

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY

Proposed Commercial Development, Houghton Main Colliery

Reference	RWO/FRADS/Y21011
Date	September 2021
Version	1

4 Park Place
Leeds
LS1 2RU

Tel: +44 (0)113 5323500
info@rwo.group
www.rwo.group



CONTENTS

Confidentiality Statement

Document History

1.0	Executive Summary.....	1
2.0	Introduction	2
3.0	The site	2
4.0	Existing Drainage	3
5.0	Proposed Development	3
6.0	Flood Risk.....	4
7.0	Surface and Foul Water Drainage.....	9
8.0	Conclusions.....	12

APPENDICES

Appendix A	Site Location Plan
Appendix B	Existing Drainage Features
Appendix C	Topographical Survey
Appendix D	Yorkshire Water Sewer Records
Appendix E	Proposed Site Layout
Appendix F	Gov.UK Flood Map
Appendix G	IH124 Calculation
Appendix H	Barnsley MBC Correspondence
Appendix I	Surface Water Attenuation Estimate Calculation
Appendix J	Yorkshire Water Correspondence

CONFIDENTIALITY STATEMENT

This report is addressed to and may be relied upon by the following:

Harworth Group

This report has been prepared for the sole use and reliance of the above-named parties. This report shall not be relied upon or transferred to any other parties without the express written authorisation of RWO. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party.

DOCUMENT HISTORY

VERSION	PURPOSE/DESCRIPTION	DATE
1	First Issue	03.09.2021

1.0 EXECUTIVE SUMMARY

This assessment has looked at the implications of a proposed commercial development in relation to drainage and flood risk.

The site under consideration is located within Flood Zone 1 on the latest version of the Indicative Floodplain Maps produced by the Environment Agency (EA) a copy of the flood map is provided in Appendix F.

NPPF Technical Guidance advises Flood Zone 1 is defined as a low-risk area, which comprises land assessed as having less than 1 in 1,000 annual probability of river or sea flooding (0.1%).

Other sources of flooding have been assessed and the risk of flooding from these sources is considered to be low and/or manageable with mitigation.

Surface water from the proposed development will discharge to the watercourse crossing the site which ultimately discharges to the River Dearne at a rate of 1.55 l/s/Ha. Onsite attenuation will be provided to ensure that;

- No surcharge of pipes occurs in the 1 in 2-year rainfall event.
- No surface flooding occurs in 1 in 30-year rainfall events.
- No flooding to buildings and adjacent properties occurs in 1 in 100-year rainfall events (including an allowance of 30% for the effects of future climate change), as defined in NPPF Technical Guidance.

Foul water disposal shall be in accordance with Yorkshire Water's Pre-development enquiry response, which advises;

- Foul water domestic waste can discharge to the 225mm diameter public foul sewer recorded running through the site and across Park Spring Road.

2.0 INTRODUCTION

RWO Associates (RWO) has been instructed by Harworth Group to prepare a Flood Risk Assessment and Drainage Strategy to support a planning application for a proposed commercial/industrial development at Houghton Main Colliery.

3.0 THE SITE

The proposed development is located on part of the former Houghton Main Colliery, located approximately 6 Km to the East of Barnsley. The development consists of a single site located adjacent to Park Spring Road, the A6195. The site centred ordnance survey reference is SE 42040 05914. A site location plan is provided in Appendix A and an aerial photograph is presented in Figure 1 below.

