PROPOSED RESIDENTIAL DEVELOPMENT

RED HOUSE FARM

BARNSLEY ROAD

BRIERLEY

DRAINAGE REPORT

18/05/2018

HM DESIGN
10 The Green York YO26 5LR 07919 031289

1. INTRODUCTION

This report provides an assessment of the proposed drainage for this development site. It considers the disposal of foul and surface water from the development and provides the background information and hydraulic calculations for the drainage design.

It should be read with HM Design's drawing YH452/RD/2 Road and Drainage Layout.

2. LOCATION AND SITE

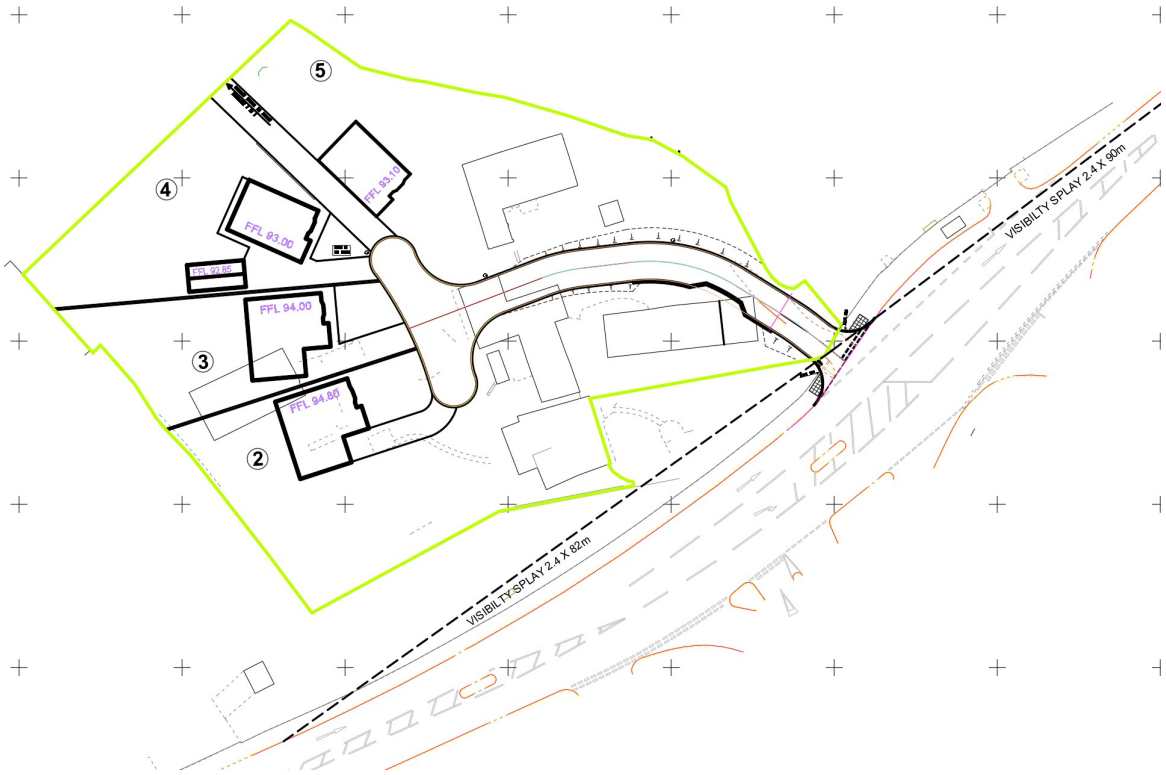
The site is adjacent to Barnsley Road, Brierley. An aerial view of the site is shown below.



LOCATION PLAN

3. PROPOSALS

The proposals are for 4 new dwellings within the ground of Red House Farm. The proposals are shown below.

