



NPPF: Flood Risk Assessment

Land Adjacent to Holly Cottage, Old Mill Road, Thurgoland

Mr Ronald Evans

SHF.1742.001.HY.R.001.A



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Land Adjacent to Holly Cottage, Old Mill Road, Thurgoland

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Executive Summary

This report presents an FRA in accordance with the NPPF and NPPG ID: 7 guidance, for a proposed single dwelling residential development located on land to the south of Old Mill Road, Thurgoland, South Yorkshire.

The report includes an assessment of the surface water drainage requirements of the Site and details the flood risk and how this could be managed and mitigated to allow the Site to be developed in support of the outline planning application.

The FRA has demonstrated the following:

- The 0.020-hectare (ha) Site is comprised of terraced (grassed) gardens.
- The Site slopes in a southerly direction and is underlain by peaty, wet soils and clayey geology with low infiltration potential.
- The River Don conveys flow north east approximately 5m to the south of the Site.
- The risk of flooding is assessed as followed:
 - The risk of fluvial flooding is assessed as negligible
 - The risk of groundwater flooding is assessed as negligible in the southwestern extent and medium in the northern and eastern extent.
 - The risk of flooding from all other sources is assessed as negligible.
- Flood risk from identified sources can be mitigated to a negligible level through the following approach:
 - No below surface habitable buildings (i.e. basements).
 - Set finished floor levels above external levels.

The proposed residential use is classified as more vulnerable. More vulnerable uses are considered acceptable in terms of flood risk in Flood Zone 1. As such, a Sequential and Exception Test would not be required.

The FRA has considered the potential impact of the development on surface water runoff rates, given the increase in impermeable areas post-development. These rates have been calculated, and it has been demonstrated that surface water can be managed, such that flood risk to and from the Site following development will not increase. This will be achieved through a free discharge with an outfall to the River Don.

The FRA demonstrates that the proposed development would be operated with minimal risk from flooding and would not increase flood risk elsewhere. The development should therefore not be precluded on the grounds of flood risk, or from surface water and foul drainage.

1.0 Introduction

1.1 Background

- 1.1.1 Enzygo Ltd was commissioned by Mt Ronald Evans to carry out a site-specific flood risk assessment (FRA) including a surface water drainage strategy in support of an outline application for a proposed residential development, located on land south of Old Mill Road, Thurgoland, South Yorkshire (the 'Site').
- 1.1.2 The proposal is for a single residential dwelling, with associated garden and landscaping on the 0.020-hectare (ha) Site. A copy of the proposed layout is included in Appendix 1.
- 1.1.3 A site-specific FRA assesses the current and future flood risk to and from a development site. It demonstrates how flood risk will be managed now and over the development's lifetime, taking climate change, drainage, and the vulnerability of its intended users into account.
- 1.1.4 The objectives of a site-specific FRA are to:
- Assess whether a proposed development is likely to be affected by current or future flooding from a range of sources;
 - Assess whether the development will increase flood risk elsewhere;
 - Decide on measures to deal with these effects and risks and assess their appropriateness;
 - Provide enough evidence for the local planning authority to apply (if necessary) the Sequential Test; and
 - Decide whether the development will be safe and will pass the Exception Test if applicable.
- 1.1.5 In England, planning applications for development need an FRA¹ for most developments including:
- In Flood Zones 2 and 3 including minor development and change of use;
 - Sites of 1ha or larger in Flood Zone 1;
 - Sites of less than 1ha in Flood Zone 1, including change of use to a more vulnerable class (for example from commercial to residential), and where they could be affected by sources of flooding other than rivers and the sea;
 - Land in Flood Zone 1 in a Critical Drainage Area (CDA) as notified by the Environment Agency; and
 - Land in Flood Zone 1 identified in a strategic flood risk assessment as being at increased flood risk in future.
- 1.1.6 An FRA is required for this development, as initial site screening using Environment Agency online indicative flood mapping shows that the Site is located partially within Flood Zones 2 and 3 (medium to high risk) and is at risk of surface water flooding.
- 1.1.7 The purpose of this FRA is to assess the risk of flooding to the proposed development and where possible provide sufficient mitigation to demonstrate that future users of the development would remain safe throughout its lifetime, that the development would not

¹ <https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications> 2014 (as updated February 2017)

increase flood risk on Site and elsewhere and, where practicable, would reduce flood risk overall.

1.2 Scope

- 1.2.1 Government policy on development and flood risk is set out in the National Planning Policy Framework (NPPF)² and is supported by National Planning Practice Guidance: Flood Risk and Coastal Change [NPPG ID7]³.
- 1.2.2 NPPF paragraphs 148-169 set out the need for an appropriate assessment of flood risk at all levels of the planning process and require the application of a sequential risk-based approach to assess the suitability of land for development in flood risk areas.
- 1.2.3 The FRA should also make allowances for climate change⁴ to minimise vulnerability and provide resilience to flooding and coastal change in the future. The allowances are predictions of anticipated change in
- Peak river flow by river basin district;
 - Peak rainfall intensity;
 - Sea level rise; and
 - Offshore wind speed and extreme wave height.
- 1.2.4 They are based on climate change projections and different scenarios of carbon dioxide emissions to the atmosphere. There are different allowances for different periods of time over the next century.
- 1.2.5 Site-specific FRAs are categorised according to level. Simple Level 1 Screening studies give a general indication of the potential flood risk to a site and identify whether more detailed Level 2 assessment is required or not. A Level 2 assessment is a qualitative appraisal to develop understanding of flood risk to a site and the effects of the site on flooding elsewhere including recommended mitigation measures. Level 3 assessments are more detailed quantitative studies, for example modelling to establish flood levels at a site in the absence of Environment Agency or other data or providing detailed outline drainage designs.
- 1.2.6 This report is a Level 2 qualitative FRA but includes a Level 3 assessment of the surface water drainage requirements for the proposed development.

1.3 Aims

- 1.3.1 This FRA aims to provide enough flood risk information to satisfy the requirements of the NPPF, PPG ID7 and regional/local government plans and policies. It describes the potential for the Site to be impacted by flooding, the impacts of the proposed development on flooding elsewhere near the Site, and the proposed measures that could be incorporated into the development to mitigate the identified risks.

² Department for Communities and Local Government (2018) Revised National Planning Policy Framework (as updated February 2019).

³ Department for Communities and Local Government (2014) Planning Practice Guidance ID7-030-20140306; Flood Risk & Coastal Change.

⁴ <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

1.4 Planning Context

National Policy

1.4.1 The FRA was prepared in accordance with the NPPF and NPPG ID7.

Regional/Local Policy

1.4.1 The FRA also considers the following Local Plan policies of Barnsley Metropolitan Borough Council:

- CSP 1 Climate Change;
- CSP 3 Sustainable Drainage Systems (SuDS); and
- CSP 4 Flood Risk.

Report Structure

1.4.2 This report is structured as follows:

- Section 2 identifies the sources of information that were consulted;
- Section 3 describes the Site and the existing and proposed development;
- Section 4 outlines the flood risk to the existing site and proposed development;
- Section 5 details the proposed mitigation measures against identified flooding sources;
- Section 6 assesses the potential impacts of the proposed development on surface water drainage and proposes mitigation for those effects; and
- Section 7 presents a summary and conclusions.

2.0 Sources of Information

2.1 Sources of Information

2.1.1 The following information was consulted:

- Ordnance Survey 1:25,000 mapping (Explorer 278: Sheffield and Barnsley).
- 1M Digital Terrain Model (DTM) LIDAR data.
- Environment Agency online mapping (Flood Map for Planning⁵, Long Term Flood Risk Assessment for Locations in England⁶, Catchment Data Explorer⁷ and Main River Map⁸).
- River Basin District (RBD) Maps⁹ (Humber RBD) together with guidance on climate change allowances¹⁰.
- National River Flow Archive¹¹.
- Barnsley (September 2010) Strategic Flood Risk Assessment (SFRA) and associated mapping (Appendix 2).
- British Hydrological Society Chronology of British Hydrological Events¹².
- National Soils Resources Institute (NSRI): Soilscape online mapping¹³.
- British Geological Survey [BGS] online mapping: Geology of Britain Viewer¹⁴.
- Landmark's Promap: Flood Data package: Additional flood mapping.
- Geosmart 1 in 100-year groundwater flood risk map.
- Yorkshire Water sewer asset plans (Appendix 3).
- DEFRA's Magic Map¹⁵ for identifying Designated Sites.

2.2 Consultation and Discussion with Regulators

2.2.1 Consultation and discussions were undertaken with the Environment Agency, the Lead Local Flood Authority (LLFA), and Water Utility.

Environment Agency

2.2.2 The Environment Agency is a statutory consultee on flood risk and planning and is directly responsible for the prevention, mitigation and remediation of flood damage for main rivers and coastal areas; and it has a strategic overview for all forms of flooding.

⁵ <https://flood-map-for-planning.service.gov.uk/>

⁶ <https://flood-warning-information.service.gov.uk/long-term-flood-risk/>

⁷ <http://environment.data.gov.uk/catchment-planning/>

⁸ <https://environment.maps.arcgis.com/apps/webappviewer/index.html?id=17cd53dfc524433980cc333726a56386>

⁹ <https://www.gov.uk/government/publications/flood-risk-assessments-river-basin-district-maps>

¹⁰ <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

¹¹ <http://nrfa.ceh.ac.uk>

¹² <http://www.cbhe.hydrology.org.uk/search.php>

¹³ <http://www.landis.org.uk/soilscape/>

¹⁴ <http://mapapps.bgs.ac.uk/geologyofbritain/home.html>

¹⁵ <http://www.natureonthemap.naturalengland.org.uk/>

2.2.3 Environment Agency Standing Advice¹⁶ and the NPPF/PPG ID: 7 was consulted and reviewed.

2.2.4 Correspondence with the Environment Agency is included in Appendix 4.

Lead Local Food Authority (LLFA)

2.2.5 Barnsley Metropolitan Borough Council as the LLFA is responsible for surface water, groundwater and ordinary watercourses and was consulted on flood risk issues at this Site.

2.2.6 Correspondence with the LLFA is included in Appendix 5.

Water Utility

2.2.7 Drainage and sewerage services in the UK are provided by a number of water and sewerage companies. Yorkshire Water is responsible for sewerage within the area of the Site.

2.2.8 All sewerage undertakers maintain the 'DG5 register' of properties and external areas (such as gardens, highways, open spaces) which have suffered flooding from public foul/combined sewers. It does not include flooding caused by blockages.

2.3 Site Walkover

2.3.1 Enzygo staff carried out a walkover of the Site during January 2020. Observations made were used to inform the Site description.

¹⁶ <https://www.gov.uk/guidance/flood-risk-assessment-standing-advice>

3.0 Site Location and Description

3.1 Location

- 3.1.1 The Site is located on land south of Old Mill Road, Thurgoland, S35 7EG.
- 3.1.2 The Site is centred on National Grid Reference (NGR) 429191, 400057.
- 3.1.3 The Site location is shown in Drawing 001 and in more detail in Drawing 002, which shows the red line boundary enclosing an area of approximately 0.020ha.

3.2 Land Use

- 3.2.1 The land use is comprised of terraced (grassed) gardens (Figures 3.1 and 3.2).
- 3.2.2 The Site is bounded by Old Mill Lane to the north, with residential dwellings beyond; residential dwelling to the east and west; scrubland/woodland (under the applicant's ownership; blue line boundary) and the River Don to the south.
- 3.2.3 The Site is currently accessed from Old Mill Road.

Figure 3.1: Photographs of the Site (continues over page)



View looking south-east from Old Mill Road across the the Site.



View looking north-west from Forge Lane Bridge towards the scrubland/woodland (Blue line Boundary) to the south of the Site

Figure 3.2: Aerial Photograph of the Site



Image © 2020 Digital Globe.

3.3 Topographic Information

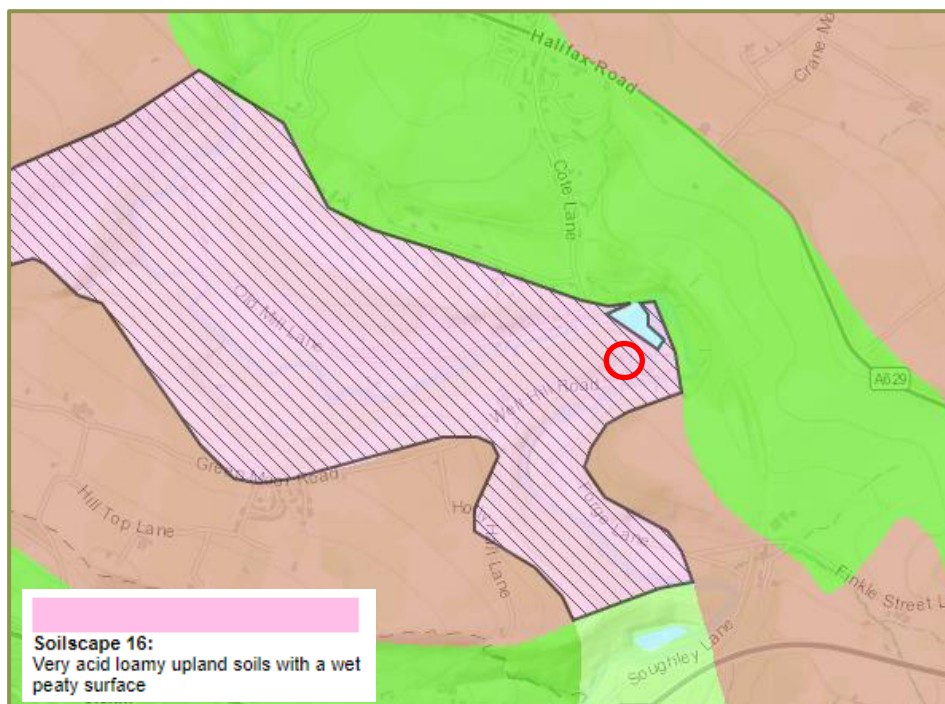
- 3.3.1 A detailed topographic survey was not available at the time of writing this report. In lieu of a detailed topographic survey, 1M DTM LIDAR¹⁷ was used to inform Site levels.
- 3.3.2 The Site comprises a sloping plateau which varies between 158.8 along the northern boundary to 157.5 along the southern boundary, with a median elevation of 158.2m AOD. The fall of 1.3m over approximately 11m gives a gradient of 1:8.
- 3.3.3 The area of scrubland/woodland (blue line boundary) to the south of the Site falls steeply from an elevation of 157.5 to 154.4m AOD adjacent to the River Don. The fall of 3.1m over approximately 5m gives a gradient of 1:1.6.

3.4 Soils and Geology

Soils Mapping

- 3.4.1 The Soilsmap online soils map viewer shows that the Site is underlain by loamy upland soils with a wet peaty surface (Figure 3.3).
- 3.4.2 The soils mapping is indicative and there may be localised variation in soil type.

Figure 3.3: Soils Mapping



Soils Data © Cranfield University (NSRI) and for the Controller of HMSO [2020]. Site denoted by the red circle.

¹⁷ <https://environment.data.gov.uk/DefraDataDownload/?Mode=survey>

Geology Mapping

- 3.4.3 The Geology of Britain online map viewer (Figure 3.4) shows the bedrock beneath the northern and eastern extent of is Grenoside Sandstone. The southwestern extent of the Site is underlain by Pennine Lower Coal measures formation – Mudstone, Siltstone and Sandstone. There are no superficial deposits recorded beneath the Site.

Figure 3.4: Geology Mapping

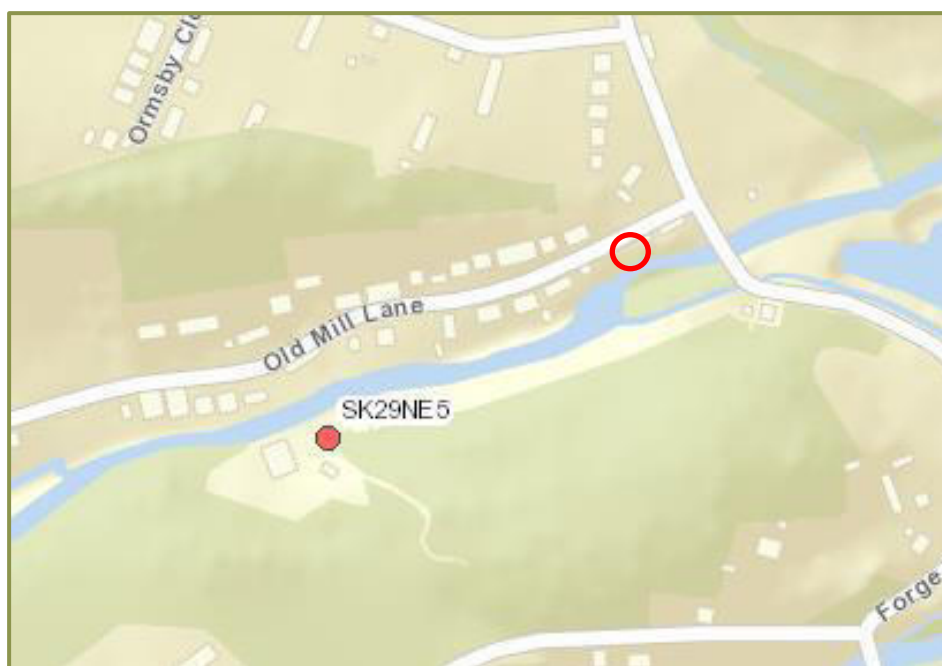


*Top: Bedrock Geology. Bottom: Superficial Deposits. Contains British Geological Survey materials © NERC [2020].
Site denoted by the red circle.*

BGS Borehole Records

- 3.4.1 The Geology of Britain online map viewer shows the nearest borehole record in relation to the Site is SK29NE5 (Greenmoor Quarries), located approximately 220m to the south-west. The borehole record is located within an area with the same soils and bedrock (Figure 3.5).
- 3.4.2 The borehole record has a depth of 61.57m, which found clays, gravel, shale and sandstone within the first 7.9m (Table 3.1). A copy of the borehole record is included in Appendix 6.

Figure 3.5: Borehole Mapping



Contains British Geological Survey materials © NERC [2020]. Site denoted by the red circle.

Table 3.1: BGS Borehole Data

Reference	Summary of Strata	Depth (m bgl)	Groundwater Depth (m bgl)
SK29NE5	0.00 to 1.5m = No Record 1.5m to 5.5m = Soft Loam Clay and Gravel 5.5m to 6.1m = Grey Shale, Clay and Gravel 6.1m to 7.9m = Very Hard Grey Shale	61.57	Non-Encountered

Contains British Geological Survey materials © NERC [2020].

3.5 Hydrogeology

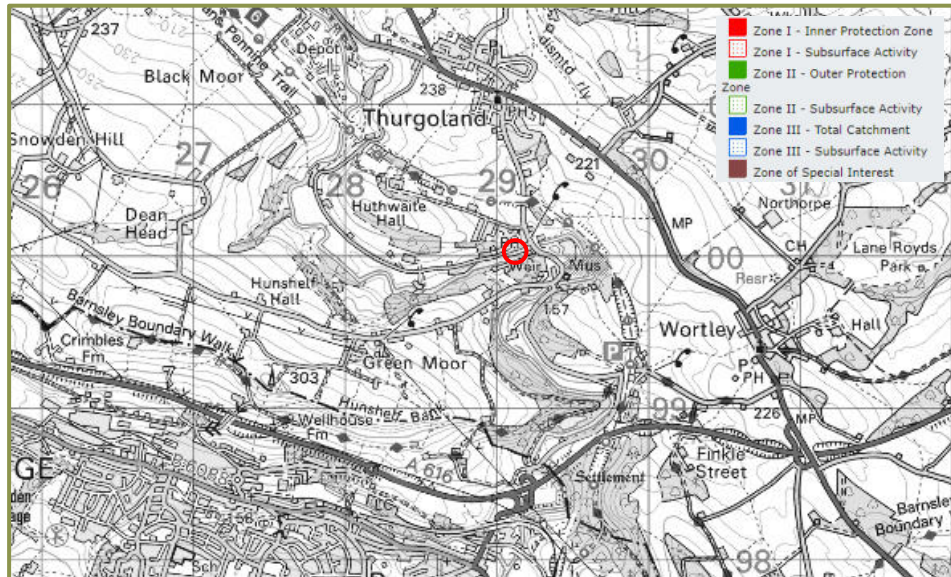
Infiltration Potential

- 3.5.1 The loamy/peaty soils and underlying clayey geology are likely to represent low infiltration potential (Figure 3.3).

Defra Magic Map

- 3.5.2 Defra Magic Map online mapping (Figure 3.6) shows the Site is not located in a groundwater Source Protection Zone (SPZ).

Figure 3.6: Source Protection Zone Map

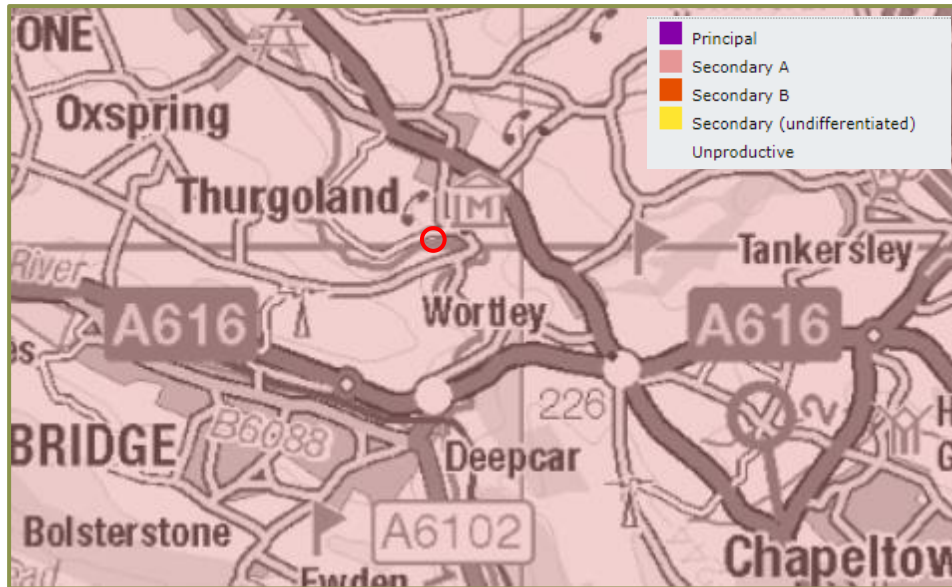


From Magic Map. Contains Environment Agency information © Environment Agency and database right [2020]. Site denoted by the red circle.

- 3.5.3 The Site is not located above a Principal Aquifer. The Site is however located above a Secondary A Aquifer for Bedrock (Figure 3.7).

Figure 3.7: Aquifer Designation Map (continues over page)





Top: Aquifer Designation (superficial deposits). Bottom: Aquifer Designation (bedrock). From Magic Map. Contains Environment Agency information © Environment Agency and database right [2020]. Site denoted by the red circle.

3.6 Catchment Hydrology

OS Mapping

- 3.6.1 OS mapping shows the River Don conveys flows north-east approximately 5m to the south of the Site (Figure 3.8).
- 3.6.2 The River Don is classified as a 'main river', where flood risk work is carried out by the Environment Agency.

Figure 3.8: Map of Watercourses



Contains Environment Agency information © Environment Agency and database right [2020]. Site denoted by the red circle.

Site Walkover Observations

- 3.6.3 A Site walkover was undertaken during January 2020. The River Don to the south of the Site was observed to be conveying a moderate flow and was well maintained (Figure 3.9).
- 3.6.4 The River Don was observed to convey within a steep sided channel with natural, wooded vegetation along the right-hand bank and scrubland/woodland along the left-hand bank.
- 3.6.5 Approximately 40m to the south-west (upstream) of the Site is weir structure across the River Don and approximately 50m to the south-east of the Site is Forge Lane Road bridge.

Figure 3.9: River Don



Top: View looking upstream towards the Site from Forge Lane Road Bridge. **Bottom:** Looking downstream from Forge Lane Road Bridge.

Environment Agency Catchment Data Explorer Mapping

- 3.6.6 The Site resides within the River Don (Don from Scout Dyke to the Little Don) catchment, within the Don and Rother Management Catchment, the Don Upper Operational Catchment and the Humber River Basin District (Figure 3.10).

Figure 3.10: Catchment Data Explorer



Top Left: River Don zoomed to Site level. **Top Right:** River Don (Don from Scout Dyke to the Little Don), full catchment. **Bottom Left:** Don and Rother Operational Catchment. **Bottom Right:** Humber River Basin District. Contains Environment Agency information © Environment Agency and database right [2020].

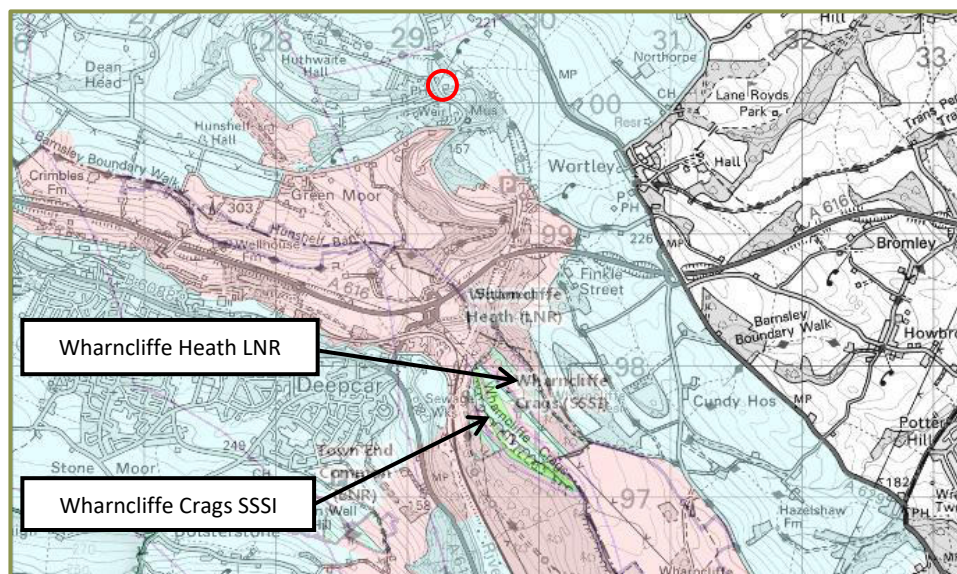
3.7 Sewerage Assets

- 3.7.1 Yorkshire Water asset plans (Appendix 3) show a Ø225mm surface water sewer conveying flows north east within Old Lane to the north of the Site. The surface water sewer begins adjacent to Stone Croft (approximately 100m to the west of the Site) and terminates adjacent to Thurllea, approximately 25m to the west of the Site. It is assumed the surface water sewer outfalls to the River Don, upstream from the Site.
- 3.7.2 There is a Ø150mm foul sewer conveying flows east and a rising main conveying west within Old Mill Lane to the north of the Site.

