FLOOD RISK CONSULTANCY LIMITED

Neighbourhood Plan Flood Risk Assessment

Site 015 Black Carr Mill

Client: Trawden Parish Council
Report No: 2018-058-02
Date: 20/06/2018

Trawden Forest Parish Council

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Contract

This report describes work commissioned by Adele Waddington of Trawden Parish Council, dated 23rd May 2018. Chris Vose and Donna Metcalf of The Flood Risk Consultancy carried out the work.

Prepared by.....Chris Vose (Flood Risk Consultant)

Reviewed by.....Donna Metcalf (Managing Director)

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Disclaimer

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Executive Summary

Flood Risk Consultancy Ltd has been appointed by Trawden Parish Council, to provide a Flood Risk Assessment in support of allocation of Site 015 (Black Carr Mill) within the emerging Neighbourhood Plan for housing provision.

The development boundary covers an area approximating 0.41 Hectares and is shown to be situated within Flood Zone's 2 and 3 of the Environment Agency Flood Map.

The primary flood sources are identified to be fluvial (Trawden Brook) and Pluvial (surface water).

The nearest watercourse to the development site is of Trawden Brook, which flows through the centre of the site.

No site specific topographical survey has been undertaken, and therefore existing ground levels have been extracted from LIDAR data for the surrounding area. Levels along the east of Trawden Brook boundary range from 174.000m AOD at the north up to 175.000 AOD at the north, levels associated with the mill building west of Trawden Brook range from 174.500m AOD at the north up to 175.500m AOD at the south.

Pluvial:

Hazard rating calculations indicate that the surface water flood route presents a low hazard to people during the highest probability event, which increases to a moderate hazard with increased potential flood depths and flow velocities attributed to medium probability flood event, the hazard then increases to significant during the low probability event. As such it is highly recommended that a robust evacuation plan is devised and practised due to the vulnerability of end users.

Furthermore, mitigation measures adopted at the site will also be suitable to provide flood protection from surface water sources.

Fluvial:

Following evaluation of fluvial flooding of Trawden Brook the site will flood during all return periods from the 25-year event up to the 100 year + 70% climate change event and the 1000-year event, which corresponds well with the EA Flood Map, concluding that the risk associated with fluvial flooding within the site is considered to be medium and high.

Providing that finished floor levels for habitable dwellings are elevated 600mm above the 100 year + 70% climate change fluvial flood level the risk of surface water ingress into the building is considered to be low.

Drainage:

Following a non-intrusive desk top study infiltration at the site is not considered to be feasible, a review of Soilscape maps identifies the site to be located on land which is considered to be *slowly permeable seasonally wet acid loamy and clayey soils.*

Borehole logs taken from approximal 100m west of the site using the BGS online service identify that the ground comprises of clay and coal, as such the ground conditions suggest that they are not considered to be suitable for infiltration devices.

The nearest watercourse to the proposed development is Trawden Brook which flows through the centre of the site.

As such disposal of surface water to watercourse is considered the most feasible option due to the fact that the underlying ground seems to be unsuitable for the use of soakaways.

Consents:

Due to the watercourse being considered to be a Main River consent will be required from the Environment Agency must be undertaken prior to making a connection in accordance with the Land & Drainage Act 1991 & 1994, for any works within 8m of the river bank, including discharge of surface water runoff.

SUDS:

In this specific scenario permeable paving is not considered to be appropriate as flood water and silt can affect the porosity of the surface and prevent water from entering into the system.

On/offline storage is considered the most appropriate solution in terms of this site, due to lack of available space for soft landscaping SUDs.

Furthermore, the developer should consider source control methods such as green roofs and rain water harvesting.

Existing runoff rates have been calculated using the ICP SUDS method for the 1 year, 30 year and 100 year return periods as 6.5l/s, 10.9l/s and 11.9l/s.

Indicative attenuation volumes have been calculated restricting discharge rates to no more than greenfield runoff for the 100 year + 40% climate change as 78-144m^3, based on 65% impermeable area to allow for landscaping.

Foul from the east proportion of the site should be directed to the 225mm diameter public combined sewer located within Keighley Road via a pumped solution.

Foul from the west proportion of the site should be directed to the 375mm diameter public combined sewer located within Skipton Road.

Failing a connection to the public sewer a Package Treatment Plant could be located onsite with treated effluent directed to watercourse.

Site Constraints & Recommendations

- In accordance with the NPPF finished floor levels should be set to no less than 600mm above the 100 year plus 70% climate change event.

