



FLOOD RISK ASSESSMENT

12 CALDER ROAD, LOWER HOPTON, MIRFIELD, WEST YORKSHIRE, WF14 8PJ

**DEMOLITION OF SINGLE STOREY GARAGE AND ALTERATIONS TO
EXISTING BUILDING TO FORM 05 APARTMENTS**

JOB REFERENCE: AAH/0206/14FRA

AUGUST 2014

FLOOD RISK ASSESSMENT

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1.0 Introduction

- 1.1 AAH Planning Consultants have been commissioned to undertake a Flood Risk Assessment of Kirklees Local Planning Authority application 2013/93709 at 12 Calder Road in Lower Hopton. The proposal is to alter and extend an existing residential building and then to subdivide it into ten residential apartments. The proposal would also see the demolition of a single storey garage building. The site lies within the administrative area of Yorkshire Water who is the both the Water Authority and Drainage Undertaker for the area.
- 1.2 The National Planning Policy Framework (NPPF) and its accompanying technical guidance identify that Flood Risk Assessments should be conducted for new developments proposed on the floodplain of rivers, sites potentially subject to coastal flooding and for developments of one hectare in size or larger. The aforementioned site is in an area broadly classified by the Environment Agency (EA) as Flood Zone 2, the medium fluvial flood risk area with a 1% - 0.1% chance of fluvial flooding in any given year.
- 1.3 Table 2 of the National Planning Policy Framework Technical Guidance states that the pre- and post-development residential use of the site (use class C3) is 'more vulnerable' development to flooding. The proposal would increase the number of planning units on the site and thus the development constitutes a net increase in flood vulnerability of the site.
- 1.4 The purpose of this Flood Risk Assessment is to quantify the flood risk posed to the development at 12 Calder Road. The report concludes that under design flood conditions the risk of flooding to the site from fluvial and tidal main rivers is moderate, with a 0.1%-1.0% annual probability of occurrence based upon an appraisal of published flood information held by the Environment Agency, Drainage Undertaker and Local Authority, The British Geological Survey maps and the topographic Digital Terrain Model (DTM) data.
- 1.5 Using the same baseline data it is concluded that the risk of groundwater flooding is low. However, residual risks to the general site area are identified, associated with pluvial flow and ordinary watercourse culvert exceedance flow. The flood risk to the internal aspects of the development is considered to be low from all perspectives subject to modest floor level raising within the new build aspect of the development.

2.0 The Site As Existing

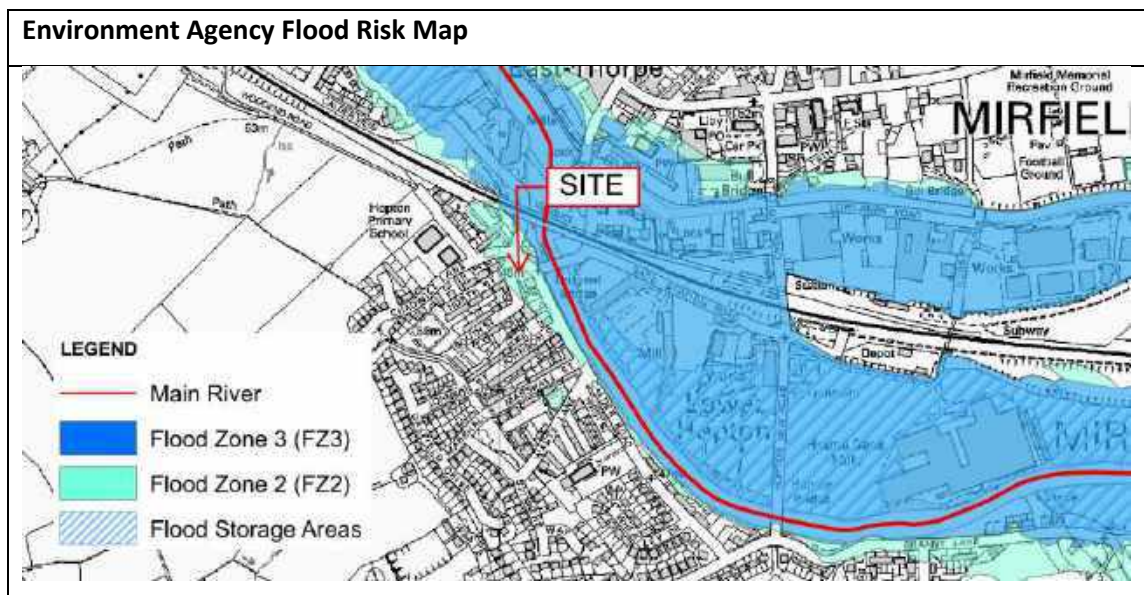
- 2.1 The site is located within Lower Hopton in Mirfield between the North Street, Calder Road and South Street highways which lie to the north, east and west of the plot respectively. The site contains a medium sized building located on its south eastern extents that is currently occupied by eight studio apartments over two floors with shared facilities. A garage building occupies the south western corner of the site, whilst the remainder of the plot is covered by areas of general hardstanding which are predominantly used for parking.
- 2.2 The main vehicular access is from Calder Road with a secondary access on to South Street, both leading to the main car parking area which occupies the majority of the site. The existing use of the site as apartments is classified by Table 2 of the National Planning Policy Framework Technical Guidance as 'more vulnerable' to flooding.
- 2.3 The site curtilage is circa 959m² with this footprint comprising the existing 161m² building, the 121m² garage building and 677m² of general hardstanding. The plot is shown by the site Digital Terrain Model (DTM) to vary from 45.58m AOD to 46.39m AOD with a uniform fall from west to east. A peak level within the centre of the plot also exists with ground levels falling both north and south from this point. The area surrounding current buildings varies from 45.64-46.39m AOD. The site DTM is attached to this report in Appendix A.
- 2.4 The main building is of three storeys from ground to second floor level but only contains habitable space on the ground and first floor. The finished ground floor level is elevated circa 0.50m above ground level with the main three stepped access fronting on to Calder Road from the eastern building façade. The ground floor of the property is occupied by four studio apartments with a shared bathroom, WC and a centrally located hallway containing stairs to first floor level. The first floor of the property is again occupied by four studio apartments with a shared bathroom and a centrally located landing area containing the stairs.
- 2.5 The main building and garage appear to benefit from conventional roof drainage and below ground infrastructure. Connection of existing site drainage infrastructure is acknowledged by the drainage undertaker, Yorkshire Water, but remains unproven at this time. No car park drainage appears to exist, however the general fall of the site is east towards the Calder Road highway gullies.

3.0 Development Proposal

- 3.1 The proposal is to alter and extend an existing residential building and then to subdivide it in to ten residential apartments. The proposal would also see the demolition of a single storey garage building, alter the existing car parking arrangements and introduce landscaping into the scheme.
- 3.2 The extension of the existing property would be to the rear to create additional floor space for use by the proposed apartment units. On the ground floor would be four one bedroom flats accessed by two shared entrance lobbies with both doorways on the northern building façade. The existing doorway would be retained but built up and thus would not provide an access point into the new development. Each flat would contain one bedroom, a bathroom and open plan kitchen, dining and living room area. This layout would be duplicated on the first floor of the property, thus providing four additional apartments. At second floor level would be two apartments, each with two bedrooms including one en-suite, a bathroom and open plan kitchen, dining and living room areas.
- 3.3 The new building on the site would have a footprint of circa 313m²; this is a 30m² increase in the built footprint of the site in comparison to the pre-development situation. The exiting external hardstanding areas would be resurfaced as part of the development proposal with small landscaping areas marginally reducing the impermeable footprint of the site. It is anticipated that site levels would be largely unchanged by the development proposal.
- 3.4 The floor level of the building for retention would be maintained by the development. Due to the fall across the site from west to east, the finished floor level varies between 0.3m and 0.5m above ground level. The new build aspect would require a modest raising of floor level by circa 0.2m above existing to allow a 0.3m freeboard above ground level. Environment Agency Standing Advice requires a finished floor level 0.3m above mean site level and hence the proposal would be compliant with this design requirement.
- 3.5 Like the pre-development site use, the proposal would be 'more vulnerable' development to flooding in the form of residential apartments (use class C3). The flood risk vulnerability of the site is increased, however, due to an increased number of residents inhabiting the site.