3.8 Designated Sites

- 3.8.1 The DEFRA Magic Map (England and Wales) (Figure 3.11) shows there are no designated sites in or close to the Site including downstream (from a flood risk and drainage perspective).
- 3.8.2 The nearest designated sites include; Wharnccliffe Heath Local Nature reserve (LNR) and Wharnccliffe Craggs Site of Special Scientific Interest (SSSI) located approximately 1.8km to the south of the Site. However, these designated sites do not have a hydrological connectivity to the Site, as they are located at elevations greater than 200m AOD which are approximately 65m higher than the River Don at that location and approximately 40m higher than the Site.

Figure 3.11: Designated Sites



Contains Environment Agency information © Environment Agency and database right [2020]. Site denoted by the red circle.

4.0 Flood Risk Assessment

4.1 Potential Sources of Flooding

- 4.1.1 A summary of the potential sources of flooding and the potential risk posed by each source at the Site is presented in Table 4.1. Each source of flooding and level of risk is then assessed in further detail.

Table 4.1: Potential Risk Posed by Flooding Sources

Flooding Source	Potential Flood Risk at Application Site (Yes/No)	Potential Source	Data Sources
Fluvial	Yes	River Don	Environment Agency flood mapping (Drawing 005), Environment Agency historic flood mapping (Drawing 008), JBA Flooding (Drawing 00.4.2), SFRA mapping and Environment Agency/LLFA consultation (Appendix 4 and 5).
Tidal	No	None identified	Environment Agency flood mapping (Drawing 005).
Groundwater	Yes	Aquifer	BGS mapping (Drawing 003) and Geosmart Groundwater (Drawing 006) .
Surface Water	Yes	Poor permeability and Site topography	SFRA mapping, JBA Surface Water Flooding (Drawing 004.1) and Environment Agency Complex mapping (Drawing 009.1 to 009.4).
Sewer	Yes	Public sewers	Yorkshire Water Asset plans (Appendix 3).
Infrastructure Failure	Yes	Reservoir failure	Environment Agency online flood mapping.

4.2 Fluvial Flooding

Environment Agency Flood Zone Mapping

- 4.2.1 The Environment Agency Flood Zones are the current best information on the extent of the extremes of flooding from rivers or the sea that would occur without the presence of flood defences, since these can be breached, overtopped and may not be in existence for the lifetime of a development.
- 4.2.2 The Environment Agency online flood map (Drawing 005) shows the entire Site (including Site access/egress) is located within Flood Zone 1; which is land outside the extent of the 1 in 1000-year (<0.1% Annual Exceedance Probability [AEP]) risk of fluvial (river) flooding, at 'low' risk.

Modelled Flood Levels

- 4.2.3 The Environment Agency provided modelled flood levels for the River Don, sourced from the Sheffield Comprehensive Flood Review (CFR) Model – RFI 74440 (2012) (Appendix 4). A range

of return periods were provided, including the 1 in 25-year, 100-year and 1000-year event, for both defended and undefended scenarios.

- 4.2.4 A summary of the modelled flood levels is included below in Table 4.2 and Table 4.3, and a node location plan is included in Figure 4.1. The most relevant nodes to the Site the upstream node (DON_17_19354d) and downstream node (DON_17_19262u). The Site is located between the two nodes, therefore interpolated flood levels based on an average of the upstream and downstream nodes are representative of the Site. There is no difference in flood levels under a defended and undefended scenario.
- 4.2.5 Whilst the 1 in 20-year event is generally considered representative of Flood Zone 3b, the 1 in 25-year modelled flood level has been used in this instance to provide Flood Zone 3b extents.

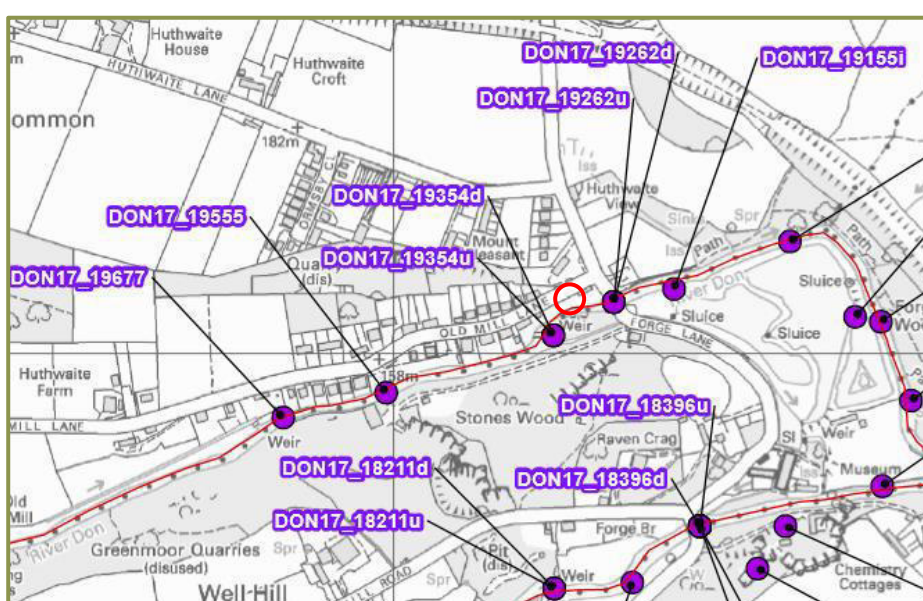
Table 4.2: Modelled Flood Levels (Defended Scenario)

Node	Location	Flood Level (m AOD) / Return Period		
		25yr (4% AEP)	100yr (1% AEP)	1000yr (0.1% AEP)
DON_17_19354d	Upstream from Site.	154.002	154.589	156.168
<i>Interpolated</i>	<i>Adjacent to Site</i>	<i>153.906</i>	<i>154.483</i>	<i>156.069</i>
DON_17_19262u	Downstream from Site.	153.809	154.377	155.969

Table 4.3: Modelled Flood Levels (Undefended Scenario)

Node	Location	Flood Level (m AOD) / Return Period		
		25yr (4% AEP)	100yr (1% AEP)	1000yr (0.1% AEP)
DON_17_19354d	Upstream from Site.	154.002	154.589	156.169
<i>Interpolated</i>	<i>Adjacent to Site</i>	<i>153.906</i>	<i>154.483</i>	<i>156.069</i>
DON_17_19262u	Downstream from Site.	153.809	154.377	155.970

Figure 4.1: Modelled Node Location Plan



- 4.2.6 The interpolated modelled flood levels were overlaid onto 1M DTM LIDAR data to accurately map the flood outlines within the Site boundary. A copy of the modelled flood outlines has been included within Drawing 10. Drawing 10 shows the Site is located outside the mapped extent of the 1 in 25-year event (Flood Zone 3b), 1 in 100-year event (Flood Zone 3a) and 1 in 1000-year event (Flood Zone 2). Drawing 10 confirms the Environment Agency mapped flood Zones (Drawing 005).
- 4.2.7 Drawing 10 shows the Site lies approximately 1.4m above the mapped 1 in 1000-year flood level.
- 4.2.8 The Environment Agency reported that 'Lower Don Valley FAS Post Scheme Modelling' was expected to be completed in December 2019 and that defended levels have not been verified and may change following an update. However, at the time of writing this report, the 'Lower Don Valley FAS Post Scheme Modelling' was not available and the information provided (Appendix 4) was the best information available. Furthermore, the reach adjacent to the Site is demonstrated not to be influenced by flood defences (see Tables 4.1 and 4.2)

Climate Change

- 4.2.9 Revised (February 2016) climate change allowances for the Humber RBD are 30% for the 'higher central' allowance and 50% for the 'upper end' allowance (anticipated for the '2080's' [2070 to 2115]). These allowances are representative of the lifetime of development (i.e. 1 in 100 years for residential development).
- 4.2.10 The Environment Agency consultation did not include levels or flows representative of climate change. In order to determine flood levels for both the higher central and upper end scenarios, an interpolation exercise was undertaken, based on the supplied modelled 1 in 100-year and 1 in 1000-year flood levels and flows.
- 4.2.11 The flood level for a climate change increase of 50%, representing the 'upper end' estimate was derived as follows:
1. 1 in 1000-year Level (156.069m AOD) [-] 1 in 100-year Level (154.483m AOD) = 1.586m
 2. 1 in 1000-year Flow (119.027 m³/s) [-] 1 in 100-year Flow (65.02 m³/s) = 54.007 m³/s
 3. Therefore, a flow increase of 54.007m³/s equates to a level increase of 1.586m.
 4. 1.586m [/] 54.007m³/s = 0.0293m per 1 m³/s increase.
 5. 65.02 m³/s (1 in 100-year flow) [*] 1.5 (50% increase) = 97.53m³/s
 6. (97.54 m³/s - 65.02 m³/s) [*] 0.0293 = 0.953m
 7. 154.483mAOD (1 in 100-year Level) [+] 0.953m = 155.436mAOD
- 4.2.12 The above interpolation was undertaken for both the higher central (+30%) and upper end (+50%) climate change scenarios, resulting in flood levels at the Site of 155.054 and 155.436mAOD respectively. The climate change levels were contoured against 1M DTM LIDAR data and are presented in Drawing 10. Both the higher central and upper end climate change flood events do not inundate the Site and do not exceed the 1 in 1000-year flood extent.

JBA Flooding from Rivers

- 4.2.13 The JBA Flooding from Rivers map (Drawing 004.2) shows the Site is located within Flood Zones 1, 2 and 3. Furthermore, the JBA mapping shows an area of Flood Zone 3b within the southern extent. However, the mapping is coarse in relation to the Environment Agency flood mapping (Drawing 005) and comparison of modelled flood levels to 1M DTM LIDAR data (Drawing 010). As such, the JBA mapping should be superseded.

SFRA Mapping

- 4.1.1 The SFRA mapping (Appendix 2) is in agreement with the Environment Agency mapping, showing the Site is located in Flood Zone 1. However, the mapping is coarse in relation to the Environment Agency flood mapping (Drawing 005) and comparison of modelled flood levels to 1M DTM LIDAR data (Drawing 010).

Flood History

- 4.2.14 Environment Agency online historical flood map¹⁸ (Figure 4.2) and Drawing 008 show that there has been no historical flooding within the Site. However, the Site is near to the location of historical flooding within gardens of properties located upstream of the Site and within the floodplain downstream of Forge Lane bridge. The extent of flooding, and/or flood level information is only shown for those watercourses surveyed after the flood event. Other flooding may have occurred which is not shown. This is the best information currently available.

Figure 4.2: Environment Agency Historical Flood Map



Historical flooding shown as the light blue hatched areas. <https://data.gov.uk/dataset/76292bec-7d8b-43e8-9c98-02734fd89c81/historic-flood-map> Site denoted by the red circle.

Flood Defences

- 4.2.15 The Environment Agency provided asset mapping, including the location of defences in the vicinity of the Site (Appendix 4). Asset 25777 is shown to have a west to east orientation through the Site and comprises a 115.66m long wall, with upstream and downstream crest heights of 157.99 and 152.72mAOD respectively. Asset 25777 is listed as a private asset which is not the responsibility of the Environment Agency.

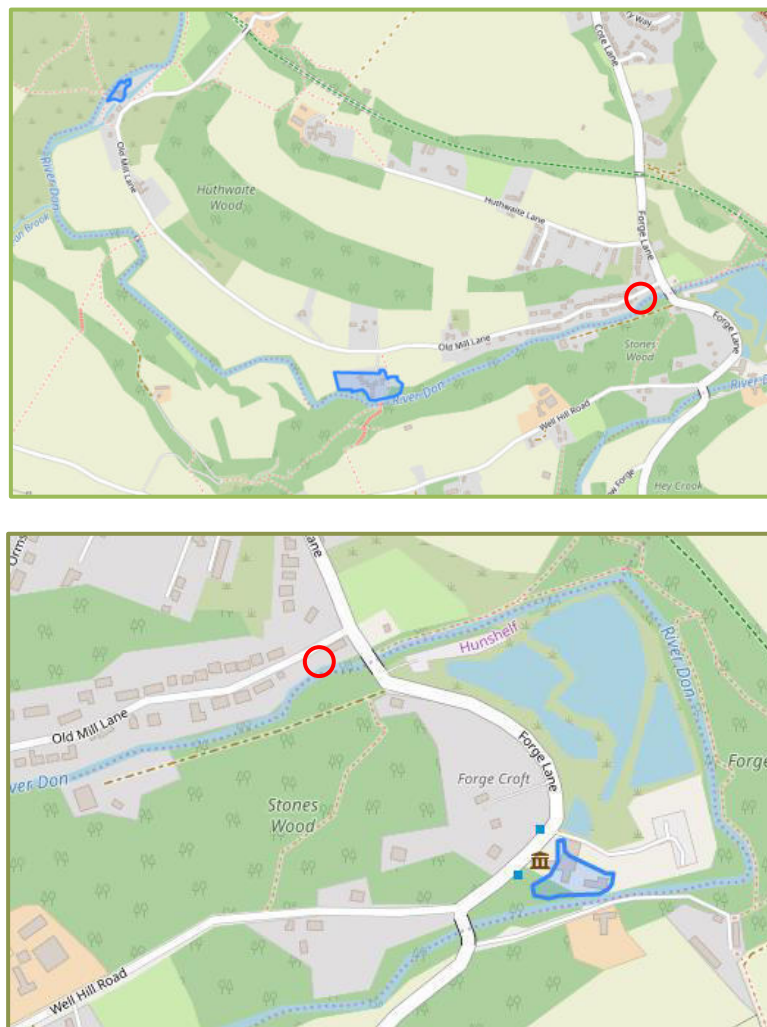
¹⁸ <https://environment.data.gov.uk/DefraDataDownload/?mapService=EA/HistoricFloodMap&Mode=spatial>

- 4.1.2 Modelled flood levels provided by the Environment Agency demonstrate that the Site does not benefit from Asset 25777 and is not located within an Area Benefitting from Defences (ABD).

Flood Warning Service

- 4.2.16 Online mapping¹⁹ shows the Site is not located within an area which receives flood warnings. However, there are two small areas to the south-east (downstream) and south-west (upstream) which receive flood warnings (Figure 4.3).
- River Don at Thurgoland: Thurgoland including Old Mill Lane and the Old Wire Mill
 - River Don at Wortley Top Forge, Huthwaite: Wortley Top Forge Huthwaite, including Forge Lane

Figure 4.3: Flood Warning Areas



Top: River Don at Thurgoland Flood Warning Area Bottom: River Don at Wortley Top Forge Flood Warning Area
<https://riverlevels.uk/flood-warning-river-don-at-wortley-top-forge-huthwaite#.XjBErs77SUK> Site denoted by the red circle.

¹⁹ <https://riverlevels.uk/flood-warning-river-don-at-wortley-top-forge-huthwaite#.XjBErs77SUK>

Summary Flood Risk

4.2.17 The risk of fluvial flooding is assessed as negligible.

4.3 Tidal Flooding

4.3.1 The Site is not located close to tidally affected flooding sources and so the flood risk from this source is assessed as negligible.

4.4 Groundwater Flooding

Introduction

4.4.1 Groundwater flooding occurs when subsurface water emerges either at surface or in made ground or in subsurface structures such as basements and services ducts. It occurs as diffuse seepage, emergence from new point source springs or an increase in flow from existing springs. It results from aquifer recharge from infiltrating rainfall, from sinking streams entering aquifers from adjacent non-aquifers, or from high river levels or tides driving water through near surface deposits. It tends to occur with a delay following rainfall and can last for several weeks or months. Groundwater flooding or shallow water tables also prevent or reduce infiltration and so can worsen surface water flooding.

Flood History

4.4.2 Consultation with the LLFA reported no historical groundwater flooding incidents within the Site boundary (Appendix 5).

BGS Groundwater Flooding Susceptibility Map

4.4.3 The BGS Groundwater Flooding Susceptibility Map (Drawing 003) shows the Site is within the mapped extent with potential for Groundwater Flooding to occur at the surface.

4.4.4 The BGS mapping is coarse and should be superseded by the Geosmart groundwater flood risk map.

Geosmart Groundwater Flood Risk Map

4.4.5 The Geosmart 1 in 100-year groundwater flood risk map (Drawing 006) shows that the northern and eastern extent is at moderate risk of groundwater flooding and falls within Risk Class 2 (Table 4.2). The southwestern extent is at negligible risk of groundwater flooding and falls within Risk class 4. The variation in groundwater flood risk across the Site is likely to correspond to the varying bedrock permeability with moderate risk associated with the higher permeability Grenoside Sandstone.

4.4.6 Mapped classes combine understanding of likelihood, model and data uncertainty, and possible severity. Likelihood is ranked according to whether we expect groundwater flooding at a site due to extreme elevated groundwater levels with an annual probability of occurrence greater than 1%, considering model and data uncertainty. Severity relates to expectations of the amount of property damage or other harm that groundwater flooding at that location might cause (Table 4.2).

Table 4.4: Groundwater Flood Risk Classification

Risk Class	Probability of Groundwater Flooding	Effect
4: Negligible	Annual probability less than 1%.	Negligible unless unusually sensitive use.
3: Low	Annual probability greater than 1%.	Remote possibility of damage to property or harm to sensitive receptors. Flooding likely to be limited to seepages and waterlogged ground, damage to basements and subsurface infrastructure, and should pose no significant risk to life. Surface water flooding may be worsened.
2: Moderate	Annual probability greater than 1%.	Significant possibility of damage to property or harm to other sensitive receptors at or near this location. Flooding is likely to be in the form of shallow pools or streams. Surface water flooding and failure of drainage systems may be worsened when groundwater levels are high.
1: High	Annual probability greater than 1%.	Groundwater flooding will occur which could lead to damage to property or harm to other sensitive receptors at or near this location. Flooding may result in damage to property, road or rail closures and, in exceptional cases, may pose a risk to life. Surface water flooding and failure of drainage systems may be worsened when groundwater levels are high.

Flood Risk

- 4.4.7 The risk of groundwater flooding is assessed as negligible in the southwestern extent and medium in the northern and eastern extent.
- 4.4.8 Mitigation measures against groundwater flooding are discussed in Section 5.

4.5 Surface Water Flooding*Introduction*

- 4.5.1 Surface water flooding occurs following rainfall on ground where infiltration rates are less than the rainfall precipitation rate. This can occur when either:
- Soils or ground materials are naturally of low permeability or have been compacted (infiltration excess runoff);
 - Soils or ground materials are saturated from previous rainfall either directly or from upslope (saturation excess runoff and return flow) or from high groundwater levels.

Flood History

- 4.5.2 Consultation with the LLFA reported no historical surface water flooding incidents within the Site boundary (Appendix 5).

JBA Surface Water Flood Map

- 4.5.3 The JBA Surface Water Flood Map (Drawing 004.1) shows the southern extent of the Site is located within the mapped extent of surface water flooding associated with the 1 in 75-year, 200-year and 1000-year events. The northern extent of the Site is shown to lie outside the mapped extents of surface water flooding.
- 4.5.4 The surface water flood outline is representative of fluvial flooding from the River Don.
- 4.5.5 The JBA Surface Water Flood mapping is superseded by the more detailed Environment Agency Complex Surface Water Flood mapping.

Environment Agency Complex Surface Water Flood Mapping

- 4.5.6 The Environment Agency Complex Surface Water Flood Mapping (Drawings 009.1 to 009.4) shows the Site is located outside of the 1 in 30-year, 1 in 100-year and 1 in 1000-year surface water flood extents.
- 4.5.7 The surface water flood outline is representative of fluvial flooding associated with the River Don.
- 4.5.8 The Site access/egress to the north of the Site is located outside the mapped extent of surface water flooding.

Flood Risk

- 4.5.9 The risk of surface water flooding is assessed as negligible. Surface water mapping is representative of fluvial flood risk from the river Don and should be superseded by the comparison of modelled flood levels against the LIDAR data (Drawing 010).

4.6 Sewer Flooding

Introduction

- 4.6.1 Sewer flooding occurs when urban drainage networks become overwhelmed after heavy or prolonged rainfall due to restrictions or blockage in the sewer network or if the volume of water draining into the system exceeds the sewer design capacity.
- 4.6.2 New sewers are built to the guidelines within Sewers for Adoption²⁰ and have a design standard to the 1 in 30-year flood event. Older sewers were not designed to any standard. Modern sewer systems will only surcharge during rainstorm events with a return period greater than 1 in 30-years (e.g. 1 in 100-years).
- 4.6.3 There are no sewers located within the Site boundary. The nearest assets are located within Old Mill Lane to the north.

²⁰ WRC (2012) Sewers for Adoption 7th Edition.

Flood Risk

4.6.4 The risk of flooding from sewers is assessed as negligible.

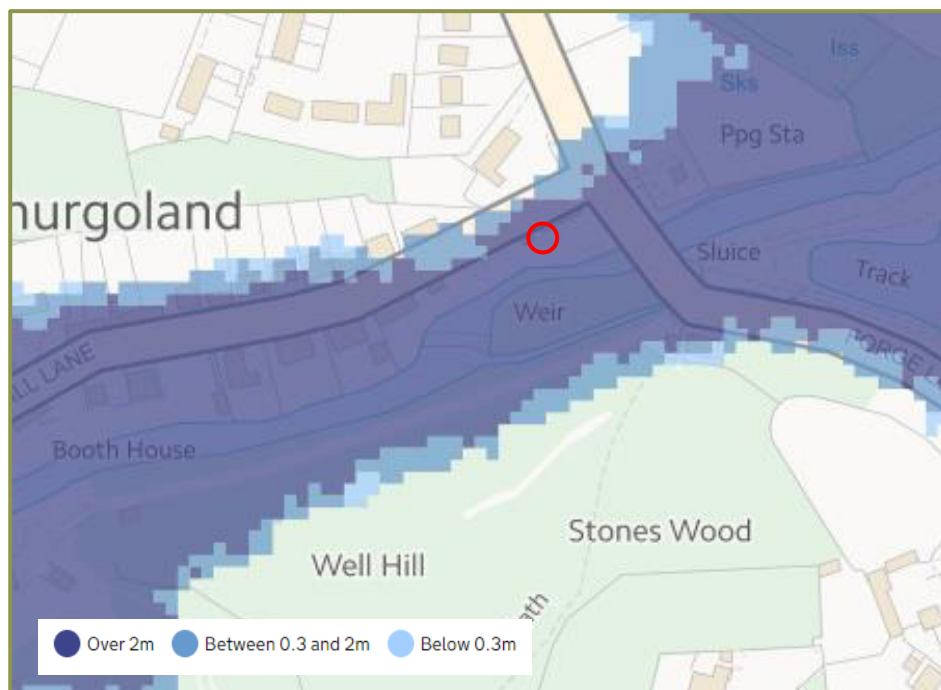
4.7 Flooding from Infrastructure Failure*Reservoir*

4.7.1 Environment Agency online reservoir flood mapping²¹ shows the Site is located inside the extent of flooding sourced from reservoirs. The depth of flooding from this source is shown to be over 2m (Figure 4.4).

4.7.2 Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in England, the Environment Agency ensure that reservoirs are inspected regularly, and essential safety work is carried out.

4.7.3 The risk of flooding from reservoirs is assessed as negligible.

Figure 4.4: Reservoir Flood Mapping



Site denoted by the red circle.

²¹ flood-warning-information.service.gov.uk/long-term-flood-risk/map

5.0 Flood Risk Mitigation Measures

5.1 Introduction

5.1.1 The following sources of flooding were identified:

- Groundwater flooding.

5.2 Mitigation Measures

Groundwater Flooding

- No below surface habitable buildings (i.e. basements); and
- Set finished floor levels a minimum of 150mm above external levels.

5.3 Summary of Flood Risk

5.3.1 Table 5.1 summarises the probability and level of risk, both with and without mitigation measures.

Table 5.1: Probability and Consequences of All Sources of Flooding (continues over page)

Flooding Source	Potential Source	Probability	Consequence & Impact Without Mitigation	Consequence & Impact with Mitigation
Fluvial	River Don	Negligible	Negligible	Negligible
Tidal	None identified	Negligible	Negligible	Negligible
Groundwater	Aquifer	Medium for the northern and eastern extent and negligible for the southwestern extent.	Medium for the northern and eastern extent and negligible for the southwestern extent.	Negligible
Surface Water	River Don	Negligible	Negligible	Negligible
Sewer	Public sewers	Negligible	Negligible	Negligible
Infrastructure Failure	Reservoir failure	Negligible	Negligible	Negligible

Key: Green - Negligible, Yellow - Low, Orange - Medium and Red - High; based on consequence and impact with mitigation from each flooding source.

5.4 Flood Guidance and Sequential Test

5.4.1 The proposal is for a single residential dwelling. Table 2 of PPG ID: 7 (not included in this report) classifies the proposed use as 'more vulnerable'.

- 5.4.2 The Environment Agency Flood Zones and acceptable development types are listed in Table 5.2. All development types (including more vulnerable uses) are acceptable in Flood Zone 1 (low risk). As such, a Sequential and Exception Test would not be required as indicated in Table 5.3.

Table 5.2: Environment Agency Flood Zones and Appropriate Land Use

Flood Zone	Probability	Explanation	Appropriate Land use
Zone 1	Low	Less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).	All development types generally acceptable.
Zone 2	Medium	Between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% 0.1%) in any year.	Most development type are generally acceptable.
Zone 3a	High	A 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.	Some development types not acceptable.
Zone 3b	'Functional Floodplain'	Land where water must flow or be stored in times of flood. SFRAs should identify this zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1% flood, or at another probability to be agreed between the LPA and the Environment Agency, including water conveyance routes).	Some development types not acceptable.

Note: The Flood Zones are the current best information on the extent of the extreme flood from rivers or the sea that would occur without the presence of flood defences, because these can be breached, overtopped and may not be in existence for the lifetime of the development. The identified risk of fluvial flooding is highlighted green.

Table 5.3: Vulnerability and Flood Zone 'Compatibility' as Identified in Table 3 of PPG ID: 7

Flood Risk Vulnerability classification (see Table 1 of PPG ID: 7)	Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Zone 1	Yes	Yes	Yes	Yes	Yes
Zone 2	Yes	Yes	Exception test required	Yes	Yes
Zone 3a	Exception test required	Yes	No	Exception test required	Yes
Zone 3b 'Functional Floodplain'	Exception test required	Yes	No	No	No

Key: Yes: Development is appropriate, No: Development should not be permitted.
The identified risk of fluvial flooding is highlighted green.

