Hillbrook SASS & HD3 Developments Ltd

Proposed Residential Development
758 New Hey Road
Outlane
Near Huddersfield

Drainage Assessment

Prepared by EWE Associates Ltd
Draft Rev0 December 2018

EWE Associates Ltd
7 Waveney Close
Burton Upon Stather
Scunthorpe
North Lincolnshire
DN15 9DT
t: 01724 721099
M: 07875 972270
e: lea.favill@eweassociates.com

CLIENT DETAILS

Hillbrook SASS
8 St Stephen Street
Manchester
M3 6AY

HD3 Developments Ltd
9 New Road
Holmfirth
HD9 3XT

CONTRACT

This report describes work commissioned by Hillbrook SASS & HD3 Developments Ltd following written instruction by their representative on 16th November 2018. Hillbrook SASS & HD3 Developments Ltd representative for the contract was Mr Hamish Gledhill of Acumen. Lea Favill of EWE Associates Ltd carried out the work.

Date: 6th December 2018

Prepared by: …… ……. Lea Favill
Director

REVISION HISTORY

Draft Report Rev0 issued 6th December 2018
- 1No copy issued to Mr Hamish Gledhill

CONTENTS

APPENDICES:

1. INTRODUCTION

Terms of Reference

This report was commissioned by Hillbrook SASS & HD3 Developments Ltd to consider the surface water and foul water system for the proposed residential development within the former garage site at 753 New Hey Road, Outlane near Huddersfield.

The proposal involves the construction of a residential dwellings and an access road. 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.
- Existing infiltration characteristics of subsoils.
- Existing Yorkshire Water sewers in area
- Onsite constriction.
- Options available to developer.
- NPPF guidelines with regards to the control of runoff.
- PPG3 pollution prevention guidelines.
- 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 29 residential dwellings as such any SUDs features or attenuation structures within private land will be maintained by the individual owner.
- The proposed access road will be put forward for adoption. As such, any SUDs features will be adopted by local authority Highways.
- SUDs features are to be recommended where practically possible.
- A site visit was undertaken during November 2018. During the site visit several manholes were lifted and inspected. There was a shallow highway drain running adjacent to Mule House Lane to the north of the site. However, this just appears to discharge into the fragmented limestone in line with the development site.

- The Yorkshire Water sewer maps show a 225mm diameter sewer to the north within Mule House Lane which is approximately 3m deep. There is also a combined sewer within New Hey Road to the south of the site. The foul drainage within the existing building appears to discharge into this sewer. The depth of the sewer is unknown. The sewer plan is provided at Appendix A of this report.
- Site investigation works have been undertaken within the site by RGS which included percolation tests within 3 trial holes during August 2018. Test holes showed a mixture of gravels and clay. Trial holes SA1 & SA2 showed no infiltration, however, trial hole SA3 provide an average rate of 0.756m/hr. Extracts from the site investigation report are provide at Appendix B.
- 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 south 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 DRAINAGE SYSTEM

Catchment Area

The catchment area was calculated from proposed layout drawing provide by Acumen. The total impermeable area to be drained has been estimated at 4440m² (0.444 hectares).

Drainage Strategy

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

- Roof drainage from Plots. Sealed downpipes to traditional pipe system discharging to crate soakaway in north west corner of site.
- Private driveways. Permeable paving system to be constructed within driveways with porous paving/blocks above. Under drained to traditional pipe system discharging to crate soakaway in north west corner of site.
- Access Road. The access road will be adopted by Highways. As such, trapped gullies to traditional pipe system discharging to crate soakaway in north west corner of site.

Adoption & Maintenance

It is considered that the permeable paving systems within private driveways will be maintained by individual owners.

The access road will be put forward for adoption by Highways.

The crate soakaway will be maintained by a private management company.

Proposed Drainage Strategy

The percolation testing provided an estimate of 0.756m/hr at a depth of 2m below ground level within the gravels. See Appendix B for details of calculations.

The roof drainage and pavement drainage will be directed via a traditional piped system to a single crate soakaway located within the north west corner of the site.

The drainage strategy is provided at Appendix C of this report.

