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Flood Risk Assessment & Drainage Strategy

SITE NAME: BARNBURGH LANE, GOLDTHORPE

PREPARED FOR: HOMES BY HONEY

DATE: 22/02/2023

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FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY

BARNBURGH LANE, GOLDTHORPE

FOR

HOMES BY HONEY



47619-0001 **22 February 2023**

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Job No.	:	47619
Report Status	:	Issue 3
Document Date	:	22.02.23
Approved :		

Andrew Allison

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EXECUTIVE SUMMARY

The project comprises the proposed development of a 3.3-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 fluvial flooding. In accordance with current Planning Practice Guidance 'Flood Risk and Coastal Change', sequential testing is not required.

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.

The majority of the site is at very low risk of surface water flooding. There is a low to high risk flow route, originating off site, with one branch flowing north-west and exiting the western boundary while the second branch flows south-east terminating within the site. The surface water flow route that crosses the site north westerly should be maintained and diverted around proposed buildings if required. The surface water flow route flowing south easterly will be diverted and accommodated by the proposed surface water drainage system.

Infiltration type SuDS, such as soakaways, will not be viable on the site due to the presence of impermeable ground (mudstone). SuDS features such as permeable paving (type C) and rain gardens may be suitable to incorporate into the site to provide water quality treatment and attenuation at source.

Surface water disposal should be via gravity to the proposed SuDS attenuation area in the south-east of the site before discharging to the West Moor Dike (ordinary watercourse) south-east of the site, subject to approval from the Lead Local Flood Authority and third party land owner. Surface water discharge to West Moor Dike may require a pumped solution subject to confirmation of outfall levels.

Surface water discharge will be restricted to the greenfield runoff rate, equating to 7.67 l/s, subject to approval from the Lead Local Flood Authority. Attenuation storage will be provided for rainfall events up to the return period of 1 in 100 year plus climate change. The total estimated storage volume is 1555 m^3, subject to detailed design.

Foul effluent will discharge via gravity to a pumping station in the south eastern corner and low point of the site before being pumped to the 300 mm public foul sewer in Barnburgh Lane, south-west of the site as stipulated by Yorkshire Water. The restricted foul water flow rate is to be confirmed by

Yorkshire Water. Emergency foul water storage will be provided on site, equating to 15.4 m^3 (160 l/dwelling).

Both the surface water and foul water drainage system will be offered for adoption to Yorkshire Water.

1.0 THE DEVELOPMENT AND NATIONAL PLANNING POLICY

1.1 Introduction

This Flood Risk Assessment & Drainage Strategy 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 Homes by Honey. 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 3.3-hectare greenfield site for residential use.

1.2 Site location and description

The site is located within Goldthorpe and is centred on coordinates 446880E, 403983N (Appendix 1).

The site is bounded by Barnburgh Lane to the south, woodland to the north and east, with a public footpath to the west.

The site is currently occupied by open ploughed farmland boarded by mature trees and hedgerows.

The site falls from approximately 41.23 mAOD in the north-west at to approximately 31.15 mAOD in the south-east at an average gradient of 1 in 38 (Appendix 2).

Proposals are for 95 household properties with access from Barnburgh Lane to the south (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 river flooding.

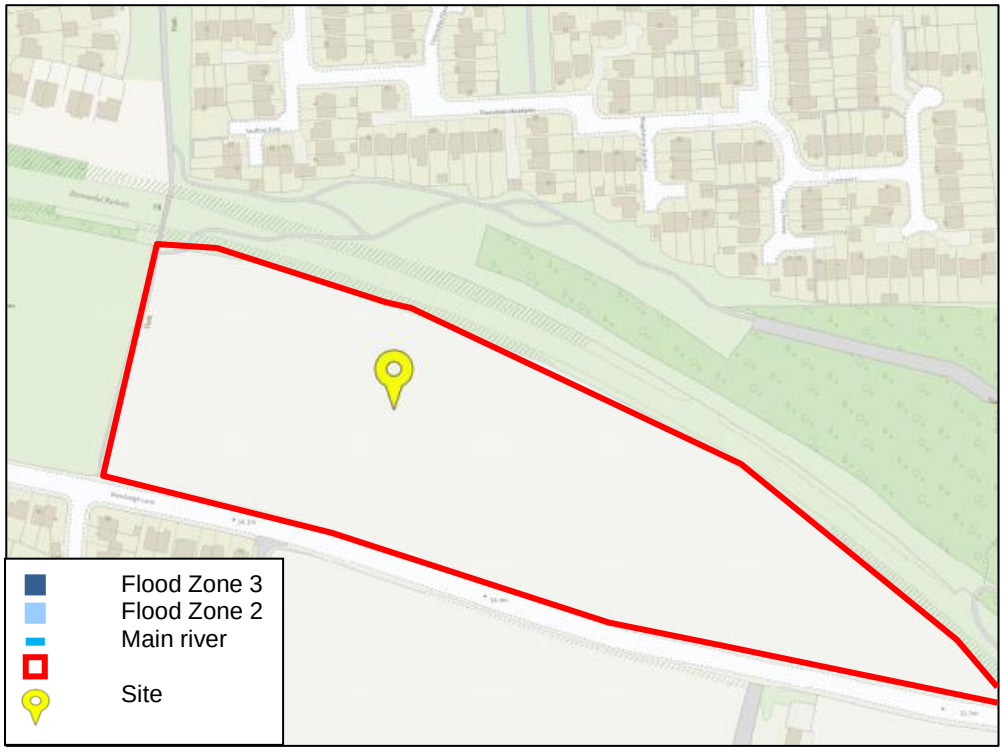

Figure 1: Environment Agency's Flood Map for Planning

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 (July 2021) 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 Zone 1 and this report confirms that the site is not at significant risk of potential flooding from any source, 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. The Environment Agency's report 'Flood risk assessments: climate change allowances'[3], updated in May 2022, recommends 25 to 40% increase in peak rainfall intensity is taken into account for small and urban catchments for design horizons up to 2125. For the purposes of this Flood Risk Assessment, a 40% increase in peak rainfall intensity has been used for assessing storage requirements representing the 'upper end' of the data range.

[3] https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall?mgmtcatid=3029

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

The nearest watercourse is West Moor Dike (ordinary watercourse) located immediately south-east of the site boundary in third party land. The nearest main river is the River Dearne located approximately 1.5 km south 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 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 flow route, originating off site, with one branch flowing north-west and exiting the western boundary while the second branch flows south-east terminating within the site. DEFRA surface water flood mapping is also presented in Figure 3 and Appendix 6. The DEFRA flood map corroborates the Environment Agency results with a clearer delineation of the surface water flood boundaries.

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 ponding depths for extreme rainfall events between the 1 in 100 and 1 in 1000 year rerturn period range from 0-300 mm and 300 – 900 mm (Appendix 4).

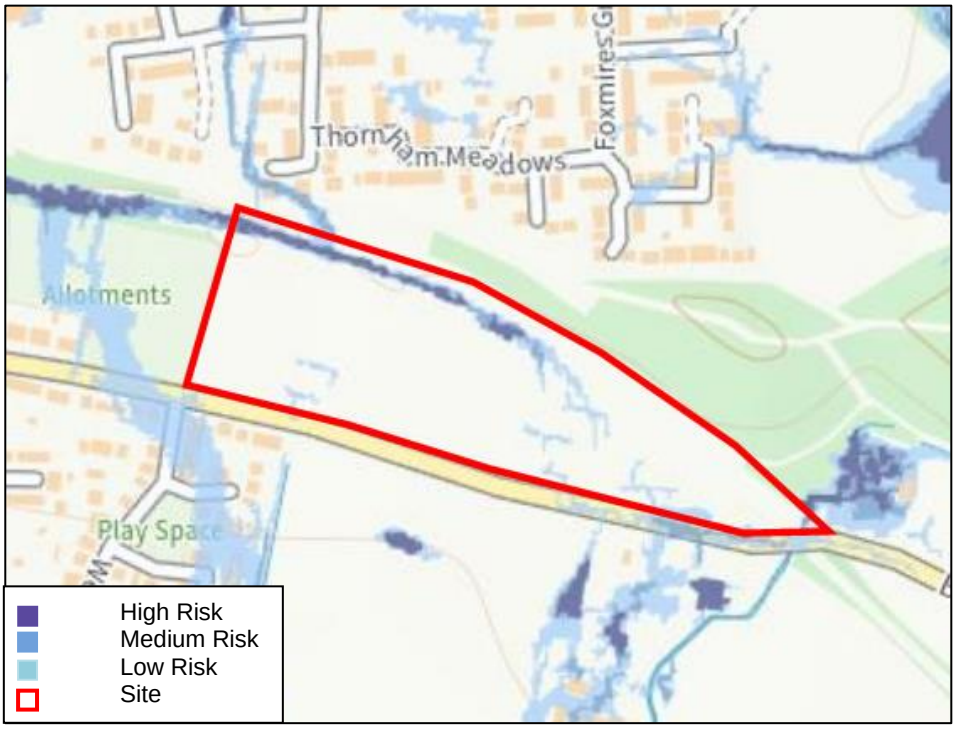

Figure 2: Environment Agency – Risk of surface water flooding map

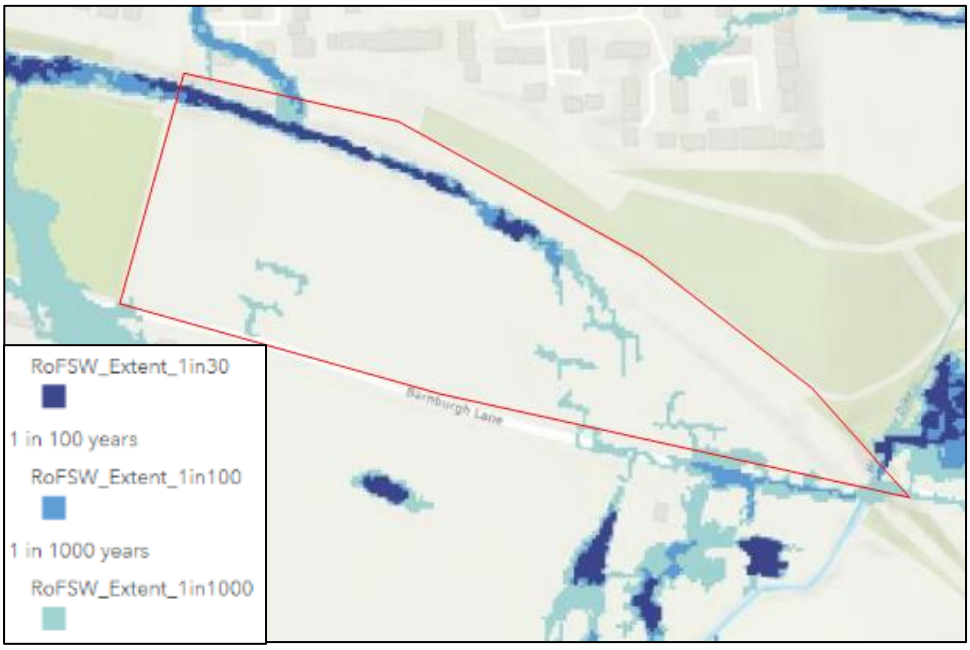

Figure 3: DEFRA – Risk of surface water flooding map

2.1.3 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 associated with groundwater.

2.1.4 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

The Barnsley Metropolitan Borough Council's Strategic Flood Risk Assessment historic flood map (Appendix 5) records the site to lie outside the historical flood outline.

2.3 Residual flood risk

The site lies within Flood Zone 1 and is not at significant risk of fluvial flooding.

The majority of the site is at very low risk of surface water flooding. There is a low to high risk flow route originating off site near the northern border that splits into two branches.

The first branch flows north westerly, exiting the site through the western boundary while the second branch flows south easterly within a localised depression, terminating within the eastern portion of the site. There is no significant area of surface water ponding at the termination of this second branch .

This 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 that crosses the site north westerly should be maintained and diverted around proposed buildings if required. The surface water flow route flowing south easterly will be diverted and accommodated by the proposed surface water drainage system.

3.0 DRAINAGE STRATEGY

3.1 Existing drainage

Yorkshire Water sewer records (Appendix 7) show a 225 mm public combined sewer in the footpath located along the western boundary, increasing to a 300 mm public combined sewer in Barnburgh Lane. There are no public surface water sewers recorded around the site.

3.2 Yorkshire Water consultation

Pre-planning advice has been received from Yorkshire Water (Appendix 7); letter referenceY013425 dated 11th November 2011. The main points of the advice are summarised below.

Foul Water

- Development of the site should take place with separate systems for foul and surface water drainage.
- Foul water domestic waste can discharge to the 300 mm public combined sewer recorded in Barnburgh Lane, at a point to the west of the site.

Surface water

- Following the surface water disposal hierarchy, surface water should look to discharge to soakaway, infiltration system and watercourse in that priority order.
- SuDS (soakaways, permeable hardstanding etc) may be a suitable solution for surface water disposal in this situation. It is advised to seek comments on the suitability of comments on the suitability of SuDS in this instance from the appropriate authorities.
- Further restrictions on surface water disposal may be imposed by other parties. It is strongly advised to seek advice/ comments from the Environment Agency/ Land Drainage Authority/ Internal Drainage Board with regards to surface water disposal.
- It is understood that watercourses are located around the site. This appears to be the obvious place for surface water disposal (if SuDS are not viable). Yorkshire Water cannot provide plans of culverted watercourses or highway drains. To obtain plans, the Lead Local Flood Authority should be contacted.

3.3 Ground conditions

The British Geological Survey maps record bedrock geology as mudstone, siltstone and sandstone of the Pennine middle Coal Measures Formation. Superficial deposits are not available online for this site.

A site investigation undertaken by Sirius (Ref: C9434) identified topsoil between 0.1 – 0.3 m below ground level (bgl) and cohesive residual soils between 0.9 – 2.4 m bgl overlaying weak mudstone across the site.

A historical borehole log (Ref: SE40SE27) located approximately 170 m north of the site records 1.22 m of clay overlying 5.64 m of sandstone. Groundwater was not recorded in the borehole log.

3.4 Greenfield Calculations

Greenfield runoff is calculated using the ReFH2.3 statistical rainfall-runoff method with FEH 2013 rainfall data using the default catchment characteristics (Appendix 8). Table 1 below summarises the runoff rates for varying return periods. These figures relate to the 3.3 ha greenfield area with runoff per unit area (hectare).

Greenfield runoff				
Catchment	**Return period**			
	1 in 1 yr	**1 in 2 yr**	**1 in 30 yr**	**1 in 100 yr**
Dearne Operational Catchment	7.67 l/s	8.69 l/s	20.22 l/s	28.26 l/s
	2.32 l/s/ha	2.63 l/s/ha	6.13 l/s/ha	8.56 l/s/ha

Table 1: Greenfield runoff rates

3.5 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.

3.5.1 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 type SuDS such as soakaways will not be viable due to the presence of impermeable ground conditions (mudstone).

SuDS features such as permeable paving (type C) and rain gardens may be suitable to incorporate into the site to provide water quality treatment and attenuation at source. SuDS methods that may be applicable and their use is summarised in the appended SuDS checklist (Appendix 8).

3.5.2 Watercourse

The nearest watercourse is West Moor Dike (ordinary watercourse) located immediately south-east of the site boundary within third party land. Discharge to this watercourse will require approval from the Lead Local Flood Authority and third party land owner.

3.5.3 Public sewer

There are no public surface water sewers recorded within the vicinity of the site. Discharge of surface water to a public sewer is therefore discounted.

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

3.6 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 via gravity to the proposed SuDS attenuation area in the south-east of the site. This will then discharge to West Moor Dike (ordinary watercourse) south-east of the site, subject to approval from the Lead Local Flood Authority and third party land owner. Surface water discharge to West Moor Dike may require a pumped solution subject to confirmation of outfall levels.
- Surface water discharge will be restricted to the greenfield runoff rate, equating to 7.67 l/s, subject to approval from the Lead Local Flood Authority.
- Attenuation storage will be provided for rainfall events up to the return period of 1 in 100 year plus climate change. The total estimated storage volume is 1555 m^3 subject to detailed design. Attenuation calculations and a drainage strategy are provided in Appendix 8.
- SuDS features such as permeable paving (type C) and rain gardens may be suitable to incorporate into the site to provide water quality treatment and attenuation at source.
- The surface water drainage system will be offered for adoption to Yorkshire Water.

