Eastwood
CONSULTING ENGINEERS

Flood Risk Assessment

SITE NAME: GREAT HOUGHTON, BARNSLEY

PREPARED FOR: AVANT HOMES (WEST YORKSHIRE) LTD

DATE: 29/02/2024

Eastwood
CONSULTING ENGINEERS

St Andrew's House
23 Kingfield Road
Sheffield, S11 9AS
mail@eastwoodce.com
0114 255 4554
eastwoodce.com

FLOOD RISK ASSESSMENT

GREAT HOUGHTON, BARNSLEY

FOR

AVANT HOMES (WEST YORKSHIRE) LTD

48439-0001

29 February 2024

FLOOD RISK ASSESSMENT

GREAT HOUGHTON, BARNSLEY

FOR

AVANT HOMES (WEST YORKSHIRE) LTD

Job No.	:	48439
Report Status	:	Issue 3
Document Date	:	29 February 2024
Approved :		

Andrew Allison

Eastwood
CONSULTING ENGINEERS

CONTENTS

APPENDICES

Appendix 1 -	Location plan
Appendix 2 – PD Site Surveys	Topographical survey
Appendix 3 – Avant Homes (West Yorkshire Ltd)	Site layout
Appendix 4 – Environment Agency	Online flood mapping
Appendix 5 – Barnsley Council	SFRA maps
	LLFA correspondence
Appendix 6 – DEFRA	Historic flood map
Appendix 7 – Yorkshire Water	Sewer assets plans
	Pre-development response
Appendix 8 – PD Site Surveys	Utility Survey
Appendix 9 – Eastwood CE	Greenfield runoff rates
	SuDS checklist
	MicroDrainage calculations

First Issue:	*28 September 2023*	
Issue 2:	*14 February 2024*	*Updated layout and minor text changes. Updated drainage strategy to suit new layout.*
Issue 3:	*29 February 2024*	*Text changes relating to SuDS features and adoption. Details from Site Investigation referenced.*

EXECUTIVE SUMMARY

The project comprises the proposed development of a 3.6 -hectare greenfield site for residential use.

The Environment Agency's Flood Map for Planning shows the site to lie within Flood Zone 1. The site is not at significant risk of flooding from any source. In accordance with current Planning Practice Guidance 'Flood Risk and Coastal Change', sequential testing is not required.

There is a low to high risk surface water flow route with an easterly orientation noted along the north-eastern boundary of the site corresponding with the location around the existing ditch/ watercourse.

The surface water flow route should be maintained as it corresponds with the location of the existing ditch/ watercourse. The presence of surface water attenuation and drainage features will reduce any surface water flood risk that is not constrained within the channel.

Current layout plans show that no residential development will be located within the north-eastern portion of the site, therefore the risk of surface water flooding affecting properties on-site is considered to be low.

Surface water disposal is considered in accordance with the drainage hierarchy in Building Regulations Part H 2015 and Planning Practice Guidance 'Reducing the causes and impacts of flooding', paragraph 80.

Infiltration testing conducted by Eastwood Consulting Engineers recorded a BRE365 infiltration rate of 7.6×10^{-5} m/s in the southern portion of the site (high point), however water failed to drain during infiltration testing in the two trail pits in the north of the site (low point) due to the presence of impermeable cohesive strata. Infiltration type SuDS such as soakaways will therefore not be viable due to the presence of impermeable ground (clay, mudstone and siltstone).

Surface water disposal will be to the existing ditch located along the northern site boundary, subject to approval from the LLFA. The in-channel water level is required to confirm whether a gravity solution will be viable. Surface water discharge will be restricted to 5 l/s/ha as agreed in principle with the LLFA. For the 3.6 ha site this equates to a discharge rate restricted to a maximum 18.0 l/s.

Attenuation storage will be provided for rainfall events up to the return period of 1 in 100 year plus 40% climate change. Attenuation will be provided in an attenuation basin located in the north-eastern portion of the site. The total estimated storage volume is 1040 m^3 subject to detailed design. Attenuation calculations are provided in Appendix 9.

The proposed attenuation basin will provide water quality treatment and attenuation as well as adding biodiversity and amenity value to the site.

Foul effluent will discharge to the 300 mm public combined sewer crossing the site. Existing ground levels in the northern portion of the site will need to be raised in order to achieve a gravity connection.

Both the surface and foul water drainage systems will be offered for adoption to Yorkshire Water or a NAV (New Appointments and Variations).

The level of risk and safeguards available are considered appropriate to this class of development.

1.0 THE DEVELOPMENT AND NATIONAL PLANNING POLICY

1.1 Introduction

This Flood Risk Assessment has been prepared in accordance with current National Planning Policy Framework[1] and Planning Practice Guidance 'Flood Risk and Coastal Change'[2] on the instruction of Avant Homes (West Yorkshire) Ltd. Any other parties using the information in this report do so at their own risk, unless previously approved in writing.

The project comprises the development of a 3.6 -hectare greenfield site for residential use.

1.2 Site location and description

The site is located within Great Houghton, to the east of Barnsley, and is centred on coordinates 442960E, 407060N (Appendix 1).

The site is bounded by High Street (B6273) to the west, open ploughed fields to the north and east, with farm buildings to the south.

The site is currently occupied by two open ploughed fields bordered by hedgerows and three farm buildings (barns) located in the southern portion of the site.

The site falls from approximately 62.16 mAOD in the south-west and 56.61 mAOD in the north, to approximately 54.43 mAOD in the north-east at average gradients of 1 in 32 and 1 in 69 respectively (Appendix 2).

Proposals are for 108 residential properties with access from High Street to the west (Appendix 3).

[1] https://www.gov.uk/government/publications/national-planning-policy-framework--2
[2] https://www.gov.uk/guidance/flood-risk-and-coastal-change

1.3 Environment Agency - Flood Map for Planning

The Environment Agency's Flood Map for Planning (Figure 1 and Appendix 4) shows that the site lies within Flood Zone 1 (low risk); land having a less than 1 in 1,000 annual probability of flooding from rivers or sea.

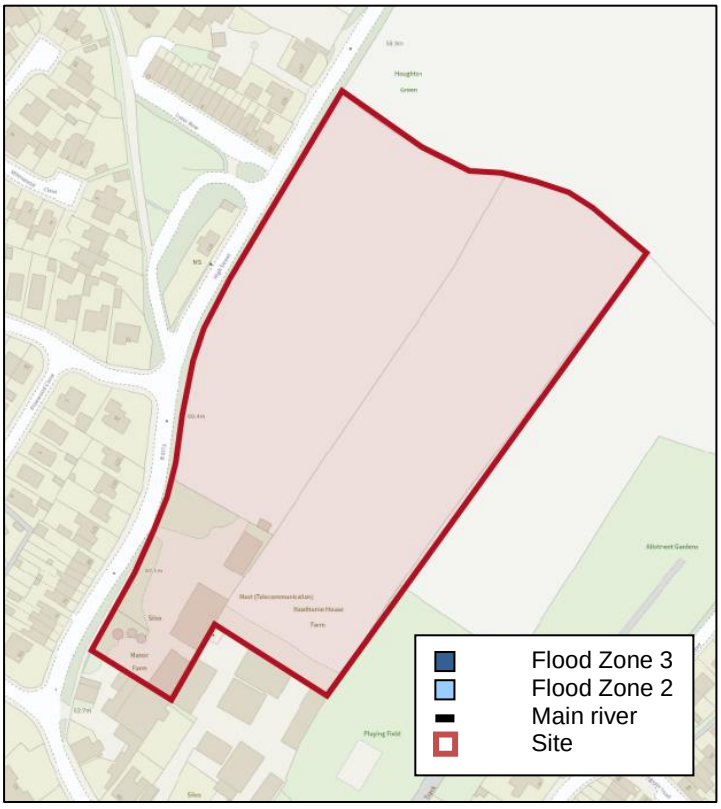


Figure 1: Environment Agency's Flood Map for Planning

1.4 Barnsley Metropolitan Borough Council Strategic Flood Risk Assessment

The Barnsley Metropolitan Borough Council's Strategic Flood Risk Assessment flood map is based on the Environment Agency flood map and records the site to be within Flood Zone 1 (Appendix 5).

1.5 National Planning Policy Framework

The National Planning Policy Framework (September 2023) sets out the principles for assessing the suitability of sites for development, in relation to flood risk, as part of the planning process.

1.5.1 Sequential Test

Initially a Sequential Test is applied to the allocation of land suitable for development. The test is required for any development proposed in Flood Zone 2 or 3 (and occasionally also in Flood Zone 1 where there are flood risks present which are not identified on the Environment Agency's Flood Maps for Planning).

The aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. Development should not be allocated or permitted if there are reasonably available sites, appropriate for the proposed development, in areas with a lower probability of flooding.

The site lies within Flood Zone 1; Environment Agency surface water flood risk maps show a small portion of the site adjacent to the north eastern site boundary is at low to high risk of surface water flooding. However, this portion of the site is to remain undeveloped and only contain surface water attenuation features, therefore the sequential test is not required.

1.5.2 Climate change

An issue emphasised in the Planning Policy Guidance is the requirement to take account of potential climate change effects. New development is generally accepted as having a 100 year design life for flood risk purposes. Climate change allowances for peak rainfall intensity[3] are to be selected based on the assigned values for the relevant management catchment and epoch suited to the design life of the development. For the Don and Rother Management Catchment the upper end allowance of 40% should be used to assess storage requirements.

[3] https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall

2.0 FLOOD RISK

2.1 Potential sources of flooding

The Environment Agency and Strategic Flood Risk Assessment maps are intended for general guidance on flood risk and it is also necessary to consider other, more detailed, sources in relation to local factors.

2.1.1 Fluvial and tidal

The nearest watercourse is an unnamed watercourse located along the northern site boundary. This watercourse flows east and is a tributary of the Thurscoe Dyke, which ultimately discharges into the River Dearne. The nearest main river is the River Dearne located approximately 1.35 km west of the site. Flood risk from this source is assessed as negligible.

2.1.2 Surface water

The Environment Agency surface water flood risk map (Figure 2 and Appendix 4) shows that the majority of the site is at very low risk of surface water flooding. Very low risk corresponds to the unshaded areas of the map. There is a low to high risk surface water flow route flowing in an easterly direction along the north-eastern site boundary which corresponds to the area around the existing ditch/ watercourse.

Very low risk refers to land having less than a 1 in 1,000 annual exceedance probability of flooding (0.1% AEP). Low risk refers to land having between a 1 in 1,000 and 1 in 100 annual exceedance probability of flooding (0.1% - 1% AEP). Medium risk refers to land having between a 1 in 100 and 1 in 30 annual exceedance probability of flooding (1% - 3.33% AEP). High risk refers to land having a greater than 1 in 30 annual exceedance probability of flooding (>3.33% AEP).

Surface water flood depths for extreme rainfall events between the 1 in 100 and 1 in 1000 year rerturn period range from 0 - 300 mm in the north-eastern portion of the site (Appendix 4).

Figure 2: Environment Agency – Risk of surface water flooding map

2.1.3 Reservoir

The Environment Agency reservoir flood risk map (Figure 3 and Appendix 4) shows the whole site to lie outside of the maximum extent of flooding from reservoirs, even when there is flooding from rivers.

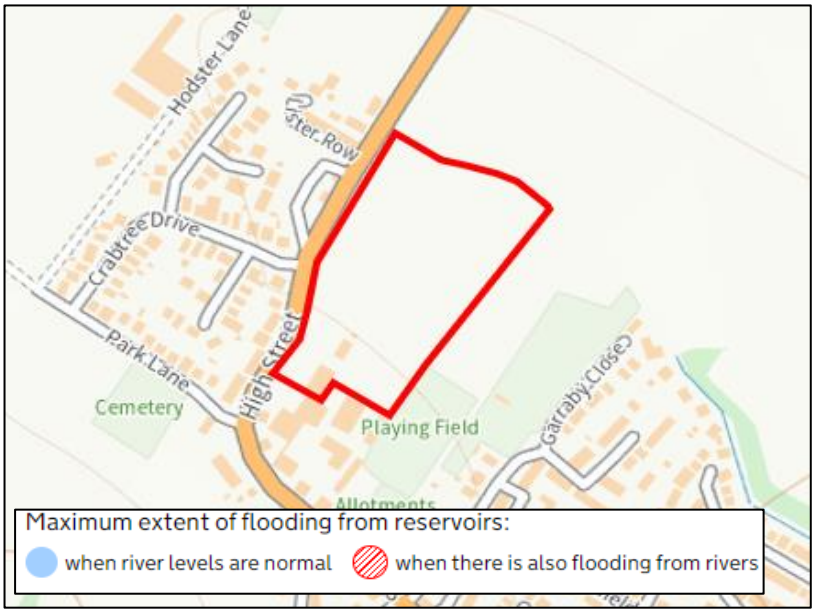


Figure 3: Environment Agency – Risk of reservoir flooding map

2.1.4 Groundwater

Groundwater is a potential flood risk to areas which are low lying and on permeable ground or, occasionally, to areas of higher ground in the vicinity of springs. There is no public record of any flood risk to the site from groundwater.

2.1.5 Sewerage

The surrounding public sewer network is owned and maintained by Yorkshire Water. There is no public record of any flood risk to the site associated with these sewers.

2.2 Historic Flooding

DEFRA historic online mapping (Appendix 6) records the site to be outside the historical flood outline.

2.3 Residual flood risk

There is a low to high risk surface water flow route with an easterly orientation noted along the north-eastern boundary of the site corresponding with the location around the existing ditch/ watercourse.

This risk is not a development constraint and will be managed on the site within the surface water drainage strategy and by the mitigation measures in Section 2.4.

2.4 Flood Mitigation Measures

The surface water flow route should be maintained as it corresponds to the existing ditch/ watercourse near the north-eastern boundary of the site. Furthermore, the presence of surface water attenuation and drainage features will further reduce the flood risk associated with surface water that is not constrained within the channel.

Current layout plans show that no residential development will be located within the north-eastern portion of the site, therefore the risk of surface water flooding affecting properties is very low.

3.0 DRAINAGE STRATEGY

3.1 Existing drainage

Yorkshire Water sewer records (Appendix 7) show a 300 mm public combined sewer to the west of the site in High Street (B6273) which then crosses the northern portion of the site. There is also a 225 mm public surface water sewer in Crabtree Drive to the west of the site.

A utility survey has been undertaken by PD Site Surveys (Appendix 8). The survey notes the 300 mm public sewer crossing the northern portion of the site as well as a 300 mm private surface water drain in High Street (B6273) to the south-west of the site.

3.2 Yorkshire Water consultation

A pre-planning advice has been received from Yorkshire Water (Appendix 7); letter reference Z004212 dated 24th August 2023. The main points of the advice are summarised below.

Existing infrastructure:

- There is a 300 mm public combined sewer crossing the site.
- No buildings or other obstructions are to be erected within 3 m of the sewer centre line.
- No trees are to be planted within 5 m of the public sewer.
- It may not be acceptable to raise or lower ground levels over the sewer, or restrict access to the manholes in the site.

