

PROPOSED RESIDENTIAL DEVELOPEMENT

LAND OFF CROSS STREET

MONK BRETTON

BARNSELY

HIGHWAY SOAKAWAY DESIGN



## 1. INTRODUCTION

This report provides the background information for the drainage design of soakways for the proposed adoptable access road for a new proposed development off cross street at Barnsley.

This report should be read in conjunction with HM Design drainage design drawing YH743/2 and 5.

This report and design is to support planning application for the development and for a subsequent Section 38 application.

## 2. LOCATION AND SITE

The site is off Cross Street Barnsley and will be an extension of Folly Way housing development.

## 3. PRE-DEVELOPMENT SITE

The pre-development site should be considered greenfield in drainage terms with no existing positive drainage on the pre-development site.

## 4. SURFACE WATER ASSESSMENT

### INFILTRATION.

A site investigation has been carried out by Rogers Geotechnical Services Ltd and the ground conditions were investigated for the use of infiltration as a means of surface water disposal.

The site investigation shows that the development ground conditions are generally sands and gravels and an extract from the site investigation is provided below.

The report shows that the ground conditions are suitable for infiltration.





### 7.3 Soakaway Tests

The results obtained from the borehole soakaway infiltration testing are summarised below:

<b>Table 5: Soakaway Test Results</b>					
Location	Soakage Area Dimensions (m)	Test Depth (m)	Soil Description	Infiltration Rate (m/sec)	Drainage Characteristics
WS1	Diameter – 0.15m Response – 0.05m	0.95 – 1.0m	Gravelly SAND	$1.3 \times 10^{-5}$	Good
WS2	Diameter – 0.15m Response – 0.05m	0.95 – 1.0m	Gravelly SAND	$9.8 \times 10^{-5}$	Good
WS4	Diameter – 0.15m Response – 0.05m	0.95 – 1.0m	Gravelly SAND	$2.0 \times 10^{-5}$	Good

Soakaway testing has shown the subsurface natural material to possess an good infiltration rate. These results show it may be possible to employ soakaways within the weathered fraction of the underlying solid geology. As such, a suitable design would be required to ensure an appropriate storage volume.

#### DISCHARGE TO SURFACE WATER BODY

No surface water body is available on or close to this site.

#### DISCHARGE TO A SURFACE WATER SEWER OR DRAIN

No existing drainage is available.

Due to the above findings, the surface water from the proposed highway on this development will be disposed of on site by the use of infiltration (highway soakways).

### 5. SURFACE WATER OVERVIEW

The proposed highway drainage on this development will mimic that of the existing Folly Way development, with lined soakaways being used to dispose of surface water from the proposed highway (carriageways and footways).

### 6. SURFACE WATER DESIGN STANDARD

The design of the surface water system has been designed to the 1 in 100 year storm event.

### 7. CLIMATE CHANGE

All calculations within this report include a climate change allowance of +30%.

## 8. HYDRAULIC CALCULATIONS

The proposed soakaways are to be located adjacent to the proposed highway.

The soakway test result for WS2 is at the proposed location of the highway soakways and this value of infiltration rate for the soakaway has used  $9.8 \times 10^{-5}$  m/sec (0.35m/hr). This has only been used for the sides of the soakways and so is conservative.

A factor of safety of 2 has been used.

Contributing areas are 350 sq m (0.035hectares).

The Microdrainage software has been used to design suitable soakaways. 2 x soakaways 1.8m diameter in 3.0m square stone filled pits are satisfactory.

## 9. CONCLUSIONS

- The highway can be successfully drained by using lined soakaways.

Report by





Hugh Morris BSc CEng MICE  
13/01/2020


## APPENDIX

- MICRODRAINAGE STORAGE CALCULATIONS  
1 in 100 year plus 30% climate change plus 10% urban creep.