6.0 Site Drainage

6.1 Surface Water Drainage

- 6.1.1 Consideration of flood issues is not confined to the floodplain. This is recognised in the NPPF and associated guidance where all proposed development of 1ha or more in flood zone 1 and so outside the floodplain nevertheless requires an FRA. The alteration of natural surface water flow patterns through development can lead to problems elsewhere in a catchment, particularly flooding downstream,; and the replacement of permeable vegetated areas by low-permeability roofs, roads and other paved surfaces will increase the speed, volume and peak flow of surface water runoff. So, the NPPF and associated guidance require an FRA for all proposed development of 1ha or more outside the floodplain in flood zone 1.
- 6.1.2 A surface water management strategy for the development is proposed to manage and reduce the flood risk posed by surface water runoff from the Site. The developer will be required to ensure that any scheme for surface water management should build in enough capacity for the entire Site.
- 6.1.3 The surface water drainage arrangements for any development Site should be such that the volume and peak flow rates of surface water leaving a developed Site are no greater than the rates prior to the proposed development, unless specific off-Site arrangements are made and result in the same net effect.
- 6.1.4 An assessment of the surface water runoff rates was undertaken to determine the surface water options and attenuation requirements for the Site.

6.2 Existing Drainage System

- 6.2.1 The 0.020ha Site land use comprises a terraced (grassed) garden.
- 6.2.2 The Site is underlain by low permeable soils and geology. It is likely that drainage is predominantly via overland flow, following the topography of the Site to the topographic low points (River Don), with a small amount of infiltration to bedrock, and throughflow to watercourse.

6.3 Developable and Impermeable Areas

- 6.3.1 The proposal is for a single dwelling residential development within infill land. An indicative proposed layout is provided in Appendix 1.
- 6.3.2 The proposed impermeable areas will consist of the building footprint (approximately 58m²) and car parking (approximately 25m²). An increase of 10% to account for urban creep has also been applied. The existing and proposed impermeable areas are shown in Table 6.1. 7
- 6.3.3 The proposed development will increase the impermeable surfaces and so increase the amount of runoff.

Table 6.1: Impermeable Area

Area	Existing Buildings and Hardstanding	Proposed Buildings and Hardstanding	Difference
Area (ha)	0	0.0091	+0.0091
Percentage of Total Site Area (%)	0	46	+46

6.4 Runoff Rates

- 6.4.1 An assessment of runoff rates was undertaken to determine the attenuation requirements for the proposed development.
- 6.4.2 The pre-development greenfield runoff rates were calculated using the FEH Method as part of the online HR Wallingford Greenfield runoff tool²², which is an appropriate methodology for Sites up to 50 hectares in area. Runoff calculations are included in Appendix 7.
- 6.4.3 Average Annual Rainfall (SAAR) and Bfihost19 were obtained from the FEH Webservice²³ and edited within the HR Wallingford Greenfield runoff tool.
- 6.4.4 The following parameters were used in the runoff calculations:
- Developable Area; 0.020 ha
 - Average Annual Rainfall (SAAR); 858 mm/year;
 - BFIHOST19; 0.511
 - Region No; 3
- 6.4.5 The greenfield runoff tool will only calculate runoff rates for sites greater than 0.1ha. As such, rates were calculated for a 0.1ha site and scaled to the developable area of 0.020ha through a reduction factor of 0.20.
- 6.4.6 Table 6.2 shows the calculated runoff rates for both the pre and post-development scenarios.

Table 6.2: Pre- and Post-Development Runoff Rates

Annual Probability (Return Period, years)	Pre-Development Runoff (l/s)	Post Development Runoff (l/s)
50% (Qbar)	0.10	0.22
100% (1)	0.08	0.19
3.33% (30)	0.17	0.39
1% (100)	0.21	0.46
1% + Climate Change	0.29	0.64

Note: 40% added to the data to account for long-term climate change as stated in 'Flood Risk Assessment: Climate Change Allowance'. The 1-year, 30-year and 100-year annual probability events are of importance to the Water Companies and the Environment Agency when looking at sewage discharge and flood risk.

- 6.4.7 Due to the small Site area (0.020ha) and small proposed impermeable area (0.0091ha), runoff rate increases when calculated are shown to be negligible. To provide context, post-

²² <https://www.uksuds.com/drainage-tools-members/greenfield-runoff-rate-tool.html>

²³ <https://fehweb.ceh.ac.uk/GB/map>

development runoff calculations assumed a BFIHOST19 value of 0.01 for the whole Site area (0.020ha). A BFIHOST19 value of 0.01 assumes a very low (almost impermeable) infiltration rate (Appendix 7).

- 6.4.8 Table 6.2 shows that the post-development runoff represents an increase of between 0.12 and 0.35 l/s for Qbar and 1% plus climate change events respectively.
- 6.4.9 Normally, 5 l/s is the recommended minimum surface water discharge rate as per the current best practice guidance contained within 'Preliminary rainfall runoff management for developments, R&D Technical Report W5-074/A/TR/1, Revision E'.
- 6.4.10 The runoff rate post-development has been calculated to be 0.64/s for the 1 in 100-year event (plus 40% climate change event), which is 4.36l/s lower than the recommended minimum. Based on the very small calculated flows, it would not be feasible to engineer a SuDS solution that meets the minimum recommended discharge rate. A free discharge rate to the River Don is therefore proposed.
- 6.4.11 The modelled fluvial flows for the River Don are included in Table 6.3. An interpolated flow has been estimated by taking an average of flows between the upstream and downstream nodes.
- 6.4.12 The proposed 0.64 l/s discharge rate, minus the current 0.29 l/s runoff rate, is 0.35l/s (or 0.00035 m³/s), which represents the additional flow resulting from the proposed development when compared to existing conditions.
- 6.4.13 A discharge of 0.00035m³/s accounts for 0.0007% of the 1 in 25-year event, 0.0005% of the 1 in 100-year event and 0.0003% of the 1 in 1000-year event. The increase in flow from the single dwelling (within infill land) would not measurably increase fluvial flood risk based on the negligible increase in runoff.

Table 6.3: Modelled Flows (Undefended Scenario)

Node	Location	Flood Flow (m ³ /s) / Return Period		
		25yr (4% AEP)	100yr (1% AEP)	1000yr (0.1% AEP)
DON_17_19354d	Upstream from Site.	47.9	65.0	119.0
<i>Interpolated</i>	<i>Adjacent to Site</i>	47.9	65.0	119.0
DON_17_19262u	Downstream from Site.	47.9	65.0	119.0

6.5 Sustainable Drainage Options (SuDS)

SuDS Consideration

- 6.5.1 Sustainable water management measures should be used to control the surface water runoff from the proposed development Site, thereby managing the flood risk to the Site and surrounding areas from surface water runoff. These measures will also improve the quality of water discharged from the Site.
- 6.5.2 The Site is underlain soils and geology indicative of low infiltration potential. As such, the use of infiltration-based SuDS is unlikely to be feasible.

6.6 Surface Water Management Strategy

Hierarchy of Discharge

- 6.6.1 In accordance with requirement H3 of the Building Regulations 2010²⁴ rainwater runoff must discharge to one of the following, listed in order of priority:
- 1. An adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable:** Infiltration based SuDS is unlikely to be feasible due to the low infiltration potential of the soils and clayey geology.
 - 2. A watercourse; or where that is not reasonably practicable:** The River Don conveys flows in an easterly direction, approximately 5m to the south of the Site.
 - 3. A sewer:** There is a surface water and foul sewer located within Old Mill Lane to the north of the Site. An outfall to the surface water sewer would require a pumped connection (due to the depth of sewer to achieve a gravity fed connection) and a restricted rate to the foul sewer would be a last option after exhausting the drainage hierarchy and would require Yorkshire Water agreement.
- 6.6.2 The potential route to discharge from the existing Site will be by outfall to watercourse (River Don).
- 6.6.3 Where a new surface water outfall is proposed, pre-approval would need to be sought from the Environment Agency.
- 6.6.4 The proposed development may require a permit under the Environmental Permitting (England and Wales) Regulations 2010 for any proposed works or structures, in, under, over or within eight metres of the top of the bank of the River Don, A permit is separate to, and in addition, to any planning permission granted. Works should not commence until the permit is granted.

Drainage Design and Flood Risk Considerations

- 6.6.5 Surface water runoff would be directed to the drainage system through drainage gullies located around the perimeter of the building and contouring of the hardstanding areas.
- 6.6.6 Landscaped areas should be incorporated into the layout where possible, and the associated gardens will allow a proportion of the rainfall to infiltrate into the soil substrate.
- 6.6.7 Surface water will be directed to the watercourse. Due to the small size of the Site and steep topography, it would not be feasible to provide surface water attenuation to restrict surface water runoff to the 5l/s minimum rate. A free discharge rate is therefore proposed.
- 6.6.8 It is proposed that the surface water outfall from the northern extent will be set at an invert level of 157.35m AOD, which would convey flows south, via a swale to the River Don. It is recommended that the swale is armoured, and scour protection is provided at the outfall to the River Don.
- 6.6.9 The proposed swale would be located in land to the south of the Site which is under the ownership of the applicant (blue line boundary).
- 6.6.10 The outfall from the northern extent is proposed at an invert level of 157.35mAOD, which is 1.28m above the 1 in 1000-year fluvial flood level. This will ensure that the outfall cannot become surcharged and discharge can be maintained during all fluvial flood events.

²⁴ Office of the Deputy Prime Minister, The Building Regulations 2010.

6.6.11 An indicative drainage layout is provided in Drawing 011.

6.7 Foul Water

- 6.7.1 The Site is not currently served by a foul drainage network. It is proposed that foul flow is discharged to the public foul sewer located within Old Mill Lane to the north of the Site. Based on the depth of the foul sewer and topography of the Site, a gravity fed connection could be established.
- 6.7.2 In accordance with Sewers for Adoption (7th Edition), peak foul water discharge from a residential development can be considered to be 4,000 litres per property per day. Using this method, approximate foul flows can be calculated for the proposed residential development at 0.09l/s.
- 6.7.3 All new foul sewerage should be designed in accordance with Building Regulations Part H. In areas where sewers are to be adopted by Yorkshire Water, sewerage should be designed in accordance with Sewers for Adoption (7th Edition) and supplemented with additional standards provided by Yorkshire Water.
- 6.7.4 An application to enter into a Section 104 agreement for sewer adoption must be made in writing to Yorkshire Water prior to any works commencing on Site. A connection point should be agreed with Yorkshire Water.

7.0 Summary and Conclusions

7.1 Introduction

- 7.1.1 A site-specific Flood Risk Assessment (FRA) has been undertaken for a proposed single dwelling residential development, located on a 0.020ha Site south of Old Mill Road, Thurgoland.

7.2 Flood Risk

- 7.2.1 The risk of fluvial flooding is assessed as negligible
- 7.2.2 The risk of groundwater flooding is assessed as negligible in the southwestern extent and medium in the northern and eastern extent.
- 7.2.3 The risk of flooding from all other sources is assessed as negligible.

7.3 Mitigation Measures

- 7.3.1 Flood risk can be mitigated to a negligible and acceptable level through the following approach:
- No below surface habitable buildings (i.e. basements).
 - Set finished floor levels above external levels.

7.4 Flood Guidance

- 7.4.1 The proposed residential use is classified as 'more' vulnerable. More vulnerable uses are considered acceptable in terms of flood risk in Flood Zone 1. As such, a Sequential and Exception Test would not be required.

7.5 Site Drainage

Surface Water

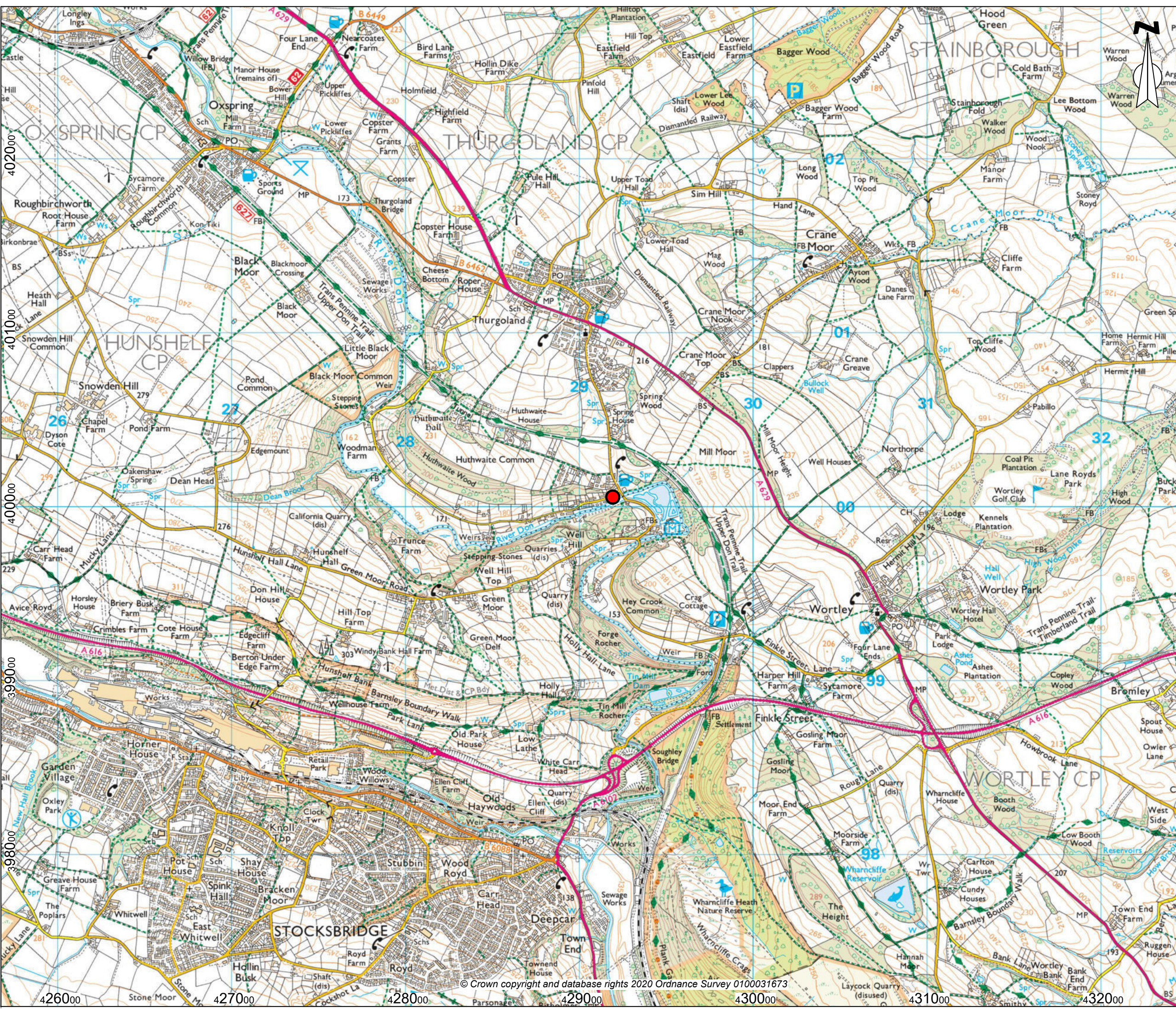
- 7.5.1 The proposed development will increase the impermeable surfaces and therefore increase the amount of runoff.
- 7.5.2 Surface water runoff will be directed to watercourse. A free discharge rate is proposed. The use of attenuation would not be feasible due to the small size of the Site.

Foul Water

- 7.5.3 Foul flow would discharge to the nearby public foul sewer via a gravity fed connection.

7.6 Conclusion

- 7.6.1 This FRA demonstrates that the proposed development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of national policy and guidance.
- 7.6.2 The development should not therefore be precluded on the grounds of flood risk, or from surface water and foul drainage.



Key

Site Location
(SE 2919 0005)

enzygo

environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT:

Ronald Evans

SCALE:

1:20,000@A3

PROJECT REF:

SHF.1742.001

DRAWN:

CH

CHECKED:

RH

DATE:

Feb 2020

PROJECT:

Land next to Holly Cottage, Thurgoland

TITLE:

Site Location Plan

DRAWING NO:

SHF.1742.001.HY.D.001

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Key

	Site Boundary
	Ownership Boundary
	Surface Water Features

environmental consultants

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CLIENT: Ronald Evans		
SCALE: 1:1,000@A3	PROJECT REF: SHF.1742.001	
DRAWN: CH	CHECKED: RH	DATE: Feb 2020
PROJECT: Land next to Holly Cottage, Thurgoland		
TITLE: Surface Water Features		
DRAWING NO: SHF.1742.001.HY.D.002		



Key

- Site Boundary
- Ownership Boundary
- Potential for Groundwater Flooding to Occur at Surface
- Potential for Groundwater Flooding of Property Situated Below Ground Level
- Limited Potential for Groundwater Flooding to Occur



Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT: Ronald Evans		
SCALE: 1,1,000@A3	PROJECT REF: SHF.1742.001	
DRAWN: CH	CHECKED: RH	DATE: Feb 2020
PROJECT: Land next to Holly Cottage, Thurgoland		
TITLE: BGS Groundwater Flooding Susceptibility		
DRAWING NO: SHF.1742.001.HY.D.003		



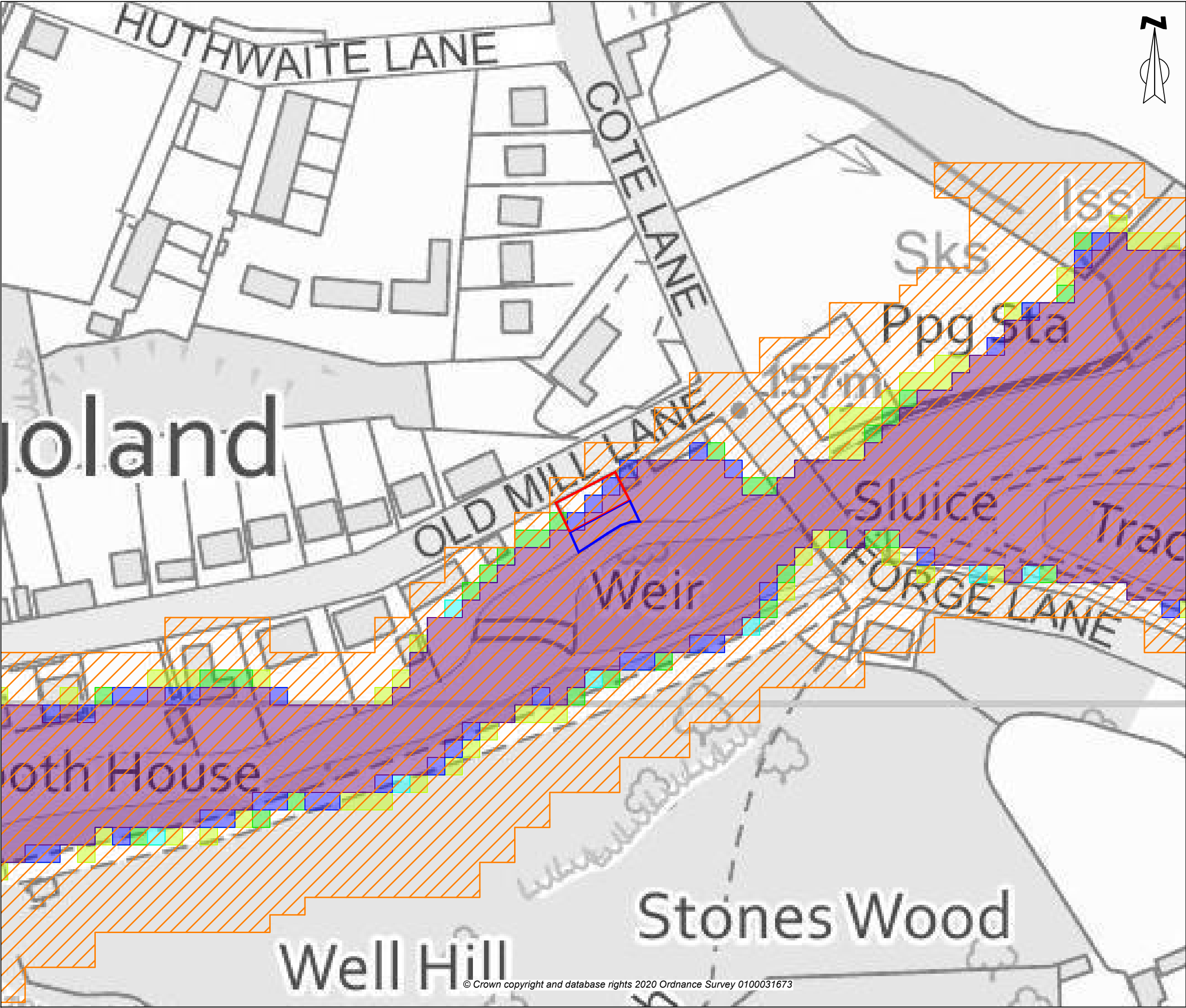
Key

- Site Boundary
- Ownership Boundary
- 1 in 75 Year Surface Water Flooding
- 1 in 200 Year Surface Water Flooding
- 1 in 1000 Year Surface Water Flooding



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CLIENT: Ronald Evans		
SCALE: 1:1,000@A3	PROJECT REF: SHF.1742.001	
DRAWN: CH	CHECKED: RH	DATE: Feb 2020
PROJECT: Land next to Holly Cottage, Thurgoland		
TITLE: JBA Surface Water Flooding		
DRAWING NO: SHF.1742.001.HY.D.004.1		



Key

- Site Boundary
- Ownership Boundary
- 1 in 20 Year Flooding from Rivers
- 1 in 75 Year Flooding from Rivers
- 1 in 100 Year Flooding from Rivers
- 1 in 200 Year Flooding from Rivers
- 1 in 1000 Year Flooding from Rivers
- Dam Break Flood Extent



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CLIENT: Ronald Evans		
SCALE: 1:1,000@A3	PROJECT REF: SHF.1742.001	
DRAWN: CH	CHECKED: RH	DATE: Feb 2020
PROJECT: Land next to Holly Cottage, Thurgoland		
TITLE: JBA Flooding from Rivers		
DRAWING NO: SHF.1742.001.HY.D.004.2		



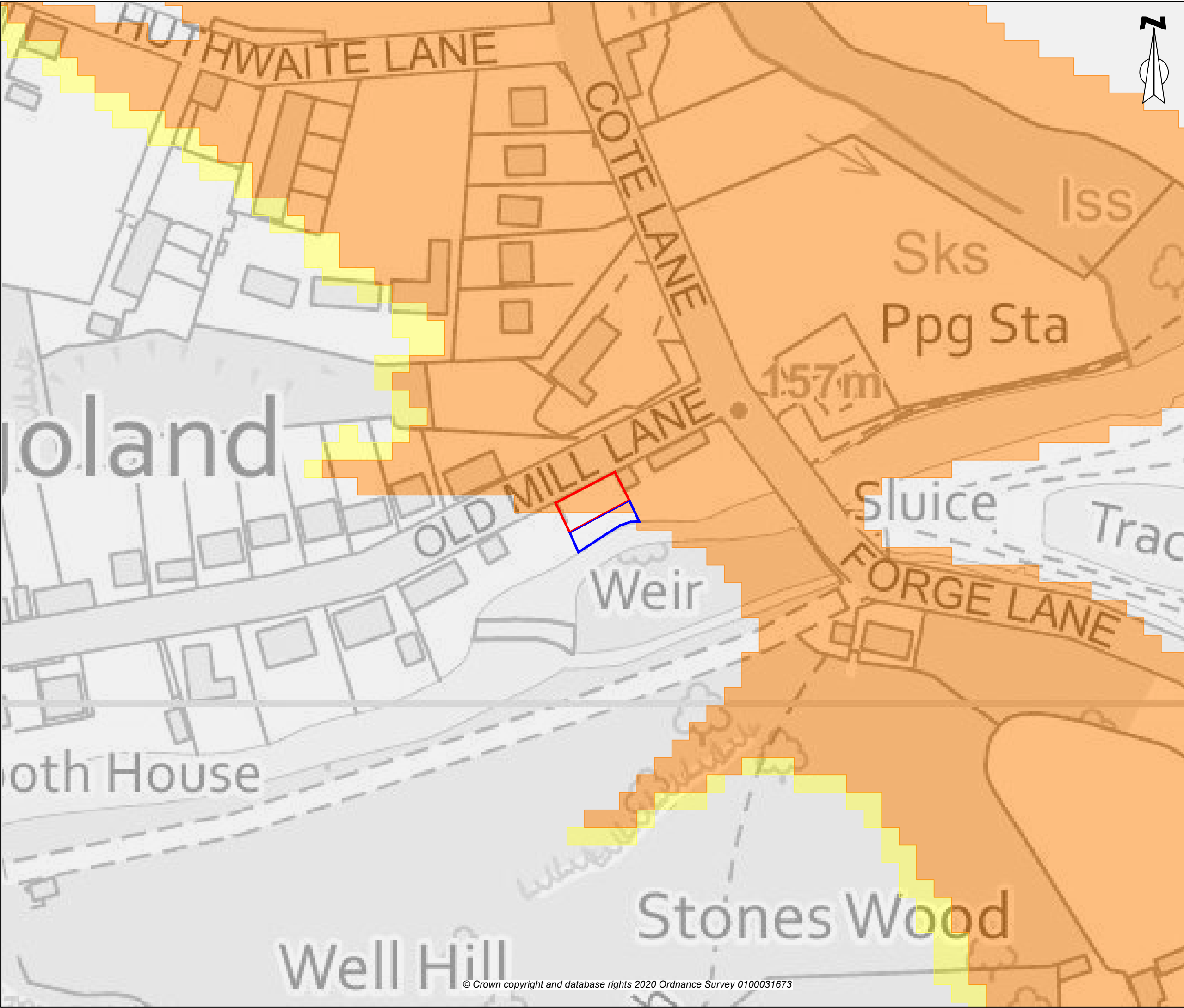
Key

[Red line]	Site Boundary
[Blue line]	Ownership Boundary
[Orange line]	Flood Defences
[Dark blue box]	Flood Zone 3
[Medium blue box]	Flood Zone 2
[Light blue box]	Flood Zone 1



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CLIENT: Ronald Evans		
SCALE: 1:1,000@A3	PROJECT REF: SHF.1742.001	
DRAWN: CH	CHECKED: RH	DATE: Feb 2020
PROJECT: Land next to Holly Cottage, Thurgoland		
TITLE: Environment Agency Flood Zones		
DRAWING NO: SHF.1742.001.HY.D.005		



Key

	Site Boundary
	Ownership Boundary
	Class 1 - High Risk
	Class 2 - Moderate Risk
	Class 3 - Low Risk
	Class 4 - Negligible Risk

Notes:
GEOSMART GROUNDWATER FLOOD RISK MAP GW5
Version 2.2 © - www.geosmartinfo.co.uk



