

HYDROLOGICAL ASSESSMENT

**HARROGATE ROAD
WETHERBY**

FOR

**HALLAM LAND MANAGEMENT LIMITED
&
STOCKELD PARK**



40866-003

May 2018

FLOOD RISK ASSESSMENT
HARROGATE ROAD
WETHERBY

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&
STOCKELD PARK

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CONTENTS

1.0 THE DEVELOPMENT..... 4

 1.1 Introduction..... 4

 1.2 Site Location & Description..... 4

2.0 GEOLOGY & HYDROLOGY 5

 2.1 Geology 5

 2.2 Hydrological classification..... 8

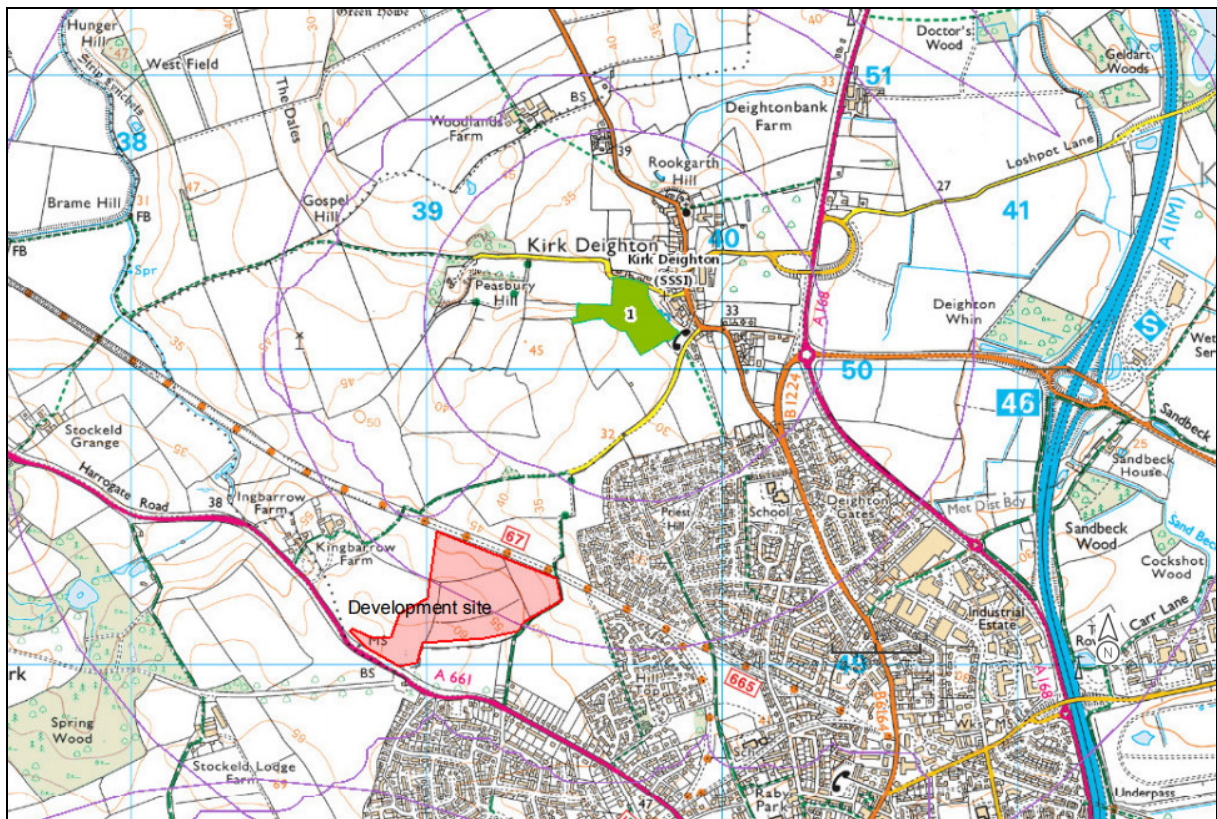
3.0 DEVELOPMENT IMPACT 9

1.0 THE DEVELOPMENT

1.1 Introduction

This Hydrological Assessment has been prepared on the instruction of Hallam Land Management Ltd. Any other parties using the information in this report do so at their own risk, unless previously approved in writing.

