Mr Jason Hughes

Area 1 & 2
Southview
Darfield

Drainage Assessment

Prepared by EWE Associates Ltd
Final RevA December 2024

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CLIENT DETAILS

Mr Jason Hughes

CONTRACT

This report describes work commissioned on behalf of Mr Jason Hughes by their representatives during August 2024. The representatives for the contract is Mr James Roberts. Lea Favill of EWE Associates Ltd carried out the work.

Date: 3rd December 2024

Prepared by: …… ……. Lea Favill
Director

REVISION HISTORY

Draft Report Rev0 issued 22nd October 2024 - 1No copy issued to James Roberts
Final Report RevA issued 3rd December 2024 - 1No copy issued to James Roberts

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APPENDICES:

1. INTRODUCTION

Terms of Reference

This report was commissioned by Mr Jason Hughes to consider the surface water drainage system for the proposed residential development at Southview Darfield.

The proposal involves the construction 33 residential units and access roads. Area 1 includes 25 units and Area 2 includes 8 units. The drainage issues are being considered as part of the planning application.

Approach to the Assessment

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

- Site level information and proposed finished levels of the building and external works.
- Catchment area draining to the existing public sewers.
- Existing infiltration characteristics of subsoils.
- 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.
- Discharge rates into Phase 1 and public sewer.
- 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 a residential development as such any SUDs features or attenuation structures will be maintained by the individual owner/maintenance company.
- SUDs features are to be recommended where practically possible.
- RB Geotechnical has undertaken percolation tests within the site. Trial holes within the site identified made ground and mudstone/sandstone. The infiltration rates estimated are extremely low and the site steeply slopes down from north to south. As such, soakaways not considered practical for this site.

- A site visit was completed during September 2020. During the visit no open or culverted watercourse were found. There is a 225mm diameter combined Yorkshire Water public sewer located within Snape Hill Road to the south of the site. The sewer is over 1.7m deep in line with the site entrance. There is a 225mm diameter combined Yorkshire Water public sewer located within Southview to the north of the site. The sewer is over 1.1m deep in line with the site entrance.
- Phase 1 of the development has been granted planning permission and highway/drainage conditions discharged. The Phase 2 development assumes that a connection will be made into the Phase 1 drainage system for both surface water and foul water drainage.
- The minimum design standard is 1 in 100 years plus climate change (40%). Based on latest climate change allowance figures dated February 2016.
- No on site above ground flooding will be acceptable up to and including 1 in 100 years plus climate change (40%) storm.
- A discharge rate of 8.6l/s has been estimated from the Area 1 based on ADAS345 greenfield runoff rates. The site is considered to be 100% permeable with no roofed or paved areas.

2. DESIGN OF PROPOSED SURFACE WATER DRAIANGE SYSTEM

Existing Runoff

Area 1 site has a total area of 1.313 hectares which is steeply sloping (1 in 5). There are no roofed or paved areas within the site. Due to the steep sloping site the ADAS345 method has been used to estimate the Qbar runoff from the site at 8.6l/s. The calculations are provided at Appendix B of this report.

Area 2 is only 0.1628 hectares in area and has a Qbar of approximately 1.1l/s calculated on a pro rata basis. As this is less than 3.5l/s which is the practical minimum discharge rate applied by Yorkshire Water a rate of 3.5l/s is recommended.

Catchment Area

The catchment area was calculated from proposed layout drawing provide by the clients representative.

The total impermeable area for Area 1 has been estimated at 0.523 hectares.

The total impermeable area for Area 2 has been estimated at 0.043 hectares.

Yorkshire Water Sewer

There is a 225mm diameter combined Yorkshire Water sewer located inline with the site entrance within Snape Hill Road to the south of the site. The sewer is at least 1.7m deep.

There is a 225mm diameter combined Yorkshire Water sewer located inline with the site entrance within Southview Road to the north of the site. The sewer is at least 1.1m deep.

