Kexborough Farms

Proposed Residential Development
Kexborough Farm
Churchfield Lane
Kexborough
Barnsley

Drainage Assessment
Prepared by EWE Associates Ltd
Final RevA August 2020

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

Kexborough Farms
Town Farm
Kexborough
Darton
Barnsley
S75 5DU
FAO Susan Mellor

CONTRACT

This report describes work commissioned by Kexborough Farms following written instruction dated 2nd June 2020. Kexborough Farms representative for the contract was Mr Leigh Ogden of Paragon Highways. Lea Favill of EWE Associates Ltd carried out the work.

Date: 18th August 2020

Prepared by: …… ……. Lea Favill
Director

REVISION HISTORY

Draft Report Rev0 issued 13th August 2020 - 1No copy issued to Mr Leigh Ogden/Natalie Garside
Final Report RevA issued 18th August 2020 - 1No copy issued to Mr Leigh Ogden/Natalie Garside

CONTENTS

APPENDICES:

1. INTRODUCTION

Terms of Reference

This report was commissioned by Kexborough Farms to consider the surface water and foul drainage for the construction/redevelopment of 25 residential dwellings at Town Farm and Kexborough Hall Farm. This report is to support the current 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.
- 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.
- 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.
- Soil permeability test have been performed by RB Geotechnical during July 2020. The soakaway tests confirm that the underlying sand soils are adequate to allow infiltration and consist of made ground above sandstone. An infiltration rate of between 93mm/hr and 2600mm/hr has been estimated within the site. The test results are provided at Appendix A of this report.
- The proposal is for a residential development with 25 private dwellings, access drives and gardens. At this stage an adoptable access road is proposed for the Town Farm part of the site, however, the access road into Kexborough Hall farm will remain private as a private foul rising main is required within the access road. The private drives will remain within private ownership. The drives will drain direct runoff to permeable paving systems which will be surface with either blocks or gravel. The roof

drainage will discharge to individual crate soakaways located within domestic gardens. They will remain in private ownership.

- SUDs features are to be recommended where practically possible.
- It is assumed that the minimum design standard is 1 in 100 years plus climate change (40%).
- No Ground water was observed within any trial holes.
- There is a 200mm diameter foul public sewer located within Churchfield lane to the north of the site. Manholes couldn't be raised in order to determine accurate invert levels. The assumption is that the lower parts of the site will require pumping. Sewer plan is provided at Appendix B.

2. DESIGN OF PROPOSED SURFACE WATER DRAIANGE SYSTEM

Catchment Area

The individual catchment areas for the proposed roofs, access roads and private drives were calculated from proposed layout drawing provide by the architect.

Drainage Strategy

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

- Private Drives will drain to permeable paving. Attenuation up to and including 1 in 100 year plus climate change 40% event has been provided within the structures.
- Private Access Roads/Drives will drain to crate soakaways located within private land. Attenuation up to and including 1 in 100 year plus climate change 40% event has been provided within the structures.
- Adoptable Roads and Management Company Roads will drain to lined soakaways located within easement land 5m from the highway and any buildings. Attenuation up to and including 1 in 100 year plus climate change 40% event has been provided within the structures.
- Roof drainage from private dwellings to be directed to crate soakaways located within private land. Attenuation up to and including 1 in 100 year plus climate change 40% event has been provided within the structures.

Adoption & Maintenance

The different infiltration devices will be maintained as follows.

- Private Drives will drain to permeable paving. Individual private landowners to maintain.
- Private Access Roads/Drives will drain to crate soakaways located within private land. Management company or individual landowners.
- Management Company Roads will drain to lined soakaways located within easement land 5m from the highway and any buildings. Management company.
- Adoptable Roads will drain to lined soakaways located within easement land 5m from the highway and any buildings. Highway Authority.
- Roof drainage from private dwellings to be directed to crate soakaways located within private land. Individual private landowners to maintain.

Proposed Drainage Town Farm

The individual catchment areas of each of the private access roads are shown on the strategy drawing provided at Appendix C of this report.