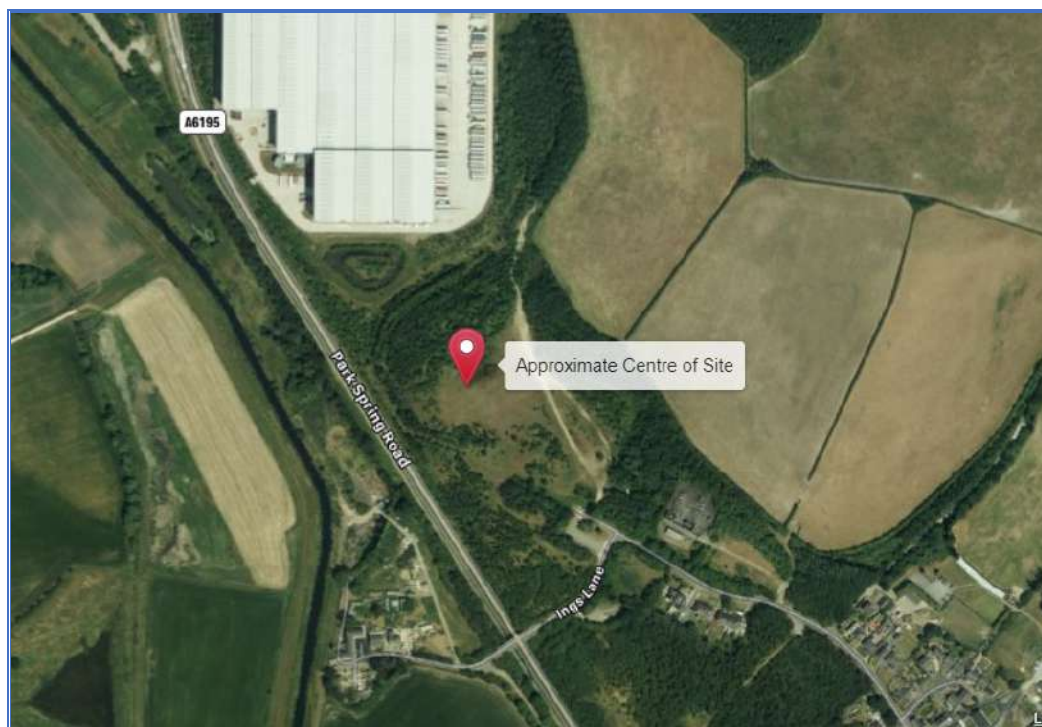


Figure 1 – Site location (Red marker indicates the approximate centre of the site)

The site is generally greenfield in nature and forms part of the former colliery. The site is located in a semi-rural setting with open/agricultural land to the east, a large commercial property to the north, Little Houghton to the south-east and Park Spring Road with the River Dearne beyond to the west.

The land is currently greenfield in nature with trees located around the boundaries and rough grassland towards the centre of the site. There is a ditch/watercourse wrapping around the north and western boundaries and an informal track cutting north to south. The ditch/watercourse outfalls via a 900mm diameter culvert/pipe. There is also a ditch from the southeast cutting north to the 900mm diameter culvert/pipe. A plan is included in Appendix B showing the ditch locations following a site visit by RWO in May 2021.

A topographic survey of the sites is provided in Appendix C, this shows that the site generally falls from the south to the north, with the southern highest level being circa 44m AOD and the northern levels being in the region of 32m AOD, giving a fall of 12m across the site.

4.0 EXISTING DRAINAGE

Public sewer records obtained from Yorkshire Water are provided in Appendix D which identifies the following public sewers in the vicinity of the site;

- A 225mm public foul sewer is recorded crossing the site from south-east to west.
- A foul rising main is also crossing the site, at the southern extent, running east to west.

The public sewer may require diverting to allow the development to take place and this will be subject to an S185 agreement. In addition, for both the sewer and rising main no buildings, or other obstructions, are to be erected within 4 (four), no trees planted within 5 (five) metres of this public sewer. It may not be acceptable to raise or lower ground levels over the sewer, nor to restrict access to the manholes on the sewer

Several open ditches/watercourses cross the site as identified in Section 3.0 of this report and included on a plan in Appendix B. The ditches/watercourses all drain via a 900mm diameter culvert on the sites western boundary, ultimately flowing to the River Dearne.

The River Dearne is located circa 100m west of the site.

5.0 PROPOSED DEVELOPMENT

It is proposed to develop the site for commercial/industrial purposes which will consist of 5 warehouse type buildings ranging from circa 21,000 sqft to 87,000 sqft, along with associated roads, drainage and site infrastructure.

A proposed site layout plan is included in Appendix E.

6.0 FLOOD RISK

The site under consideration is located within Flood Zone 1 on the latest version of the Indicative Floodplain Maps produced by the Environment Agency (EA) a copy of the flood map is provided in Appendix D. Based on the EA published flood map the proposed development site is at low risk of flooding.

NPPF Technical Guidance advises Flood Zone 1 is defined as a low risk area, which comprises land assessed as having less than 1 in 1,000 annual probability of river or sea flooding (0.1%).

The proposed site usage falls within the 'less vulnerable' category as identified in the NPPF Table 2: Flood Risk Vulnerability Classification. As such the exception test, will not need considering as the development is in Flood Zone 1, based on NPPF Table 3: Flood risk vulnerability and flood zone 'compatibility'.

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

Key:

✓ Development is appropriate

✗ Development should not be permitted.