Discharge to Crate Soakaways

For the purpose of this assessment a percolation rate of 0.756m/hr has been adopted. An assessment of the required balance volume has been made using the estimated post development impermeable area of 0.444 hectares. 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 D where the calculation sheets are provided. The attenuation size has been tabulated below in Table 2-1. It is estimated that during the 1 in 100 year plus climate change (40%) event that 183.9m³ of storage will be required. This will be provided within a single crate tank soakaway within the north west corner of the site. The drainage strategy drawing provided at Appendix C shows the initial drainage strategy for the site which includes a crate tank soakaway.

Table 2-1: WinDes 1 in 100 year+CC Storage Volume

Return Period	Required Attenuation	Approx Volume (m³)
1 in 100 year + CC	Crate tank 60m² by 0.4m deep with 0.6m cover	183.9

It is normal practice to ensure that the 1 in 30 year event is maintained below the ground in the form of storage and the difference between the 1 in 100 year and the 1 in 30 year is permitted to flood the surface as long as there is no flooding to buildings and the flood volume is contained within the site boundary. Alternatively, if the development is sensitive, the client can choose to store the full 1 in 100 year plus climate change balance volume below ground.

The volume balance requirements should be recalculated during the detailed design stage to reflect the actual development proposal, agreed discharge rate and the extent of impermeable areas and runoff to be generated.

SUDS

The Environment Agency requires that adequate pollution control is incorporated into the proposed drainage system in order to prevent deterioration of the quality of the water environment. However, this is only applicable for surface water originating from access roads and communal parking areas, which needs to be passed through a petrol/oil interceptor or equivalent system prior to discharge into the existing surface water sewer or infiltration system. It is noted however, that this will not apply to surface water originating from roof drainage.

To reduce the impact of surface water runoff from the development in accordance with the requirements of the Environment Agency and Local Authority, the employment of SUDS techniques to limit runoff volumes and rates from the site are recommended. SUDS techniques can also be used to provide an appropriate level of treatment to the runoff.

It is normal practice to ensure that the 1 in 30 year event is maintained within the drainage system and the 1 in 100 year is permitted to flood the surface as long as there is no flooding to buildings and the flood volume is contained within the site boundary in specific areas proposed for this purpose.

The following section will provide some possible SUDS techniques which could be employed on the site to balance flows in excess of the 1 in 30 year event. SUDS techniques will also provide treatment to the runoff to remove a proportion of the pollution and protect the quality of the downstream watercourses. Following guidance from CIRIA Report C522 the following levels of treatment will be provided:

- • Roofs – 1 level
- • Driveways – 1 level
- • Roads and communal parking areas – 2 levels.

The level of treatment indicates the number of SUDS techniques that will be used to treat pollution. For example if two levels are required the runoff may enter a filter drain that leads to a basin or pond before outfall. It is recommended that source control techniques are used. In practice there will be little outflow from these techniques for a 1 in 2 year storm as most of the rainfall will be held within the system and will disperse via evapotranspiration. Further detail of the potential to use SUDS within this site it provided overleaf within Table 2-2. The precise combination of methods used will be dependent upon the site constraints identified at the final design stage.

Initial data suggests that the site is partially underlain by an impermeable layer which is unlikely to allow infiltration at a reasonable rate therefore making infiltration drainage impractical. However, there is an area within the north west corner of the site where good infiltration is occurring.

The impermeable area within the site has been estimated at 0.444 hectares following development.

The development site is considered to be small with limited space set aside, in which to incorporate appropriate SUDs techniques. As such, the following SUDS techniques shown below in Table 2-2 have been considered for use at this site.

Table 2-2: SUDS Techniques

SUDs Group	Suitability for Proposed Development
Retention	✖
Wetland	✖
Infiltration	✖
Filtration	✖
Detention	✖
Open Channel	✖
Source Control	**Under drained permeable paving on parking spaces discharging to crate tank soakaway**

