

## FLOOD RISK ASSESSMENT

**BALDERSTONE HALL  
MIRFIELD**

**FOR**

**BELLWAY HOMES LTD (YORKSHIRE)**



**41667-002**

**November 2017**

**Eastwood & Partners, St Andrews House, 23 Kingfield Road, Sheffield, S11 9AS**

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Job No. : 41667

Report Status : Issue 3

Document Date : November 2017

Approved :



**N J Baines**

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	Location plan
Haycock & Todd	Topographical survey, S8848
STEN Architecture Ltd	Planning layout, 1731.01 Rev A
Environment Agency	Flood Map for Planning Surface water flood map
Kirklees Council	Strategic Flood Risk Assessment, Map W
Yorkshire Water	Pre-planning letter Sewer record plan
Eastwood & Partners	Drainage Appraisal, drawing 41034/001 Rev C Flood Routing, drawing 41034/002 Rev B SuDS checklist

Issue 1	Oct 2017	
Issue 2	Nov 2017	<i>Minor text changes to sections 2.1.4 &amp; 3.5 to client's comments</i>
Issue 3	Nov 2017	<i>Layout updated</i>

## EXECUTIVE SUMMARY

The project comprises the development of a 4.7 ha greenfield site for residential/retail use.

The Environment Agency's Flood Map for Planning shows the site to lie within Zone 1. The site is not at significant risk of potential flooding from any source. 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 2002 and Planning Practice Guidance "Reducing the causes and impacts of flooding", paragraph 080.

Infiltration type SuDS such as soakaways are viable on the site. Dwellings will drain to private soakaways within the plot curtilage or to shared soakaways within public open space. Highways will drain to adopted soakaways within public open space. Soakaways will be sized to accommodate the 1 in 100 year plus climate change event and to be half empty within 24 hours for a 1 in 10 year event.

Foul effluent will drain by gravity to the public combined sewer.

## 1.0 THE DEVELOPMENT & NATIONAL PLANNING POLICY GUIDANCE

### 1.1 Introduction

This Flood Risk Assessment has been prepared in accordance with current Planning Practice Guidance “Flood Risk and Coastal Change” on behalf of Bellway Homes Ltd (Yorkshire). Any other parties using the information in this report do so at their own risk, unless previously approved in writing.

The project comprises the proposed development of a 4.7 ha greenfield site for residential use.

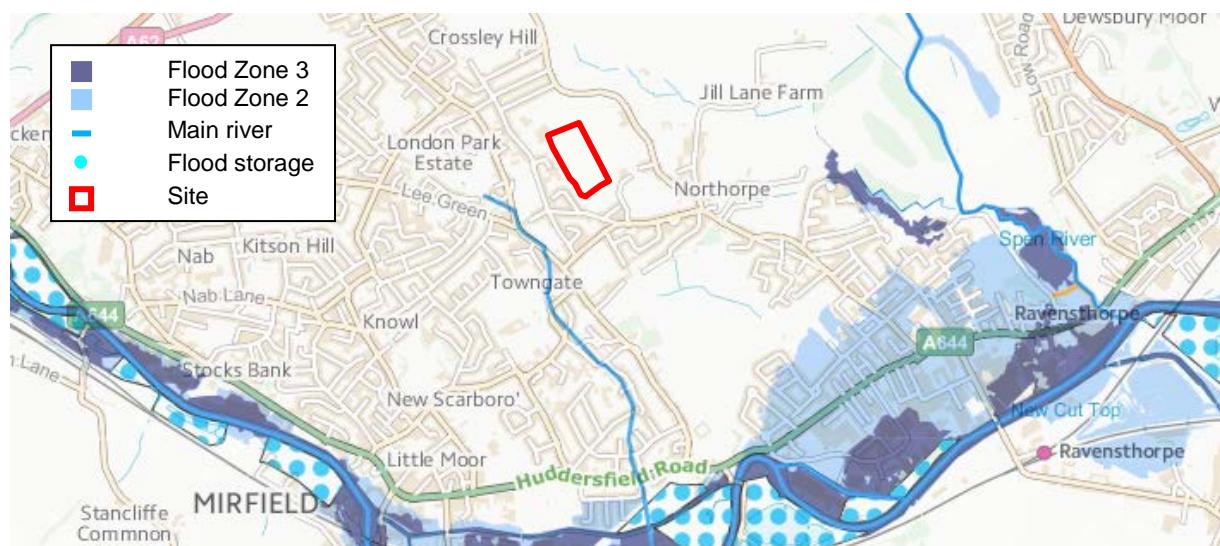
### 1.2 Site Location & Description

The site is located at the north-eastern edge of Mirfield and is centred on National Grid Reference SE 209 211. The site is bounded by Crosslet Fields Junior & Infant School to the north, by houses on Woodward Court, Hepworth Close and Hepworth Drive to the south and west, and by Balderstone Hall and arable fields to the east.

Proposals are for 61 houses with access from Woodward Court.

### 1.3 Environment Agency Flood Map

The Environment Agency's Flood Map for Planning shows the site to lie within Zone 1 (low risk), where Zone 1 comprises the unshaded areas of the map.



*Environment Agency's Flood Map for Planning*

## **1.4 Kirklees Council - Strategic Flood Risk Assessment**

Kirklees Council's Level 1 Strategic Flood Risk Assessment flood map shows the site to lie within Zone 1.

## **1.5 National Planning Policy Framework**

National Planning Policy Framework (March 2012) 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, sequential testing 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", published in February 2016, recommends a 20 - 40% increase in peak rainfall intensity is taken into account for small and urban catchments for design horizons up to 2115. For the purposes of this Flood Risk Assessment, a 30% increase in peak rainfall intensity has been used for assessing storage requirements; 30% being an average between the "central" and "upper end" of the data range given in the report. It is recommended that the potential effects of an increase of 40% are considered in detailed design.

