.4	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
Site Location	412650 407050 SE 12650 07050
C (1km)	-0.026
D1 (1km)	0.435
D2 (1km)	0.509
D3 (1km)	0.296
E (1km)	0.304
F (1km)	2.525
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time / Area Diagram

Total Area (ha) 0.147

Time (mins)	Area (ha)
0-4	0.147

EWE Associates Ltd		Page 4
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 06/03/2026 10:10 File area 3 to swale 1...	Designed By Lea Checked By	
Micro Drainage	Source Control W.12.4	

Model Details

Storage is Online Cover Level (m) 173.200

Double Pipe Structure

Diameter (m) 0.900 Length (m) 45.000
Slope (1:X) 300.000 Invert Level (m) 172.200

Hydro-Brake® Outflow Control

Design Head (m) 1.850 Diameter (mm) 156
Design Flow (l/s) 20.0 Invert Level (m) 172.200
Hydro-Brake® Type Md5 SW Only

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.3	1.200	16.1	3.000	25.4	7.000	38.8
0.200	10.6	1.400	17.4	3.500	27.5	7.500	40.2
0.300	12.0	1.600	18.6	4.000	29.4	8.000	41.5
0.400	12.0	1.800	19.7	4.500	31.1	8.500	42.8
0.500	11.9	2.000	20.8	5.000	32.8	9.000	44.1
0.600	12.2	2.200	21.8	5.500	34.4	9.500	45.3
0.800	13.4	2.400	22.7	6.000	36.0		
1.000	14.7	2.600	23.7	6.500	37.4		