An assessment of the required balance volume for a paved area has been made using the estimated post development impermeable areas shown on the strategy drawing and tabulated below. Using WinDes Source Control software developed by Microdrainage the required permeable paving depths have been calculated for the 1 in 100 year plus climate change (40%) event.

Reference should be made to Appendix G where the calculation sheets are provided. The attenuation size has been tabulated below. The drainage strategy drawing provided at Appendix C shows the location of the drainage systems.

WinDes 1 in 100 year+CC Storage Volume for Town Farm

Area (m^2)	Infiltration Rate m/hr (depth)	Ground water depth	Attenuation type	Length	Width	Depth
Plot 1 (130)	0.16 (1.5m)	no	Crate Soakaway	2.5	2	1.5
Plot 2+3 (180)	0.16 (1.5m)	no	Crate Soakaway	3	3	1.5
Plot 4+5 (282)	0.16 (1.5m)	no	Crate Soakaway	3	2.5	1.5
Plot 6+7 (300)	1.3 (1.4m)	no	Crate Soakaway	3	2.5	1.5
Plot 8 (130)	1.3 (1.4m)	no	Crate Soakaway	2	2	1.5
Plot 9 (160)	1.3 (1.4m)	no	Crate Soakaway	2	2	1.5
Plot 10 (160)	1.3 (1.4m)	no	Crate Soakaway	2	2	1.5
Plot 11 (160)	2.6 (1.3m)	no	Crate Soakaway	2	2	1.5
Plot 12 (150)	2.6 (1.3m)	no	Crate Soakaway	2	2	1.5
Private Drive (233)	0.16 (1.5m)	no	Crate Soakaway	3.5	3	1.5
Private Drive (390)	1.3 (1.4m)	no	Crate Soakaway	3.5	3	1.5
Adoptable Road (607)	2.6 (1.3m)	no	Lined Soakaway	2No. 2.1m dia 1.5m deep		

Proposed Drainage Kexborough Hall Farm

The individual catchment areas of each of the private access roads are shown on the strategy drawing provided at Appendix D of this report.

An assessment of the required balance volume for a paved area has been made using the estimated post development impermeable areas shown on the strategy drawing and tabulated below. Using WinDes Source Control software developed by Microdrainage the required permeable paving depths have been calculated for the 1 in 100 year plus climate change (40%) event.

Reference should be made to Appendix G where the calculation sheets are provided. The attenuation size has been tabulated below. The drainage strategy drawing provided at Appendix D shows the location of the drainage systems.

WinDes 1 in 100 year+CC Storage Volume for Kexborough Hall Farm

Area (m²)	Infiltration Rate m/hr (depth)	Ground water depth	Attenuation type	Length	Width	Depth
Plot 1+2+3 (203)	1.0 (1.4m)	no	Crate Soakaway	3	2	1.5
Plot 4+5+6 (300)	0.093 (1.4m)	no	Crate Soakaway	4	4	1.5
Plot 7 (91)	1.0 (1.5m)	no	Crate Soakaway	2	2	1.5
Plot 8 (104)	0.093 (1.4m)	no	Crate Soakaway	2	2	1.5
Plot 9 (102)	0.093 (1.4m)	no	Crate Soakaway	2.5	2	1.5
Plot 10 (102)	0.093 (1.4m)	no	Crate Soakaway	2.5	2	1.5
Car park plot7 (105)	1.0 (1.4m)	no	Crate Soakaway	2	2	1.5
Access drive to Plot 1-6 (437)	0.3 (1.4m)	no	Crate Soakaway	5	4	1.5
Main House (287)	0.3 (1.4m)	no	Crate Soakaway	4	3	1.5
Access drive to Main House (188)	0.3 (1.4m)	no	Crate Soakaway	3	2.5	1.5
Manage Road (612)	0.093 (1.4m)	no	Lined Soakaway	5No. 2.1m dia 1.5m deep		