3.7 SuDS Maintenance

Maintenance of the potential SuDS systems for this site will be in accordance with the recommendations within The SuDS Manual (CIRIA C753, 2015) as stipulated in Table 2, along with any recommendations provided by suppliers and product specifications.

SuDS System	ACTION	FREQUENCY
Permeable Paving	Initial inspection of porous pavement	Monthly for three months after installation
	General removal of litter and debris. Brush regularly.	Monthly (or more frequently if required)
	Inspect porous pavements for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 hours after large storms for first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Brushing and vacuuming of porous pavements (standard cosmetic sweep over whole surface)	Annually, after autumn leaf fall
	Removal of weeds from porous pavements or management using glyphosate applied direction into the weeds by an applicator rather than spraying	Annually (or more frequently if necessary)
	Remedial work to any depressions, rutting and cracks of the permeable pavement considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure of the permeable pavement by remedial sweeping	Every 15 years or as required

Rain garden/ bio retention area	Record de-watering time of the facility and assess standing water levels in underdrain to determine if maintenance is necessary	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
	Inspect inlets and outlets for blockage	Quarterly
	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually
	Infill any holes or scour in the filter medium, improve erosion protection if required	As required
	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years
Sub-surface storage	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
	Inspect inlets and outlets for blockage	Quarterly

	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually

Table 2: SuDS Maintenance

3.8 Proposals for foul disposal

Foul effluent will discharge via gravity to a pumping station in the south eastern corner and low point of the site before being pumped to the 300 mm public foul sewer in Barnburgh Lane, south-west of the site as stipulated by Yorkshire Water. The restricted foul water flow rate is to be confirmed by Yorkshire Water. Emergency foul water storage will be provided on site, equating to 15.4 m^3 (160 l/dwelling).

The foul drainage system will be offered for adoption to Yorkshire Water.

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 fluvial flooding.

2. The majority of the site is at very low risk of surface water flooding. There is a low to high risk flow route, originating off site, with one branch flowing north-west and exiting the western boundary while the second branch flows south-east terminating within the site.

3. The surface water flow route that crosses the site north westerly should be maintained and diverted around proposed buildings if required. The surface water flow route flowing south easterly will be diverted and accommodated by the proposed surface water drainage system.

4. Infiltration type SuDS, such as soakaways, will not be viable on the site due to the presence of impermeable ground (mudstone). SuDS features such as permeable paving (type C) and rain gardens may be suitable to incorporate into the site and provide water quality treatment and attenuation at source.

5. Surface water disposal should be via gravity to the proposed SuDS attenuation area in the south-east of the site before discharging to the West Moor Dike (ordinary watercourse) south-east of the site, subject to approval from the Lead Local Flood Authority and third party land owner. Surface water discharge to West Moor Dike may require a pumped solution subject to confirmation of outfall levels.

6. Surface water discharge to the West Moor Dike will be restricted to the greenfield runoff rate of 7.67 l/s, subject to approval from the Lead Local Flood Authority.

7. Attenuation storage will be provided for rainfall events up to the return period of 1 in 100 year plus climate change. The total estimated storage volume is 1555 m^3 subject to detailed design.

8. Foul effluent will discharge via gravity to a pumping station in the south eastern corner and low point of the site before being pumped to the 300 mm public foul sewer in Barnburgh Lane, south-west of the site as stipulated by Yorkshire Water. The restricted foul water flow rate is to be confirmed by Yorkshire Water. Emergency foul water storage will be provided on site, equating to 15.4 m^3 (160 l/dwelling).

9. Both the surface water and foul water drainage system will be offered for adoption to Yorkshire Water.

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

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APPENDICES

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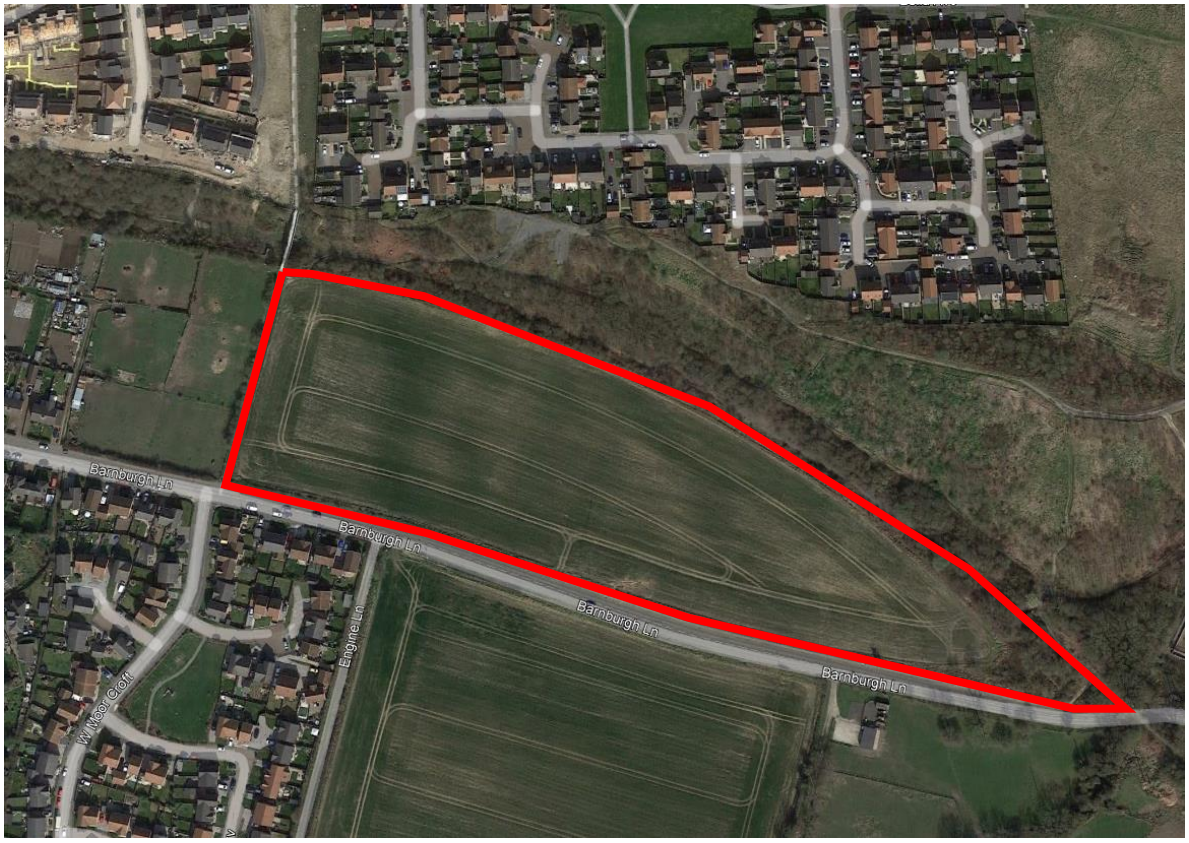
APPENDIX 1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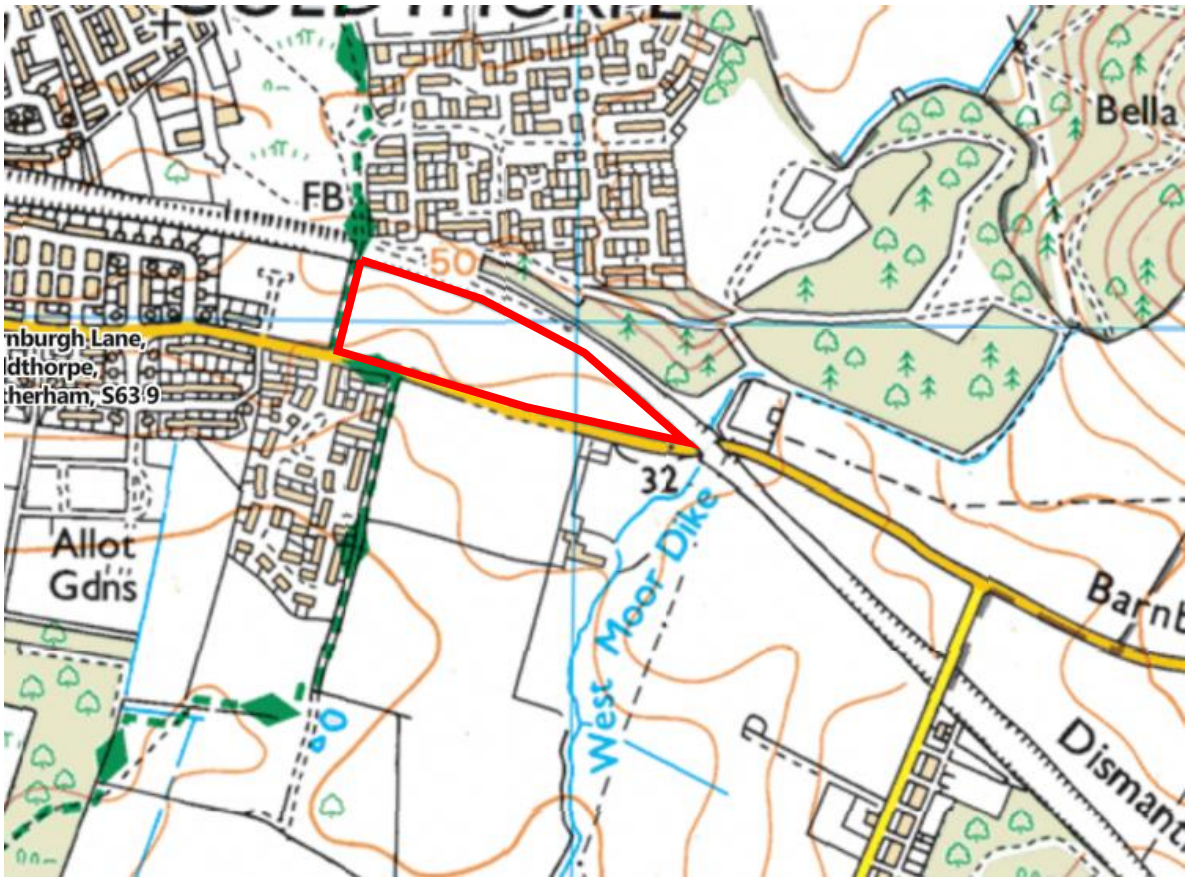
Engine Ln
Wilson Croft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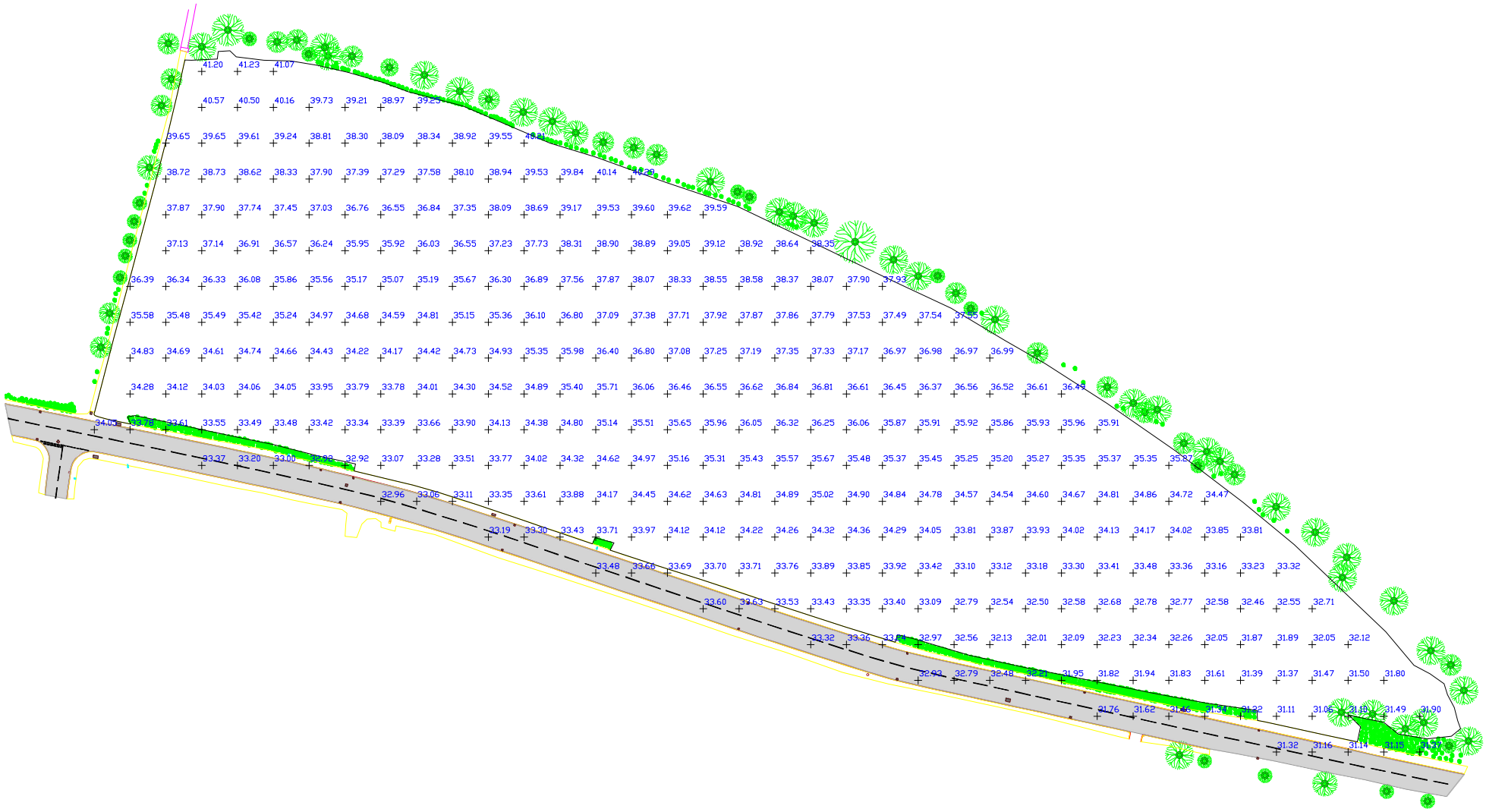
APPENDIX 2



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APPENDIX 3



Accommodation Schedule

House Type Name	House Type		NDSS	Sq Ft	Beds	No. of Plots	Total Sq Ft	Bed Percentages	
Affordable Housing									
Avacado	AVDO	Semi/Terr	NDSS	757	2	6	4,542	8	80%
Blueberry	BLUE	Semi/Terr	NDSS	854	2	2	1,708		
Beechwood	BEEC	Semi/Terr	NDSS	835	3	2	1,670	2	20%
				Sub-Total		10	7,920	10	11%
Market Housing									
Acacia	ACIA	Semi/Terr	NDSS	676	2	5	3,380	17	20%
Avacado	AVDO	Semi/Terr	NDSS	757	2	11	8,327		
Blueberry	BLUE	Semi/Terr	NDSS	854	2	1	854		
Beechwood	BEEC	Semi	NDSS	835	3	8	6,680	39	46%
Buckwheat	BUCK	Semi/Terr		854	3	3	2,562		
Dandelion	DAND	Semi	NDSS	995	3	4	3,980		
Chestnut	CHES	Semi	NDSS	859	3	14	12,026		
Clover	CLOV	Semi/Det	NDSS	954	3	4	3,816		
Eucalyptus	EUCA	Det	NDSS	1,054	3	6	6,324		
Jarrah	JARR	Det	NDSS	1,209	4	3	3,627	29	34%
Lavender	LAVR	Det	NDSS	1,239	4	10	12,390		
Linden	LIND	Det	NDSS	1,274	4	4	5,096		
Rosemary	ROSE	Det	NDSS	1,359	4	12	16,308		
				Sub-Total		85	85,370	85	89%
					Grand Total	95	93,290		

honey

nineteen47
CHARTERED TOWN PLANNERS & URBAN DESIGNERS

Project
Barnburgh Lane, Goldthorpe

Drawing Title
Planning Layout

Project Code	Drawing Nr	Rev	Drawing Scale
n1982	008	C	1:500 @ A1

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APPENDIX 4

Flood map for planning

Your reference	Location (easting/northing)	Created
Barnburgh Lane	**446860/403995**	**21 Oct 2022 16:21**

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.