Appendix F: - Construction Check List

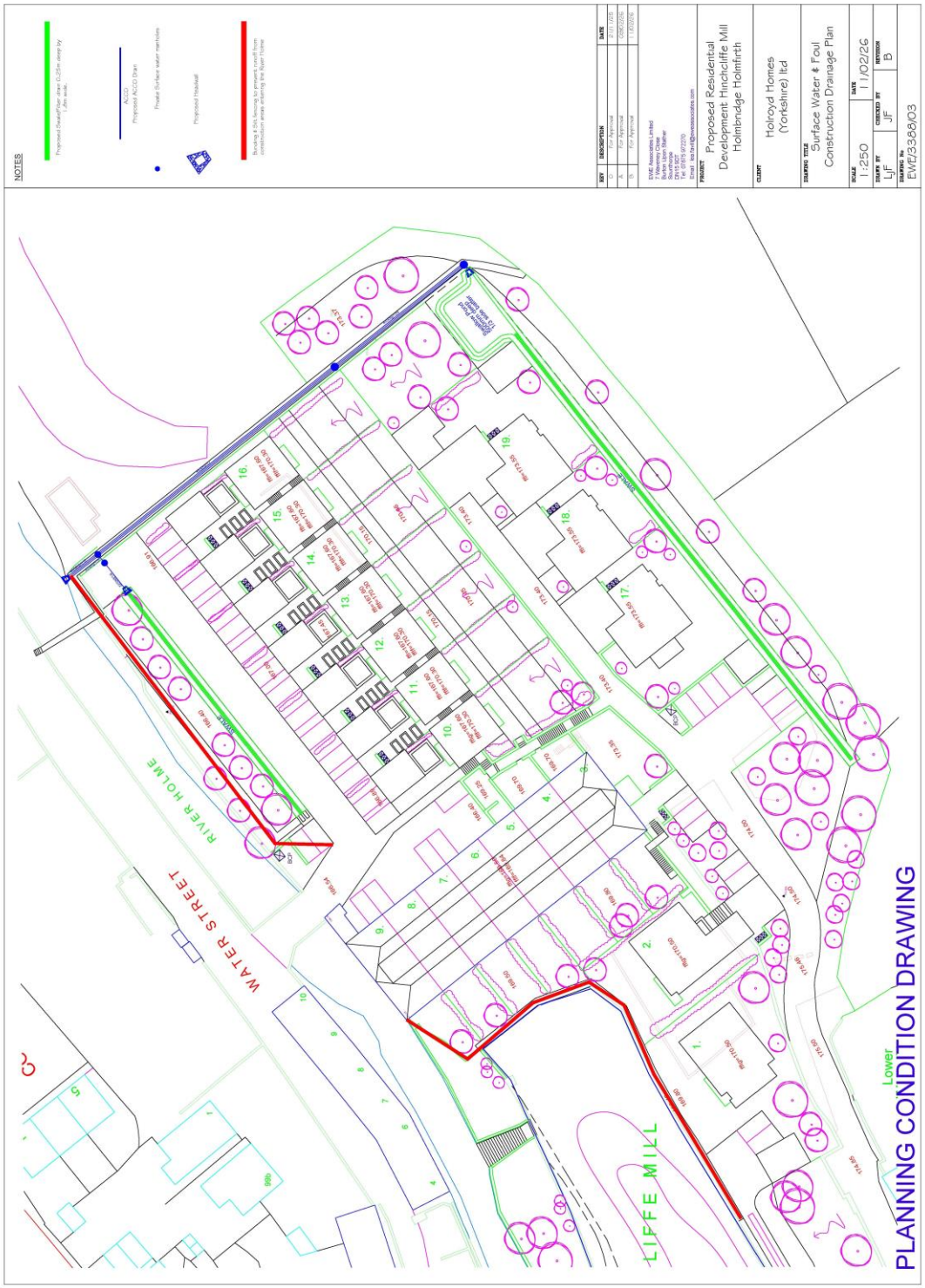
A7 Construction inspection checklist

Phase and inspection item	Inspection date	Condition*	Date phase completed	Remarks/remedial works
Pre-excavation				
Runoff from areas of bare soil diverted to site control				
Runoff from contaminated areas diverted to site control				
Excavation				
Soil is not smeared or compacted so that permeability is reduced				
Excavation is to required size and gradient and is located in correct position				
Side slopes are correct				
All debris (eg loose roots) removed from base feature				
There is no groundwater seepage in the base of the feature				
Depth of excavation is correct				
Construction				
Earthworks materials to specification with test results				
Filter materials in accordance with specification with test results				
Compaction acceptable				
Inlets and outlets constructed in accordance with drawings and specification and drawings				
Construction to required line and levels				
Planting				
Planting in accordance with specification				
Planting established				
Handover inspection				
No silting from construction				
No erosion or bare areas of planting				
All litter removed and inlets and outlets operating correctly				

* Acceptable or unacceptable

CIRIA C609 303

Appendix G: - Construction Phase Drawing



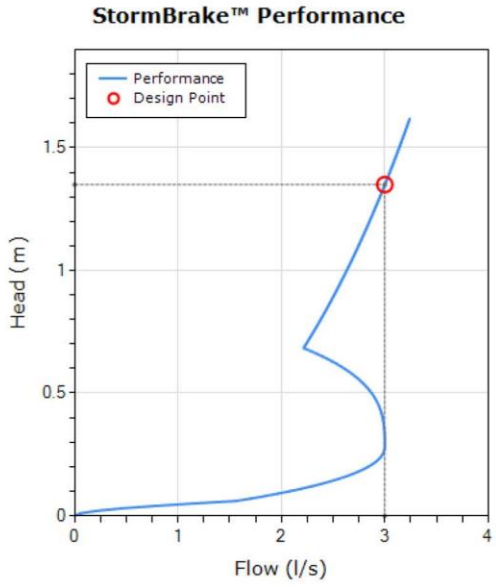
Appendix H: - Hydro-brake Information

fpmccann

StormBrake™ Performance Report

wrc approved PT/398/0217

Contractor:	EWE Associates Ltd	Head(m):	1.35
Site:	Hinchliffe Mill Holmfirth	Flow(l/s):	3
Date:	10/02/2026	Chamber Ref:	SW12
Created By:	lea favill	Mounting Style:	LUGS (Default)
Device Ref:	FPM-SB1-01350-00300-0100		



	Head (m)	Flow (l/s)
Design Point	1.35	3.00
Flush Flow	0.28	3.00
Kick Back	0.68	2.21

	Dims (mm)
Min. Chamber Diameter	1200
Min. Outlet Pipe Diameter	150
Min. Sump Depth	250

Head (m)	Flow (l/s)
0	0.00
0.06	1.39
0.11	2.21
0.17	2.67
0.22	2.92
0.28	3.00
0.33	3.00
0.39	2.98
0.45	2.94
0.5	2.87
0.56	2.74
0.61	2.55
0.67	2.29
0.73	2.28
0.78	2.35
0.84	2.43
0.89	2.50
0.95	2.57
1	2.64
1.06	2.70
1.12	2.76
1.17	2.82
1.23	2.88
1.28	2.94
1.34	2.99
1.4	3.04
1.45	3.10
1.51	3.15
1.56	3.19
1.62	3.24

The unique performance characteristics of this StormBrake™ are derived from extensive dynamic modelling using parametric experimental testing and computational fluid dynamics.

