Hoober Ltd

Proposed Residential Development
Barber Street
Hoyland

Drainage Assessment

Prepared by EWE Associates Ltd
Draft Rev0 March 2018

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CLIENT DETAILS

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CONTRACT

This report describes work commissioned by Hoober Ltd following written instruction by their representative during January 2018. Hoober Ltd representative for the contract was Mr Geoff Sanderson. Lea Favill of EWE Associates Ltd carried out the work.

Date: 19th March 2018

Prepared by: …… ……. Lea Favill
Director

REVISION HISTORY

Draft Report Rev0 issued 19th March 2018
- 1No copy issued to Mr Geoff Sanderson

CONTENTS

APPENDICES:

1. INTRODUCTION

Terms of Reference

This report was commissioned by Hoober Ltd to consider the surface water and foul water drainage systems for the proposed residential development to the south west of Barber Street in Hoyland near Barnsley.

The proposal involves the construction of 11 residential dwellings, private driveways and an access road. The drainage issues are being considered as part of the planning conditions.

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 combined sewer within Barber Street.
- 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 combined 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 11 residential dwellings which will be sold to individual owners as such any drainage features or attenuation structures will be maintained by the individual owner/maintenance company.
- SUDs features are to be recommended where practically possible.
- Site investigation works have been undertaken within the site which included percolation tests. Three trial holes where excavated within the site. The trial holes where excavated to approximately 1.5m below ground. The excavation found made ground which is not suitable for soakaways.

The natural subsoils are believed to be clay and sandy clays. There is a 3.5m difference in levels from the back of the site to the front adjacent to Barber Street. The built-up ground is generally made ground and arisings from the demolition works. Therefore, any soakaways would need to be excavated through the made ground into the original subsoils to ensure that runoff is maintained within the drainage system. It was concluded that infiltration drainage is not a practical solution for this site.

- A ground works contractor visited site during January 2018 and lift manhole lids within the site and undertook CCTV survey. It was confirmed that there are two 150mm diameter connections from the site into the Yorkshire Water combined sewer within Barber Street.
- It is assumed that the minimum design standard is 1 in 100 years plus climate change (40%).
- Due to the existing residential development to the north east of the site that 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 DRAIANGE SYSTEM

Catchmant Area

The catchment area was calculated from proposed layout drawing provide by Saxton Design Ltd (17.024.2 RevB dated October 2017). The total impermeable area to be adopted has been estimated at 1283m² (0.1283 hectares).

Drainage Strategy

The proposed drainage strategy is as follows and is illustrated on the drainage layout drawing provided at Appendix A of this report.

- Roof drainage from building. Soakaways are not a practical solution due to limited infiltration. As such, it is proposed that runoff is directed to a crate tank before being discharged at a restricted rate into the combined sewer.
- Access drives/parking area drainage. All pavement drainage will be directed to a crate tank before being discharged at a restricted rate into the combined sewer.

Adoption & Maintenance

It is considered that the piped drainage systems and attenuation structures will be maintained by private land owners and a maintenance company.

Existing Drainage

The site was previously occupied by a public house which included extensive roofed and paved areas. It is believed that both the surface water and foul drainage was connected to two 150mm diameter pipes which discharge into the 300mm diameter combined sewer within Barber Street. The sewer plan of the area is provided at Appendix B of this report.

The public house was demolished several years ago. As such, the existing discharge from the site will be like that of greenfield rate.

Proposed Drainage Strategy

It is proposed to ultimately discharge any surface water flows generated by the development of the site which cannot drain via infiltration to the 300mm diameter sewer within Barber Street via existing 150mm diameter north east connection.

Assuming a greenfield runoff rate of 5l/s/ha as the total site is only 0.224 hectares the peak discharge would be approximately 1.12 l/s. This is considered to be impractical. As such, a peak discharge rate of 3l/s has been adopted.

The proposed impermeable area for the development site has been calculated to be approximately 1283m² of roofed and paved area.

The drainage strategy utilises an appropriately sized hydro brake to restrict the flow to 3l/s. This allows the discharge through the hydro brake to vary as the head increases due to the increase in upstream flows. Storage will be provided by two crate tanks.