Flood risk data is covered by the Open Government Licence **which** sets out the terms and conditions for using government data. https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

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Environment Agency

Flood map for planning

Your reference
Barnburgh Lane

Location (easting/northing)
446860/403995

Scale
1:2500

Created
21 Oct 2022 16:21

- Selected point
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60m

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Flood risk

Extent of flooding

Location

s63 9nt



Extent of flooding from surface water

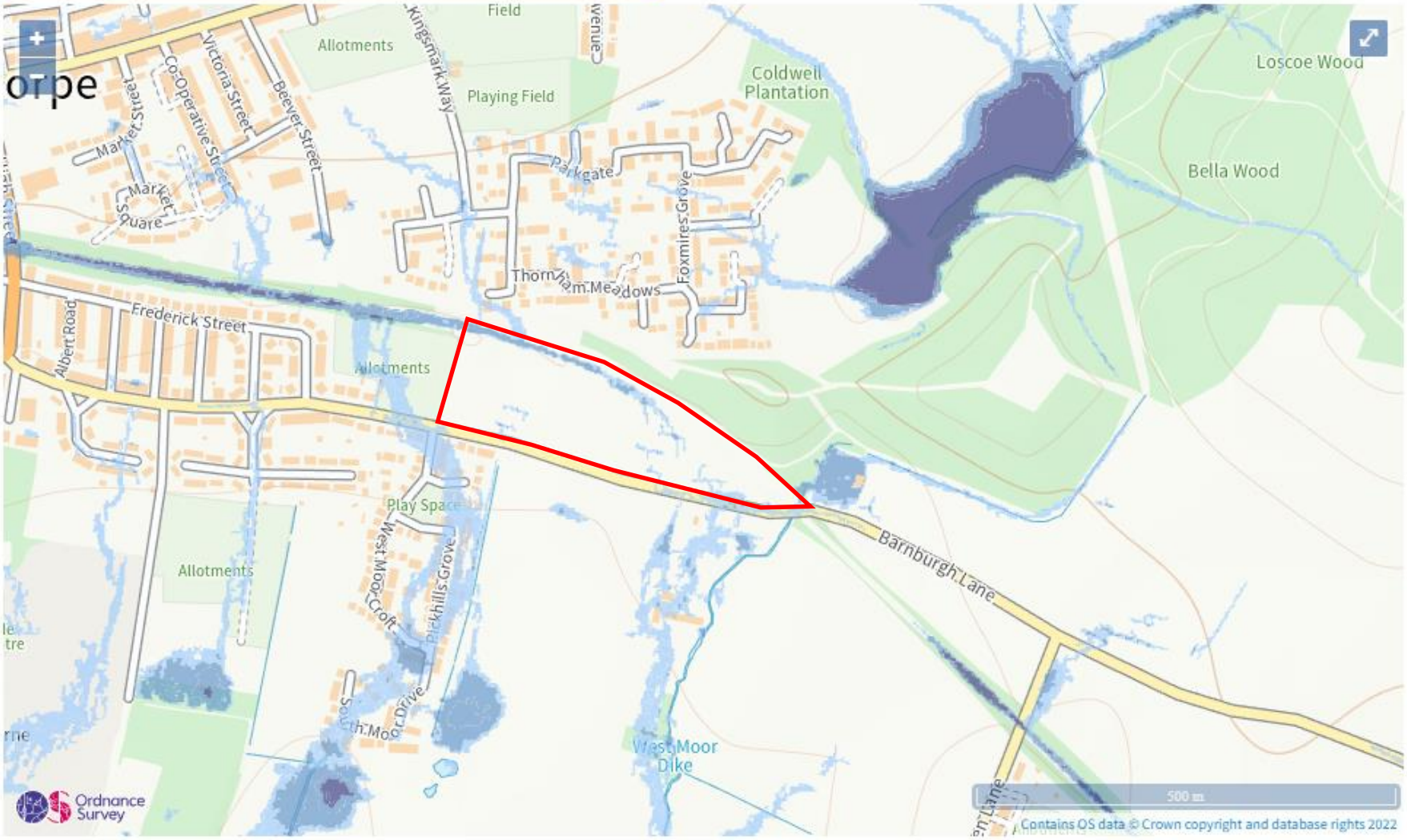
High Medium Low Very low

Flood risk

Low risk: depth

Location

s63 9nt



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

s63 9nt



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

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APPENDIX 5

North

Site location

1:126,172

LEGEND

Barnsley MBC Boundary

Main River

Historical Flood Extents

June 2007

Autumn 2000

January 1982

March 1947

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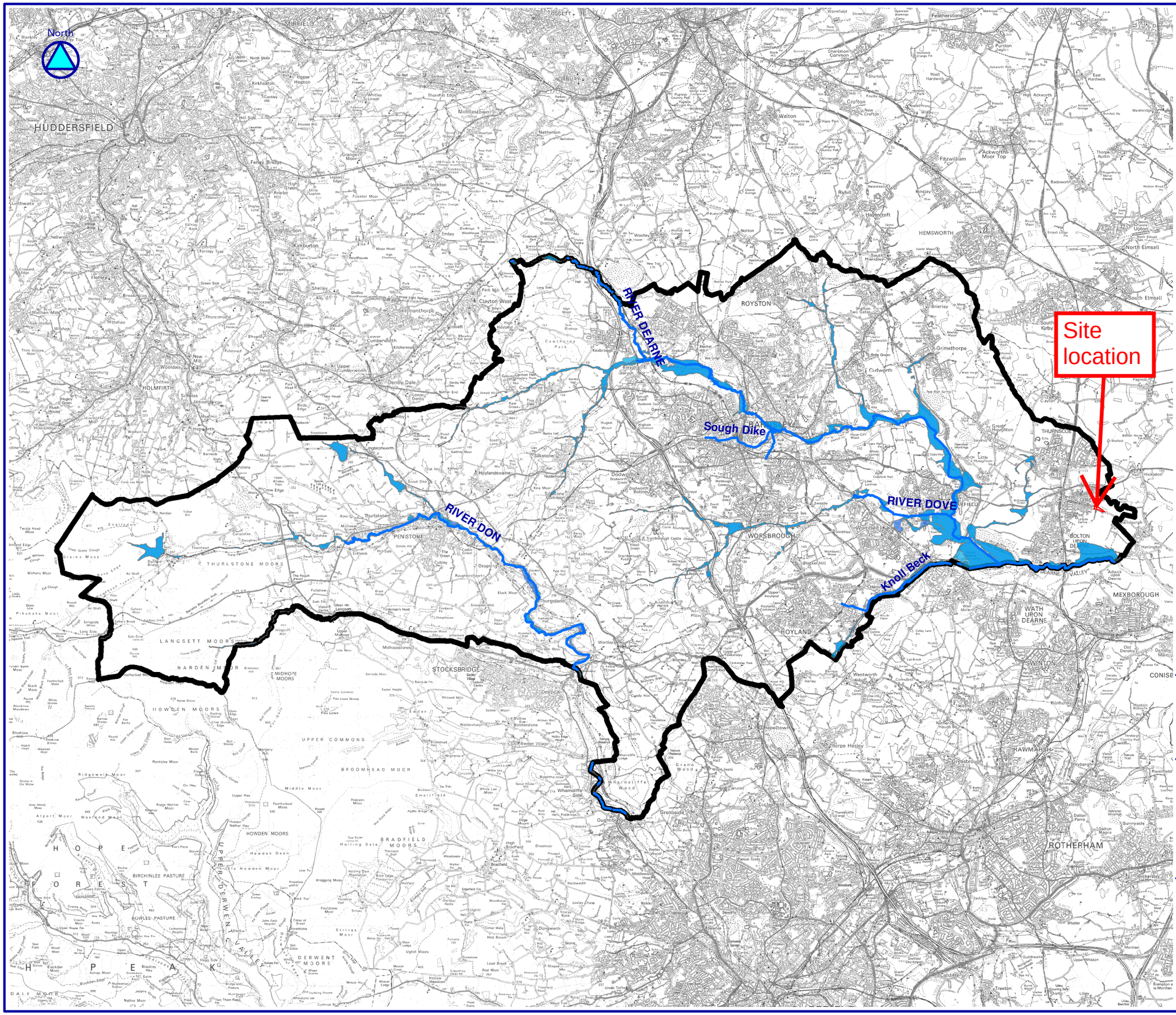
MAP 2

HISTORICAL FLOOD EVENTS



LEGEND

1:120,000

- Main River
- Flood Zone 3
- Barnsley MBC Boundary

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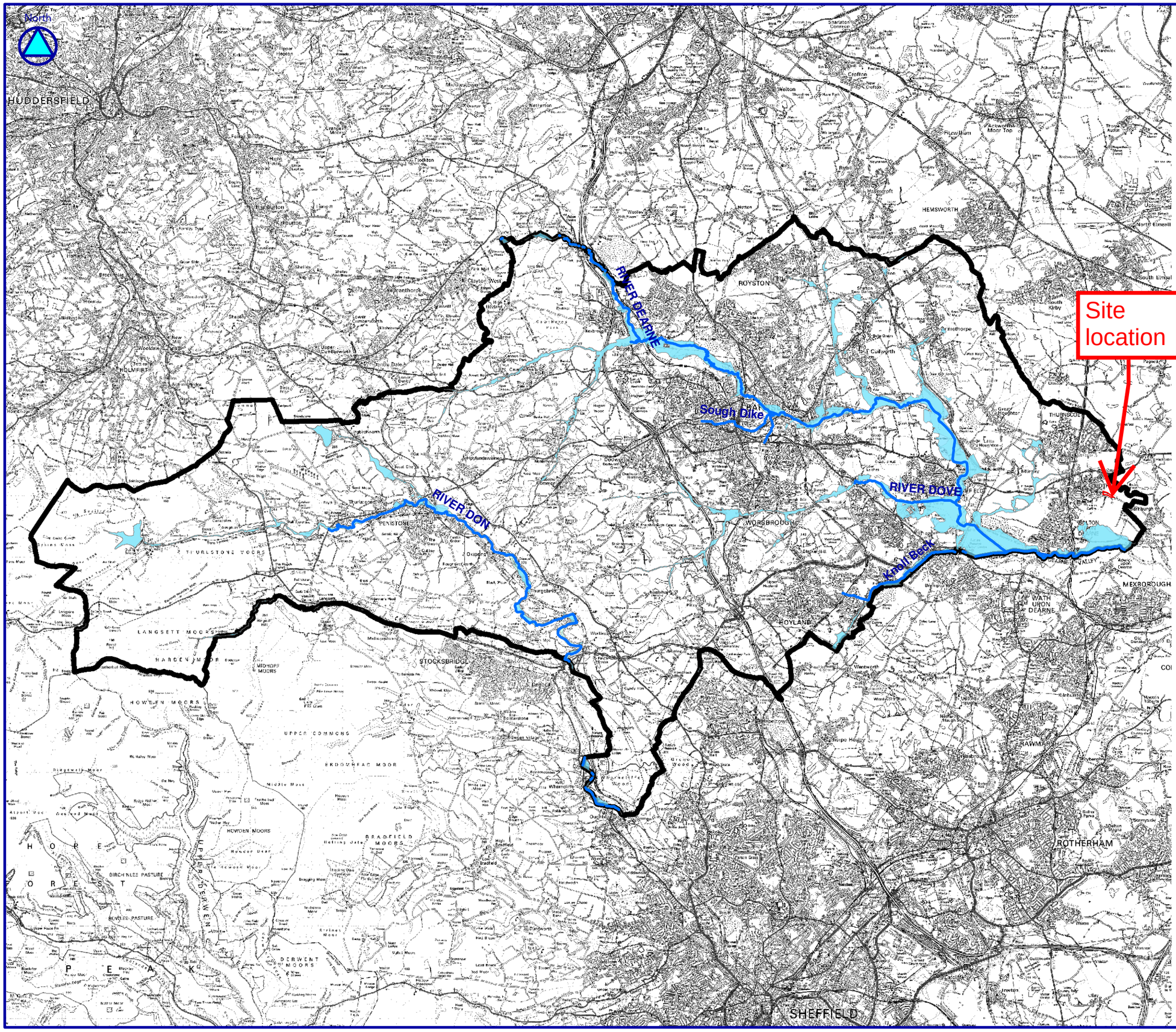
MAP 3

FLOOD ZONE 3



LEGEND 1:120,000

- Main River
- Flood Zone 2
- Barnsley MBC Boundary

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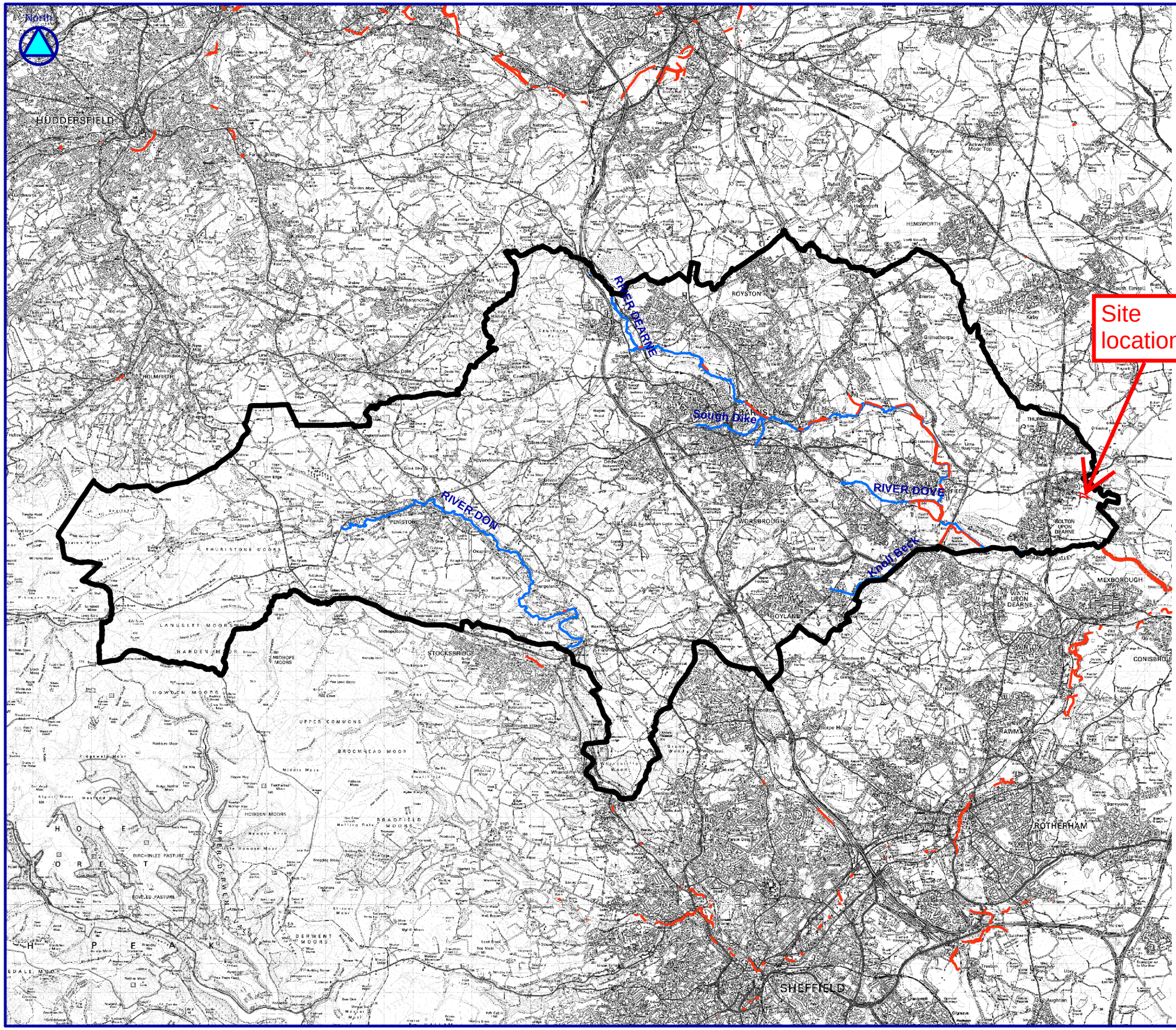
MAP 4