3. DESIGN OF PROPSOED FOUL DRAINAGE SYSTEM

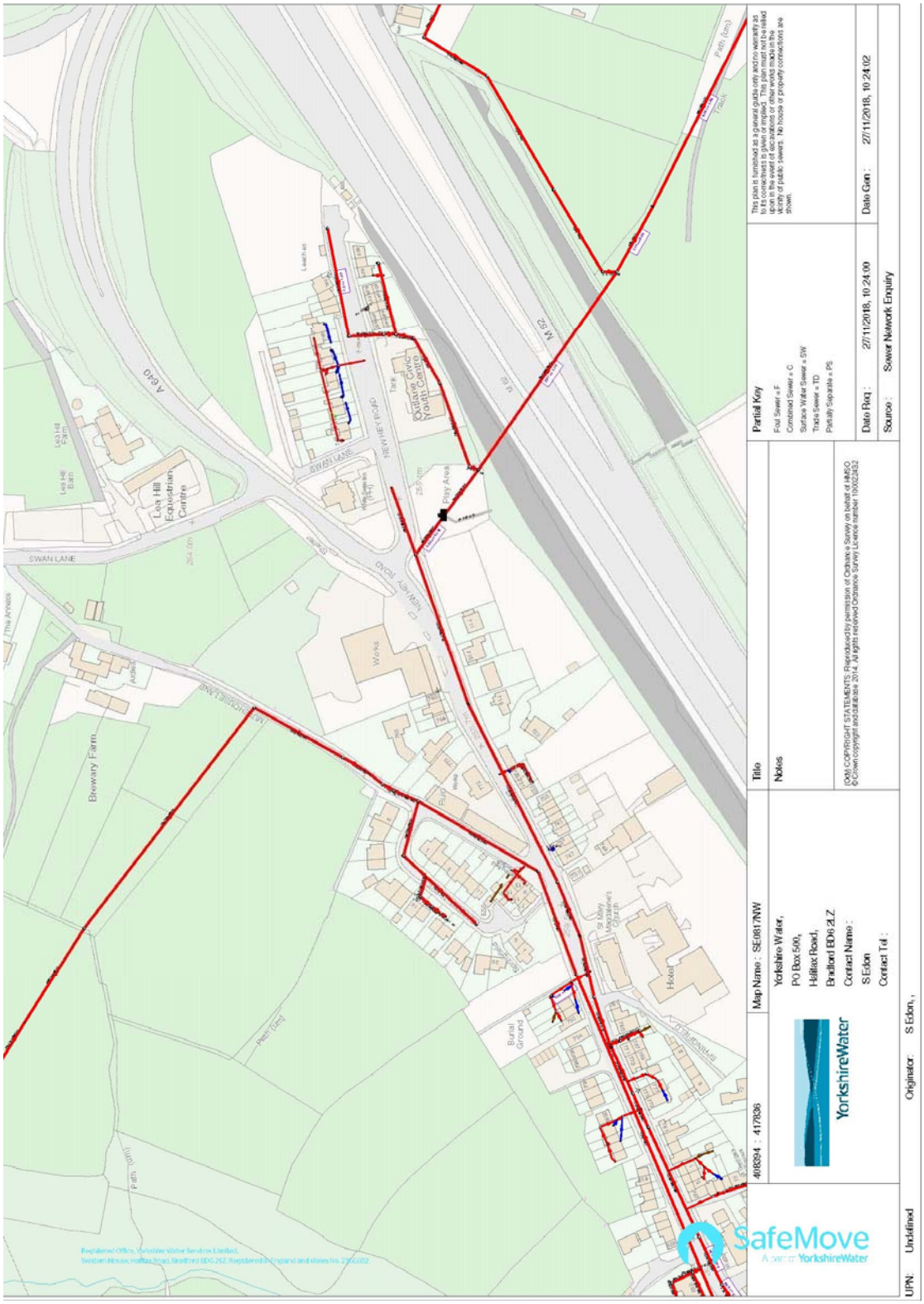
Existing Foul Drainage

There is a combined Yorkshire Water sewer to the south and north of the site. The sewer to the south is assumed to be at least 1.5m deep. The sewer to the north is approximately 3m deep. It is therefore assumed that a gravity connection can be made from the whole site to the north and half of the site to the south.

Proposed Foul Drainage

The current proposal is to connect the foul drainage from the front of the site into the combined sewer within New Hey Road. The remainder of the site will connect not the combined sewer to the north.