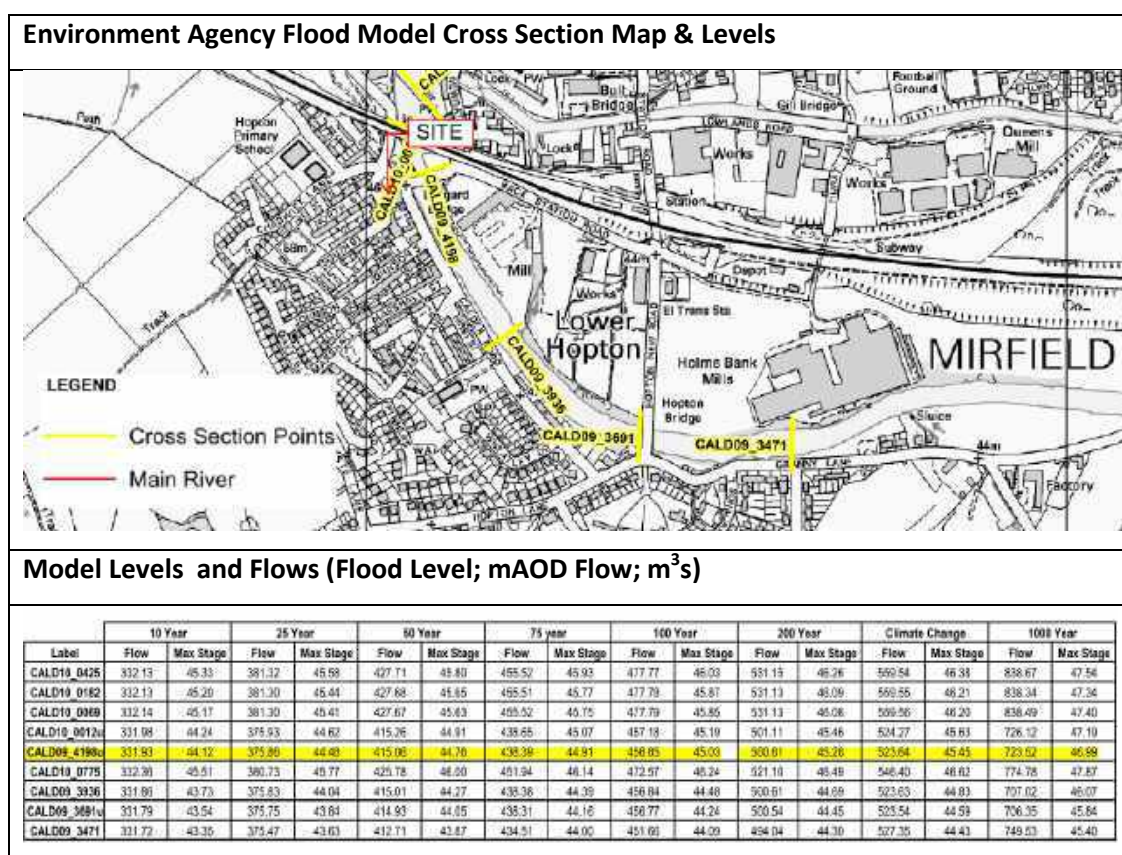
4.0 Fluvial/Tidal Flooding

- 4.1 Following an appraisal of the Environment Agency (EA) flood map, it can be seen that the site is designated at a strategic level as Flood Zone 2 and is therefore considered at an annual risk of fluvial flooding, on average, between 1% and 0.1%. In this instance the main source of fluvial flood risk to the site is the River Calder which is located 0.02km to the east. An excerpt from the EA flood map is included below for illustrative purposes.



- 4.2 The River Calder, which flows from north to south adjacent to the plot, is denoted on the Environment Agency Flood Map as a main river which does not benefit from raised flood defences which are typically shown as pink dashed lines adjacent to river channels. Characteristically areas of floodplain which benefit from flood defences are represented by a black hatching over the flood zone outline dependent upon defence design standard. The River Calder at this location is not tidally influenced.
- 4.3 The fluvial Flood Zone 2 of the River Calder which encompasses the development extends approximately 0.02km to the west of the plot, at a point immediately to the west of the North Street/South Street highway junction. Beyond this point areas of fluvial Flood Zone 1 exist; these are considered low risk with an annual probability of flooding less than 0.1% from this perspective. The closest area of Flood Zone 3, the high flood risk area with an annual probability flooding greater than 1% is correlated with the course of the River Calder, constrained by naturally high ground with a shear wall beneath Calder Road.

- 4.4 In 2011 the Environment Agency completed a study to model and map fluvial flood risk along the River Calder, from Todmorden to Castleford, this study is entitled the River Calder Flood Mapping Study 2011. The peak water levels are produced for the 0.1% (1 in 1000yr), 0.5% (1 in 200yr), 1% (1 in 100yr), 1.3% (1 in 75yr), 2% (1 in 50yr), 4% (1 in 25yr), 10% (1 in 10) and 1% (1 in 100yr) plus climate change Scenario (+20% Flow) annual chance events. The flood model data provision to our office by the EA is attached to this document in Appendix C. The closest upstream model node to the site is CALD09_4198u, with its exact location and associated flood levels highlighted in the table below;



- 4.5 For the design flood event which has a return period of 1% AEP plus climate change and is the base for Flood Zone 3, the corresponding in channel flood level is 45.45m AOD at the most relevant node point CALD09_4198u. The 0.1% AEP extreme flood level which is representative of Flood Zone 2 is 46.99m AOD. The 4% AEP flood level which is most representative of functional floodplain (Flood Zone 3b) is 44.48m AOD.
- 4.6 The plot is shown by the site Digital Terrain Model (DTM) to vary from 45.58m AOD to 46.39m AOD with a uniform fall from west to east. A peak level within the centre of the plot also exists with ground levels falling both north and south from this point. The area

surrounding current buildings varies from 45.64-46.39m AOD. The site DTM is attached to this report with the existing site plans in Appendix A.

- 4.7 Based on the DTM the site is shown to lie entirely above the 4% and 1% plus climate change River Calder flood levels, however the 45.58m AOD low point of the site is 1.41m below the extreme fluvial flood level of 46.99m AOD.
- 4.8 For the extreme flood event the flood hazard to people building can be calculated in accordance with DEFRA and Environment Agency research document FD2320 'Flood Risk Assessment Guidance for New Development', whereby Flood Hazard = Flood Depth x (Flow Velocity + 0.5) + Debris Factor. In this instance, a generic flow velocity of 0.5m/s and a debris factor of 1 (urban area) is appropriate for use, in accordance with paragraph 22.7.1 of report FD2320/TR2 which is entitled 'Determining the Flood Hazard'. A flood depth of 1.41m would have an associated hazard rating of 2.41 which is classified as 'danger to all' with 'all' being the general public and emergency services.
- 4.9 The finished floor level of the property, which is elevated 0.3-0.5m above adjacent ground level, is approximately 46.30m AOD, this finished floor level is approximately 0.69m below the extreme flood level and as such the internal ground floor space would be subject to a flood hazard rating of 1.69 which would be 'danger to most', with 'most' being the general public. In accordance with Environment Agency Standing Advice, a safe refuge must be provided for residents to ensure their safety under extreme flood conditions.
- 4.10 It is understood from the Kirklees Council Drainage Department that several flood incidents at adjacent properties have been reported to the Council. The source of flooding was not the main River Calder but an ordinary watercourse which has not been modelled to produce flood zones. This watercourse is a tributary to the River Calder which runs in pipe/culvert circa 10 metres from the site in the grounds of 14-18 Calder Road. It appears that the ordinary watercourse enters the culvert 0.21km west of the site adjacent to Chadwick Lane. Historical flooding appears to be to the basement level of properties within the vicinity.
- 4.11 Due to the fall of the general area to the east, culvert exceedance flow caused by localised blockage of the culvert would also be in this direction, accumulating on Calder Road where there is a wall which would prevent these volumes overflowing in to the River Calder. Calder

Road is shown by the site DTM to be to the southeast and away from the proposal site and as such it is improbable that flow on this highway would extend as far as the proposal site.