FLOOD ZONE 2



LEGEND

1:126,172

Barnsley MBC Boundary

Main River

Existing Flood Defences

Flood Defence

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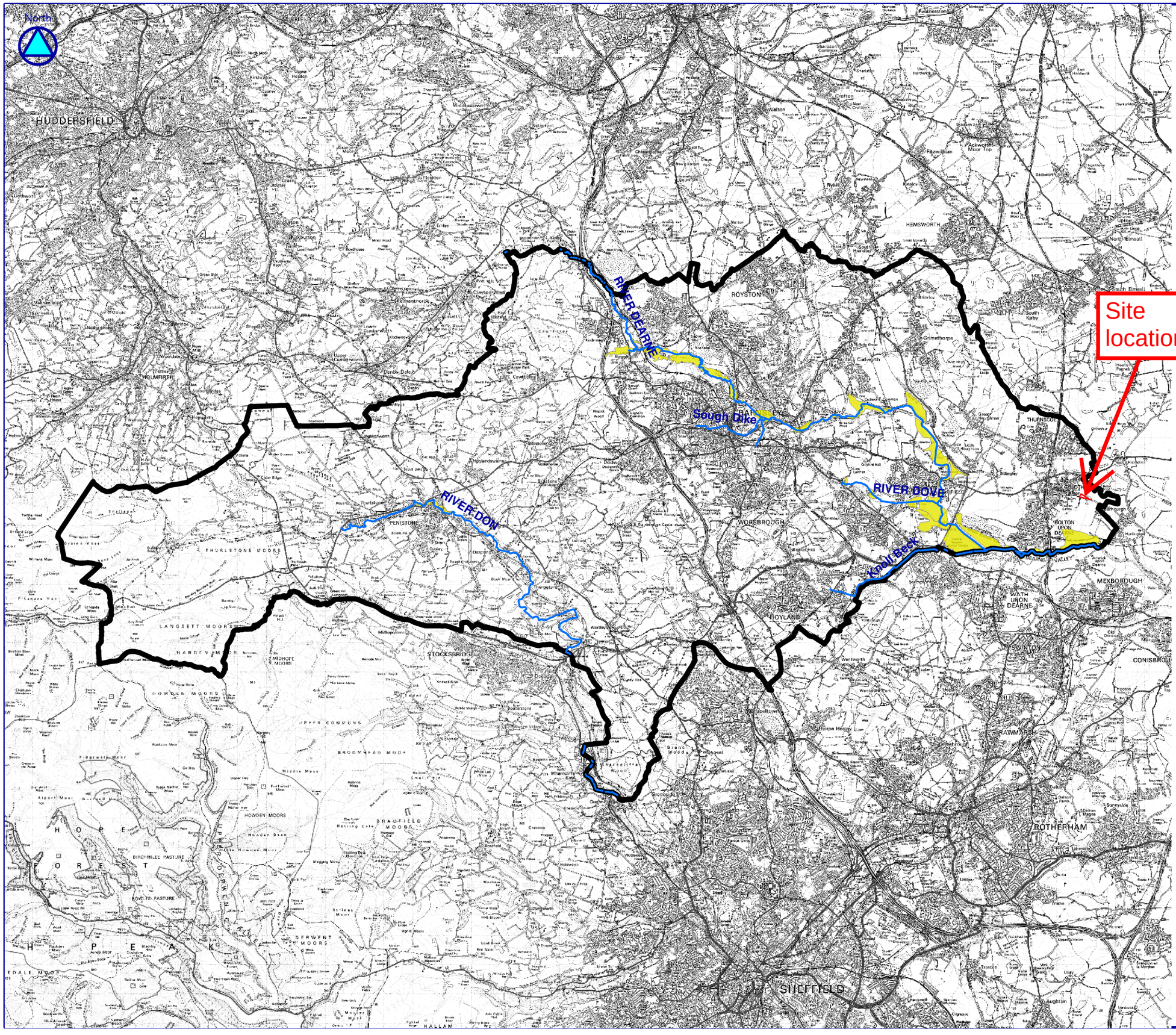
MAP 5

EXISTING DEFENCES



LEGEND

1:126,172

- Main River
- Barnsley MBC Boundary
- Functional Floodplain (FZ3b)

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MAP 6

FUNCTIONAL FLOODPLAIN (FZ3b)

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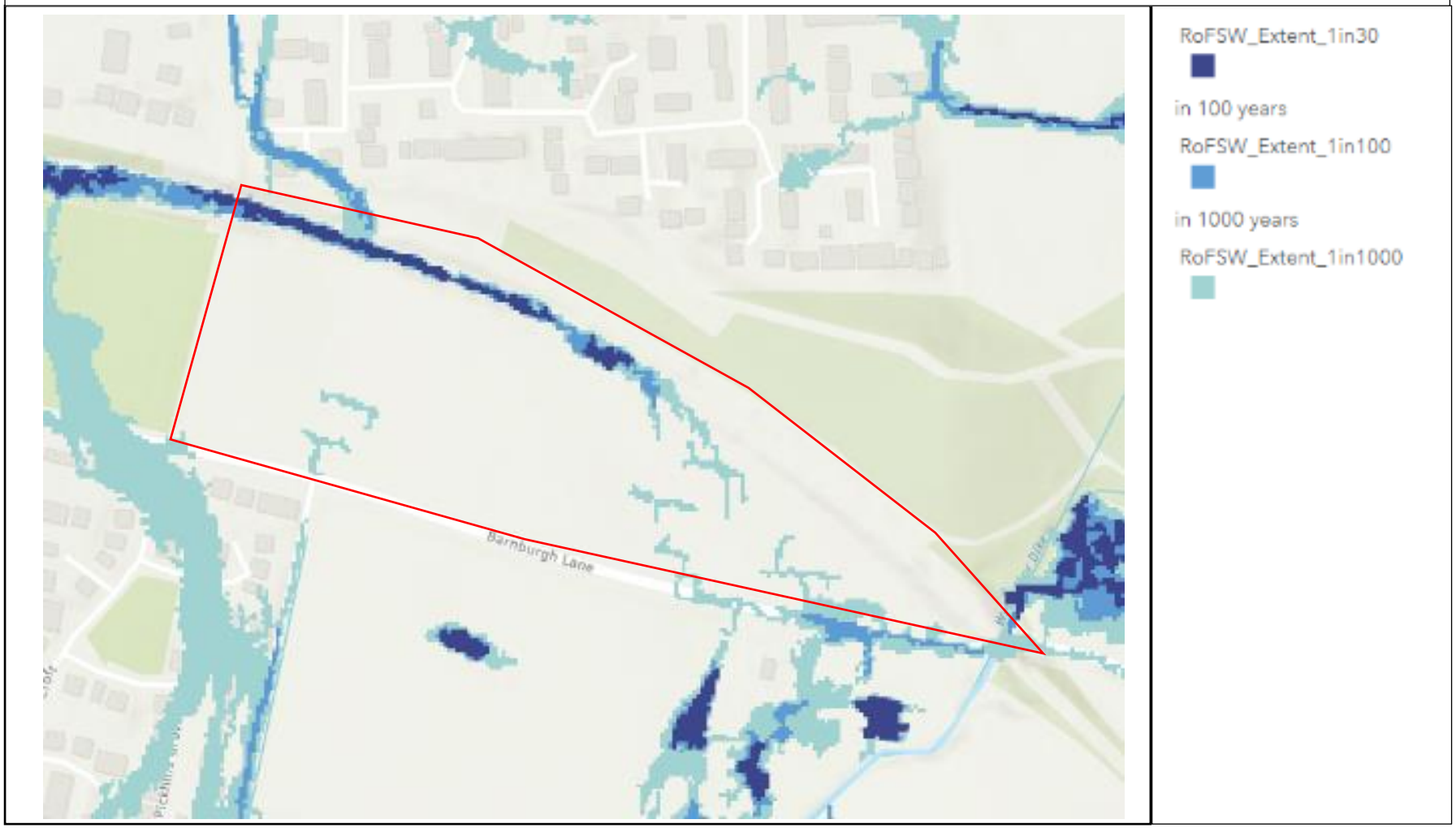
APPENDIX 6

DEFRA: Surface water flood map



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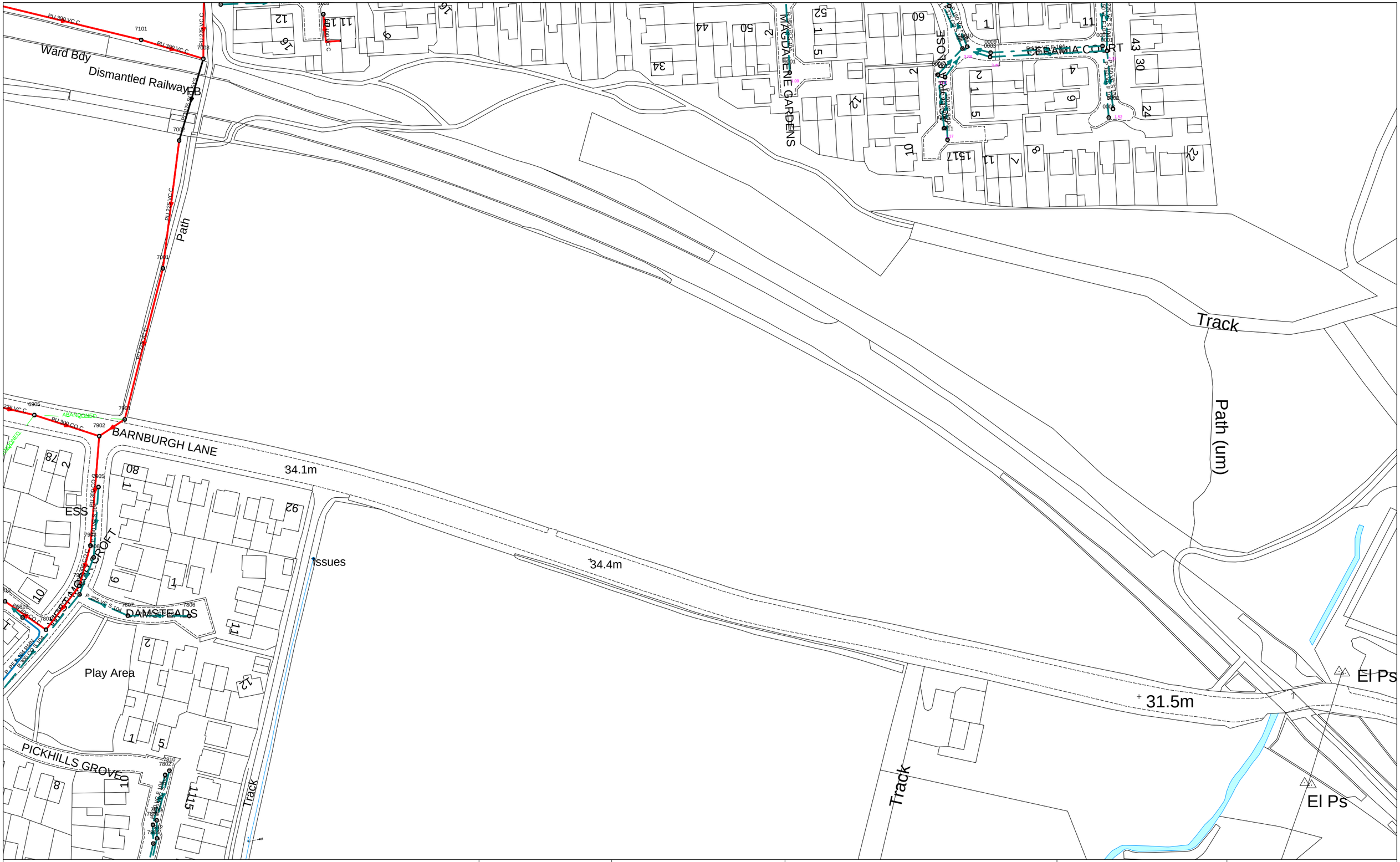
APPENDIX 7



	446844 : 403899	Map Name : SE4603NE	Title
	Yorkshire Water, PO Box 500, Halifax Road, Bradford BD6 2LZ Contact Name : YorMap Advisor C ROBERTS Contact Tel : 87 2582	Notes	Partial Key Foul Sewer = F Combined Sewer = C Surface Water Sewer = SW Trade Sewer = TD Partially Separate = PS
		(Ody) COPYRIGHT STATEMENTS: Reproduced by permission of Ordnance Survey on behalf of HMSO © Crown copyright and database 2014. All rights reserved Ordnance Survey Licence number 100022432	This plan is furnished as a general guide only and no warranty as to its correctness is given or implied. This plan must not be relied upon in the event of excavations or other works made in the vicinity of public sewers. No house or property connections are shown.
			Date Req : 11/11/2022, 09:23:13 — Date Gen : 11/11/2022, 09:24:09
			Source : Sewer Network Enquiry

UPN: Undefined Originator: C ROBERTS, YorMap, 87 2582

YorkshireWater

Ms J Stevenson-Steels
Eastwood & Partners Ltd
Ground Floor
23 Kingfield Road
Sheffield
S11 9AS

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

Your Ref:
Our Ref: Y013425

For telephone enquiries ring:
Chris Roberts on 0345 120 8482

11th November 2022

Dear Ms Stevenson-Steels,

BARNBURGH LANE, GOLDTHORPE, S63 9NT - Pre-planning Enquiry U826454

Thank you for your recent enquiry. Our charge of £172.00 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:

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YorkshireWater

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 in Barnburgh Lane, at a point to the west of 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.

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.

It is understood that watercourses are located through around 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.

YorkshireWater

Other Observations

Any new connection to an existing public sewer will require the prior approval of Yorkshire Water. You may apply on line or obtain an application form from our website - https://www.yorkshirewater.com/developers/sewerage/sewerage-connections/

An off-site foul and surface water sewer may be required which may be provided by the developer and considered for Code for Adoption under Section 104 of the Water Industry Act 1991. Please telephone 0345 120 84 82 for advice on sewer adoptions. Alternatively, the developer may in certain circumstances be able to requisition off-site sewers under Section 98 of the Water Industry Act 1991 for which an application must be made in writing. For further information, please telephone 0345 120 84 82.

Prospectively adoptable sewers and pumping stations must be designed and constructed in accordance with the Code for Adoption 2021/22, 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 for adoption, prior to submission of your adoption application.

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.