Foul water:

- Foul water domestic waste can discharge to the 300 mm public combined sewer crossing the site.

Surface water:

- The surface water drainage hierarchy should be followed.
- The watercourse located to the north of the site is the obvious place for surface water disposal.
- Further restrictions on surface water disposal from the site may be imposed by other parties.

3.3 Ground conditions

The British Geological Survey maps records the bedrock geology in the central and northern portions of the site as mudstone, siltstone and sandstone of the Pennine Upper Coal Measures Formation. The bedrock geology in the southern portion of the site is recorded as sandstone of the Newstead Rock formation. There are no online records of the superficial deposits for this site.

A historical borehole log (Ref: SE40NW151) located approximately 130 m east of the site (starting at 17 m below ground level) records sandstone, mudstone, siltstone, sand and silt, with the occasional presence of coal. Groundwater was not recorded on this borehole log.

A site investigation has been conducted by Eastwood Consulting Engineers (Ref: 48417-ECE-XX-XX-RP-C-0002). The geology was recorded as; 0.2 – 0.5 m topsoil, overlying 1.1 m clay over sandstone in the north and 0.4 m sand over sandstone in the south. A coal seam was also recorded in the north-east of the site. Groundwater was not encountered during the excavation of trail pits.

3.4 Greenfield Calculations

The greenfield runoff for the site is calculated using the IH24 statistical rainfall run-off method on the UK SuDs greenfield runoff estimation tool (Appendix 9).

Table 1 below summarises the runoff rates for varying return periods. These figures relate to the 3.6 ha development area and runoff per unit area.

Greenfield runoff					
Catchment	**Return period**				
	Q_{BAR}	**1 in 1 yr**	**1 in 30 yr**	**1 in 100 yr**	**1 in 200 yr**
Dearne	14.91 l/s	12.82 l/s	26.09 l/s	31.01 l/s	35.33 l/s
	4.14 l/s/ha	3.56 l/s/ha	7.25 l/s/ha	8.61 l/s/ha	9.81 l/s/ha

Table 1: Greenfield runoff rates

3.5 Barnsley Metropolitan Borough Council (LLFA) consultation

Barnsley Metropolitan Borough Council (LLFA) have been contacted to confirm the acceptable surface water discharge rate from the site into the ditch along the northern site boundary.

A response received on 22nd August 2023 (Appendix 5) states that the previously agreed rate of 5 l/s/ha for this site (2020) would still be acceptable in principle. It is also noted that Ordinary Watercourse Consent will be required for any connections to the watercourse.

3.6 Drainage hierarchy

Surface water disposal should be in accordance with the drainage hierarchy in Building Regulations Part H[4] and Planning Practice Guidance 'Reducing the causes and impacts of flooding', paragraph 80 reference ID 7-080-20150323. Disposal via SuDS methods should be considered as the first option. Disposal to the public sewer should be considered only when SuDS methods and disposal to the watercourse are shown to be unsuitable.

3.6.1 Sustainable Drainage Systems (SuDS)

SuDS methods include water infiltration systems such as soakaways, basins and filter strips, together with swales, pervious pavements, detention basins, ponds and other wetland solutions. The various methods are considered in detail in The SuDS Manual (CIRIA C753).

Infiltration testing was conducted by Eastwood Consulting Engineers (report ref: 48417-ECE-XX-XX-RP-C-0002). The BRE365 infiltration rate in the south (high point) of the site was recorded as 7.6 x 10^{-5} m/s, however water failed to drain during infiltration testing in the two trail pits in the north (low point) of the site due to the presence of impermeable cohesive strata. Infiltration type SuDS such as soakaways will therefore not be viable due to the presence of impermeable ground (clay, mudstone and siltstone).

The proposed attenuation basin will provide water quality treatment and attenuation as well as adding biodiversity and amenity value to the site.

Other SuDS methods may be applicable and their use is summarised in the appended SuDS checklist (Appendix 9).

[4]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/442889/BR_PDF_AD_H_2015.pdf

3.6.2 Watercourse

The nearest watercourse is an unnamed ditch/ watercourse located along the northern boundary of the site which is a tributary of the Thurscoe Dyke that ultimately discharges into the River Dearne.

Discharge to this watercourse requires approval from the LLFA.

3.6.3 Public sewer

There is a 300 mm public combined sewer crossing the northern portion of the site, parallel to the northern site boundary. A 225 mm public surface water sewer is also located to the west of the site within in Crabtree Drive. Discharge to these sewers would require approval from Yorkshire Water and a request for a new connection.

3.7 Proposals for surface water disposal

The final disposal strategy for surface water run-off requires detailed consideration and approval during the design phase of the project. The final design will need the approval of the relevant statutory bodies but will broadly follow these principles:

- Surface water disposal will be to the existing ditch located along the northern site boundary, subject to approval from the LLFA. The in-channel water level is required to confirm whether a gravity solution will be viable.
- Surface water discharge will be restricted to 5 l/s/ha, as agreed in principle with the LLFA. For the 3.6 ha site this equates to a discharge rate restricted to a maximum 18.0 l/s.
- Attenuation storage will be provided for rainfall events up to the return period of 1 in 100 year plus 40% climate change. Attenuation will be provided via an attenuation basin located in the north-eastern portion of the site. The total estimated storage volume is 1040 m^3 subject to detailed design. MicroDrainage model summary sheets are provided in Appendix 9.
- The proposed attenuation basin will provide water quality treatment and attenuation as well as adding biodiversity and amenity value to the site.
- The surface water drainage system could be offered for adoption to Yorkshire Water or a NAV (New Appointments and Variations).

3.8 Proposals for foul disposal

Foul effluent will discharge to the 300 mm public combined sewer crossing of the site. Existing ground levels in the northern portion of the site will need to be raised in order to achieve a gravity connection.

The foul drainage system could be offered for adoption to Yorkshire Water or a NAV (New Appointments and Variations).

3.9 Residual flood risk

There is a potential flood risk to site occupiers and to others from surface water runoff as a result of developing the site. The residual risk can be managed by the general flood mitigation measures outlined in Section 3.10.

3.10 Mitigation measures

The proposed surface water drainage system is designed to current best practice and to the standards laid out in the publication 'Design and Construction Guidance for foul and surface water sewers' and Building Regulations Part H 2015.

In the event of surface water exceedance during extreme rainfall events the site is laid out so that surface water runoff is directed away from houses, including those on neighbouring streets.

4.0 CONCLUSIONS

1. The site is within Flood Zone 1 and is not at significant risk of flooding from fluvial or sea source.

2. There is a low to high risk surface water flow route with an easterly orientation noted along the north-eastern boundary of the site corresponding with the location around the existing ditch/ watercourse.

3. The surface water flow route should be maintained as it corresponds with the location of the existing ditch/ watercourse. The presence of surface water attenuation and drainage features will further reduce the flood risk associated with surface water that is not constrained within the channel.

4. Current layout plans show that no residential development will be located within the north-eastern portion of the site, therefore the risk of surface water flooding affecting properties is very low.

5. Infiltration testing conducted by Eastwood Consulting Engineers recorded a BRE365 infiltration rate of 7.6 x 10^{-5} m/s in the southern portion of the site (high point), water failed to drain during infiltration testing in the two trail pits in the north of the site (low point) due to the presence of impermeable cohesive strata. Infiltration type SuDS such as soakaways will therefore not be viable due to the presence of impermeable ground (clay, mudstone and siltstone).

6. Surface water disposal will be to the existing ditch located along the northern site boundary, subject to approval from the LLFA. The in-channel water level is required to confirm whether a gravity solution will be viable. Surface water discharge will be restricted to 5 l/s/ha, as agreed in principle with the LLFA. For the 3.6 ha site this equates to a discharge rate restricted to a maximum 18.0 l/s.

7. Attenuation storage will be provided for rainfall events up to the return period of 1 in 100 year plus 40% climate change. Attenuation will be provided via an attenuation basin located in the north-eastern portion of the site. The total estimated storage volume is 1040 m^3 subject to detailed design.

8. The proposed attenuation basin will provide water quality treatment and attenuation as well as adding biodiversity and amenity value to the site.

9. Foul effluent will discharge to the 300 mm public combined sewer crossing the northern portion of the site, parallel to the northern site boundary. Existing ground levels in the northern portion of the site will need to be raised in order to achieve a gravity connection.

10. Both the surface and foul water drainage systems will be offered for adoption to Yorkshire Water or a NAV (New Appointments and Variations).

11. The level of risk and safeguards available are considered appropriate to this class of development.

Eastwood
CONSULTING ENGINEERS

APPENDICES

Eastwood
CONSULTING ENGINEERS

APPENDIX 1


Something
Unique Stationery
Wedding Shop
Ducky School Lane
B6273
Crabtree Dr
High St
Garraby Cl
Springvale Rd
B6273


58
Houghton Green

Eastwood
CONSULTING ENGINEERS

APPENDIX 2

N

Station	Easting	Northing	Level
P1	442852.868	407045.659	59.655
P2	442931.226	407180.746	58.125
P3	442904.064	407136.299	57.904
P4	442853.514	406971.958	61.269
P5	442794.482	406886.900	62.005
P6	442828.516	406951.849	61.557
P7	442867.930	406960.291	61.284
P8	442858.220	406921.060	62.200
P9	442923.456	406925.585	61.246

SYMBOL LEGEND

- Borehole
- Benchmark
- Bollard
- Bus Stop
- Electric Box
- Electricity Pole
- Fence Post
- Gas Stop Valve
- Gate Post
- Gas Marker
- Gully Drain
- Electric Inspection Cover
- Kerb Outlet
- Litter Bin
- BT Inspection chamber
- Lamp Post
- Manhole Point
- MH Triangular
- MH Square
- MH Round
- Marker Post
- Pylon
- Rodding Eye
- BT Exchange Box
- Sign Post
- Spot Height
- Eave Level
- Ridge Level
- Stile
- Survey Station
- Traffic Camera
- Telephone Box
- Trial Pit
- Telegraph Pole
- Deciduous Tree
- Road Sign
- GATE
- Fire Hydrant
- Water Meter
- Letter Box
- CATV Inspection Chamber
- Water Stop Valve

LINETYPE LEGEND

- Bridge
- Bottom of Bank
- Building
- Canopy Edge
- Concrete Edge
- Ditch
- Drop Kerb
- Overhead Cable
- Grid
- Tacktile Paver
- Kerb
- Path
- Pipe Line
- FOUL SEWER
- SURFACE WATER SEWER
- Chanel Line
- Road Centre Line
- Tarmac Edge
- Top of Bank
- Track
- Wall
- Verge
- Flagstone Paving
- Stone
- Hedgeline
- Grass Edge
- Vegetation Line
- Post and Rail Fence
- Post and Wire Fence
- Contour Normal
- Contour Prominent

ABBREVIATIONS

LP.	Lamp Post
TP.	Telegraph Pole
EP.	Electricity Pole
SP.	Sign Post
TS.	Tarffic Sign
BS.	Bus Stop
GM.	Gas Marker

ABBREVIATIONS CONTINUED

MH.	Manhole
GU.	Gully
FH.	Fire Hydrant
CATV.	Cable Television Point
WM.	Water Meter
WSV.	Water Stop Valve
GSV.	Gas Stop Valve
RE.	Rodding Eye
GU.	Gully
FH.	Fire Hydrant
CATV.	Cable Television Point
WM.	Water Meter
WSV.	Water Stop Valve
GSV.	Gas Stop Valve
RE.	Rodding Eye

SURVEY CARRIED OUT USING GPS - BASED ON OSGB 36 SCALE FACTOR OF 1 - GRID SET AT 50m

THIS SURVEY SHOWS PHYSICAL SITE BOUNDARIES ONLY. CONFIRMATION OF LEGAL OWNERSHIP BOUNDARIES SHOULD BE OBTAINED BY REFERENCE TO THE H.M. LAND REGISTRY TITLE PLAN EVERY EFFORT IS MADE TO IDENTIFY ALL VISIBLE ABOVE GROUND FEATURES. HOWEVER, IT SHOULD BE BORNE IN MIND THAT THERE MAY BE ITEMS OBSCURED AT THE TIME OF SURVEY.

THE PLAN SCALE IS FOR GUIDANCE ONLY.
DO NOT SCALE DIRECTLY .
IF IN DOUBT, PLEASE ASK.

THE CONTRACTOR IS TO CHECK AND VERIFY ALL BUILDING AND SITE DIMENSIONS,LEVELS AND SEWER INVERT LEVELS AT CONNECTION POINTS BEFORE WORK STARTS. SHOULD THERE BE ANY CONFLICT BETWEEN THE DETAILS INDICATED ON THIS DRAWING AND THOSE INDICATED ON OTHER DRAWINGS, THE ENGINEER SHOULD BE INFORMED PRIOR TO CONSTRUCTION ON SITE.