Based upon the assumption that the drainage authority will agree to the maximum discharge rate of 3l/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 A 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;

- 7 pipes to represent the proposed system
- 2 control structures
- 2 crate tanks
- 1 outfall into the combined sewer with no surcharging

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 Hoyland 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 Hoyland has been used. As this is a drainage design a MADD factor of 0 has been applied.

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, 90, 180, 240, 300, 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 below 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 lower crate tank and flow through the final control structure before the combined sewer.

The 240 minute duration produced the largest flow through the control structure (2.4 l/s) which is less than the proposed discharge restriction of 3l/s. The modelled result for the 240 minute Winter model run is provided at Appendix C. There was no flooding during any of the durations simulated.

Return Period	Profile	Duration (min)	Peak depth in lower tank	Peak flow into combined sewer
100 year+CC	Winter FSR	15min	6.923	1.9
100 year+CC	Winter FSR	45min	7.036	2.1
100 year+CC	Winter FEH	60min	7.123	2.2
100 year+CC	Winter FEH	90min	7.180	2.3
100 year+CC	Winter FEH	180min	7.257	2.4
100 year+CC	Winter FEH	240min	7.253	2.3
100 year+CC	Winter FEH	300min	7.248	2.3
100 year+CC	Winter FEH	360min	7.241	2.3
100 year+CC	Winter FEH	600min	7.193	2.2
100 year+CC	Winter FEH	900min	7.151	2.2
100 year+CC	Winter FEH	1440min	7.090	2.1
100 year+CC	Winter FEH	10080min	6.677	0.8

3. DESIGN OF PROPSOED FOUL DRAINAGE SYSTEM

Existing Foul Drainage

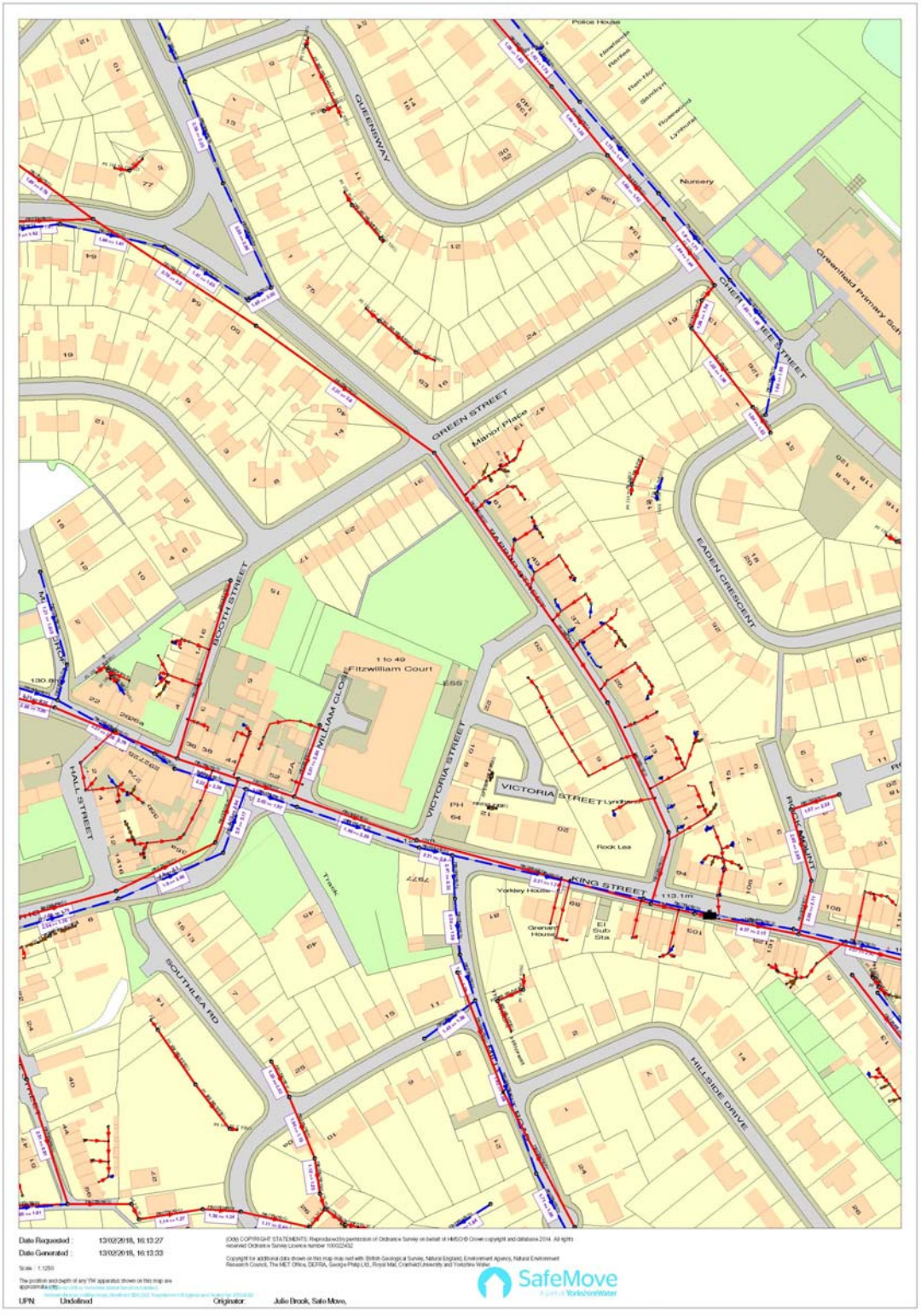
There is a 300mm diameter combined Yorkshire Water sewer to the north east of the site within Barber Street which the previous public house is believed to have been connected for both sewerage and roof/pavement drainage. CCTV survey confirmed that there are two 150mm diameter connections from the site into the sewer.