- 4.12 Due to the location of the culvert mouth to the west it lies at a greater elevation than the proposal site and therefore in the scenario of an upstream culvert blockage it is possible that exceedance flow would be in the general direction of the plot channelled by North Street and South Street. Both raised kerbstones and a highway drainage infrastructure exist on South Street and North Street.
- 4.13 The highway drainage would be likely to contain some of the culvert exceedance flows, but where these systems are overwhelmed flow would be channelled by raised kerbstones towards the Calder Road junction and subsequently northwest on to Calder View.
- 4.14 In the scenario that overland flow on the South Street/North Street highway exceeded the kerb threshold, this would travel across the site and on to Calder Road. Due to the elevation of the finished floor level above site level, the risk of flooding to the habitable space of the dwellings caused by culvert exceedance flow is anticipated to be a low risk; but this is not quantifiable without additional hydraulic investigation which is disproportionate to the type of development and the nature of flood risk.

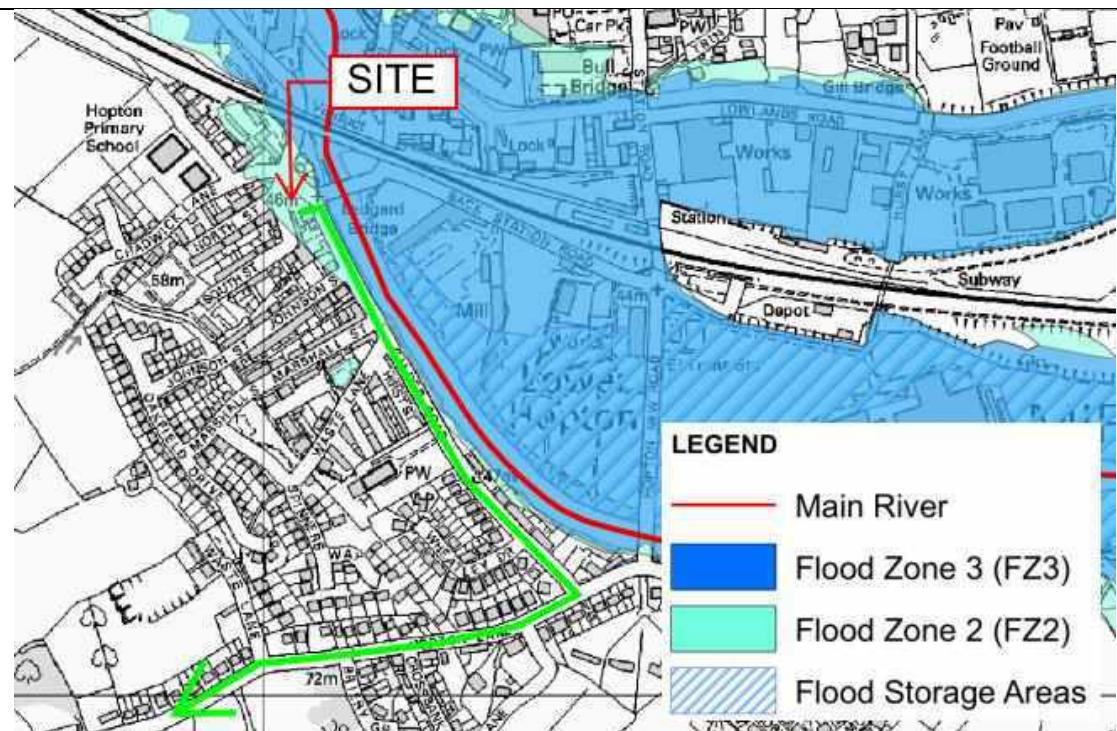
5.0 Access, Egress and Escape

- 5.1 Under design flood conditions within the River Calder which are equivalent to the 1% AEP plus climate change event, it is shown that the site could remain operational and accessible without danger to its inhabitants, with a dry route of access and egress in to Flood Zone 1 located to the to the south.
- 5.2 Under extreme flood conditions, inundation of the site would occur and it would not be possible for safe access, egress, or evacuation of the site residents to be undertaken unaided. In this instance, apartments 1-4 would have access to communal landing areas within the property at first floor level which are accessible by an internal fixed staircase. This area is of refuge is not an ideal provision and should only be used as a fallback position.
- 5.3 Due to the residual risk of flooding to the site being from the extreme fluvial flood event of the River Calder overtopping its natural bank top level, an advanced warning flood evacuation plan is proposed for use by residents prior to impending periods of extreme flood risk.
- 5.4 The Environment Agency (EA) provides a flood warning service in England and Wales, and supports the public taking action to prepare and respond when these warnings are issued. The warnings are provided for flooding from rivers and the sea but not for localised flash flooding from blocked or overloaded sewers or groundwater flooding.
- 5.5 Warnings are issued through the media on TV and radio weather bulletins and on its website (www.environment-agency.gov.uk/floodline). In areas of particular risk, the Environment Agency can send a warning message direct to people at home or at work by telephone, mobile, email, SMS text message, fax or pager using an Automated Voice Messaging (AVM) system. The EA's Floodline 0845 988 1188 service for England and Wales carries recorded information on flood warnings in force anywhere in England and Wales. The information is regularly updated and is available 24 hours a day. The Environment Agency's early warning flood warning system is divided into three categories, depending on the stage of flooding and the predicted severity of flooding;

	What it means • Flooding is possible. Be prepared. When it's used • Two hours to two days in advance of flooding. What to do • Be prepared to act on your flood plan. • Prepare a flood kit of essential items. • Monitor local water levels and the flood forecast on our website.
	What it means • Flooding is expected. Immediate action required. When it's used • Half an hour to one day in advance of flooding. What to do • Move family, pets and valuables to a safe place. • Turn off gas, electricity and water supplies if safe to do so. • Put flood protection equipment in place.
	What it means • Severe flooding. Danger to life. When it's used • When flooding poses a significant threat to life. What to do • Stay in a safe place with a means of escape. • Be ready should you need to evacuate from your home. • Co-operate with the emergency services. • Call 999 if you are in immediate danger.

5.6 The proposed development lies within the 'River Calder at Mirfield' flood warning area with public flood warnings issued through local TV and radio stations. Following the issue of a flood warning or severe flood warning, residents should prepare their property for flooding and themselves for evacuation. Due to the slow and progressive nature of rising flood water, evacuation should only begin when inundation of Calder Road is imminent, or is advised by the emergency services. The shortest, lowest risk route out of the floodplain is shown below;

Proposed Route of Egress



- Leave the site, turn right on to Calder Road
- Follow Calder Road 0.5km southeast to the junction with Granny Lane
- ENTER FLOOD ZONE 1
- Turn right on to Granny Lane which becomes Hopton Lane
- Continue journey to a known area of refuge in Flood Zone 1.