- As such the finished floor level for the habitable part of any dwelling should be set to no less than: 175.256m AOD + 0.600m = **175.756m AOD**

- The site is located predominantly within Flood Zone 3, and therefore the displacement of flood water volume from the site resulting from development is likely to increase the flood risk for others. Therefore, careful consideration must be provided to the development type proposed for the site.

- Development Type:

  - Retained/Redeveloped Mill Building – non-habitable space/communal areas located at ground floor with living space restricted to first floor level and above.
  - New development – apartment building with flood void/undercroft at ground floor level, and habitable accommodation set at first floor level and above.
  - New development – town house style dwellings with non-habitable space such as garages set at ground floor level; and habitable accommodation at first flood level and above.

- During the design phase, boundary treatments should be carefully considered to ensure that existing flood routes are not impeded. Obstruction to established flood routes may have the potential to increase flood risk to others. As such it is recommended that boundary treatments comprise of vegetation/hedging and/or open style fencing.

- LIDAR Data suggests that the level on the bridge is 173.900m AOD, therefore during minor flood events the access is considered to be under water by a considerable depth e.g. 1.356m deep during the 100-year plus 70% climate change event and therefore should not be used.

- It is recommended that for the east part of the site, the emergency access and egress route should direct people towards the field north of the Rock Business Centre, and onto Keighley Road, as this would provide a direct route into Flood Zone 1.

- It is recommended that residents in the west proportion of the site should exit the site prior to the onset of flooding south onto Church Street and into Flood Zone 1.

- It is concluded that secondary sources of flood risk i.e. groundwater; overland flows and artificial water sources present a low risk to the proposed development.

- A robust flood evacuation plan should be formultade to support planning application for residential development at the Black Carr Mill Site to ensure that all residents can safely evacuate to an area with a lower flood risk, well in advance of the onset of flooding.

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1.0 Introduction

1.1 Terms of Reference

Flood Risk Consultancy Ltd has been appointed by Trawden Parish Council, to provide a Flood Risk Assessment in support a site to be allocated within the Trawden Forest Neighbourhood Plan Ref: 015 located at Black Carr Mill, Trawden, Lancashire.

The development redline boundary covers an area approximating 0.41 Hectares and is shown to be situated within Flood Zone 3 of the Environment Agency Flood Map.

Definitions of the different Flood Zones are provided within Section 2.2.2 of this report.

It is usual for the Environment Agency to raise an objection to development applications within the floodplain, or Zones 2 and 3 of the flood map until the issue of flood risk has been properly evaluated. The Agency will also object to developments where the total site area is in excess of 1 Hectare until suitable consideration has been given to surface water runoff.

1.2 Objectives

The objective of this assessment is to evaluate the following issues in regard to flood risk at the application site:

- Suitability of the proposed development in accordance with current planning policy.
- Identify the risk to both the proposed development and people from all forms of flooding.
- Provide a preliminary assessment of foul and surface water management.
- Increasing the risk of flooding elsewhere e.g. surface water flows; flood routing; and loss of floodplain storage.
- Recommendation of appropriate measures to mitigate against flooding both within the proposed development, and neighbouring land and property.

1.3 Data Sources

This assessment is based on desk-top study of information from the following sources:

- National Planning Policy Framework (2016)
- Planning Practice Guidance at www.gov.uk (March 2014)
- Building Regulations Approved Document H
- Environment Agency Flood Mapping
- Pendle Borough Council Strategic Flood Risk Assessment (2006)
- British Geological Society – Historic Borehole Logs
- Cranfield University's Soilscape Viewer

2.0 Planning Policy Context

2.1 Approach to the Assessment

A Level 2 Scoping Study is designed to provide a qualitative appraisal of flood risk both within the site and any potential impact that the development will have on flood risk elsewhere; and provide recommendations for mitigation measures which may be included within the design of the development to reduce the overall risk of flooding.

An initial assessment indicates that the primary flood risk at the proposed development is from the fluvial source Trawden Brook which flows through the centre of the site.

Consideration has also been given to the site flooding from secondary sources such as pluvial, groundwater; artificial water bodies; infrastructure failure; overland flow and ponding.

2.2 National Planning Policy Framework (NPPF)

The requirements for undertaking site specific flood risk assessments are generally as set out in Guidance Point 10 from the Planning Practice Guide – Flood Risk & Coastal Change (www.gov.uk).

The information provided in the flood risk assessment should be credible and fit for purpose.