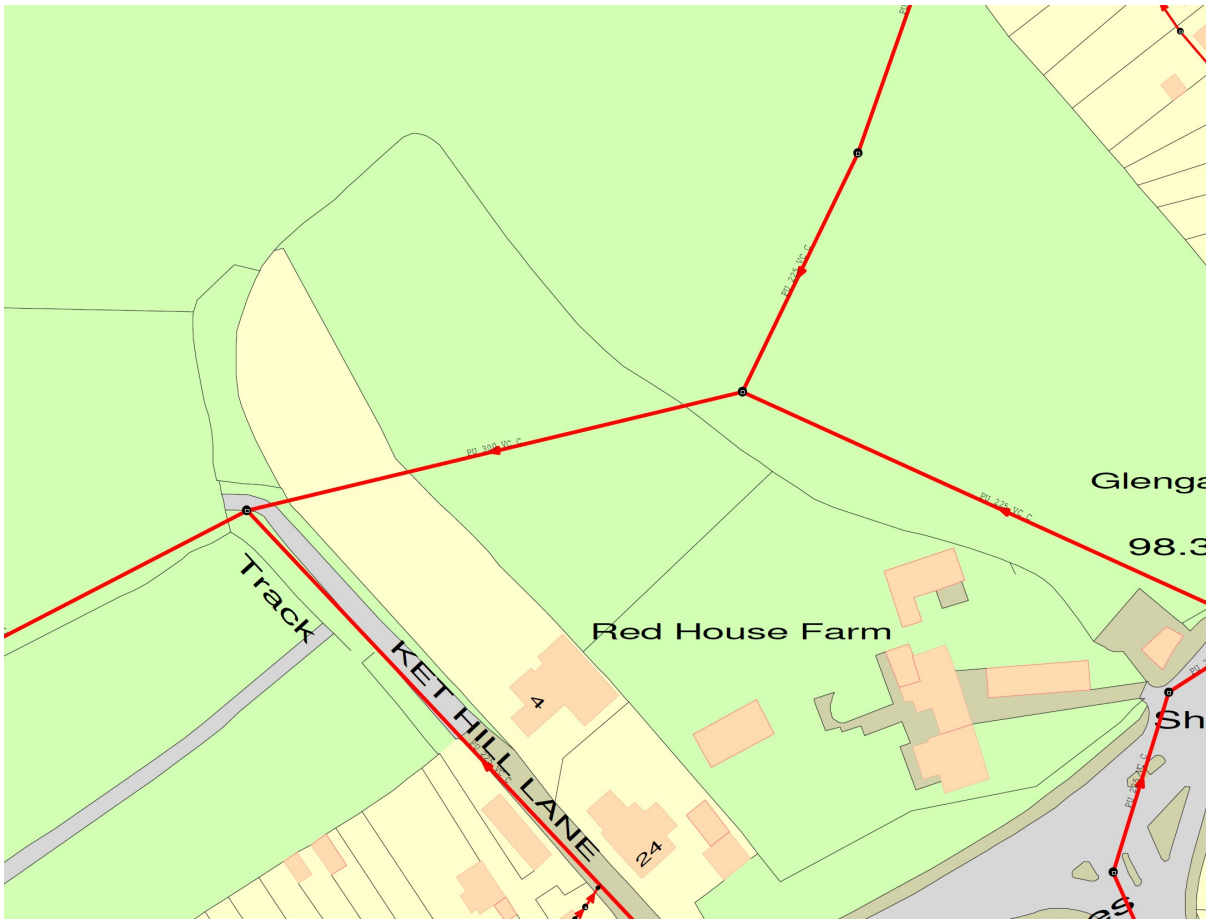


PROPOSALS PLAN

4. PUBLIC SEWER RECORDS

The local public sewer records have been obtained and these are shown below.

A public combined sewer exists immediately to the north of the site, within the same ownership as red House farm.



PUBLIC SEWER RECORDS

5. FOUL SEWERAGE

Foul sewers from the development will be connected to the combined public sewer to the north of the site.

A separate system of foul drainage will be provided on site. The system will be gravity.