This report comprises an assessment of the hydrological impacts of the proposed residential development on Kirk Deighton Site of Special Scientific Interest (SSSI).



Extract OS plan showing location of SSSI relative to development site

1.2 Site Location & Description

The site is located at the western edge of Wetherby and is centred on National Grid Reference SE 391 491. It is bounded by Harland Way (cycle route) to the north, Harrogate Road to the south, proposed residential development to the east and arable land to the west.

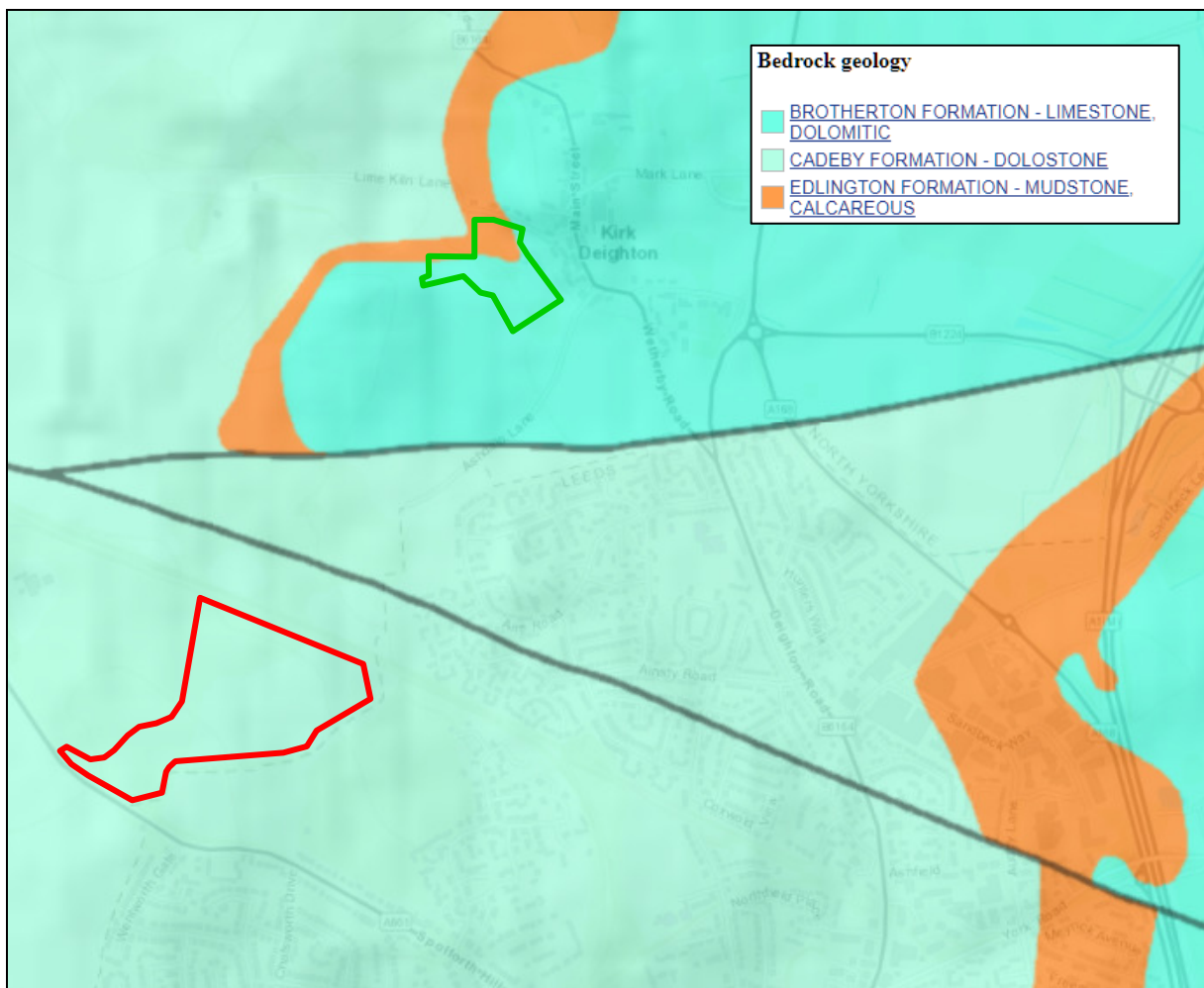
The site is currently arable fields. Land falls to the north-east at a steady gradient of approximately 1 in 20.