The sewer plan is provided at Appendix A of this report.

Drainage Strategy

The proposed drainage strategy is as follows and is illustrated on the drainage layout drawing provided at Appendix C of this report. The drainage system will include oversized pipes within the adoptable highway and tanks located in areas which could allow easements directly off the adoptable highway.

Adoption & Maintenance

It is considered that the piped drainage system within the adoptable highway will be adopted by Yorkshire Water and the tanks will be the responsibility of a private management company.

Proposed Drainage Strategy Area 1

It is proposed to ultimately discharge any surface water flows generated by the development of the site which cannot drain via infiltration to the 225mm diameter Yorkshire Water combined sewer located in Snape Hill Road.

The 0.523 ha will be directed to a system of oversized pipes and a tank.

The drainage strategy utilises an appropriately sized hydro brake to restrict the flow rate to a maximum of 8.6l/s. A second hydro brake will be provided due to the steep slopes within the proposed highway. As such, the flow will vary for each of the design storms shown above and it is expected that during the more extreme return periods there will be a considerable betterment as the hydro brake is likely to restrict flows to a lesser rate than estimated at present.

Based upon the assumption that the drainage authority will agree to the maximum discharge rates of 8.6l/s, a preliminary surface water network has been developed and attenuation has been sized using MicroDrainage software.

The model data for the proposed surface water drainage network has been obtained from the proposed development layout drawing and the drainage strategy drawing is provided at Appendix C of this report. A model has been developed to represent the main drainage runs within the proposed drainage network and contributing drainage areas within the development.

Overall, the hydraulic models include the following;

- 11 pipes to represent the proposed system
- 2 hydro-brake downstream of pond (8.6l/s)
- 1 Tank
- 1 outfall into the combined sewer

Impermeable area contributions have been based on those supplied on the proposed layout drawing, considered to be 100% impermeable, comprising of roofed and paved areas.

The models have been set up as a fixed runoff model assuming 100% runoff coefficient for roofed and paved areas. The rainfall characteristics for Darfield have been utilised with a value for M5-60 given as 20mm (the depth of rain in a once in five years one hour duration event); and r given as 0.40 (the ratio of the M5-60 rainfall to the M5-2day rainfall). For durations over 60 minutes the FEH runoff data for Darfield has been used.

Hydraulic Modelling Results

The proposed MicroDrainage models have been simulated with the 1 in 100 year plus climate change (40%) return period design storm events with durations of 15, 45, 60, 180, 360, 600, 900 and 1440 minutes. At the request of the Environment Agency seven day 10080 minute duration was also undertaken. The durations were run in both Winter and Summer profiles. It was found that the Winter profile was critical.

The table overleaf shows a summary of the 1 in 100 year plus climate change model runs and the impact on the drainage system in terms of peak depth within the system and flow through the hydro-brake.

The 1440 minute duration produced the largest flow through the hydro-brake (4.6 l/s) which is less than the restricted runoff rate (8.6l/s). The modelled result for the 1440 minute Winter model run is provided at Appendix D. There was no flooding during this event.

Return Period	Duration (min)	Peak water system	Peak flow into sewer	Status
100 yr+CC	15min	45.097	3.1	OK
100 yr+CC	45min	45.207	3.3	OK
100 yr+CC	60min	45.278	3.5	SUR
100 yr+CC	180min	45.582	4.0	SUR
100 yr+CC	360min	45.694	4.4	SUR
100 yr+CC	600min	45.687	4.5	SUR
100 yr+CC	900min	45.710	4.6	SUR
100 yr+CC	1440min	45.765	4.6	SUR
100 yr+CC	10080min	44.938	3.2	OK

Proposed Drainage Strategy Area 2

The total roofed and paved catchment area has been estimated at 0.043 hectares and is shown on the strategy drawing provided at Appendix C of this report. The discharge rate into the combined sewer is 3.5l/s.