6. SURFACE WATER APPRAISAL

The building regulations require that surface water is disposed of through a specific hierarchy of:-

- By infiltration
- To watercourse
- Or to sewer

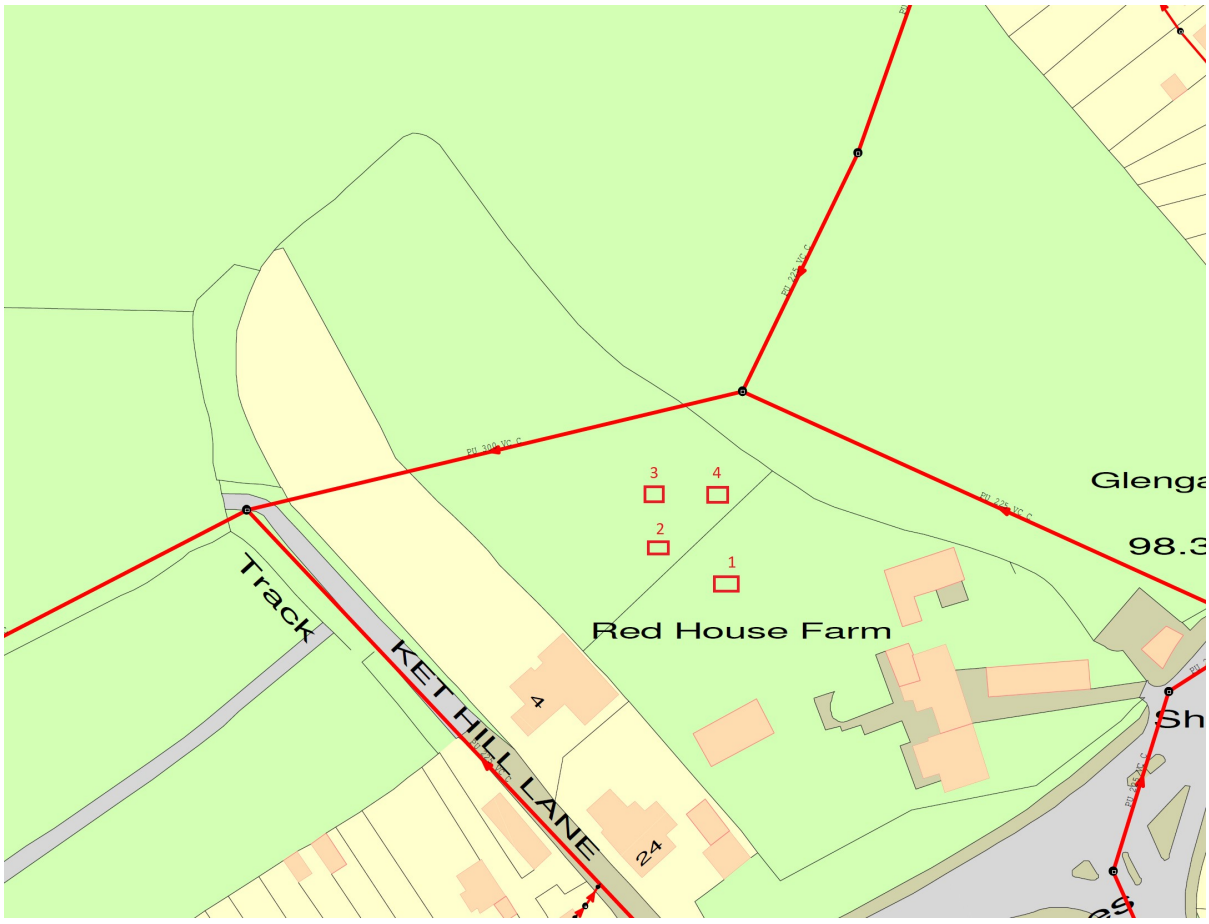
in that specific order.

Infiltration

To determine if the ground is suitable for infiltration as a means of surface water disposal, testing to BRE Digest was carried out on the 28th April 2018.

The testing regime proposed was to excavate 2 trial pits for BRE Digest 365 testing (TP1 and TP2). A further 2 test pits (TP3 and TP4) were excavated to a deeper depth to determine that the ground water level was at least 2m below ground level and so at least 1m below the likely invert level of any infiltration system.

The location of the pits is shown below.



TRIAL PIT LOCATIONS

BRE Digest 365 testing was carried out on site within test pits 1 and 2 and a photograph of the test pits are shown below.





BRE DIGEST 365 TEST PITS

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Test pit 3 and 4 remained dry throughout the test procedure and so ground water levels are well below any proposed soakaways.