2.0 GEOLOGY & HYDROLOGY

2.1 Geology

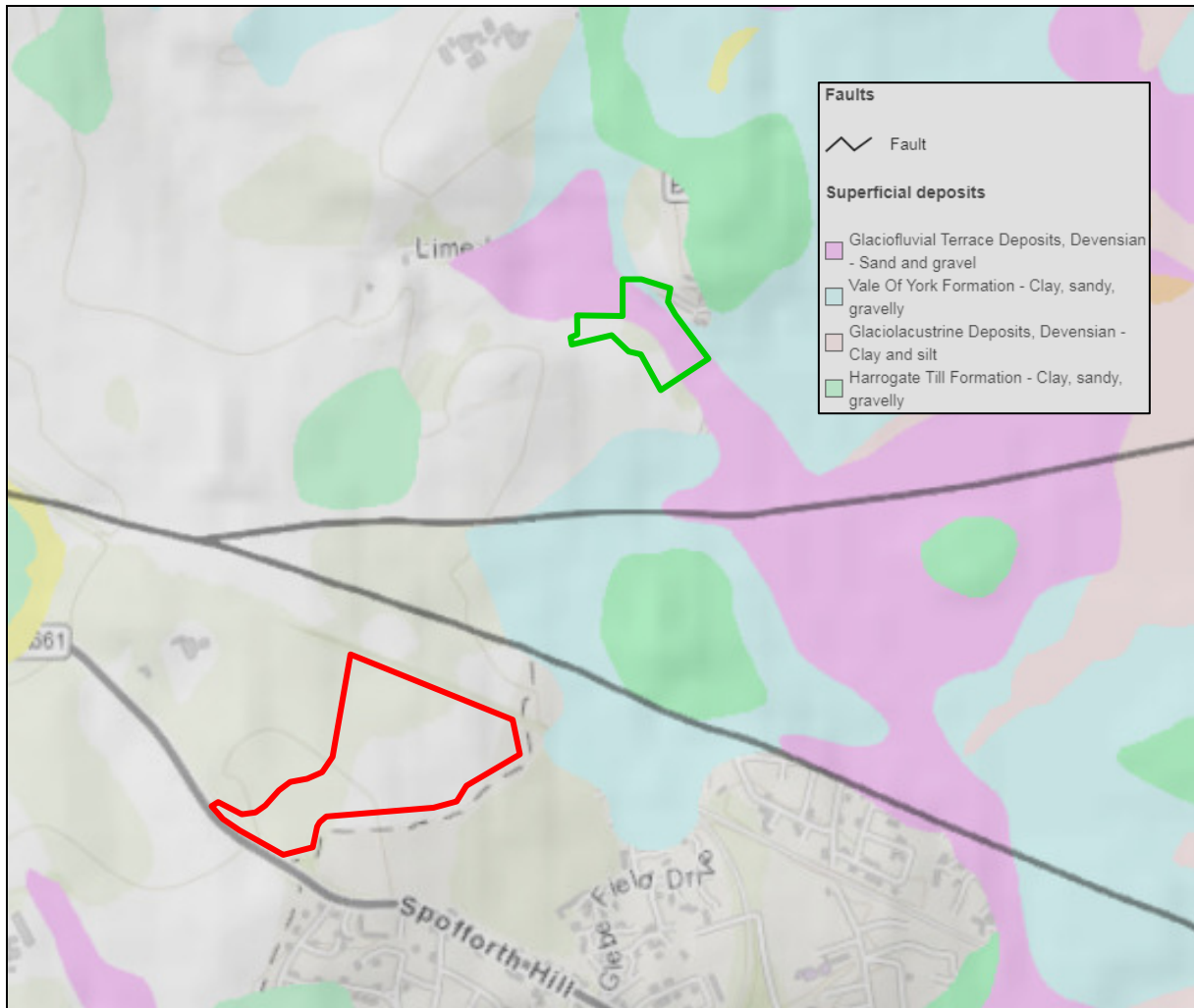
The British Geological Survey maps show that the underlying geology is dolostone under the development site and mudstone and limestone under the SSSI. The bedrock slopes to the south-east. Two faults separate the site from the SSSI; one minor fault immediately to the north of the disused railway track and a second more prominent fault to the south of Kirk Deighton.