Table 1 – 'NPPF Table 3: Flood risk Vulnerability Classification'

• Essential transport infrastructure (including mass evacuation routes) has to cross the area at risk. • Essential utility infrastructure has to be located in a flood risk area for operational reasons, including electricity-generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind Turbines.
Highly Vulnerable • Police stations, ambulance stations and fire stations and command centres and telecommunication installations are required to be operational during flooding. • Emergency disposal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as “essential infrastructure”).
More vulnerable • Hospitals. • Residential institutions such as residential care homes, children’s homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non-residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, <i>subject to a specific warning and evacuation plan.</i>
Less vulnerable • Police, ambulance and fire stations are not required to be operational during flooding. • Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in “more vulnerable”, and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities). • Minerals workings and processing (except for sand and gravel working). • Water treatment works do not need to remain operational during times of flood. • Sewerage treatment works (if adequate measures to control pollution and manage sewerage during flooding events are in place).
Water-compatible development • Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel working. • Docks, marinas and wharves. • Navigation facilities. • Ministry of defence installations. • Shipbuilding, repairing, dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastal stations. • Amenity open space, nature conversation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, <i>subject to specific warning and evacuation plan.</i>

Table 2 – ‘NPPF Table 2: Flood Risk Vulnerability Classification’

Surface Water (Pluvial) Flooding

The Environment Agency Surface Water (Pluvial) Flood Map provided below indicates the proposed development site is at risk of surface water flooding, this includes low, medium and high risk.

Flooding is associated with the existing ditches/watercourses crossing the site and based upon the flood maps appears to be as a result of blockages with the 900mm culvert/pipe that flows western from the site under Park Spring Road.

During a site visit by RWD during May 2021 it was observed the outfall headwall to the 900mm culvert/pipe was fully blocked with debris, this is the potential cause of the localised surface water flooding. The debris was removed during the site visit. Photographs of the headwall pre and post debris removal are included in Appendix B.

It is recommended that the existing culvert be CCTV surveyed to confirm their condition and identify any defects which are affecting the performance are rectified. In addition, a new EA compliant grille should be constructed at inlet within the Developer's land to minimise the risk of blockage and reduce the risk of water escaping the channel. It is also recommended that regular inspections of the grilles and culverts be included within the site management to ensure the risk is managed on an ongoing basis.

The risk of flooding from this source is therefore considered to be manageable.