YorkshireWater

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

Chris Roberts
Development Services Technician

Eastwood
CONSULTING ENGINEERS

APPENDIX 8

UK Design Flood Estimation

Generated on 14 November 2022 14:26:06 by ihopkinson
Printed from the ReFH2 Flood Modelling software package, version 3.2.7591.25584

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: 87B5-DD0D

Site name: FEH_Point_Descriptors_446880_403989_v4_0_0

Easting: 446880

Northing: 403989

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0.03 [0.5]*

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 1 year

Summary of results

Rainfall - FEH 2013 model (mm):	16.98	Total runoff (ML):	0.10
Total Rainfall (mm):	10.61	Total flow (ML):	0.35
Peak Rainfall (mm):	3.58	Peak flow (m³/s):	0.01

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.62	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	101.18	No
Cmax (mm)	391.76	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.18 [1.01]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	39.19 [31.88]	Yes
BR	2.68	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km^2)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No
Exporting drained area (km^2)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

Printed from the ReFH2 Flood Modelling software package, version 3.2.7591.25584

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	0.4310	0.0000	0.1116	0.0000	0.00071	0.00071
00:30:00	0.9648	0.0000	0.2514	0.0000	0.000701	0.000736
01:00:00	2.1154	0.0000	0.5596	0.0002	0.000696	0.000881
01:30:00	3.5828	0.0000	0.9738	0.0006	0.0007	0.00129
02:00:00	2.1154	0.0000	0.5904	0.0015	0.000727	0.0022
02:30:00	0.9648	0.0000	0.2730	0.0028	0.000791	0.00362
03:00:00	0.4310	0.0000	0.1228	0.0043	0.000902	0.00523
03:30:00	0.0000	0.0000	0.0000	0.0056	0.00106	0.0067
04:00:00	0.0000	0.0000	0.0000	0.0064	0.00125	0.00761
04:30:00	0.0000	0.0000	0.0000	0.0062	0.00145	0.00767
05:00:00	0.0000	0.0000	0.0000	0.0056	0.00163	0.00718
05:30:00	0.0000	0.0000	0.0000	0.0047	0.00178	0.00645
06:00:00	0.0000	0.0000	0.0000	0.0038	0.0019	0.00569
06:30:00	0.0000	0.0000	0.0000	0.0031	0.002	0.00506
07:00:00	0.0000	0.0000	0.0000	0.0025	0.00206	0.00455
07:30:00	0.0000	0.0000	0.0000	0.0020	0.00211	0.00409
08:00:00	0.0000	0.0000	0.0000	0.0015	0.00215	0.00365
08:30:00	0.0000	0.0000	0.0000	0.0010	0.00216	0.00321
09:00:00	0.0000	0.0000	0.0000	0.0006	0.00216	0.0028
09:30:00	0.0000	0.0000	0.0000	0.0003	0.00215	0.00246
10:00:00	0.0000	0.0000	0.0000	0.0001	0.00213	0.00225
10:30:00	0.0000	0.0000	0.0000	0.0000	0.00211	0.00214
11:00:00	0.0000	0.0000	0.0000	0.0000	0.00208	0.00209
11:30:00	0.0000	0.0000	0.0000	0.0000	0.00206	0.00206
12:00:00	0.0000	0.0000	0.0000	0.0000	0.00203	0.00203
12:30:00	0.0000	0.0000	0.0000	0.0000	0.002	0.002
13:00:00	0.0000	0.0000	0.0000	0.0000	0.00198	0.00198
13:30:00	0.0000	0.0000	0.0000	0.0000	0.00195	0.00195
14:00:00	0.0000	0.0000	0.0000	0.0000	0.00193	0.00193
14:30:00	0.0000	0.0000	0.0000	0.0000	0.0019	0.0019
15:00:00	0.0000	0.0000	0.0000	0.0000	0.00188	0.00188
15:30:00	0.0000	0.0000	0.0000	0.0000	0.00186	0.00186
16:00:00	0.0000	0.0000	0.0000	0.0000	0.00183	0.00183
16:30:00	0.0000	0.0000	0.0000	0.0000	0.00181	0.00181
17:00:00	0.0000	0.0000	0.0000	0.0000	0.00179	0.00179

Printed from the ReFH2 Flood Modelling software package, version 3.2.7591.25584

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:30:00	0.0000	0.0000	0.0000	0.0000	0.00176	0.00176
18:00:00	0.0000	0.0000	0.0000	0.0000	0.00174	0.00174
18:30:00	0.0000	0.0000	0.0000	0.0000	0.00172	0.00172
19:00:00	0.0000	0.0000	0.0000	0.0000	0.0017	0.0017
19:30:00	0.0000	0.0000	0.0000	0.0000	0.00168	0.00168
20:00:00	0.0000	0.0000	0.0000	0.0000	0.00165	0.00165
20:30:00	0.0000	0.0000	0.0000	0.0000	0.00163	0.00163
21:00:00	0.0000	0.0000	0.0000	0.0000	0.00161	0.00161
21:30:00	0.0000	0.0000	0.0000	0.0000	0.00159	0.00159
22:00:00	0.0000	0.0000	0.0000	0.0000	0.00157	0.00157
22:30:00	0.0000	0.0000	0.0000	0.0000	0.00155	0.00155
23:00:00	0.0000	0.0000	0.0000	0.0000	0.00153	0.00153
23:30:00	0.0000	0.0000	0.0000	0.0000	0.00151	0.00151
24:00:00	0.0000	0.0000	0.0000	0.0000	0.00149	0.00149
24:30:00	0.0000	0.0000	0.0000	0.0000	0.00148	0.00148
25:00:00	0.0000	0.0000	0.0000	0.0000	0.00146	0.00146
25:30:00	0.0000	0.0000	0.0000	0.0000	0.00144	0.00144
26:00:00	0.0000	0.0000	0.0000	0.0000	0.00142	0.00142
26:30:00	0.0000	0.0000	0.0000	0.0000	0.0014	0.0014
27:00:00	0.0000	0.0000	0.0000	0.0000	0.00138	0.00138
27:30:00	0.0000	0.0000	0.0000	0.0000	0.00137	0.00137
28:00:00	0.0000	0.0000	0.0000	0.0000	0.00135	0.00135
28:30:00	0.0000	0.0000	0.0000	0.0000	0.00133	0.00133
29:00:00	0.0000	0.0000	0.0000	0.0000	0.00132	0.00132
29:30:00	0.0000	0.0000	0.0000	0.0000	0.0013	0.0013
30:00:00	0.0000	0.0000	0.0000	0.0000	0.00128	0.00128
30:30:00	0.0000	0.0000	0.0000	0.0000	0.00127	0.00127
31:00:00	0.0000	0.0000	0.0000	0.0000	0.00125	0.00125
31:30:00	0.0000	0.0000	0.0000	0.0000	0.00123	0.00123
32:00:00	0.0000	0.0000	0.0000	0.0000	0.00122	0.00122
32:30:00	0.0000	0.0000	0.0000	0.0000	0.0012	0.0012
33:00:00	0.0000	0.0000	0.0000	0.0000	0.00119	0.00119
33:30:00	0.0000	0.0000	0.0000	0.0000	0.00117	0.00117
34:00:00	0.0000	0.0000	0.0000	0.0000	0.00116	0.00116
34:30:00	0.0000	0.0000	0.0000	0.0000	0.00114	0.00114
35:00:00	0.0000	0.0000	0.0000	0.0000	0.00113	0.00113

Printed from the ReFH2 Flood Modelling software package, version 3.2.7591.25584

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
35:30:00	0.0000	0.0000	0.0000	0.0000	0.00111	0.00111
36:00:00	0.0000	0.0000	0.0000	0.0000	0.0011	0.0011
36:30:00	0.0000	0.0000	0.0000	0.0000	0.00109	0.00109
37:00:00	0.0000	0.0000	0.0000	0.0000	0.00107	0.00107
37:30:00	0.0000	0.0000	0.0000	0.0000	0.00106	0.00106
38:00:00	0.0000	0.0000	0.0000	0.0000	0.00105	0.00105
38:30:00	0.0000	0.0000	0.0000	0.0000	0.00103	0.00103
39:00:00	0.0000	0.0000	0.0000	0.0000	0.00102	0.00102
39:30:00	0.0000	0.0000	0.0000	0.0000	0.00101	0.00101
40:00:00	0.0000	0.0000	0.0000	0.0000	0.000993	0.000993
40:30:00	0.0000	0.0000	0.0000	0.0000	0.000981	0.000981
41:00:00	0.0000	0.0000	0.0000	0.0000	0.000968	0.000968
41:30:00	0.0000	0.0000	0.0000	0.0000	0.000956	0.000956
42:00:00	0.0000	0.0000	0.0000	0.0000	0.000944	0.000944
42:30:00	0.0000	0.0000	0.0000	0.0000	0.000932	0.000932
43:00:00	0.0000	0.0000	0.0000	0.0000	0.00092	0.00092
43:30:00	0.0000	0.0000	0.0000	0.0000	0.000908	0.000908
44:00:00	0.0000	0.0000	0.0000	0.0000	0.000897	0.000897
44:30:00	0.0000	0.0000	0.0000	0.0000	0.000886	0.000886
45:00:00	0.0000	0.0000	0.0000	0.0000	0.000874	0.000874
45:30:00	0.0000	0.0000	0.0000	0.0000	0.000863	0.000863
46:00:00	0.0000	0.0000	0.0000	0.0000	0.000852	0.000852
46:30:00	0.0000	0.0000	0.0000	0.0000	0.000842	0.000842
47:00:00	0.0000	0.0000	0.0000	0.0000	0.000831	0.000831
47:30:00	0.0000	0.0000	0.0000	0.0000	0.00082	0.00082
48:00:00	0.0000	0.0000	0.0000	0.0000	0.00081	0.00081
48:30:00	0.0000	0.0000	0.0000	0.0000	0.0008	0.0008
49:00:00	0.0000	0.0000	0.0000	0.0000	0.00079	0.00079
49:30:00	0.0000	0.0000	0.0000	0.0000	0.00078	0.00078
50:00:00	0.0000	0.0000	0.0000	0.0000	0.00077	0.00077
50:30:00	0.0000	0.0000	0.0000	0.0000	0.00076	0.00076
51:00:00	0.0000	0.0000	0.0000	0.0000	0.00075	0.00075
51:30:00	0.0000	0.0000	0.0000	0.0000	0.000741	0.000741
52:00:00	0.0000	0.0000	0.0000	0.0000	0.000731	0.000731
52:30:00	0.0000	0.0000	0.0000	0.0000	0.000722	0.000722

Printed from the ReFH2 Flood Modelling software package, version 3.2.7591.25584

Appendix

Catchment descriptors *

Name	Value	User-defined value used?
BFIHOST	0.48	No
BFIHOST19	0.48	No
PROPWET (mm)	0.32	No
SAAR (mm)	614	No

Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM

UK Design Flood Estimation

Generated on 14 November 2022 14:26:27 by ihopkinson
Printed from the ReFH2 Flood Modelling software package, version 3.2.7591.25584

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: 87B5-DD0D

Site name: FEH_Point_Descriptors_446880_403989_v4_0_0

Easting: 446880

Northing: 403989

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0.03 [0.5]*

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 2 year

Summary of results

Rainfall - FEH 2013 model (mm):	19.34	Total runoff (ML):	0.11
Total Rainfall (mm):	12.08	Total flow (ML):	0.40
Peak Rainfall (mm):	4.08	Peak flow (m³/s):	0.01

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.62	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	101.18	No
Cmax (mm)	391.76	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.18 [1.01]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	39.19 [31.88]	Yes
BR	2.65	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km^2)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No
Exporting drained area (km^2)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

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Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	0.4909	0.0000	0.1271	0.0000	0.00071	0.00071
00:30:00	1.0988	0.0000	0.2867	0.0000	0.000701	0.000741
01:00:00	2.4092	0.0000	0.6394	0.0002	0.000697	0.000907
01:30:00	4.0805	0.0000	1.1168	0.0007	0.000703	0.00137
02:00:00	2.4092	0.0000	0.6793	0.0017	0.000734	0.00242
02:30:00	1.0988	0.0000	0.3148	0.0032	0.000807	0.00405
03:00:00	0.4909	0.0000	0.1416	0.0050	0.000935	0.00589
03:30:00	0.0000	0.0000	0.0000	0.0065	0.00111	0.00757
04:00:00	0.0000	0.0000	0.0000	0.0073	0.00133	0.00862
04:30:00	0.0000	0.0000	0.0000	0.0071	0.00156	0.00869
05:00:00	0.0000	0.0000	0.0000	0.0064	0.00177	0.00814
05:30:00	0.0000	0.0000	0.0000	0.0054	0.00194	0.0073
06:00:00	0.0000	0.0000	0.0000	0.0043	0.00208	0.00643
06:30:00	0.0000	0.0000	0.0000	0.0035	0.00218	0.00571
07:00:00	0.0000	0.0000	0.0000	0.0029	0.00226	0.00512
07:30:00	0.0000	0.0000	0.0000	0.0023	0.00232	0.0046
08:00:00	0.0000	0.0000	0.0000	0.0017	0.00236	0.00409
08:30:00	0.0000	0.0000	0.0000	0.0012	0.00238	0.00358
09:00:00	0.0000	0.0000	0.0000	0.0007	0.00238	0.00311
09:30:00	0.0000	0.0000	0.0000	0.0004	0.00237	0.00272
10:00:00	0.0000	0.0000	0.0000	0.0001	0.00235	0.00248
10:30:00	0.0000	0.0000	0.0000	0.0000	0.00232	0.00236
11:00:00	0.0000	0.0000	0.0000	0.0000	0.00229	0.0023
11:30:00	0.0000	0.0000	0.0000	0.0000	0.00226	0.00226
12:00:00	0.0000	0.0000	0.0000	0.0000	0.00223	0.00223
12:30:00	0.0000	0.0000	0.0000	0.0000	0.00221	0.00221
13:00:00	0.0000	0.0000	0.0000	0.0000	0.00218	0.00218
13:30:00	0.0000	0.0000	0.0000	0.0000	0.00215	0.00215
14:00:00	0.0000	0.0000	0.0000	0.0000	0.00212	0.00212
14:30:00	0.0000	0.0000	0.0000	0.0000	0.0021	0.0021
15:00:00	0.0000	0.0000	0.0000	0.0000	0.00207	0.00207
15:30:00	0.0000	0.0000	0.0000	0.0000	0.00204	0.00204
16:00:00	0.0000	0.0000	0.0000	0.0000	0.00202	0.00202
16:30:00	0.0000	0.0000	0.0000	0.0000	0.00199	0.00199
17:00:00	0.0000	0.0000	0.0000	0.0000	0.00197	0.00197

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:30:00	0.0000	0.0000	0.0000	0.0000	0.00194	0.00194
18:00:00	0.0000	0.0000	0.0000	0.0000	0.00192	0.00192
18:30:00	0.0000	0.0000	0.0000	0.0000	0.00189	0.00189
19:00:00	0.0000	0.0000	0.0000	0.0000	0.00187	0.00187
19:30:00	0.0000	0.0000	0.0000	0.0000	0.00185	0.00185
20:00:00	0.0000	0.0000	0.0000	0.0000	0.00182	0.00182
20:30:00	0.0000	0.0000	0.0000	0.0000	0.0018	0.0018
21:00:00	0.0000	0.0000	0.0000	0.0000	0.00178	0.00178
21:30:00	0.0000	0.0000	0.0000	0.0000	0.00175	0.00175
22:00:00	0.0000	0.0000	0.0000	0.0000	0.00173	0.00173
22:30:00	0.0000	0.0000	0.0000	0.0000	0.00171	0.00171
23:00:00	0.0000	0.0000	0.0000	0.0000	0.00169	0.00169
23:30:00	0.0000	0.0000	0.0000	0.0000	0.00167	0.00167
24:00:00	0.0000	0.0000	0.0000	0.0000	0.00165	0.00165
24:30:00	0.0000	0.0000	0.0000	0.0000	0.00162	0.00162
25:00:00	0.0000	0.0000	0.0000	0.0000	0.0016	0.0016
25:30:00	0.0000	0.0000	0.0000	0.0000	0.00158	0.00158
26:00:00	0.0000	0.0000	0.0000	0.0000	0.00156	0.00156
26:30:00	0.0000	0.0000	0.0000	0.0000	0.00154	0.00154
27:00:00	0.0000	0.0000	0.0000	0.0000	0.00152	0.00152
27:30:00	0.0000	0.0000	0.0000	0.0000	0.0015	0.0015
28:00:00	0.0000	0.0000	0.0000	0.0000	0.00149	0.00149
28:30:00	0.0000	0.0000	0.0000	0.0000	0.00147	0.00147
29:00:00	0.0000	0.0000	0.0000	0.0000	0.00145	0.00145
29:30:00	0.0000	0.0000	0.0000	0.0000	0.00143	0.00143
30:00:00	0.0000	0.0000	0.0000	0.0000	0.00141	0.00141
30:30:00	0.0000	0.0000	0.0000	0.0000	0.00139	0.00139
31:00:00	0.0000	0.0000	0.0000	0.0000	0.00138	0.00138
31:30:00	0.0000	0.0000	0.0000	0.0000	0.00136	0.00136
32:00:00	0.0000	0.0000	0.0000	0.0000	0.00134	0.00134
32:30:00	0.0000	0.0000	0.0000	0.0000	0.00132	0.00132
33:00:00	0.0000	0.0000	0.0000	0.0000	0.00131	0.00131
33:30:00	0.0000	0.0000	0.0000	0.0000	0.00129	0.00129
34:00:00	0.0000	0.0000	0.0000	0.0000	0.00127	0.00127
34:30:00	0.0000	0.0000	0.0000	0.0000	0.00126	0.00126
35:00:00	0.0000	0.0000	0.0000	0.0000	0.00124	0.00124