Appendix A: - YW Sewer Plan



Appendix B: - Site Investigation Report Extracts

Environmental Geotechnical Specialists RGS

Table 3: Soakaway Test Results

Location	Soakage Area Dimensions (average) (m)	Depths of soaked strata (m)	Soil Description (of soaked strata)	Infiltration Rate (m/sec)	*Drainage Characteristics
SA1	1.5 x 0.4	0.85 to 1.7	Side – Made Ground (Gravelly Sand) Base – CLAY	0	Impervious
SA2	1.4 x 0.5	0.82 to 1.8	Side – Made Ground (Gravelly Sand) Base – CLAY	0	Impervious
SA3	1.5 x 0.4	1.15 to 2.0	Side – Made Ground (Gravelly Sand) Base – Made Ground (Gravelly Sand)	$2.7x10^{-4}$ $1.7x10^{-4}$ $1.9x10^{-4}$	Good

*Based on the most onerous results for each test.

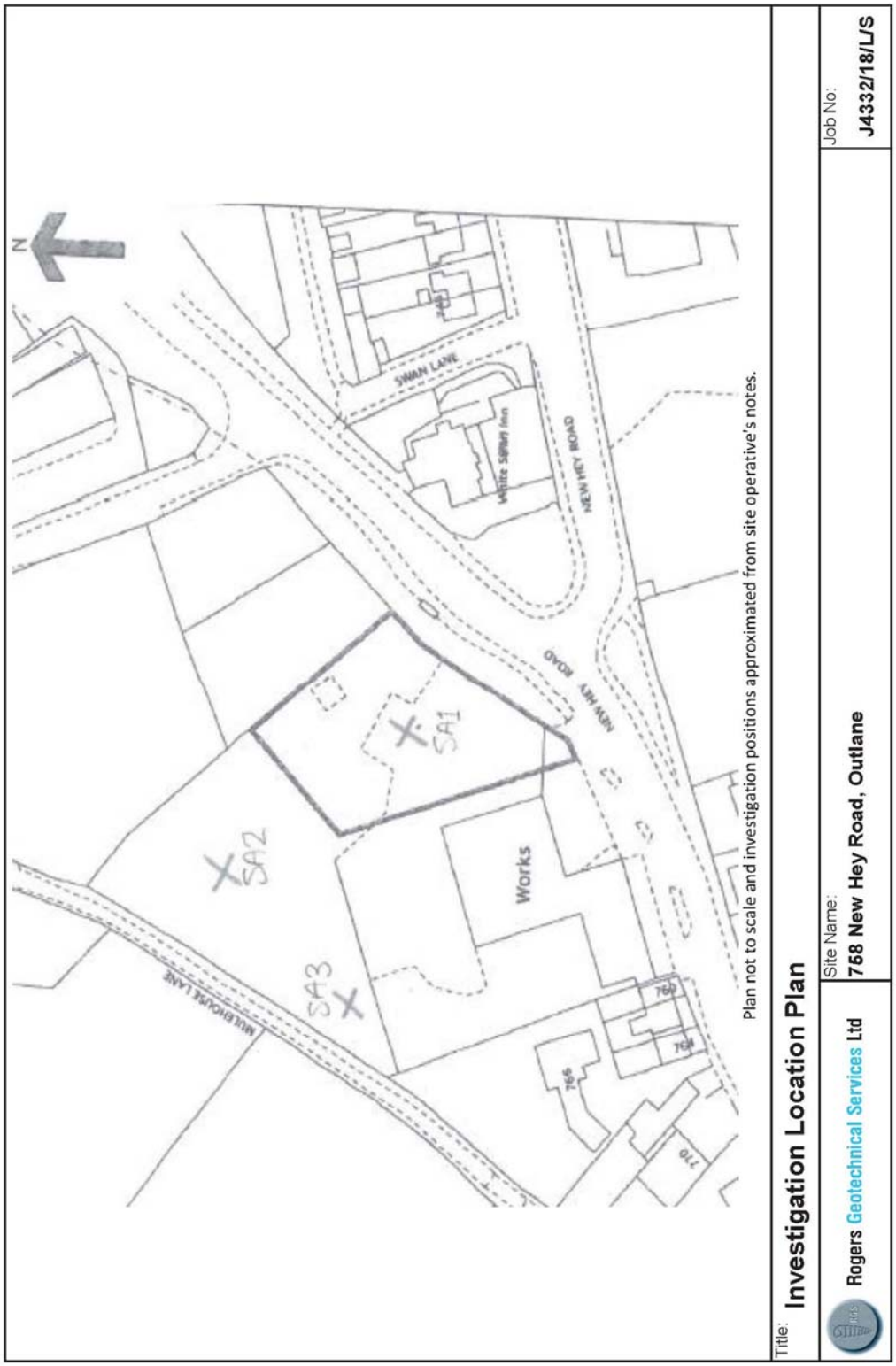
7. Discussion

The soils encountered beneath the made ground were found to be typical of the underlying Rossendale Formation. The strata conditions appear to be comparable across the site although the clay layer was not encountered at SA3. In this instance, the infiltration testing has revealed the soils drainage characteristics to be impervious at the clay layer that was encountered at SA1 & SA2 and Good at the location of SA3 where the clay layer was not encountered. Therefore, soakaways can be recommended at this site in the location of SA3 but not in the other locations across the site as although they still consist of the made ground material, this material rests upon an impermeable layer of clay and bearing in mind that we have endured a prolonged period of dry weather, it is possible that during wet periods the water table could rise, reducing the storage volume within this material. This should also be taken into account with the location SA3, although we didn't encounter the clay layer to a depth of 2.2m this is not to say that the layer is not present at all.

8. References

- Building Research Establishment (BRE) Digest 365, *Soakaway Design*, September 1991.
- British Standards Institution (1999) BS5930: *Code of practice for site investigations*, B.S.I., London.
- British Standards Institution (2007), Amendment No 1, BS5930: *Code of practice for site investigations*, B.S.I., London.