## 2.0 FLOOD RISK

### 2.1 Potential Sources of Flooding

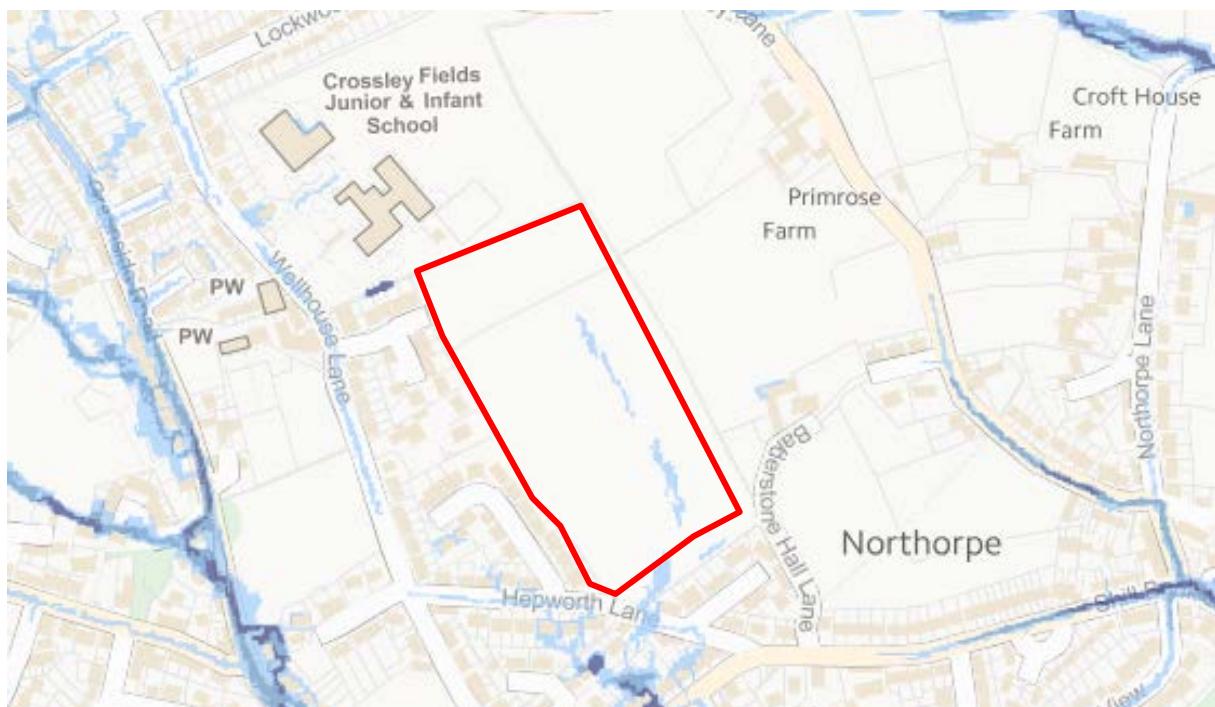
The Environment Agency and Strategic Flood Risk Assessment maps are intended for general guidance on flood risk and it is also necessary to consider other, more detailed, sources in relation to local factors.

#### 2.1.1 Fluvial

The nearest main watercourse is a culvert running through Towngate which outfalls at the River Calder. The site is separated from the culvert by higher ground and flood risk from this source is low. There are no minor watercourses or land drains recorded in the vicinity of the site.

#### 2.1.2 Surface water

The Environment Agency surface water flood risk map shows the site to be at low and very low risk of flooding.



*Environment Agency – 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. These conditions do not apply to this site. The Strategic Flood Risk Assessment does not identify north-east Mirfield as an area at risk of groundwater emergence.

### **2.1.4 Sewerage**

The site is elevated relative to the local drainage system and flood risk from this source is low. The nearby sewers are owned and maintained by Yorkshire Water and there is no public record of sewer flooding in the area.

The Strategic Flood Risk Assessment notes that Mirfield is a potential Critical Drainage Area due to a cluster of sewer flooding and urban areas at risk of surface water flooding.

## **2.2 Residual Flood Risk**

The site is not at significant risk of flooding from any source.

## 3.0 DRAINAGE STRATEGY

### 3.1 Existing Drainage

There is no evidence of positive drainage on the site.

### 3.2 Yorkshire Water

The Yorkshire Water sewer record plan shows 150/ 225 mm public combined sewers in Hepworth Lane. A 225 mm combined sewer and a 300 mm surface water sewer are shown in Woodward Court.

Pre-planning advice has been received from Yorkshire Water; their letter reference T010657 dated 7 July 2017. The main points of the Yorkshire Water letter are summarised below.

- Foul effluent should drain to the 225 mm public combined sewer recorded in Hepworth Lane to the south of the site.
- The public sewer network does not have capacity to accept any surface water from the proposed site.

### 3.3 Ground Conditions

British Geological Survey maps show the underlying geology to be sandstone of the Falhouse Rock. No superficial deposits are recorded.

A Phase 2 geotechnical investigation, including trial pit excavation, soakaway testing and borehole drilling, was undertaken by Lithos Consulting in 2013: their report 1668/1B. The investigation encountered sandy gravel with occasional clay over shallow sandstone bedrock, typically 1.0 – 1.5 m below ground level. Groundwater seepage was encountered in a small number of boreholes at a depth of 11.5 – 16.8 m below ground level. Infiltration testing within the weathered sandstone and sandstone bedrock recorded rates in the range  $125 - 686 \times 10^{-6}$  m/s. These rates are considered to be in the range moderately good to good. Lithos note that “soakaway percolation in bedrock is predominately via joints within the rock mass, and this can result in variable performance”.

### **3.4 Drainage Hierarchy**

Surface water disposal should be in accordance with the drainage hierarchy in Building Regulations Part H 2002 and Planning Practice Guidance “Reducing the causes and impacts of flooding”, paragraph 080. 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.

#### **3.4.1 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 are viable on the site.

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

#### **3.4.2 Watercourse**

There are no watercourses in the vicinity of the site.

#### **3.4.3 Public Sewer**

There are no public sewers in the vicinity which may accept surface water.

### **3.5 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 soakaways.
- Surface water from dwellings will drain to either private soakaways within the plot curtilage or to shared soakaways within public open space.
- Surface water from highways will drain to adopted highway soakaways in public open space.

- Private and adopted soakaways will be sized to accommodate the 1 in 100 year plus climate change rainfall and to be half empty within 24 hours for the 1 in 10 year event.
- Private shared soakaways will be maintained by a management company. Private individual soakaways will be the responsibility of the householder.
- Highway soakaways will be adopted and maintained by the local highway authority.

### **3.6 Proposals for Foul Disposal**

Foul effluent will drain by gravity to the public combined sewer in Hepworth Lane.

### **3.7 Residual Flood Risk**

The proposed surface water drainage system will be designed to current best practice and to the standards laid out in the publication “Sewers for Adoption (6th Edition)” and Building Regulations Part H 2002. In the event of surface water failure for rainfall in excess of the design standard, the site will be laid out so that surface water runoff is directed away from buildings, including those on neighbouring streets.