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Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
35:30:00	0.0000	0.0000	0.0000	0.0000	0.00123	0.00123
36:00:00	0.0000	0.0000	0.0000	0.0000	0.00121	0.00121
36:30:00	0.0000	0.0000	0.0000	0.0000	0.0012	0.0012
37:00:00	0.0000	0.0000	0.0000	0.0000	0.00118	0.00118
37:30:00	0.0000	0.0000	0.0000	0.0000	0.00117	0.00117
38:00:00	0.0000	0.0000	0.0000	0.0000	0.00115	0.00115
38:30:00	0.0000	0.0000	0.0000	0.0000	0.00114	0.00114
39:00:00	0.0000	0.0000	0.0000	0.0000	0.00112	0.00112
39:30:00	0.0000	0.0000	0.0000	0.0000	0.00111	0.00111
40:00:00	0.0000	0.0000	0.0000	0.0000	0.00109	0.00109
40:30:00	0.0000	0.0000	0.0000	0.0000	0.00108	0.00108
41:00:00	0.0000	0.0000	0.0000	0.0000	0.00107	0.00107
41:30:00	0.0000	0.0000	0.0000	0.0000	0.00105	0.00105
42:00:00	0.0000	0.0000	0.0000	0.0000	0.00104	0.00104
42:30:00	0.0000	0.0000	0.0000	0.0000	0.00103	0.00103
43:00:00	0.0000	0.0000	0.0000	0.0000	0.00101	0.00101
43:30:00	0.0000	0.0000	0.0000	0.0000	0.001	0.001
44:00:00	0.0000	0.0000	0.0000	0.0000	0.000988	0.000988
44:30:00	0.0000	0.0000	0.0000	0.0000	0.000975	0.000975
45:00:00	0.0000	0.0000	0.0000	0.0000	0.000963	0.000963
45:30:00	0.0000	0.0000	0.0000	0.0000	0.00095	0.00095
46:00:00	0.0000	0.0000	0.0000	0.0000	0.000938	0.000938
46:30:00	0.0000	0.0000	0.0000	0.0000	0.000927	0.000927
47:00:00	0.0000	0.0000	0.0000	0.0000	0.000915	0.000915
47:30:00	0.0000	0.0000	0.0000	0.0000	0.000903	0.000903
48:00:00	0.0000	0.0000	0.0000	0.0000	0.000892	0.000892
48:30:00	0.0000	0.0000	0.0000	0.0000	0.00088	0.00088
49:00:00	0.0000	0.0000	0.0000	0.0000	0.000869	0.000869
49:30:00	0.0000	0.0000	0.0000	0.0000	0.000858	0.000858
50:00:00	0.0000	0.0000	0.0000	0.0000	0.000847	0.000847
50:30:00	0.0000	0.0000	0.0000	0.0000	0.000837	0.000837
51:00:00	0.0000	0.0000	0.0000	0.0000	0.000826	0.000826
51:30:00	0.0000	0.0000	0.0000	0.0000	0.000816	0.000816
52:00:00	0.0000	0.0000	0.0000	0.0000	0.000805	0.000805
52:30:00	0.0000	0.0000	0.0000	0.0000	0.000795	0.000795
53:00:00	0.0000	0.0000	0.0000	0.0000	0.000785	0.000785

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Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
53:30:00	0.0000	0.0000	0.0000	0.0000	0.000775	0.000775
54:00:00	0.0000	0.0000	0.0000	0.0000	0.000765	0.000765
54:30:00	0.0000	0.0000	0.0000	0.0000	0.000755	0.000755
55:00:00	0.0000	0.0000	0.0000	0.0000	0.000746	0.000746
55:30:00	0.0000	0.0000	0.0000	0.0000	0.000736	0.000736
56:00:00	0.0000	0.0000	0.0000	0.0000	0.000727	0.000727

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Appendix

Catchment descriptors *

Name	Value	User-defined value used?
BFIHOST	0.48	No
BFIHOST19	0.48	No
PROPWET (mm)	0.32	No
SAAR (mm)	614	No

Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM

UK Design Flood Estimation

Generated on 14 November 2022 14:26:46 by ihopkinson
Printed from the ReFH2 Flood Modelling software package, version 3.2.7591.25584

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: 87B5-DD0D

Site name: FEH_Point_Descriptors_446880_403989_v4_0_0

Easting: 446880

Northing: 403989

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0.03 [0.5]*

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 30 year

Summary of results

Rainfall - FEH 2013 model (mm):	44.18	Total runoff (ML):	0.27
Total Rainfall (mm):	27.60	Total flow (ML):	0.81
Peak Rainfall (mm):	9.32	Peak flow (m³/s):	0.02

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.62	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	101.18	No
Cmax (mm)	391.76	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.18 [1.01]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	39.19 [31.88]	Yes
BR	2.41	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km^2)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No
Exporting drained area (km^2)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	1.1217	0.0000	0.2913	0.0000	0.00071	0.00071
00:30:00	2.5107	0.0000	0.6637	0.0001	0.000702	0.000794
01:00:00	5.5050	0.0000	1.5115	0.0005	0.000702	0.00119
01:30:00	9.3238	0.0000	2.7365	0.0016	0.000724	0.00228
02:00:00	5.5050	0.0000	1.7199	0.0040	0.0008	0.00477
02:30:00	2.5107	0.0000	0.8101	0.0077	0.000968	0.00869
03:00:00	1.1217	0.0000	0.3671	0.0119	0.00126	0.0132
03:30:00	0.0000	0.0000	0.0000	0.0157	0.00166	0.0173
04:00:00	0.0000	0.0000	0.0000	0.0178	0.00215	0.02
04:30:00	0.0000	0.0000	0.0000	0.0176	0.00266	0.0202
05:00:00	0.0000	0.0000	0.0000	0.0157	0.00314	0.0189
05:30:00	0.0000	0.0000	0.0000	0.0133	0.00354	0.0168
06:00:00	0.0000	0.0000	0.0000	0.0108	0.00386	0.0146
06:30:00	0.0000	0.0000	0.0000	0.0087	0.00411	0.0128
07:00:00	0.0000	0.0000	0.0000	0.0071	0.0043	0.0114
07:30:00	0.0000	0.0000	0.0000	0.0056	0.00444	0.0101
08:00:00	0.0000	0.0000	0.0000	0.0043	0.00453	0.00883
08:30:00	0.0000	0.0000	0.0000	0.0030	0.00459	0.0076
09:00:00	0.0000	0.0000	0.0000	0.0018	0.0046	0.00644
09:30:00	0.0000	0.0000	0.0000	0.0009	0.00459	0.00548
10:00:00	0.0000	0.0000	0.0000	0.0003	0.00455	0.00489
10:30:00	0.0000	0.0000	0.0000	0.0001	0.0045	0.00459
11:00:00	0.0000	0.0000	0.0000	0.0000	0.00444	0.00445
11:30:00	0.0000	0.0000	0.0000	0.0000	0.00439	0.00439
12:00:00	0.0000	0.0000	0.0000	0.0000	0.00433	0.00433
12:30:00	0.0000	0.0000	0.0000	0.0000	0.00427	0.00427
13:00:00	0.0000	0.0000	0.0000	0.0000	0.00422	0.00422
13:30:00	0.0000	0.0000	0.0000	0.0000	0.00417	0.00417
14:00:00	0.0000	0.0000	0.0000	0.0000	0.00411	0.00411
14:30:00	0.0000	0.0000	0.0000	0.0000	0.00406	0.00406
15:00:00	0.0000	0.0000	0.0000	0.0000	0.00401	0.00401
15:30:00	0.0000	0.0000	0.0000	0.0000	0.00396	0.00396
16:00:00	0.0000	0.0000	0.0000	0.0000	0.00391	0.00391
16:30:00	0.0000	0.0000	0.0000	0.0000	0.00386	0.00386
17:00:00	0.0000	0.0000	0.0000	0.0000	0.00381	0.00381

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Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:30:00	0.0000	0.0000	0.0000	0.0000	0.00376	0.00376
18:00:00	0.0000	0.0000	0.0000	0.0000	0.00372	0.00372
18:30:00	0.0000	0.0000	0.0000	0.0000	0.00367	0.00367
19:00:00	0.0000	0.0000	0.0000	0.0000	0.00362	0.00362
19:30:00	0.0000	0.0000	0.0000	0.0000	0.00358	0.00358
20:00:00	0.0000	0.0000	0.0000	0.0000	0.00353	0.00353
20:30:00	0.0000	0.0000	0.0000	0.0000	0.00349	0.00349
21:00:00	0.0000	0.0000	0.0000	0.0000	0.00344	0.00344
21:30:00	0.0000	0.0000	0.0000	0.0000	0.0034	0.0034
22:00:00	0.0000	0.0000	0.0000	0.0000	0.00335	0.00335
22:30:00	0.0000	0.0000	0.0000	0.0000	0.00331	0.00331
23:00:00	0.0000	0.0000	0.0000	0.0000	0.00327	0.00327
23:30:00	0.0000	0.0000	0.0000	0.0000	0.00323	0.00323
24:00:00	0.0000	0.0000	0.0000	0.0000	0.00319	0.00319
24:30:00	0.0000	0.0000	0.0000	0.0000	0.00315	0.00315
25:00:00	0.0000	0.0000	0.0000	0.0000	0.00311	0.00311
25:30:00	0.0000	0.0000	0.0000	0.0000	0.00307	0.00307
26:00:00	0.0000	0.0000	0.0000	0.0000	0.00303	0.00303
26:30:00	0.0000	0.0000	0.0000	0.0000	0.00299	0.00299
27:00:00	0.0000	0.0000	0.0000	0.0000	0.00295	0.00295
27:30:00	0.0000	0.0000	0.0000	0.0000	0.00292	0.00292
28:00:00	0.0000	0.0000	0.0000	0.0000	0.00288	0.00288
28:30:00	0.0000	0.0000	0.0000	0.0000	0.00284	0.00284
29:00:00	0.0000	0.0000	0.0000	0.0000	0.00281	0.00281
29:30:00	0.0000	0.0000	0.0000	0.0000	0.00277	0.00277
30:00:00	0.0000	0.0000	0.0000	0.0000	0.00274	0.00274
30:30:00	0.0000	0.0000	0.0000	0.0000	0.0027	0.0027
31:00:00	0.0000	0.0000	0.0000	0.0000	0.00267	0.00267
31:30:00	0.0000	0.0000	0.0000	0.0000	0.00263	0.00263
32:00:00	0.0000	0.0000	0.0000	0.0000	0.0026	0.0026
32:30:00	0.0000	0.0000	0.0000	0.0000	0.00257	0.00257
33:00:00	0.0000	0.0000	0.0000	0.0000	0.00253	0.00253
33:30:00	0.0000	0.0000	0.0000	0.0000	0.0025	0.0025
34:00:00	0.0000	0.0000	0.0000	0.0000	0.00247	0.00247
34:30:00	0.0000	0.0000	0.0000	0.0000	0.00244	0.00244
35:00:00	0.0000	0.0000	0.0000	0.0000	0.00241	0.00241

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Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
35:30:00	0.0000	0.0000	0.0000	0.0000	0.00238	0.00238
36:00:00	0.0000	0.0000	0.0000	0.0000	0.00235	0.00235
36:30:00	0.0000	0.0000	0.0000	0.0000	0.00232	0.00232
37:00:00	0.0000	0.0000	0.0000	0.0000	0.00229	0.00229
37:30:00	0.0000	0.0000	0.0000	0.0000	0.00226	0.00226
38:00:00	0.0000	0.0000	0.0000	0.0000	0.00223	0.00223
38:30:00	0.0000	0.0000	0.0000	0.0000	0.0022	0.0022
39:00:00	0.0000	0.0000	0.0000	0.0000	0.00217	0.00217
39:30:00	0.0000	0.0000	0.0000	0.0000	0.00215	0.00215
40:00:00	0.0000	0.0000	0.0000	0.0000	0.00212	0.00212
40:30:00	0.0000	0.0000	0.0000	0.0000	0.00209	0.00209
41:00:00	0.0000	0.0000	0.0000	0.0000	0.00207	0.00207
41:30:00	0.0000	0.0000	0.0000	0.0000	0.00204	0.00204
42:00:00	0.0000	0.0000	0.0000	0.0000	0.00201	0.00201
42:30:00	0.0000	0.0000	0.0000	0.0000	0.00199	0.00199
43:00:00	0.0000	0.0000	0.0000	0.0000	0.00196	0.00196
43:30:00	0.0000	0.0000	0.0000	0.0000	0.00194	0.00194
44:00:00	0.0000	0.0000	0.0000	0.0000	0.00191	0.00191
44:30:00	0.0000	0.0000	0.0000	0.0000	0.00189	0.00189
45:00:00	0.0000	0.0000	0.0000	0.0000	0.00187	0.00187
45:30:00	0.0000	0.0000	0.0000	0.0000	0.00184	0.00184
46:00:00	0.0000	0.0000	0.0000	0.0000	0.00182	0.00182
46:30:00	0.0000	0.0000	0.0000	0.0000	0.0018	0.0018
47:00:00	0.0000	0.0000	0.0000	0.0000	0.00177	0.00177
47:30:00	0.0000	0.0000	0.0000	0.0000	0.00175	0.00175
48:00:00	0.0000	0.0000	0.0000	0.0000	0.00173	0.00173
48:30:00	0.0000	0.0000	0.0000	0.0000	0.00171	0.00171
49:00:00	0.0000	0.0000	0.0000	0.0000	0.00168	0.00168
49:30:00	0.0000	0.0000	0.0000	0.0000	0.00166	0.00166
50:00:00	0.0000	0.0000	0.0000	0.0000	0.00164	0.00164
50:30:00	0.0000	0.0000	0.0000	0.0000	0.00162	0.00162
51:00:00	0.0000	0.0000	0.0000	0.0000	0.0016	0.0016
51:30:00	0.0000	0.0000	0.0000	0.0000	0.00158	0.00158
52:00:00	0.0000	0.0000	0.0000	0.0000	0.00156	0.00156
52:30:00	0.0000	0.0000	0.0000	0.0000	0.00154	0.00154
53:00:00	0.0000	0.0000	0.0000	0.0000	0.00152	0.00152

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Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
53:30:00	0.0000	0.0000	0.0000	0.0000	0.0015	0.0015
54:00:00	0.0000	0.0000	0.0000	0.0000	0.00148	0.00148
54:30:00	0.0000	0.0000	0.0000	0.0000	0.00146	0.00146
55:00:00	0.0000	0.0000	0.0000	0.0000	0.00145	0.00145
55:30:00	0.0000	0.0000	0.0000	0.0000	0.00143	0.00143
56:00:00	0.0000	0.0000	0.0000	0.0000	0.00141	0.00141

Printed from the ReFH2 Flood Modelling software package, version 3.2.7591.25584

Appendix

Catchment descriptors *

Name	Value	User-defined value used?
BFIHOST	0.48	No
BFIHOST19	0.48	No
PROPWET (mm)	0.32	No
SAAR (mm)	614	No

Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM

UK Design Flood Estimation

Generated on 14 November 2022 14:26:57 by ihopkinson
Printed from the ReFH2 Flood Modelling software package, version 3.2.7591.25584

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: 87B5-DD0D

Site name: FEH_Point_Descriptors_446880_403989_v4_0_0

Easting: 446880

Northing: 403989

Country: England, Wales or Northern Ireland

Catchment Area (km²): 0.03 [0.5]*

Using plot scale calculations: Yes

Model: 2.3

Site description: None

Model run: 100 year

Summary of results

Rainfall - FEH 2013 model (mm):	60.03	Total runoff (ML):	0.38
Total Rainfall (mm):	37.50	Total flow (ML):	1.08
Peak Rainfall (mm):	12.67	Peak flow (m³/s):	0.03

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH 2013 model)

Name	Value	User-defined?
Duration (hh:mm:ss)	03:30:00	No
Timestep (hh:mm:ss)	00:30:00	No
SCF (Seasonal correction factor)	0.62	No
ARF (Areal reduction factor)	1 [0.99]	Yes
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	101.18	No
Cmax (mm)	391.76	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	2.18 [1.01]	Yes
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m^3/s)	0	No
BL (hr)	39.19 [31.88]	Yes
BR	2.27	No

Urbanisation parameters

Name	Value	User-defined?
Urban area (km^2)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No
Exporting drained area (km^2)	0.00	Yes
Sewer capacity (m^3/s)	0.00	Yes