REV.	DESCRIPTION	DATE
B	ADDITIONAL DITCH ADDED	05.12.21
A	ADDITIONAL AREA TO SOUTH ADDED	30.03.21

PD SITE SURVEYS

1 ISLINGTON DRIVE
BESSACARR
DONCASTER
DN4 6FA

M - 07515 381674

E - peter.dickinson29@gmail.com

CLIENT

CLIENT

HARRON HOMES

COLTON HOUSE,
TEMPLE POINT
BULLERTHORPE LANE
LEEDS
LS15 9JL

JOB TITLE

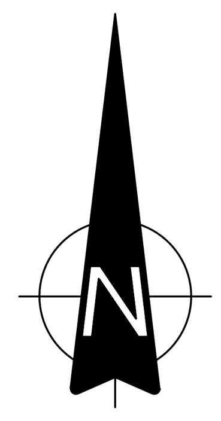
HIGH ST, GREAT HOUGHTON

DRAWING TITLE

TOPOGRAPHICAL SURVEY

DRAWN	SIGNATURE	DATE	STATUS
JP		15/03/2021	FOR COMMENT ☐
APPROVED	SIGNATURE	DATE	FOR APPROVAL ☐
PD		15/03/2021	DRAFT ☐
			FINAL ■

SCALE	SHEET	DRAWING NO.	REVISION
1:500	A1	0725-001	B



Station	Easting	Northing	Level
P1	442852.868	407045.659	59.655
P2	442931.226	407180.746	58.125
P3	442904.064	407136.299	57.904
P4	442853.514	406971.958	61.269
P5	442794.482	406886.900	62.005
P6	442828.516	406951.849	61.557
P7	442867.930	406960.291	61.284
P8	442858.220	406921.060	62.200
P9	442923.456	406925.585	61.246

SYMBOL LEGEND

Borehole
Benchmark
Bollard
Bus Stop
Electric Box
Electricity Pole
Fence Post
Gas Stop Valve
Gate Post
Gas Marker
Gully Drain
Electric Inspection Cover
Kerb Outlet
Litter Bin
BT Inspection chamber
Lamp Post
Manhole Point
MH Triangular
MH Square
MH Round
Marker Post
Pylon
Rodding Eye
BT Exchange Box
Sign Post
Spot Height
Eave Level
Ridge Level
Stile
Survey Station
Traffic Camera
Telephone Box
Trial Pit
Telegraph Pole
Deciduous Tree
Road Sign
GATE
Fire Hydrant
Water Meter
Letter Box
CATV Inspection Chamber
Water Stop Valve

LINETYPE LEGEND

Bridge
Bottom of Bank
Building
Canopy Edge
Concrete Edge
Ditch
Drop Kerb
Overhead Cable
Grid (438300N)
Tacktile Paver
Kerb
Path
Pipe Line
FOUL SEWER
SURFACE WATER SEWER
Chanel Line
Road Centre Line
Tarmac Edge
Top of Bank
Track
Wall
Verge
Flagstone Paving
Stone
Hedgeline
Grass Edge
Vegetation Line
Post and Rail Fence
Post and Wire Fence
Contour Normal
Contour Prominent

ABBREVIATIONS

LP.	Lamp Post
TP.	Telegraph Pole
EP.	Electricity Pole
SP.	Sign Post
TS.	Tarffic Sign
BS.	Bus Stop
GM.	Gas Marker

ABBREVIATIONS CONTINUED

MH.	Manhole
GU.	Gully
FH.	Fire Hydrant
CATV.	Cable Television Point
WM.	Water Meter
WSV.	Water Stop Valve
GSV.	Gas Stop Valve
RE.	Rodding Eye
GU.	Gully
FH.	Fire Hydrant
CATV.	Cable Television Point
WM.	Water Meter
WSV.	Water Stop Valve
GSV.	Gas Stop Valve
RE.	Rodding Eye

SURVEY CARRIED OUT USING GPS - BASED ON OSGB 36 SCALE FACTOR OF 1 - GRID SET AT 50m

THIS SURVEY SHOWS PHYSICAL SITE BOUNDARIES ONLY. CONFIRMATION OF LEGAL OWNERSHIP BOUNDARIES SHOULD BE OBTAINED BY REFERENCE TO THE H.M. LAND REGISTRY TITLE PLAN EVERY EFFORT IS MADE TO IDENTIFY ALL VISIBLE ABOVE GROUND FEATURES. HOWEVER, IT SHOULD BE BORNE IN MIND THAT THERE MAY BE ITEMS OBSCURED AT THE TIME OF SURVEY.

THE PLAN SCALE IS FOR GUIDANCE ONLY.
DO NOT SCALE DIRECTLY .
IF IN DOUBT, PLEASE ASK.

THE CONTRACTOR IS TO CHECK AND VERIFY ALL BUILDING AND SITE DIMENSIONS,LEVELS AND SEWER INVERT LEVELS AT CONNECTION POINTS BEFORE WORK STARTS. SHOULD THERE BE ANY CONFLICT BETWEEN THE DETAILS INDICATED ON THIS DRAWING AND THOSE INDICATED ON OTHER DRAWINGS, THE ENGINEER SHOULD BE INFORMED PRIOR TO CONSTRUCTION ON SITE.

REV.	DESCRIPTION	DATE
B	ADDITIONAL DITCH ADDED	05.12.21
A	ADDITIONAL AREA TO SOUTH ADDED	30.03.21

PD SITE SURVEYS

1 ISLINGTON DRIVE
BESSACARR
DONCASTER
DN4 6FA

M - 07515 381674

E - peter.dickinson29@gmail.com

CLIENT

CLIENT

HARRON HOMES

COLTON HOUSE,
TEMPLE POINT
BULLERTHORPE LANE
LEEDS
LS15 9JL

JOB TITLE

HIGH ST, GREAT HOUGHTON

DRAWING TITLE

TOPOGRAPHICAL SURVEY

DRAWN	SIGNATURE	DATE	STATUS
JP		15/03/2021	FOR COMMENT ☐ FOR APPROVAL ☐
APPROVED	SIGNATURE	DATE	
PD		15/03/2021	DRAFT ☐ FINAL ■

SCALE	SHEET	DRAWING NO.	REVISION
1:500	A1	0725-002	B

Eastwood
CONSULTING ENGINEERS

APPENDIX 3

PLANNING KEY

PLANNING LAYOUT KEY:

- SITE BOUNDARY
- ASSOCIATED LAND
- ROAD
- ROAD MARKINGS
- DRIVES & PATHS
- 1.8m TIMBER SCREEN FENCE
- 1.2m POST & RAIL FENCE
- 1.8m TIMBER GATE
- 1.2m METAL RAILINGS
- 0.45m KNEE HIGH RAIL
- 1.8m SCREEN WALL & FENCE PANEL INFILL
- PILLARS
- 2m ACOUSTIC FENCING
- EASEMENT
- VISIBILITY SPLAY
- EVCP
- BIN STORAGE
- BCP BIN COLLECTION POINT
- SH SHED LOCATION
- 1 PLOT NUMBERS
- 1 PARKING SPACES
- AFFORDABLE PLOTS
- TARMAC ROAD
- BLOCK PAVING
- TARMAC PRIVATE DRIVES
- POS & FRONT GARDENS
- REAR GARDENS
- EXISTING TREES AND HEDGING
- TREES AND HEDGING TO BE REMOVED

Schedule of Accommodation

Great Houghton **23.01.24**

Affordable Housing				
Name	**Bed**	**NDSS**	**Storey**	**Number**
E2.1	2	Y	2.5	6
B3	3	Y	2.5	4
Affordable Total				**10**

Open Market Housing				
Askham	1	Y	2	8
Eastbeck	2	Y	2.5	7
Ferndale	2	Y	2	5
Ripley	2	Y	2	16
Oakwood	3	Y	2	10
Leyburn	3	Y	2	9
Maltby	3	Y	2	5
Baildon	3	Y	2.5	8
Salbury	3	Y	2.5	8
Wentbridge	4	Y	2	9
Cookbury	4	Y	2	11
Horbury	4	Y	2	2
Open Market Total				**98**

Overall Total	**108**

0 10m 20m 30m 40m 50m

REV	DATE	BY	AMENDMENTS
C	23.01.24	KW	AMENDMENTS MADE FURTHER TO REGIONAL MEETING ON 22.01.24.
B	14.11.23	KW	RECENT TREE SURVEY, VISIBILITY SPLAYS AND REGIONAL COMMENTS ADDED. PL's 29-35 ADJUSTED TO IMPROVE GARDENS
A	09.09.23	KW	PLOTS ROTATED TO ALLOW FOR ACCESS ROAD TO THE FARM TO THE SOUTH.

AVANT homes
Unit 2, Mariner Court, Peel Avenue, Durkar, Wakefield, WF4 3FL,
Tel: 01924 248410, Fax: 01924 248488,
www.avanthomes.co.uk

DATE:	SCALE:	DRAWN BY:
24.08.23	1:500 @ A1	KW

DWG TITLE: Planning Layout

PROJECT: Main Street, Great Houghton

DWG No. 4206-04 REV. C

Eastwood
CONSULTING ENGINEERS

APPENDIX 4

Flood map for planning

Your reference	Location (easting/northing)	Created
<Unspecified>	**442953/407034**	**14 Aug 2023 12:16**

Your selected location is in flood zone 1, an area with a low probability of flooding.

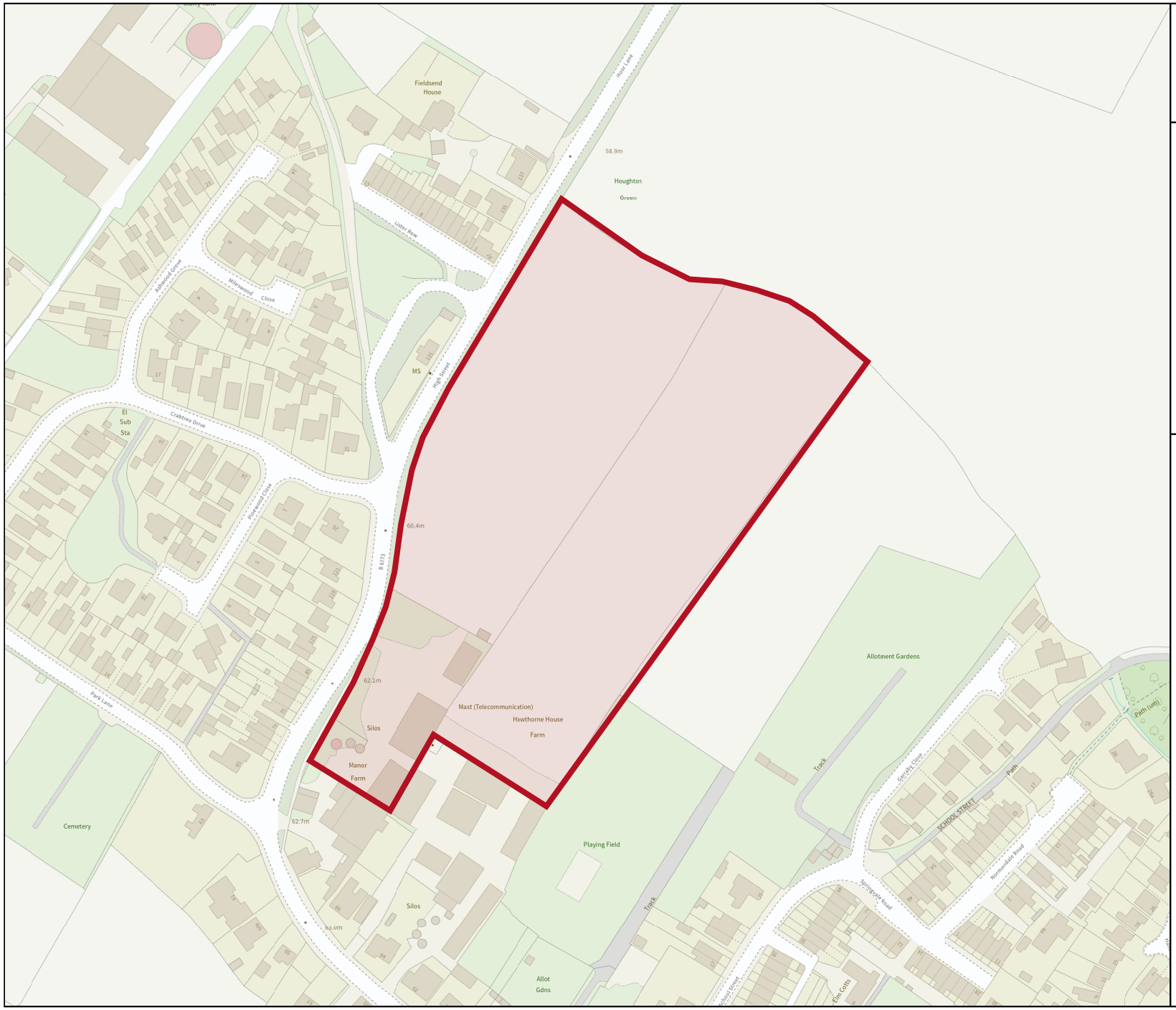
You will need to do a flood risk assessment if your site is **any of the following:**

- bigger that 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.