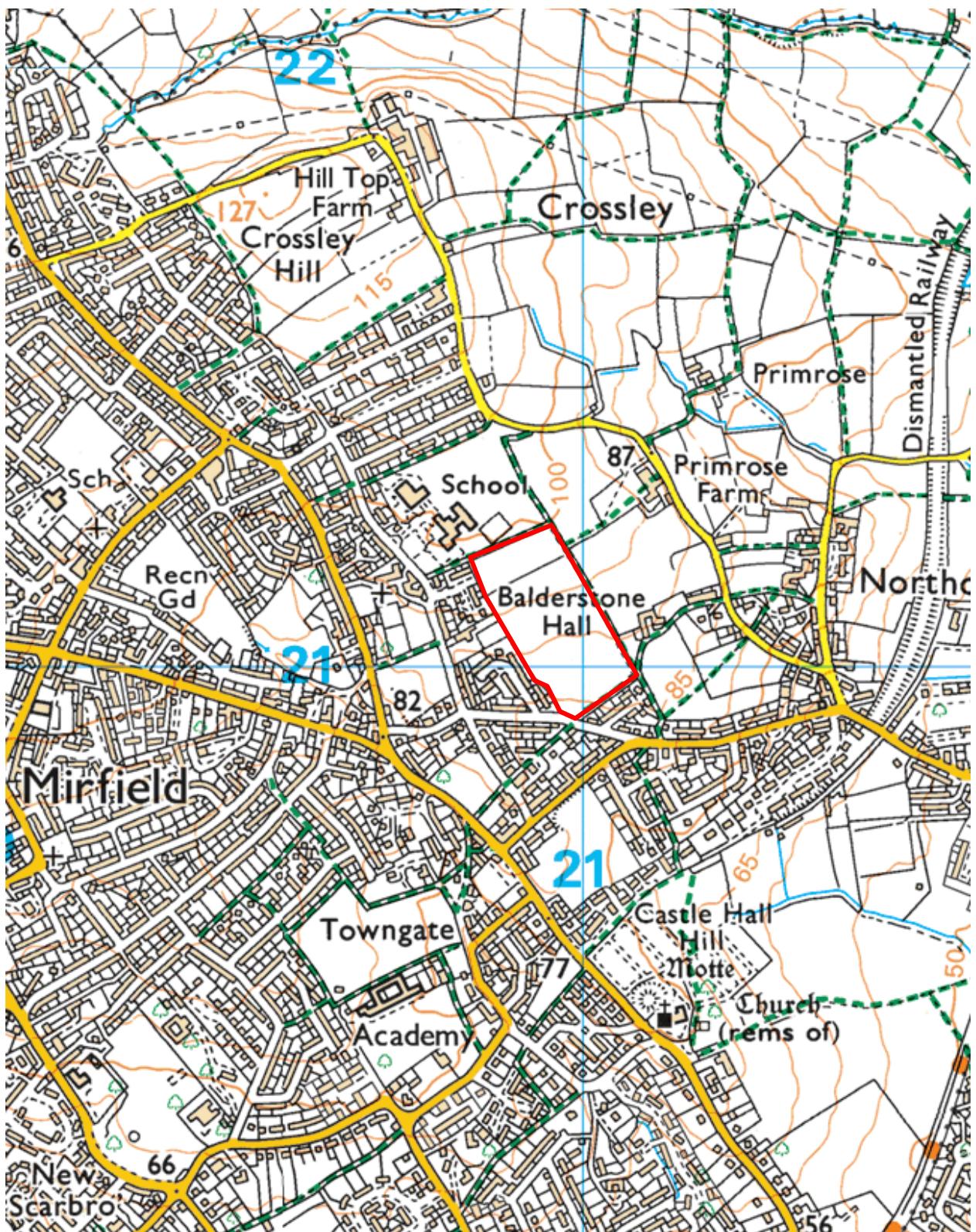
## 4.0 CONCLUSIONS

1. The site does not lie within an area shown on flood maps as at risk of flooding and is not at significant risk of flooding from any source.
2. Surface water disposal will be to soakaways.
3. Soakaways will be sized for the 1 in 100 year plus climate change event and to be half empty within 24 hours for the 1 in 10 year event.
4. The level of risk and safeguards available are considered appropriate to this class of development.

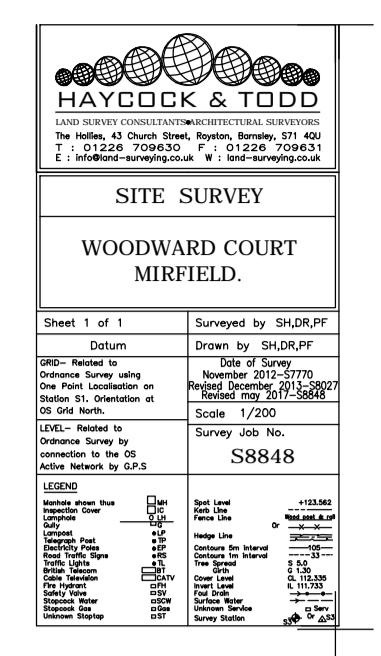
## APPENDICES

## Location plan

### Balderstone Hall, Mirfield



Site



Notes:

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## PLANNING LAYOUT KEY

- 1.8m MASONRY WALL
- 1.8m TIMBER FENCE
- 0.9m ESTATE RAILING
- BLOCK PAVING
- REMOVED HEDGE SECTION
- RETAINED TREE
- ROOT PROTECTION
- \* AFFORDABLE
- BIN COLLECTION POINT (BIN COLLECTION DAY ONLY)

<b>Bellway</b>	
Reference	Total
<b>Private</b>	
3 BEDS	
Beswick	6
Hawthorne	7
Wickham	6
4 BEDS	
Middleham	5
Rosedale	6
Mulberry	7
Acacia	5
Hambleton	7
<b>Sub-Total</b>	<b>49</b>
<b>Affordable</b>	
A2 (2 Bed)	6
A3 (3 Bed)	6
<b>Sub-Total</b>	<b>12</b>
<b>Total</b>	<b>61</b>

A	Layout amended in line with clients comments.	TS	02.11.17
REV:	DESCRIPTION:	BY:	DATE:
STATUS: FOR COMMENT			