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CLIENT:
Ronald Evans

SCALE: 1:1,000@A3
PROJECT REF: SHF.1742.001

DRAWN: CH
CHECKED: RH
DATE: Feb 2020

PROJECT:
Land next to Holly Cottage,
Thurgoland

TITLE:
Groundwater Flood Risk Map

DRAWING NO:
SHF.1742.001.HY.D.006



Key

- Site Boundary
- Ownership Boundary
- Geological Indicators of Flooding from Inland Flooding

enzygo
environmental consultants

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CLIENT: Ronald Evans		
SCALE: 1:1,000@A3	PROJECT REF: SHF.1742.001	
DRAWN: CH	CHECKED: RH	DATE: Feb 2020
PROJECT: Land next to Holly Cottage, Thurgoland		
TITLE: Geological Indicators of Flooding (based on geological deposits)		
DRAWING NO: SHF.1742.001.HY.D.007		



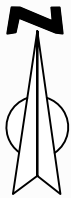
Key

- Site Boundary
- Ownership Boundary
- Historic Flood Zone
(Date of flood 15/06/2007 - 30/06/2007)

enzygo
environmental consultants

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CLIENT: Ronald Evans		
SCALE: 1:1,000@A3	PROJECT REF: SHF.1742.001	
DRAWN: CH	CHECKED: RH	DATE: Feb 2020
PROJECT: Land next to Holly Cottage, Thurgoland		
TITLE: Historic Flood Events		
DRAWING NO: SHF.1742.001.HY.D.008		



- Key**
- Site Boundary
 - Ownership Boundary
 - 30 Year Extent
 - 100 Year Extent
 - 1000 Year Extent
 - Flow Direction



Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT:
Ronald Evans

SCALE:
1:1,000@A3

PROJECT REF:
SHF.1742.001

DRAWN:
CH

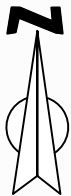
CHECKED:
RH

DATE:
Feb 2020

PROJECT:
Land next to Holly Cottage,
Thurgoland

TITLE:
Environment Agency Surface
Water Flow Paths

DRAWING NO:
SHF.1742.001.HY.D.009.1



Key	
	Site Boundary
	Ownership Boundary
	Depth greater than 1.20 (m)
	Depth 0.90 - 1.20 (m)
	Depth 0.60 - 0.90 (m)
	Depth 0.30 - 0.60 (m)
	Depth 0.15 - 0.30 (m)
	Depth 0.0 - 0.15 (m)



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CLIENT: Ronald Evans		
SCALE: 1:1,000@A3	PROJECT REF: SHF.1742.001	
DRAWN: CH	CHECKED: RH	DATE: Feb 2020
PROJECT: Land next to Holly Cottage, Thurgoland		
TITLE: Environment Agency 1 in 1000 Year Surface Water Depth		
DRAWING NO: SHF.1742.001.HY.D.009.2		



Key

- Site Boundary
- Ownership Boundary
- Velocity 0.00 - 0.25 (m/s)
- Velocity 0.25 - 0.50 (m/s)
- Velocity 0.50 - 1.00 (m/s)
- Velocity 1.00 - 2.00 (m/s)
- Velocity 2.00 or greater (m/s)

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CLIENT: Ronald Evans		
SCALE: 1:1,000@A3	PROJECT REF: SHF.1742.001	
DRAWN: CH	CHECKED: RH	DATE: Jan 2020
PROJECT: Land next to Holly Cottage, Thurgoland		
TITLE: Environment Agency 1 in 1000 Year Surface Water Velocity		
DRAWING NO: SHF.1742.001.HY.D.009.3		



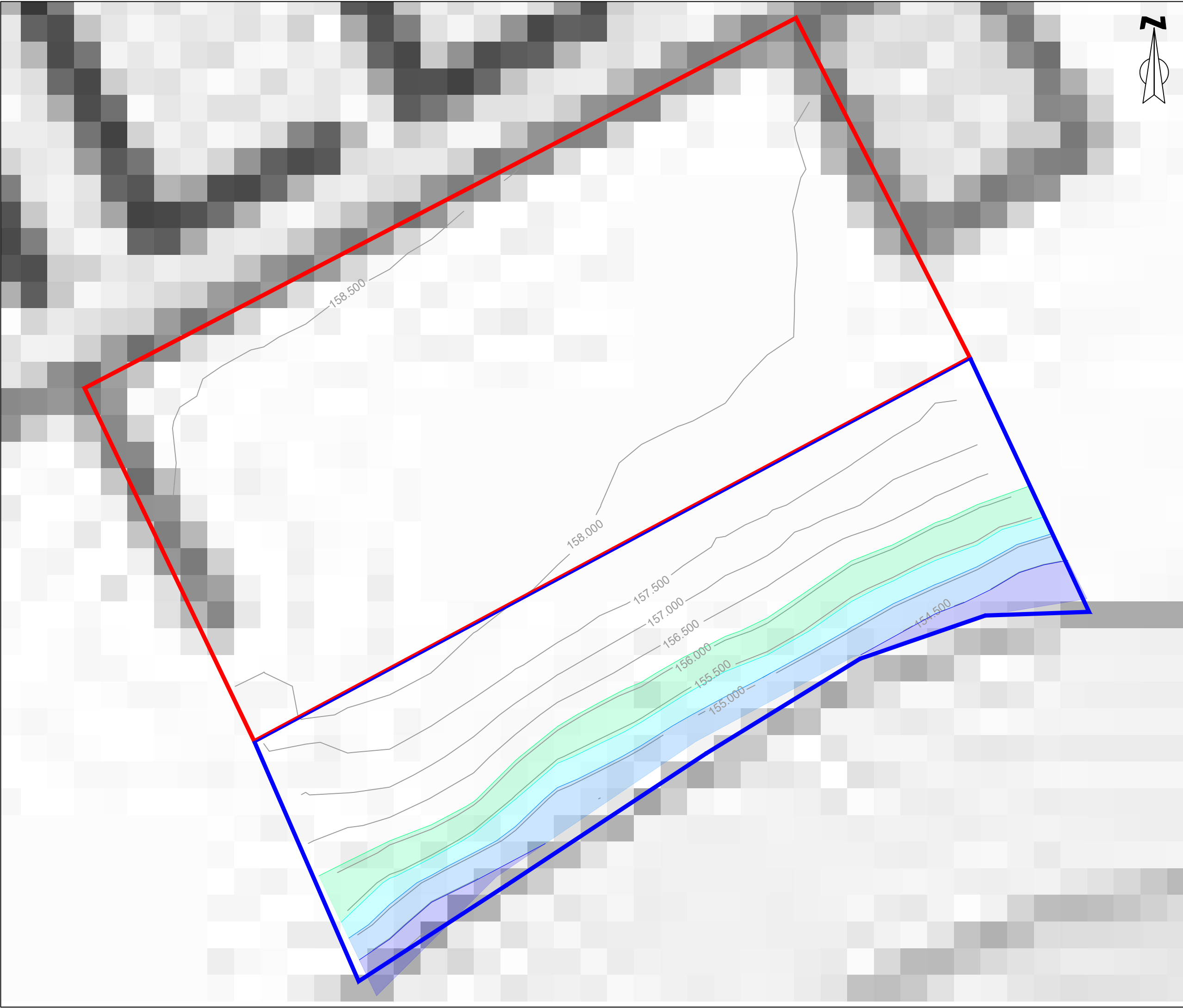
Key

- Site Boundary
- Ownership Boundary
- Extreme Hazard (> 2.0)
- Significant Hazard (1.25 - 2.00)
- Moderate Hazard (0.75 - 1.25)
- Low Hazard (0.50 - 0.75)

enzygo
environmental consultants

Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT: Ronald Evans		
SCALE: 1:1,000@A3	PROJECT REF: SHF.1742.001	
DRAWN: CH	CHECKED: RH	DATE: Feb 2020
PROJECT: Land next to Holly Cottage, Thurgoland		
TITLE: Environment Agency Surface Water 1000 Year Hazard Rating		
DRAWING NO: SHF.1742.001.HY.D.009.4		



- Key**
-  Site Boundary
 -  Ownership Boundary
 -  1 in 100 Year Flooding
 -  1 in 100 (30%CC) Year Flooding
 -  1 in 100 (50%CC) Year Flooding
 -  1 in 1000 Year Flooding



Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT:		Ronald Evans	
SCALE:	NTS	PROJECT REF:	SHF.1742.001
DRAWN:	CH	CHECKED:	RH
		DATE:	Jan 2020
PROJECT:		Land Next to Holly Cottage, Thurgoland	
TITLE:		Modelled Flood Extent	
DRAWING NO:		SHF.1742.001.HY.D.010	



- NOTES
1. Do not scale from this drawing
 2. All dimensions are in meters unless stated otherwise
 3. This drawing is to be read in conjunction with all relevant drawings and documents associated with this project.
 4. All surveyed information including levels and layout is provided by others
 5. All existing and proposed dimensions, levels and locations to be checked and verified by the main contractor on site prior to the commencement of the works and any anomalies reported to the engineer.
 6. All works, workmanship and materials on private drainage to be in accordance with the civil engineering specification for water industry 7th edition published by the water research council.

P01	18/02/20	First Issue	CH	RH	RH
REV:	DATE:	DETAIL:	DES:	CHK:	APP:



Samuel House, 5 Fox Valley Way, Stocksbridge, Sheffield, S36 2AA

CLIENT:
Ronald Evans

PROJECT:
Old Mill Lane, Thurgoland

DRAWING TITLE:
Surface Water Outfall

DRAWN: CH	DESIGNED: CH	CHECKED: RH	APPROVED: RH
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DATE: 03/02/2020	SCALE @ A3: 1:10
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PROJECT NO.: SHF.1742.001	DRAWING NO.: 11
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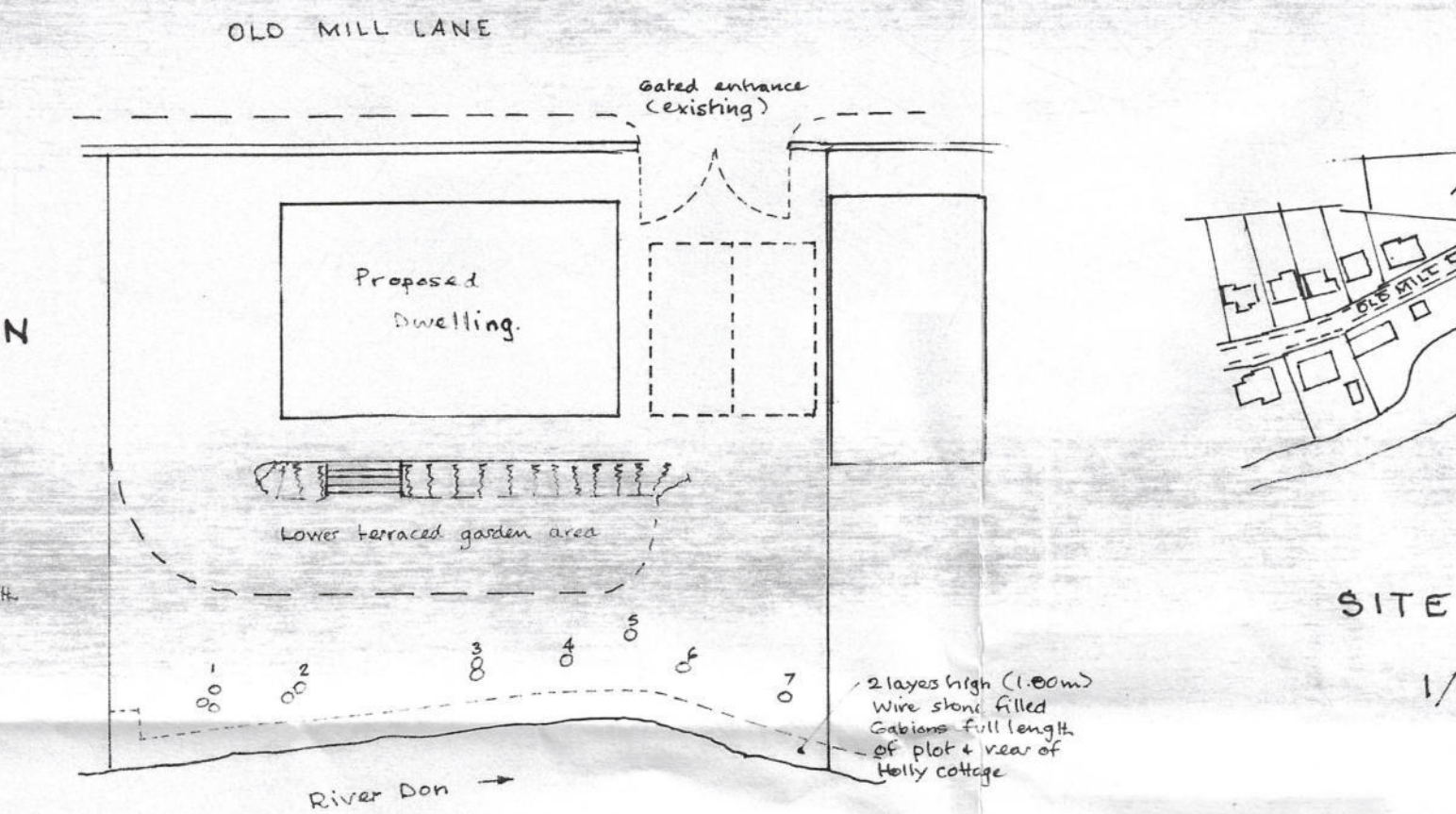
DRAWING STATUS: Preliminary	ISSUE: P01
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Appendix 1 – Proposed Site Layout

GROUND PLAN

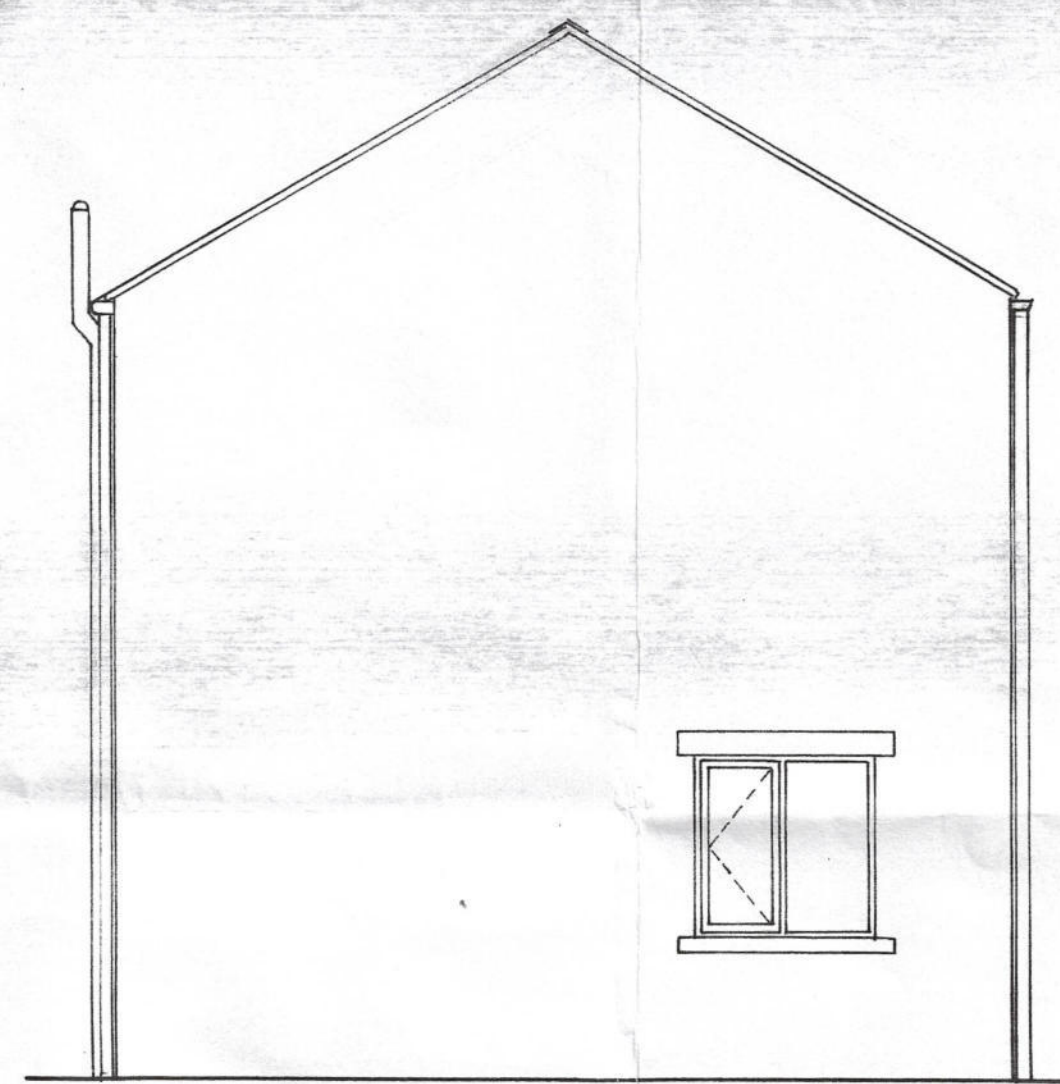
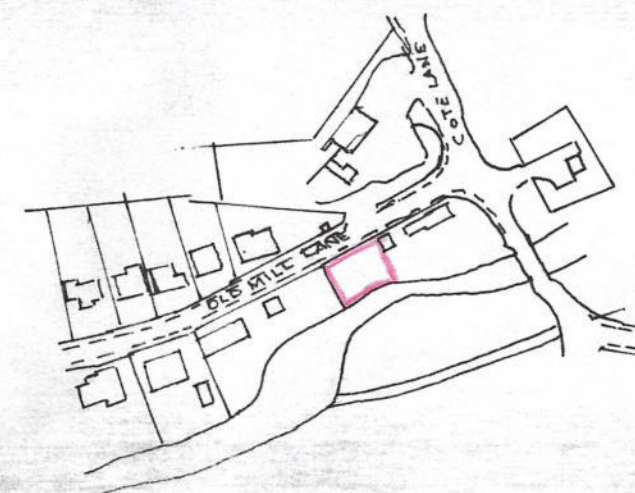
1:200.

- 31° from same root
31° 0.65-91% 1.1° 1.00-91%
Sycomore (pseudo-platanus)
- 21° from same root
1.1° 1.00-91%
Sycomore (pseudo-platanus)
- 21° from same root
1.00-91%
Elm (ulmus)
- 1.05-91%
Elm (ulmus)
- 0.15-91%
Elm (ulmus)
- 1.05-91%
Elm (ulmus)
- 0.75-91%
Elm (ulmus)

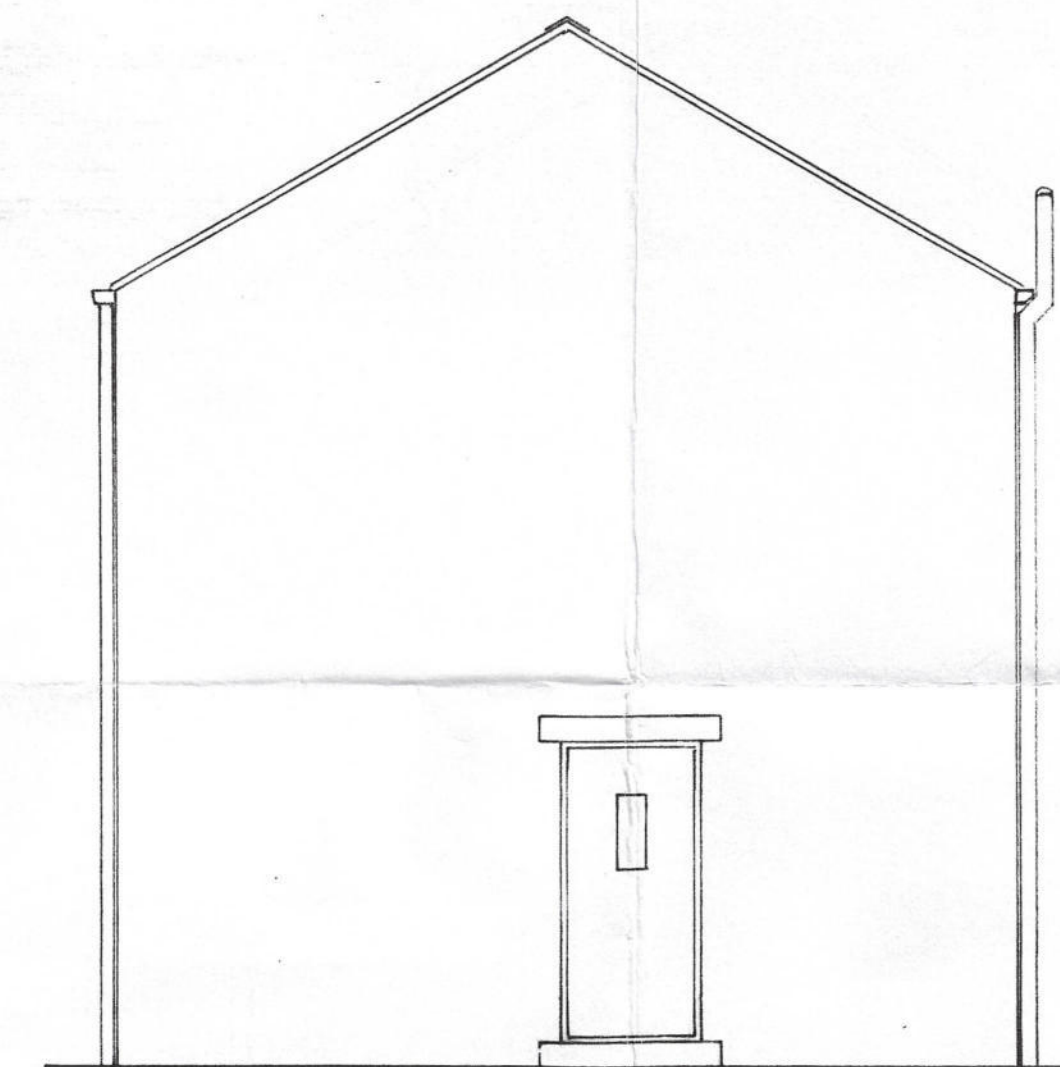


SITE PLAN

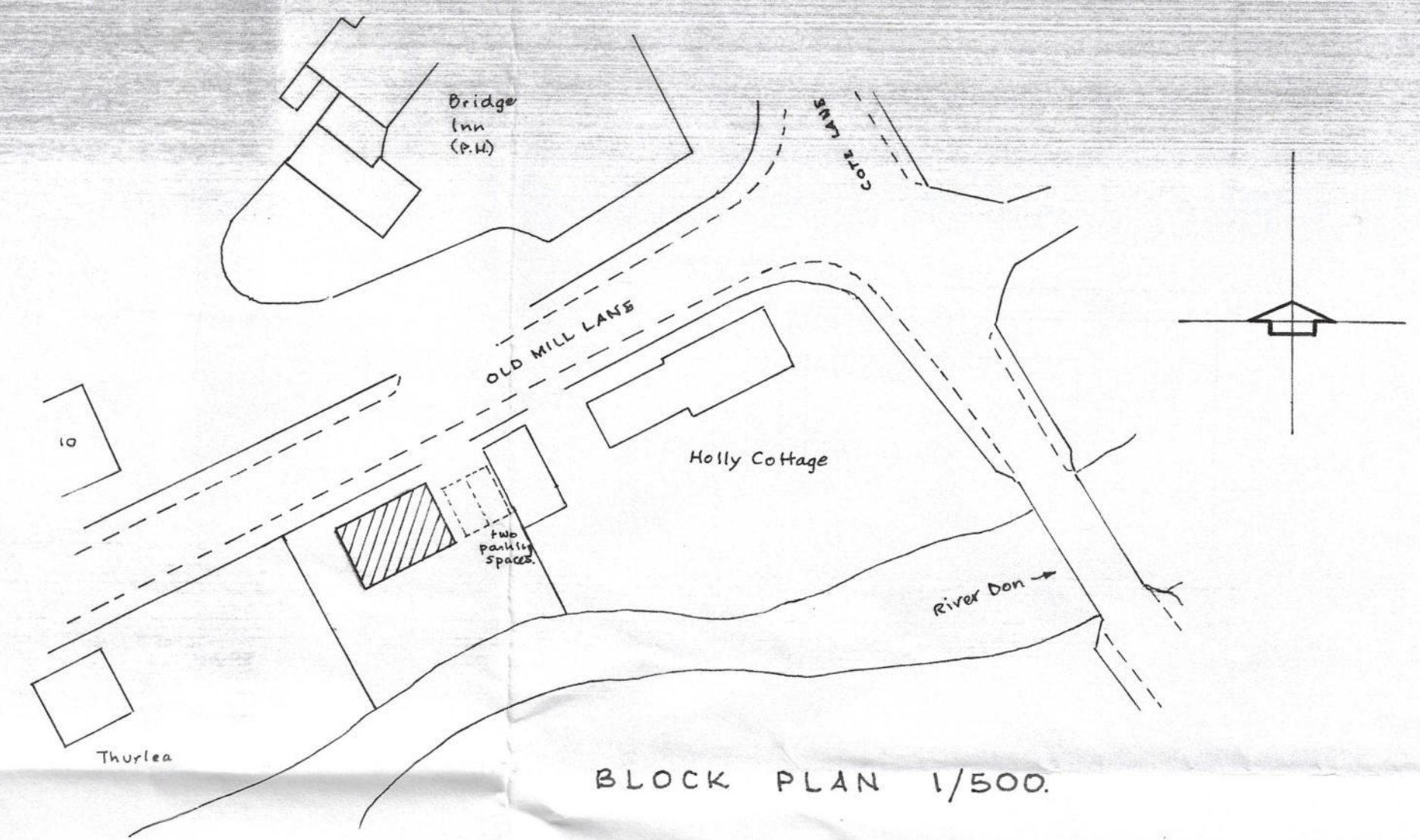
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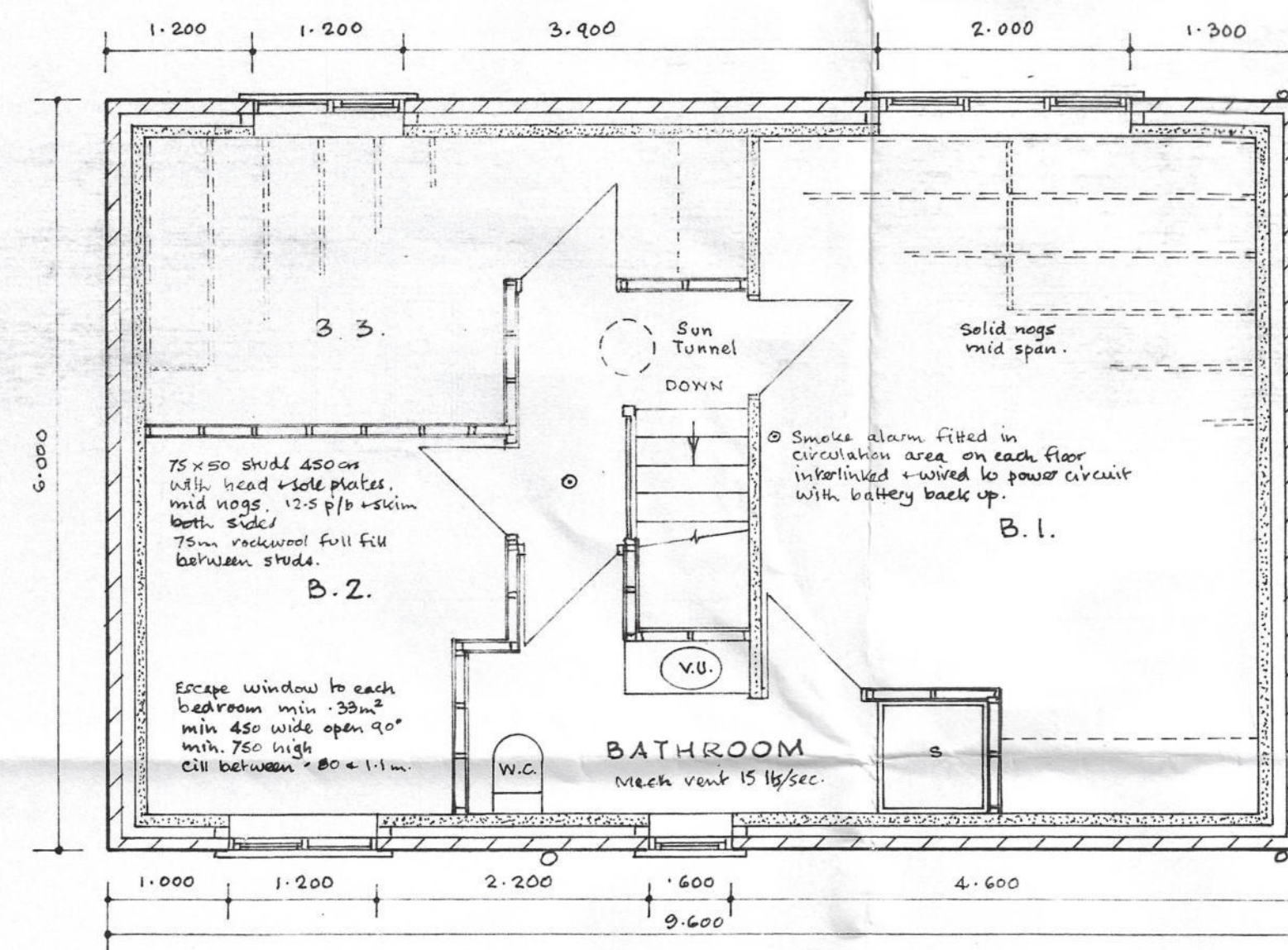
SIDE ELEVATION