Time series data

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
00:00:00	1.5241	0.0000	0.3966	0.0000	0.00071	0.00071
00:30:00	3.4112	0.0000	0.9091	0.0001	0.000703	0.000827
01:00:00	7.4794	0.0000	2.0974	0.0007	0.000705	0.00137
01:30:00	12.6679	0.0000	3.8780	0.0021	0.000736	0.00288
02:00:00	7.4794	0.0000	2.4820	0.0055	0.000837	0.00634
02:30:00	3.4112	0.0000	1.1794	0.0108	0.00106	0.0118
03:00:00	1.5241	0.0000	0.5365	0.0167	0.00144	0.0182
03:30:00	0.0000	0.0000	0.0000	0.0221	0.00198	0.0241
04:00:00	0.0000	0.0000	0.0000	0.0252	0.00264	0.0279
04:30:00	0.0000	0.0000	0.0000	0.0249	0.00332	0.0283
05:00:00	0.0000	0.0000	0.0000	0.0224	0.00396	0.0264
05:30:00	0.0000	0.0000	0.0000	0.0189	0.00451	0.0234
06:00:00	0.0000	0.0000	0.0000	0.0153	0.00494	0.0203
06:30:00	0.0000	0.0000	0.0000	0.0124	0.00528	0.0177
07:00:00	0.0000	0.0000	0.0000	0.0101	0.00553	0.0156
07:30:00	0.0000	0.0000	0.0000	0.0080	0.00572	0.0138
08:00:00	0.0000	0.0000	0.0000	0.0061	0.00585	0.012
08:30:00	0.0000	0.0000	0.0000	0.0043	0.00593	0.0102
09:00:00	0.0000	0.0000	0.0000	0.0026	0.00595	0.0086
09:30:00	0.0000	0.0000	0.0000	0.0013	0.00594	0.00723
10:00:00	0.0000	0.0000	0.0000	0.0005	0.00589	0.00638
10:30:00	0.0000	0.0000	0.0000	0.0001	0.00582	0.00596
11:00:00	0.0000	0.0000	0.0000	0.0000	0.00575	0.00577
11:30:00	0.0000	0.0000	0.0000	0.0000	0.00568	0.00568
12:00:00	0.0000	0.0000	0.0000	0.0000	0.0056	0.0056
12:30:00	0.0000	0.0000	0.0000	0.0000	0.00553	0.00553
13:00:00	0.0000	0.0000	0.0000	0.0000	0.00546	0.00546
13:30:00	0.0000	0.0000	0.0000	0.0000	0.00539	0.00539
14:00:00	0.0000	0.0000	0.0000	0.0000	0.00533	0.00533
14:30:00	0.0000	0.0000	0.0000	0.0000	0.00526	0.00526
15:00:00	0.0000	0.0000	0.0000	0.0000	0.00519	0.00519
15:30:00	0.0000	0.0000	0.0000	0.0000	0.00513	0.00513
16:00:00	0.0000	0.0000	0.0000	0.0000	0.00506	0.00506
16:30:00	0.0000	0.0000	0.0000	0.0000	0.005	0.005
17:00:00	0.0000	0.0000	0.0000	0.0000	0.00493	0.00493

Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
17:30:00	0.0000	0.0000	0.0000	0.0000	0.00487	0.00487
18:00:00	0.0000	0.0000	0.0000	0.0000	0.00481	0.00481
18:30:00	0.0000	0.0000	0.0000	0.0000	0.00475	0.00475
19:00:00	0.0000	0.0000	0.0000	0.0000	0.00469	0.00469
19:30:00	0.0000	0.0000	0.0000	0.0000	0.00463	0.00463
20:00:00	0.0000	0.0000	0.0000	0.0000	0.00457	0.00457
20:30:00	0.0000	0.0000	0.0000	0.0000	0.00451	0.00451
21:00:00	0.0000	0.0000	0.0000	0.0000	0.00445	0.00445
21:30:00	0.0000	0.0000	0.0000	0.0000	0.0044	0.0044
22:00:00	0.0000	0.0000	0.0000	0.0000	0.00434	0.00434
22:30:00	0.0000	0.0000	0.0000	0.0000	0.00429	0.00429
23:00:00	0.0000	0.0000	0.0000	0.0000	0.00423	0.00423
23:30:00	0.0000	0.0000	0.0000	0.0000	0.00418	0.00418
24:00:00	0.0000	0.0000	0.0000	0.0000	0.00413	0.00413
24:30:00	0.0000	0.0000	0.0000	0.0000	0.00407	0.00407
25:00:00	0.0000	0.0000	0.0000	0.0000	0.00402	0.00402
25:30:00	0.0000	0.0000	0.0000	0.0000	0.00397	0.00397
26:00:00	0.0000	0.0000	0.0000	0.0000	0.00392	0.00392
26:30:00	0.0000	0.0000	0.0000	0.0000	0.00387	0.00387
27:00:00	0.0000	0.0000	0.0000	0.0000	0.00382	0.00382
27:30:00	0.0000	0.0000	0.0000	0.0000	0.00377	0.00377
28:00:00	0.0000	0.0000	0.0000	0.0000	0.00373	0.00373
28:30:00	0.0000	0.0000	0.0000	0.0000	0.00368	0.00368
29:00:00	0.0000	0.0000	0.0000	0.0000	0.00363	0.00363
29:30:00	0.0000	0.0000	0.0000	0.0000	0.00359	0.00359
30:00:00	0.0000	0.0000	0.0000	0.0000	0.00354	0.00354
30:30:00	0.0000	0.0000	0.0000	0.0000	0.0035	0.0035
31:00:00	0.0000	0.0000	0.0000	0.0000	0.00345	0.00345
31:30:00	0.0000	0.0000	0.0000	0.0000	0.00341	0.00341
32:00:00	0.0000	0.0000	0.0000	0.0000	0.00336	0.00336
32:30:00	0.0000	0.0000	0.0000	0.0000	0.00332	0.00332
33:00:00	0.0000	0.0000	0.0000	0.0000	0.00328	0.00328
33:30:00	0.0000	0.0000	0.0000	0.0000	0.00324	0.00324
34:00:00	0.0000	0.0000	0.0000	0.0000	0.0032	0.0032
34:30:00	0.0000	0.0000	0.0000	0.0000	0.00316	0.00316
35:00:00	0.0000	0.0000	0.0000	0.0000	0.00312	0.00312

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Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
35:30:00	0.0000	0.0000	0.0000	0.0000	0.00308	0.00308
36:00:00	0.0000	0.0000	0.0000	0.0000	0.00304	0.00304
36:30:00	0.0000	0.0000	0.0000	0.0000	0.003	0.003
37:00:00	0.0000	0.0000	0.0000	0.0000	0.00296	0.00296
37:30:00	0.0000	0.0000	0.0000	0.0000	0.00292	0.00292
38:00:00	0.0000	0.0000	0.0000	0.0000	0.00289	0.00289
38:30:00	0.0000	0.0000	0.0000	0.0000	0.00285	0.00285
39:00:00	0.0000	0.0000	0.0000	0.0000	0.00281	0.00281
39:30:00	0.0000	0.0000	0.0000	0.0000	0.00278	0.00278
40:00:00	0.0000	0.0000	0.0000	0.0000	0.00274	0.00274
40:30:00	0.0000	0.0000	0.0000	0.0000	0.00271	0.00271
41:00:00	0.0000	0.0000	0.0000	0.0000	0.00267	0.00267
41:30:00	0.0000	0.0000	0.0000	0.0000	0.00264	0.00264
42:00:00	0.0000	0.0000	0.0000	0.0000	0.00261	0.00261
42:30:00	0.0000	0.0000	0.0000	0.0000	0.00257	0.00257
43:00:00	0.0000	0.0000	0.0000	0.0000	0.00254	0.00254
43:30:00	0.0000	0.0000	0.0000	0.0000	0.00251	0.00251
44:00:00	0.0000	0.0000	0.0000	0.0000	0.00248	0.00248
44:30:00	0.0000	0.0000	0.0000	0.0000	0.00245	0.00245
45:00:00	0.0000	0.0000	0.0000	0.0000	0.00241	0.00241
45:30:00	0.0000	0.0000	0.0000	0.0000	0.00238	0.00238
46:00:00	0.0000	0.0000	0.0000	0.0000	0.00235	0.00235
46:30:00	0.0000	0.0000	0.0000	0.0000	0.00232	0.00232
47:00:00	0.0000	0.0000	0.0000	0.0000	0.00229	0.00229
47:30:00	0.0000	0.0000	0.0000	0.0000	0.00227	0.00227
48:00:00	0.0000	0.0000	0.0000	0.0000	0.00224	0.00224
48:30:00	0.0000	0.0000	0.0000	0.0000	0.00221	0.00221
49:00:00	0.0000	0.0000	0.0000	0.0000	0.00218	0.00218
49:30:00	0.0000	0.0000	0.0000	0.0000	0.00215	0.00215
50:00:00	0.0000	0.0000	0.0000	0.0000	0.00213	0.00213
50:30:00	0.0000	0.0000	0.0000	0.0000	0.0021	0.0021
51:00:00	0.0000	0.0000	0.0000	0.0000	0.00207	0.00207
51:30:00	0.0000	0.0000	0.0000	0.0000	0.00205	0.00205
52:00:00	0.0000	0.0000	0.0000	0.0000	0.00202	0.00202
52:30:00	0.0000	0.0000	0.0000	0.0000	0.00199	0.00199
53:00:00	0.0000	0.0000	0.0000	0.0000	0.00197	0.00197

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Time (hh:mm:ss)	Rain (mm)	Sewer Loss (mm)	Net Rain (mm)	Runoff (m^3/s)	Baseflow (m^3/s)	Total Flow (m^3/s)
53:30:00	0.0000	0.0000	0.0000	0.0000	0.00194	0.00194
54:00:00	0.0000	0.0000	0.0000	0.0000	0.00192	0.00192
54:30:00	0.0000	0.0000	0.0000	0.0000	0.00189	0.00189
55:00:00	0.0000	0.0000	0.0000	0.0000	0.00187	0.00187
55:30:00	0.0000	0.0000	0.0000	0.0000	0.00185	0.00185
56:00:00	0.0000	0.0000	0.0000	0.0000	0.00182	0.00182

Printed from the ReFH2 Flood Modelling software package, version 3.2.7591.25584

Appendix

Catchment descriptors *

Name	Value	User-defined value used?
BFIHOST	0.48	No
BFIHOST19	0.48	No
PROPWET (mm)	0.32	No
SAAR (mm)	614	No

Values in square brackets are the original values loaded from the FEH Web Service or FEH CD-ROM

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.
	Bio retention area/ rain garden	Small depressions in the ground that can act as infiltration points.	Possible	Potential areas of rain gardens could be developed.
	Rainwater harvesting/rainwater butts	Rainwater is stored and re-used	Possible	Low volumes of water are likely to be required by the development. Individual water butts can be used for garden watering.
	Permeable paving	Paving which allows inflow of rainwater into underlying construction/soil	Possible	Presence of impermeable ground (cohesive soils, clay and mudstone), only Type C (no infiltration) permeable paving will be viable with limited attenuation available in the granular subbase material.
Infiltration	Soakaway	Pit or trench which stores and disposes of water to the ground	No	Presence of impermeable ground (cohesive soils, clay and mudstone).
	Filter Drain	Trench which conveys and/or disposes of water to the ground.	No	
	Infiltration Basin	Shallow basin which stores and disposes of water to the ground	No	Presence of impermeable ground (cohesive soils, clay and mudstone) and lack of suitable open space.
Conveyance	Swale	Shallow vegetated depression which conducts and retains water	No	Difficulties of adoption and lack of suitable space.
Detention	Subsurface storage	Traditional underground pipes, tank storage, or modular systems	Yes	Area available on the site for an attenuation tank.
	Detention Basin	Normally dry but may have small permanent water pools at the inlet and outlet. They can function as POS	No	Lack of suitable public open space

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

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 1

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	0.380	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	75	Maximum Backdrop Height (m)	0.000
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.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Surface Network 1

« - Indicates pipe capacity < flow

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	57.381	2.844	20.2	0.139	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	18.849	0.491	38.4	0.116	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	26.090	0.354	73.8	0.057	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	13.806	0.466	29.6	0.028	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	33.406	1.795	18.6	0.113	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	32.304	2.710	11.9	0.062	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	67.236	1.095	61.4	0.051	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.002	30.710	0.260	118.1	0.053	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.005	26.919	0.140	192.3	0.017	0.00	0.0	0.600	o	375	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	62.80	5.42	37.985	0.139	0.0	0.0	0.0	2.25	39.8	23.7
1.001	62.08	5.57	35.065	0.255	0.0	0.0	0.0	2.12	84.2	42.9
1.002	60.73	5.86	34.574	0.312	0.0	0.0	0.0	1.52	60.6	51.3
1.003	60.29	5.95	34.221	0.340	0.0	0.0	0.0	2.41	95.9	55.5
1.004	59.48	6.14	33.755	0.453	0.0	0.0	0.0	3.05	121.2	73.0
2.000	64.03	5.18	36.100	0.062	0.0	0.0	0.0	2.93	51.9	10.8
2.001	59.84	6.06	33.390	0.113	0.0	0.0	0.0	1.29	22.7	18.3
2.002	58.01	6.48	32.220	0.166	0.0	0.0	0.0	1.20	47.8	26.1
1.005	56.63	6.83	31.810	0.636	0.0	0.0	0.0	1.30	143.9	97.5

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Network Design Table for Surface Network 1

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
1.006	18.862	0.100	188.6	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.007	33.206	0.175	189.8	0.090	0.00	0.0	0.600	o	375	Pipe/Conduit	
3.000	35.694	0.240	148.7	0.102	5.00	0.0	0.600	o	225	Pipe/Conduit	
3.001	9.280	0.070	132.6	0.032	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.002	17.987	0.125	143.9	0.027	0.00	0.0	0.600	o	225	Pipe/Conduit	
3.003	40.974	0.210	195.1	0.167	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.004	28.550	0.660	43.3	0.068	0.00	0.0	0.600	o	300	Pipe/Conduit	
3.005	28.924	2.905	10.0	0.063	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.008	40.803	0.210	194.3	0.036	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.009	41.290	0.516	80.0	0.038	0.00	0.0	0.600	o	450	Pipe/Conduit	
4.000	18.452	1.206	15.3	0.079	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.010	98.610	1.094	90.1	0.034	0.00	0.0	0.600	o	450	Pipe/Conduit	
5.000	48.408	1.660	29.2	0.262	5.00	0.0	0.600	o	225	Pipe/Conduit	
5.001	51.811	1.625	31.9	0.103	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.002	48.601	1.850	26.3	0.041	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.011	7.561	0.050	151.2	0.000	0.00	0.0	0.600	o	525	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)
1.006	55.71	7.06	31.670	0.636	0.0	0.0	0.0	1.32	145.3	97.5
1.007	54.17	7.49	31.570	0.726	0.0	0.0	0.0	1.31	144.9	106.5
3.000	62.16	5.56	35.680	0.102	0.0	0.0	0.0	1.07	42.5	17.2
3.001	61.50	5.69	35.440	0.134	0.0	0.0	0.0	1.13	45.1	22.4
3.002	60.23	5.97	35.370	0.161	0.0	0.0	0.0	1.09	43.3	26.3
3.003	57.62	6.58	35.170	0.328	0.0	0.0	0.0	1.12	79.3	51.2
3.004	56.82	6.78	34.960	0.397	0.0	0.0	0.0	2.40	169.4	61.1
3.005	56.45	6.87	34.300	0.460	0.0	0.0	0.0	5.01	354.2	70.3
1.008	52.58	7.95	31.320	1.222	0.0	0.0	0.0	1.45	231.4	174.0
1.009	51.61	8.26	31.110	1.260	0.0	0.0	0.0	2.27	361.7	176.1
4.000	64.37	5.12	32.100	0.079	0.0	0.0	0.0	2.59	45.7	13.7
1.010	49.32	9.02	30.594	1.372	0.0	0.0	0.0	2.14	340.7	183.3
5.000	63.27	5.33	34.860	0.262	0.0	0.0	0.0	2.43	96.7	45.0
5.001	61.45	5.70	33.200	0.366	0.0	0.0	0.0	2.33	92.5	60.9
5.002	60.24	5.97	31.500	0.407	0.0	0.0	0.0	3.08	217.7	66.4
1.011	49.13	9.09	29.500	1.779	0.0	0.0	0.0	1.82	393.8	236.7

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Network Design Table for Surface Network 1