3. DESIGN OF PROPOSED FOUL WATER DRAINAGE SYSTEM

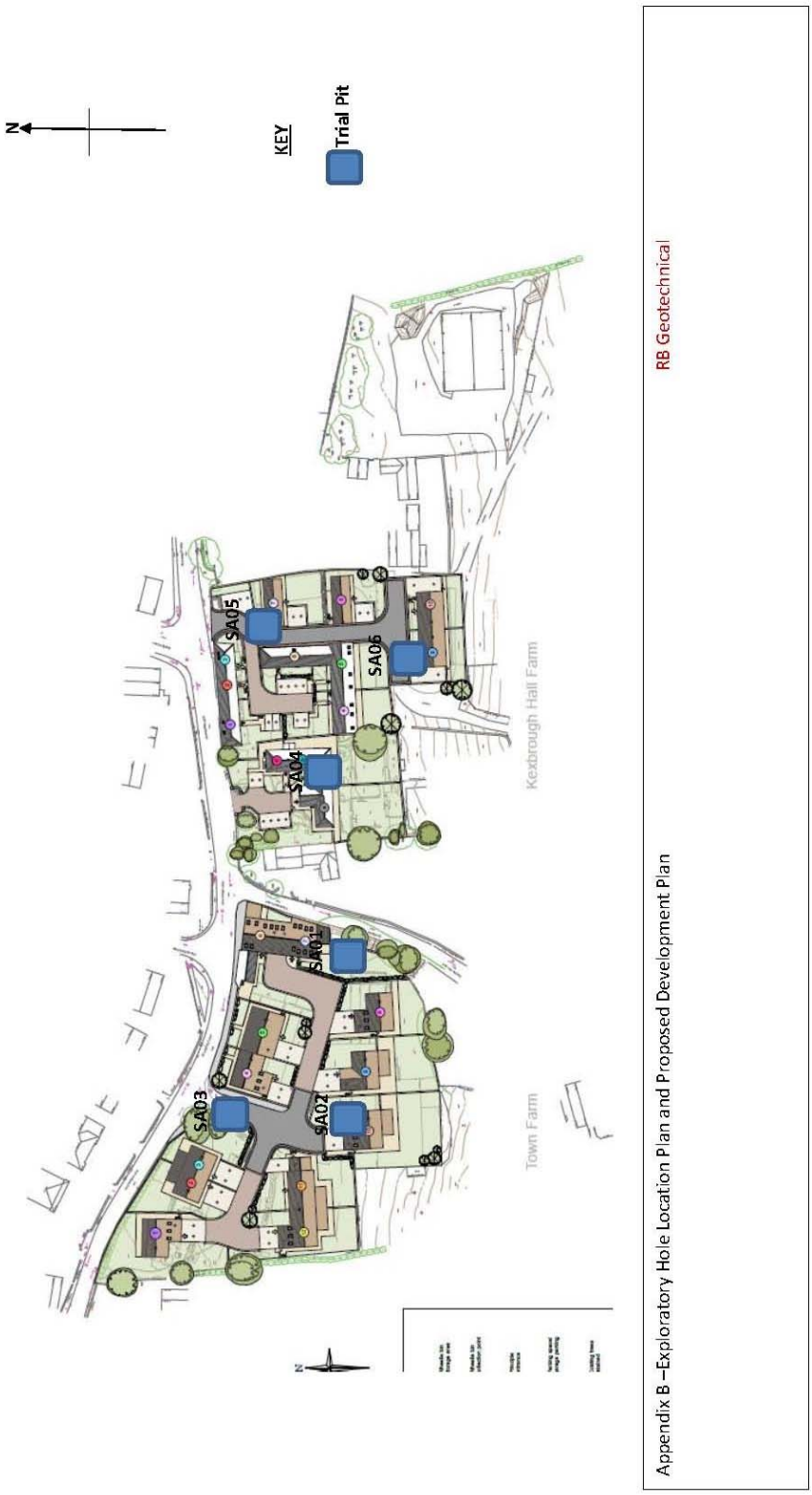
There is an existing 200mm diameter foul sewer located to the north of the site within Churchfield Lane. The sewer depths shown on the Yorkshire Water sewer plan vary between 1.31m and 2.81m. Manholes couldn't be lifted in order to verify depths. As such, it is envisaged that the lower part of the site will requiring pumping.