An assessment of the required balance volume for the roofed and paved area has been made using the estimated post development impermeable area shown on the strategy drawing and tabulated below in Table 1. 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.

Reference should be made to Appendix E where the calculation sheets are provided. The attenuation sizes have been tabulated below in Table 1. The drainage strategy drawing provided at Appendix C shows the location of the storage tanks.

Table 1: Storage Volume from 430m2 area

Return Period	Modelled total volume over duration	Attenuation type	Length	Width	Depth
100yr+CC	15.6m3	8No Crate Tank	3	2	0.4

Crate Tank Maintenance

Following construction regular inspection is recommended. The main concern is to reduce the level of siltation entering the tank and as such a catchpit manhole should be located directly upstream of the tank to intercept any silt being washed down the surface water system. It is recommended that this manhole is lifted and inspected on a monthly basis and any silt located in the bottom removed. Furthermore the location of the tank within the site should be clearly marked on a plan. This area should also be inspected for any deformation of the topsoil/pavement which could indicate settlement or failure. 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 below and will be the responsibility of the appointed management company.

Maintenance Schedule	**Required action**	**Frequency**
Monitoring	Inspect catchpit manhole for silt and debris	Monthly
	Inspect crate tank locations for ground deformation	3 monthly
	Inspect crate tank for silt buildup	6 monthly
Regular Maintenance	Litter and debris removal from road gullies	Monthly
	Remove silt and debris from catchpit manholes	Monthly
Occasional Maintenance	Remove silt from crate tank	6 monthly
Remedial actions	Repair deformation of topsoil once settlement stopped	As required
	Repair deformation of paved areas once settlement stopped	As required