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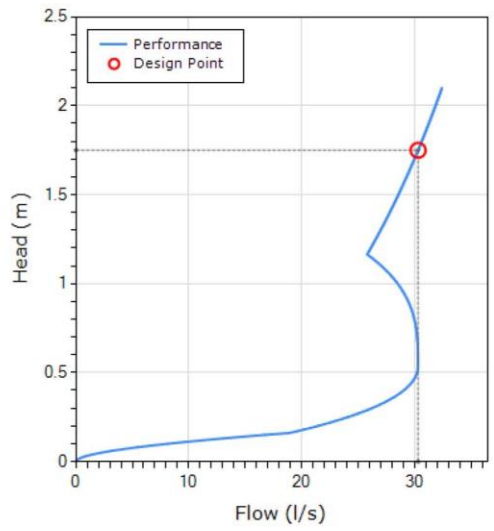
StormBrake™ Performance Report

wrc approved PT/398/0217

Contractor:	EWE Associates Ltd	Head(m):	1.75
Site:	Hinchliffe Holmfirth	Flow(l/s):	30.3
Date:	10/02/2026	Chamber Ref:	SW47
Created By:	lea favill	Mounting Style:	LUGS (Default)
Device Ref:	FPM-SB1-01750-03030-0100		

StormBrake™ Performance



	Head (m)	Flow (l/s)
Design Point	1.75	30.30
Flush Flow	0.54	30.30
Kick Back	1.16	25.79

	Dims (mm)
Min. Chamber Diameter	1800
Min. Outlet Pipe Diameter	300
Min. Sump Depth	470

Head (m)	Flow (l/s)
0	0.00
0.07	4.51
0.14	15.75
0.22	22.41
0.29	25.81
0.36	28.17
0.43	29.60
0.51	30.24
0.58	30.30
0.65	30.27
0.72	30.18
0.8	29.98
0.87	29.64
0.94	29.10
1.01	28.33
1.09	27.28
1.16	25.93
1.23	26.39
1.3	27.00
1.38	27.60
1.45	28.16
1.52	28.71
1.59	29.23
1.67	29.74
1.74	30.22
1.81	30.69
1.88	31.14
1.95	31.58
2.03	32.00
2.1	32.41

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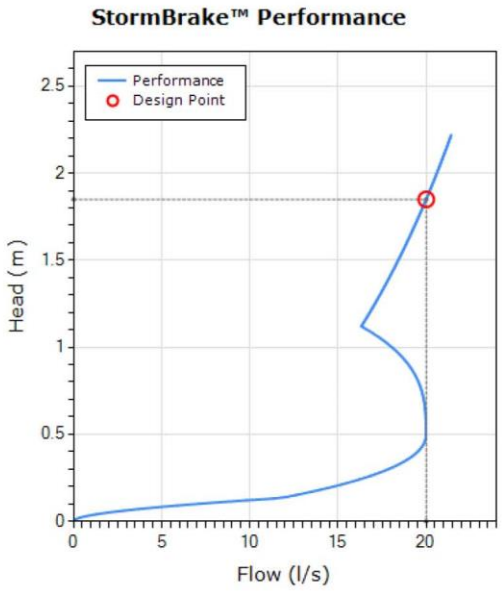
StormBrake™ Performance Report

wrc approved PT/398/0217

Contractor:	EWE Associates Ltd	Head(m):	1.85
Site:	Hincliffe Holmfirth	Flow(l/s):	20
Date:	10/02/2026	Chamber Ref:	SW29
Created By:	lea favill	Mounting Style:	LUGS (Default)
Device Ref:	FPM-SB1-01850-02000-0100		



	Head (m)	Flow (l/s)
Design Point	1.85	20.00
Flush Flow	0.50	19.99
Kick Back	1.12	16.32

	Dims (mm)
Min. Chamber Diameter	1500
Min. Outlet Pipe Diameter	225
Min. Sump Depth	440

Head (m)	Flow (l/s)
0	0.00
0.08	4.41
0.15	12.77
0.23	15.87
0.31	18.02
0.38	19.33
0.46	19.93
0.54	19.99
0.61	19.96
0.69	19.88
0.77	19.69
0.84	19.36
0.92	18.85
1	18.11
1.07	17.11
1.15	16.50
1.22	16.95
1.3	17.38
1.38	17.79
1.45	18.19
1.53	18.57
1.61	18.93
1.68	19.28
1.76	19.62
1.84	19.95
1.91	20.26
1.99	20.57
2.07	20.86
2.14	21.14
2.22	21.42

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Appendix I: - Flood Routing Plan