Site-specific flood risk assessments should always be proportionate to the degree of flood risk and make optimum use of information already available, including information in a Strategic Flood Risk Assessment for the area, and the interactive flood risk maps available on the Environment Agency's website.

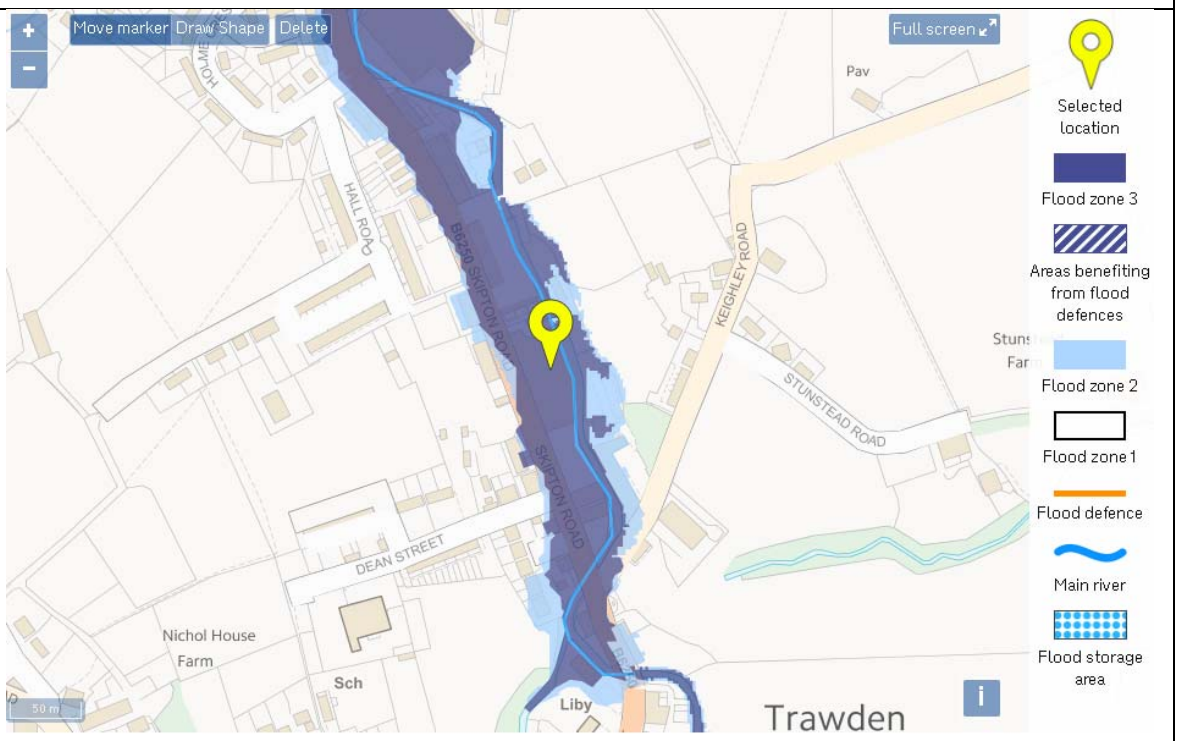
A flood risk assessment should also be appropriate to the scale, nature and location of the development.

Changes to the NPPF in April 2015 made SuDS (Sustainable Drainage Systems) a material consideration while determining planning applications for major development with developers required to provide SuDS on major development where appropriate.

2.2.1 Sources of Flooding

- **Rivers (fluvial):** Flooding occurs when flow within river channels exceeds capacity; and the type of flood event experienced e.g. flash flooding; depends upon the characteristics of the river catchment.
- **The Sea (tidal):** Flooding at low lying coastline and tidal estuaries is caused by storm surges and high tides; with overtopping and breach failure of sea defences possible during extreme storm events.
- **Pluvial (surface flooding or overland flows):** Heavy rainfall, which is unable to soak away via infiltration or enter drainage systems can flow overland, resulting in localised flooding. Topography generally influences the direction and depth of flooding caused by this mechanism.
- **Groundwater:** Caused when ground water levels rise to the surface; and is most likely to occur in low lying areas underlain by aquifers.
- **Sewers and drains:** Generally occurs in more urban areas; where sewers and drains are overwhelmed by heavy rainfall or blocked pipes and gullies.
- **Artificial Sources (reservoirs, canals, lakes and ponds):** Reservoir and canal flooding may occur as a result of capacity exceedance or structural failure.