Environment Agency

Flood map for planning

Your reference
<Unspecified>

Location (easting/northing)
442953/407034

Scale
1:2500

Created
14 Aug 2023 12:16

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60m

Flood risk

Extent of flooding

Location

s72 0ay

Extent of flooding from rivers or the sea

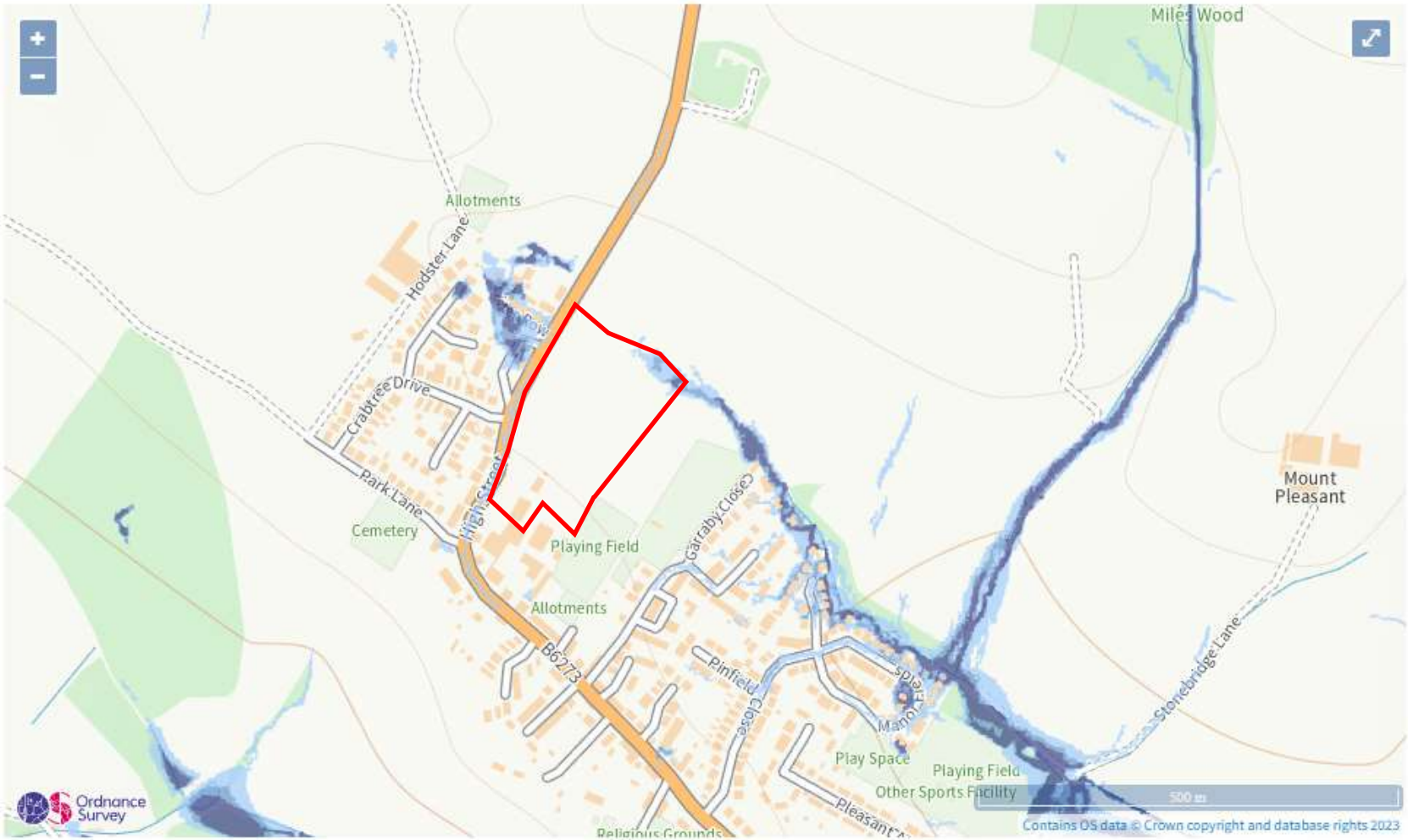
High Medium Low Very low

Flood risk

Extent of flooding

Location

s72 0ay



Extent of flooding from surface water

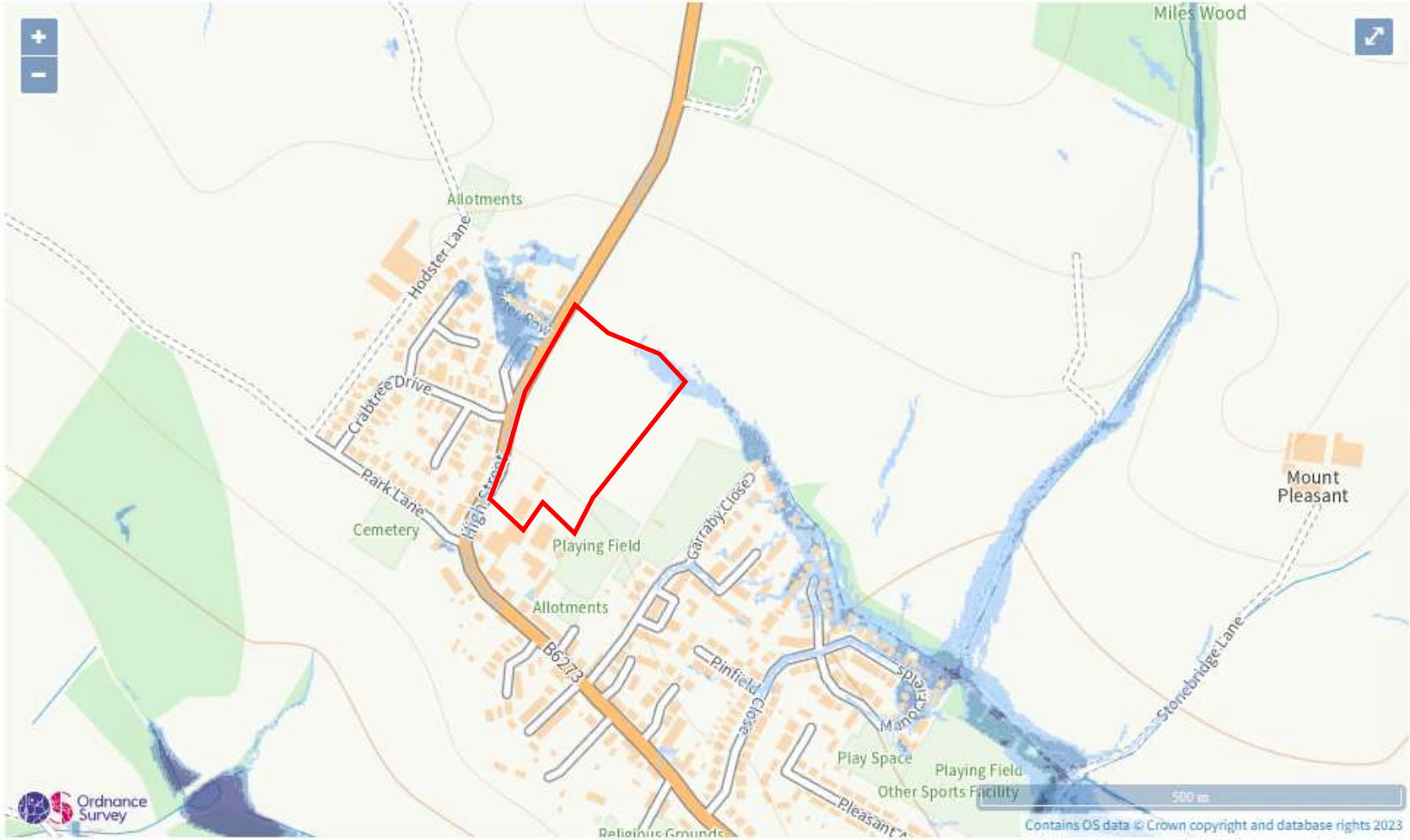
High Medium Low Very low

Flood risk

Low risk: depth

Location

s72 0ay



Surface water flood risk: water depth in a low risk scenario

Flood depth (millimetres)

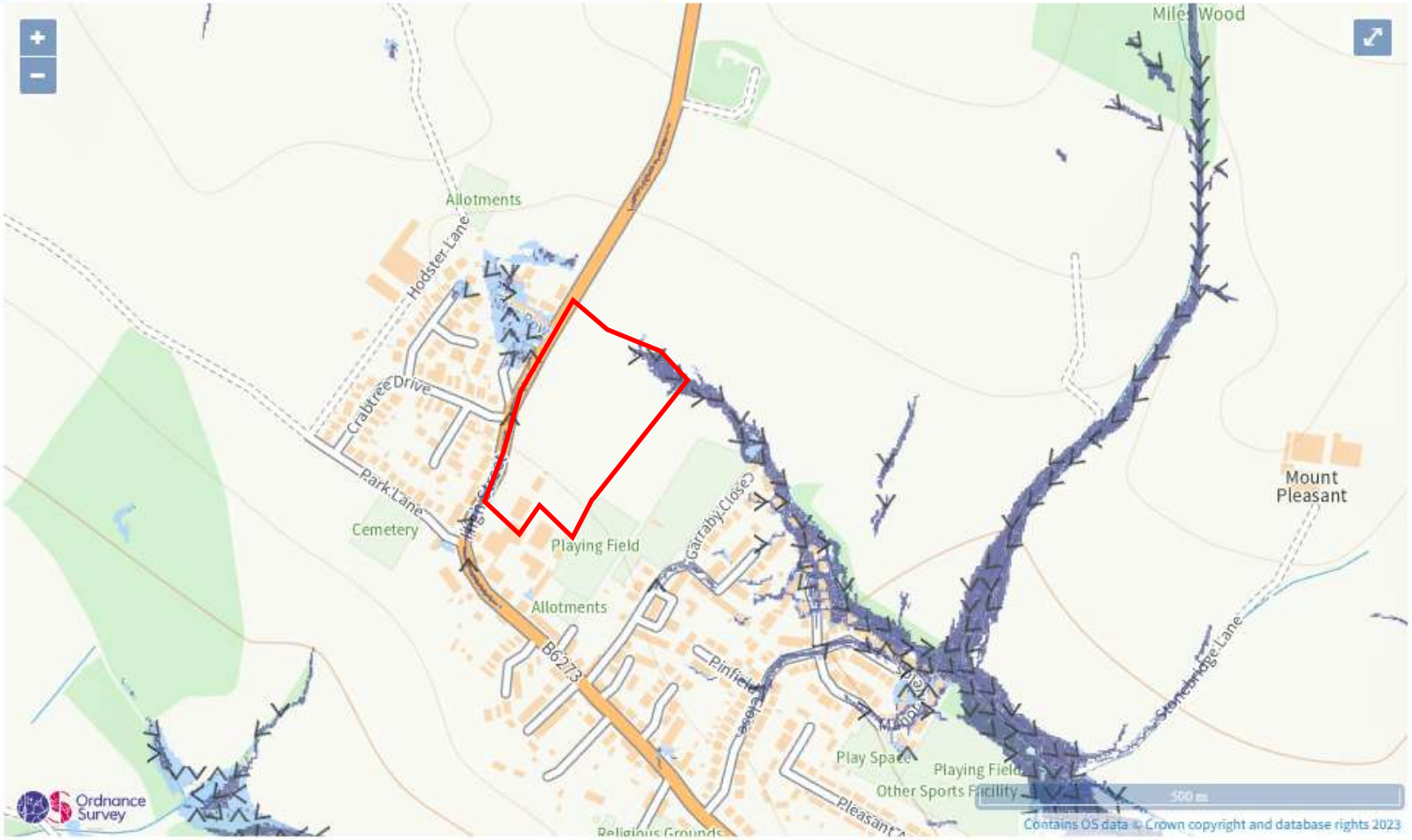
Over 900mm | 300 to 900mm | Below 300mm

Flood risk

Low risk: velocity

Location

s72 0ay



Surface water flood risk: water velocity in a low risk scenario

Flood velocity (metres/second)

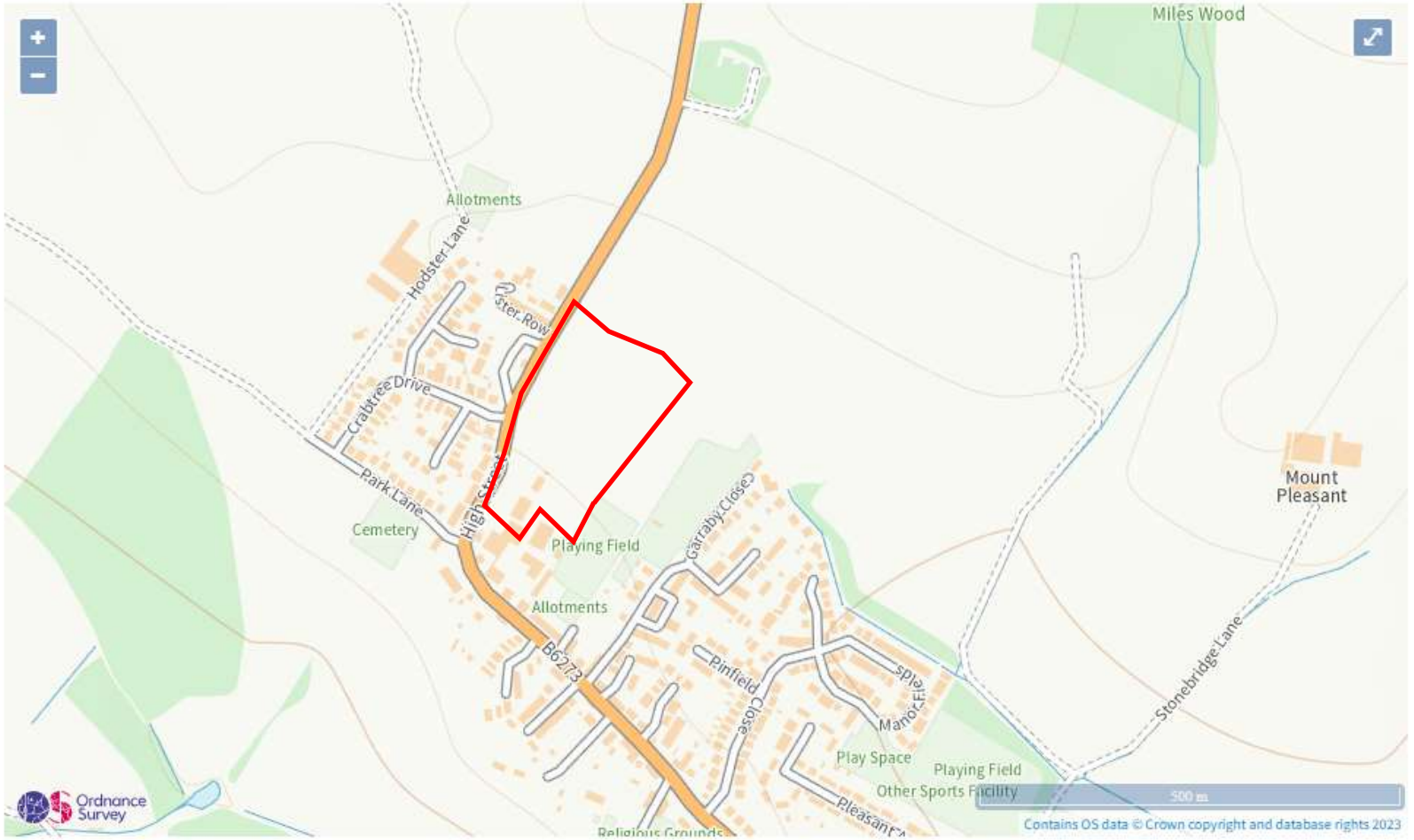
Over 0.25 m/s Less than 0.25 m/s Direction of water flow

Flood risk

Extent of flooding

Location

s72 0ay



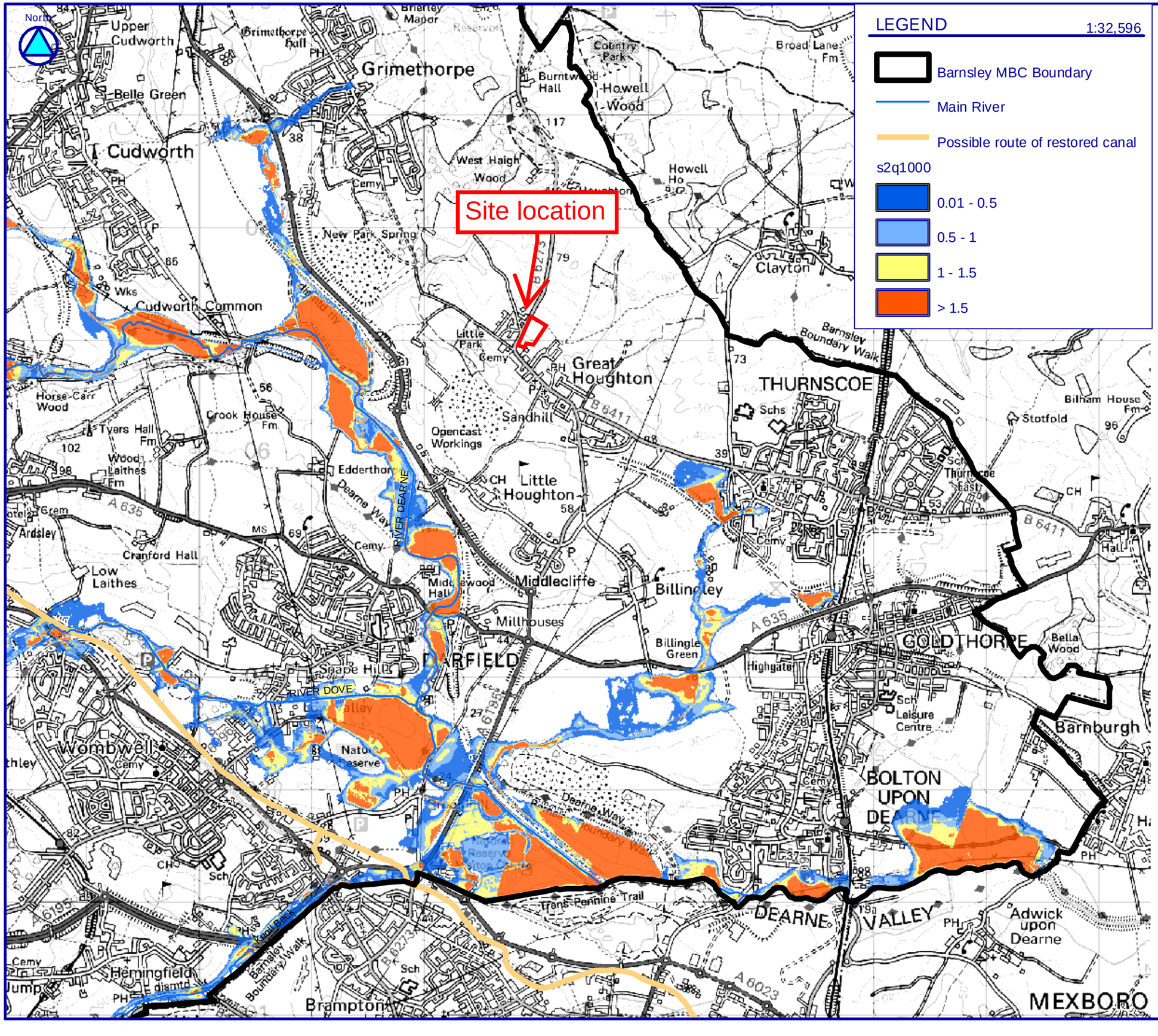
Maximum extent of flooding from reservoirs:

when river levels are normal

when there is also flooding from rivers

Eastwood
CONSULTING ENGINEERS

APPENDIX 5



LEGEND

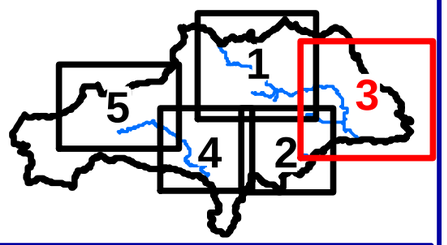
1:32,596

- Barnsley MBC Boundary
- Main River
- Possible route of restored canal

s2q1000

- 0.01 - 0.5
- 0.5 - 1
- 1 - 1.5
- > 1.5

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
q1000 = 1 in 1000year or 0.1% probability flood event.