Proposed Foul Drainage

The current proposal is to connect the foul drainage from the site into the combined sewer within Barber Street via gravity connections using the two existing 150mm diameter pipes. The proposed foul drainage layout is provided at Appendix D of this report. The foul networks draining to each connection point have been modelled using WinDES software. The outputs are provided at Appendix E and F of this report.

Appendix A: - Surface Water Drainage Strategy Plan EWE2171/01

Appendix B: - Yorkshire Water Sewer Plan



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

EWE Associates Ltd		Page 1
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 18/03/2018 16:54	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	12.000	0.150	80.0	0.039	4.00	0.600	o	225
2.000	8.500	0.100	85.0	0.026	4.00	0.600	o	150
1.001	8.000	0.400	20.0	0.020	0.00	0.600	o	150
3.000	16.300	0.163	100.0	0.008	4.00	0.600	o	100
4.000	24.000	0.240	100.0	0.012	4.00	0.600	o	100
1.002	3.000	0.020	150.0	0.000	0.00	0.600	o	225
5.000	18.300	0.615	29.8	0.009	4.00	0.600	o	100
1.003	23.000	0.110	209.1	0.014	0.00	0.600	o	300
1.004	1.000	0.050	20.0	0.000	0.00	0.600	o	300

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	9.450	8.250	0.975	9.450	8.100	1.125		600
2.000	2	9.450	8.200	1.100	9.450	8.100	1.200		600
1.001	3	9.450	8.100	1.200	9.300	7.700	1.450	Hydro-Brake®	1200
3.000	4	8.800	6.863	1.837	9.300	6.700	2.500		450
4.000	5	8.800	6.940	1.760	9.300	6.700	2.500		450
1.002	4	9.300	6.680	2.395	7.500	6.660	0.615		600
5.000	5	7.800	7.350	0.350	7.500	6.735	0.665		450
1.003	6	7.500	6.660	0.540	7.500	6.550	0.650		600
1.004	7	7.500	6.550	0.650	7.500	6.500	0.700	Hydro-Brake®	1200

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)
1.004	combined sewer	7.500	6.500	6.500	0	0

EWE Associates Ltd		Page 2
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 18/03/2018 16:54	Designed By Lea	
File 100yr+CC40%Winter...	Checked By	
Micro Drainage	Network W.12.4	

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	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)	480
Hot Start Level (mm)	0	Output Interval (mins)	4
Manhole Headloss Coeff (Global)	0.500		

Number of Input Hydrographs	0	Number of Storage Structures	2
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	437800 400950 SE 37800 00950
C (1km)	-0.024
D1 (1km)	0.360
D2 (1km)	0.436
D3 (1km)	0.224
E (1km)	0.296
F (1km)	2.384
Summer Storms	No
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.750
Storm Duration (mins)	240

EWE Associates Ltd		Page 3
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 18/03/2018 16:54 File 100yr+CC40%Winter...	Designed By Lea Checked By	
Micro Drainage	Network W.12.4	