SIDE ELEVATION

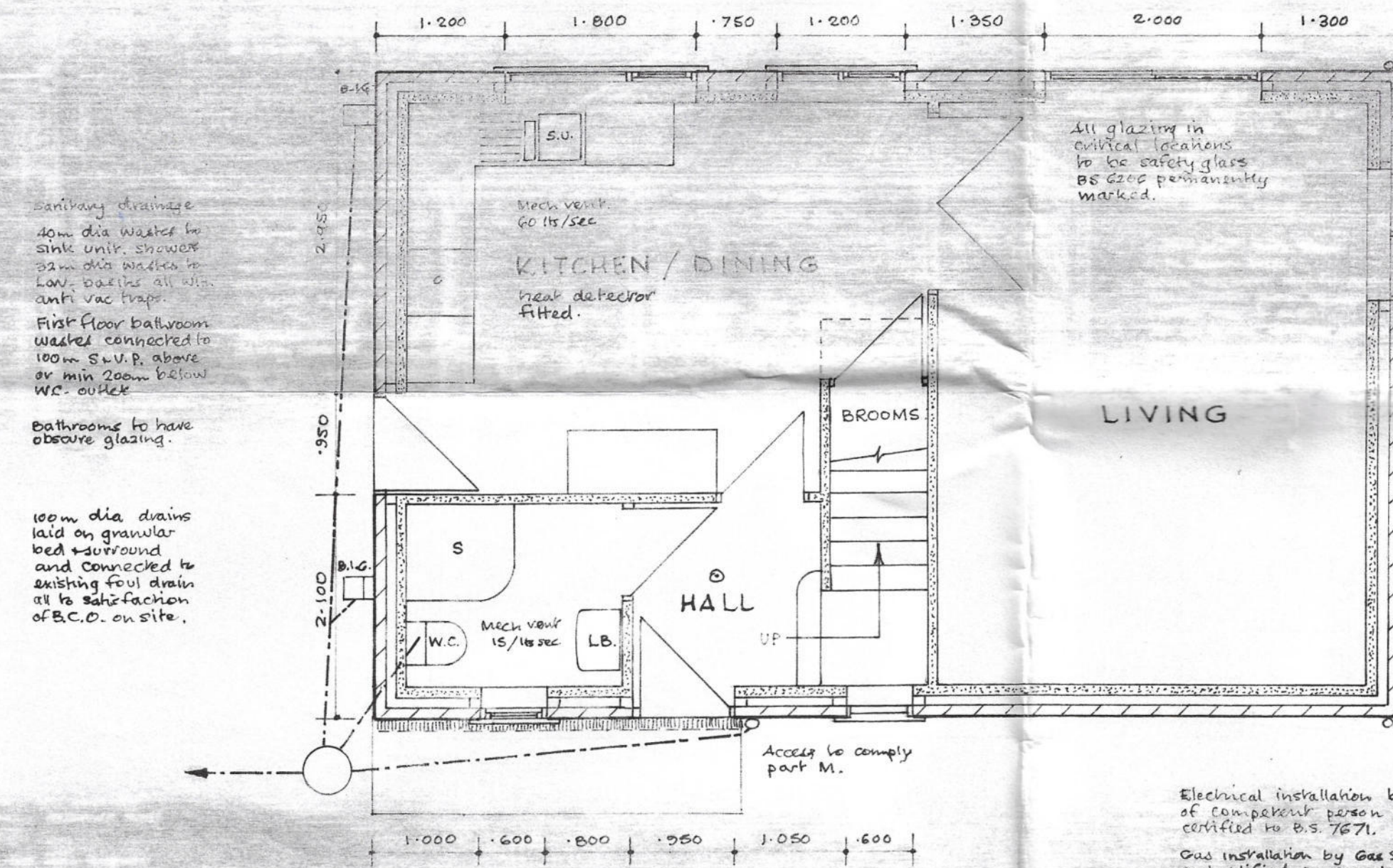


BLOCK PLAN



FIRST FLOOR

100mm S.W. drain laid on granular bed & surrounded and taken to lower level soakaway with 5m from dwelling - subject to percolation test.



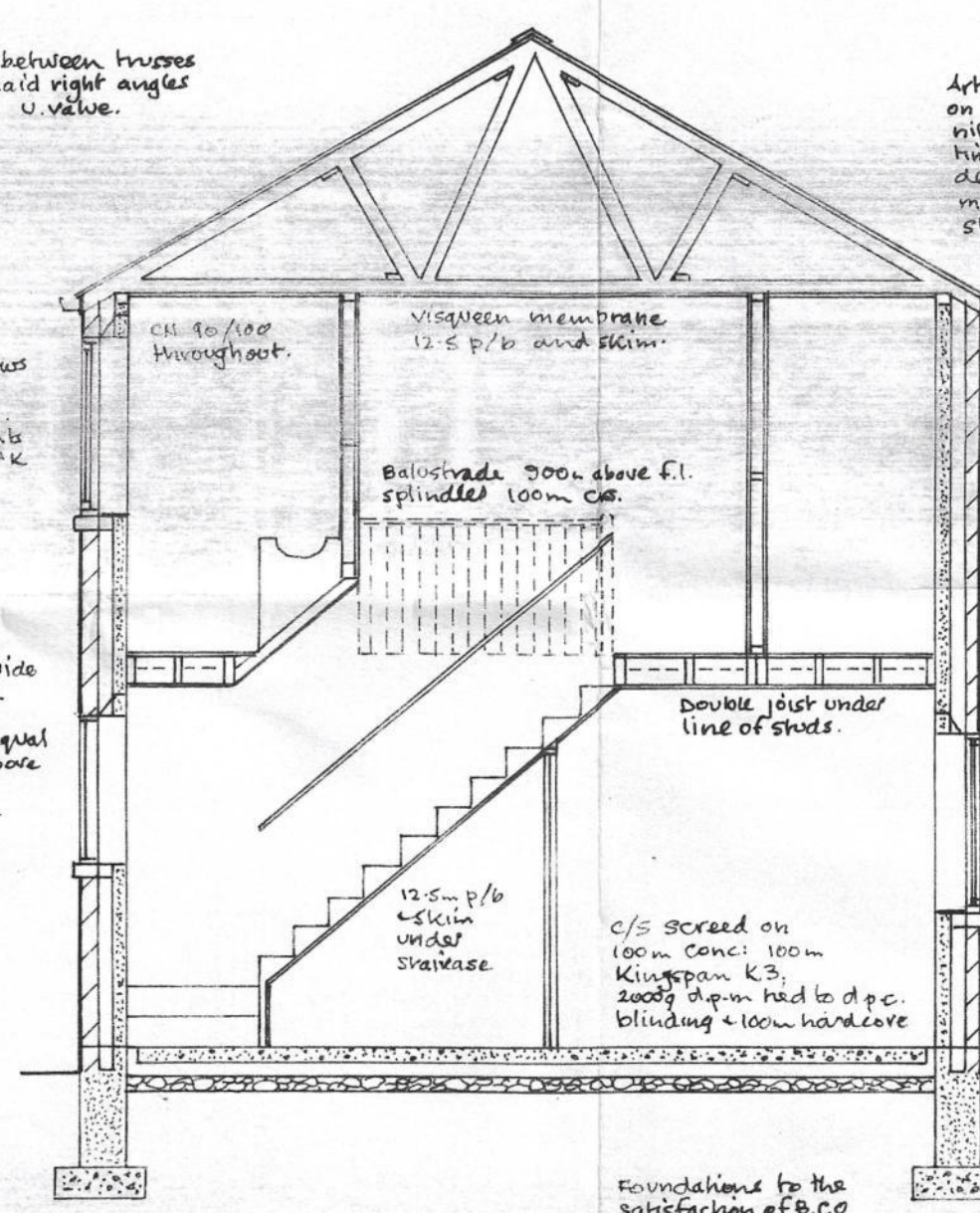
GROUND FLOOR

Electrical installation by member of competent person scheme and certified to B.S. 7671.
Gas installation by Gas Safe Engineer and certified on completion.

100mm fibreglass between houses
200mm fibreglass laid right angles to achieve 0.15 U-value.

Double glazed
rescuable windows
Low E glazing
100mm air gap
100mm mineral wool
0.05 U-value 1.5 W/m²K
Thermabreak
cavity doors

Staircase 900mm wide
treads min 220mm
risers 200mm
all treads & nosings equal
handrail 300mm above
line of nosings
min 2m headroom



SECTION

Artificial stone slates
on 50 x 25 tanalised battens
without vent membrane on
timber busses @ 600mm
designed to meet BS 5262 part 3
mechanically fixed to 100 x 75 wall plate
stopped down @ 12mm gap.

Traditional section
black p.v.c. gutters
and down pipes.

Outer leaf York stone
with saum back
100mm rescuable full fill cavity
50mm tyro block or equal
S steel ties 5 m.p.
750mm cavity, 450mm vertical
225mm air reveals.

Floor grade 100mm with
glued joists & fixed 100mm
to 175 x 50 joists @ 450mm c/s.
100mm rescuable 100mm density
in floor void.

Sawn stone heads
& cills.

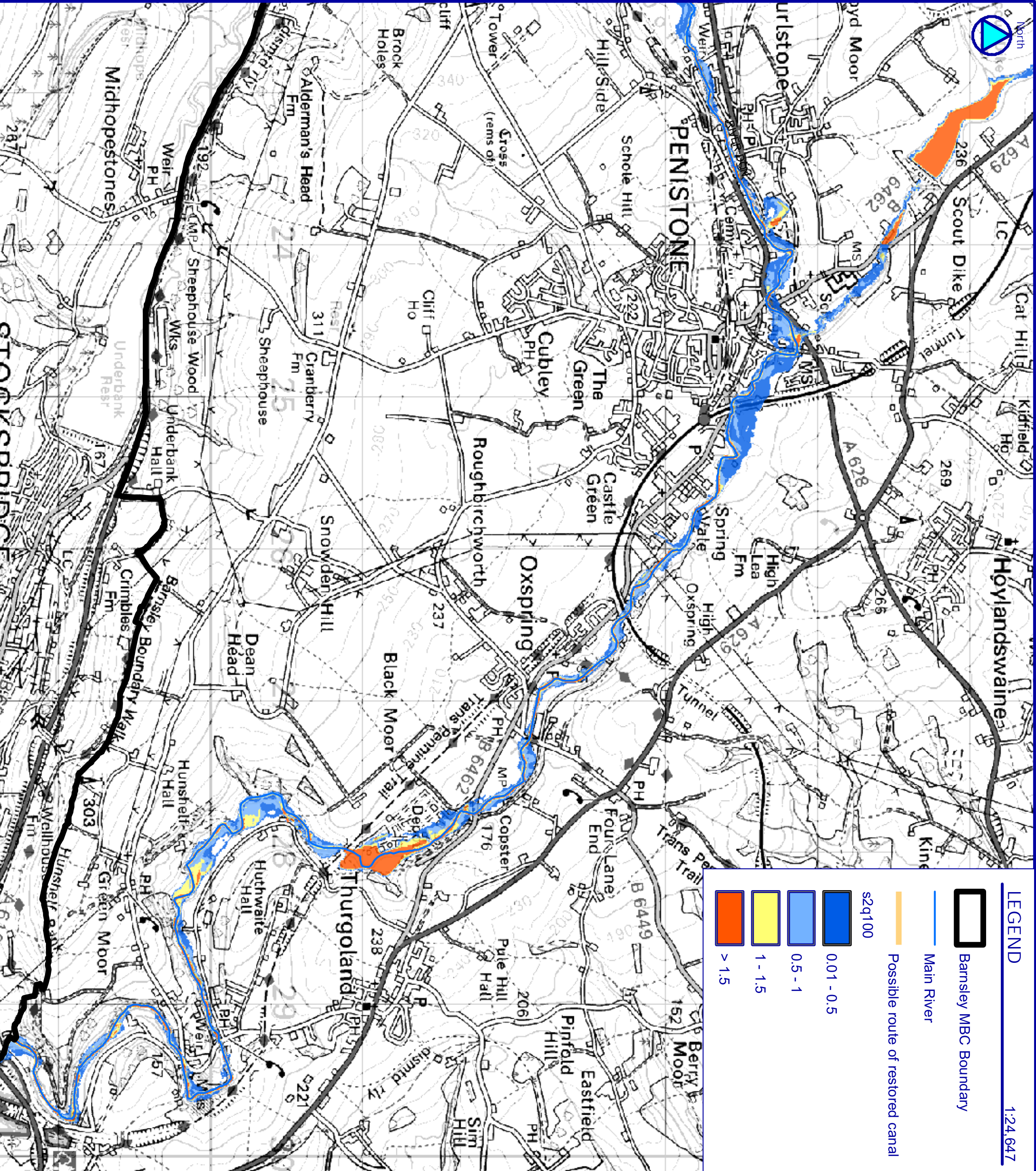
opening lights min
120mm floor area
B.P.C. to head, cill
and reveals secured
225mm vertically.

may d.p.c.
150mm min
300mm conc
found blocks
600 x 200 conc
found

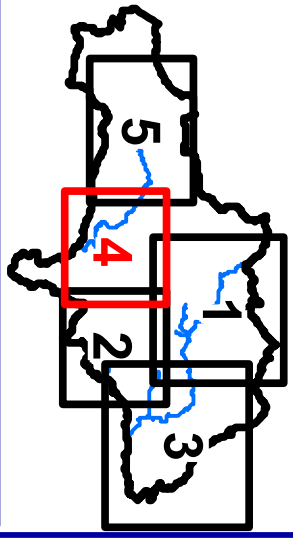


FRONT ELEVATION

Appendix 2 – SFRA Mapping Extracts



KEYPLAN



Note:

This map shows the potential scale of flood inundation for a range of severe overtopping flood events and different standards of flood defence. They do not include the impact of a breach or failure of these defences.

Typical range of defence standards for the River Don and Dearne is to protect up to a 1 in 30year (3%) return period.

s2 = 1 in 2year Standard of Defence
q100 = 1 in 100year or 1% probability flood event.

This map should be considered in support of the Environment Agency Flood Zone Maps to aid the Sequential and Exception Tests.
It should not be considered in isolation without reference to the other SFRA Flood Risk Maps.

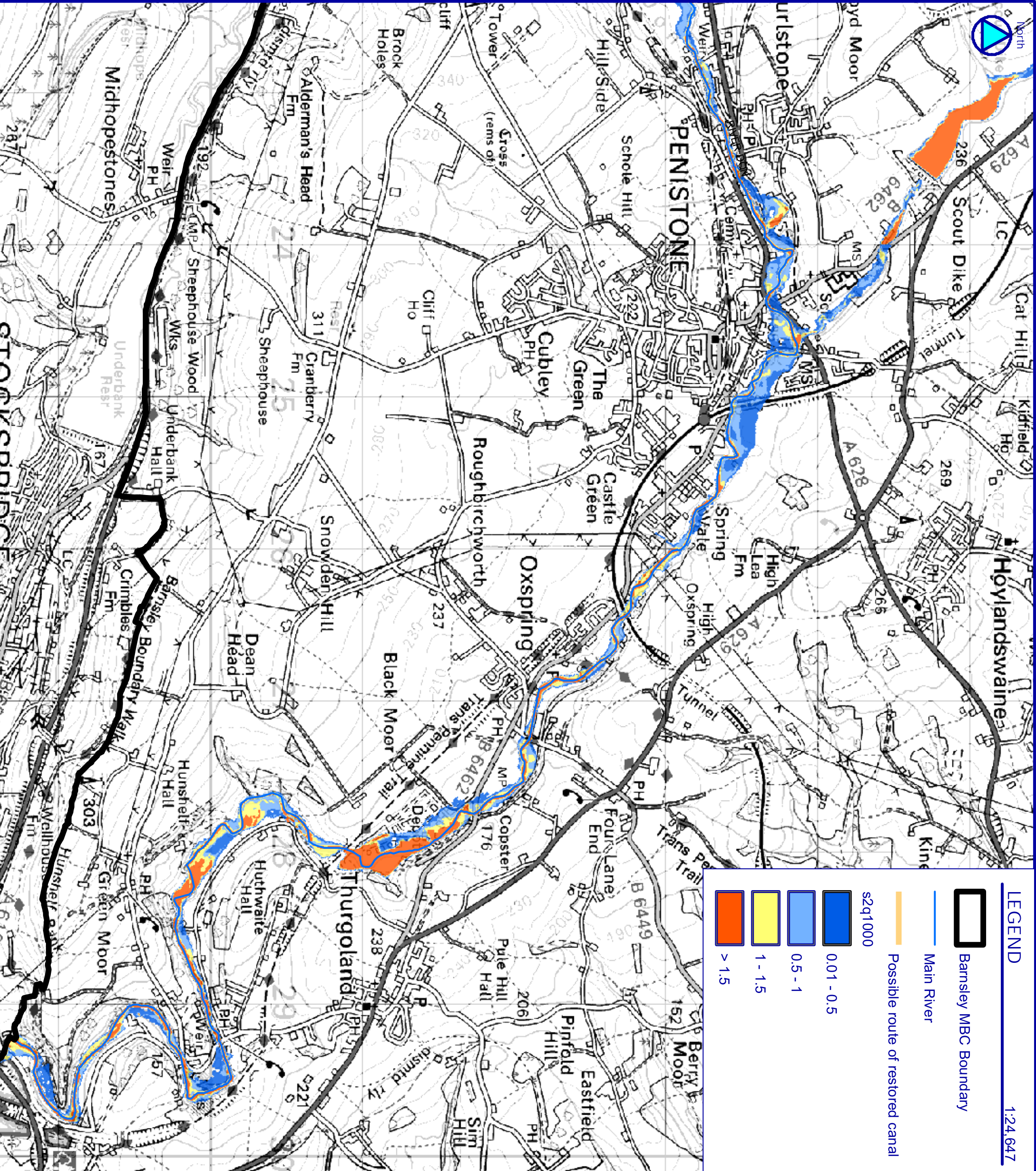
Please see the Section 6 of the SFRA for further details.

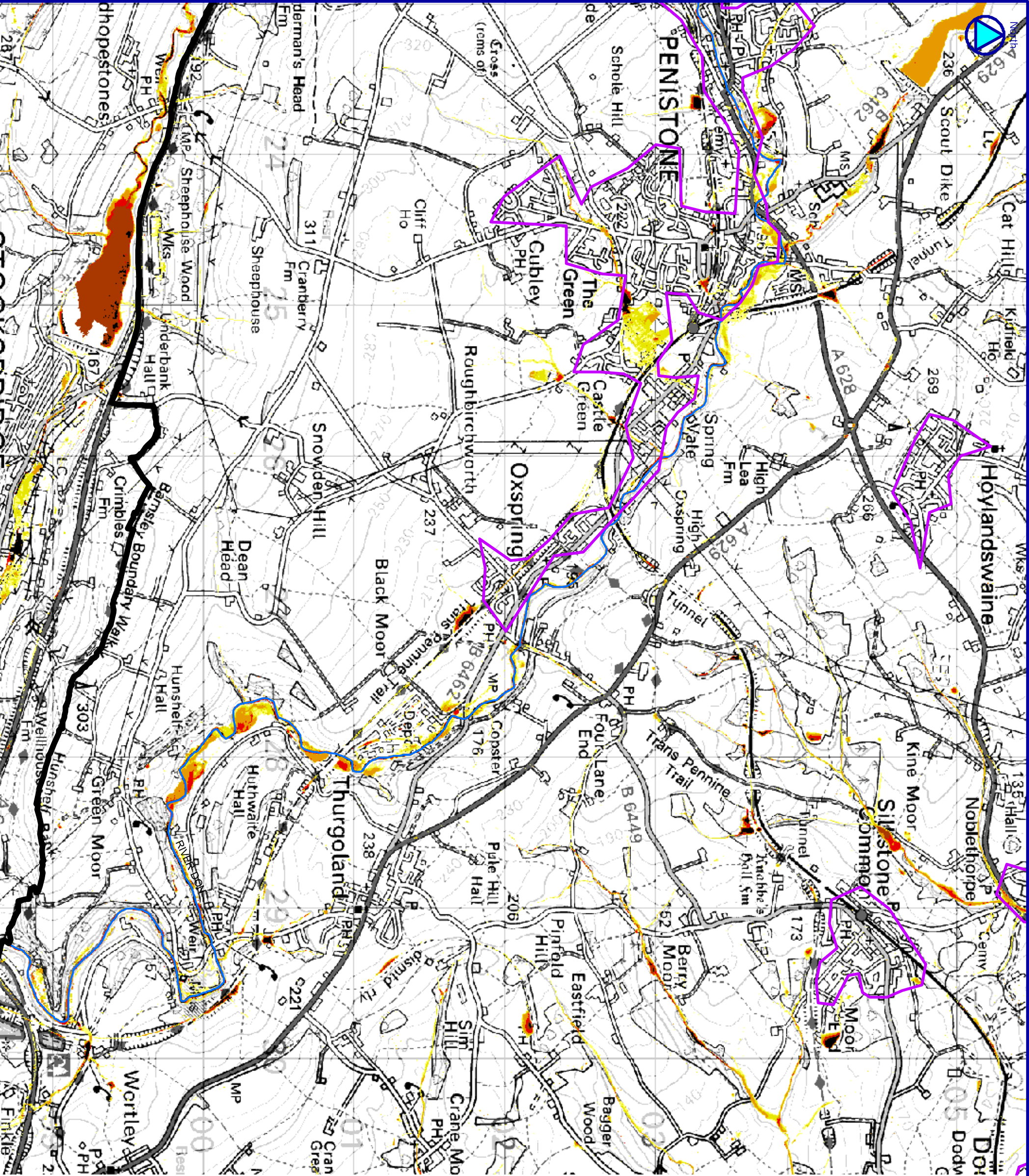
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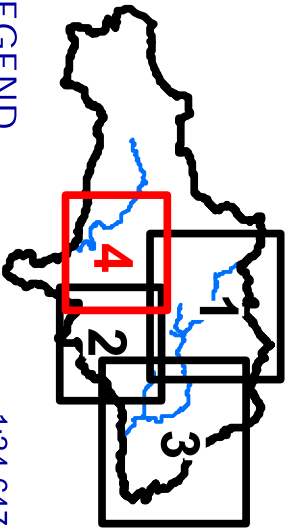
MAP D - 4

s2q100





KEYPLAN



LEGEND

1:24,647

- Barnsley MBC Boundary
- Urban Areas
- Main River
- Surface Water Flooding
- Flood Depth (m)
 - 0.15 - 0.3
 - 0.3 - 0.5
 - 0.5 - 1
 - 1 - 1.5
 - 1 - 2
 - > 2

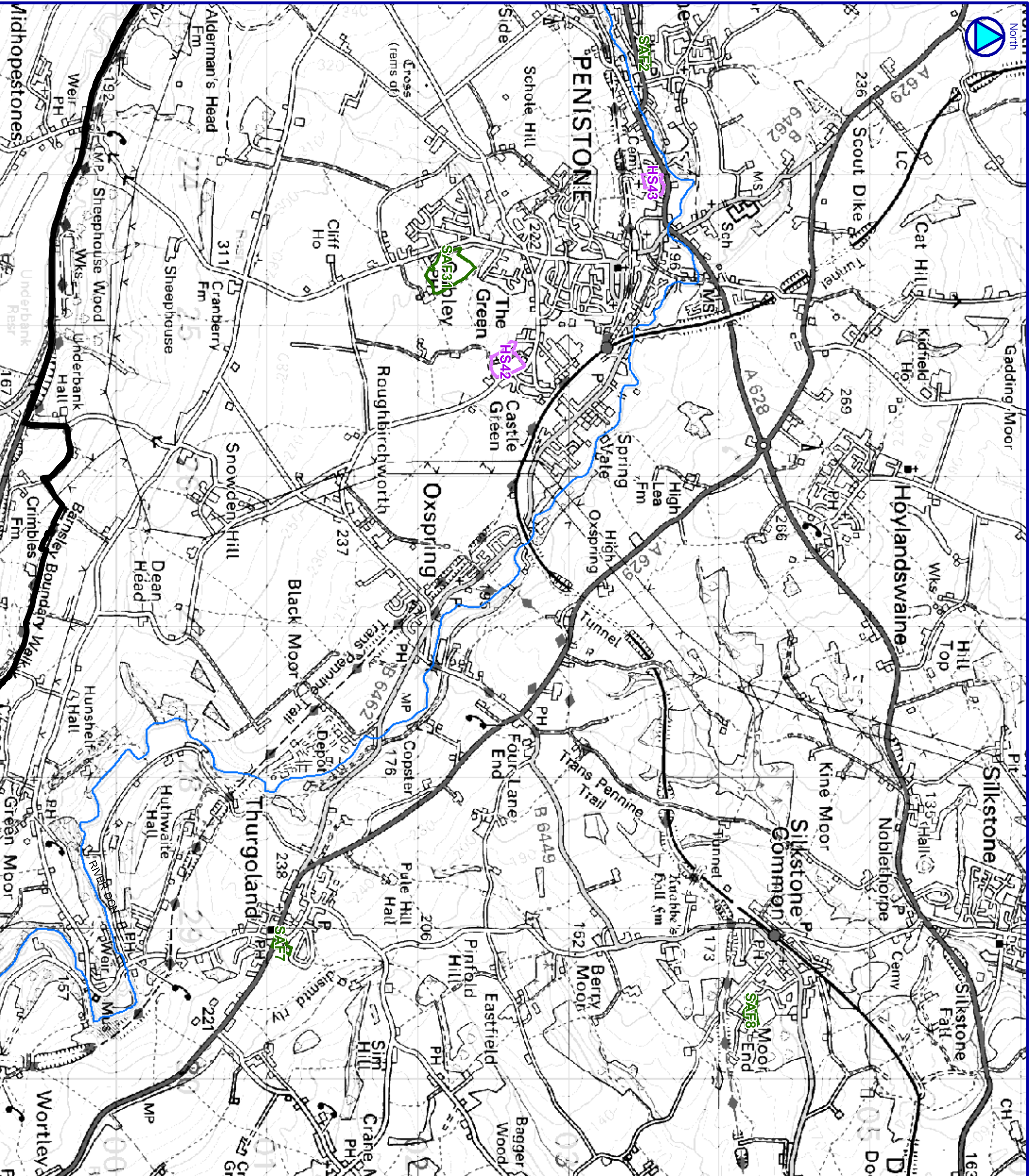
Note:
Please see Section 5.8 of the SFRA
for further details.