- Barnes, G. (2000). *Soil Mechanics Principle and Practice.* 2nd ed. London: Macmillan Press Ltd, p.47.

Rogers Geotechnical Services Ltd Telephone 0843 50 666 87 Fax 0843 51 599 30
Email enquiries@rogersgeotech.co.uk www.rogersgeotech.co.uk


N
SWAN LANE
NEW HEY ROAD
SA1
SA2
SA3
Works
MULLEHOUSE LANE
Plan not to scale and investigation positions approximated from site operative's notes.
Title:
Investigation Location Plan
Rogers Geotechnical Services Ltd
Site Name:
768 New Hey Road, Outlane
Job No:
J4332/18/LS

Appendix C: - Drainage Strategy Drawing

Appendix D: - Crate Soakaway Calculations

EWE Associates Ltd		Page 1
Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 06/12/2018 17:44	Designed By Windows7	
File 100yr+CCcrate tan...	Checked By	
Micro Drainage	Source Control W.12.4	

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

Half Drain Time : 72 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	9.321	0.821	20.9	124.7	O K
30 min Summer	9.459	0.959	21.6	145.8	O K
60 min Summer	9.545	1.045	22.1	158.8	O K
120 min Summer	9.533	1.033	22.0	157.0	O K
180 min Summer	9.497	0.997	21.8	151.5	O K
240 min Summer	9.457	0.957	21.6	145.4	O K
360 min Summer	9.370	0.870	21.2	132.3	O K
480 min Summer	9.282	0.782	20.7	118.9	O K
600 min Summer	9.197	0.697	20.3	105.9	O K
720 min Summer	9.116	0.616	19.8	93.7	O K
960 min Summer	8.973	0.473	19.1	71.9	O K
1440 min Summer	8.756	0.256	18.0	38.9	O K
2160 min Summer	8.578	0.078	17.2	11.9	O K
2880 min Summer	8.545	0.045	15.2	6.8	O K
4320 min Summer	8.533	0.033	11.2	5.0	O K
5760 min Summer	8.526	0.026	8.9	4.0	O K
7200 min Summer	8.522	0.022	7.6	3.4	O K
8640 min Summer	8.519	0.019	6.6	2.9	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	184.614	29
30 min Summer	112.156	39
60 min Summer	68.137	62
120 min Summer	41.394	98
180 min Summer	30.926	132
240 min Summer	25.148	166
360 min Summer	18.788	234
480 min Summer	15.278	302
600 min Summer	13.013	366
720 min Summer	11.414	430
960 min Summer	9.281	554
1440 min Summer	6.934	790
2160 min Summer	5.181	1120
2880 min Summer	4.213	1468
4320 min Summer	3.062	2192
5760 min Summer	2.441	2864
7200 min Summer	2.048	3656
8640 min Summer	1.774	4328