**STEN**  
ARCHITECTURE

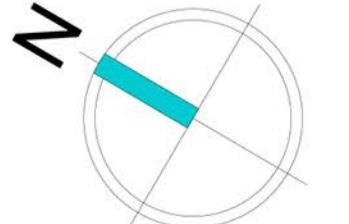
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Horbury,  
Wakefield,  
WF4 5RZ  
Tel: 01924 669424

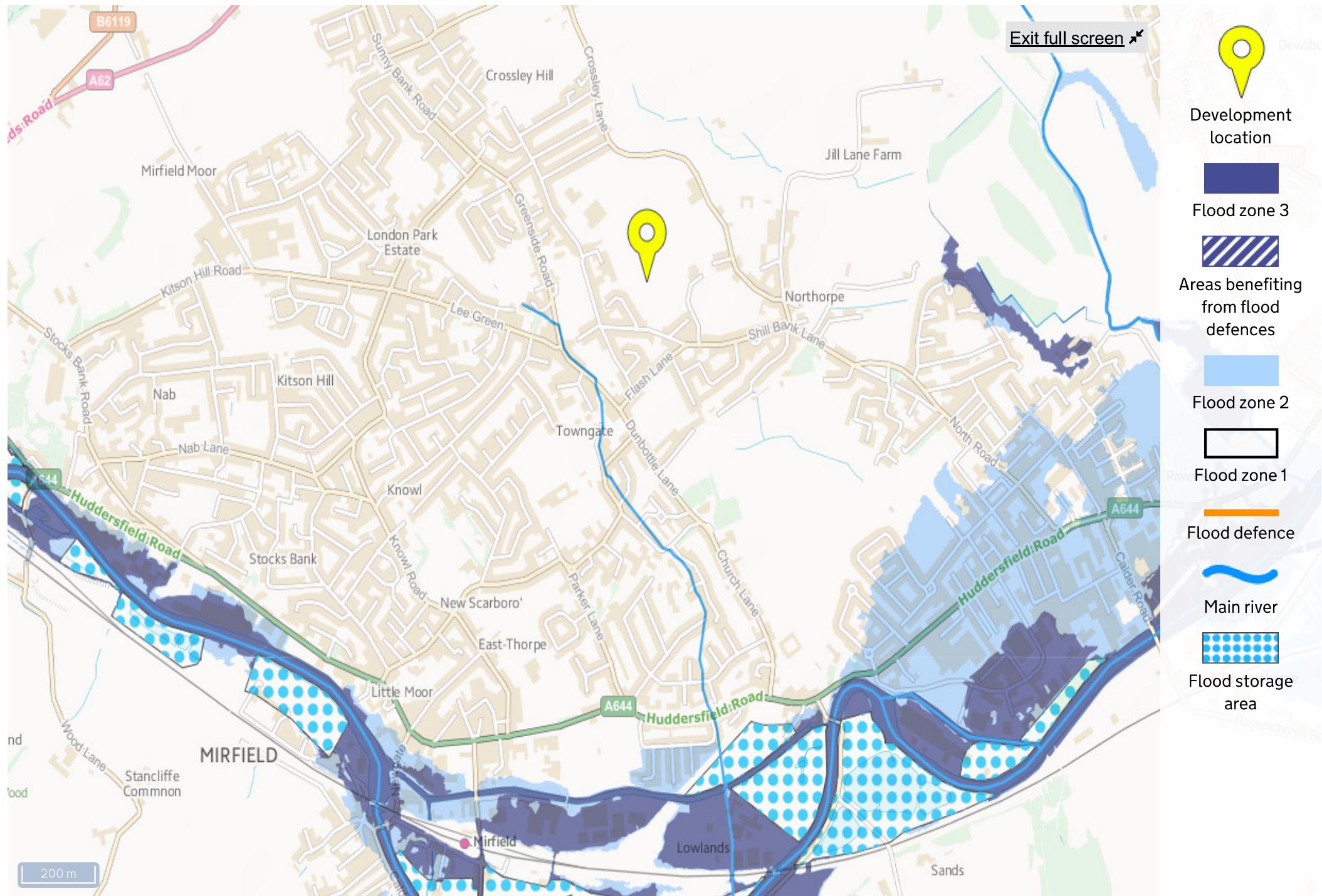
Web: www.sten-architecture.co.uk  
Twitter: @STEN\_arch  
Facebook: stenarchitectureuk  
LinkedIn: Sten Architecture