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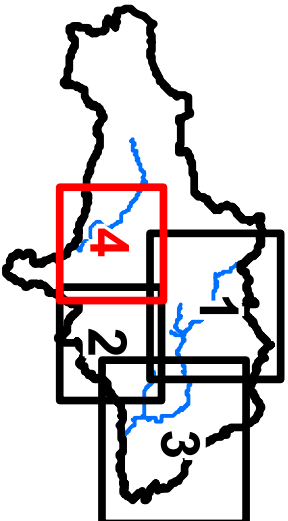


MAP C - 4

PLUVIAL FLOODING CAUSED BY
100YEAR RAINSTORM



KEYPLAN



LEGEND

1:24,647

- Barnsley MBC Boundary
- IDB Boundaries
- Main River
- Possible route of restored canal
- Proposed Development Sites
- Employment Sites
- Housing Sites
- UDP Sites
- Safeguarded Land

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MAP B - 4

PROPOSED DEVELOPMENT SITES
AND IDB BOUNDARIES

Appendix 3 – Yorkshire Water Sewer Asset Plans

YORKSHIRE WATER PROTECTION OF MAINS AND SERVICES

1. The position of Yorkshire Water Services Ltd (YWS) apparatus shown on the existing mains record drawing(s) indicates the **general** position and nature of our apparatus and the accuracy of this information cannot be guaranteed. Any damage to YWS apparatus as a result of your works may have serious consequences and you will be held responsible for all costs incurred. Prior to commencing major works, the exact location of apparatus must be determined on site, if necessary by excavating trial holes. The actual position of such apparatus and that of service pipes which have not been indicated must be established on site by contacting the Customer Helpline on 0845 124 24 24 for both water and sewerage.
2. The public sewer and water network is lawfully retained in its existing position and the sewerage and water undertaker is entitled to have it remain so without any disturbance. The provisions of section 159 of the Water Industry Act 1991 provides that the undertaker may "inspect, maintain, adjust, repair or alter" the network. Those rights are given to enable the undertaker to perform its statutory duties. Any development of the land or any other action that unacceptably hindered the exercise of those rights would be unlawful. The provisions contained in Section 185 of the Water Industry Act 1991 state that where it is reasonable to do so, a person may require the water supply undertaker to alter or remove a pipe where it is necessary to enable that person to carry out a proposed change of use of the land. The provisions contained in Section 185 also require the person making the request to pay the full cost of carrying out the necessary works.
3. Ground levels over existing YWS apparatus are to be maintained. Sewers in highways will **generally** be laid to give 1200mm of cover from finished ground level working to kerb races, other permanent identification of the limits of the road or to an agreed line and level. Substantial increases or decreases to this 1200mm depth of cover will result in the sewer being re-laid at your expense. Water mains and services will **generally** be laid with a minimum of 750mm depth of cover however some mains and services usually those installed over 50 years ago may have less ground cover.
4. If surface levels are to be decreased / increased significantly the effects on existing water supply apparatus will be carefully considered and if any alterations are necessary, the costs of the alterations will be recharged to you in full. Outlets on fire hydrants must be no more than 300mm below the new levels and all surface boxes must be adjusted as part of the scheme.
5. To enable future repair works to be carried out without hindrance; any pipe, cable, duct, etc. installed parallel to a water main or service pipe should not be installed directly over or within 300mm of a water main or service pipe or 1000mm of a waste water asset. Where a pipe, cable, duct, etc. crosses a main or service it should preferably cross perpendicular or at an angle of no less than 45° and with a minimum clearance of 150mm. These requirements apply to activities within an existing highway and are relevant to the installation of pipes, cables, ducts, etc. up to and including 250mm in diameter (*see illustration below*). Necessary protection measures for installations greater than 250mm in diameter and/or in private land will need to be agreed on an individual basis. Installations within a new development site must comply with the National Joint Utilities Group publication Volume 2: NJUG Guidelines On The Positioning Of Underground Utilities Apparatus For New Development Sites.
6. All excavation works near to YW apparatus should be by hand digging only.
7. Backfilling with a suitable material to a minimum 300mm above YW apparatus is required.
8. Adequate support must be provided where any works pass under YW apparatus.
9. Jointing chambers, lighting columns and other structures must be installed in such a way that future repair or maintenance works to YW apparatus will not be hindered.
10. Apparatus such as; railings, sign posts, etc. must not be placed in such a way that they prevent access to or full operation of controlling valves, hydrants or similar apparatus. YWS surface boxes must not be covered or buried. Any adjustment, alteration or replacement of manhole covers must be agreed on site prior to the commencement of the works with a YWS Inspector who may be contacted via our Call Centre on 0845 124 24 24.
11. Explosives shall not be used within 100 metres of any Yorkshire Water Services apparatus or installations.
12. Vibrating plant should not be used directly over any apparatus. Movement or operation by vehicles or heavy plant is not to be permitted in the immediate vicinity of YWS plant or apparatus unless there has been prior consultation and, if necessary, adequate protection provided without cost to YWS.
13. **Under no circumstances** should thrust boring or similar trenchless techniques commence until the actual position of the Company's mains/services along the proposed route have been confirmed by trial holes.
14. Any alterations to the highway should be notified following the procedures outlined in the New Road and Street Works Act 1991 Code of Practice; Measures Necessary Where Apparatus Is Affected By Major Works (Diversions Works).

15. You will be held responsible for any damage or loss to YWS apparatus during and after completion of work, caused by yourselves, your servant or agent. Any damage caused or observed to YWS plant or apparatus should be immediately reported to YWS. Should YW incur any costs as a result of non-compliance with the above, all costs will be rechargeable in full.
16. You should ensure that nothing is done on the site to prejudice the safety or operation of YWS employees, plant or apparatus.
17. In accordance with the New Roads and Street Works Act 1991, Chapter 22, Part 3, Section 80. The location of any identified YW asset "*which is not marked, or is wrongly marked, on the records made available*" should be communicated back to Yorkshire Water. The location of the apparatus should be identified on copies of the supplied plans which should be returned to Yorkshire Water (Asset Records Team) with photographic supporting evidence where possible.
18. The Government has decided that responsibility for private sewers serving two or more properties and lateral drains (the section of pipe beyond the boundary of a single property, connecting it to the public sewer) will be transferred to the water companies on Oct 1 2011. Private pumping stations will also transfer during the period 1 October 2011 – 1 Oct 2016. Records of these assets may not yet be shown on the existing mains record drawing(s). If you encounter any of these assets you must inform Yorkshire Water Services Ltd (YWS).
19. Please note that the information supplied on the enclosed plans is reproduced from Ordnance Survey material with the permission of the Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office, © Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Licence Number 1000019559.
20. This information is for guidance only and the position and depth of any YW apparatus is approximate only. Likewise, the nature and condition of any YW apparatus cannot be guaranteed. YW has no responsibility for recording the locations of privately owned apparatus. As of 1 October 2011, there may be some lateral drains and/or public sewers which are not documented on YW records but may still be present. For the avoidance of doubt, this information is not a substitute for appropriate professional and/or legal advice. YW accepts no responsibility for any inaccuracy or omissions in this information. The actual position of YW apparatus must be determined on site by excavating trial holes by hand. YW requires a minimum of two working days' written notice of the intention to excavate any trial holes before any excavation can be undertaken. If there are any queries in this respect please contact Yorkshire Water on 0345 124 24 24.

Property Identifier

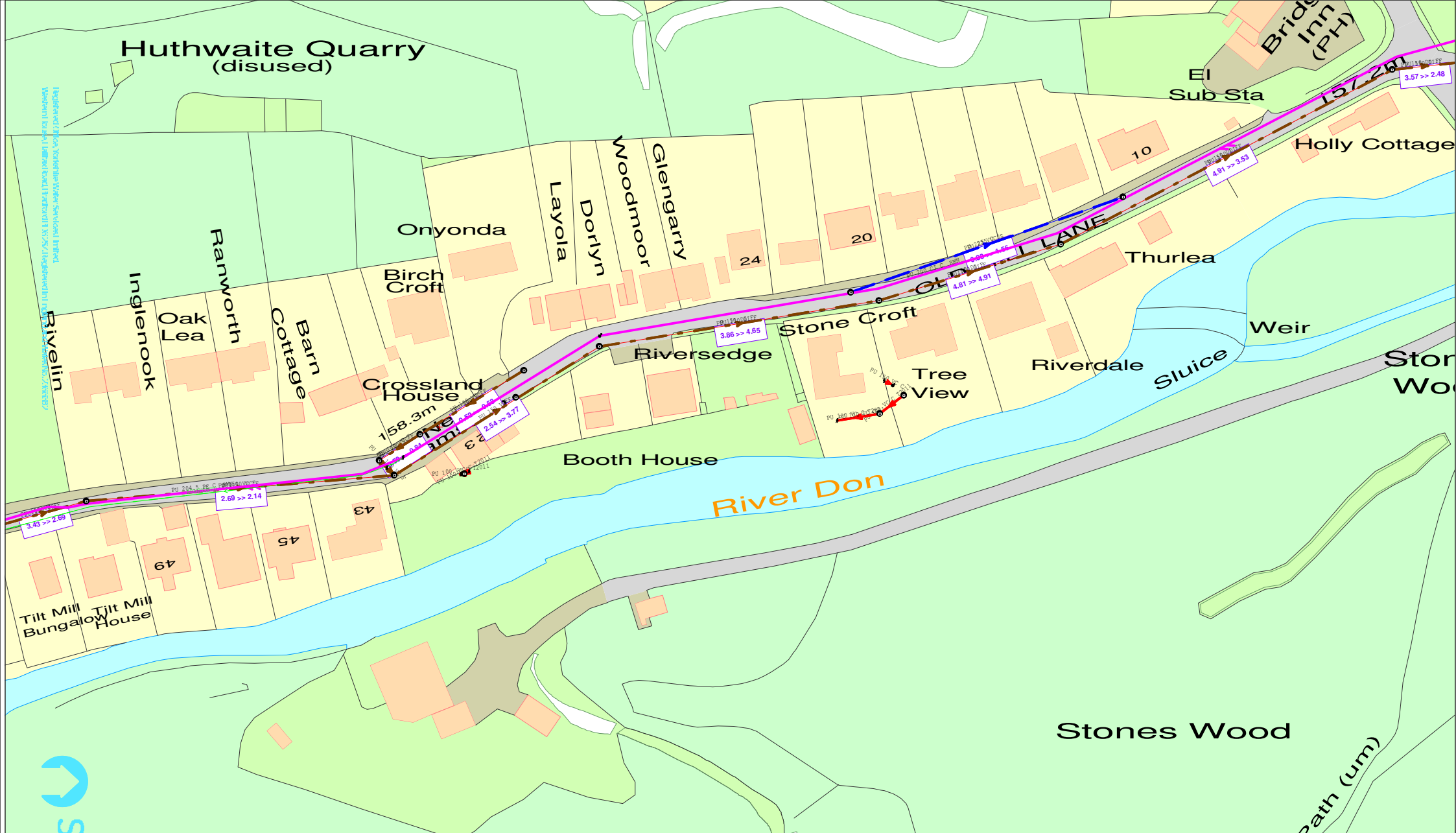


Sewer Legend

	Combined Sewer		S24 Combined Sewer
	Surface Water Sewer		S24 Surface Water Sewer
	Foul Sewer		S24 Foul Sewer
	Section 104 Sewer		Rising Main
	Overflow		Abandoned Sewer
	Syphon Sewer & Vacuum Sewer		
	Pumping Station		Public Sewer Treatment Works

Water Legend

	Water Main 4" and below
	Water Main 4" and above
	Raw Water Main
	Private Water Main
	Fire Hydrant
	Pumping Station



428838 : 399870

Map Name : SK2899NE

Title

Notes

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Partial Key

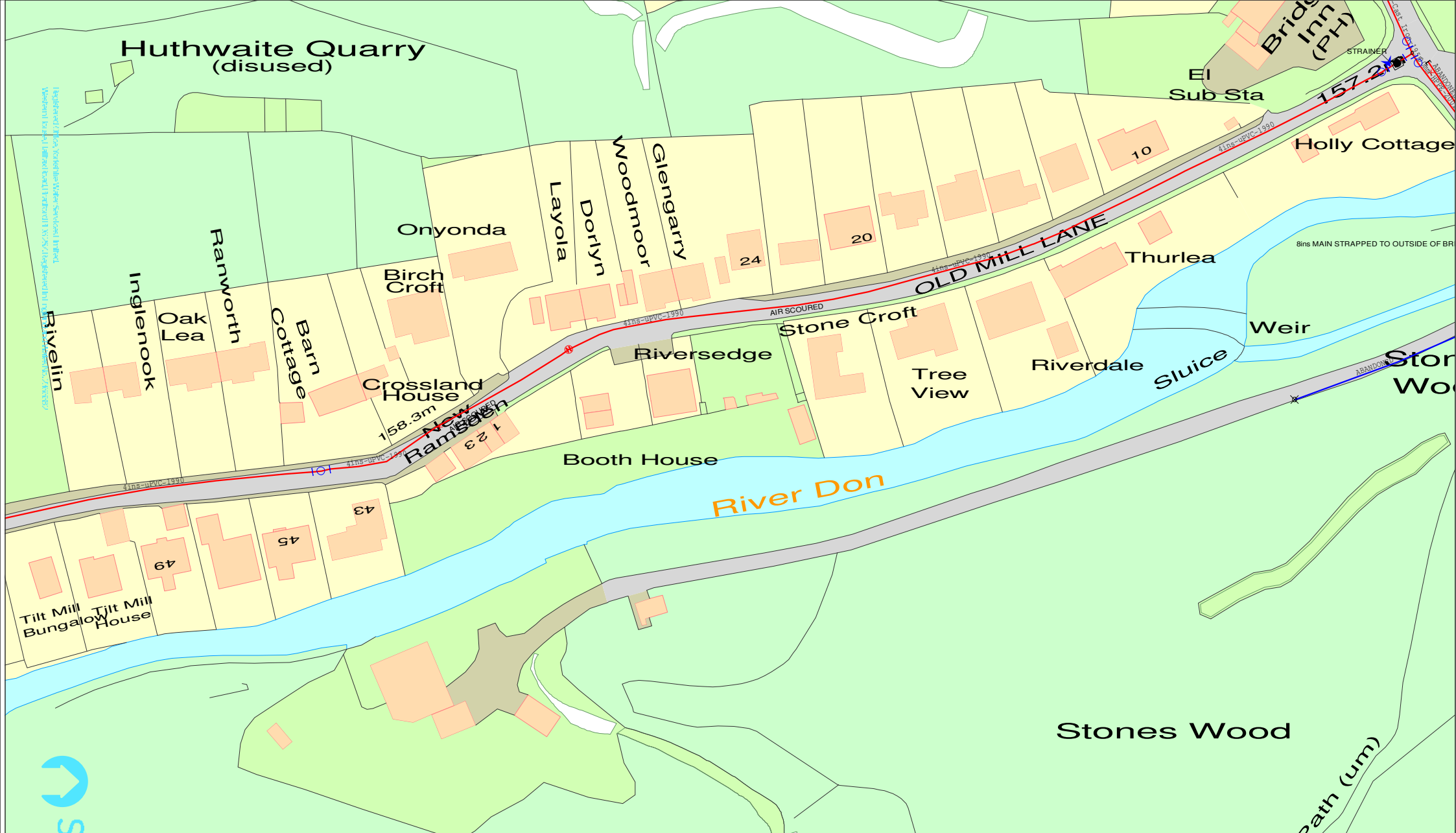
Foul Sewer = F
Combined Sewer = C
Surface Water Sewer = SW
Trade Sewer = TD
Partially Separate = PS

Date Req : 28/02/2018, 09:40:27

Source : Sewer Network Enquiry

This plan is furnished as a general guide only and no warranty as to its correctness is given or implied. This plan must not be relied upon in the event of excavations or other works made in the vicinity of public sewers. No house or property connections are shown.

Date Gen : 28/02/2018, 09:40:28



Appendix 4 – Environment Agency Correspondence

Defences (3rd Party Maintained) - RFI/2019/149170										
ASSET ID	DESCRIPTION	ASSET MAINTAINER	ASSETS TYPE	LENGTH (m)	ACTUAL Downstream Crest Level (mAOD)	ACTUAL Upstream Crest Level (mAOD)	PROTECTION	TARGET CONDITION	OVERALL CONDITION	DESIGN STANDARD OF PROTECTION (SOP)
25777	wall	private	flood_risk_management	115.66	152.72	157.99	fluvial	3	3	
170502	high_ground	private	flood_risk_management	6023.22			fluvial	3	2	

2012 Sheffield River Don Defended Max Levels - RFI/2019/149170 (Level - mAOD)

Node Point	Annual Exceedance Probability (AEP)					
	4% AEP (1 in 25)	2% AEP (1 in 50)	1.33% AEP (1 in 75)	1% AEP (1 in 100)	0.5% AEP (1 in 200)	0.1% AEP (1 in 1000)
DON17_19677	156.23	156.407	156.493	156.555	156.775	157.402
DON17_19555	155.687	155.833	155.904	155.954	156.132	156.793
DON17_19354u	154.894	154.996	155.046	155.083	155.215	156.234
DON17_19354d	154.002	154.322	154.475	154.589	154.982	156.168
DON17_19262u	153.809	154.117	154.267	154.377	154.77	155.969
DON17_19262d	153.694	153.954	154.076	154.164	154.467	155.127
DON17_19155i	153.346	153.595	153.709	153.791	154.072	154.695
DON17_19048	152.895	153.109	153.207	153.278	153.515	154.139
DON17_18965i	152.567	152.76	152.85	152.915	153.133	153.655
DON17_18883	152.314	152.491	152.575	152.635	152.834	153.339
DON17_18707i	151.855	152.028	152.108	152.166	152.358	152.898
DON17_18620	151.494	151.694	151.79	151.857	152.078	152.714
DON17_18566i	151.234	151.448	151.552	151.626	151.875	152.585
DON17_18459i	150.737	150.953	151.063	151.144	151.427	152.271
DON17_18406u	150.505	150.714	150.821	150.9	151.179	152.024
DON17_18406d	150.441	150.614	150.699	150.761	150.97	151.489
DON17_18396u	150.381	150.55	150.633	150.693	150.896	151.399
DON17_18396d	150.288	150.442	150.518	150.573	150.754	151.191
DON17_18349i	150.111	150.245	150.313	150.362	150.525	150.927
DON17_18211u	149.375	149.506	149.571	149.617	149.774	150.151
DON17_18211d	148.389	148.586	148.695	148.78	149.237	149.733
DON17_18158	147.936	148.13	148.226	148.303	148.595	149.258
DON17_18105	147.62	147.805	147.892	147.961	148.218	148.821
DON17_17731i	145.915	146.064	146.133	146.181	146.345	146.785

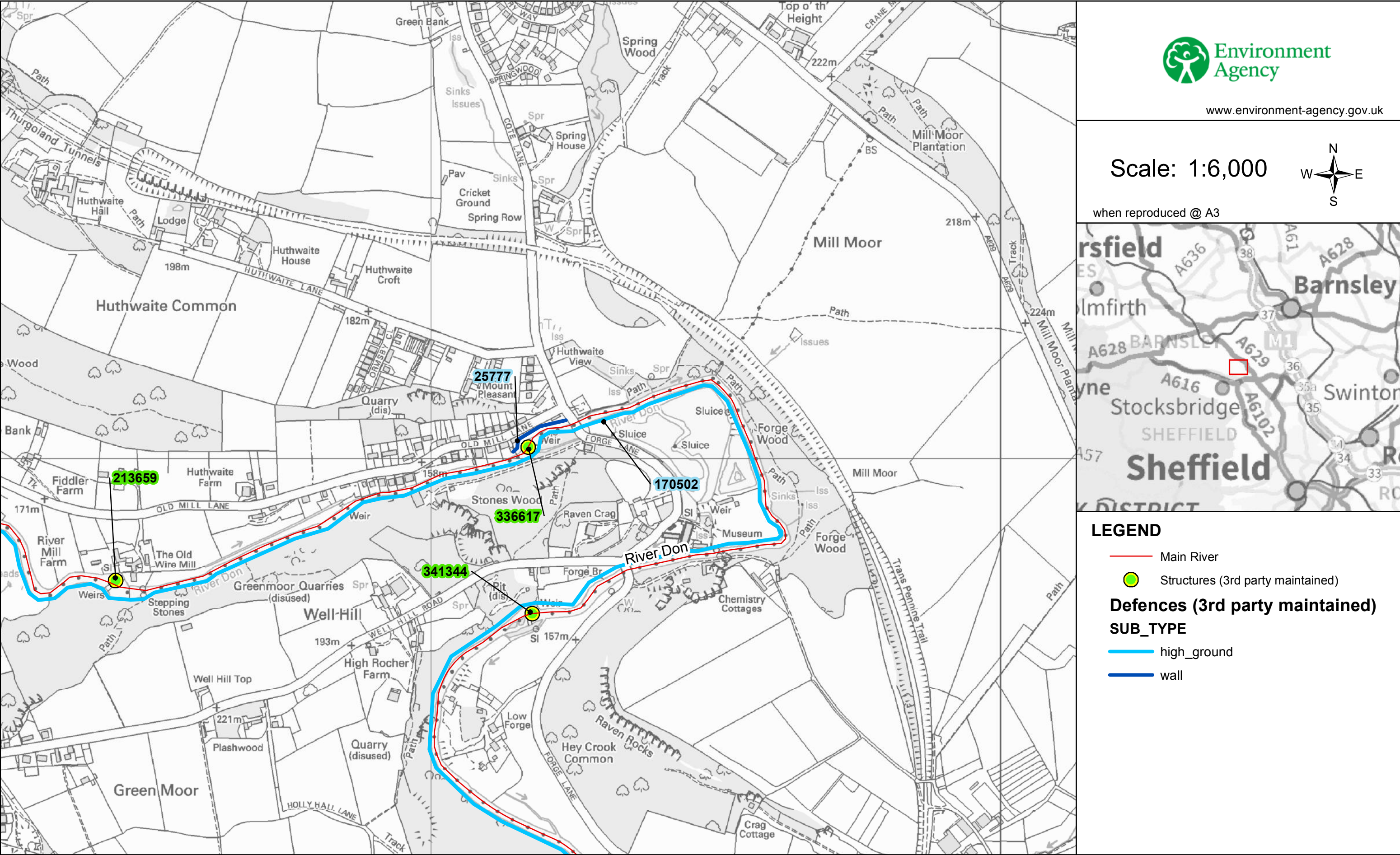
2012 Sheffield River Don Defended Max flows - RFI/2019/149170 (Flow - m³s)						
Node Point	Annual Exceedance Probability (AEP)					
	4% AEP (1 in 25)	2% AEP (1 in 50)	1.33% AEP (1 in 75)	1% AEP (1 in 100)	0.5% AEP (1 in 200)	0.1% AEP (1 in 1000)
DON17_19677	47.911	56.813	61.519	65.018	78.226	119.024
DON17_19555	47.913	56.808	61.523	65.02	78.218	119.02
DON17_19354u	47.911	56.813	61.519	65.022	78.21	119.016
DON17_19354d	47.911	56.813	61.519	65.022	78.21	119.016
DON17_19262u	47.914	56.811	61.518	65.022	78.21	119.015
DON17_19262d	47.914	56.811	61.518	65.022	78.21	119.015
DON17_19155i	47.911	56.809	61.514	65.019	78.205	119.015
DON17_19048	47.916	56.808	61.514	65.025	78.207	119.015
DON17_18965i	47.914	56.808	61.518	65.019	78.209	119.01
DON17_18883	47.916	56.805	61.514	65.02	78.207	119.012
DON17_18707i	47.917	56.799	61.511	65.026	78.206	118.993
DON17_18620	47.912	56.793	61.506	65.017	78.2	118.973
DON17_18566i	47.911	56.785	61.508	65.008	78.2	118.965
DON17_18459i	47.911	56.779	61.503	65.008	78.202	118.957
DON17_18406u	47.91	56.778	61.501	65.009	78.199	118.953
DON17_18406d	47.91	56.778	61.501	65.009	78.199	118.953
DON17_18396u	47.908	56.778	61.501	65.009	78.198	118.954
DON17_18396d	47.908	56.778	61.501	65.009	78.198	118.954
DON17_18349i	47.91	56.779	61.505	65.008	78.198	118.956
DON17_18211u	47.909	56.779	61.501	65.003	78.196	118.953
DON17_18211d	47.909	56.779	61.501	65.003	78.196	118.953
DON17_18158	47.908	56.778	61.503	65.004	78.197	118.952
DON17_18105	47.911	56.78	61.504	65.003	78.198	118.95
DON17_17731i	47.909	56.774	61.501	65.007	78.194	118.949