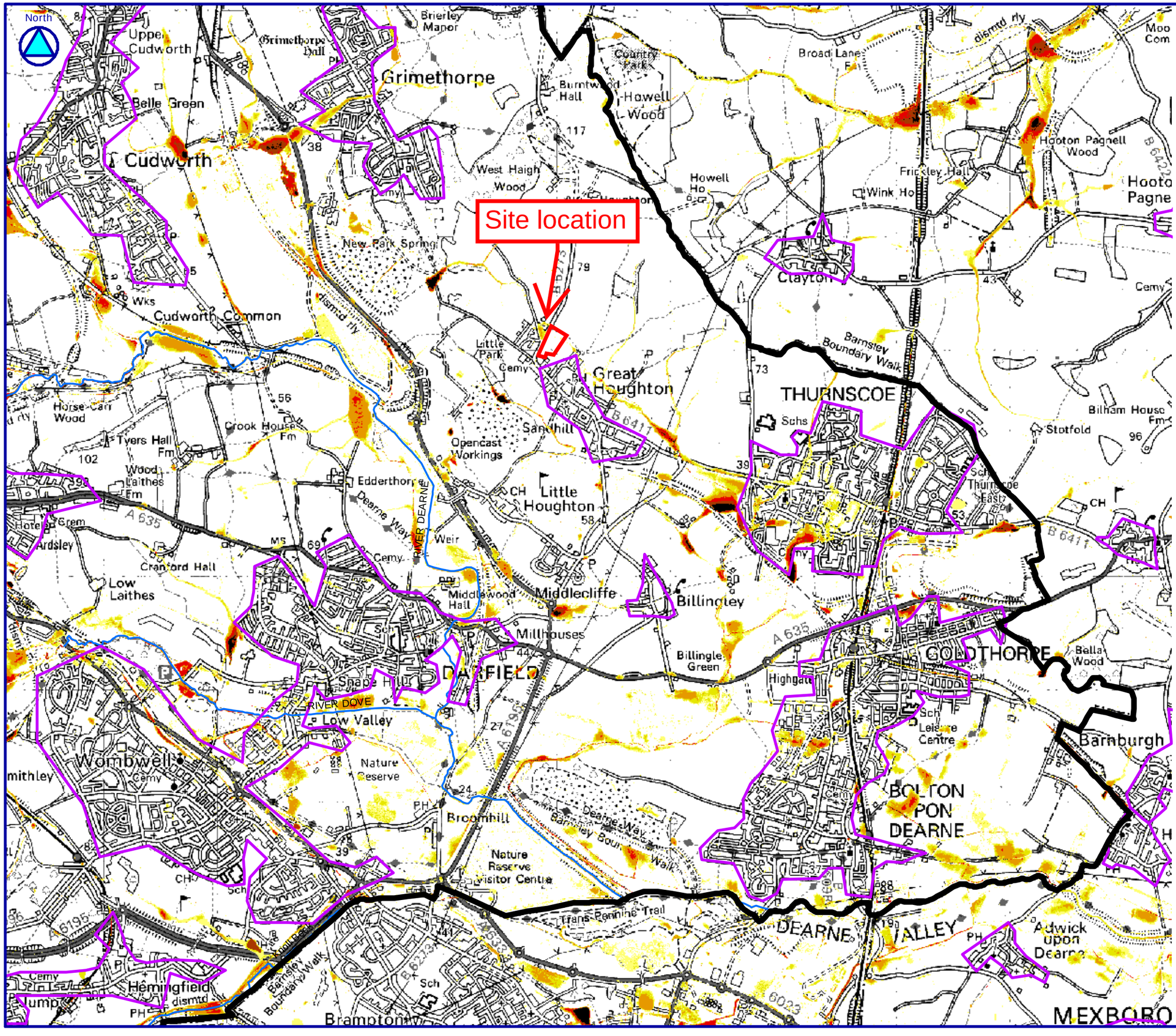
This map should be considered in support of the Environment Agency Flood Zone Maps to aid the Sequential and Exception Tests.
It should not be considered in isolation without reference to the other SFRA Flood Risk Maps.

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

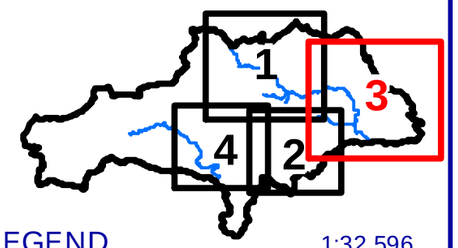
jba CONSULTING

MAP E - 3

s2q1000



KEYPLAN



LEGEND 1:32,596

- Barnsley MBC Boundary
- Urban Areas
- Main River

Surface Water Flooding

Flood Depth (m)

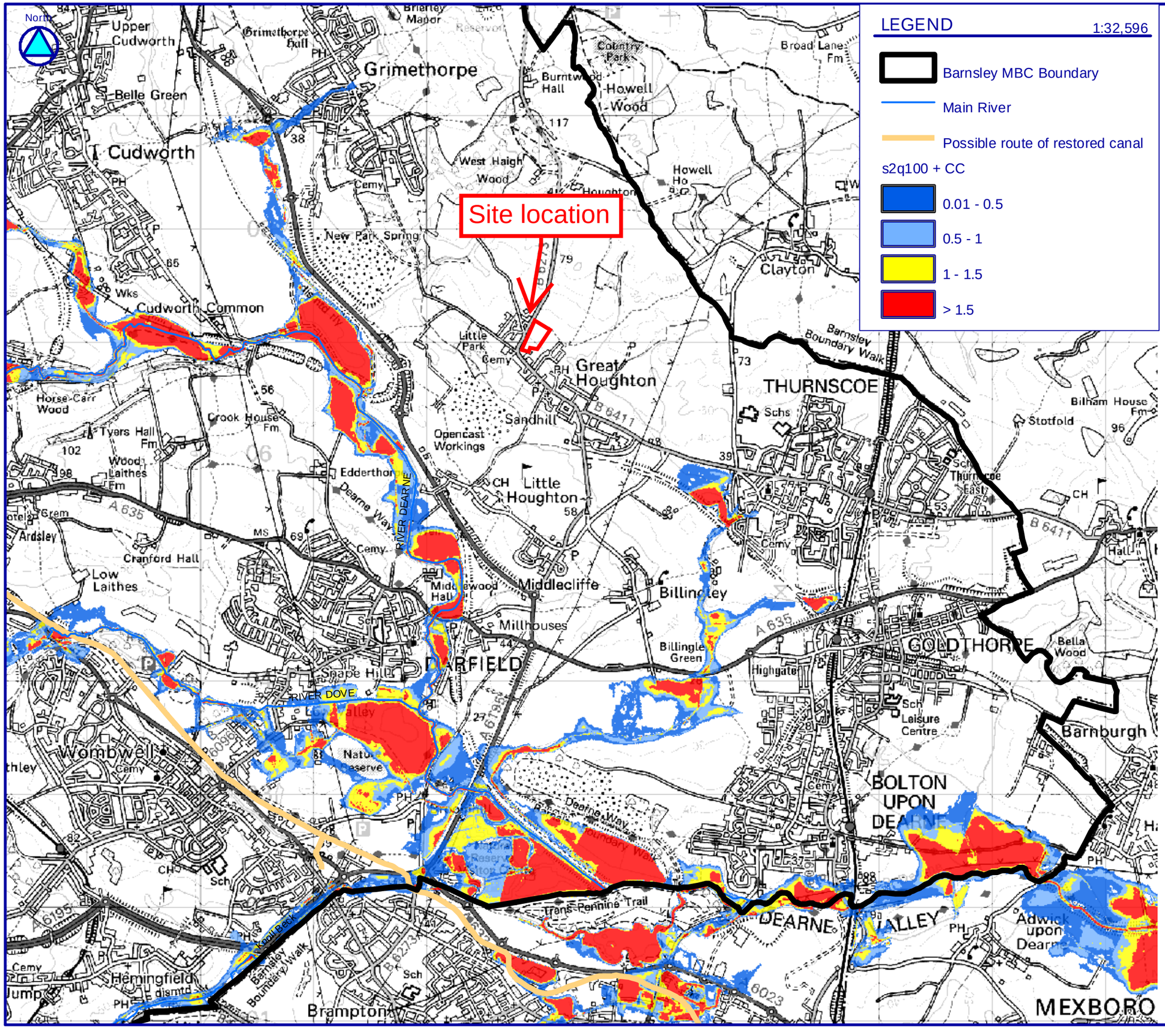
- 0.15 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1 - 2
- > 2

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

jba CONSULTING

MAP C - 3

PLUVIAL FLOODING CAUSED BY 100YEAR RAINSTORM



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.
Climate Change scenario represents 20% increase of flood flow.

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.

jba CONSULTING

MAP H - 3

s2q100 + Climate Change

Jessica Stevenson-Steels

From: Grayson , Ian (SENIOR ENGINEER - ASSETS) <iangrayson@barnsley.gov.uk> on behalf of Grayson , Ian (SENIOR ENGINEER - ASSETS)
Sent: 22 August 2023 12:34
To: Jessica Stevenson-Steels
Subject: RE: 48439- High Street, Great Houghton- Discharge to watercourse [Filed 22 Aug 2023 12:34]

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: Filed by Mail Manager

Hello Jessica

I can you confirm that the previously agreed discharge rate of 5 l/s/ha is still acceptable in principle, and we will require Ordinary Watercourse Consent for connection to the watercourse.

Thanks

From: Jessica Stevenson-Steels <jessica.stevenson-steels@eastwoodce.com>
Sent: 22 August 2023 12:29
To: HighwayDrainage <HighwayDrainage@barnsley.gov.uk>
Subject: 48439- High Street, Great Houghton- Discharge to watercourse

FAO Lead Local Flood Authority
Good afternoon,
I am preparing a Flood Risk Assessment and Drainage Strategy for a site off High Street, Great Houghton, centred on 442960E, 407060N (see location plan attached).
It is understood that there has been previous correspondence regarding surface water discharge from this site to the watercourse along the northern site boundary.
Please can you confirm that the previously agreed discharge rate of 5 l/s/ha is still acceptable in principle.
In addition, please can you advise on any further requirements that we should be aware of to discharge surface water to this watercourse.
Kind regards,
Jessica Stevenson-Steels
Environmental Engineer
www.eastwoodce.com
Eastwood
CONSULTING ENGINEERS

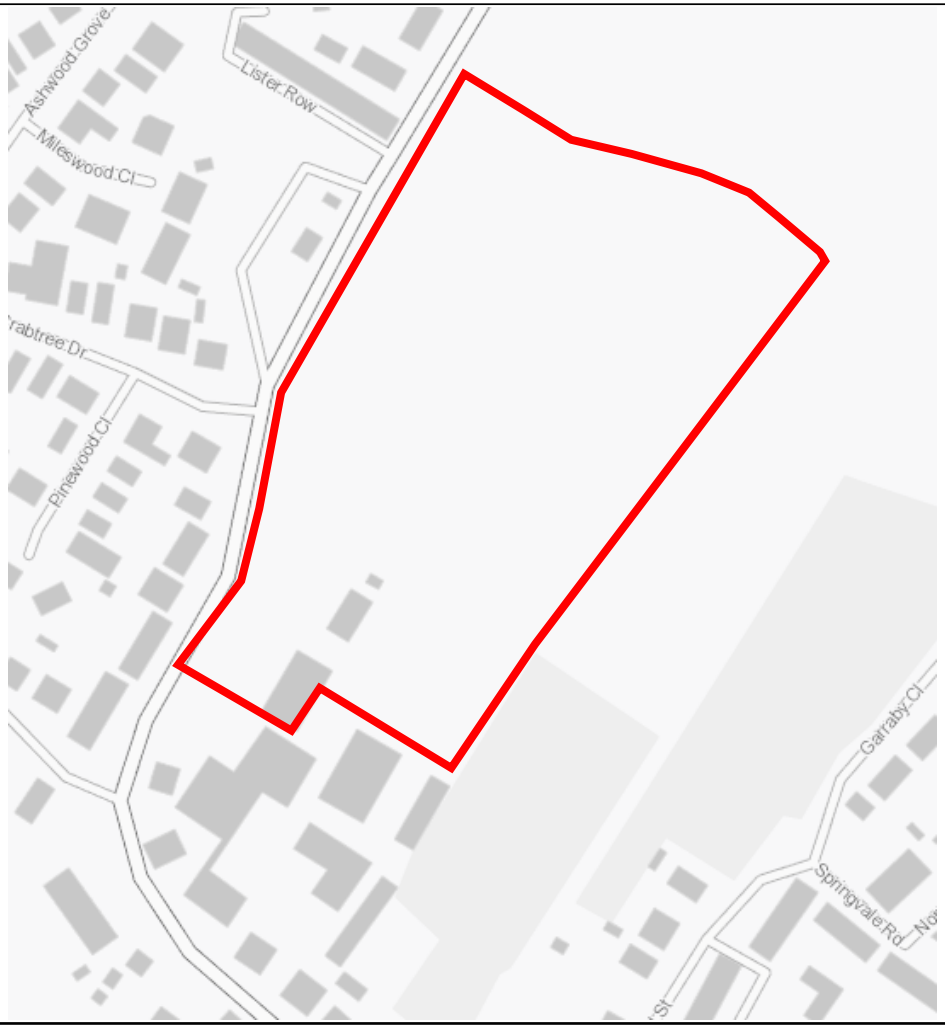
Raising money for St Luke's Hospice. Please show your support by donating via our JustGiving page.
Click here to donate