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
1.012	20.347	1.700	12.0	0.000	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.013	6.730	0.050	134.6	0.000	0.00	0.0	0.600	o	225	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)
1.012	48.98	9.14	29.450	1.779	0.0	0.0	0.0	6.50	1407.0	236.7
1.013	48.71	9.24	27.750	1.779	0.0	0.0	0.0	1.13	44.7«	236.7

Free Flowing Outfall Details for Surface Network 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.013	S28	31.832	27.700	0.000	1200	0

Simulation Criteria for Surface Network 1

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
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)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.380		

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Online Controls for Surface Network 1

Hydro-Brake® Optimum Manhole: S27, DS/PN: 1.013, Volume (m³): 9.9

Unit Reference	MD-SHE-0109-7200-2150-7200
Design Head (m)	2.150
Design Flow (l/s)	7.2
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	109
Invert Level (m)	27.750
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.150	7.2
Flush-Flo™	0.474	6.2
Kick-Flo®	0.971	5.0
Mean Flow over Head Range	-	5.8

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	3.7	1.200	5.5	3.000	8.4	7.000	12.6
0.200	5.5	1.400	5.9	3.500	9.1	7.500	13.0
0.300	6.0	1.600	6.3	4.000	9.6	8.000	13.4
0.400	6.2	1.800	6.6	4.500	10.2	8.500	13.8
0.500	6.2	2.000	7.0	5.000	10.7	9.000	14.2
0.600	6.2	2.200	7.3	5.500	11.2	9.500	14.6
0.800	5.8	2.400	7.6	6.000	11.7		
1.000	5.0	2.600	7.9	6.500	12.1		

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Storage Structures for Surface Network 1

Tank or Pond Manhole: S26, DS/PN: 1.012

Invert Level (m) 29.450

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	792.0	2.000	792.0	2.001	0.0

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

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
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 0.380
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	1.000

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	OFF

Profile(s)	Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	S1	15 Winter	100	+40%	30/15 Winter	100/15 Winter		
1.001	S2	15 Winter	100	+40%	30/15 Winter	100/15 Winter		
1.002	S3	30 Winter	100	+40%	30/15 Winter	100/15 Winter		
1.003	S4	15 Winter	100	+40%	30/15 Winter	100/15 Winter		
1.004	S5	15 Winter	100	+40%	30/15 Winter	100/15 Winter		
2.000	S14	15 Winter	100	+40%	100/15 Winter			
2.001	S15	15 Winter	100	+40%	30/15 Winter	30/15 Winter		
2.002	S16	15 Winter	100	+40%	30/15 Winter	100/15 Winter		
1.005	S6	30 Winter	100	+40%	30/15 Winter	100/15 Winter		
1.006	S7	15 Winter	100	+40%	30/15 Winter			
1.007	S8	15 Winter	100	+40%	30/15 Winter			
3.000	S17	15 Winter	100	+40%	30/15 Winter	100/15 Winter		
3.001	S18	15 Winter	100	+40%	30/15 Winter			
3.002	S19	15 Winter	100	+40%	30/15 Winter			
3.003	S20	15 Winter	100	+40%	30/15 Winter			
3.004	S21	15 Winter	100	+40%	100/15 Winter			
3.005	S22	15 Winter	100	+40%	100/15 Winter			
1.008	S9	15 Winter	100	+40%	30/15 Winter			
1.009	S10	15 Winter	100	+40%	30/15 Winter			

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

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	S1	39.368	1.234	11.461	1.04			40.6	FLOOD
1.001	S2	36.612	1.321	7.429	1.02			77.4	FLOOD
1.002	S3	36.111	1.312	20.296	1.82			102.3	FLOOD
1.003	S4	35.649	1.203	2.800	1.24			103.9	FLOOD
1.004	S5	35.338	1.358	4.468	1.04			118.1	FLOOD
2.000	S14	36.448	0.198	0.000	0.78			38.9	SURCHARGED
2.001	S15	34.771	1.231	14.513	1.42			31.6	FLOOD
2.002	S16	33.822	1.377	1.288	1.04			46.7	FLOOD
1.005	S6	33.577	1.392	31.093	1.80			225.7	FLOOD
1.006	S7	33.629	1.584	0.000	1.96			237.3	FLOOD RISK
1.007	S8	33.674	1.729	0.000	1.82			235.8	SURCHARGED
3.000	S17	37.118	1.213	8.845	1.71			68.6	FLOOD
3.001	S18	37.181	1.516	0.000	1.96			72.9	SURCHARGED
3.002	S19	37.127	1.532	0.000	1.99			77.2	FLOOD RISK
3.003	S20	36.894	1.424	0.000	2.14			157.8	SURCHARGED
3.004	S21	36.052	0.792	0.000	1.27			195.2	SURCHARGED
3.005	S22	34.969	0.369	0.000	0.74			236.4	SURCHARGED
1.008	S9	33.578	1.808	0.000	1.79			368.9	SURCHARGED
1.009	S10	32.953	1.393	0.000	1.17			377.0	SURCHARGED

PN	US/MH Name	Level Exceeded
1.000	S1	3
1.001	S2	3
1.002	S3	3
1.003	S4	2
1.004	S5	2
2.000	S14	
2.001	S15	4
2.002	S16	2
1.005	S6	3
1.006	S7	
1.007	S8	
3.000	S17	2
3.001	S18	
3.002	S19	
3.003	S20	
3.004	S21	
3.005	S22	
1.008	S9	
1.009	S10	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
4.000	S11	15 Winter	100	+40%	100/15 Winter			
1.010	S12	15 Winter	100	+40%	30/15 Winter	100/15 Winter		
5.000	S23	15 Winter	100	+40%	30/15 Winter	100/15 Winter		
5.001	S24	15 Winter	100	+40%	30/15 Winter	100/15 Winter		
5.002	S25	15 Winter	100	+40%				
1.011	S13	960 Winter	100	+40%	2/15 Winter			
1.012	S26	960 Winter	100	+40%	30/60 Winter			
1.013	S27	720 Winter	100	+40%	2/15 Winter			

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
4.000	S11	33.307	1.057	0.000	0.98			42.0	FLOOD RISK
1.010	S12	32.340	1.296	0.038	1.28			413.6	FLOOD
5.000	S23	36.312	1.227	16.194	0.99			91.4	FLOOD
5.001	S24	34.692	1.267	8.319	1.34			118.6	FLOOD
5.002	S25	31.690	-0.110	0.000	0.72			148.2	OK
1.011	S13	31.238	1.213	0.000	0.34			81.1	FLOOD RISK
1.012	S26	31.237	1.262	0.000	0.03			27.9	FLOOD RISK
1.013	S27	31.205	3.230	0.000	0.29			9.0	SURCHARGED

PN	US/MH Name	Level Exceeded
4.000	S11	
1.010	S12	1
5.000	S23	2
5.001	S24	2
5.002	S25	
1.011	S13	
1.012	S26	
1.013	S27	

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Key

- Roof: 0.60 ha
- Highway: 0.48 ha
- Driveway/ private drive: 0.53 ha

Contributing impermeable area	+ 10% urban creep (on roof area only)
1.61 ha	1.67 ha

REV	DESCRIPTION	SIG	CHK	DATE
P03	Plan adjusted to comply with new layout from client.	JSS	AA	22.02.2023
P02	Plan adjusted to comply with new layout from client.	GT	JSS	2.12.2022
P01	First Issue.	GT	KE	27.10.2022

HOMES BY HONEY

BARNBURGH LANE

IMPERMEABLE AREA PLAN

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ECE PROJECT No	SCALE AT A1	STATUS	SUITABLE FOR
47619	1:500	S0	Initial

DRAWING NUMBER

47619 - ECE - XX - XX - DR - C - 0003 REV P03

Project Originator Zone Level Type Role Number



Key

- Roof: 0.60 ha
- Highway: 0.48 ha
- Driveway/ private drive: 0.53 ha

Contributing impermeable area	+ 10% urban creep (on roof area only)
1.61 ha	1.67 ha

REV	DESCRIPTION	SIG	CHK	DATE
P03	Plan adjusted to comply with new layout from client.	JSS	AA	22.02.2023
P02	Plan adjusted to comply with new layout from client.	GT	JSS	2.12.2022
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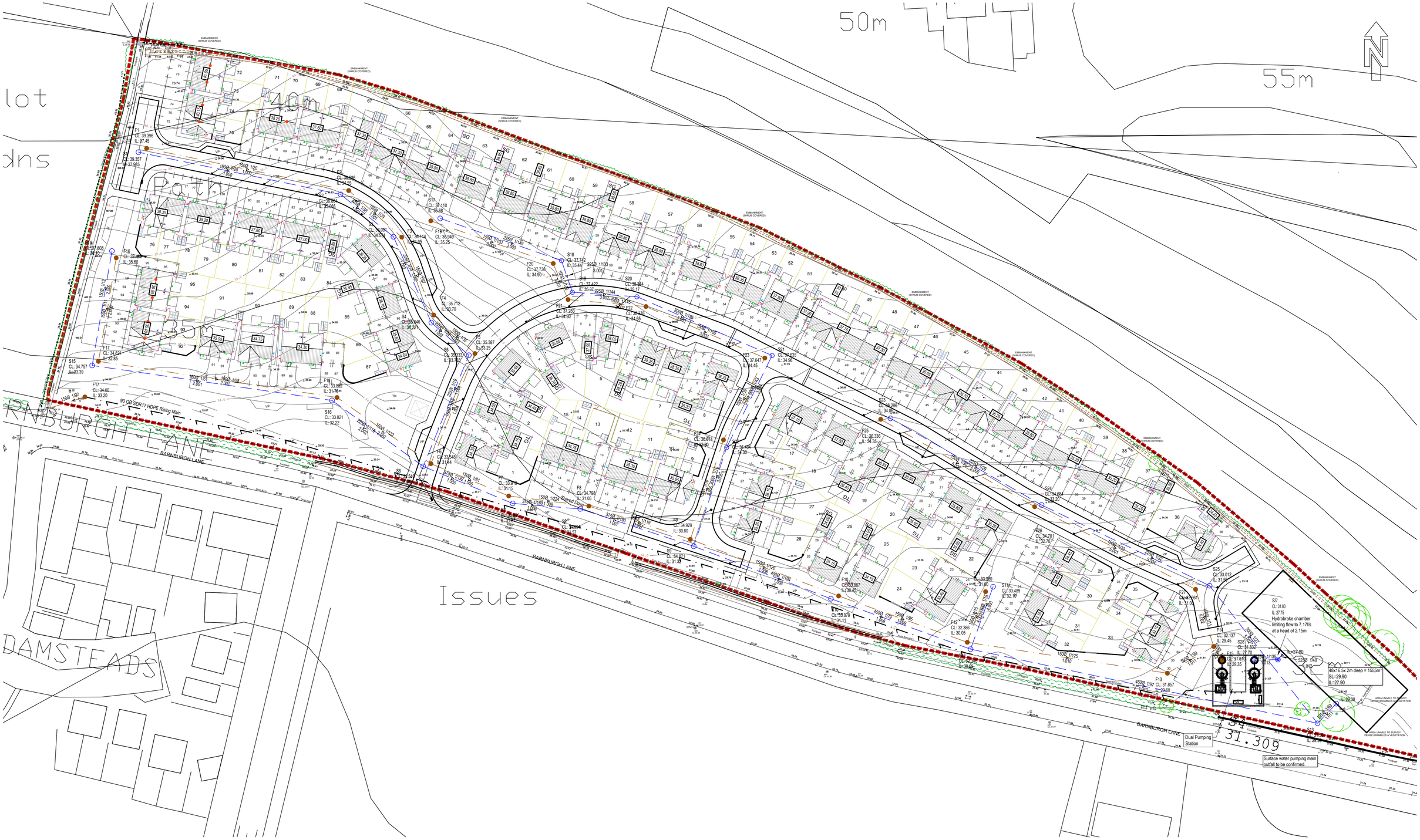
ECE PROJECT No	SCALE AT A1	STATUS	SUITABLE FOR
47619	1:500	S0	Initial

DRAWING NUMBER

47619 - ECE - XX - XX - DR - C - 0004 P03

Project - Originator - Zone - Level - Type - Role - Number

REV



REV	DESCRIPTION	SIG	CHK	DATE
P01	First Issue.	AA	GH	24.01.23
P02	Updated with new layout.	JSS	AA	21.02.23

HOMES BY HONEY

BARNBURGH LANE, GOLDTHORPE

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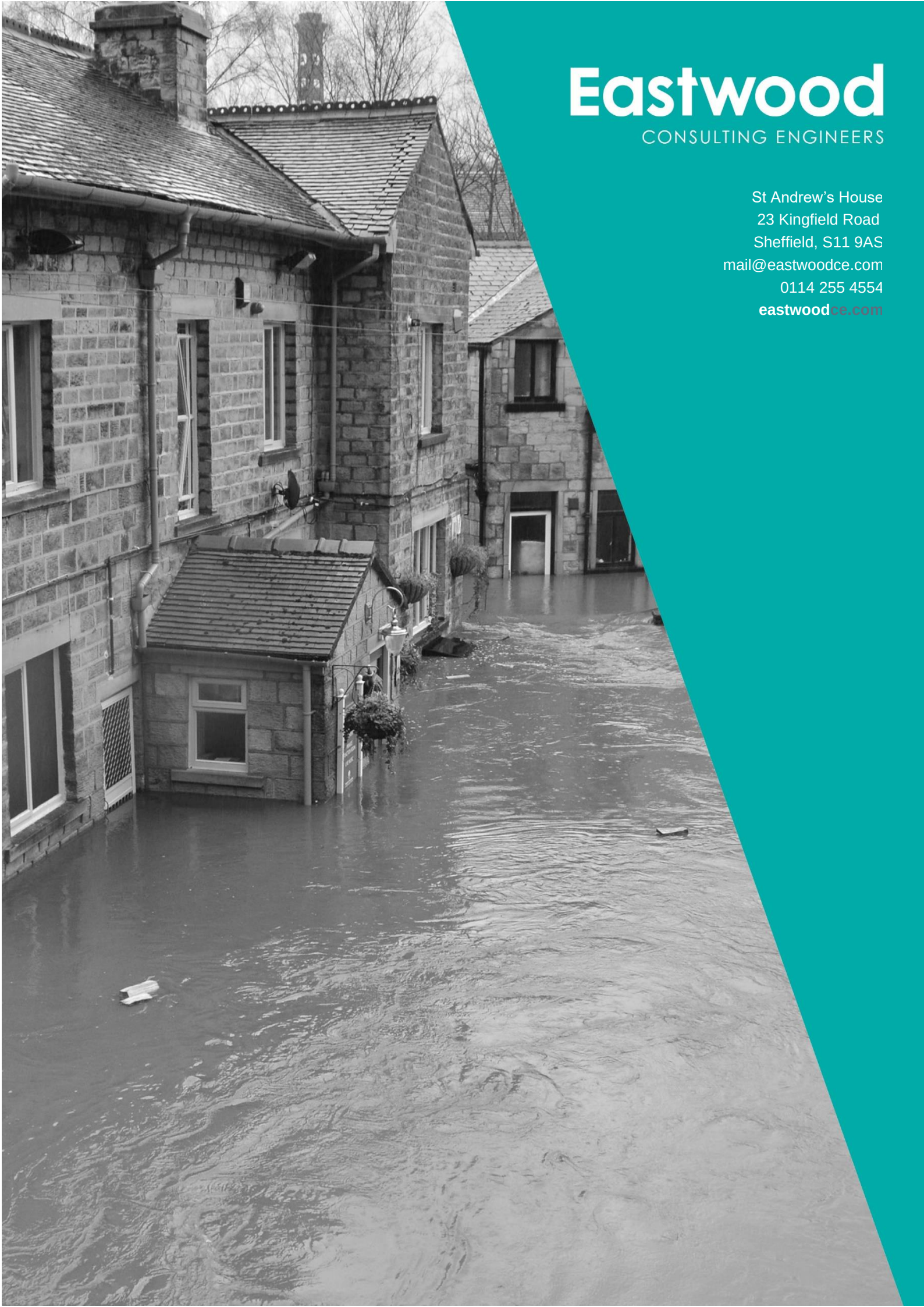
ECE PROJECT No	SCALE AT A1	STATUS	SUITABLE FOR
47619	1:500	S0	Initial

DRAWING NUMBER — REV

47619 - ECE - XX - XX - DR - C - **0011** P02

Project · Originator · Zone · Level · Type · Role · Number



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