Figure 2.1: The Environment Agency Flood Map



Source: www.environment-agency.gov.uk

2.2.2 Flood Zones

- **Flood Zone 1:** Low probability (less than 1 in 1000 year (<0.1% AEP) annual probability of river or sea flooding in any year).
- **Flood Zone 2:** Medium probability (between 1 in 100 year (1.0% AEP) and 1 in 1000 year (0.1% AEP) annual probability of river flooding; or between 1 in 200 year (0.2% AEP) and 1 in 1000 year (0.1% AEP) annual probability of sea flooding in any year).
- **Flood Zone 3a:** High probability (1 in 100 year (1.0% AEP) or greater annual probability of river flooding in any year or 1 in 200 year (0.5% AEP) or greater annual probability of sea flooding in any year).
- **Flood Zone 3b:** This zone comprises land where water has to flow or be stored in times of flood. Land which would flood with an annual probability of 1 in 20 (5% AEP), or is designed to flood in an extreme flood (0.1%) should provide a starting point for discussions to identify functional floodplain.

2.2.3 Vulnerability of Different Development Types

- **Essential Infrastructure:** Transport infrastructure (railways and motorways etc…); utility infrastructure (primary sub-stations, water treatment facilities; power stations; and wind turbines).
- **Water Compatible Development:** Flood control infrastructure; water and sewage infrastructure; navigation facilities.
- **Highly Vulnerable:** Emergency services; basement dwellings; mobile home parks; industrial or other facilities requiring hazardous substance consent.
- **More Vulnerable:** Hospitals; residential dwellings; educational facilities; landfill sites caravan and camping sites.
- **Less Vulnerable:** Commercial premises; emergency services not required during a flood; agricultural land.

2.2.4 Climate Change

The NPPF requires the application of climate change over the lifetime of a development. As of 19th February 2016 the Technical Guidance for NPPF has updated the climate change allowances based on the river basin district. The climate change allowance for the North West river basin district is tabulated below:

Table 1: North West Climate Change Allowances[1]

Parameter	Allowance Category	2010 - 2039	2040 - 2059	2060 - 2069	2070 - 2115
Peak Rainfall Intensity	Upper end	+ 10%	+ 20%	+ 40%	
	Central	+ 5%	+ 10%	+ 20%	
Peak River Flow	Upper end	+ 20%	+ 35%		+ 70%
	Higher Central	+ 20%	+ 30%		+ 35%
	Central	+ 15%	+ 25%		+ 30%

The selection of climate change allowance should be chosen appropriate to the expected lifespan of the proposed development.

When designing the strategy for the site an allowance of 40% should be applied to rainfall intensity to account for climate change over the lifetime of the development.

If the development is to be allocated for residential use it is expected to have a design life of between 2070 to 2115, as such the 70% - 35% climate change allowance should be used when assessing flood risk.

[1] Extracted from Tables 1-4 of the Technical Guidance for flood risk assessments: Climate change allowances Document (February 2016)

3.0 Details of the Site

3.1 Site Details

Table 2: Development Location

Site Name:	Ref: 015 Black Carr Mill
Purpose of Development:	Residential
Existing Land Use:	Commercial
OS NGR:	SD911390
Country:	England
County:	Lancashire
Local Planning Authority:	Pendle Borough Council
Internal Drainage Board:	Not Applicable
Other Authority (e.g. British Waterways/ Harbour Authority)	Not Applicable

Location Plan:

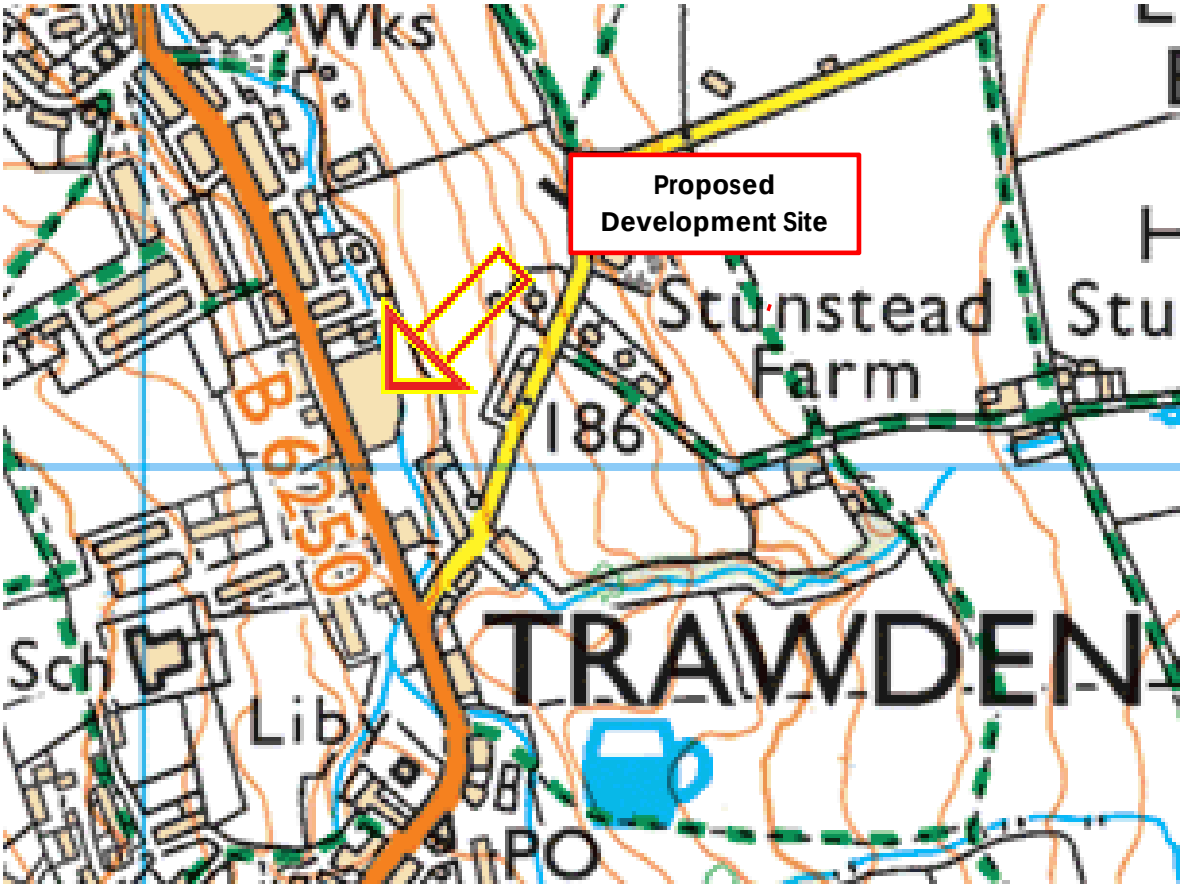


Image produced from the Ordnance Survey Get-a-map service.
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3.2 Site Description

The application site at present comprises of the Black Carr Mill building and the car parking/open storage area on the east side of Trawden Brook.

The site is accessed from the west direct from Skipton Road and a bridge over Trawden Brook.

Table 3: Boundaries

North	Directly north of the site are the rear gardens of properties on River Street, beyond which is an expanse of residential development associated with Skipton Road.
East	The east of the mill building is Trawden Brook, to the east of the storage area is a steep grassed agricultural field, beyond which is an expanse of agricultural land.
South	Directly south of the site a car parking area associated with the mill building, beyond which are more industrial units.
West	The west of the site is Skipton Road and Brookside Garage, beyond which is an expanse of green open space.