3. DESIGN OF PROPSOED FOUL DRAINAGE SYSTEM

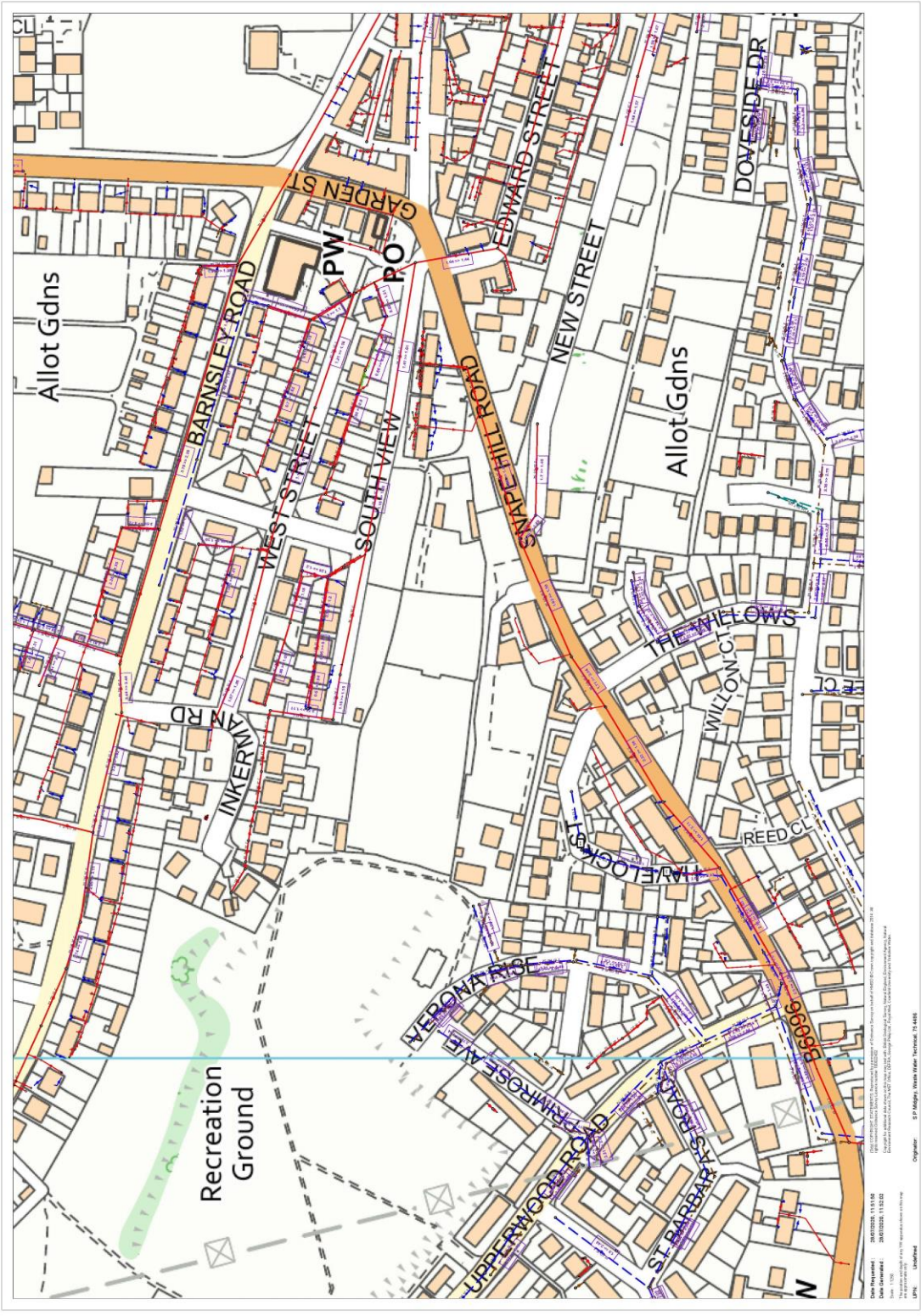
Existing Foul Drainage

There is a public combined sewer within Snape Hill Road and Southview Road.

Proposed Foul Drainage

A gravity connection can be made into the Yorkshire Water public sewer within Snape Hill Road and Southview Road based on the proposed floor levels.

Appendix A: - YW Sewer Plan



Appendix B: - ADAS345 Runoff Calculations

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 22/10/2024 15:31 File	Designed By Lea Checked By	
Micro Drainage	Source Control W.12.4	