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10 The Green		HIGHWAY SOAKAWAYS			
York		CROSS STREET			
YO26 5LR		BARNSELEY			
Date 13/01/2021 12:09		Designed by HM			
File HIGHWAY SOAKAWAY.SRCX		Checked by			
Micro Drainage		Source Control 2020.1			
Summary of Results for 100 year Return Period (+30%)					
Half Drain Time : 90 minutes.					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	116.696	0.786	0.9	7.2	O K
30 min Summer	116.904	0.994	1.2	9.1	O K
60 min Summer	117.049	1.139	1.4	10.5	O K
120 min Summer	117.132	1.222	1.5	11.2	O K
180 min Summer	117.143	1.233	1.5	11.3	O K
240 min Summer	117.126	1.216	1.4	11.2	O K
360 min Summer	117.067	1.157	1.4	10.6	O K
480 min Summer	117.005	1.095	1.3	10.0	O K
600 min Summer	116.945	1.035	1.2	9.5	O K
720 min Summer	116.890	0.980	1.2	9.0	O K
960 min Summer	116.797	0.887	1.1	8.1	O K
1440 min Summer	116.658	0.748	0.9	6.9	O K
2160 min Summer	116.520	0.610	0.7	5.6	O K
2880 min Summer	116.430	0.520	0.6	4.8	O K
4320 min Summer	116.315	0.405	0.5	3.7	O K
5760 min Summer	116.243	0.333	0.4	3.1	O K
7200 min Summer	116.196	0.286	0.3	2.6	O K
8640 min Summer	116.161	0.251	0.3	2.3	O K
10080 min Summer	116.134	0.224	0.3	2.1	O K
15 min Winter	116.791	0.881	1.0	8.1	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
15 min Summer	117.781	0.0	18		
30 min Summer	78.510	0.0	32		
60 min Summer	49.937	0.0	56		
120 min Summer	30.696	0.0	86		
180 min Summer	22.772	0.0	120		
240 min Summer	18.305	0.0	154		
360 min Summer	13.390	0.0	222		
480 min Summer	10.728	0.0	288		
600 min Summer	9.027	0.0	354		
720 min Summer	7.835	0.0	418		
960 min Summer	6.260	0.0	542		
1440 min Summer	4.556	0.0	794		
2160 min Summer	3.308	0.0	1152		
2880 min Summer	2.634	0.0	1528		
4320 min Summer	1.906	0.0	2248		
5760 min Summer	1.514	0.0	2952		
7200 min Summer	1.265	0.0	3680		
8640 min Summer	1.092	0.0	4408		
10080 min Summer	0.965	0.0	5144		
15 min Winter	117.781	0.0	18		
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10 The Green York YO26 5LR	HIGHWAY SOAKAWAYS CROSS STREET BARNSELEY				
Date 13/01/2021 12:09 File HIGHWAY SOAKAWAY.SRCX	Designed by HM Checked by				
Micro Drainage Source Control 2020.1					
<u>Summary of Results for 100 year Return Period (+30%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	117.027	1.117	1.3	10.3	O K
60 min Winter	117.195	1.285	1.5	11.8	O K
120 min Winter	117.270	1.360	1.6	12.5	O K
180 min Winter	117.261	1.351	1.6	12.4	O K
240 min Winter	117.221	1.311	1.6	12.0	O K
360 min Winter	117.121	1.211	1.4	11.1	O K
480 min Winter	117.027	1.117	1.3	10.3	O K
600 min Winter	116.944	1.034	1.2	9.5	O K
720 min Winter	116.871	0.961	1.1	8.8	O K
960 min Winter	116.751	0.841	1.0	7.7	O K
1440 min Winter	116.584	0.674	0.8	6.2	O K
2160 min Winter	116.433	0.523	0.6	4.8	O K
2880 min Winter	116.340	0.430	0.5	3.9	O K
4320 min Winter	116.230	0.320	0.4	2.9	O K
5760 min Winter	116.168	0.258	0.3	2.4	O K
7200 min Winter	116.127	0.217	0.3	2.0	O K
8640 min Winter	116.098	0.188	0.2	1.7	O K
10080 min Winter	116.076	0.166	0.2	1.5	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)		
30 min Winter	78.510	0.0	31		
60 min Winter	49.937	0.0	58		
120 min Winter	30.696	0.0	92		
180 min Winter	22.772	0.0	130		
240 min Winter	18.305	0.0	166		
360 min Winter	13.390	0.0	236		
480 min Winter	10.728	0.0	304		
600 min Winter	9.027	0.0	372		
720 min Winter	7.835	0.0	436		
960 min Winter	6.260	0.0	566		
1440 min Winter	4.556	0.0	820		
2160 min Winter	3.308	0.0	1188		
2880 min Winter	2.634	0.0	1556		
4320 min Winter	1.906	0.0	2288		
5760 min Winter	1.514	0.0	3000		
7200 min Winter	1.265	0.0	3736		
8640 min Winter	1.092	0.0	4416		
10080 min Winter	0.965	0.0	5144		
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Micro Drainage		Source Control 2020.1

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Shortest Storm (mins)	15
Ratio R	0.368	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30


Time Area Diagram

Total Area (ha) 0.035

Time (mins)	Area
From:	To: (ha)
0	4 0.035

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Micro Drainage Source Control 2020.1		

Model Details

Storage is Online Cover Level (m) 117.800

Lined Soakaway Structure

Infiltration Coefficient Base (m/hr) 0.00000	Ring Diameter (m) 1.80
Infiltration Coefficient Side (m/hr) 0.35000	Pit Multiplier 1.7
Safety Factor 2.0	Number Required 2
Porosity 0.30	Cap Volume Depth (m) 0.000
Invert Level (m) 115.910	Cap Infiltration Depth (m) 0.000

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