2012 Sheffield River Don Undefended Max flows - RFI/2019/149170 (Flow - m³s)						
Node Point	Annual Exceedance Probability (AEP)					
	4% AEP (1 in 25)	2% AEP (1 in 50)	1.33% AEP (1 in 75)	1% AEP (1 in 100)	0.5% AEP (1 in 200)	0.1% AEP (1 in 1000)
DON17_19677	47.911	56.818	61.487	65.02	78.274	119.04
DON17_19555	47.913	56.815	61.488	65.021	78.271	119.031
DON17_19354u	47.911	56.813	61.489	65.025	78.282	119.033
DON17_19354d	47.911	56.813	61.489	65.025	78.282	119.033
DON17_19262u	47.914	56.809	61.49	65.02	78.277	119.027
DON17_19262d	47.914	56.809	61.49	65.02	78.277	119.027
DON17_19155i	47.911	56.814	61.487	65.023	78.277	119.029
DON17_19048	47.916	56.808	61.489	65.021	78.276	119.023
DON17_18965i	47.914	56.807	61.486	65.022	78.277	119.018
DON17_18883	47.916	56.807	61.491	65.019	78.273	119.021
DON17_18707i	47.917	56.796	61.489	65.023	78.275	118.999
DON17_18620	47.912	56.799	61.478	65.023	78.269	118.991
DON17_18566i	47.911	56.789	61.482	65.015	78.269	118.979
DON17_18459i	47.911	56.784	61.477	65.011	78.263	118.972
DON17_18406u	47.91	56.784	61.475	65.008	78.262	118.961
DON17_18406d	47.91	56.784	61.475	65.008	78.262	118.961
DON17_18396u	47.908	56.783	61.476	65.011	78.262	118.96
DON17_18396d	47.908	56.783	61.476	65.011	78.262	118.96
DON17_18349i	47.91	56.786	61.475	65.009	78.261	118.964
DON17_18211u	47.909	56.783	61.475	65.006	78.261	118.961
DON17_18211d	47.909	56.783	61.475	65.006	78.261	118.961
DON17_18158	47.908	56.784	61.474	65.006	78.263	118.963
DON17_18105	47.911	56.785	61.476	65.009	78.259	118.963
DON17_17731i	47.909	56.777	61.478	65.012	78.259	118.957

2012 Sheffield River Don Undefended Max Levels - RFI/2019/14970 (Level - mAOD)						
Node Point	Annual Exceedance Probability (AEP)					
	4% AEP (1 in 25)	2% AEP (1 in 50)	1.33% AEP (1 in 75)	1% AEP (1 in 100)	0.5% AEP (1 in 200)	0.1% AEP (1 in 1000)
DON17_19677	156.23	156.407	156.493	156.555	156.776	157.402
DON17_19555	155.687	155.833	155.904	155.954	156.133	156.793
DON17_19354u	154.894	154.996	155.046	155.083	155.215	156.235
DON17_19354d	154.002	154.322	154.474	154.589	154.984	156.169
DON17_19262u	153.809	154.117	154.266	154.377	154.772	155.97
DON17_19262d	153.694	153.954	154.075	154.164	154.469	155.128
DON17_19155i	153.346	153.595	153.708	153.791	154.073	154.695
DON17_19048	152.895	153.109	153.207	153.278	153.516	154.139
DON17_18965i	152.567	152.76	152.849	152.915	153.134	153.655
DON17_18883	152.314	152.491	152.574	152.635	152.834	153.339
DON17_18707i	151.855	152.028	152.108	152.167	152.359	152.898
DON17_18620	151.494	151.694	151.789	151.857	152.079	152.714
DON17_18566i	151.234	151.448	151.552	151.626	151.876	152.585
DON17_18459i	150.737	150.953	151.063	151.144	151.429	152.271
DON17_18406u	150.505	150.714	150.821	150.9	151.18	152.024
DON17_18406d	150.441	150.614	150.699	150.761	150.971	151.49
DON17_18396u	150.381	150.55	150.632	150.693	150.897	151.399
DON17_18396d	150.288	150.442	150.517	150.573	150.755	151.191
DON17_18349i	150.111	150.245	150.312	150.362	150.526	150.927
DON17_18211u	149.375	149.506	149.57	149.617	149.775	150.151
DON17_18211d	148.389	148.587	148.694	148.78	149.238	149.733
DON17_18158	147.936	148.13	148.225	148.303	148.596	149.258
DON17_18105	147.62	147.805	147.892	147.961	148.219	148.821
DON17_17731i	145.915	146.064	146.133	146.181	146.345	146.786

RFI/2019/149170 Assets Map centred on Holly Cottage, Old Mill Lane, S35 7EG

Date created: 05/12/2019



www.environment-agency.gov.uk

Scale: 1:6,000

when reproduced @ A3

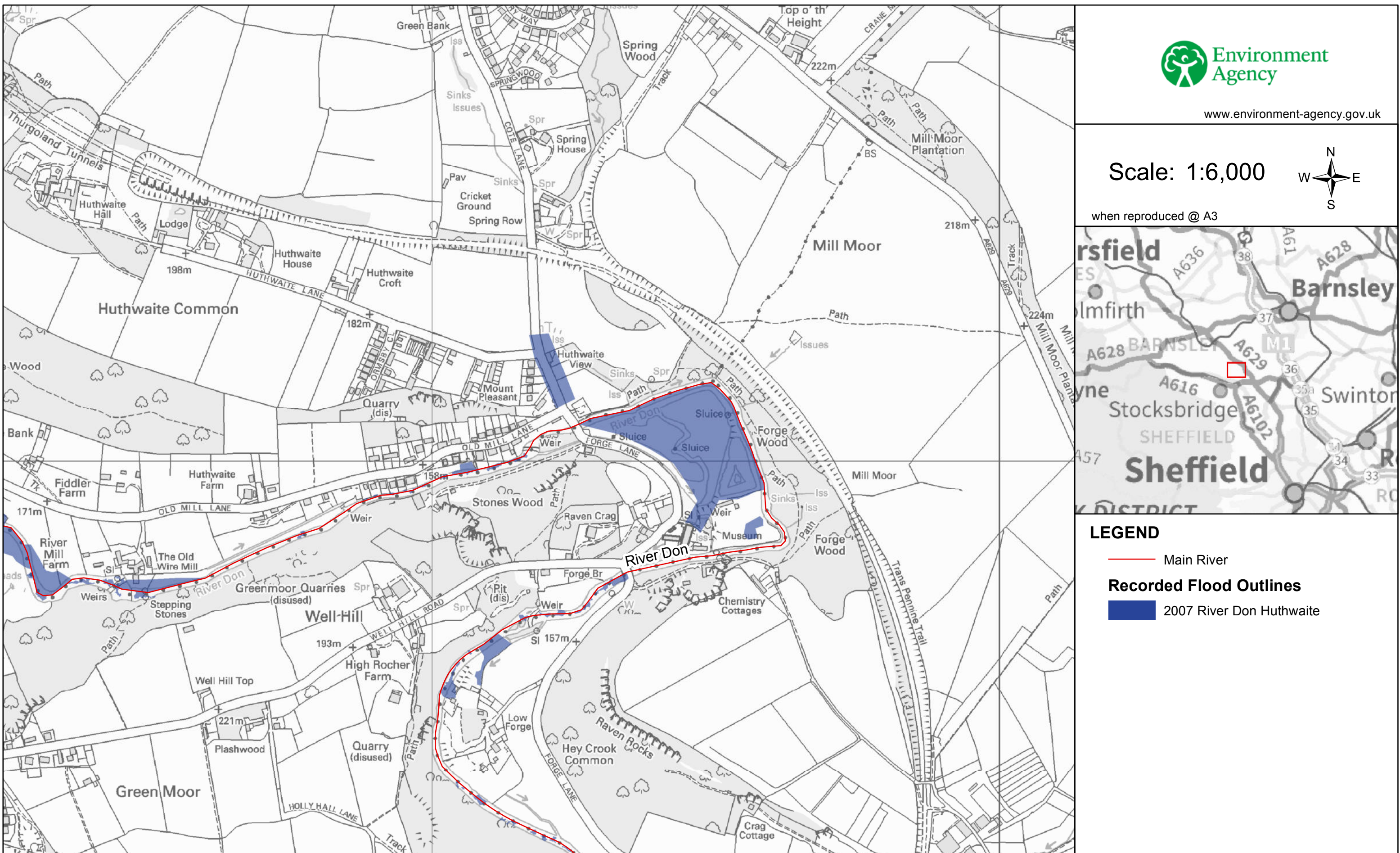
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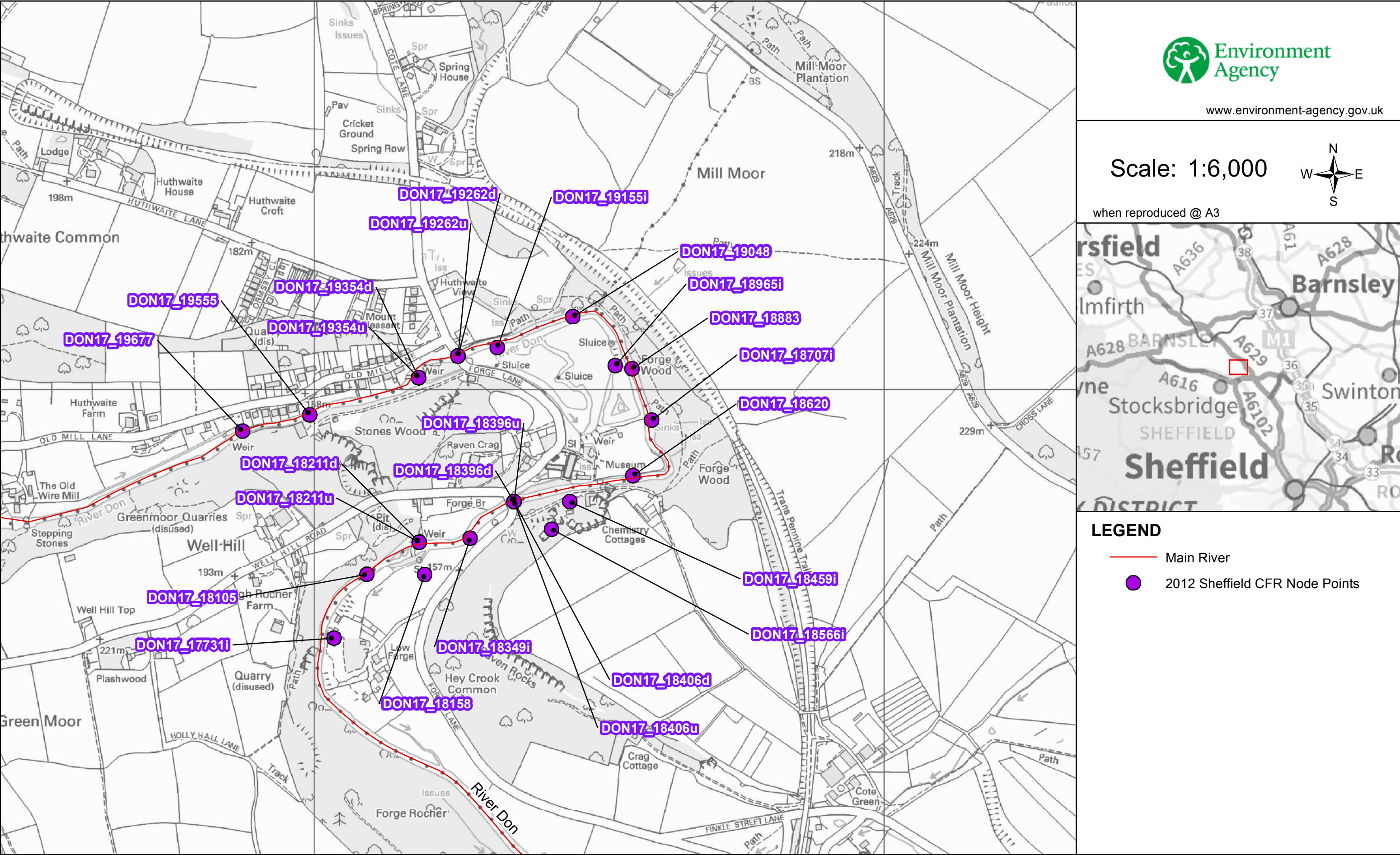
- LEGEND**
- Main River
 - Structures (3rd party maintained)
 - Defences (3rd party maintained)**
 - SUB_TYPE**
 - high_ground
 - wall

**RFI/2019/149170 Flood History Map centred on Holly Cottage, Old Mill Lane, S35 7EG.
Date created: 04/12/2019**

**RFI/2019/149170 Flood History Map centred on Holly Cottage, Old Mill Lane, S35 7EG.
Date created: 04/12/2019**



RFI/2019/149170 Node Point Map centred on Holly Cottage, Old Mill Lane, S35 7EG.
Date created: 04/12/2019





Planning advice for developers – FAQs

INTRODUCTION

Local planning authorities (LPAs) across Yorkshire are required to consult us on [certain planning applications](#) which affect flood risk, groundwater, waste, or water quality.

If your development falls into one of these categories, we'll be invited to comment on your planning application. Your LPA, when considering your application, will take our comments into account.

We've produced this guidance to summarise the environmental issues we're responsible for. The guidance forms part of our free advice service; if you require site-specific or face-to-face advice, we'll need to recover our costs through our [charged advice service](#). Engaging with us early can help you identify the big issues, reduce the chances of subsequent delays and help you design a more sustainable and attractive development.

DEVELOPMENT AND FLOOD RISK

Is my development proposal at risk of flooding?

The [flood map for planning](#) shows where flooding from rivers and the sea may occur. Whilst this map isn't suitable for a detailed flood risk assessment, it'll show which [flood zone](#) your development is located within and therefore will indicate whether further assessment is needed. You should also refer to your LPA's [strategic flood risk assessment](#) which will provide additional local information on flood risk, including the location of functional floodplain and areas which are susceptible to other sources of flooding such as from surface water or reservoirs.

Will my application need to pass the sequential and exception tests?

Local planning authorities apply the [sequential test](#) to steer development towards areas at the lowest risk of flooding. If your proposal is located within flood zones 2 or 3, you should contact your LPA to discuss the sequential test **before** submitting your application. The LPA may require you to submit information with your application in support of the sequential test.

If the LPA confirm that the sequential test has ruled out steering the development to lower risk sites, the development may also need to pass the [exception test](#) by demonstrating that its sustainability benefits outweigh flood risk and that it can be made safe for its lifetime, through the production of a site-specific flood risk assessment. [Planning practice guidance](#) advises when an exception test will be required, which will depend on the [vulnerability of the development](#) and the flood zone it lies within.

Do I need to submit a flood risk assessment with my planning application?

You'll need to submit a flood risk assessment if your application lies within flood zones 2 or 3 or is over 1 hectare within flood zone 1. You'll also need to submit an assessment if your proposal could be affected by sources of flooding other than from rivers or the sea. For certain lower risk applications, we've provided '[flood risk standing advice](#)' which enables local planning authorities to assess flood risk assessments without the need to consult us.

What information should I include in my flood risk assessment?

We recommend that you refer to the checklist for a [site-specific flood risk assessment](#) for detailed advice on what to include in your flood risk assessment. Alongside referring to your LPA's strategic flood risk assessment, you should contact your LPA to find out whether there are any development guidelines which are specific to your locality.

Can I undertake my own flood risk assessment?

Your FRA must be appropriate to the scale, nature and location of the development whilst being credible and fit-for-purpose. Whilst it's possible to undertake your own assessment, most applicants employ suitably experienced professionals. We're not able to recommend specific consultants, but a simple web search should help you source a competent individual or company.

Do I need to consider how climate change will affect my proposal's flood risk?

Yes, you should demonstrate how flood risk will be managed now and over the development's lifetime, taking climate change into account. Please refer to the following [guidance](#) when undertaking your flood risk assessment. In some cases we'll hold the climate change flood data you need. In others you'll need to undertake your own analysis to understand the impacts.

Where can I get modelled or historic flood levels from?

Email our Customers and Engagement team (neyorkshire@environment-agency.gov.uk) to find out whether we have any modelled or historic flood levels available for your development site. A list of the packages of information we're able to provide can be found under the 'get information to complete an assessment' section of the [planning practice guidance](#). They'll aim to provide this information within 20 days. We no longer charge for providing this information.

The risk portrayed by your flood map doesn't seem to reflect the site's actual risk. How do I 'challenge' your flood map?

If you have evidence suggesting that our flood map is inaccurate, please contact our Customers and Engagement team (neyorkshire@environment-agency.gov.uk) who will provide you with any existing data we hold. To formally contest our flood zones, you'll need to submit supporting evidence, such as digital copies of a topographic survey or modelling for quality assurance purposes. Digital files of the proposed new flood zones in ArcMap or MapInfo format should also be supplied. Any new outline data you submit must conform to our flood zones policy, copies of which are available on request.

Whilst we'll usually be happy to review any topographical survey or model prior to the application being submitted, we would have to recover our costs for this work. In some cases where work to review and update our existing models is already underway, we may decline to consider a challenge.

As we have to be certain that the data which informs our flood map is fit-for-purpose, any revisions will need to meet stringent quality checks.

SURFACE WATER AND DRAINAGE

Who's responsible for managing surface water?

[Lead local flood authorities](#) are responsible for providing advice on the management of surface water resulting from new [major](#) development. [Internal drainage boards](#), where established, have permissive powers to manage water levels within their drainage districts, so also play a key role in managing surface water.

Will I need to provide surface water storage and limit the discharge rate?

You should contact your lead local flood authority to discuss surface water discharge rates and storage requirements. Typically, they'll ask that your development does not increase run-off and limits the discharge to the existing greenfield run-off rate (usually 1.4l/s/ha if not calculated).

Do I need to install sustainable drainage systems?

[Sustainable Drainage Systems \(SuDS\)](#) should always be carefully considered in discussion with your lead local flood authority. A SuDS scheme can reduce flood risk, improve water quality, create better habitats for wildlife, and produce pleasant, more amenable places for people.

Infiltration drainage must not, however, pose a risk to groundwater quality. All infiltration SuDS must:

- Meet the groundwater protection criteria set out on [GOV.UK](https://www.gov.uk)
- Not be constructed in ground affected by contamination

Who should I contact about connecting my development to the mains sewer?

Talk to your water company about connecting to their sewerage system. Here are some contact details for water companies operating in the Yorkshire Environment Agency area:

Yorkshire Water	planningconsultation@yorkshirewater.co.uk
Northumbrian Water	developmentenquiries@nwl.co.uk
Severn Trent Water	new.connections@severntrent.co.uk

My development is a long way from the mains sewer. Can I install a 'non-mains' drainage system, such as a package treatment plant?

New development should connect to the public mains sewer wherever possible. Individual treatment plants can deteriorate local water quality and are more challenging to monitor and regulate. If you can't connect to the mains sewer, your planning submission should outline how you will deal with foul drainage discharge. You should include evidence as to why it is not possible to connect to the mains system, including details of any prohibitive costs. Please

note that some 'non-mains' foul water drainage systems will require an environmental permit, irrespective of any planning approval.

OTHER ENVIRONMENTAL CONSIDERATIONS

What other environmental issues will you consider with my planning application?

Your planning application will need to demonstrate that any environmental risks can be managed, through design and construction, for the development's lifetime. Alongside flood risk, the key environmental risks we'll consider are:

- **[Land Contamination](#)**
We're mainly interested in those sites where there is a risk of pollution to controlled waters. You should investigate any contamination to see whether the environmental risk or cost of clean-up (remediation) would hinder your proposal. If contamination is known or suspected, a desktop study, investigation, remediation and other works may be required to enable safe development. Our [model procedures for the management of land contamination](#) provide further information.
- **[Pollution prevention](#)**
Your application should demonstrate how you'll minimise the risk of pollution from all aspects of your development, including construction and

operation phases. Groundwater can be vulnerable to pollution, as well as rivers and streams. Some areas (source protection zones and aquifers) are especially sensitive to pollutants as they typically supply public drinking water. To find out whether your development is located in an area sensitive to groundwater pollution, visit our interactive [maps](#). Advice on groundwater protection can be found on [GOV.UK](#)

- **Fisheries, biodiversity, geomorphology and protected species**

If your proposal is likely to affect the ecology of a main river, you'll need to carry out a risk assessment. This assessment should show that your development can proceed without demonstrable harm, and should propose mitigation, compensation or enhancements where required. A survey should be carried out if any protected species are thought to be nearby. If this survey confirms the presence of protected species or their habitat, measures should be taken to manage the development's risks. Natural England are the statutory consultee for other biodiversity-related matters. Further information on their remit can be found on [GOV.UK](#)

- **Water framework directive**

If your proposal affects ground or surface waterbodies, you'll need to consider the [Water Framework Directive](#) (WFD) and the actions set out in the [Humber River Basin Management Plan](#). You'll also need to submit a [WFD Assessment](#) demonstrating how the development will prevent deterioration and improve the waterbody's ecological status.

- **River buffer zone**

Your development should ensure that an 8m strip of land (planted with locally appropriate, native species) is left undisturbed next to the bank of any main river. This 'river corridor' will improve habitat connectivity and will ensure we're able to access the bank for any future flood defence construction and maintenance.

- **Culverting**

We're opposed to culverting. Culverts degrade watercourses' ecology and prevent the movement of wildlife and fish. As culverts can easily become blocked, they increase flood risk. They're also difficult to inspect and maintain. We may object to any planning applications involving culverting on a main river and may refuse to grant an environmental permit. Existing culverts should be removed and the river channel and bankside habitat reinstated to restore the ecological continuity of the river channel and its corridor.

Will I need any other Environment Agency permits for my development?

You might need an environmental permit if your development manages or produces waste or emissions that pollute the air, water or land or is work that affects a [main river](#) or a sea defence. The lead local flood authority is responsible for any consents relating to ordinary watercourses.

The [Environmental Permitting Regulations \(England and Wales\) 2015](#) cover water discharges, groundwater activities, flood risk activities, radioactive substances, waste, mining waste and installations. They also include provision for a number of directives including batteries. Further information, including contact details for further permitting related enquiries, can be found [here](#).

As planning and permitting decisions are often closely linked, we have issued detailed [guidance for developments requiring planning permission and environmental permits](#). This guidance explains how, when responding to planning consultations that require environmental permits, we will advise of three possible positions:

- No major permitting concerns
- More detailed consideration is required and parallel tracking is recommended
- Don't proceed – unlikely to grant a permit.

PRE-APPLICATION ADVICE

Can you provide site-specific advice, review a submission document, or attend a site meeting before I submit my planning application?

We encourage you to seek pre-application advice as it can help you solve key environmental issues early, reduce the chance of an objection and help you design a more sustainable development. If you'd like to take advantage of this service, please email our Sustainable Places team so that we can provide further details and estimated costs.

Please note that any pre-application guidance we provide doesn't represent our final view in relation to any future planning application. We recommend that you seek your own expert advice prior to submitting your application.

Who should I contact for further information?

Yorkshire planning enquiries: sp-yorkshire@environment-agency.gov.uk

General enquiries: 03708 506 506

Environment Agency, Lateral, 8 City Walk, Leeds LS11 9AT
<https://www.gov.uk/government/organisations/environment-agency>

The Flood Map for Planning

The Flood Map for Planning (Rivers and Sea) can be viewed and downloaded as a PDF file on GOV.UK by following this link: <https://flood-map-for-planning.service.gov.uk> or downloaded in GIS format under an open data licence from the following address: <https://data.gov.uk/publisher/environment-agency>

Please type Flood Map for Planning in the search box.

What is the Flood Map for Planning?

The Flood Map for Planning provides information on flooding from rivers and the sea for England and Wales. The Flood Map also has information on flood defences and the areas benefiting from those flood defences.

The Flood Map for Planning shows the following:

1. Flood Zone 3 (dark blue area on the enclosed map): natural flood plain area that could be affected by flooding from rivers and/or the sea – not taking into account the presence of any flood defences
 - For flooding from rivers the map indicates the extent of a flood with a 1% (1 in 100) chance of happening each year;
 - For flooding from the sea the map shows the extent of a flood with a 0.5% (1 in 200) chance of happening each year.
2. Flood Zone 2 (light blue area): natural flood plain area that could be affected by flooding from rivers and/or the sea – not taking into account the presence of any flood defences. Flood Zone 2:
 - indicates the extent of a flood with a 0.1% (1 in 1000) chance of happening each year.
 - and/or indicates the greatest recorded historic flood, whichever is greater.
3. Flood defences built in the last five years to protect against river floods with a 1% (1 in 100) chance of happening each year, together with some natural or constructed entities which retain, store or channel water and which may protect against smaller floods.
4. Areas benefiting from flood defences - areas that benefit from the flood defences shown, in the event of a river flood with a 1% (1 in 100) chance of happening each year, or a flood from the sea with a 0.5% (1 in 200) chance of happening each year. If the defences were not there, these areas would flood.

Flood History

Please refer to the following table detailing the causes of those past floods.

Name	Start Date	End Date	Flood Source	Flood Cause	Source of data
2007 River Don Huthwaite	15/06/2007	30/06/2007	Main River	Channel Capacity	Local Authority

Flood History

To the best of our knowledge there is no known flood history for this site. However, in close proximity to this location we do have some flood history available (see enclosed map). The extent of flooding, and/or flood level information is only shown for those watercourses surveyed after the flood. Other flooding may have occurred which is not shown. This is the best information currently available.

Water causing flooding can come from different places, for example from rivers or the sea; surface water (i.e. rainwater flowing over or accumulating on the ground before it is able to enter rivers or the drainage system); overflowing or backing up of sewers or drainage systems which have been overwhelmed or from groundwater rising up from underground aquifers.

Assets

Asset Location Map

Please find attached asset map(s) showing location of all (Agency and non Agency maintained) flood defences and channels.

Description of Works

See attached table with description of the defences and structures shown on the above drawing, including condition ratings, upstream and downstream crest levels, where available.

Risk of Flooding – Environment Agency Defences

The risk of flooding in this area is now reduced by the presence of flood defences that we maintain, but there still is a residual risk of flooding if these were to breach or be overtopped by a flood greater than that for which they were designed.

Risk of Flooding – Privately Maintained Defences

You will see that the Environment Agency does not maintain any of those defences. However we undertake regular risk based visual inspections. We do not hold design levels and have no height information on these defences or structures.

Asset Condition Ratings

The performance of a flood defence asset is recorded as the condition of the asset. Our asset inspectors subjectively assess the conditions of assets (during visual inspection site visits) with reference to a national standard template. Each asset is given a rating between one and five

with one being very good condition and five being very poor. A condition rating of 3, or 'fair' is the minimal acceptable standard for a critical asset, such as a defence wall that protects properties. We are striving to improve all assets below 'fair' to an acceptable standard.