Online Controls for Storm

Hydro-Brake® Manhole: 3, DS/PN: 1.001, Volume (m³): 2.1

Design Head (m) 1.200 Hydro-Brake® Type Md4 Invert Level (m) 8.100
Design Flow (l/s) 2.5 Diameter (mm) 55

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.4	1.200	2.6	3.000	4.1	7.000	6.2
0.200	1.2	1.400	2.8	3.500	4.4	7.500	6.5
0.300	1.3	1.600	3.0	4.000	4.7	8.000	6.7
0.400	1.5	1.800	3.2	4.500	5.0	8.500	6.9
0.500	1.7	2.000	3.3	5.000	5.3	9.000	7.1
0.600	1.8	2.200	3.5	5.500	5.5	9.500	7.3
0.800	2.1	2.400	3.7	6.000	5.8		
1.000	2.4	2.600	3.8	6.500	6.0		

Hydro-Brake® Manhole: 7, DS/PN: 1.004, Volume (m³): 2.6

Design Head (m) 0.900 Hydro-Brake® Type Md4 Invert Level (m) 6.550
Design Flow (l/s) 3.0 Diameter (mm) 64

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.8	1.200	3.5	3.000	5.5	7.000	8.4
0.200	1.8	1.400	3.8	3.500	6.0	7.500	8.7
0.300	1.8	1.600	4.0	4.000	6.4	8.000	9.0
0.400	2.0	1.800	4.3	4.500	6.8	8.500	9.3
0.500	2.3	2.000	4.5	5.000	7.1	9.000	9.6
0.600	2.5	2.200	4.7	5.500	7.5	9.500	9.8
0.800	2.9	2.400	4.9	6.000	7.8		
1.000	3.2	2.600	5.1	6.500	8.1		

EWE Associates Ltd		Page 4
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 18/03/2018 16:54 File 100yr+CC40%Winter...	Designed By Lea Checked By	
Micro Drainage	Network W.12.4	

Storage Structures for Storm

Tank or Pond Manhole: 1, DS/PN: 1.000

Invert Level (m) 8.250

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	60.5	1.400	0.0	2.800	0.0	4.200	0.0
0.200	60.5	1.600	0.0	3.000	0.0	4.400	0.0
0.400	60.5	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		

Tank or Pond Manhole: 4, DS/PN: 1.002

Invert Level (m) 6.680

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	47.2	1.400	0.0	2.800	0.0	4.200	0.0
0.200	47.2	1.600	0.0	3.000	0.0	4.400	0.0
0.400	47.2	1.800	0.0	3.200	0.0	4.600	0.0
0.600	47.2	2.000	0.0	3.400	0.0	4.800	0.0
0.800	47.2	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		

EWE Associates Ltd		Page 5
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 18/03/2018 16:54 File 100yr+CC40%Winter...	Designed By Lea Checked By	
Micro Drainage	Network W.12.4	

Summary of Results for 240 minute 100 year Winter (Storm)

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status ON
Inertia Status ON

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	9.070	0.595	0.000	0.04	0.0	1.8	SURCHARGED
2.000	2	9.070	0.720	0.000	0.17	0.0	2.8	SURCHARGED
1.001	3	9.068	0.818	0.000	0.07	0.0	2.3	SURCHARGED
3.000	4	7.132	0.169	0.000	0.15	0.0	0.9	SURCHARGED
4.000	5	7.131	0.091	0.000	0.22	0.0	1.3	SURCHARGED
1.002	4	7.133	0.228	0.000	0.21	0.0	5.7	SURCHARGED
5.000	5	7.370	-0.080	0.000	0.09	0.0	1.0	OK
1.003	6	7.253	0.293	0.000	0.07	0.0	4.5	FLOOD RISK
1.004	7	7.314	0.464	0.000	0.04	0.0	2.4	FLOOD RISK

Appendix D: - Foul Water Drainage Strategy Plan EWE2171/02

Appendix E: - WinDES Foul Model

EWE Associates Ltd		Page 1
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 18/03/2018 17:32	Designed By Lea	
File Foul Network A 18...	Checked By	
Micro Drainage	Network W.12.4	

