PROPOSED RESIDENTIAL DEVELOPEMENT

LAND OFF CROSS STREET

MONK BRETTON

BARNSLEY

DRAINAGE REPORT

HM DESIGN
10 The Green York YO26 5LR 07919 031289

1. INTRODUCTION

This report provides the background information for the drainage design 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.

This report and design is to support planning application for the development.

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

The surface water from this development should use Sustainable Drainage Systems (SuDS) to deal with the surface water. This system or systems should discharge surface water through one or more of the following, in this order of priority.

- Discharge to the ground (infiltration).
- Discharge to a surface water body.
- Discharge to a surface water sewer, highway drain or other drain.
- Discharge to a combined sewer.

<u>INFILTRATION.</u>

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:

Table 5: Soakaway Test Results

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	1.3×10^{-5}	Good
WS2	Diameter – 0.15m Response – 0.05m	0.95 – 1.0m	Gravelly SAND	9.8×10^{-5}	Good
WS4	Diameter – 0.15m Response – 0.05m	0.95 – 1.0m	Gravelly SAND	2.0×10^{-5}	Good

Soakaway testing has shown the subsurface natural material to posess 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 this development will be dispose of on site by the use of infiltration.

5. FOUL SEWERAGE

Foul sewerage will be disposed of by a new connection to the adoptable foul sewer laid within the Folly Way development. The sewer will be offered for adoption with Yorkshire Water through a Section 104 agreement.

6. SURFACE WATER OVERVIEW

The surface water from this development will be disposed of by infiltration on site.

The infiltration techniques used will be as follows:-

1. Roof areas and shared private driveways to a single soakaway located under the shared private driveway.
2. Single driveways are to be permeable paving.
3. Adoptable highway and footways are to be to lined soakways and offered for adoption, with the roads and footways, through a Section 38 agreement with Barnsley MBC. (Calculations for the highway soakaways are not part of this report as a separate design report has been prepared).

7. SURFACE WATER DESIGN STANDARD

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

8. CLIMATE CHANGE AND URBAN CREEP

All calculations within this report include a climate change allowance of +30% and +10 % for urban creep.

9. HYDRAULIC CALCULATIONS

The proposed soakaway system to serve the house roofs and the shared private driveways will be a single soakaway under the shared driveway.

The infiltration rate for the soakaway has used $1.3x10^{-5}$ m/sec (0.047m/hr), the lower of the infiltration rates determined within the site investigation.

A factor of safety of 2 has been used.

Contributing areas are 1156 sq m + 10% urban creep = 1271sq m (0.0127hectares).

The Microdrainage software has been used to design a suitable soakaway. A soakaway 22m x 4.5m x 0.8m deep is satisfactory.

The Microdrainage calculations are appended to the end of this report.

10. EXCEEDANCE AND FLOOD ROUTE

If the surface water drainage system is exceeded any floods, then a safe flood route away from houses is available on this proposed development and is shown on HM Design drawing YH743/7.

11. MAINTENANCE

The surface water system on this development will be maintained for the lifetime of the development.

The following maintenance schedules are proposed for the surface water system.

GENERAL MAINTENANCE

MAINTENANCE	FREQUENCY	DETAIL
REGULAR MAINTENACE	YEARLY	Visually inspect all surface water system at chambers. All debris and silt to be removed from all main chambers and all linear drains. Silt trap chamber and flow control chamber emptied of silt. Ensure all covers are secure. Visual inspect for any surface anomalies on the system.
REGULAR CCTV	10 YEARLY	As above inspections. Full CCTV of surface water system to identify any fault within the system.
CORRECTIVE MAINTENANCE	AS REQUIRED	If the above inspections identify problems with the surface water system, then remedial action should be carried out. This could include repair/replacement to any item on the surface water drainage system.

PERVIOUS PAVEMENTS

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface). Remove debris rubbish etc from pervious pavements surface. Pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this is the area most likely to collect sediment.	One a year after autumn leaf fall, or frequency as required, based on site specific observations of clogging or manufacturers recommendation.
	Mow adjacent areas and ensure no soil etc enters pervious pavements	As required.
	Remove weeds mechanically or by the application of a suitable weedkiller applied directly to the weeds by an applicator rather than spraying.	As required – at least once a year.
Remedial Actions	Remediate any surrounding landscaping which has raised to within 50mm of the pavements.	As required.
	Fill any depressions, rutted areas or other areas that might constitute a hazard and remediate	As required.
	Rehabilitate surface and upper substructure by remedial sweeping.	Every 10-15 years or as required (if infiltration performance is reduced due to significant clogging).
Monitoring	Initial Inspection.	Monthly and then 3 months after installation.
	Inspect for poor operation and weed growth and take remedial action if necessary.	Three monthly and 48hrs after severe storms in first 6 months.
	Inspect silt build up and establish appropriate	Annually

	brushing frequencies.	
	Inspect any chambers.	Annually

GULLIES

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Visually inspect gullies for surface damage.	Six monthly
	Remove and surface litter and detritus.	Monthly
	Inspect external covers for damage.	Annually
	Clean gullies and remove silt.	Annually
Occasional Maintenance	Carry out CCTV of outgoing pipework to identify problems.	Ten yearly
Remedial Actions	Replace damaged covers and gratings.	As required
	Replace or repair damaged outgoing pipework.	As required and as identified by CCTV

MANHOLES AND PIPES

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove and surface litter and detritus.	Monthly
	Inspect manhole covers for damage.	Annually
	Clean sumps and remove silt.	Annually
Occasional Maintenance	Carry out CCTV of outgoing pipework to identify problems.	Ten yearly
Remedial	Replace damaged manhole covers.	As required

Actions		
	Repair damaged manholes.	As required and as identified by CCTV
	Remove any root ingress or damage to pipework.	As required and as identified by CCTV

SOAKAWAY

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually.
	Remove debris from the catchment surface (where it may cause risks to performance).	Monthly
	For systems where rainfall infiltrates from above, check surface of filter for blockages by sediment, algae or other matter, remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures - silt trap manholes.	Annually , or as required
Remedial Actions	Repair / rehabilitate inlets, outlets, overflows and vents.	As required.
Monitoring	Inspect / check all inlets, outlets, overflows and vents to ensure they are in good condition and operating as designed.	Annually
	Survey inside of tank for sediment build-up and remove if necessary.	Ten yearly or as required.