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 06/12/2018 17:44	Designed By Windows7	
File 100yr+CCcrate tan...	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 Infiltration (l/s)	Max Volume (m³)	Status
10080 min Summer	8.517	0.017	5.7	2.6	O K
15 min Winter	9.434	0.934	21.5	142.0	O K
30 min Winter	9.596	1.096	22.4	166.6	O K
60 min Winter	9.710	1.210	23.0	183.9	Flood Risk
120 min Winter	9.704	1.204	23.0	183.0	Flood Risk
180 min Winter	9.647	1.147	22.7	174.4	O K
240 min Winter	9.581	1.081	22.3	164.3	O K
360 min Winter	9.439	0.939	21.5	142.7	O K
480 min Winter	9.298	0.798	20.8	121.3	O K
600 min Winter	9.166	0.666	20.1	101.3	O K
720 min Winter	9.046	0.546	19.5	83.0	O K
960 min Winter	8.841	0.341	18.4	51.8	O K
1440 min Winter	8.577	0.077	17.2	11.7	O K
2160 min Winter	8.540	0.040	13.5	6.1	O K
2880 min Winter	8.533	0.033	11.2	4.9	O K
4320 min Winter	8.524	0.024	8.1	3.6	O K
5760 min Winter	8.519	0.019	6.4	2.9	O K
7200 min Winter	8.516	0.016	5.4	2.4	O K
8640 min Winter	8.514	0.014	4.7	2.1	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
10080 min Summer	1.572	5136
15 min Winter	184.614	29
30 min Winter	112.156	40
60 min Winter	68.137	64
120 min Winter	41.394	104
180 min Winter	30.926	142
240 min Winter	25.148	180
360 min Winter	18.788	252
480 min Winter	15.278	322
600 min Winter	13.013	390
720 min Winter	11.414	454
960 min Winter	9.281	576
1440 min Winter	6.934	780
2160 min Winter	5.181	1104
2880 min Winter	4.213	1456
4320 min Winter	3.062	2196
5760 min Winter	2.441	2936
7200 min Winter	2.048	3496
8640 min Winter	1.774	4272

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		
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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 Infiltration (l/s)	Max Volume (m³)	Status
10080 min Winter	8.512	0.012	4.2	1.9	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
10080 min Winter	1.572	5064

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 06/12/2018 17:44	Designed By Windows7	
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Micro Drainage	Source Control W.12.4	

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
Site Location	408500 418350 SE 08500 18350
C (1km)	-0.025
D1 (1km)	0.396
D2 (1km)	0.396
D3 (1km)	0.328
E (1km)	0.305
F (1km)	2.482
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) 0.444

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.100	4-8	0.100	8-12	0.100	12-16	0.100	16-20	0.044

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Windy Ridge Barn Thealby Lane Winterton DN15 9TG		Micro Drainage
Date 06/12/2018 17:44 File 100yr+CCcrate tan...	Designed By Windows7 Checked By	
Micro Drainage	Source Control W.12.4	

Model Details

Storage is Online Cover Level (m) 10.000

Cellular Storage Structure

Invert Level (m) 8.500 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.75600 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.75600

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	160.0	160.0	2.600	0.0	225.8
0.200	160.0	170.1	2.800	0.0	225.8
0.400	160.0	180.2	3.000	0.0	225.8
0.600	160.0	190.4	3.200	0.0	225.8
0.800	160.0	200.5	3.400	0.0	225.8
1.000	160.0	210.6	3.600	0.0	225.8
1.200	160.0	220.7	3.800	0.0	225.8
1.400	0.0	225.8	4.000	0.0	225.8
1.600	0.0	225.8	4.200	0.0	225.8
1.800	0.0	225.8	4.400	0.0	225.8
2.000	0.0	225.8	4.600	0.0	225.8
2.200	0.0	225.8	4.800	0.0	225.8
2.400	0.0	225.8	5.000	0.0	225.8