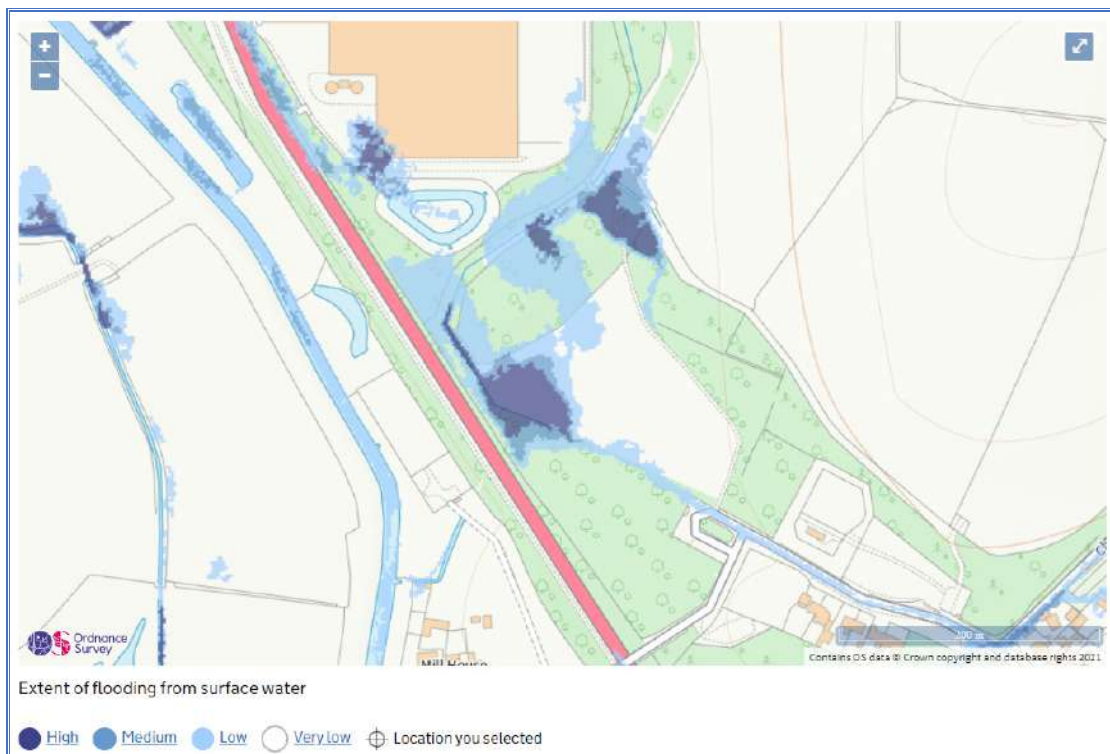


Figure 2 – Surface Water (Pluvial) Flood Map

Groundwater Flooding

The Soilscape maps have been reviewed to identify ground conditions and allow an initial assessment of the risk of groundwater flooding. The ground is identified as being slowly permeable which suggests that perched groundwater will be in existence at shallow depths. Given the ditches/watercourse on the north and west boundaries and the known level of these being 30 – 31m AOD which is circa 1.5 – 2.0m below the site levels, it is anticipated that groundwater will be at least this depth below existing ground levels. In addition, the ditch/watercourse will ensure the groundwater level is controlled as any groundwater will naturally being conveyed to this location.

Based on the available information the risk of groundwater flooding is considered low.

Following an intrusive site investigation if groundwater is encountered this should be reported to the engineer for review,

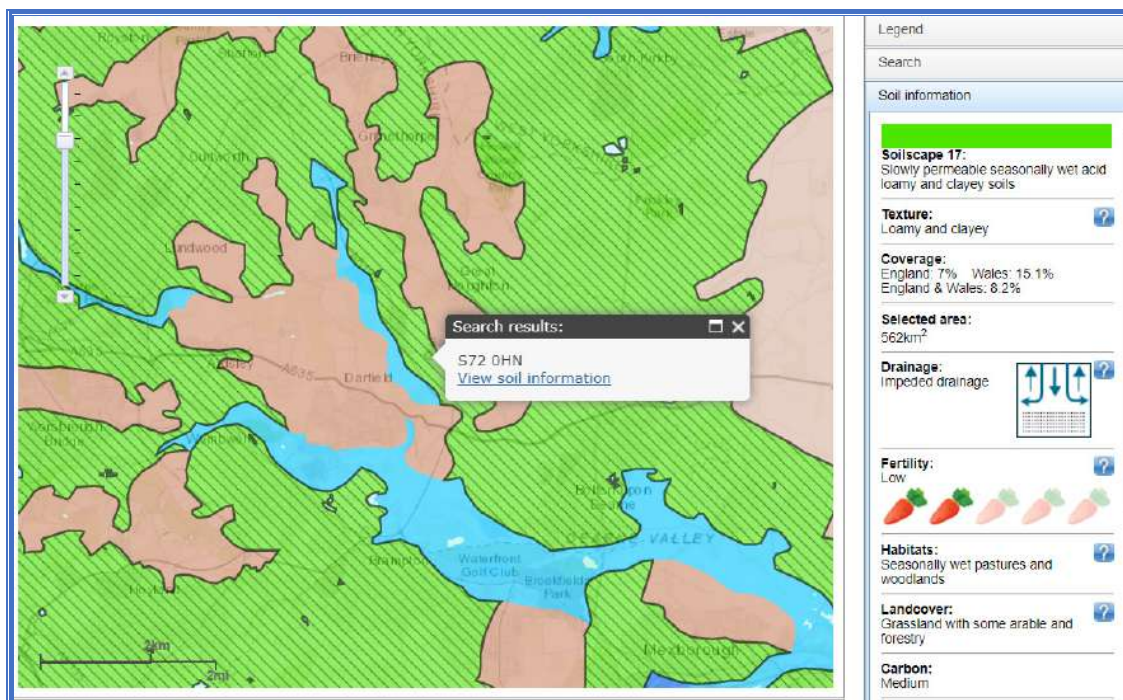


Figure 3 – Groundwater Flood Map

Flooding from Sewers

The sewers near the site are public sewers owned by Yorkshire Water and will be subject to regular maintenance and inspection, therefore blockage of these sewers is unlikely.

The risk of flooding from sewers is low.

The measures to mitigate the risks of flooding from new drainage are as detailed in Section 7.0.

Flooding from Reservoirs, Canals and Other Artificial Sources

The site is not located in an area identified as being at potential risk in the event of a reservoir failure or canal breach when reviewing the EA maps. It is noted that the River Dearne is shown at being at risk of flooding in the event of reservoir failure but this does not impact the development site.

The risk of flooding from the reservoir is low.

7.0 SURFACE AND FOUL WATER DRAINAGE

The proposed site drainage will comprise a separate foul and surface water drainage system.

The following summarises the requirements for the discharge of surface and foul water from the site.