6.0 Pluvial Flooding

- 6.1 Intense rainfall, particularly in urban areas, can create runoff which temporarily overwhelms the capacity of the local drainage systems. Under these conditions, localised 'flash' flooding can occur. In addition, surface water sewers can flood into foul sewers and overload both the surface water and combined sewer networks. This type of flooding is especially problematic when these systems become overloaded simultaneously.
- 6.2 The Environment Agency flood map for Surface Water divides England and Wales into areas with a very low, low, medium and high risk of surface water flooding. 'Very low' means that each year this area has a chance of flooding of less than 1 in 1000 (0.1%). 'Low' means that each year this area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%), 'Medium' means that each year this area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%) and 'High' means that each year this area has a chance of flooding of greater than 1 in 30 (3.3%).
- 6.3 Due to the low resolution of the Environment Agency flood map for Surface Water, it is not possible to accurately describe the extents of the denoted flood outlines in detail. In addition to this, it is also noted that this resource has significant inaccuracies due to the coarse nature of the topographic data upon which it is based. In general terms the surface water flood map alone should not be used to assess flood risk on an individual site basis.
- 6.4 When used to consider catchment wide surface water flows (which will also be indicative of catchment wide pluvial flow), the surface water flood map does comprise a useful tool in determining the generalised flood risk to an area.
- 6.5 A rough appraisal of the flood map for surface water appears to show the site as being predominantly at 'very low' risk of surface water flooding. Areas of low and medium risk border the site to the north and west on both North Street and South Street. An excerpt from the Environment Agency Flood Map for Surface Water is included below for illustrative purposes;

Environment Agency flood map for Surface Water



- 6.6 Locally, the fall of the site and surrounding area to the east would mean that the most potent pluvial flood risk to the site would be from South Street to the west. Both raised kerbstones and a highway drainage infrastructure exist on South Street which under most circumstances would contain rainfall on this highway and convey it away from the site.
- 6.7 In the scenario of highway drainage system failure caused by overwhelming rainfall intensities or blockage of the system, overland flow on South Street would in the first instance be channelled by raised kerbstones on to Calder Road and subsequently northwest on to Calder View. In the scenario that overland flow on the South Street highway exceeded the kerb threshold, this would travel across the site and on to Calder Road. Due to the elevation of the development finished floor levels above site level, the risk of pluvial flooding to the habitable space of the dwellings is anticipated to be a low risk.

7.0 Groundwater Flooding

- 7.1 As part of the Flood Risk Assessment process, an appraisal of the published geology and hydrogeology of the area has been undertaken. The British Geological Survey (BGS) online geology viewer shows no superficial site geology whilst the bedrock geology is a Pennine Lower Coal Measures Formation of Mudstone, Siltstone and Sandstone. The Pennine Lower Coal Measures Formation is classified by the BGS hydrogeology viewer as 'a Moderately Productive Aquifer' at this location.
- 7.2 Due to the apparent permeability of the bedrock geology (based on aquifer designation and anecdotal evidence of basement flooding) of the site, it would appear to be geologically susceptible to groundwater flooding since the site strata would allow reasonably unimpeded vertical and lateral movement of groundwater. In practice it is noted that lower areas in the locality which share the same geology as the site would be more susceptible to groundwater emergence and consequential above ground ponding. Such low areas in the locality would include the eastern lying River Calder valley which is also denoted as fluvial floodplain.
- 7.3 In the scenario of localised groundwater emergence from the hillside comprising the site, it is noted that the gentle fall of the plot to the east would generally mean that emergent groundwater would be shed to the east and away from the proposed development, potentially with some minor ponding within localised depressions on the site.
- 7.4 Due to the typically shallow and slow flowing nature of groundwater, it is improbable that groundwater emergence would cause operational problems to the habitable space of the proposed dwellings which would be elevated well above ground level.

8.0 Flood Resistant and Resilient Design

- 8.1 In accordance with EA Standing Advice for 'More Vulnerable developments in Flood Zone 2' the ground floor of the new dwellings would be elevated 600mm above the 1 in 100 (1% AEP) plus climate change flood level which equates to 46.05m AOD. It is recommended that the new build aspect of the proposal achieves a finished floor level 0.3m above ground level at the point of any apertures such as doors and airbricks.

9.0 Surface Water Drainage

- 9.1 The proposed development would utilise existing site drainage infrastructure. The Drainage Undertaker, Yorkshire Water, has inferred connection of the site drainage system to the public sewer and given its approval in principle for connection of the new development to the sewer via existing infrastructure due to the negligible change in the built footprint of the site resultant from the development. The Yorkshire Water planning consultation response is attached to this report in Appendix D.
- 9.2 It appears from the existing and proposed development plans that areas of impermeable hardstanding will be marginally reduced by the proposal resultant from a new landscaping scheme within the development. There would also be opportunities to incorporate permeable pavements in to car parking spaces which would allow a cumulative decrease in the impermeable area of the site by 22%. Since only re-surfacing of the hardstanding slab is proposed, replacement of all existing hard surfaces with permeable pavements would not appear to be a practical option.

10.0 Conclusion

- 10.1 The development proposal is for the alteration and extension of an existing apartment block building into a larger footprint building comprising ten residential units. The proposed development is classified as 'more vulnerable' development to flooding in accordance with Table 2 of the National Planning Policy Framework.
- 10.2 The site lies within the extents of Flood Zone 2, the medium risk area with an annual probability of flooding between 1 in 100 years (1% AEP) and 1 in 1000 years (0.1% AEP) from fluvial sources. Environment Agency flood data shows that the development site would not experience flooding during the design 1 in 100 year (1% AEP) plus climate change flood event but that it would flood in the 1 in 1000 (0.1% AEP) extreme flood scenario.
- 10.3 Under design flood conditions (1% AEP plus climate change) the site benefits from a dry access and egress route in to Flood Zone 1. Under extreme flood conditions advanced evacuation of the site is advised; however a fallback position of onsite refuge is offered. The risk of surface water and groundwater flooding to the site are generally considered to be moderate and low respectively and a secondary risk to the proposed development. The exceedance of a culverted ordinary watercourse also poses a moderate risk to the proposal site.
- 10.4 In general terms the elevation of the finished floor levels of the existing built unit for retention and the new build aspect on the site would mean that the requirement for flood resistant and resilient design measures is limited to these raised floor levels.
- 10.5 The surface water drainage strategy for the site is to maintain an existing connection of surface water drainage to the public sewer which has been met with approval by the drainage undertaker for the area, Yorkshire Water. Opportunities are identified to provide betterment in terms of offsite runoff produced from external hardstanding areas.

APPENDIX A

EXISTING SITE PLAN

12 CALDER ROAD
MIRFIELD
WEST YORKSHIRE
WF14 8NP



OS Ordnance
Survey

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BOUNDARIES SUBJECT TO CONFIRMATION WITH TITLE DEEDS



Drawing Key:

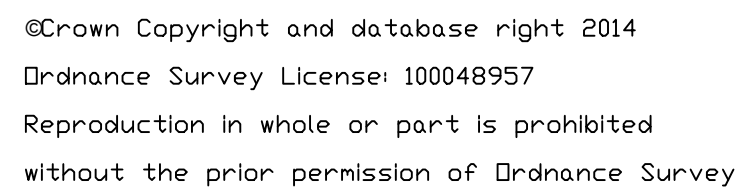
Existing site boundary.

Existing buildings to be demolished to facilitate proposed works.

Existing Buildings to be retained and remodeled / refurbished.

REVISION	DESCRIPTION	DATE
-	PLANNING	MAR 14
SCALE	1:100	
ORIGINAL SIZE	A1	
	DRAWN	SIGNATURE
	CHECKED	DATE
	APPROVED	
This drawing is copyright and may not be reproduced or made use of unless expressly agreed by M Bradbury Consulting Ltd		
CLIENT	BRADBURY MILLS Watersedge Park Road Elland HX5 9HZ	
PROJECT	Proposed Residential Apartment Scheme 12 Calder Road Mirfield WF14 8NP	
	BRADBURY CONSULTING LTD BlackBox Business Centre Wilmslow, Cheshire TEL: 01625 522 209	
TITLE	As Existing Site Plan	
JOB NUMBER	2013/CALDER ROAD	
DRAWING NUMBER	2013/CALDER ROAD/001	

Ukmapcentre.com



APPENDIX B

PROPOSED SITE PLAN

NOTES:
Any errors or omissions to be reported to Code L6 immediately.
This drawing and design is the copyright of Code L6 and is not to be used for any purpose without their consent.