Figure 3.1: Aerial View of Proposal Site

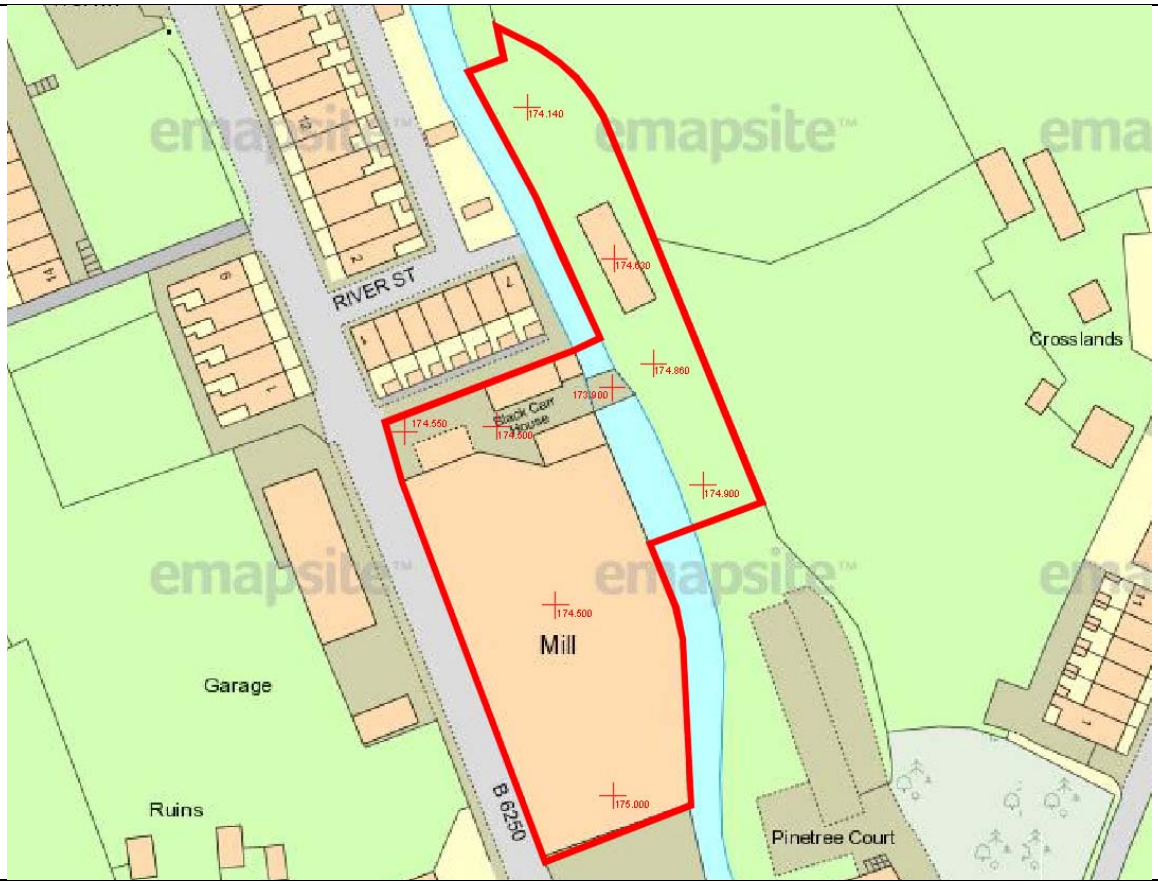
Source: Google Earth

The nearest watercourse is Trawden Brook which flows through the centre of the site.

No topographical survey has been provided for the development, as such levels have been extracted from LIDAR data for the surrounding area. Levels along the east of Trawden Brook boundary range from 174.000m AOD at the north up to 175.000 AOD at the north, levels

associated with the mill building west of Trawden Brook range from 174.500m AOD at the north up to 175.500m AOD at the south.

Figure 3.2: Spot Levels



Source: FRC

The Environment Agency Flood Map shows that the majority of the whole site is located within Flood Zone 3 i.e high risk, whilst the north of the eastern extent is located within Flood Zone 2 i.e. medium risk.

4.0 Historic Flooding

4.1 Internet Search

An internet search revealed a number of flooding incidents within the Trawden area of Lancashire, some of the incidents are identified below:

- Lancashire Telegraph – 22nd June 2012 - Rivers Calder, Brun, Don and Pendlewater, from Laneshaw Bridge to the river Ribble including Trawden, Burnley, Nelson, Colne, Accrington and Whalley are all at risk flooding according to the Environment Agency.
- Colne and West Craven Police – 12th December 2015 - TRAWDEN - Flooding Proctor Croft & Colne Road.
- 2BR Radio – 17th March 2017 - An alert is also being issued for people living in Padiham, Trawden, Burnley, Nelson, Colne, Accrington and Whalley as the River Calder could also burst its banks as well.

4.2 Pendle Strategic Flood Risk Assessment

A Stage 2 Strategic Flood Risk Assessment was completed on behalf of Pendle Borough Council by Entec in October 2006.

Table 5.1 Historic Flood Records within Pendle identifies a number of flooding incidents across the borough, the incidents specifically located within Trawden are identified below:

- 1927- Flooding in Rock Lane to 1.5 metres
- 1947- Properties undercut due to flooding from Colne Water
- June 2000 – Flooding of 3No properties between 0.3m and 1.0m
- Oct 2001- Flooding of 4No properties
- Aug 2004 – Flooding of Burnley and Colne Road

4.3 Environment Agency Historic Flooding

The Environment Agency have provided Historic Flood Data for the site which identifies the following incidents:

- 8th October 2010 – Trawden Brook – No Level Data
- 26th December 2015 – On site flood level of 174.889m AOD

5.0 Initial Evaluation of Flood Risk

5.1 The Environment Agency Flood Map

The Environment Agency Flood Map illustrated within Figure 2.1, confirms that proposed development site is located within Flood Zones 2 and 3.