Adoptable pumping stations will have an impact on the proposed layout plan. As such, at this stage private pumping stations have been shown on the strategy plans. The Town Farm part of the development will include a section of adoptable foul sewer which will be located within the adoptable highway which will accept a rising main from the private pumping station.

Due to constraints within the Kexborough Hall Farm part of the site a rising main is required within the main access road. Subsequently, the access road will remain private and the responsibility of a management company.

The foul drainage strategy drawings are provided at Appendix E & F.

Appendix A: - Percolation Test Results



SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: l Land at Kexbrough

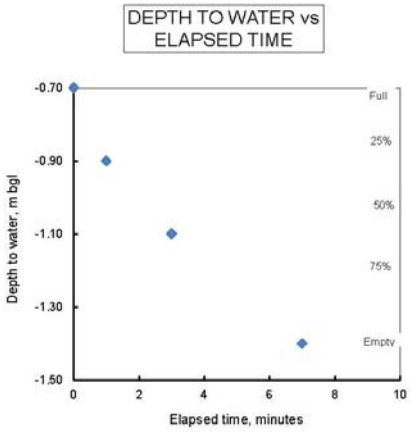
Project No: RBG191

Sheet No: 1/6

Trial Pit: SA01
Depth: 1.40
Length: 1.00
Width: 0.30

Description of Stratum under test:
sandy Gravel
Depth to base of pit (mbgl):
1.4

Elapsed Time min	Depth to Water m
0.0	-0.70
1.0	-0.90
3.0	-1.10
7.0	-1.40



NOTES

All dimensions given in metres

f = (V75-V25)/A50(T75-T25)60

V75-V25 = 0.11 m^3
A50 = 1.21 m^2
T75-T25 = 4 minutes

Soil Infiltration Rate

f = 3.62E-04 m/s
1301.653 **mm/hr**

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: l Land at Kexbrough

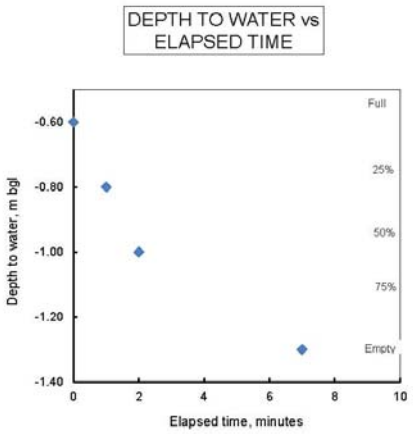
Project No: RBG191

Sheet No: 2/6

Trial Pit: SA02
Depth: 1.30
Length: 1.00
Width: 0.30

Description of Stratum under test:
Sandstone bedrock
Depth to base of pit (mbgl):
1.3