Key to Drainage

- 100mm diameter SVP
- New foul manhole
- 100mm diameter foul drain. Fall 1:60
- 80mm diameter RWP with gulley and 125mm wide gutters
- New surface water manhole
- 100mm diameter surface water drain. Fall 1:60



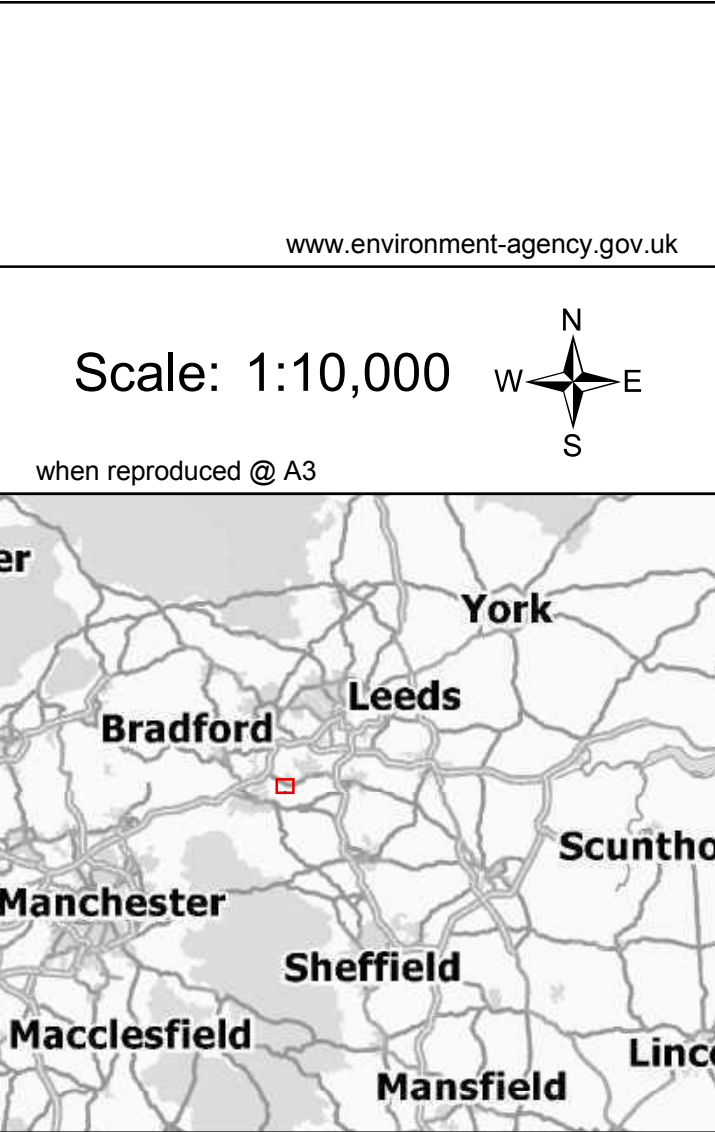
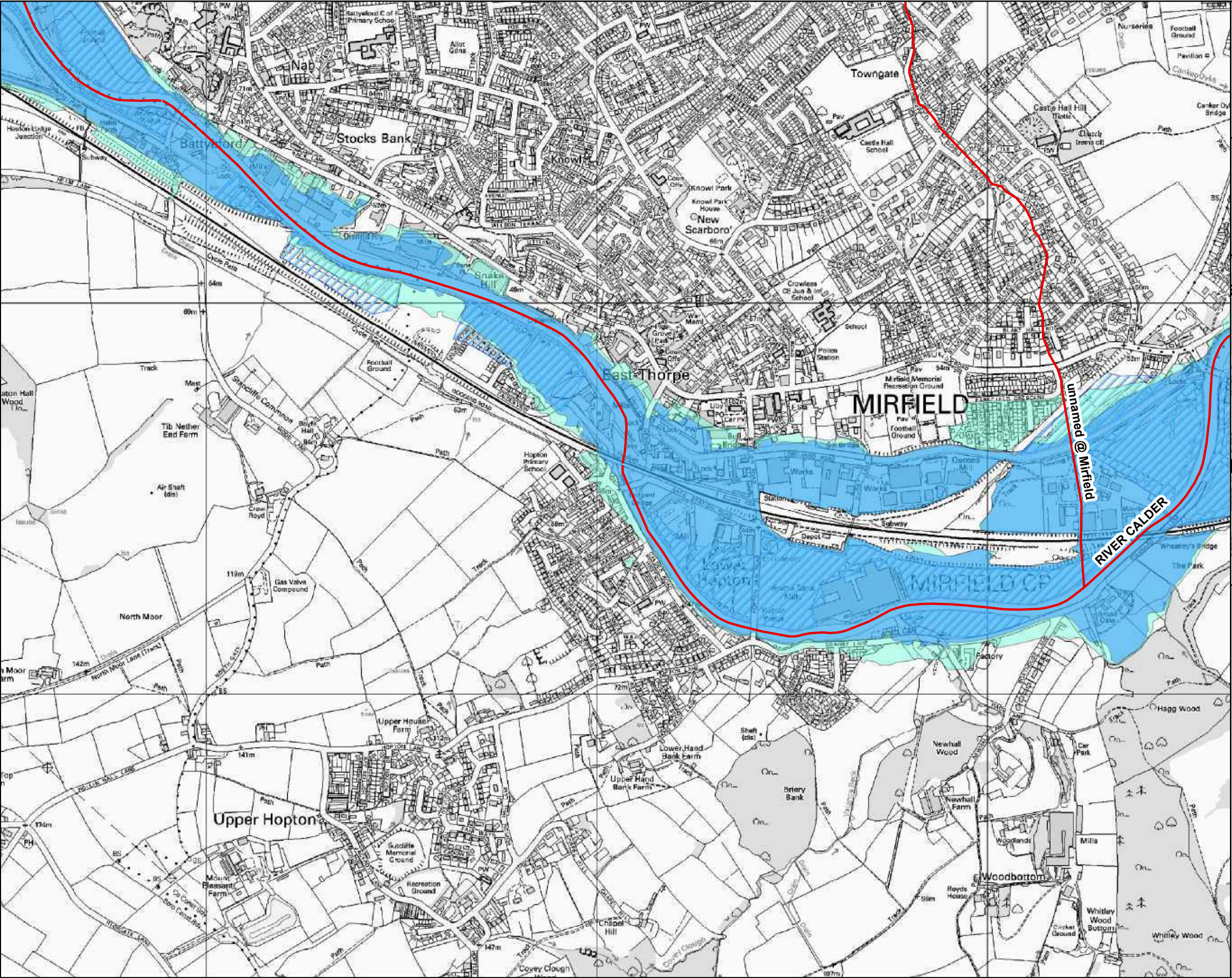
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rev	details	date
Code L6 Architecture Ltd 31 Halifax Road, Brough West Yorkshire, H5 8 2AA T: 01484 714 870 E: code.l6@btinternet.com W: www.CODEL6.com		
Project: 12 Calder Road, Mirfield, WF14 8PJ		
Client: Mr J. Oates		
Drawing: Drainage Plan As Proposed		
Date: 12/05/20	Scale: 1:100/200	Size: A1
Drawing Number: 19-119-SK52		