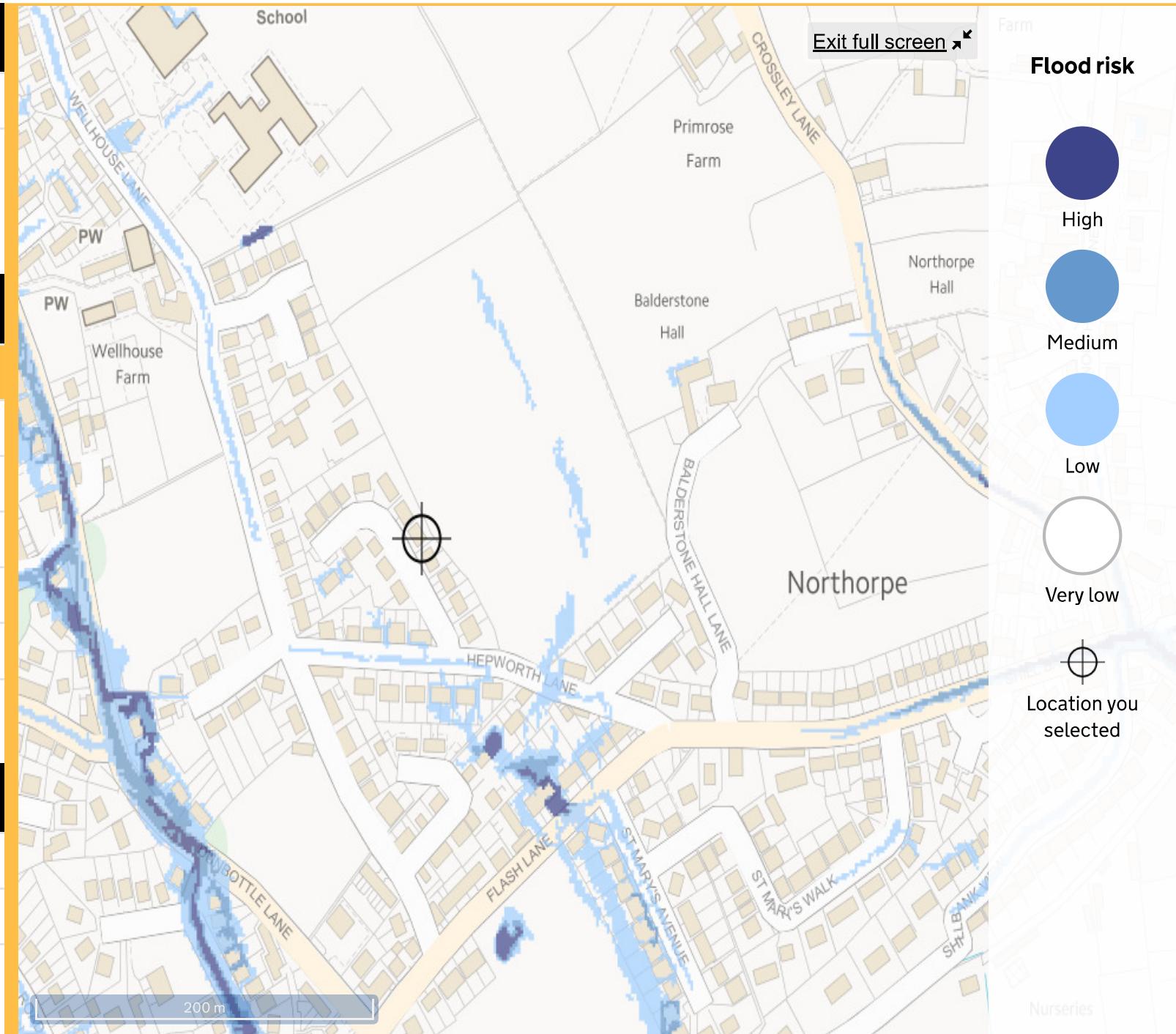
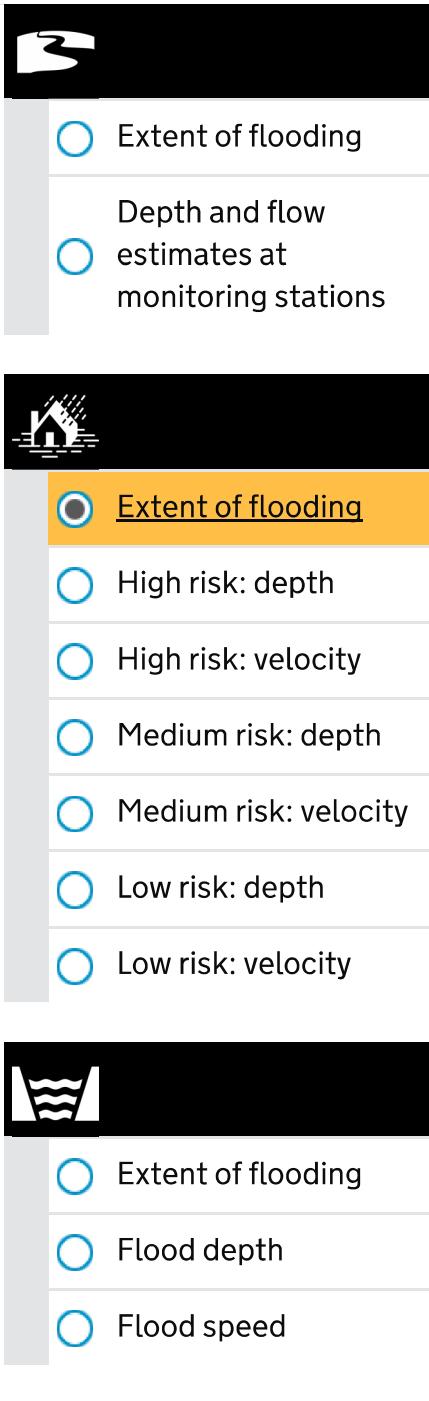
CLIENT: Bellway Homes Limited (Yorkshire)  
First Floor, 2150 Century Way  
Thorpe Park  
Leeds, LS15 8ZB

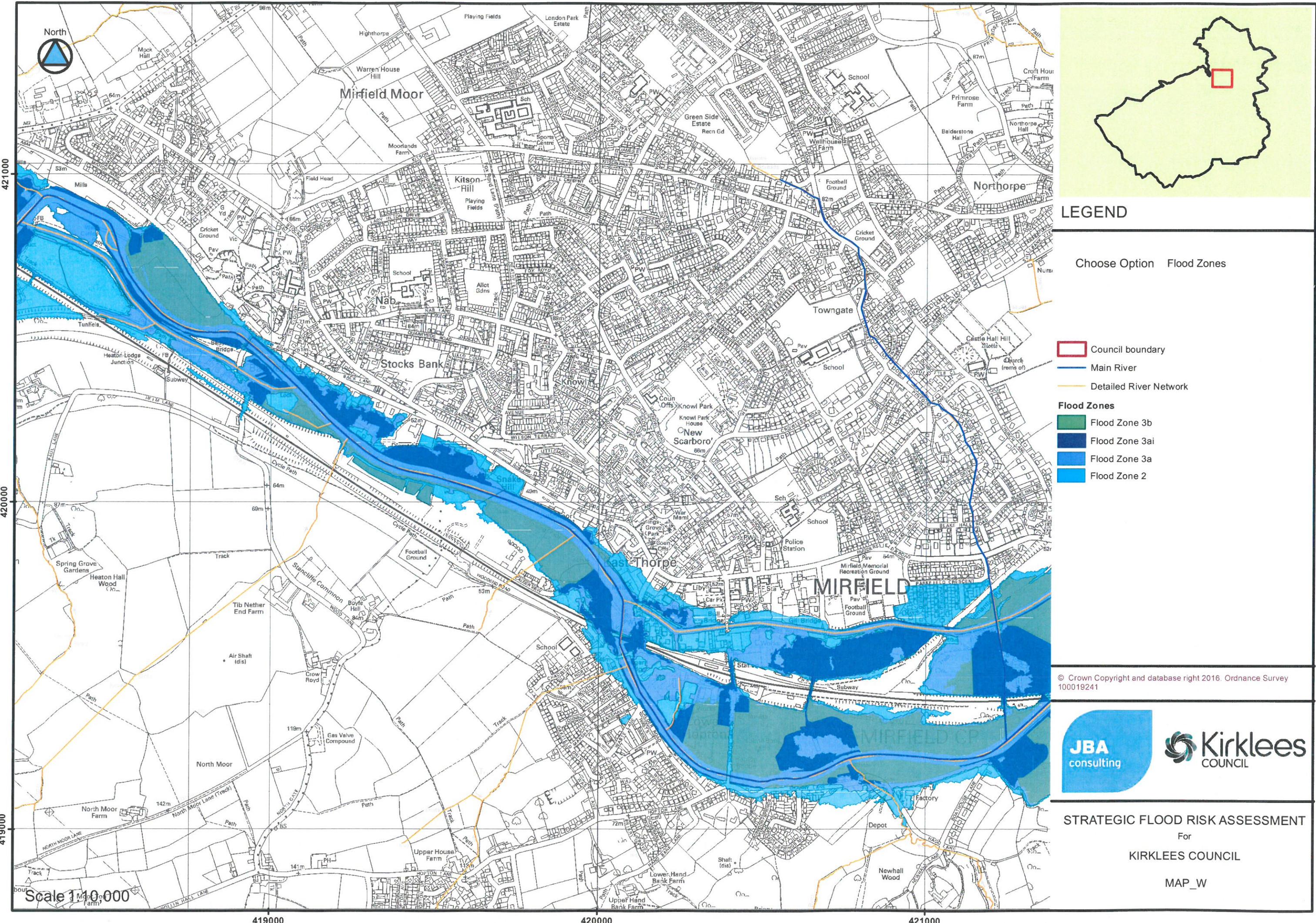
SITE: Mirfield  
TITLE: Planning Layout  
SCALE AT A1: 1:500 DATE: 17.07.17 DRAWN: TS CHECKED: BS  
PROJECT NO: 1731 DRAWING NO: 1731.01 REVISION: A