Asset inspections are done on average every six months, although some critical assets are assessed on a more regular basis. It is possible that adjacent assets are inspected on different dates, which may result in two assets of a similar state of repair having different condition ratings.

Condition ratings of assets may also be affected by the time of year the surveys are conducted, as vegetation may obscure the asset in the summer months, or accessibility may be an issue during winter months. These factors would not usually affect the recorded condition rating of an asset unless the asset is on a borderline between two ratings.

Asset Standard of Protection

Please note that the provided Design Standard of Protection is an estimate and should not be relied on. Please note that where available the defended flood extents provide more reliable information relating to the protection offered by the defence (i.e. at which return period the water levels are likely to overtop the defence). If available and required the defended flood extents can be provided on request.

Modelling

2012 Sheffield Comprehensive Flood Review Model

Please see enclosed:

- Table of results for peak water levels for the 0.1% (1 in 1000), 0.5% (1 in 200) 1% (1 in 100), 1.3% (1 in 75), 2% (1 in 50) and 4% (1 in 25) Annual Exceedance Probabilities (AEP)
- and a map showing the location of the model node points

Please note that the climate change scenario for this model is not available. *If this information will be used to produce a flood risk assessment you will be expected to generate climate change levels for setting finished floor levels etc.*

Lower Don Valley FAS Post Scheme Modelling is expected to be available in December 2019. However please note that this is an estimate timescale and therefore subject to change

Please note that the defended levels have not been verified and may change following an update.

Climate Change

Updated guidance on how climate change could affect flood risk to new development - '[Flood risk assessments: climate change allowances](#)' was published on gov.uk on 19 February 2016. You should confirm the flood risk vulnerability classification and lifetime of your proposed development in line with NPPF and apply the appropriate climate change allowances.

Bespoke Flood Risk Assessment (FRA) advice:

If the pre-application advice is required with regards the preparation of a site-specific Flood Risk Assessment, this can be requested via the Yorkshire Sustainable Places team (email: sp-yorkshire@environment-agency.gov.uk). Charges may apply for any advice that is provided, this currently stands at £100 per hour per person. The [gov.uk](https://www.gov.uk) pages provide a good starting point on what to include within a site-specific Flood Risk Assessment and can be accessed via <https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>. A site-specific Flood Risk Assessment will need to consider flood risks from all sources, including those associated with defence failure (e.g. breach) and accounting for the predicted impacts as a result of climate change. Please contact the Sustainable Places team if you require advice on how to include these within a Flood Risk Assessment.

Surface Water Map

Lead Local Flood Authorities (LLFA) are responsible for managing local flood risk from surface water flooding and groundwater flooding. You should check with the LLFA as they may have more up to date information regarding this type of flooding.

The Risk of Flooding from Surface Water Flood Map can be viewed and downloaded as a PDF file on GOV.UK by following this link: <https://flood-warning-information.service.gov.uk/long-term-flood-risk>

Surface Water Drainage

The Lead Local Flood Authority is the statutory consultee for planning matters relating to surface water drainage, therefore it is recommended they should be consulted separately regarding this.

Surface water discharge from new development should ideally 'mimic' the pre-development situation using a sustainable drainage system so that the flow and volume of water in watercourses is not increased.

A permit may be required, under the Environmental Permitting Regulations 2010 from the Environment Agency for any proposed works or structures in, under, over or within eight metres of a 'main river' (e.g. a new outfall). A permit is separate to and in addition to any planning permission granted. Further details and guidance are available on the GOV.UK website: <https://www.gov.uk/guidance/flood-risk-activities-environmental-permits>

Risk of Flooding from Reservoirs Map

Outlines and simplified depth and velocity maps can be viewed on our website:

<https://flood-warning-information.service.gov.uk/long-term-flood-risk/#x=438988&y=406600&scale=2>

Please, zoom into the location of interest, and then click on the inundated location for details. As a result a list of reservoirs will be provided with supporting information and a links to other data, such as estimated depths and speed of flooding, at the bottom of the result page.

A map of showing the outlines can also be provided on request.

Flood Warning

The site is not covered by a Flood Warning.

LIDAR Data

Please note that our LiDAR data is now available free of charge (Open Data) from <http://environment.data.gov.uk/ds/survey/index.jsp#/survey> (once zoomed to the relevant location the available LiDAR products will be listed below the map).

Two LIDAR products are available:

1. Tiled LIDAR data - The full tiled dataset consists of historic LIDAR data which has been gathered since 1998. For some areas we have carried out repeat surveys and data is available in a range of resolutions.
2. Composite LIDAR data - The composite dataset is derived from a combination of our full tiled dataset which has been merged and re-sampled to give the best possible spatial coverage.

Light Detection and Ranging (LIDAR) is an airborne mapping technique, which uses a laser to measure the distance between the aircraft and the ground. This technique results in the production of an accurate, cost-effective terrain model suitable for assessing flood risk and other environmental applications.

The Environment Agency owns two LIDAR systems, which are installed in a survey aircraft along with its other operational remote sensing instruments.

The aircraft is positioned and navigated using Global Positioning System (GPS) corrected to known ground reference points. The aircraft typically flies at a height of about 800 metres above ground level and a scanning mirror allows a swath width of about 600 metres to be surveyed during a flight.

The Rights & Responsibilities of a Riverside Owner

The owner of property adjacent to a watercourse is usually deemed to be the riparian owner and, as such, has both riparian rights and responsibilities with regard to the watercourse within their ownership.

For more information on Rights and Responsibilities of a riverside owner, you can visit our website at:

<https://www.gov.uk/guidance/owning-a-watercourse>

Ordnance Survey Data

Under the terms of our licence agreement with the Ordnance Survey, we are unable to supply the OS data. Under this agreement we can only supply OS data to consultants/contractors carrying out work on our behalf.

Flood Portal

It's a new 'one-stop shop' web portal providing guidance and information on flood risk management in the UK. Arup have written and designed the site, in conjunction with CIRIA, the Local Government Association, the EA and Defra, primarily as a resource for local authority officers, flood risk management professionals, and others with an interest in flood risk. It's a part of the Capacity Building Strategy. <http://www.local.gov.uk/floodportal>

Environmental Sensitive Receptors

We have records of the below possible sensitive receptors in the immediate vicinity of the site (NGR: SE2921200073)

- Stones Wood ancient woodland directly to the South of the River Don
- Glow worm Silkstone Common Local Wildlife Site to the North and East of the site
- Forge Rocher and Tin Mill Rocher Local Wildlife Site 1km downstream
- Deciduous woodland (various locations)
- Trout
- Bullhead
- Eel

Groundwater

Unfortunately, we do not hold any information relating to groundwater flooding in this area. If you want to find out if your site could be at risk of flooding from groundwater or may have flooded in the past you should contact your Lead Local Flood Authority.

Lead local flood authorities (LLFAs) have responsibilities for local flood risk (including groundwater) under the Flood and Water Management Act 2010. This Act gives LLFAs duties to prepare local flood risk management strategies and to co-operate with other risk management authorities, and powers to carry out local flood risk management.

We do not have any groundwater monitoring stations located within 10km of the site, and as such do not hold details of groundwater levels in the vicinity of the site.

Appendix 5 – Barnsley Metropolitan Borough Council Correspondence

From: **Atkins , Wayne** <WayneAtkins@barnsley.gov.uk>
To: **Helena Du-Roe** <helena.du-ro@enzygo.com>
Subject: RE: Customer contact for action - Flooding advice enquiry
Date: 28.11.2019 09:12:30 (+0000)

Helana,

The Council have no records of any culverted or open watercourses crossing the site indicated on the attached plan.

Part of the site lies within flood zone 2 and 3, advice should be sought from the Environment Agency regarding building in this area.

There is a foul sewer in Old Mill Lane, The developer should contact Yorkshire Water if they wish to discharge to these sewers to discuss allowable discharge rates.

If discharge is proposed to the River Don then permission should be sought from the Environment Agency to discuss allowable discharge rates.

The developer's attention is drawn to the following:

There should be no increase in surface water runoff from the new development. NPPF recognizes that the management of flood risk is not simply restricted to flood plains and that a catchment-wide approach should be employed.

There are alternatives to conventional storage for the control of surface water run-off that are favoured by the authority where ground conditions are suitable. Sustainable Urban Drainage techniques (SUD's) tackle surface water run-off problems at source using features such as soakaways, permeable pavements, grassed swales, infiltration trenches, ponds and wetlands to attenuate flood peak flows, produce water quality improvements and environmental enhancements.

The authority seeks to promote the use of SUD's techniques to this site and the authority expects the developer of the site to submit detailed investigations such that the use of SUD's has been fully explored.

Regards

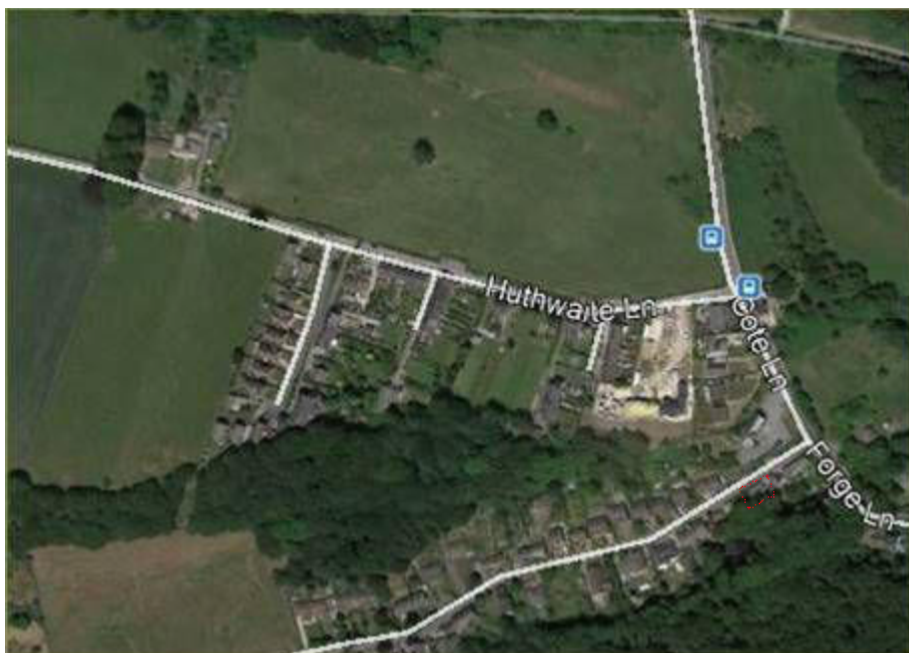
Wayne Atkins
Principal Engineer – Asset Management
Environment & Transport
Place Directorate
Barnsley Metropolitan Borough Council

Telephone: 01226 772182
E-mail: wayneatkins@barnsley.gov.uk

From: Helena Du-Roe [mailto:helena.du-ro@enzygo.com]
Sent: 20 November 2019 10:35
To: Atkins , Wayne
Subject: RE: Customer contact for action - Flooding advice enquiry

Hi Wayne,

Please see below for the location of the Site. The National Grid Reference of the Site is 429188, 400053. At this initial stage we do not have many details in regards to the Site apart from it being a single residential dwelling.



Should you require any additional information please let me know.

Kind Regards,

Helena Du-Roe BSc (Hons), MCIWEM
Environmental Consultant



Enzygo Ltd,
Offices in Bristol, Sheffield and Manchester

[Landscape](#), [Hydrology](#), [Permitting](#), [Ecology](#), [Geo-environmental](#), [Noise](#), [Transport](#), [Planning](#) and [Arboriculture](#)

Tel: +44 (0) 114 321 5151

Email: helena.du-roe@enzygo.com

Web: www.enzygo.com

View my profile on 

Registered Office: Stag House, The Chipping, Wotton under Edge, GL12 7AD

Registered in England & Wales registered number: 06525159 **VAT number:** 283 2596 77



At Enzygo Ltd we merit any and all comments received from our clients, take pride in providing an excellent service and place value on our ability to correct error. Should you wish to comment on any aspect of the service that I personally, or Enzygo Ltd as a whole, have given you, please reply through my e-mail address above, or email hello@enzygo.com (in confidence - if appropriate).



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From: Atkins , Wayne <WayneAtkins@barnsley.gov.uk>
Sent: 20 November 2019 10:23
To: Helena Du-Roe <helena.du-ro@enzygo.com>
Subject: RE: Customer contact for action - Flooding advice enquiry

Hi,

Thank you for your enquiry.

Please can you send me a location plan and a site layout plan.

Thanks

Wayne Atkins
Principal Engineer – Asset Management
Environment & Transport
Place Directorate
Barnsley Metropolitan Borough Council

Telephone: 01226 772182
E-mail: wayneatkins@barnsley.gov.uk

From: Highway Maintenance
Sent: 06 November 2019 11:18
To: Atkins , Wayne
Subject: FW: Customer contact for action - Flooding advice enquiry

Please tell us more about your enquiry and what you'd like us to do

To whom it may concern, Enzygo have been commissioned to undertake a flood risk consultation for a proposed

outline planning application at Land adjacent to Holly Cottage, Thurgoland (the 'Site'[NGR 429188, 400053]). Environment Agency online mapping flood map shows that the northern extent of the Site is located within Flood Zone 1; which is land outside the 1 in 1000-year (<0.1% Annual Exceedance Probability [AEP]) extent of fluvial (river) flooding, at 'low' risk. The southern extent of the Site is within Flood Zone 2 and 3. Flood Zone 2 is land located between the extents of the 1 in 100-year and 1 in 1000-year (<1% to >0.1% AEP) event, at 'medium' risk. Flood Zone 3 is land located within the extent of the 1 in 100-year (1% AEP) event, at 'high' risk. Environment Agency online surface water mapping shows the southern extent of the Site is at risk surface water flooding, associated with a surface water flow pathway. The flow pathway is likely to be associated with fluvial flooding from the River Don. As part of completing initial flood risk consultations it is considered appropriate to contact the Lead Local Flood Authority to determine the points outlined below. I was hoping someone may have records of flooding for the local area events pertaining to the site area plus other information of value to my enquires. Please note that we are also consulting the Environment Agency and have also reviewed the local SFRA: • Do you have any records of historic flooding events on this site, either from fluvial sources and other sources (i.e. surface water, sewers, groundwater, reservoir etc.)? If you are aware of historical flooding at the site, can you please provide us with details of these historical flood events where it is available, including flood levels, estimated return periods, photographs, and other such data as may be relevant to our study? • Do you have any information on drainage within the site and in the local area, including any known drainage problems on site and in the local area? • Please can you also indicate to us whether the LLFA is aware of any relevant environmentally sensitive receptors (such as aquatic wildlife in receiving watercourses, etc.) in the area around the site that we should be aware of when preparing this Flood Risk Assessment? • Do you have any set discharge rates, requirements for betterment when discharging to local watercourses if any? Many thanks and I look forward to your response in due course. Kind Regards, Helena Du-Roe
Environmental Consultant, BSc (hons), MCIWEM Enzygo Ltd

Kim Fox

Asset Technician

Development

BMBC

Tel : 01226 773589

Email: kimfox@barnsley.gov.uk

From: BarnsleyMBC

Sent: 06 November 2019 11:15

To: Highway Maintenance

Subject: Customer contact for action - Flooding advice enquiry



Customer contact for action - Flooding advice enquiry

You have received a new submission through the council website.

[View the submission details](#)

You must be connected to the corporate network to access this link.

Please do not reply to this e-mail as it's sent from an unattended mailbox. Do not forward this email

as it may contain sensitive information.

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Appendix 6 – BGS Borehole Records

**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 203535 : BGS Reference: SK29NE5

British National Grid (27700) : 429008,399941 [Report an issue with this borehole](#)

<< < Prev Page 1 of 14 Next > >>

SK 29 NE/3

RECORD OF WELL (SHAFT OR BOREHOLE)

At GREEN MOOR QUARRIES
Town or Village HUNSFORD County YORKS. Six-inch quarter sheet 144
Exact site Plan attached. (A rough sketch or a tracing map is very desirable)
in parish of _____
Level of ground surface above sea-level (O.D.) 516.30 ft. If well starts below ground surface, state how far _____
Shaft 202 ft., diameter _____ ft. Bore 202 ft. Diameter of bore: at top 27 ins.; at bottom 27 ins.
Details of permanent lining tubes (internal diameters preferred) _____
Record of 87/144 A. in folder attached.
Water struck at depths of (feet) _____
Rest-level of water below top of well _____ feet. Suction at _____ feet. Yield on _____ hours' test
above _____ days' test
_____ gallons per _____ (with pump of capacity _____ g.p.h.); depressing water level to _____ feet
below top. Time of recovery _____ hrs. Amount normally pumped daily _____ g.p.h. for _____ hours.
Quality (attach copy of analysis if available) _____
Sunk by _____ for Mr. Bansley Waterworks Dep't. Date of well 16.2.48 - 11.5.48.
Information from Visited by R.A. Dyer - V.A. Dyer 16.6.48.

(For Survey use only). GEOLOGICAL CLASSIFICATION.	NATURE OF STRATA (and any additional remarks).	THICKNESS		DEPTH	
		Feet.	Inches.	Feet.	Inches.
	No record	1	52	1	52
	Soft brown clay & gravel	5	0	5	0
	Grey shale, clay & gravel	13	3-46	18	5-49
	Very hard grey shale	2	0-61	20	6-10
	Hard rock	6	1-83	26	7-92
	Hard grey shale with bands of rock	4	1-22	30	9-14
	Hard massive sandstone	9	2-94	39	11-89
	Grey siltstone. Micaceous, with many sandstone lenticles & laminations	6	1-83	45	13-72
	Fine micaceous sandstone with many micaceous planes. False bedding at 100'	2	0-61	47	14-33
	Coarse grey siltstone. Micaceous, with much planar deluv.	67	20-57	114	34-70
	Grey-brown sandstone. Fine micaceous with micaceous bedding planes. Reacts with weak hydrochloric acid.	0	15	115	05
	Micaceous sandstone	6	1-83	121	36-88
	Sandstone and coarse siltstone interbedded	6	1-83	127	38-71
	Sandstone with many siltstone laminations	6	1-83	133	40-59
	Micaceous sandstone	8	2-44	141	42-48
	Dark grey siltstone with occasional sandstone laminations	5	1-52	146	44-50
	Fine sandstone and grey siltstone interbedded and interbedded. Small scale false bedding and 1" bands of clay at top	4	1-22	150	45-72
	Dark grey fine siltstone with sandstone laminations and thin bands especially 166-176.	10	3-05	160	48-77
	Cores not extracted	12	19	172	6-46
		40	0-61	200	0
		2	0	202	0
		✓		✓	

Water level at start of rotary boring (39') 12' 6" down.

PT. 6 12		25'4" "					
British Geological Survey		British Geological Survey		British Geological Survey			
GEOLOGICAL SURVEY AND MUSEUM. SOUTH KENSINGTON. LONDON. S.W.7.				For Survey use only			
Date received		G.S.M. Office File No.		Site marked on 1" map (use symbol)			
30.11.48				C		(*11815) Wt.29051/0.869 10,000 9/39 A.& E.W.Ltd. Gp.686	



RECORD OF WELL (SHAFT OR BOREHOLE)

1" N.S. 1" O.S. SK 29/5R
GRI 144
R61

GREENMOOR QUARRIES
Town or Village HUNSFORD County YORKS.
Exact site Plan attached SK 29 NE 5 (2902 9994) Six-inch quarter sheet 32
(A rough sketch or a tracing map is very desirable)
in parish of
Level of ground surface above sea-level (O.D.) 56.30 ft. If well starts below ground surface, state how far
Shaft ft., diameter ft. Bore 202 ft. Diameter of bore: at top 27 ins.; at bottom 24
Details of permanent lining tubes (internal diameters preferred)
Water struck at depths of (feet)
Rest-level of water below top of well feet. Suction at feet. Yield on hours' test
gallons per (with pump of capacity g.p.h.); depressing water level to feet
below top. Time of recovery hrs. Amount normally pumped daily g.p.h. for hours.
Quality (attach copy of analysis if available)
Sunk by for Mr. Bensley Waterworks Dept. Date of well 16.2.48 - 11.5.48.
Information from Visited by R.A. Allen - V.A. Dyles 16.6.48.

(For Survey use only).
GEOLOGICAL
CLASSIFICATION.

NATURE OF STRATA
(and any additional remarks).

Feet. Inches. Feet. Inches.

5 0 5 0
13 0 18 0
2 0 20 0
6 0 26 0
4 0 30 0
9 0 39 0
6 0 45 0
2 0 47 0
67 6 114 6
6 115 0
6 0 121 0
6 0 127 0
6 0 133 0
8 0 141 0
5 0 146 0
4 0 150 0
10 0 160 0
40 0 200 0
2 0 202 0

Mo. reced
Soft brown clay & gravel
Grey shale, clay & gravel
Very hard grey shale
Hard rock
Hard grey shale with bands of rock
Hard massive sandstone
Grey siltstone. Micaceous, with many sandstone
lenticles & laminations
Fine micaceous sandstone with many micaceous
planes. False bedding at 100'
Coarse grey siltstone. Micaceous, with much planar
dip
Grey-brown sandstone. Fine micaceous with
micaceous bedding planes. Reacts with
weak hydrochloric acid.
Micaceous sandstone
Sandstone and coarse siltstone interbedded
Sandstone with many siltstone laminations
Micaceous sandstone
Dark grey siltstone with occasional sandstone
laminations
Fine sandstone and grey siltstone interbedded and
interbedded. Small scale false bedding and
1" bands of chert at top
Dark grey fine siltstone with sandstone lamination
and thin bands especially 166-176.
Cores not extracted

Water level at start of boring (29') 12' 6" down.
" " " " " 25' 4" "

British Geological Survey

GEOLOGICAL SURVEY AND MUSEUM.
SOUTH KENSINGTON.
LONDON, S.W.7.

British Geological Survey

For Survey use only

Date received 30.11.48	G.S.M. Office File No.	Site marked on 1" map (use symbol) 
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(*11815) Wt.29051/0.369 10,000 9/89
A.& E.W.Ltd. **Gp.686**

British Geological Survey



**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 203535 : BGS Reference: SK29NE5

British National Grid (27700) : 429008,399941 [Report an issue with this borehole](#)

<<

[< Prev](#)

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[Next >](#)

2. 1063 Wt. 22438/0384 10m 7/45 (51) F.&S. **SK 29 NE 15** (For Survey use only) N. 2180
RECORD OF WELL (SHAFT OR BORE) 1. Map Registered No. 87/144
At *Green moon Quarries, nr Village* *Parish of Hunsbelf*
Town or Village *of Thurgoland*
County *YORKS (W.R.)* Six-inch quarter sheet *282 NW/4*
For *Mr. Co. Boro. of Barnsley*
Exact site of well *British Geological Survey*
Level of ground surface *British Geological Survey* If well-top is not at ground level, state how far *above;*
above sea level (O.D.) *516.3* ft. *OD* *below;* *—* ft.
SHAFT *—* ft.; diameter *—* ft. Details of headings *—*
BORE *200* ft.; diameter of bore: at top *27* ins.; at bottom *24* ins. Lengths,
diameters, perforations, etc., of lining tubes *21" dia. Perforated tubes from 200 ft*
up to 32' 5". 24" diameter solid tubes 0 to 39 ft
Water struck at depths, below well top, of (feet) *Unknown*
Rest-level of water *25* ft. *above* well-top. Suction at *—* ft. Yield on *—* hours' pumping, *—* gal.
per *—* with depression to *—* ft. below well-top, Capacity of pump *—* g.p.h. Recovery to
rest level in *—* mins. Date of measurements *—* Date of well *16/2/48*
Quality of water (attach copy of analysis if available) *—*
Well made by *John Thom Ltd*
Information from *Barnsley Corporation Waterworks Dept.*
Additional notes in space overleaf.

[illegible]

British Geological Survey

British Geological Survey

Continued over leaf

British Geological Survey

GEOLOGICAL SURVEY AND MUSEUM, SOUTH KENSINGTON, LONDON, S.W.7.	Date received	Correspond- ence File No.	1" N.S. Map No.	1" O.S. Map No.	Site marked (use symbol)	
					on 1" Map	on 6" Map
	30.11.48		87		Q	Q



**British
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NATURAL ENVIRONMENT RESEARCH COUNCIL

<< < Prev Page 4 of 14 Next > >>

[illegible]

Continued over leaf

British Geological Survey

GEOLOGICAL SURVEY AND MUSEUM,
SOUTH KENSINGTON,
LONDON, S.W.7.

Date
received

30.11.48

British Geological Survey

Correspond-
ence File No.

1" N.S. Map
No.

87

1" O.S. Map
No.

Site marked (use symbol)
on 1" Map on 6" Map

Q

Q

Appendix 7 – Drainage Calculations



Greenfield runoff rate estimation for sites

www.uksubs.com | Greenfield runoff tool

Calculated by:

Site name:

Site location:

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:

Longitude:

Reference:

Date:

Runoff estimation approach

FEH Statistical

Site characteristics

Total site area (ha):

Methodology

Q_{MED} estimation method:

BFI and SPR method:

HOST class:

BFI / BFIHOST:

Q_{MED} (l/s):

Q_{BAR} / Q_{MED} factor:

Hydrological characteristics

	Default	Edited
SAAR (mm):	817	858
Hydrological region:	3	3
Growth curve factor 1 year:	0.86	0.86
Growth curve factor 30 years:	1.75	1.75
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	0.91	1.1
1 in 1 year (l/s):	0.78	0.95
1 in 30 years (l/s):	1.58	1.93
1 in 100 year (l/s):	1.88	2.3
1 in 200 years (l/s):	2.15	2.62

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksubs.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksubs.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Calculated by:	Richard Hughes
Site name:	SHF 1742 001 Holly Cottage
Site location:	

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	53.49645° N
Longitude:	1.56131° W
Reference:	1913063485
Date:	Jan 14 2020 14:41

Runoff estimation approach**Site characteristics**

Total site area (ha):	0.1
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Methodology

Q _{MED} estimation method:	Calculate from BFI and SAAR
BFI and SPR method:	Specify BFI manually
HOST class:	18
BFI / BFIHOST:	0.511
Q _{MED} (l/s):	0.4
Q _{BAR} / Q _{MED} factor:	1.06

Hydrological characteristics

	Default	Edited
SAAR (mm):	817	858
Hydrological region:	3	3
Growth curve factor 1 year:	0.86	0.86
Growth curve factor 30 years:	1.75	1.75
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes**(1) Is $Q_{\text{BAR}} < 2.0$ l/s/ha?**

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is $\text{SPR}/\text{SPRHOST} \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	0.43	0.49
1 in 1 year (l/s):	0.37	0.42
1 in 30 years (l/s):	0.75	0.86
1 in 100 year (l/s):	0.89	1.03
1 in 200 years (l/s):	1.02	1.17

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