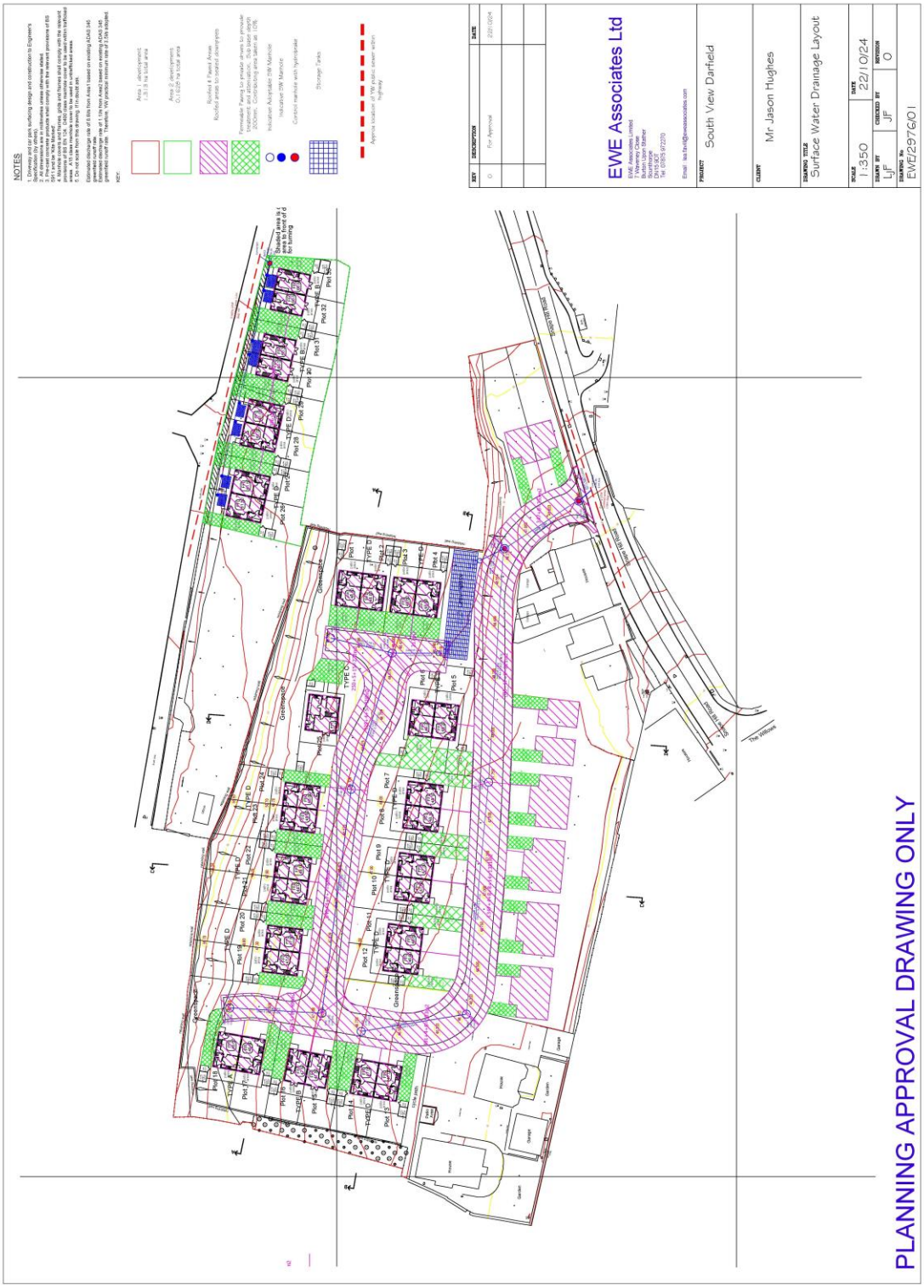
ADAS 345 Mean Annual Flood

Input

Area (ha)	1.313	Soil Type Factor (St)	0.450
Length (m)	65.000	Paved Area (%)	0.000
Average Slope (1:X)	5.0	Dominant Crop Type	Grass
AAR (mm)	608	Region Number	Region 3

Results	l/s
Q0 - Peak Flood Flow	7.4
Total Q0	7.4
QBAR	8.6
Q1 year	7.4
Q1 year	7.4
Q2 years	8.1
Q5 years	10.8
Q10 years	12.5
Q20 years	14.2
Q25 years	14.7
Q30 years	15.2
Q50 years	16.4
Q100 years	18.0
Q200 years	20.4
Q250 years	21.2
Q1000 years	26.3

Appendix C: - Drainage Drawing



Appendix D: - Area 1 -WinDes drainage Calculations Sheets

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 22/10/2024 11:19	Designed By Lea	
File 100yr+CC40%Winter...	Checked By	
Micro Drainage	Network W.12.4	

Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	k (mm)	HYD SECT	DIA (mm)
1.000	23.000	0.046	500.0	0.040	4.00	0.600	oo	600
1.001	56.600	0.114	496.5	0.086	0.00	0.600	oo	600
1.002	35.600	0.072	494.4	0.044	0.00	0.600	oo	600
2.000	15.900	0.044	361.4	0.027	4.00	0.600	oo	600
1.003	12.500	0.025	500.0	0.022	0.00	0.600	oo	600
1.004	6.000	0.012	500.0	0.000	0.00	0.600	o	600
3.000	26.700	0.054	494.4	0.050	4.00	0.600	oo	600
3.001	58.400	0.131	445.8	0.138	0.00	0.600	oo	600
3.002	58.400	0.117	499.1	0.081	0.00	0.600	oo	600
1.005	22.000	0.044	500.0	0.035	0.00	0.600	oo	600
1.006	5.000	0.034	147.1	0.000	0.00	0.600	o	600