Sustainable Urban Drainage Systems (SUDS)

A review of the Soilscape geology maps has been undertaken. A copy of the soil mapping is provided in Figure 4 below which indicates the soil strata and details of the natural drainage.

The site is located in Soilscape 17, which is impeded drainage with slowly permeable seasonally wet acid loamy and clayey soils.

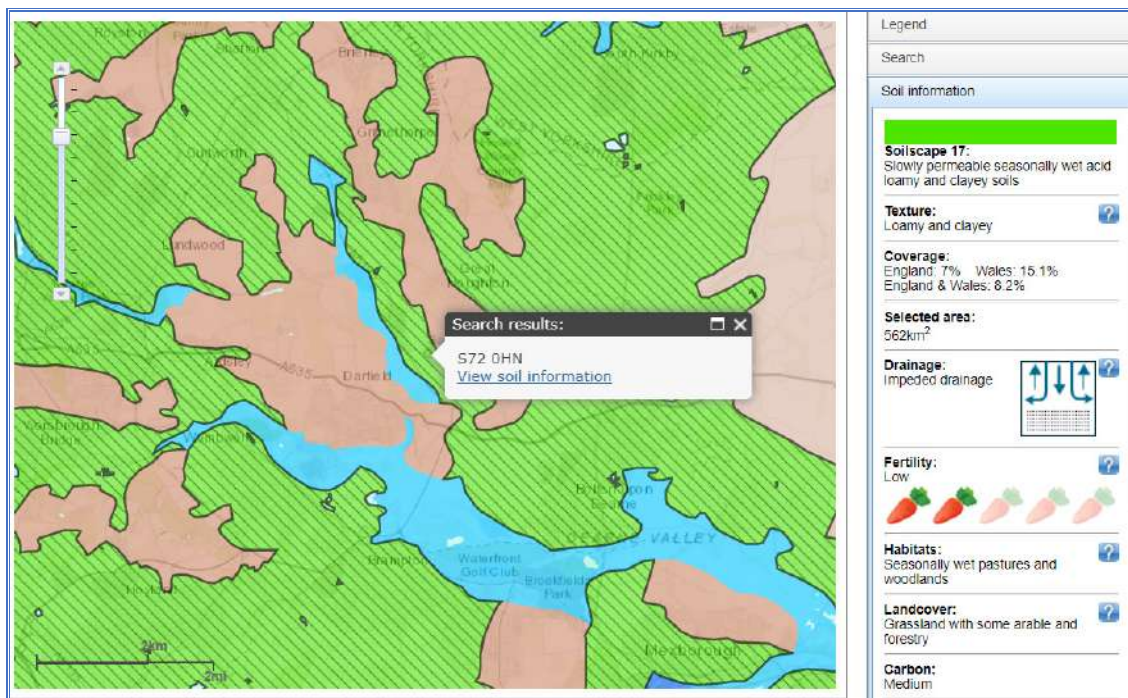


Figure 4 – Soil Types (Soilscape)

Given the underlying ground strata, it is unlikely infiltration methods for the disposal of surface water will be feasible. As such at this stage, the use of soil infiltration is excluded as a means of surface water disposal.

Whilst the disposal of surface water by infiltration methods is not deemed feasible Sustainable Urban Drainage System (SUDS) may be used in conjunction with conventional drainage systems to improve water quality as well as manage surface water discharge.

The following audit has been carried out relating to the suitability of SUD's systems:

Drainage Method	Description/Suitability	Proposal/Feasibility
1. Infiltration.	Due to clay ground conditions, it is excluded as a means of surface water disposal.	Not Applicable.
2. Ponds and wetlands.	Suitable subject to the land being made available & groundwater levels	Applicable.
3. Infiltration Basins.	Due to clay ground conditions, it is excluded as a means of surface water disposal.	Not Applicable.
4. Detention Basins.	Suitable subject to the land being made available & groundwater levels	Applicable.
5. Swale.	May be utilised to convey water/improve water quality.	Applicable.
6. French/Filter drain.	May be utilised to convey water/improve water quality.	Applicable.
7. Pervious/Permeable Pavement.	Due to clay ground conditions, it is excluded as a means of surface water disposal.	Not Applicable.
8. Geocellular Systems/Tank systems.	May be used as surface water attenuation.	Applicable.
9. Oversized pipes.	May be used as surface water attenuation.	Applicable.
10. Box culverts.	May be used as surface water attenuation.	Applicable.
11. Purpose designed tanks.	May be used as surface water attenuation.	Applicable.