FOUL SEWERAGE DESIGN

Design Criteria for Foul - Main

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.200
Flow Per Person (l/per/day)	222.00	Maximum Backdrop Height (m)	1.500
Persons per House	3.00	Min Design Depth for Optimisation (m)	1.200
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	5.000	0.125	40.0	0.000	1	0.0	1.500	o	100
1.001	10.000	0.250	40.0	0.000	1	0.0	1.500	o	100
1.002	9.000	0.225	40.0	0.000	1	0.0	1.500	o	100
1.003	12.000	0.300	40.0	0.000	0	0.0	1.500	o	100
1.004	11.000	0.750	14.7	0.000	0	0.0	1.500	o	100
1.005	3.200	0.080	40.0	0.000	1	0.0	1.500	o	100
1.006	8.000	0.200	40.0	0.000	1	0.0	1.500	o	100
2.000	10.800	0.270	40.0	0.000	1	0.0	1.500	o	100
1.007	9.600	0.240	40.0	0.000	1	0.0	1.500	o	100
1.008	1.000	0.050	20.0	0.000	0	0.0	1.500	o	100

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ DWF (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	9.400	0.000	0.0	1	0.0	6	0.26	1.05	8.3	0.0
1.001	9.275	0.000	0.0	2	0.0	8	0.33	1.05	8.3	0.1
1.002	9.025	0.000	0.0	3	0.0	9	0.38	1.05	8.3	0.1
1.003	8.800	0.000	0.0	3	0.0	9	0.38	1.05	8.3	0.1
1.004	7.820	0.000	0.0	3	0.0	7	0.53	1.74	13.7	0.1
1.005	7.070	0.000	0.0	4	0.0	11	0.41	1.05	8.3	0.2
1.006	6.990	0.000	0.0	5	0.0	12	0.45	1.05	8.3	0.2
2.000	7.060	0.000	0.0	1	0.0	6	0.26	1.05	8.3	0.0
1.007	6.790	0.000	0.0	7	0.0	14	0.49	1.05	8.3	0.3
1.008	6.550	0.000	0.0	7	0.0	12	0.63	1.49	11.7	0.3

EWE Associates Ltd		Page 2
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 18/03/2018 17:32	Designed By Lea	
File Foul Network A 18...	Checked By	
Micro Drainage	Network W.12.4	

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
3.000	1.500	0.050	30.0	0.000	1	0.0	1.500	o	100
1.009	7.000	0.090	77.8	0.000	0	0.0	1.500	o	100

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ DWF (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
3.000	6.550	0.000	0.0	1	0.0	5	0.29	1.22	9.6	0.0
1.009	6.500	0.000	0.0	8	0.0	17	0.41	0.75	5.9	0.4

EWE Associates Ltd		Page 3
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 18/03/2018 17:32	Designed By Lea	
File Foul Network A 18...	Checked By	
Micro Drainage	Network W.12.4	

Manhole Schedules for Foul - Main

MH Name	MH CL (m)	MH Depth (m)	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	9.850	0.450	450	1.000	9.400	100				
2	9.850	0.575	450	1.001	9.275	100	1.000	9.275	100	
3	9.850	0.825	450	1.002	9.025	100	1.001	9.025	100	
4	9.850	1.050	450	1.003	8.800	100	1.002	8.800	100	
5	9.450	1.630	450	1.004	7.820	100	1.003	8.500	100	680
6	7.550	0.480	450	1.005	7.070	100	1.004	7.070	100	
7	7.550	0.560	450	1.006	6.990	100	1.005	6.990	100	
8	7.550	0.490	450	2.000	7.060	100				
9	7.550	0.760	450	1.007	6.790	100	1.006	6.790	100	
							2.000	6.790	100	
10	7.350	0.800	450	1.008	6.550	100	1.007	6.550	100	
11	7.350	0.800	450	3.000	6.550	100				
12	7.300	0.800	450	1.009	6.500	100	1.008	6.500	100	
							3.000	6.500	100	
combined sewer	6.860	0.450	0		OUTFALL		1.009	6.410	100	

EWE Associates Ltd		Page 4
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 18/03/2018 17:32	Designed By Lea	
File Foul Network A 18...	Checked By	
Micro Drainage	Network W.12.4	