Scaled @ 1:500  
0 10m 20m 50m











YorkshireWater

Mr O Hart  
Bellway Homes Limited Yorkshire  
2150 Century Way  
Thorpe Park  
Leeds  
LS15 8ZB

Yorkshire Water Services  
Developer Services  
Sewerage Technical Team  
PO BOX 52  
Bradford  
BD3 7AY

Your Ref: OH/MIR/Predev Mirfield  
Our Ref: T010657

Tel: 0345 120 8482  
Fax: (01274) 372 834

Email:  
[Technical.Sewerage@yorkshirewater.co.uk](mailto:Technical.Sewerage@yorkshirewater.co.uk)

For telephone enquiries ring:  
Chris Roberts on 0345 120 8482

7th July 2017

Dear Mr Hart,

#### **Hepworth Lane, Mirfield, WF14 0PY - Pre-planning sewerage enquiry on R618025 - Residential**

Thank you for your recent enquiry. Our charge of £153.00 (plus VAT) will be added to your account with us, reference BWY015. 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.

#### **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 should discharge to the 225 mm diameter public combined sewer recorded in Hepworth Lane, at a point to the south of the site.

#### **Surface Water**

The developer's attention is drawn to Requirement H3 of the Building Regulations 2000. 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.

As the proposal site is currently undeveloped no surface water is known to have previously discharged to the public sewer network



**YorkshireWater**

As such, the local public sewer network does not have capacity to accept any surface water from the proposed site. If SuDS are not viable, the developer is advised to contact the Environment Agency/local Land Drainage Authority/Internal Drainage Board with a view to establishing a suitable watercourse for discharge.

### **Other Observations**

Any new connection to an existing public sewer will require the prior approval of Yorkshire Water. You may obtain an application form from our website ([www.yorkshirewater.com](http://www.yorkshirewater.com)) or by telephoning 0345 120 84 82.

An off-site foul and surface water sewer may be required which may be provided by the developer and considered 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 WRC publication "Sewers for Adoption - a design and construction guide for developers" 6th Edition as supplemented by Yorkshire Water's requirements, pursuant to an agreement under Section 104 of the Water Industry Act 1991. An application to enter into a Section 104 agreement must be made in writing prior to any works commencing on site. Please contact our Developer Services Team (telephone 0345 120 84 82) for further information.

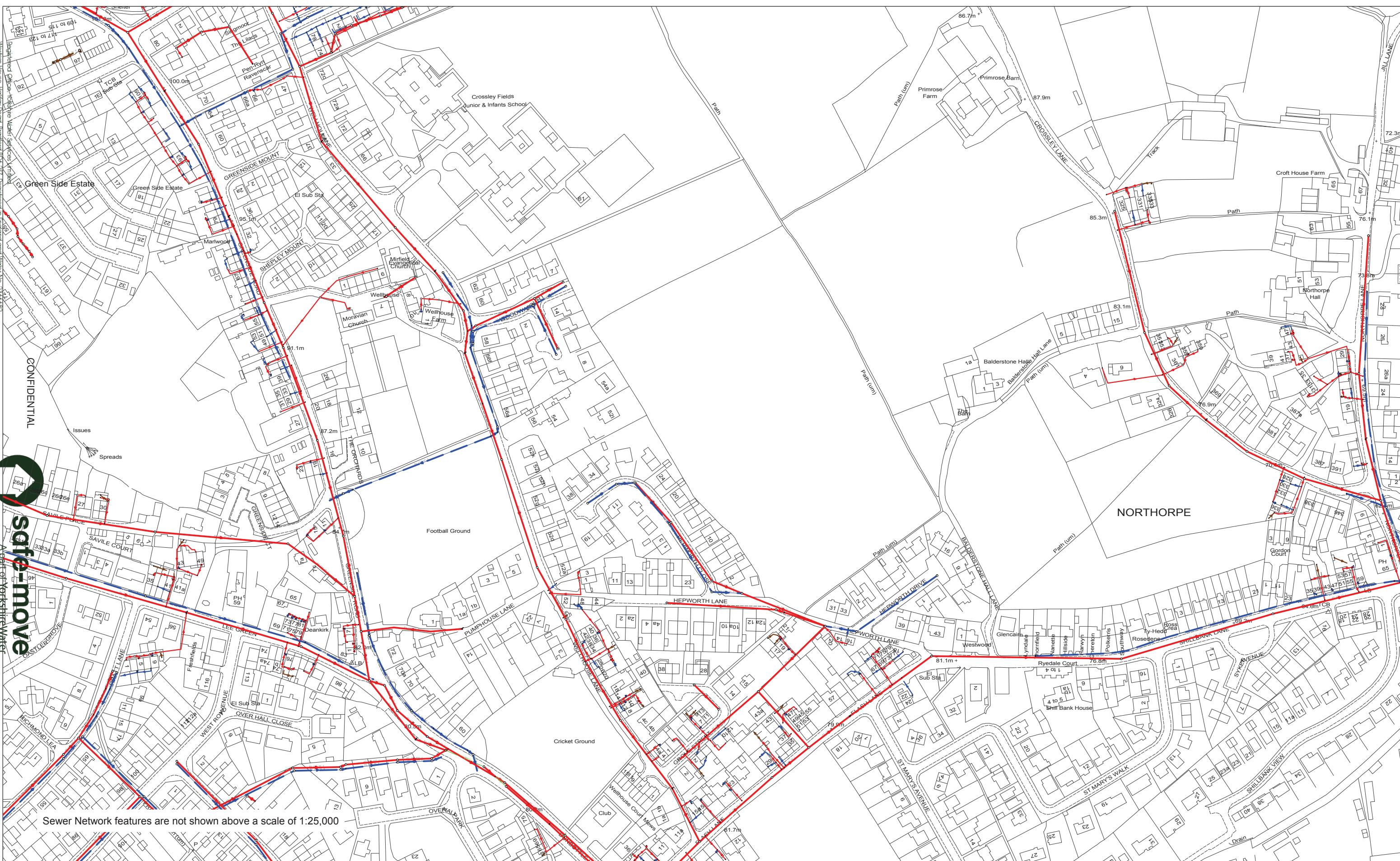
The public sewer network is for domestic sewage purposes. This generally means foul water for domestic purposes and, where a suitable surface water or combined sewer is available, surface water from the roofs of buildings together with surface water from paved areas of land appurtenant to those buildings. Land and highway drainage have no right of connection to the public sewer network. No land drainage to be connected/discharged to public sewer.