Surface Water Drainage

The disposal of surface water shall be in accordance with the Requirement H3 of Building Regulations 2000. This establishes a preferred hierarchy for surface water disposal. Consideration should first be given to discharge to soakaway/infiltration system, watercourse and public sewer in that priority order.

As noted in the SUDS sections, the discharge of surface water drainage via infiltration methods is excluded as a feasible solution.

The second consideration for the disposal of surface water should be discharged to a watercourse, as there is a watercourse on the site which discharges to the River Dearne this is the preferred solution for surface water disposal. RWO has undertaken an IH124 Greenfield Runoff calculation to determine the rate of discharge from the proposed development site. The IH124 calculation has a Qbar value of 8.52 l/s or 1.55 l/s/Ha, a copy of the calculation is included in Appendix G. Correspondence confirming acceptance of the discharge rate from Barnsley LLFA is included in Appendix H.

As surface water discharge from the sites will be restricted, on-site surface water attenuation will be required. The following provides an initial calculation of the approximate volumes of attenuation using the 'Quick Storage Estimate' element of Windes Microdrainage:

Attenuation Volumes

Storage Design Parameters

- M5-60 = 19.000
- Ratio R = 0.378

Site

- Restricted discharge rate = 8.52 litres/second.
- Proposed Impermeable area = 3.9 ha
- 1:30 Year Return Period = between 1462 & 2073m³.
- 1:100 Year Return Period (+30% cc) = between 2792 & 3776m³.

A copy of the Microdrainage attenuation estimate outputs are provided in Appendix I.

The proposed on-site drainage system shall be designed in accordance with the requirements of Sewers for Adoption and shall demonstrate that:

- No surcharge of pipes occurs in the 1 in 2-year rainfall event.
- No surface flooding occurs in 1 in 30-year rainfall events.
- No flooding to buildings and adjacent properties occurs in 1 in 100-year rainfall events (including an allowance of 30% for the effects of future climate change), as defined in NPPF Technical Guidance.

Foul Water Drainage

A Yorkshire Water Pre-development enquiry response is provided in Appendix J, which advises the following;

- *Foul water should discharge to the 225mm public combined sewer on Park Spring Road.*

8.0 CONCLUSIONS

This assessment has looked at the implications of a proposed commercial development in relation to drainage and flood risk.

The site under consideration is located within Flood Zone 1 on the latest version of the Indicative Floodplain Maps produced by the Environment Agency [EA] a copy of the flood map is provided in Appendix F.

NPPF Technical Guidance advises Flood Zone 1 is defined as a low-risk area, which comprises land assessed as having less than 1 in 1,000 annual probability of river or sea flooding (0.1%).

Other sources of flooding have been assessed and the risk of flooding from these sources is considered to be low and/or manageable with mitigation.

Surface water from the proposed development will discharge to the watercourse crossing the site which ultimately discharges to the River Dearne at a rate of 1.55 l/s/Ha. Onsite attenuation will be provided to ensure that;

- No surcharge of pipes occurs in the 1 in 2-year rainfall event.
- No surface flooding occurs in 1 in 30-year rainfall events.
- No flooding to buildings and adjacent properties occurs in 1 in 100-year rainfall events (including an allowance of 30% for the effects of future climate change), as defined in NPPF Technical Guidance.

Foul water disposal shall be in accordance with Yorkshire Waters Pre-development enquiry response, which advises;

- *Foul water domestic waste can discharge to the 225mm diameter public foul sewer recorded running through the site and across Park Spring Road.*