The definition for each of the flood zones highlighted above is provided for reference within Section 2.2.2 of this report.

Table 4: Possible Flooding Mechanisms

Source/Pathway	Significant?	Comment/Reason
Fluvial	Yes	Trawden Brook
Canal	No	No canals in the vicinity of the development site
Tidal/Coastal	No	Not Applicable
Reservoir	No	EA Map shows that the site is located within the reservoir flood extents.
Pluvial (urban drainage)	No	No known issues
Surface Water Flooding	Yes	EA Surface Water Flood Maps indicates the site is located within a surface water flow route.
Groundwater	No	Borehole logs do not identify groundwater to be an issue.
Overland flow	Yes	Flow route associated with surface water flooding.
Blockage	No	Not Applicable
Infrastructure failure	No	Not Applicable
Rainfall Ponding	No	Not Applicable

From the initial assessment it is concluded that the primary source of flood risk will be from the fluvial source Trawden Brook and the surface water flow route that passes through the site.

Fluvial: Trawden Brook

The nearest watercourse to the proposed site is known as Trawden Brook which flows through the centre of the site.

The watercourse is designated as 'Main River' and therefore flood management along the watercourse is the responsibility of the Environment Agency.

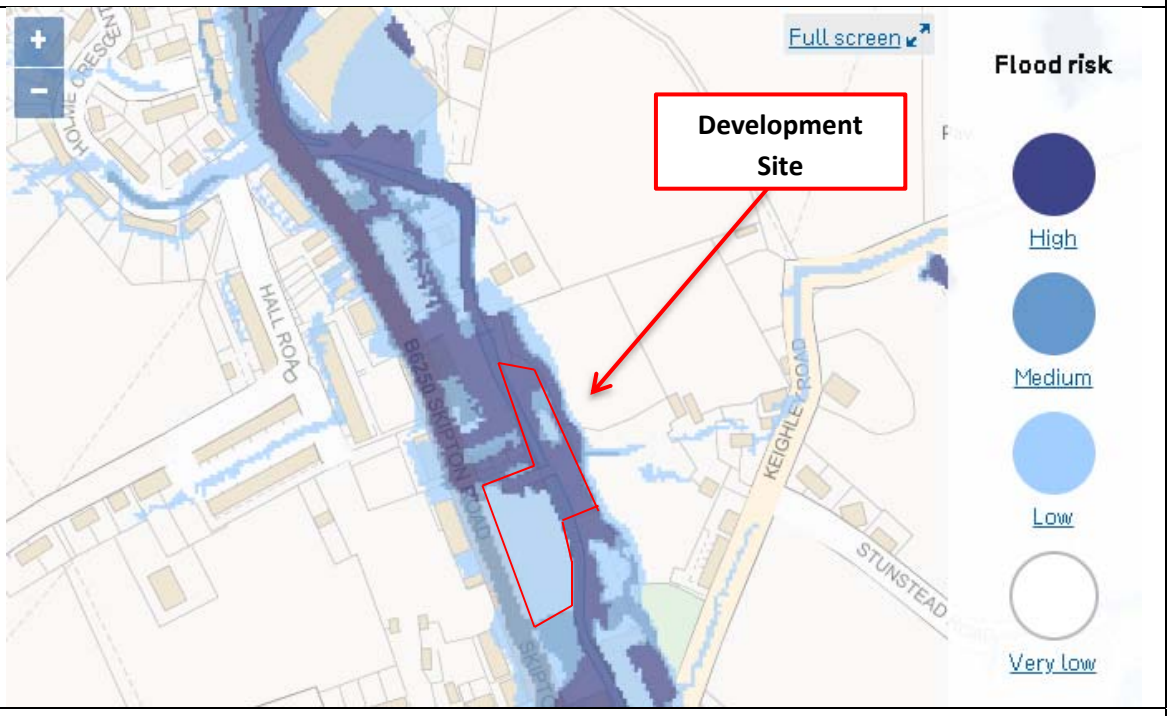
Trawden Brook flows in a northerly direction along the west boundary of the site, the watercourse is predominantly open channel through the village of Trawden, it confluences with Colne Water approximately 1.2km north of the of the site.

Due to the site being located within both Flood Zones 2 and 3 flooding from this source requires further evaluation.