The test holes showed that on site, the ground conditions were generally clay and poor infiltration results were obtained. However, just off site, the ground conditions are sandstone below the clay level and soakaway test results were good. As such, a soakaway system to drain the site will be satisfactory.

The results for test pit 2 are attached to the rear of this report. Therefore, any soakaway should be located well into the sandstone layer to provide a satisfactory soakaway.

As per the requirements of BRE Digest 365, the test in test pit 2 was carried out 3 times. The slowest percolation test was test 1 and this has been used to determine a infiltration coefficient.

The infiltration coefficient is 0.11m/hr ($3x10^{-5}$m/s).

7. SURFACE WATER EXCEEDENCE ROUTES

In the unlikely event that the surface water system floods because of blockage or design values are exceeded, then a safe flood route for surface water will be to the open green space to the north and not affect any properties. Therefore, this is satisfactory.

8. SURFACE WATER DESIGN

As in 6 above, a soakaway just off site is to be used.

Return Period: 1 in 100 year storm event.
Climate Change: + 30% added to rainfall.
Proposed impermeable area: 908 sq m (0.098 hectares).
Safety factor: 2

The industry standard microdrainage drainage software has been used to design the storage system. Using the following parameters.

M5-60 = 19mm
R= 0.378

The Microdrainage calculations show that the soakaway size required is 45.4cu m.

This soakaway size requirement can be met with a cellular storage system under the green space area immediately north of the site.

9. CONCLUSIONS

- This development site can be drained successfully.
- Foul water and surface water will have separate systems on site.
- Foul water flows will be connected to the public combined sewer immediately north of the site and in the same land ownership.
- Surface water from the development will be to a soakaway.
- The surface water storage will cater for all storms up to 1 in 100 year plus 30% climate change.
- An application to Yorkshire Water should be made for the foul sewer connection.

Report by



Hugh Morris BSc CEng MICE
18/05/2018

APPENDIX

- MICRODRAINAGE STORAGE CALCULATIONS
- PERCOLATION TEST DETAILS

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

Half Drain Time : 327 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	88.167	0.367	1.1	20.9	O K
30 min Summer	88.278	0.478	1.1	27.2	O K
60 min Summer	88.382	0.582	1.2	33.2	O K
120 min Summer	88.463	0.663	1.2	37.8	O K
180 min Summer	88.486	0.686	1.2	39.1	O K
240 min Summer	88.485	0.685	1.2	39.1	O K
360 min Summer	88.467	0.667	1.2	38.0	O K
480 min Summer	88.448	0.648	1.2	36.9	O K
600 min Summer	88.427	0.627	1.2	35.8	O K
720 min Summer	88.407	0.607	1.2	34.6	O K
960 min Summer	88.367	0.567	1.2	32.3	O K
1440 min Summer	88.293	0.493	1.1	28.1	O K
2160 min Summer	88.192	0.392	1.1	22.4	O K
2880 min Summer	88.107	0.307	1.1	17.5	O K
4320 min Summer	87.978	0.178	1.0	10.1	O K
5760 min Summer	87.896	0.096	1.0	5.5	O K
7200 min Summer	87.855	0.055	0.9	3.1	O K
8640 min Summer	87.845	0.045	0.9	2.6	O K
10080 min Summer	87.840	0.040	0.7	2.3	O K
15 min Winter	88.213	0.413	1.1	23.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	118.891	0.0	18
30 min Summer	78.889	0.0	33
60 min Summer	49.937	0.0	62
120 min Summer	30.558	0.0	122
180 min Summer	22.619	0.0	180
240 min Summer	18.159	0.0	234
360 min Summer	13.250	0.0	290
480 min Summer	10.599	0.0	354
600 min Summer	8.907	0.0	422
720 min Summer	7.723	0.0	490
960 min Summer	6.162	0.0	626
1440 min Summer	4.475	0.0	896
2160 min Summer	3.244	0.0	1296
2880 min Summer	2.579	0.0	1672
4320 min Summer	1.863	0.0	2376
5760 min Summer	1.478	0.0	3056
7200 min Summer	1.234	0.0	3680
8640 min Summer	1.065	0.0	4400
10080 min Summer	0.940	0.0	5136
15 min Winter	118.891	0.0	18