Ross Oakley
For and behalf of RWO

Appendix A Site Location Plan



Location Map

Appendix B Existing Drainage Features



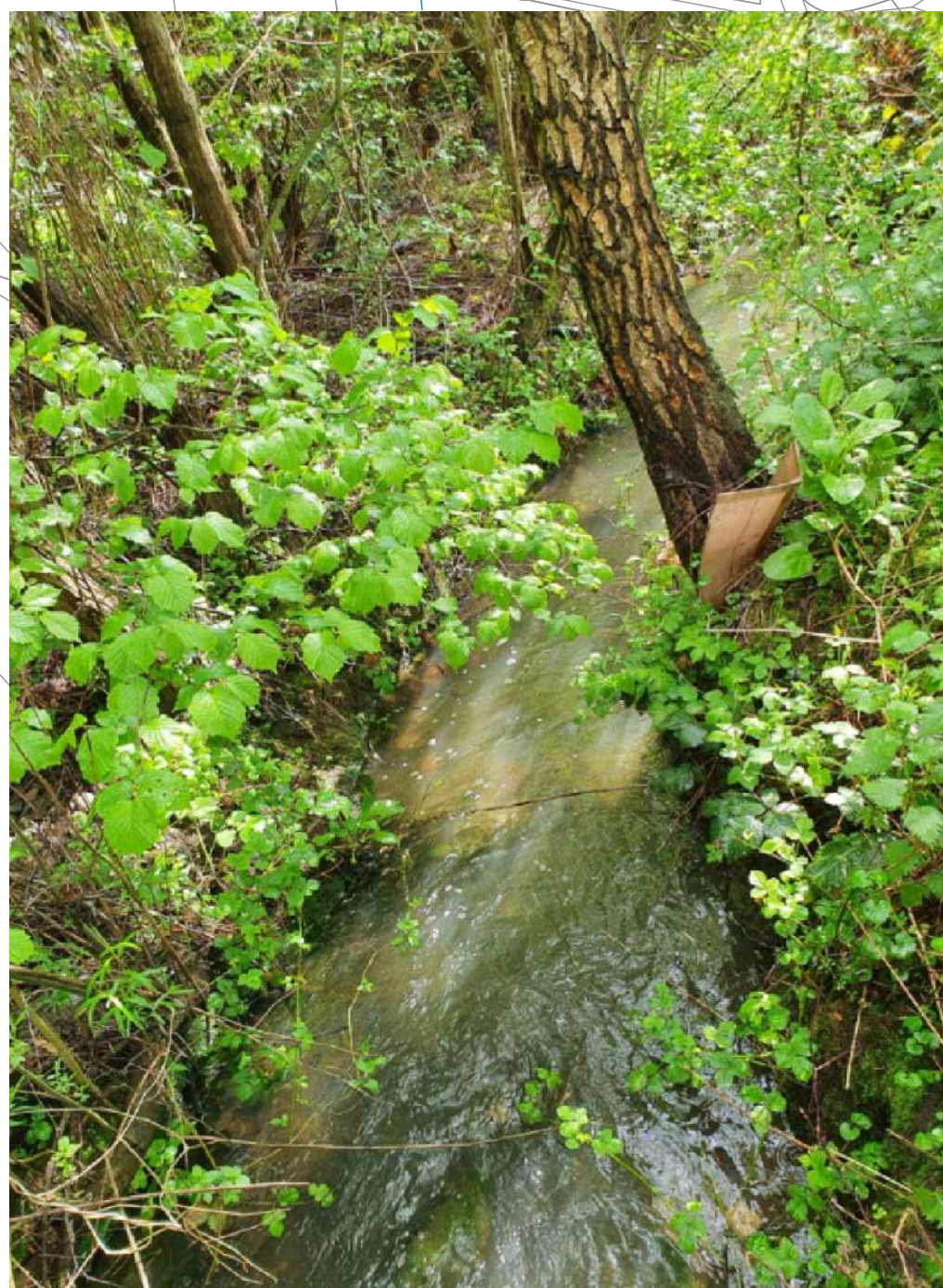
CONCRETE HEADWALL WITH
CIRCA 0.6m PIPE FROM ASOS
DEVELOPMENT
SIGNIFICANT FLOW (17.05.21)



STONE HEADWALL WITH
CIRCA 1.05m PIPE
SIGNIFICANT FLOW
(17.05.21)



BRICK HEADWALL CIRCA
1.8m DIA, SIGNIFICANT
FLOW (17.05.21)