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
1.000	o	100	1	9.850	9.400	0.350	450
1.001	o	100	2	9.850	9.275	0.475	450
1.002	o	100	3	9.850	9.025	0.725	450
1.003	o	100	4	9.850	8.800	0.950	450
1.004	o	100	5	9.450	7.820	1.530	450
1.005	o	100	6	7.550	7.070	0.380	450
1.006	o	100	7	7.550	6.990	0.460	450
2.000	o	100	8	7.550	7.060	0.390	450
1.007	o	100	9	7.550	6.790	0.660	450
1.008	o	100	10	7.350	6.550	0.700	450
3.000	o	100	11	7.350	6.550	0.700	450
1.009	o	100	12	7.300	6.500	0.700	450

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
1.000	5.000	40.0	2	9.850	9.275	0.475	450
1.001	10.000	40.0	3	9.850	9.025	0.725	450
1.002	9.000	40.0	4	9.850	8.800	0.950	450
1.003	12.000	40.0	5	9.450	8.500	0.850	450
1.004	11.000	14.7	6	7.550	7.070	0.380	450
1.005	3.200	40.0	7	7.550	6.990	0.460	450
1.006	8.000	40.0	9	7.550	6.790	0.660	450
2.000	10.800	40.0	9	7.550	6.790	0.660	450
1.007	9.600	40.0	10	7.350	6.550	0.700	450
1.008	1.000	20.0	12	7.300	6.500	0.700	450
3.000	1.500	30.0	12	7.300	6.500	0.700	450
1.009	7.000	77.8	combined sewer	6.860	6.410	0.350	0

Free Flowing Outfall Details for Foul - Main

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.009	combined sewer	6.860	6.410	6.410	0	0

Appendix F: - WinDES Foul Model A

EWE Associates Ltd		Page 1
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 18/03/2018 18:40 File Foul Network B 18...	Designed By Lea Checked By	
Micro Drainage	Network W.12.4	

FOUL SEWERAGE DESIGN

Design Criteria for Foul - Main

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.200
Flow Per Person (l/per/day)	222.00	Maximum Backdrop Height (m)	1.500
Persons per House	3.00	Min Design Depth for Optimisation (m)	1.200
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	9.000	0.235	38.3	0.000	1	0.0	1.500	o	100
2.000	6.000	0.150	40.0	0.000	1	0.0	1.500	o	100
2.001	1.400	0.035	40.0	0.000	1	0.0	1.500	o	100
1.001	7.000	0.090	77.8	0.000	0	0.0	1.500	o	100

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ DWF (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	7.000	0.000	0.0	1	0.0	6	0.26	1.08	8.5	0.0
2.000	6.950	0.000	0.0	1	0.0	6	0.26	1.05	8.3	0.0
2.001	6.800	0.000	0.0	2	0.0	8	0.33	1.05	8.3	0.1
1.001	6.765	0.000	0.0	3	0.0	11	0.30	0.75	5.9	0.1

EWE Associates Ltd		Page 2
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 18/03/2018 18:40	Designed By Lea	
File Foul Network B 18...	Checked By	
Micro Drainage	Network W.12.4	

Manhole Schedules for Foul - Main

MH Name	MH CL (m)	MH Depth (m)	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
1	7.800	0.800	450	1.000	7.000	100				
2	7.800	0.850	450	2.000	6.950	100				
3	7.800	1.000	450	2.001	6.800	100	2.000	6.800	100	
4	7.700	0.935	450	1.001	6.765	100	1.000	6.765	100	
							2.001	6.765	100	
combined sewer	7.290	0.615	0		OUTFALL		1.001	6.675	100	

EWE Associates Ltd		Page 3
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 18/03/2018 18:40 File Foul Network B 18...	Designed By Lea Checked By	
Micro Drainage	Network W.12.4	

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
1.000	o	100	1	7.800	7.000	0.700	450
2.000	o	100	2	7.800	6.950	0.750	450
2.001	o	100	3	7.800	6.800	0.900	450
1.001	o	100	4	7.700	6.765	0.835	450

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH DIAM., L*W (mm)
1.000	9.000	38.3	4	7.700	6.765	0.835	450
2.000	6.000	40.0	3	7.800	6.800	0.900	450
2.001	1.400	40.0	4	7.700	6.765	0.835	450
1.001	7.000	77.8	combined sewer	7.290	6.675	0.515	0

Free Flowing Outfall Details for Foul - Main

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.001	combined sewer	7.290	6.675	6.675	0	0