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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	88.339	0.539	1.2	30.7	O K
60 min Winter	88.459	0.659	1.2	37.6	O K
120 min Winter	88.557	0.757	1.3	43.1	O K
180 min Winter	88.590	0.790	1.3	45.0	O K
240 min Winter	88.596	0.796	1.3	45.4	O K
360 min Winter	88.576	0.776	1.3	44.2	O K
480 min Winter	88.551	0.751	1.3	42.8	O K
600 min Winter	88.525	0.725	1.3	41.3	O K
720 min Winter	88.496	0.696	1.2	39.7	O K
960 min Winter	88.437	0.637	1.2	36.3	O K
1440 min Winter	88.325	0.525	1.2	29.9	O K
2160 min Winter	88.177	0.377	1.1	21.5	O K
2880 min Winter	88.055	0.255	1.0	14.6	O K
4320 min Winter	87.889	0.089	1.0	5.1	O K
5760 min Winter	87.845	0.045	0.9	2.6	O K
7200 min Winter	87.838	0.038	0.7	2.2	O K
8640 min Winter	87.833	0.033	0.6	1.9	O K
10080 min Winter	87.829	0.029	0.6	1.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	78.889	0.0	33
60 min Winter	49.937	0.0	62
120 min Winter	30.558	0.0	120
180 min Winter	22.619	0.0	176
240 min Winter	18.159	0.0	232
360 min Winter	13.250	0.0	332
480 min Winter	10.599	0.0	376
600 min Winter	8.907	0.0	452
720 min Winter	7.723	0.0	530
960 min Winter	6.162	0.0	682
1440 min Winter	4.475	0.0	968
2160 min Winter	3.244	0.0	1380
2880 min Winter	2.579	0.0	1756
4320 min Winter	1.863	0.0	2380
5760 min Winter	1.478	0.0	2936
7200 min Winter	1.234	0.0	3672
8640 min Winter	1.065	0.0	4456
10080 min Winter	0.940	0.0	5112

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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	0.378	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.098

Time (mins) From:	To:	Area (ha)
0	4	0.098

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Model Details

Storage is Online Cover Level (m) 90.000

Cellular Storage Structure

Invert Level (m) 87.800 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.11000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.11000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	60.0	60.0	0.801	0.0	84.8
0.800	60.0	84.8			

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PERCOLATION TEST SHEET

HM DESIGN

METHOD from BRE DIGEST 365

- Excavate a soakage trial pit to the required depth (typically 1.0-2.0 m deep) using minimum width (0.3m) and length (1m). Carefully trim sides and bottom.
- Carefully measure size of pit and note sizes below.
- Fill soakage hole briskly with water (from bowser) to at least three quarters full. Being careful not to wash away sides. Note: a 300mm wide, 1 metre long, 1.5 metre deep trench needs at least 350 litres (80 gallons) of water.
- Place straight edge over top of soakage pit and measure (dip) to top of water.
- Record time versus dips in table below. Dip every 5 minutes for first hour then every hour until pit is one quarter full.
- Repeat test 3 times in total on the same or consecutive days.

DETAILS

SITE LOCATION RED HOUSE FARM - PIT 2

DATE OF TEST 28/04/18

WEATHER CONDITIONS CLOUD **DRY** YES

SIZE OF PIT

LENGTH	WIDTH	DEPTH
1500 mm	300 mm	2000 mm

TIME	DIP	TIME	DIP	TIME	DIP
14:50	765	15:55	520	17:00	390
14:55	865	16:00	730	17:05	620
15:00	1050	16:05	900	17:10	810
15:05	1180	16:10	1000	17:15	900
15:10	1270	16:15	1120	17:20	1000
15:15	1360	16:20	1190	17:25	1080
15:20	1400	16:25	1240	17:30	1170
15:25	1460	16:30	1300	17:35	1210
15:30	1480	16:35	1340	17:40	1290
15:35	1510	16:40	1370	17:45	1330
15:40	1540	16:45	1400	17:50	1360
15:45	1570	16:50	1430	17:55	1390
15:50	1600	16:55	1450	18:00	1410