The effect of the bedrock geology and above-ground topology around Kirk Deighton is to direct surface water into a dry valley to the north-west of the SSSI. The lakes within the SSSI are formed on the impermeable mudstone. Downstream of the lakes water flows underground to emerge to the east of Kirk Deighton/north-east of Wetherby.



Extract British Geological Survey – Surface geology bedrock map

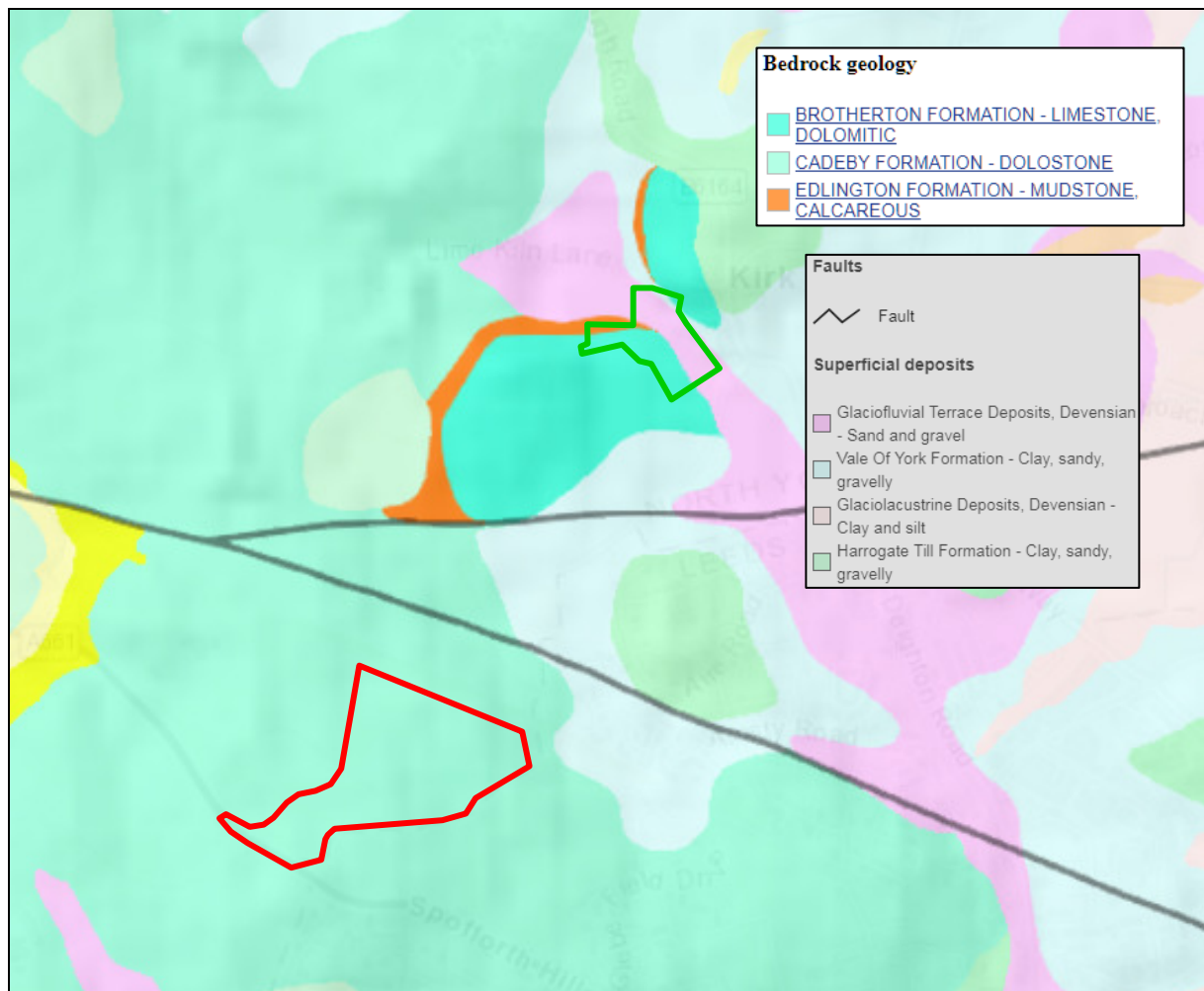
The bedrock is overlaid with clay of the Vale of York Formation across Kirk Deighton and the norther-eastern edge of Wetherby. In the valley bed this, in turn, is overlaid by sand and gravel deposits. No superficial deposits are record on the development site.