PN	US/MH Name	US/CL (m)	US/IL (m)	US C.Depth (m)	DS/CL (m)	DS/IL (m)	DS C.Depth (m)	Ctrl	US/MH (mm)
1.000	1	48.200	44.888	2.712	46.992	44.842	1.550		1800
1.001	2	46.992	44.842	1.550	48.700	44.728	3.372		1800
1.002	3	48.700	44.728	3.372	48.500	44.656	3.244		1800
2.000	4	48.890	44.700	3.590	48.500	44.656	3.244		1800
1.003	5	48.500	44.656	3.244	48.500	44.631	3.269		1800
1.004	6	48.500	44.631	3.269	48.275	44.619	3.056		1800
3.000	7	46.750	44.921	1.229	46.330	44.867	0.863		1800
3.001	8	46.330	44.867	0.863	47.750	44.736	2.414		1800
3.002	9	47.750	44.736	2.414	48.275	44.619	3.056		1800
1.005	10	48.275	44.619	3.056	46.000	44.575	0.825	Hydro-Brake®	1800
1.006	11	46.000	44.575	0.825	46.000	44.541	0.859	Hydro-Brake®	1800

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.006		46.000	44.541	44.541	0	0

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 22/10/2024 11:19	Designed By Lea	
File 100yr+CC40%Winter...	Checked By	
Micro Drainage	Network W.12.4	

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Foul Sewage per hectare (l/s)	0.000
PIMP (% impervious)	100	Additional Flow - % of Total Flow	40.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Run Time (mins)	2880
Hot Start Level (mm)	0	Output Interval (mins)	24
Manhole Headloss Coeff (Global)	0.500		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	0		

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
Site Location	441350 403850 SE 41350 03850
C (1km)	-0.025
D1 (1km)	0.356
D2 (1km)	0.406
D3 (1km)	0.248
E (1km)	0.301
F (1km)	2.361
Summer Storms	No
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Storm Duration (mins)	1440

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		
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Micro Drainage	Network W.12.4	

Online Controls for Storm

Hydro-Brake® Manhole: 10, DS/PN: 1.005, Volume (m³): 42.5

Design Head (m) 3.300 Hydro-Brake® Type Md4 Invert Level (m) 44.619
Design Flow (l/s) 8.6 Diameter (mm) 78

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.4	1.200	5.2	3.000	8.2	7.000	12.5
0.200	3.2	1.400	5.6	3.500	8.9	7.500	13.0
0.300	2.8	1.600	6.0	4.000	9.5	8.000	13.4
0.400	3.0	1.800	6.4	4.500	10.1	8.500	13.8
0.500	3.4	2.000	6.7	5.000	10.6	9.000	14.2
0.600	3.7	2.200	7.0	5.500	11.1	9.500	14.6
0.800	4.2	2.400	7.3	6.000	11.6		
1.000	4.7	2.600	7.6	6.500	12.1		

Hydro-Brake® Manhole: 11, DS/PN: 1.006, Volume (m³): 15.0

Design Head (m) 1.200 Hydro-Brake® Type Md4 Invert Level (m) 44.575
Design Flow (l/s) 8.6 Diameter (mm) 101

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.0	1.200	8.7	3.000	13.8	7.000	21.0
0.200	6.4	1.400	9.4	3.500	14.9	7.500	21.8
0.300	5.7	1.600	10.1	4.000	15.9	8.000	22.5
0.400	5.3	1.800	10.7	4.500	16.9	8.500	23.2
0.500	5.7	2.000	11.2	5.000	17.8	9.000	23.8
0.600	6.2	2.200	11.8	5.500	18.6	9.500	24.5
0.800	7.1	2.400	12.3	6.000	19.5		
1.000	7.9	2.600	12.8	6.500	20.3		