As a last resort, highway drainage may be accepted under certain circumstances. If it can be demonstrated, through satisfactory evidence, that SUDS are not a viable option, there are no watercourses or highway drains available and if capacity is available within the public sewer network, highway drainage discharges to the public sewer network may be permitted. In this event, the developer may be required to enter into a formal agreement with Yorkshire Water Services under Section 115 Water Industry Act 1991 to discharge non-domestic flows into the public sewer network.

All the above comments are based upon the information and records available at the present time. 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

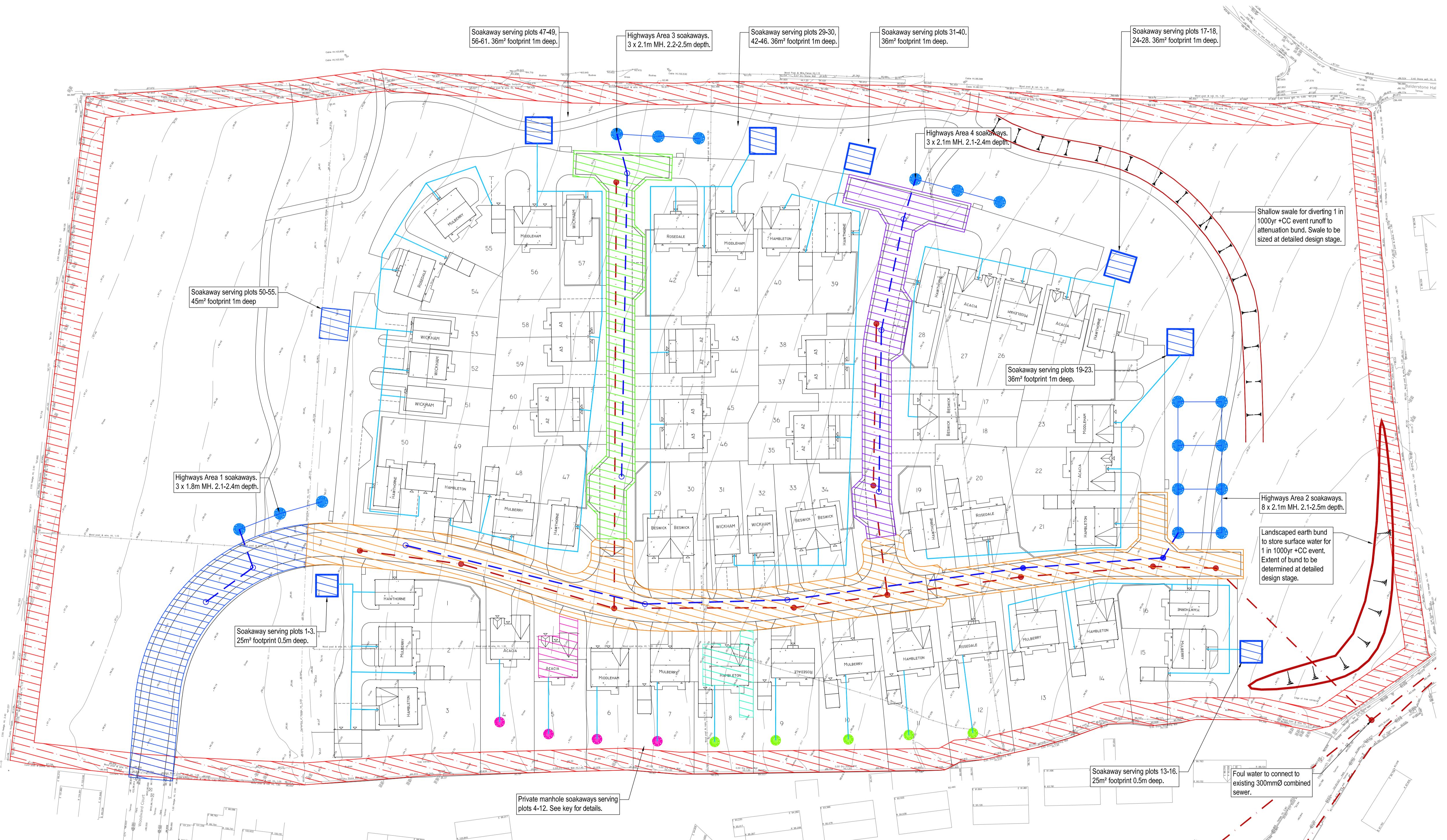
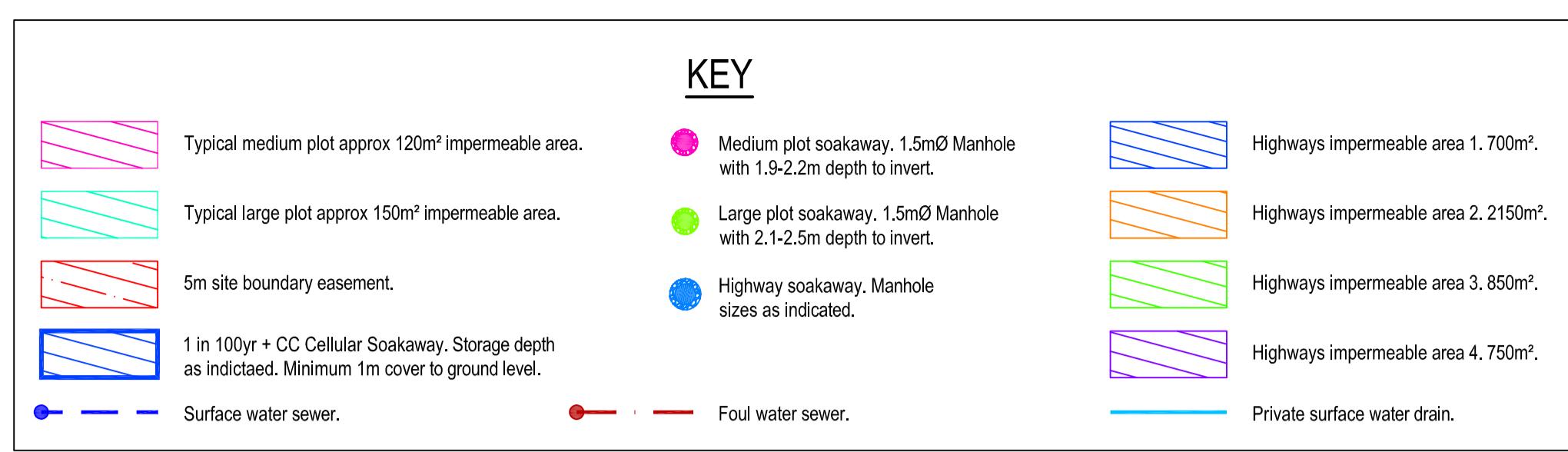
**Chris Roberts**  
**Sewerage Technician**  
**Developer Services**