Extract British Geological Survey – Surface geology superficial deposits map

No intrusive ground investigation information for the development site is available at this stage. However the Vale of York Formation was proven to a depth of 3 m at the north-western corner of the residential development adjacent to the proposed site.

The effect of the geology is for the impermeable mudstone of the Edlington Formation and the impermeable clay of the Vale of York Formation to provide a barrier to the free passage of shallow groundwater from the site to the SSSI. This is shown on the combined bedrock and superficial deposits plan overleaf.



Extract British Geological Survey – Surface geology combined bedrock & superficial deposits map

At the prominent east-west fault the mudstone outcrops to the north of the development site and because of the shallow dip of the strata will be at shallow depth to the east of the outcrop. Combined with the clay of the Vale of York Formation, this will tend to produce an impermeable barrier to the northward migration of water.

However, the hydraulic gradient would tend to suggest that any groundwater from the site will flow in a north-easterly direction towards open water at 25 mAOD to the north-east of Wetherby rather than towards northwards towards Kirk Deighton.

The eastern corner of the development site is at a level of about 43 mAOD. The distance from this point to the SSSI on the 30 m contour where groundwater might emerge if migrating northwards is 1,000 m. This is a gradient of about 1 in 70. The groundwater could migrate towards the River Wharfe at level of about 20 mAOD at a distance of 800 m to the south of

the south-eastern corner of the development site. The gradient in this direction is about 1 in 35.

A comparison can be made between the groundwater flow routes to the north to the SSSI and to the south to the River Wharfe: to the north the hydraulic gradient is only 1 in 70 and any groundwater would have to flow between a relatively thin gap at the fault between mudstone and clay; the flow to the south has a much steeper hydraulic gradient of 1 in 35 and is entirely through limestone which is suspected to be permeable.

We therefore conclude that groundwater from the site would flow southwards to the River Wharfe rather than northwards to the SSSI.