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Storage Structures for Storm

Tank or Pond Manhole: 6, DS/PN: 1.004

Invert Level (m) 44.631

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	160.0	1.400	0.0	2.800	0.0	4.200	0.0
0.200	160.0	1.600	0.0	3.000	0.0	4.400	0.0
0.400	160.0	1.800	0.0	3.200	0.0	4.600	0.0
0.600	160.0	2.000	0.0	3.400	0.0	4.800	0.0
0.800	160.0	2.200	0.0	3.600	0.0	5.000	0.0
1.000	160.0	2.400	0.0	3.800	0.0		
1.200	160.0	2.600	0.0	4.000	0.0		

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Micro Drainage	Network W.12.4	

Summary of Results for 1440 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm)	450.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	45.704	0.216	0.000	0.00	0.0	1.2	SURCHARGED
1.001	2	45.704	0.262	0.000	0.01	0.0	3.2	SURCHARGED
1.002	3	45.704	0.376	0.000	0.01	0.0	3.5	SURCHARGED
2.000	4	45.705	0.405	0.000	0.00	0.0	0.8	SURCHARGED
1.003	5	45.705	0.449	0.000	0.01	0.0	4.5	SURCHARGED
1.004	6	45.705	0.474	0.000	0.02	0.0	4.0	SURCHARGED
3.000	7	45.758	0.237	0.000	0.00	0.0	1.5	SURCHARGED
3.001	8	45.754	0.287	0.000	0.01	0.0	5.1	SURCHARGED
3.002	9	45.748	0.412	0.000	0.01	0.0	6.9	SURCHARGED
1.005	10	45.765	0.546	0.000	0.01	0.0	4.6	SURCHARGED
1.006	11	44.756	-0.419	0.000	0.02	0.0	4.6	OK

Appendix E: - Area 2 -WinDes drainage Calculations Sheets

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 22/10/2024 14:22	Designed By Lea	
File 100yr+CC40% tank ...	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	54.639	0.339	2.4	12.2	O K
30 min Summer	54.672	0.372	2.4	13.4	O K
60 min Summer	54.682	0.382	2.4	13.7	O K
120 min Summer	54.670	0.370	2.4	13.3	O K
180 min Summer	54.648	0.348	2.4	12.5	O K
240 min Summer	54.623	0.323	2.4	11.6	O K
360 min Summer	54.573	0.273	2.4	9.8	O K
480 min Summer	54.521	0.221	2.4	7.9	O K
600 min Summer	54.472	0.172	2.4	6.2	O K
720 min Summer	54.443	0.143	2.4	5.1	O K
960 min Summer	54.416	0.116	2.3	4.2	O K
1440 min Summer	54.394	0.094	1.8	3.4	O K
2160 min Summer	54.378	0.078	1.4	2.8	O K
2880 min Summer	54.369	0.069	1.2	2.5	O K
4320 min Summer	54.357	0.057	0.8	2.0	O K
5760 min Summer	54.350	0.050	0.7	1.8	O K
7200 min Summer	54.345	0.045	0.5	1.6	O K
8640 min Summer	54.342	0.042	0.5	1.5	O K
10080 min Summer	54.339	0.039	0.4	1.4	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	169.749	17
30 min Summer	100.305	31
60 min Summer	59.271	52
120 min Summer	35.023	84
180 min Summer	25.746	120
240 min Summer	20.695	154
360 min Summer	15.213	222
480 min Summer	12.229	284
600 min Summer	10.324	336
720 min Summer	8.990	388
960 min Summer	7.331	502
1440 min Summer	5.499	736
2160 min Summer	4.125	1100
2880 min Summer	3.364	1468
4320 min Summer	2.367	2200
5760 min Summer	1.845	2928
7200 min Summer	1.520	3672
8640 min Summer	1.298	4376
10080 min Summer	1.135	5136