420467 : 420760	Map Name : SE2020NW	Title	Partial Key  Foul Sewer = F Combined Sewer = C Surface Water Sewer = SW Trade Sewer = TD Partially Separate = PS	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 connection
	Yorkshire Water, PO Box 500, Halifax Road, Bradford BD6 2LZ Contact Name : Ms H Webster Contact Tel :	Notes		
UPN: Undefined	Originator: H Webster, Safe Move,	(Ody) COPYRIGHT STATEMENTS: Reproduced by permission of Ordnance Survey on behalf of HMSO © Crown copyright and database 2004. All rights reserved Ordnance Survey Licence number 100019559	Date Req : 16/08/2012, 09:16:59	Date Gen : 16/08/2012, 09:17:03
		Source : Sewer Network Enquiry		

NOTES

- This drawing is to be read on conjunction with all relevant Miller Homes planning layouts and planning documents.
- All outfall locations and discharge rates are to be agreed with Yorkshire Water and Kirklees Council.
- Depths of existing sewers to be confirmed on site.
- Allow for new manhole to be constructed at foul water outfall location.
- Allow for all of the plots to require foul water pumping.
- Soakaways are expected to be a suitable method of surface water disposal for this site. Locations to be agreed with Kirklees Council. Soakaways to be located a minimum of 5m from properties.
- Note, highway soakaways are to be located a minimum of 5m back from the back edge of footpath in line with Kirklees Council guidance.



C	Updated to suit Bellway Homes comments. Soakaways moved from private drives into soft landscaping areas.	JA	CH	18.09.17
B	Updated to suit latest site layout. 1 in 1000yr swale and bund added.	JA	CH	06.09.17
A	First Issue.			
REV	DESCRIPTION	SIG	CHK	DATE

## BELLWAY HOMES

## LAND OFF WOODWARD COURT, MIRFIELD

## DRAINAGE APPRAISAL

**Eastwood & Partners**  
CONSULTING ENGINEERS



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SCALE WHEN PLOTTED AT A1		DRAWING STATUS	
1:500		PRELIMINARY	
DRAWN	CHECKED	DATE	DRAWING NUMBER
JA	CH	10.02.17	41034/001
			REV C

NOTES

**KEY**

- 450 Retaining feature. Retained height as indicated (mm).
- Extreme Event Flood Routing

- This drawing is to be read on conjunction with all relevant Miller Homes planning layouts and planning documents.



B Updated following Bellway Homes comments. Flood routing information added. JA CH 18.09.17

A First Issue. REV DESCRIPTION SIG CHK DATE

## BELLWAY HOMES

## LAND OFF WOODWARD COURT, MIRFIELD

## HIGHWAYS & FFL LEVELS & FLOOD ROUTING

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SCALE WHEN PLOTTED AT A1  
1:500 DRAWING STATUS

PRELIMINARY

DRAWN	CHECKED	DATE	DRAWING NUMBER	REV
JA	CH	06.09.17	41034/002	B

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.
	Rainwater harvesting/rainwater butts	Rainwater is stored and re-used	No/Yes	Individual storage tank capacity unlikely to meet volume required. Individual water butts can be used for garden watering.
	Permeable paving	Paving which allows inflow of rainwater into underlying construction/soil	Yes	Soakaways are the preferred option for this site
Infiltration	Soakaway	Pit or trench which stores and disposes of water to the ground	Yes	-
	Filter Drain	Trench which conveys and/or disposes of water to the ground.	Yes	Soakaways are the preferred option for this site
	Infiltration Basin	Shallow basin which stores and disposes of water to the ground	Yes	
Conveyance	Swale	Shallow vegetated depression which conducts and retains water	Yes	Soakaways are the preferred option for this site
Detention	Subsurface storage	Traditional underground pipes, tank storage, or modular systems	Yes	-
	Detention Basin	Normally dry but may have small permanent water pools at the inlet and outlet. They can function as POS	No	Permeable ground
	Pond	Permanent body of water	No	
	Wetland	Permanent body of shallow water or marsh	No	