Eastwood Consulting Engineers is a trading name of Eastwood and Partners (Consulting Engineers) Limited
Registered Office: St Andrew's House, 23 Kingfield Road, Sheffield, S11 9AS
Company No: 1835021, VAT Registration No: 738 2114 44
Web: www.eastwoodce.com
Tel: 0114 255 4554

Eastwood
CONSULTING ENGINEERS

APPENDIX 6

DEFRA: Historic flood map



Layer List

Operational layers

HistoricFloodMap

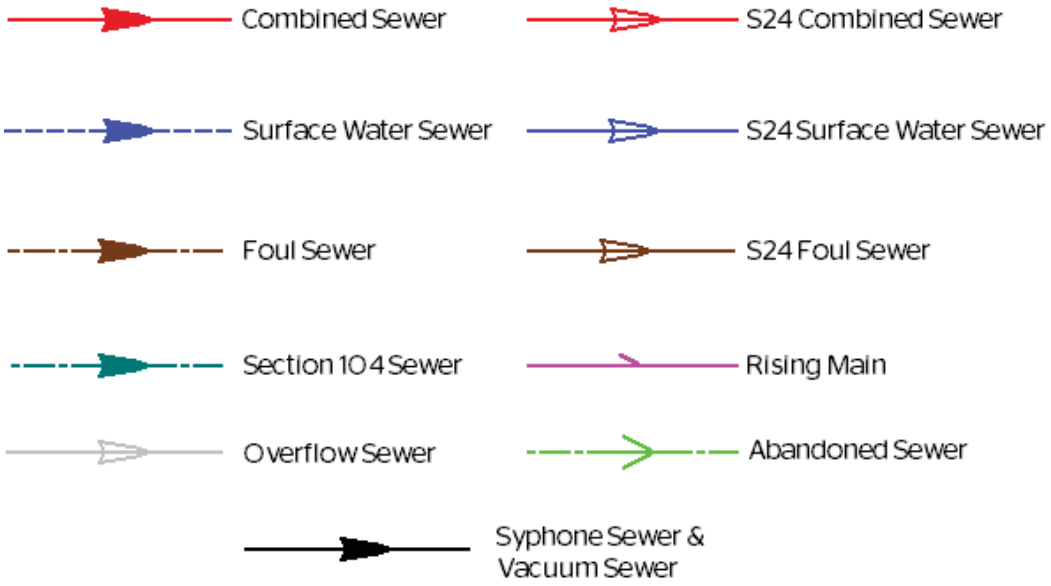
Historic_Flood_Map

Eastwood
CONSULTING ENGINEERS

APPENDIX 7

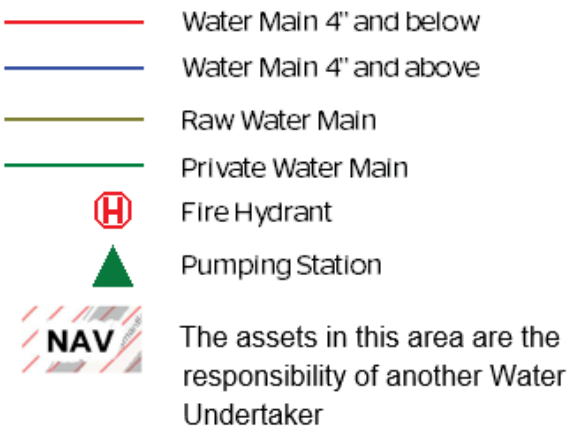
Property Identfier

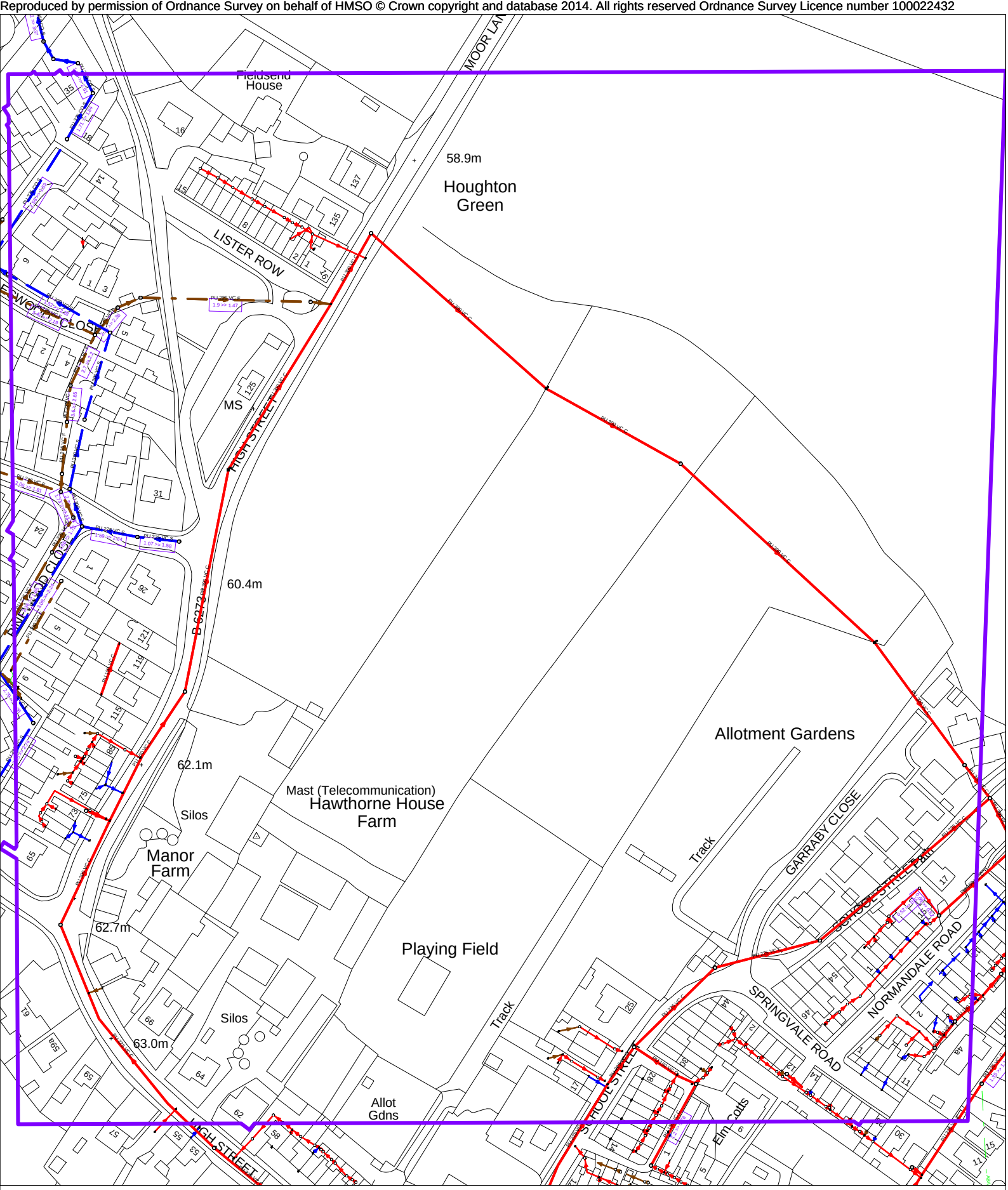
Sewer Legend



Please note that the direction of flow arrows may not always appear depending on the scale of the map.

Water Legend





Public Waste Water Network 14/08/2023 15:13:48 OS Grid Coordinates: 442778 : 406782 Map Name : SE4206NE svcGISSafeMovePD

Yorkshire Water Services
Developer Services
Pre-Development Team
PO BOX 52
Bradford
BD3 7AY

Tel: 0345 120 8482
Fax:

Email:
technical.sewerage@yorkshirewater.co.uk

Eastwood Consulting Engineers
St Andrews House
23 Kingfield Road
Sheffield
S11 9AS
jessica.stevenson-steels@eastwoodce.com

Your Ref:
Our Ref: Z004212

For telephone enquiries ring:
George Mullaney on 0345 120 8482

24th August 2023

Dear Ms Stevenson-Steels,

High Street, Great Houghton, Barnsley, S72 0AY - Pre-planning Enquiry V224390

Thank you for your recent enquiry. Our charge of £187.00 plus VAT will be added to your account with us, reference EPL039. You will receive an invoice for your account in due course.

Please find enclosed a complimentary extract from the Statutory Sewer Map which indicates the recorded position of the public sewers. Please note that as of October 2011 and the private to public sewer transfer, there are many uncharted Yorkshire Water assets currently not shown on our records. The following comments reflect our view, with regard to the public sewer network only, based on a 'desk top' study of the site and are valid for a maximum period of twelve months:

Existing Infrastructure

There is a 300mm diameter public combined sewer recorded crossing the site. No buildings, or other obstructions, are to be erected within 3 (three) metres is required at each side of the sewer centre-line, 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. If you wish to have this sewer diverted under Section 185 of the Water Industry Act 1991 an application should be made in writing. To discuss this matter, please telephone 0345 120 84 82.

Foul Water

Development of the site should take place with separate systems for foul and surface water drainage. The separate systems should extend to the points of discharge to be agreed.

Foul water domestic waste can discharge to the 300 mm diameter public combined sewer recorded crossing the site.

Surface Water

The developer's attention is drawn to Requirement H3 of the Building Regulations 2010. This establishes a preferred hierarchy for surface water disposal. Consideration should firstly be given to discharge to soakaway, infiltration system and watercourse in that priority order.

Sustainable Drainage Systems (SuDS), for example the use of soakaways and/or permeable hardstanding etc, may be a suitable solution for surface water disposal appropriate in this situation. You are advised to seek comments on the suitability of SuDS in this instance from the appropriate authorities.

It is understood that curtilage surface water is proposed to discharge to watercourse located to the north of the site. This appears to be the obvious place for surface water disposal (if SuDS are not viable). Please note Yorkshire Water cannot provide plans of culverted watercourses or highway drains. To obtain plans please contact the Lead Local Flood Authority for more details.

Please note further restrictions on surface water disposal from the site may be imposed by other parties. You are strongly advised to seek advice/comments from the Environment Agency/Land Drainage Authority/Internal Drainage Board, with regard to surface water disposal from the site.

Other Observations

Any new connection to an existing public sewer will require the prior approval of Yorkshire Water. You may apply online or obtain an application form from our website (www.yorkshirewater.com/developers/sewerage/sewerage-connections/) or by telephoning 0345 120 84 82.

Under the provisions of section 111 of the Water Industry Act 1991 it is unlawful to pass into any public sewer (or into any drain or private sewer communicating with the public sewer network) any items likely to cause damage to the public sewer network or interfere with the free flow of its contents or affect the treatment and disposal of its contents. Amongst other things this includes fat, oil, nappies, bandages, syringes, medicines, sanitary towels and incontinence pants. Contravention of the provisions of section 111 is a criminal offence.

Prospectively adoptable sewers and pumping stations must be designed and constructed in accordance with the Code for Adoption, pursuant to an agreement under Section 104 of the Water Industry Act 1991. We are happy to offer pre-development technical advice on any prospective sites that you would like to put forward for adoption, prior to submission of your adoption application.

YorkshireWater

An application to enter into a Section 104 agreement must be made in writing prior to any works commencing on site. Please contact our Sewer Adoption, Diversion and Requisition (telephone 0345 120 84 82) or email technical.sewerage@yorkshirewater.co.uk or visit - https://www.yorkshirewater.com/developers/sewerage/sewer-adoptions/ for further information.

All the above comments are based upon the information and records available at the present time and is subject to formal planning approval agreement. The information contained in this letter together with that shown on any extract from the Statutory Sewer Map that may be enclosed is believed to be correct and is supplied in good faith. Please note that capacity in the public sewer network is not reserved for specific future development. It is used up on a 'first come, first served' basis. You should visit the site and establish the line and level of any public sewers affecting your proposals before the commencement of any design work.

Yours sincerely

George Mullaney
Development Services Technician

Eastwood
CONSULTING ENGINEERS

APPENDIX 8

Station	Easting	Northing	Level
P1	442852.868	407045.659	59.655
P2	442931.226	407180.746	58.125
P3	442904.064	407136.299	57.904
P4	442853.514	406971.958	61.269
P5	442794.482	406886.900	62.005
P6	442828.516	406951.849	61.557
P7	442867.930	406960.291	61.284
P8	442858.220	406921.060	62.200
P9	442923.456	406925.585	61.246

General Notes

- Survey instruction - Survey Common Lane fully and locate known utilities from the provided record information crossing the fielded areas.
- Please use in conjunction with all available statutory utility record information. Records overlaid where possible.
- Ditches along Common Lane are heavily littered, possible hidden pipe outlets pipes in to ditch not visible.
- Unable to fully locate foul sewer over field, man entry required to manhole chamber to locate further.

Disclaimer

The location of under ground services shown on this drawing has been determined using electro-magnetic and GPR radar techniques and visual observations. No guarantee can be given that all services have been shown on the drawing. The relevant service drawings should be obtained from the appropriate service providers company and used in conjunction with this drawing. No guarantee can be given to the accuracy and completeness of any service provider record information shown in this drawing and no liability will be accepted for any losses that arise due to a lack of accuracy in any service providers record information. Reference should also be made to historical plans and as built drawings. Excavations in the vicinity of services should be carried out with due diligence ref: HSG47 document. Location accuracy is determined by referring to manufacturers guidelines for the systems deployed.