APPENDIX C

ENVIRONMENT AGENCY PRODUCT 4 FLOOD DATA

Flood Map for Calder Road, Lower Hopton, Mirfield - Date Created: 14/07/2014



www.environment-agency.gov.uk

Scale: 1:10,000

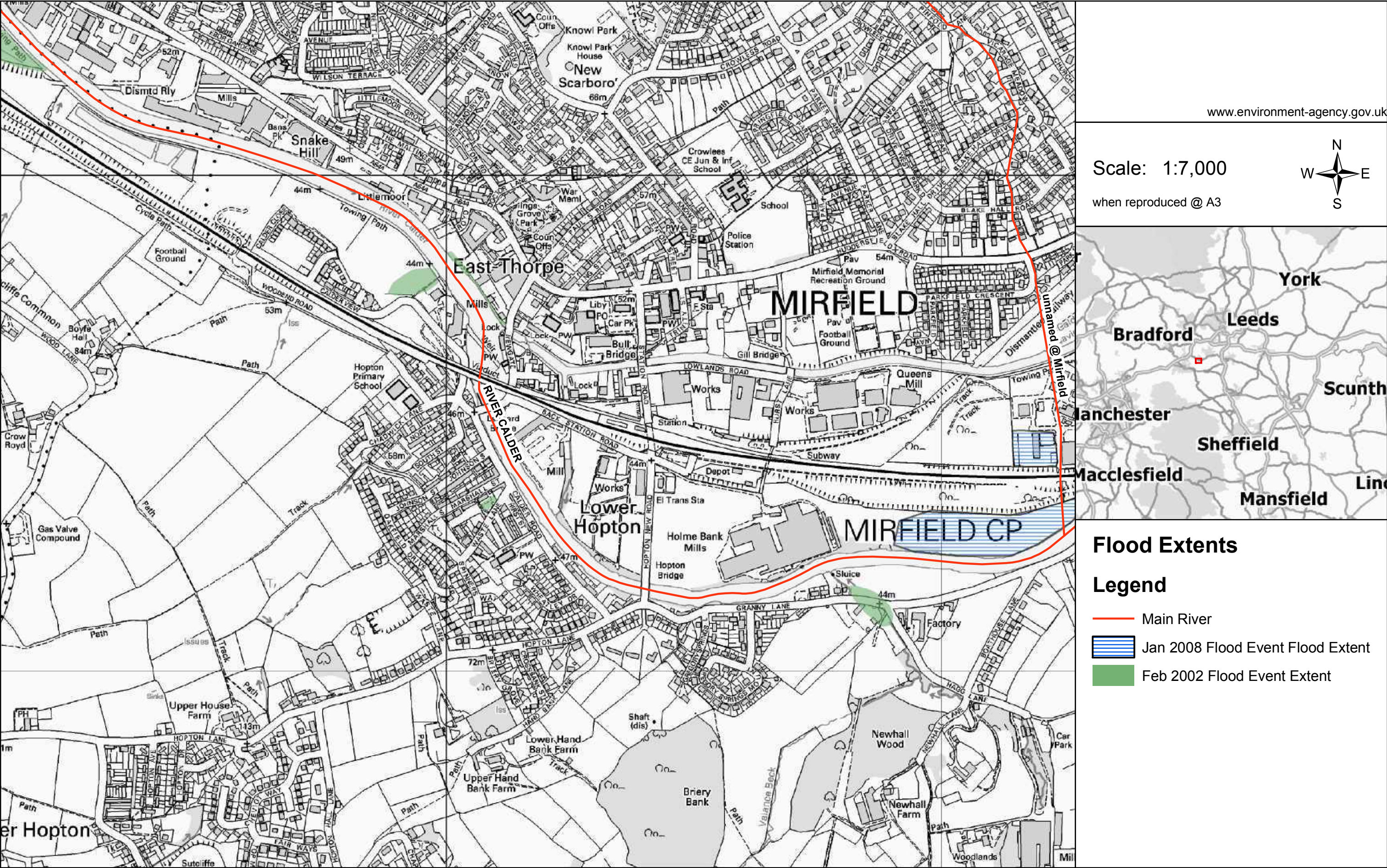
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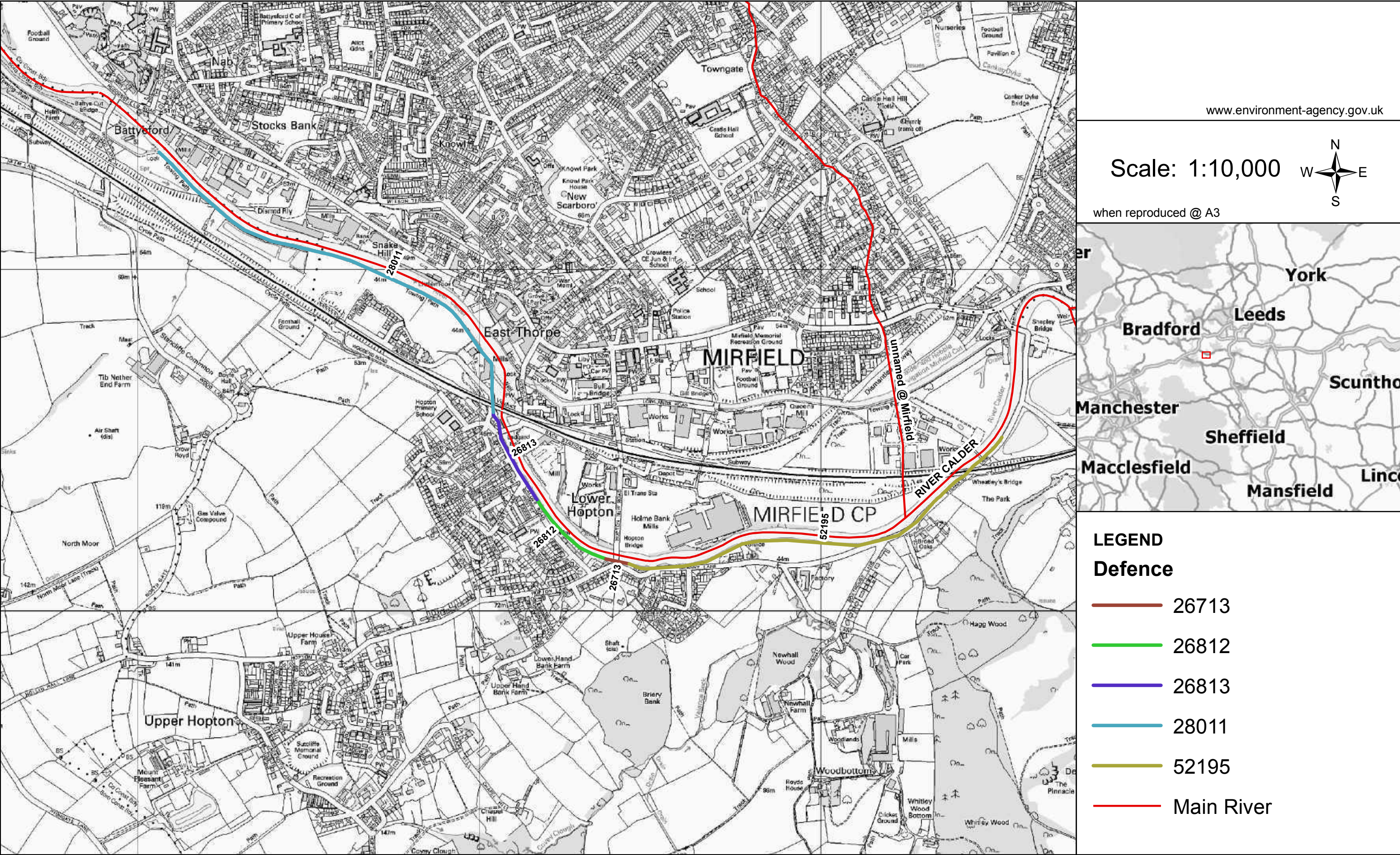
- LEGEND
- Main River
 - Flood Zone 3 (FZ3)
 - Flood Zone 2 (FZ2)
 - Flood Storage Areas

Flood History Map for Calder Road, Lower Hopton, Mirfield - dated: 14/07/2014

[Ref: 29699]