Elapsed Time min	Depth to Water m
0.0	-0.60
1.0	-0.80
2.0	-1.00
7.0	-1.30



NOTES

All dimensions given in metres

f = (V75-V25)/A50(T75-T25)60

V75-V25 = 0.11 m^3
A50 = 1.21 m^2
T75-T25 = 2 minutes

Soil Infiltration Rate

f = 7.23E-04 m/s
2603.306 mm/hr

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: l Land at Kexbrough

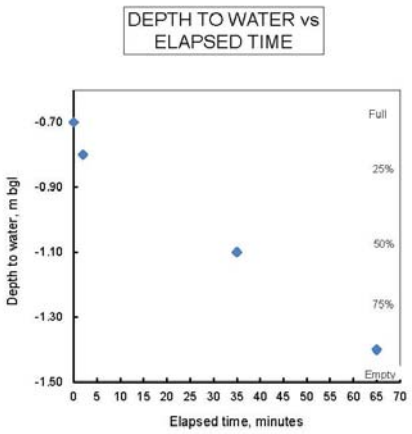
Project No: RBG191

Sheet No: 3/6

Trial Pit: SA03
Depth: 1.50
Length: 1.00
Width: 0.30

Description of Stratum under test:
Sandy Gravel
Depth to base of pit (mbgl):
1.5

Elapsed Time min	Depth to Water m
0.0	-0.70
2.0	-0.80
35.0	-1.10
65.0	-1.40



NOTES

All dimensions given in metres

f = (V75-V25)/A50(T75-T25)60

V75-V25 = 0.12 m^3
A50 = 1.34 m^2
T75-T25 = 33 minutes

Soil Infiltration Rate

f = 4.52E-05 m/s
162.8223 mm/hr

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: l Land at Kexbrough

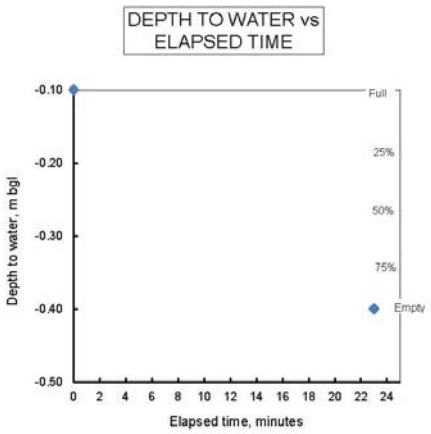
Project No: RBG191

Sheet No: 4/6

Trial Pit: SA04
Depth: 1.50
Length: 1.00
Width: 0.30

Description of Stratum under test:
Sandstone bedrock
Depth to base of pit (mbgl):
0.4

Elapsed Time min	Depth to Water m
0.0	-0.10
23.0	-0.40



NOTES

All dimensions given in metres

f = (V75-V25)/A50(T75-T25)60

V75-V25 = 0.05 m^3
A50 = 0.69 m^2
T75-T25 = 13 minutes

Soil Infiltration Rate

f = 8.36E-05 m/s
301.0033 mm/hr

SOAKAWAY TEST RESULTS

BRE DIGEST 365 - SOIL INFILTRATION RATE

Project: l Land at Kexbrough

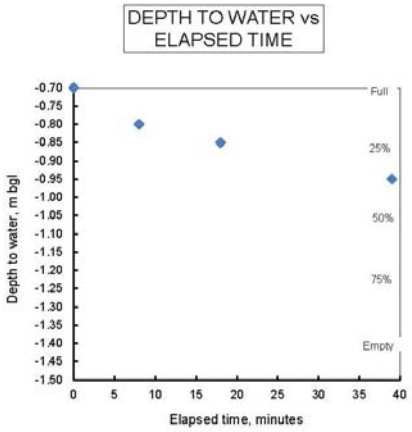
Project No: RBG191

Sheet No: 6/6

Trial Pit: SA06
Depth: 1.40
Length: 1.00
Width: 0.30

Description of Stratum under test:
Sandy Gravel
Depth to base of pit (mbgl):
1.4

Elapsed Time min	Depth to Water m
0.0	-0.70
8.0	-0.80
18.0	-0.85
39.0	-0.95



NOTES

All dimensions given in metres

f = (V75-V25)/A50(T75-T25)60 0.28

V75-V25 = 0.11 m^3

A50 = 1.21 m^2

T75-T25 = 56 minutes Extrapolated

Soil Infiltration Rate **f = 2.58E-05 m/s** Extrapolated

92.97521 **mm/hr**

Appendix B: - Sewer Map

Appendix C: - SW Drainage Drawings Town Farm

Appendix D: - SW Drainage Drawings Kexborough Hall Farm

Appendix E: - FW Drainage Drawing Town Farm

Appendix F: - FW Drainage Drawing Kexborough Hall Farm

Appendix G: - Soakaway Calculations