ABBREVIATIONS

AR	ASSUMED ROUTE	NFI	NO FURTHER INFORMATION
BD	BACKDROP	NTA	NO TRANSMITTER ACCESS
BTIC	BRITISH TELECOM CHAMBER	OSA	OUTSIDE SURVEY AREA
CI	CAST IRON	PE	POLYETHALINE
CL	COVER LEVEL	PR	PIPE RISER
CO	CONCRETE	PVC	POLIVINYL CHLORIDE
CP	CABLE PIT	RE	RODDING EYE
CR	CABLE RISER	RWP	RAINWATER PIPE
d	DEPTH IN METRES	SV	STOP VALVE
EM	EARTH MAT	SVP	SOIL VENT PIPE
EP	ELECTRICITY POLE	TFR	TAKEN FROM RECORDS
EOT	END OF TRACE	TP	TELEGRAPH POLE
FE	FENCE EARTH POINT	UDI	UNRELIABLE DEPTH INFO'
FH	FIRE HYDRANT	UTL	UNABLE TO LOCATE
G	GULLY	UTR	UNABLE TO RAISE
GPR	TRACED BY G.P.R.	UTS	UNABLE TO SURVEY
GV	GAS VALVE	UTT	UNABLE TO TRACE
GR	GAS RISER	WL	WATER LEVEL
IC	INSPECTION CHAMBER	WR	WATER RISER
IL	INVERT LEVEL	VP	VENT PIPE
LP	LAMP POST	VR	VAPOOR RECOVERY
MH	MANHOLE	WM	WATER METER
MCW	MAINS COLD WATER	WO	WASH OUT VALVE
ND	NO DEPTH (Unable to acquire depth)	WWP	WASTE WATER PIPE

LEGEND

CATV	CABLE TELEVISION
CCTV	CLOSED CIRCUIT TELEVISION
COM	COMMUNICATIONS CABLE
A	COMPRESSED AIR
	DUCTING
E	ELECTRIC CABLE
EA	EARTH CABLE
	FOUL WATER SEWER
	COMBINED WATER SEWER
	SURFACE WATER SEWER
F	FUEL PIPE
GAS	GAS PIPE
GL	GAUGE LINE
H	HEATING
O	OFFSET FILL PIPE
R	RADAR TRACE
T	TELECOMS CABLE
TL	TRAFFIC LIGHT CABLE
U	UNIDENTIFIED SERVICE
VR	VAPOUR RECOVERY
V	VENT PIPE
	WATER PIPE
	SURVEY BOUNDARY
	END OF TRACE (Signal lost, unless stated otherwise)

SURVEY CARRIED OUT USING GPS - BASED ON OSGB 36 SCALE FACTOR OF 1 - GRID SET AT 50m

THIS SURVEY SHOWS PHYSICAL SITE BOUNDARIES ONLY. CONFIRMATION OF LEGAL OWNERSHIP BOUNDARIES SHOULD BE OBTAINED BY REFERENCE TO THE H.M. LAND REGISTRY TITLE PLAN EVERY EFFORT IS MADE TO IDENTIFY ALL VISIBLE ABOVE GROUND FEATURES. HOWEVER, IT SHOULD BE BORNE IN MIND THAT THERE MAY BE ITEMS OBSCURED AT THE TIME OF SURVEY.

THE PLAN SCALE IS FOR GUIDANCE ONLY.
DO NOT SCALE DIRECTLY .
IF IN DOUBT, PLEASE ASK.

THE CONTRACTOR IS TO CHECK AND VERIFY ALL BUILDING AND SITE DIMENSIONS,LEVELS AND SEWER INVERT LEVELS AT CONNECTION POINTS BEFORE WORK STARTS. SHOULD THERE BE ANY CONFLICT BETWEEN THE DETAILS INDICATED ON THIS DRAWING AND THOSE INDICATED ON OTHER DRAWINGS, THE ENGINEER SHOULD BE INFORMED PRIOR TO CONSTRUCTION ON SITE.

REV.	DESCRIPTION	DATE

PD SITE SURVEYS

1 ISLINGTON DRIVE
BESSACARR
DONCASTER
DN4 6FA

M - 07515 381674

E - peter.dickinson29@gmail.com

CLIENT

CLIENT

HARRON HOMES

COLTON HOUSE,
TEMPLE POINT
BULLERTHORPE LANE
LEEDS
LS15 9JL

JOB TITLE

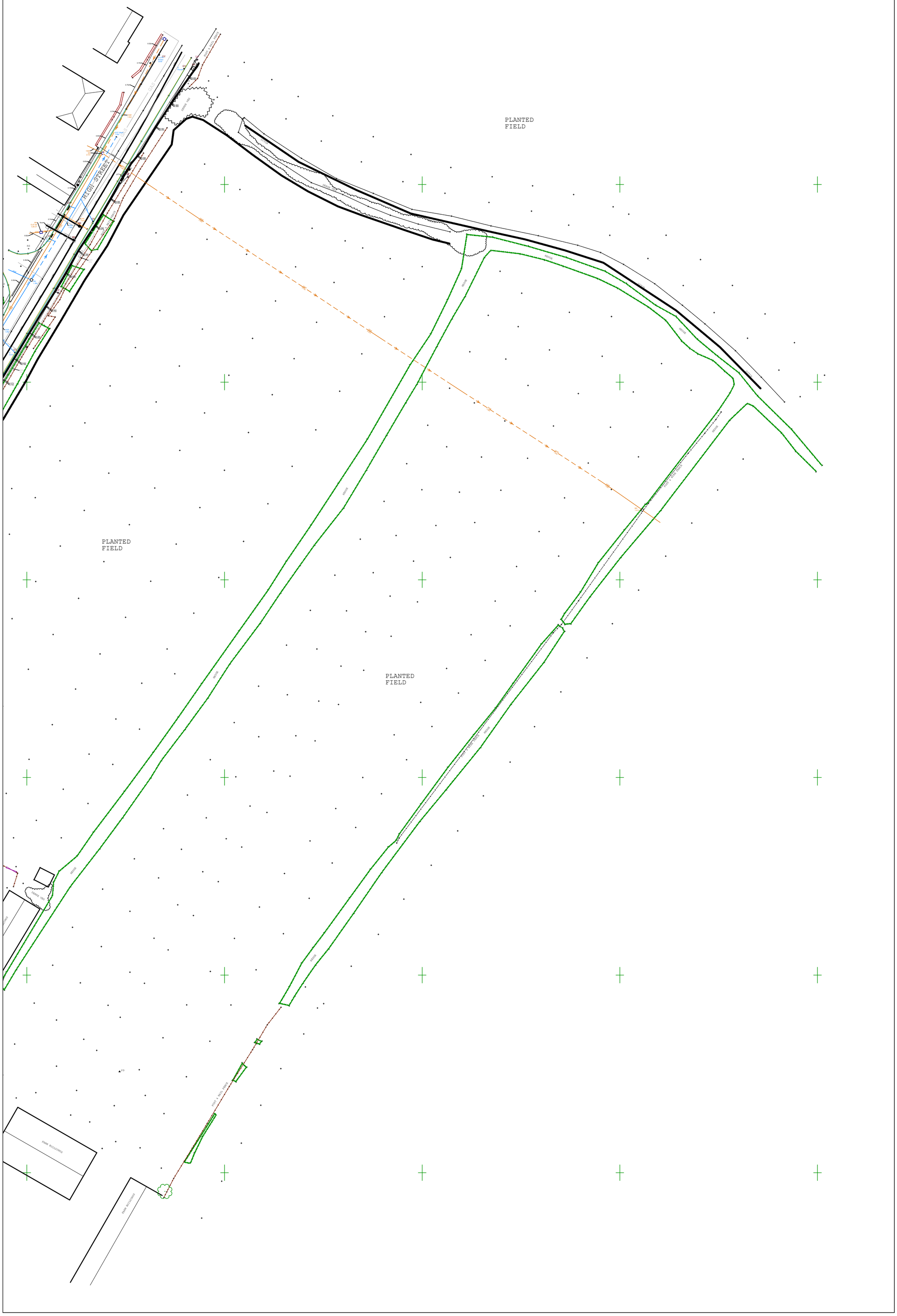
HIGH ST, GREAT HOUGHTON

DRAWING TITLE

UTILITY SURVEY

DRAWN	SIGNATURE	DATE	STATUS
JP		15/03/2021	FOR COMMENT ☐
APPROVED	SIGNATURE	DATE	FOR APPROVAL ☐
PD		15/03/2021	DRAFT ☐
			FINAL ■

SCALE	SHEET	DRAWING NO.	REVISION
1:500	A1	0725-003	*



Station	Easting	Northing	Level
P1	442852.868	407045.659	59.655
P2	442931.226	407180.746	58.125
P3	442904.064	407136.299	57.904
P4	442853.514	406971.958	61.269
P5	442794.482	406886.900	62.005
P6	442828.516	406951.849	61.557
P7	442867.930	406960.291	61.284
P8	442858.220	406921.060	62.200
P9	442923.456	406925.585	61.246

General Notes

- Survey instruction - Survey Common Lane fully and locate known utilities from the provided record information crossing the fielded areas.
- Please use in conjunction with all available statutory utility record information. Records overlaid where possible.
- Ditches along Common Lane are heavily littered, possible hidden pipe outlets pipes in to ditch not visible.
- Unable to fully locate foul sewer over field, man entry required to manhole chamber to locate further.

Disclaimer

The location of under ground services shown on this drawing has been determined using electro-magnetic and GPR radar techniques and visual observations. No guarantee can be given that all services have been shown on the drawing. The relevant service drawings should be obtained from the appropriate service providers company and used in conjunction with this drawing. No guarantee can be given to the accuracy and completeness of any service provider record information shown in this drawing and no liability will be accepted for any losses that arise due to a lack of accuracy in any service providers record information. Reference should also be made to historical plans and as built drawings. Excavations in the vicinity of services should be carried out with due diligence ref: HSG47 document. Location accuracy is determined by referring to manufacturers guidelines for the systems deployed.

ABBREVIATIONS

AR	ASSUMED ROUTE	NFI	NO FURTHER INFORMATION
BD	BACKDROP	NTA	NO TRANSMITTER ACCESS
BTIC	BRITISH TELECOM CHAMBER	OSA	OUTSIDE SURVEY AREA
CI	CAST IRON	PE	POLYETHALINE
CL	COVER LEVEL	PR	PIPE RISER
CO	CONCRETE	PVC	POLYVINYL CHLORIDE
CP	CABLE PIT	RE	RODDING EYE
CR	CABLE RISER	RWP	RAINWATER PIPE
d	DEPTH IN METRES	SV	STOP VALVE
EM	EARTH MAT	SVP	SOIL VENT PIPE
EP	ELECTRICITY POLE	TFR	TAKEN FROM RECORDS
EOT	END OF TRACE	TP	TELEGRAPH POLE
FE	FENCE EARTH POINT	UDI	UNRELIABLE DEPTH INFO'
FH	FIRE HYDRANT	UTL	UNABLE TO LOCATE
G	GULLY	UTR	UNABLE TO RAISE
GPR	TRACED BY G.P.R.	UTS	UNABLE TO SURVEY
GV	GAS VALVE	UTT	UNABLE TO TRACE
GR	GAS RISER	WL	WATER LEVEL
IC	INSPECTION CHAMBER	WR	WATER RISER
IL	INVERT LEVEL	VP	VENT PIPE
LP	LAMP POST	VR	VAPOUR RECOVERY
MH	MANHOLE	WM	WATER METER
MCW	MAINS COLD WATER	WO	WASH OUT VALVE
ND	NO DEPTH (Unable to acquire depth)	WWP	WASTE WATER PIPE

LEGEND

CATV	CABLE TELEVISION
CCTV	CLOSED CIRCUIT TELEVISION
COM	COMMUNICATIONS CABLE
A	COMPRESSED AIR
	DUCTING
E	ELECTRIC CABLE
EA	EARTH CABLE
	FOUL WATER SEWER
	COMBINED WATER SEWER
	SURFACE WATER SEWER
F	FUEL PIPE
GAS	GAS PIPE
GL	GAUGE LINE
H	HEATING
O	OFFSET FILL PIPE
R	RADAR TRACE
T	TELECOMS CABLE
TL	TRAFFIC LIGHT CABLE
U	UNIDENTIFIED SERVICE
VR	VAPOUR RECOVERY
V	VENT PIPE
	WATER PIPE
	SURVEY BOUNDARY
	END OF TRACE (Signal lost, unless stated otherwise)

SURVEY CARRIED OUT USING GPS - BASED ON OSGB 36 SCALE FACTOR OF 1 - GRID SET AT 50m

THIS SURVEY SHOWS PHYSICAL SITE BOUNDARIES ONLY. CONFIRMATION OF LEGAL OWNERSHIP BOUNDARIES SHOULD BE OBTAINED BY REFERENCE TO THE H.M. LAND REGISTRY TITLE PLAN EVERY EFFORT IS MADE TO IDENTIFY ALL VISIBLE ABOVE GROUND FEATURES. HOWEVER, IT SHOULD BE BORNE IN MIND THAT THERE MAY BE ITEMS OBSCURED AT THE TIME OF SURVEY.

THE PLAN SCALE IS FOR GUIDANCE ONLY.
DO NOT SCALE DIRECTLY .
IF IN DOUBT, PLEASE ASK.

THE CONTRACTOR IS TO CHECK AND VERIFY ALL BUILDING AND SITE DIMENSIONS,LEVELS AND SEWER INVERT LEVELS AT CONNECTION POINTS BEFORE WORK STARTS. SHOULD THERE BE ANY CONFLICT BETWEEN THE DETAILS INDICATED ON THIS DRAWING AND THOSE INDICATED ON OTHER DRAWINGS, THE ENGINEER SHOULD BE INFORMED PRIOR TO CONSTRUCTION ON SITE.

REV.	DESCRIPTION	DATE
A	ADDITIONAL AREA TO SOUTH ADDED	30.03.21

PD SITE SURVEYS

1 ISLINGTON DRIVE
BESSACARR
DONCASTER
DN4 6FA

M - 07515 381674

E - peter.dickinson29@gmail.com

CLIENT

CLIENT

HARRON HOMES

COLTON HOUSE,
TEMPLE POINT
BULLERTHORPE LANE
LEEDS
LS15 9JL

JOB TITLE

HIGH ST, GREAT HOUGHTON

DRAWING TITLE

UTILITY SURVEY

DRAWN	SIGNATURE	DATE	STATUS
JP		15/03/2021	FOR COMMENT ☐
			FOR APPROVAL ☐
			DRAFT ☐
			FINAL ■
APPROVED	SIGNATURE	DATE	
PD		15/03/2021	

SCALE	SHEET	DRAWING NO.	REVISION
1:500	A1	0725-004	*

Eastwood
CONSULTING ENGINEERS

APPENDIX 9

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Alice Gamble
Site name:	Great Houghton
Site location:	Barnsley

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:	53.55808° N
Longitude:	1.3533° W
Reference:	12545840
Date:	Aug 18 2023 14:04

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 3.6

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	614	614
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 ≤ 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):	14.91	14.91
1 in 1 year (l/s):	12.82	12.82
1 in 30 years (l/s):	26.09	26.09
1 in 100 year (l/s):	31.01	31.01
1 in 200 years (l/s):	35.33	35.33

SUDS Type	SUDS Technique	Description	Suitable	Comments
Source Control	Green roof	Vegetated roof that reduces runoff volume and rate	No	Expected planning requirement for traditional pitched roofs to match neighbouring housing.
	Rain garden/ bio retention area	Small depressions in the ground that can act as infiltration points.	No	Limited areas for rain gardens to be developed.
	Rainwater harvesting/rainwater butts	Rainwater is stored and re-used	Yes	Individual water butts can be used for garden watering.
	Permeable paving	Paving which allows inflow of rainwater into underlying construction/soil	No	Presence of impermeable ground across majority of the site (clay, mudstone and siltstone).
Infiltration	Soakaway	Pit or trench which stores and disposes of water to the ground	No	Presence of impermeable ground across majority of the site (clay, mudstone and siltstone).
	Filter Drain	Trench which conveys and/or disposes of water to the ground.	No	Presence of impermeable ground across majority of the site (clay, mudstone and siltstone).
	Infiltration Basin	Shallow basin which stores and disposes of water to the ground	No	Presence of impermeable ground in available area to locate a basin (clay, mudstone and siltstone).
Conveyance	Swale	Shallow vegetated depression which conducts and retains water	No	Difficulties of adoption and lack of space.
Detention	Subsurface storage	Traditional underground pipes, tank storage, or modular systems	No	Area available on site for an attenuation tank, however SuDS to be provide though an attenuation basin.
	Detention Basin	Normally dry but may have small permanent water pools at the inlet and outlet. They can function as POS	Yes	Area available on site for attenuation basin.
	Pond	Permanent body of water	No	Lack of suitable public open space.