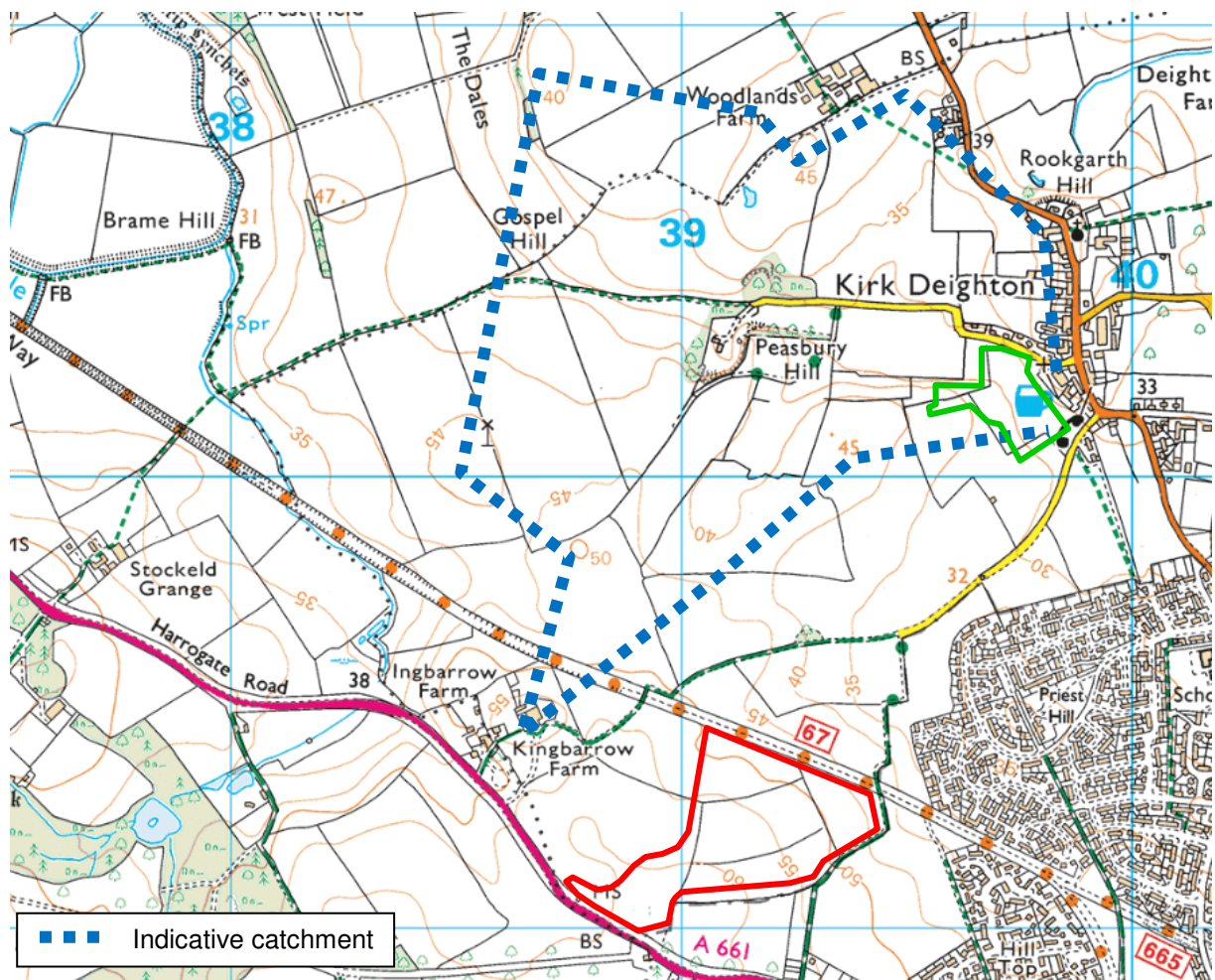
2.2 Hydrological classification

Aquifer maps indicate that the underlying dolostone/limestone bedrock is a Principal aquifer. The superficial deposits are described as Secondary (undifferentiated) or Unproductive.

3.0 DEVELOPMENT IMPACT

Natural England in their planning consultation email of 2 May 2018 have raised concerns that the drainage infrastructure for the residential developments in the vicinity and consequent changes in groundwater flows may affect water levels in Kirk Deighton SSSI. This assessment considers the potential impact of the joint Hallam Land Management & Stockeld Park site only.

The SSSI is principally served by a catchment lying to the west of Kirk Deighton. The upper catchment is underlain by limestone bedrock and the lower catchment by mudstone bedrock. The slope of the bedrock is to the south-east.



Extract OS plan showing indicative Kirk Deighton SSSI catchment

The SSSI may also be served by groundwater flows from the dolostone/limestone from a wider catchment including the development site. Groundwater flows from the site are expected to be impeded on their flow northwards by the presence of impermeable mudstone

bedrock and by impermeable clay superficial deposits. Although there is narrow passage below the clay stratum flows will tend to flow southwards towards a lower water table at the River Wharfe.

In conclusion, the evidence available suggests the development site, in its current greenfield form, contributes nominal flows to Kirk Deighton SSSI and that development of the site will have a low impact on the SSSI.