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
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File 100yr+CC40% tank ...	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	54.683	0.383	2.4	13.8	O K
30 min Winter	54.724	0.424	2.4	15.2	O K
60 min Winter	54.738	0.438	2.4	15.6	O K
120 min Winter	54.715	0.415	2.4	14.9	O K
180 min Winter	54.680	0.380	2.4	13.7	O K
240 min Winter	54.643	0.343	2.4	12.3	O K
360 min Winter	54.561	0.261	2.4	9.4	O K
480 min Winter	54.471	0.171	2.4	6.2	O K
600 min Winter	54.428	0.128	2.4	4.6	O K
720 min Winter	54.410	0.110	2.2	4.0	O K
960 min Winter	54.393	0.093	1.8	3.3	O K
1440 min Winter	54.377	0.077	1.4	2.8	O K
2160 min Winter	54.365	0.065	1.0	2.3	O K
2880 min Winter	54.358	0.058	0.9	2.1	O K
4320 min Winter	54.348	0.048	0.6	1.7	O K
5760 min Winter	54.343	0.043	0.5	1.5	O K
7200 min Winter	54.339	0.039	0.4	1.4	O K
8640 min Winter	54.336	0.036	0.3	1.3	O K
10080 min Winter	54.334	0.034	0.3	1.2	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Winter	169.749	17
30 min Winter	100.305	31
60 min Winter	59.271	58
120 min Winter	35.023	92
180 min Winter	25.746	130
240 min Winter	20.695	166
360 min Winter	15.213	238
480 min Winter	12.229	288
600 min Winter	10.324	332
720 min Winter	8.990	386
960 min Winter	7.331	502
1440 min Winter	5.499	738
2160 min Winter	4.125	1096
2880 min Winter	3.364	1436
4320 min Winter	2.367	2176
5760 min Winter	1.845	2928
7200 min Winter	1.520	3600
8640 min Winter	1.298	4360
10080 min Winter	1.135	5032

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		
Date 22/10/2024 14:22	Designed By Lea	
File 100yr+CC40% tank ...	Checked By	
Micro Drainage	Source Control W.12.4	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
Site Location	441350 403850 SE 41350 03850
C (1km)	-0.025
D1 (1km)	0.356
D2 (1km)	0.406
D3 (1km)	0.248
E (1km)	0.301
F (1km)	2.361
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 22/10/2024 14:22	Designed By Lea	
File 100yr+CC40% tank ...	Checked By	
Micro Drainage	Source Control W.12.4	

Model Details

Storage is Online Cover Level (m) 55.500

Tank or Pond Structure

Invert Level (m) 54.300

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	36.0	1.400	0.0	2.800	0.0	4.200	0.0
0.200	36.0	1.600	0.0	3.000	0.0	4.400	0.0
0.400	36.0	1.800	0.0	3.200	0.0	4.600	0.0
0.600	0.0	2.000	0.0	3.400	0.0	4.800	0.0
0.800	0.0	2.200	0.0	3.600	0.0	5.000	0.0
1.000	0.0	2.400	0.0	3.800	0.0		
1.200	0.0	2.600	0.0	4.000	0.0		

Hydro-Brake® Outflow Control

Design Head (m) 1.000 Hydro-Brake® Type Md4 Invert Level (m) 54.300
Design Flow (l/s) 3.5 Diameter (mm) 68

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.0	1.200	3.9	3.000	6.2	7.000	9.4
0.200	2.1	1.400	4.2	3.500	6.6	7.500	9.7
0.300	2.0	1.600	4.5	4.000	7.1	8.000	10.0
0.400	2.3	1.800	4.8	4.500	7.5	8.500	10.4
0.500	2.5	2.000	5.0	5.000	7.9	9.000	10.7
0.600	2.8	2.200	5.3	5.500	8.3	9.500	10.9
0.800	3.2	2.400	5.5	6.000	8.7		
1.000	3.6	2.600	5.7	6.500	9.1		