Detention	Wetland	Permanent body of shallow water or marsh	No	Lack of suitable public open space.

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.376	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	1.000	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	33.200	0.897	37.0	0.133	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	70.600	0.230	307.0	0.200	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.002	15.400	0.328	47.0	0.018	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.003	44.700	2.032	22.0	0.077	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.004	35.500	1.690	21.0	0.038	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.005	52.200	0.387	134.9	0.132	0.00	0.0	0.600	o	525	Pipe/Conduit	
2.000	51.900	2.163	24.0	0.085	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.006	13.800	0.102	135.0	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
3.000	51.900	1.265	41.0	0.224	5.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.21	60.440	0.133	0.0	0.0	0.0	2.59	183.3	24.0
1.001	50.00	6.36	59.470	0.333	0.0	0.0	0.0	1.03	113.6	60.1
1.002	50.00	6.45	59.240	0.351	0.0	0.0	0.0	2.65	292.7	63.4
1.003	50.00	6.65	58.910	0.428	0.0	0.0	0.0	3.88	428.3	77.3
1.004	50.00	6.78	56.810	0.466	0.0	0.0	0.0	4.45	708.0	84.1
1.005	50.00	7.23	55.070	0.598	0.0	0.0	0.0	1.93	417.1	108.0
2.000	50.00	5.42	57.240	0.085	0.0	0.0	0.0	2.06	36.5	15.3
1.006	50.00	7.35	54.680	0.683	0.0	0.0	0.0	1.93	417.0	123.3
3.000	50.00	5.35	56.070	0.224	0.0	0.0	0.0	2.46	174.0	40.4

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
4.000	41.100	1.350	30.4	0.067	5.00	0.0	0.600	o	150	Pipe/Conduit	
4.001	10.100	1.135	8.9	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.007	33.800	0.240	140.8	0.054	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.008	30.000	0.255	117.6	0.059	0.00	0.0	0.600	o	525	Pipe/Conduit	
5.000	53.000	0.431	123.0	0.077	5.00	0.0	0.600	o	225	Pipe/Conduit	
5.001	25.100	0.155	162.0	0.065	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.009	20.700	0.310	66.8	0.035	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.010	17.800	0.034	523.5	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.011	8.700	0.017	525.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
6.000	32.700	0.645	50.7	0.150	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.012	21.900	0.040	550.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
1.013	13.700	0.030	450.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
7.000	34.200	0.152	225.0	0.112	5.00	0.0	0.600	o	300	Pipe/Conduit	
7.001	12.200	0.388	31.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.014	6.400	0.011	590.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
4.000	50.00	5.37	57.440	0.067	0.0	0.0	0.0	1.83	32.4	12.1
4.001	50.00	5.42	56.090	0.067	0.0	0.0	0.0	3.40	60.1	12.1
1.007	50.00	7.65	54.578	1.028	0.0	0.0	0.0	1.89	408.2	185.6
1.008	50.00	7.89	54.338	1.087	0.0	0.0	0.0	2.06	446.8	196.3
5.000	50.00	5.75	54.970	0.077	0.0	0.0	0.0	1.18	46.8	13.9
5.001	50.00	6.16	54.539	0.142	0.0	0.0	0.0	1.02	40.7	25.6
1.009	50.00	8.01	54.010	1.264	0.0	0.0	0.0	2.98	843.5	228.2
1.010	50.00	8.29	53.700	1.264	0.0	0.0	0.0	1.06	299.0	228.2
1.011	50.00	8.42	53.666	1.264	0.0	0.0	0.0	1.06	298.5	228.2
6.000	50.00	5.30	54.670	0.150	0.0	0.0	0.0	1.84	73.2	27.1
1.012	49.80	8.78	53.650	1.414	0.0	0.0	0.0	1.03	291.6	254.3
1.013	49.23	8.98	53.610	1.414	0.0	0.0	0.0	1.14	322.7	254.3
7.000	50.00	5.55	54.120	0.112	0.0	0.0	0.0	1.04	73.8	20.2
7.001	50.00	5.62	53.968	0.112	0.0	0.0	0.0	2.81	198.9	20.2
1.014	48.93	9.09	53.580	1.526	0.0	0.0	0.0	1.00	281.4	269.6

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.015	12.500	0.021	590.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.015	48.35	9.29	53.570	1.526	0.0	0.0	0.0	1.00	281.4	269.6

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.015		54.510	53.549	53.390	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	1.000	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.376		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: 16, DS/PN: 1.015, Volume (m³): 3.2

Unit Reference	MD-SHE-0189-1800-1030-1800
Design Head (m)	1.030
Design Flow (l/s)	18.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	189
Invert Level (m)	53.570
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.030	18.0
Flush-Flo™	0.339	18.0
Kick-Flo®	0.731	15.3
Mean Flow over Head Range	-	15.2

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.6	1.200	19.4	3.000	30.0	7.000	45.2
0.200	17.2	1.400	20.8	3.500	32.3	7.500	46.7
0.300	18.0	1.600	22.2	4.000	34.5	8.000	48.2
0.400	17.9	1.800	23.5	4.500	36.5	8.500	49.6
0.500	17.6	2.000	24.7	5.000	38.4	9.000	51.0
0.600	17.1	2.200	25.9	5.500	40.2	9.500	52.4
0.800	16.0	2.400	27.0	6.000	41.9		
1.000	17.7	2.600	28.0	6.500	43.6		

Storage Structures for Storm

Tank or Pond Manhole: 16, DS/PN: 1.015

Invert Level (m) 53.580

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	815.0	1.000	1265.0	1.001	0.0

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.378
Region	England and Wales	Cv (Summer)	1.000
M5-60 (mm)	19.000	Cv (Winter)	1.000

Margin for Flood Risk Warning (mm)	300.0	DVD Status	ON
Analysis Timestep	Fine	Inertia Status	ON
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	1	60 Summer	100	+45%				
1.001	3	60 Summer	100	+45%	100/60 Summer			
1.002	4	60 Summer	100	+45%				
1.003	5	60 Summer	100	+45%				
1.004	6	60 Summer	100	+45%	100/60 Summer			
1.005	7	60 Summer	100	+45%	100/60 Summer			
2.000	7	60 Summer	100	+45%	100/60 Summer			
1.006	7	60 Summer	100	+45%	100/60 Summer			
3.000	8	60 Summer	100	+45%	100/60 Summer			
4.000	9	60 Summer	100	+45%	100/60 Summer			
4.001	11	60 Summer	100	+45%	100/60 Summer			
1.007	9	60 Summer	100	+45%	100/60 Summer			
1.008	10	60 Summer	100	+45%	100/60 Summer			
5.000	11	60 Summer	100	+45%	100/60 Summer	100/60 Summer		
5.001	12	60 Summer	100	+45%	30/60 Summer			
1.009	11	60 Summer	100	+45%	30/60 Summer			
1.010	11	60 Summer	100	+45%	30/60 Summer			
1.011	12	60 Summer	100	+45%	30/60 Summer			
6.000	12	60 Summer	100	+45%	100/60 Summer			
1.012	14	60 Summer	100	+45%	30/60 Summer			

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	1	60.574	-0.166	0.000	0.41			68.0	OK
1.001	3	60.228	0.383	0.000	1.57			168.6	SURCHARGED
1.002	4	59.490	-0.125	0.000	0.79			177.2	OK
1.003	5	59.108	-0.177	0.000	0.54			214.0	OK
1.004	6	57.465	0.205	0.000	0.35			219.6	SURCHARGED
1.005	7	57.106	1.511	0.000	0.70			261.9	FLOOD RISK
2.000	7	59.021	1.631	0.000	0.98			34.8	FLOOD RISK
1.006	7	56.898	1.693	0.000	1.19			297.0	SURCHARGED
3.000	8	57.281	0.911	0.000	0.65			107.4	SURCHARGED
4.000	9	58.106	0.516	0.000	1.01			31.6	SURCHARGED
4.001	11	57.027	0.787	0.000	0.56			30.1	SURCHARGED
1.007	9	56.758	1.655	0.000	1.26			437.1	SURCHARGED
1.008	10	56.374	1.511	0.000	1.23			458.8	FLOOD RISK
5.000	11	56.243	1.048	3.383	0.82			36.9	FLOOD
5.001	12	56.209	1.445	0.000	1.52			56.9	FLOOD RISK
1.009	11	55.979	1.369	0.000	0.92			515.3	FLOOD RISK
1.010	11	55.703	1.403	0.000	2.85			515.9	SURCHARGED
1.011	12	55.442	1.176	0.000	3.14			515.6	FLOOD RISK
6.000	12	55.855	0.960	0.000	1.03			71.1	SURCHARGED
1.012	14	55.179	0.929	0.000	2.89			577.6	SURCHARGED

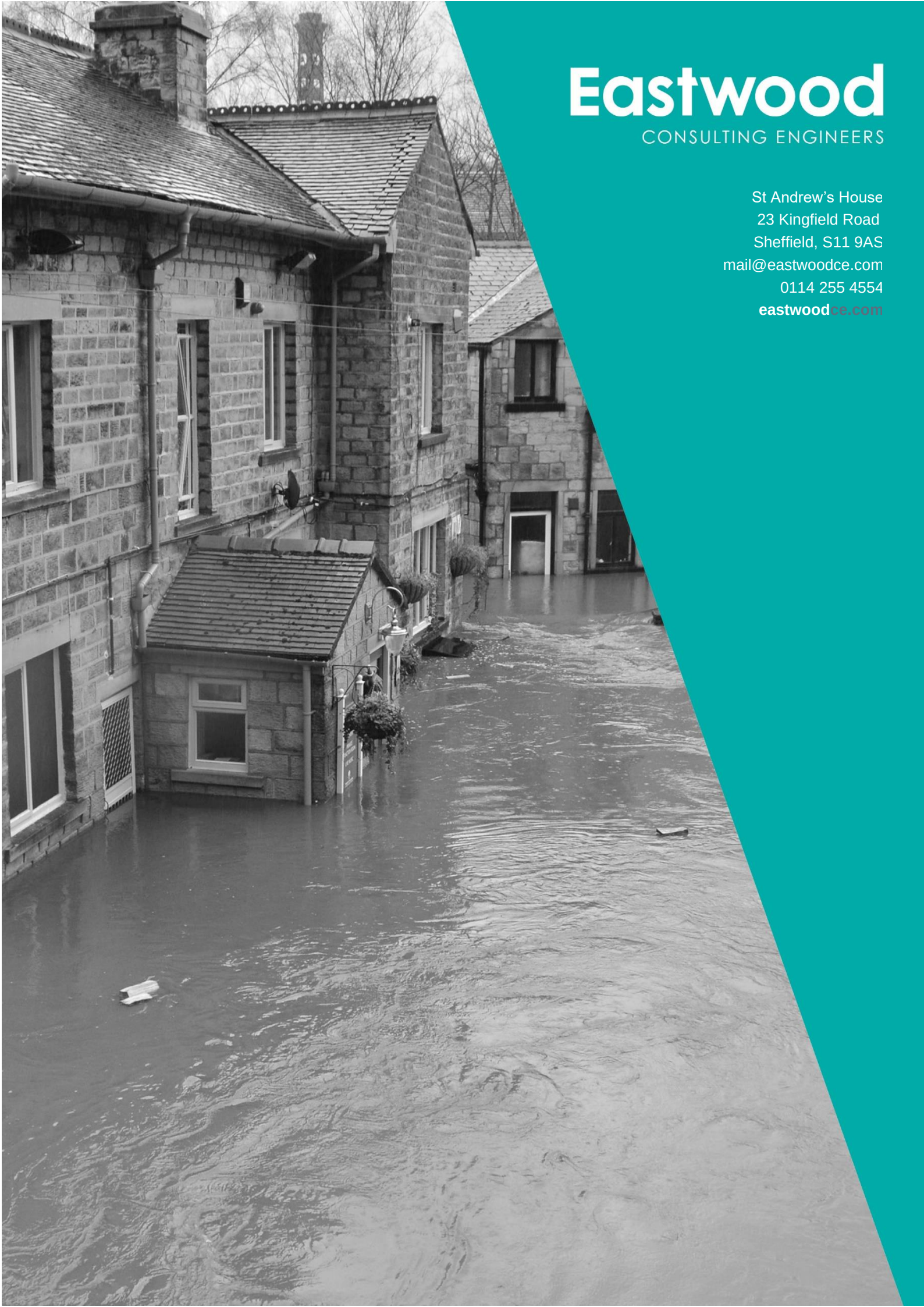
PN	US/MH Name	Level Exceeded
1.000	1	
1.001	3	
1.002	4	
1.003	5	
1.004	6	
1.005	7	
2.000	7	
1.006	7	
3.000	8	
4.000	9	
4.001	11	
1.007	9	
1.008	10	
5.000	11	1
5.001	12	
1.009	11	
1.010	11	
1.011	12	
6.000	12	
1.012	14	

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.013	14	60 Summer	100	+45%	30/60 Summer			
7.000	14	60 Summer	100	+45%	100/60 Summer			
7.001	15	60 Summer	100	+45%	100/60 Summer			
1.014	24	360 Winter	100	+45%	30/60 Summer	100/2160 Winter		
1.015	16	360 Winter	100	+45%	100/60 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.013	14	54.852	0.642	0.000	3.17			574.9	SURCHARGED
7.000	14	54.786	0.366	0.000	0.80			54.5	SURCHARGED
7.001	15	54.690	0.422	0.000	0.34			53.8	SURCHARGED
1.014	24	54.578	0.398	0.000	0.78			156.9	FLOOD RISK
1.015	16	54.576	0.406	0.000	0.13			17.9	FLOOD RISK

PN	US/MH Name	Level Exceeded
1.013	14	
7.000	14	
7.001	15	
1.014	24	
1.015	16	



Eastwood

CONSULTING ENGINEERS

St Andrew's House
23 Kingfield Road
Sheffield, S11 9AS
mail@eastwoodce.com
0114 255 4554
eastwoodce.com