12. CONCLUSIONS

- This development site can be drained successfully.
- Surface water from the development will be disposed of by the use of infiltration.
- The surface water storage will cater for all storms up to 1 in 100 year plus 30% climate change plus 10% urban creep.
- Foul water will be connected to the public foul sewerage system.
- Maintenance will be provided for the lifetime of the development

Report by

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11/02/2021

APPENDIX

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

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 774 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	116.592	0.292	0.7	27.5	O K
30 min Summer	116.685	0.385	0.7	36.2	O K
60 min Summer	116.781	0.481	0.8	45.2	O K
120 min Summer	116.872	0.572	0.8	53.8	O K
180 min Summer	116.916	0.616	0.8	57.9	O K
240 min Summer	116.940	0.640	0.8	60.2	O K
360 min Summer	116.960	0.660	0.8	62.1	O K
480 min Summer	116.964	0.664	0.8	62.5	O K
600 min Summer	116.959	0.659	0.8	62.0	O K
720 min Summer	116.951	0.651	0.8	61.3	O K
960 min Summer	116.934	0.634	0.8	59.7	O K
1440 min Summer	116.899	0.599	0.8	56.3	O K
2160 min Summer	116.847	0.547	0.8	51.5	O K
2880 min Summer	116.798	0.498	0.8	46.9	O K
4320 min Summer	116.708	0.408	0.8	38.4	O K
5760 min Summer	116.629	0.329	0.7	30.9	O K
7200 min Summer	116.561	0.261	0.7	24.5	O K
8640 min Summer	116.504	0.204	0.7	19.1	O K
10080 min Summer	116.457	0.157	0.7	14.7	O K
15 min Winter	116.628	0.328	0.7	30.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	117.781	0.0	19
30 min Summer	78.510	0.0	34
60 min Summer	49.937	0.0	64
120 min Summer	30.696	0.0	122
180 min Summer	22.772	0.0	182
240 min Summer	18.305	0.0	242
360 min Summer	13.390	0.0	362
480 min Summer	10.728	0.0	480
600 min Summer	9.027	0.0	574
720 min Summer	7.835	0.0	622
960 min Summer	6.260	0.0	748
1440 min Summer	4.556	0.0	1010
2160 min Summer	3.308	0.0	1424
2880 min Summer	2.634	0.0	1820
4320 min Summer	1.906	0.0	2636
5760 min Summer	1.514	0.0	3400
7200 min Summer	1.265	0.0	4112
8640 min Summer	1.092	0.0	4840
10080 min Summer	0.965	0.0	5544
15 min Winter	117.781	0.0	19

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	116.733	0.433	0.8	40.7	O K
60 min Winter	116.842	0.542	0.8	50.9	O K
120 min Winter	116.946	0.646	0.8	60.8	O K
180 min Winter	116.999	0.699	0.8	65.7	O K
240 min Winter	117.028	0.728	0.8	68.5	O K
360 min Winter	117.057	0.757	0.8	71.2	O K
480 min Winter	117.068	0.768	0.8	72.2	O K
600 min Winter	117.068	0.768	0.8	72.2	O K
720 min Winter	117.061	0.761	0.8	71.6	O K
960 min Winter	117.037	0.737	0.8	69.3	O K
1440 min Winter	116.993	0.693	0.8	65.1	O K
2160 min Winter	116.918	0.618	0.8	58.1	O K
2880 min Winter	116.844	0.544	0.8	51.2	O K
4320 min Winter	116.710	0.410	0.8	38.5	O K
5760 min Winter	116.594	0.294	0.7	27.7	O K
7200 min Winter	116.499	0.199	0.7	18.7	O K
8640 min Winter	116.424	0.124	0.7	11.7	O K
10080 min Winter	116.371	0.071	0.7	6.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	78.510	0.0	33
60 min Winter	49.937	0.0	62
120 min Winter	30.696	0.0	120
180 min Winter	22.772	0.0	180
240 min Winter	18.305	0.0	238
360 min Winter	13.390	0.0	352
480 min Winter	10.728	0.0	466
600 min Winter	9.027	0.0	576
720 min Winter	7.835	0.0	682
960 min Winter	6.260	0.0	796
1440 min Winter	4.556	0.0	1084
2160 min Winter	3.308	0.0	1540
2880 min Winter	2.634	0.0	1988
4320 min Winter	1.906	0.0	2812
5760 min Winter	1.514	0.0	3576
7200 min Winter	1.265	0.0	4320
8640 min Winter	1.092	0.0	4928
10080 min Winter	0.965	0.0	5456

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) 0.127

Time (mins) From:	To:	Area (ha)
0	4	0.127

Model Details

Storage is Online Cover Level (m) 117.700

Cellular Storage Structure

Invert Level (m) 116.300 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.04700 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.04700

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	99.0	99.0	0.801	0.0	130.9
0.800	99.0	130.8			