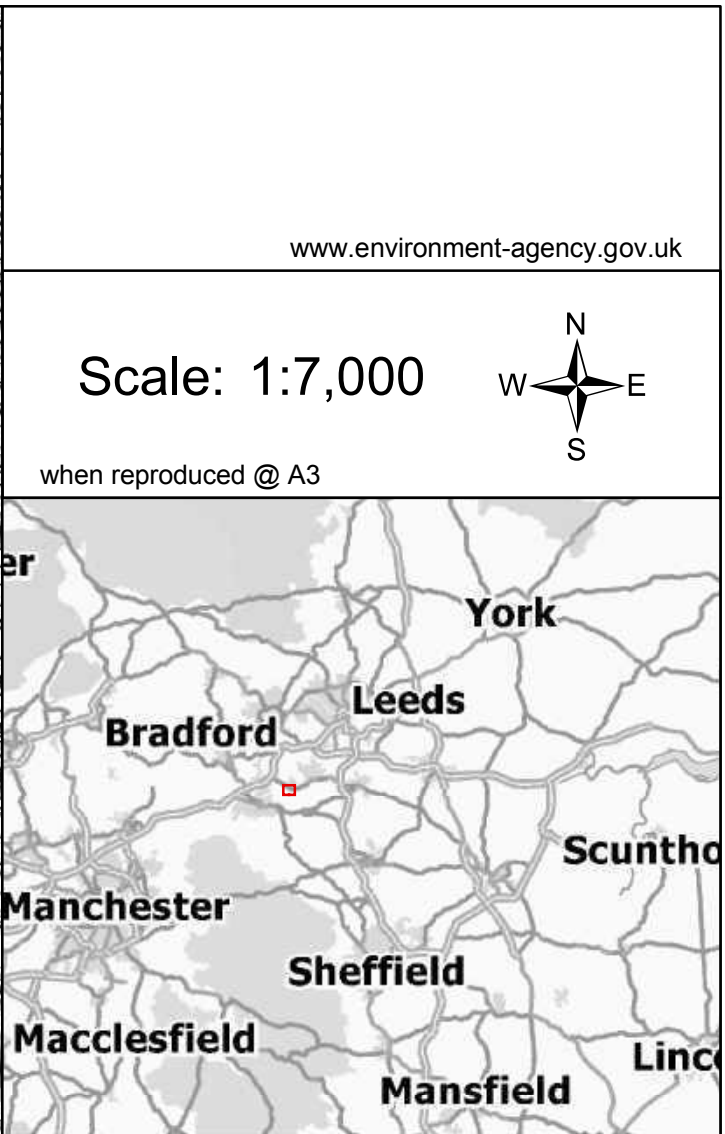
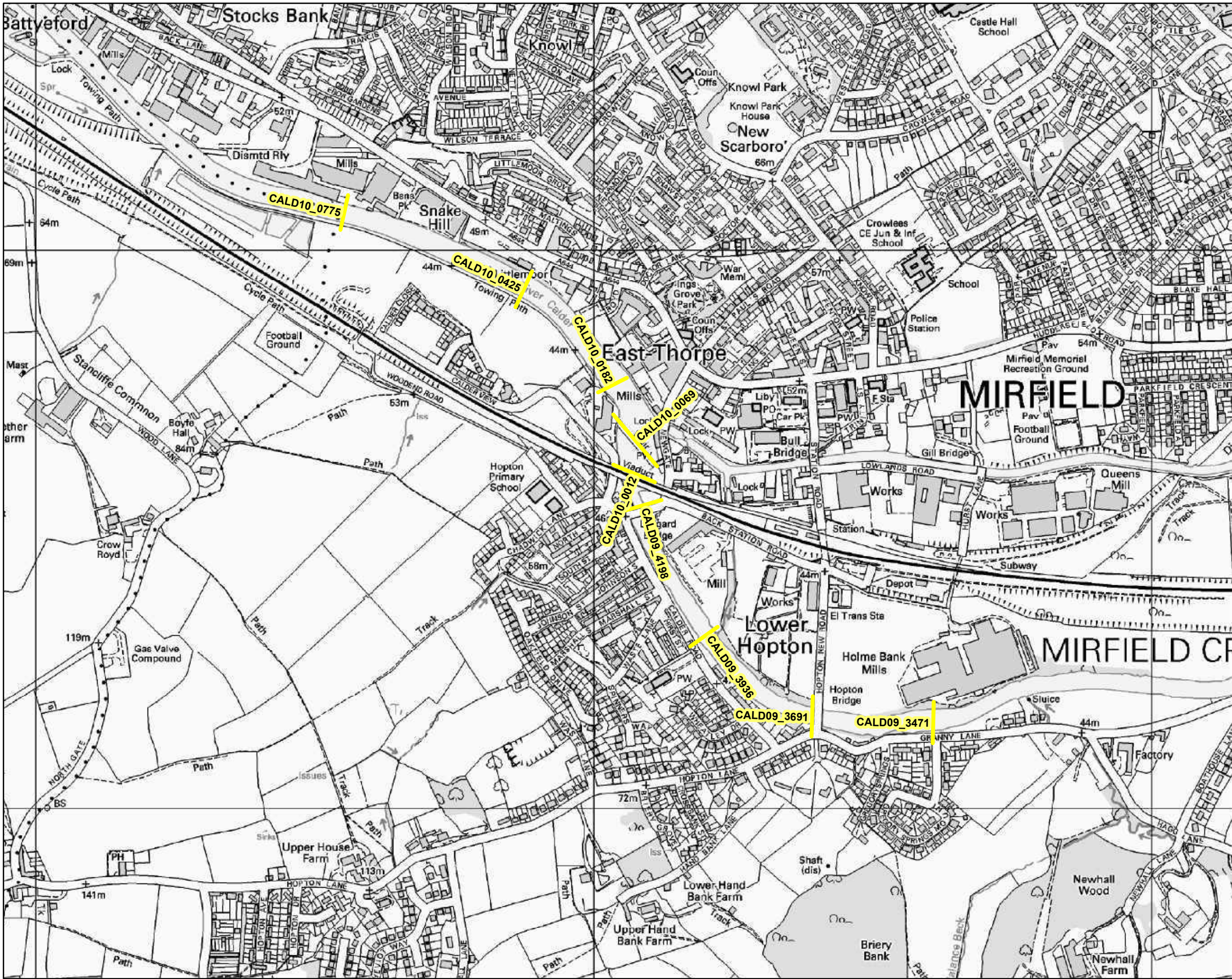
Asset Locations for Calder Road, Lower Hopton, Mirfield - Date Created: 14/07/2014



RFI No: 29699 Asset Information

Asset ID	Asset Type	Asset Subtype	Maintainer	Description	Design Standard of Protection (yrs)	Actual Downstream Crest Level	Actual Upstream Crest Level	Actual Condition Rating
26812	Defence	High Ground	Private	NATURAL BANK AND HIGH GROUND	30	46.62	47.08	3
26713	Defence	High Ground	Private	BRIDGE ABUTMENTS	30	No Data	No Data	2
52195	Defence	High Ground	Private	MASONRY WALLS AND HIGH GROUND	30	No Data	No Data	3
26813	Defence	High Ground	Private	WALL AND HIGH GROUND	30	No Data	No Data	2
28011	Defence	High Ground	Private	NATURAL CHANNEL & WASHLAND	30	No Data	No Data	2

Cross Section Locations for Calder Road, Lower Hopton, Mirfield - Date Created: 14/07/2014



www.environment-agency.gov.uk

Scale: 1:7,000

when reproduced @ A3

LEGEND

- Cross Section Points
- Main River

Model Levels (Calder) - Calder Road, Lower Hopton, Mirfield (Flow Level mAOD - Flow m³s)

	10 Year		25 Year		50 Year		75 year		100 Year	
Label	Flow	Max Stage	Flow	Max Stage	Flow	Max Stage	Flow	Max Stage	Flow	Max Stage
CALD10_0425	332.13	45.33	381.32	45.58	427.71	45.80	455.52	45.93	477.77	46.03
CALD10_0182	332.13	45.20	381.30	45.44	427.68	45.65	455.51	45.77	477.78	45.87
CALD10_0069	332.14	45.17	381.30	45.41	427.67	45.63	455.52	45.75	477.79	45.85
CALD10_0012u	331.98	44.24	375.93	44.62	415.26	44.91	438.65	45.07	457.18	45.19
CALD09_4198u	331.93	44.12	375.86	44.48	415.06	44.76	438.39	44.91	456.85	45.03
CALD10_0775	332.36	45.51	380.73	45.77	425.78	46.00	451.94	46.14	472.57	46.24
CALD09_3936	331.86	43.73	375.83	44.04	415.01	44.27	438.38	44.39	456.84	44.48
CALD09_3691u	331.79	43.54	375.75	43.84	414.93	44.05	438.31	44.16	456.77	44.24
CALD09_3471	331.72	43.35	375.47	43.63	412.71	43.87	434.51	44.00	451.66	44.09