The Water Mill



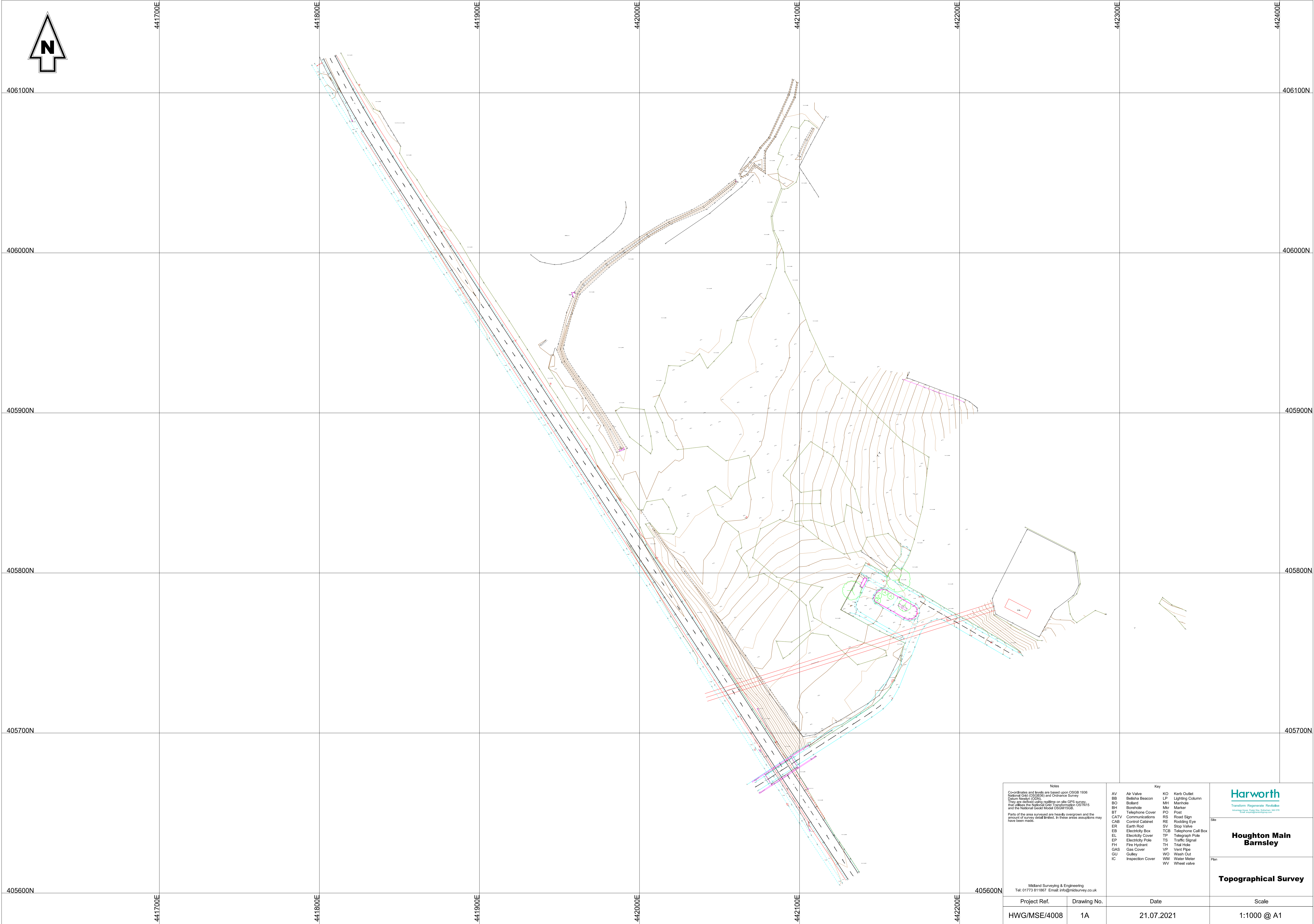


Outfall Headwall during RWD site visit May 2021 (prior to debris removal)



Outfall Headwall during RWD site visit May 2021 (following debris removal)

Appendix C Topographical Survey



Notes

Coordinates and levels are based upon OSGB 1936 National Grid (OSGB36) and Ordnance Survey Datum Newlyn (ODN).

They are derived using readings on the GPS survey, they are not the result of a datum transformation DTM15 and the National Grid Model OSGB1936.

Parts of the area surveyed are heavily overgrown and the amount of survey detail limited. In these areas assumptions may have been made.

Midland Surveying & Engineering
Tel: 01773 811867 Email: info@meidsurvey.co.uk

Key

AV	Air Valve	KO	Kerb Outlet
BB	Bellisha Beacon	LP	Lighting Column
BO	Bollard	MH	Manhole
BH	Borehole	Mkr	Marker
BT	Telephone Cover	PO	Post
CATV	Communications	RS	Road Sign
CAB	Control Cabinet	RE	Rodding Eye
ER	Earth Rod	SV	Stop Valve
EB	Electricity Box	TCB	Telephone Call Box
EL	Electricity Cover	TP	Telegraph Pole
EP	Electricity Pole	TS	Traffic Signal
PH	Fire Hydrant	TH	Trial Hole
GAS	Gas Cover	VP	Vent Pipe
GU	Gully	WO	Wash Out
IC	Inspection Cover	WM	Water Meter
		WV	Wired Valve

Site

**Houghton Main
Barnsley**

Plan

Topographical Survey

Project Ref.	Drawing No.	Date	Scale
HWG/MSE/4008	1A	21.07.2021	1:1000 @ A1

Appendix D Yorkshire Water Sewer Records