	200 Year		Climate Change		1000 Year	
Label	Flow	Max Stage	Flow	Max Stage	Flow	Max Stage
CALD10_0425	531.15	46.26	559.54	46.38	838.67	47.54
CALD10_0182	531.13	46.09	559.55	46.21	838.34	47.34
CALD10_0069	531.13	46.08	559.56	46.20	838.49	47.40
CALD10_0012u	501.11	45.46	524.27	45.63	726.12	47.19
CALD09_4198u	500.61	45.28	523.64	45.45	723.52	46.99
CALD10_0775	521.10	46.49	546.40	46.62	774.78	47.87
CALD09_3936	500.61	44.69	523.63	44.83	707.02	46.07
CALD09_3691u	500.54	44.45	523.54	44.59	706.35	45.84
CALD09_3471	494.04	44.30	527.35	44.43	749.53	45.40

APPENDIX D

YORKSHIRE WATER CONSULTEE COMMENT

More Vulnerable development up to 1ha in size (excludes non-residential extension with a footprint of less than 250sq. metres or a domestic extension) in Flood Zone 2

Applications for planning permission should be accompanied by a completed form. An electronic version can be submitted by 'printing' it to a PDF writer.

The guidance on this sheet concerning Flood Risk Assessment requirements should also be applied to applications for Change Of Use within this category. Note - the Sequential Test does not apply to Change of Use applications. This advice is not applicable to development proposals for landfill/waste facilities & holiday/short-let caravans in this Flood Zone.

Sequential Test requirements

The Sequential Test is applied by the Local Planning Authority (LPA) to planning applications within this category. Details of the sequential test are set out in paragraph 101 of the NPPF.

FRA requirements

Planning applications must be accompanied by a Flood Risk Assessment (FRA). We recommend the FRA meets the requirements set out in the table below. All flood management measures will need to be supported by plans and drawings that form part of the FRA. The requirement for a FRA is set out in the NPPF in paragraphs 103 and 104 and footnote 20.

We recommend that Table 1.0 is completed by the applicant as part of the FRA submission. The standing advice help pages¹ provide guidance to help the applicant through this process. Plans may need to be amended and/or application withdrawn if the detail provided in the table does not meet the requirements as set out.

The following sections are to be completed by the applicant and checked by the LPA:

Site address & development description:	12 Calder Road, Lower Hopton, Mirfield, West Yorkshire, WF14 8PJ
Print Name:	James Potter
Signature:	
Date:	08/08/2014

Continued...

¹The help pages are available to see on the Environment Agency website www.environment-agency.gov.uk on the flood risk standing advice pages.

Table 1.0

More vulnerable development up to 1ha in size (excludes Non-residential extension with a footprint of less than 250 sq. metres or a domestic extension) in Flood Zone 2 (Does not apply to sites used for holiday or short-let caravans and camping, or landfill and waste management sites. For these proposals please refer to FRA Guidance note 3).

Flood risk to building/occupants.	Applicant to provide level information in the boxes below	Criteria to be used by LPA in assessing the Flood Risk Assessment
Information to be provided by the applicant as part of the Flood Risk Assessment		
Flood level for the 1 in 100 annual probability river flood (1%); or 1 in 200 annual probability sea flood (0.5%) in any year (including an allowance for climate change) in relation to Ordnance Datum ² (Newlyn)	45.45m AOD	In order to deliver safe development, we strongly advise the following - Ground floor levels to be set at a minimum of whichever is the higher of: • 300mm above the general ground level of the site OR • 600mm above the 1 in 100 annual probability river flood (1%); or 1 in 200 annual probability sea flood (0.5%) in any year (including an allowance for climate change). • Basement rooms to have unimpeded access internally to an upper level.
Average ground level of the site in relation to Ordnance Datum (Newlyn)	46.10m AOD	
Finished floor level of lowest habitable room in relation to Ordnance Datum (Newlyn)	46.30m AOD (0.5m AGL)	LPA's role: Ensure that the level information has been provided and the standards set out above have been met.
1 in 1000 annual probability (0.1%) in any year flood level including an allowance for climate change where this information is available.	46.99m AOD	In order to deliver safe development, we strongly advise the following - For single storey buildings or ground floor subdivisions with no access to higher floors, users of the development have access to a refuge set above the 1 in 1000 annual probability (0.1%) in any year flood level including an allowance for climate change. LPA's role: Ensure that the provision of a safe refuge for single storey buildings complies with the above information. To achieve these standards floor levels should be raised. Note: For buildings with more than one storey in this category upper floors can be considered safe refuge

Continued...

² Ordnance Datum or the abbreviation 'OD' is the mean level of the sea at Newlyn in Cornwall from which heights above sea level are taken. The contour lines on Ordnance Survey maps measure heights above OD for example, though these are not accurate enough for a flood risk assessment.

Table 1.0 (Continued)

Applicant is to provide confirmation that the requirements below have been met	Applicant to indicate compliance in the box below. Enter 'yes' or 'no'	LPA should satisfy themselves with regard to the comments below.
Management of surface water Applicant is to indicate that surface water will be managed in accordance with the following standards: • Specific requirements for managing surface water set out in an adopted Strategic Flood Risk Assessment and/or Surface Water Management Plan produced by the Local Planning Authority. • Surface water run-off will be controlled to ensure no flooding of property and no increase in surface water run-off from the site to a watercourse or receiving water body compared to the existing pre-application run-off rate in a 1 in 100 year storm event (1% chance in any one year) plus an appropriate allowance for climate change (Flood risk Practice Guide paragraphs 5.51 and 5.54) • Meets the requirements of Approved Document Part H of Building Regulations 2000.	YES	LPA's role: Look for assurance from the applicant that surface water will be managed in accordance with the requirements opposite. Seek assurance if not already provided. Cross check the planning application with the Local Plan . Consultation with the local authority Building Control department is recommended. Paragraph 103 of NPPF states that LPAs should in determining planning applications give priority to the use of SuDS. Note: Strategic options for surface water management should be used wherever available. Options such as this would be identified as part of the SFRA for inclusion within in the Local Plan. Building regulation requirements alone are not appropriate for areas with critical drainage problems.
Flood resilience and resistance Applicant is to indicate that flood resilience/resistance and emergency escape measures/procedures have been incorporated where possible. This applies to any part of the building (e.g. basements), that are situated below the 1 in 100 annual probability river flood (1%); or 1 in 200 annual probability sea flood (0.5%) level in any year (including an allowance for climate change).	YES	LPA's role: Look for assurance from the applicant that resilience/resistance and evacuation procedures have been addressed in accordance with the requirements opposite. Seek assurance if not already provided. Cross check the planning application with the Local Plan. Consultation with the local authority Building Control (flood resilience/resistance) and Emergency Planning (evacuation) department is recommended.
Other sources of flooding (not rivers or the sea) Applicant is to indicate that the SFRA has been referred to and that the recommendations regarding other sources of flooding have been incorporated into the application. If no SFRA is available and flood risk from other sources is present, guidance should be sought from the organisations listed in the help pages under the heading 'other sources of flooding'.	YES	LPA's role: Look for assurance from the applicant that the SFRA has been referred to (where available) and that mitigation for flooding from other sources has been provided where necessary.

Note on flood level information: Flood Level information should be obtained by the applicant first from the SFRA, or if not available, from the Environment Agency. Where the applicant is unable to obtain the information from either of these sources the LPA should consult the Environment Agency for an individual consultation response.

End of comment