Surface Water/Overland Flow

The Environment Agency's Flooding from Surface Water Map identifies that site has a high, medium and low surface water flood risk.

Figure 5.1: Environment Agency's Surface Water Flood Map



Source: www.environment-agency.gov.uk

The deepest area of flooding is isolated to the low-lying access area along the east boundary.

The surface water flow route is a result of under capacity issues within the watercourse, water then overtops the banks and surfaces flowing overland following the topography of the surrounding area.

A secondary flow route passes in a northerly direction through the site as a result of ponding from the car parking area associated with the Rock Business Centre south.

Taking the above into account the risk associated with surface water flooding will require further evaluation.

Pluvial: Exceedance and Local System Failure

The following text has been extracted from CIRIA 2906 'Managing Extreme Events by Designing for Exceedance January 2013':

'*Climate change and urbanisation is already contributing to increased surface water flooding, where the capacity of the existing drainage systems are overwhelmed (or exceeded).*

The traditional approach to fixing the problem is to build bigger pipes or provide underground storage. Ofwat, the Environment Agency and others believe that this approach is unsustainable and unaffordable and are encouraging sewerage undertakers, Lead Local Flood Authorities and highway authorities to look at different approaches to managing sewer and surface water flooding.

One approach being promoted is "designing for exceedance".

Designing for exceedance is an approach to manage flood risk (particularly from extreme events) by planning, designing and retrofitting drainage schemes that can safely

accommodate rainfall and flooding that exceeds their design capacity (normally a 1 in 30 rainfall event). This is often achieved by considering flood pathways (such as managing runoff on highways) or providing additional storage (preferably on the surface through car parks, or multifunctional detention basins).

In England and Wales Sewers for Adoption and the National Planning Policy Framework encourage the consideration of drainage exceedance, it is a flexible approach to manage extreme events that can be used to reduce the need for more traditional, expensive underground approaches to manage surface water and often complement sustainable drainage and other local urban design initiatives.'

The impact of extreme rainfall events and/or local system failure will therefore need to be assessed as part of the overall surface water management strategy for the proposed development.

6.0 Quantitative Flood Risk Assessment

6.1 National Planning Policy Framework

6.1.1 Site Specific Flood Risk Assessment Checklist

The following checklist has been extracted from Flood Risk & Coastal Change Section available from www.gov.uk , published in March 2014.

1. Development Description and Location

- What type of development is proposed (e.g., new development, an extension to existing development, a change of use etc.) and where will it be located?
- What is its flood risk vulnerability classification?
- Is the proposed development consistent with the Local Plan for the area? (Seek advice from the local planning authority if you are unsure about this).
- What evidence can be provided that the Sequential Test and where necessary the Exception Test has/have been applied in the selection of this site for this development type?
- Will your proposal increase overall the number of occupants and/or users of the building/land, or the nature or times of occupation or use, such that it may affect the degree of flood risk to these people? (Particularly relevant to minor developments (alterations & extensions) & changes of use).

2. Definition of the Flood Hazard

- What sources of flooding could affect the site?
- For each identified source, can you describe how flooding would occur, with reference to any historic records where these are available?
- What are the existing surface water drainage arrangements for the site?

3. Probability

- Which flood zone is the site within?
- If there is a Strategic Flood Risk Assessment covering this site (check with the local planning authority). Does this show the same or a different flood zone compared with the Environment Agency's flood map?
- What is the probability of the site flooding, taking account of the maps of flood risk from rivers and the sea and from surface water, on the Environment Agency's site, and the Strategic Flood Risk Assessment, and of any further flood risk information for the site?
- If known, what (approximately) are the existing rates and volumes of surface water run-off generated by the site?

4. Climate Change

- How is flood risk at the site likely to be affected by climate change? (The local planning authority's Strategic Flood Risk Assessment should have taken this into account. Further information on climate change and development and flood risk is available on the Environment Agency's website.

5. Detailed Development Proposals

- Where appropriate, are you able to demonstrate how land uses most sensitive to flood damage have been placed in areas within the site that are at least risk of flooding (including providing details of the development layout)?

6. Flood Risk Management Measures

- How will the site/building be protected from flooding, including the potential impacts of climate change, over the development's lifetime?

7. Off-site Impacts

- How will you ensure that your proposed development and the measures to protect your site from flooding will not increase flood risk elsewhere?
- How will you prevent run-off from the completed development causing an impact elsewhere?
- Are there any opportunities offered by the development to reduce flood risk elsewhere?

8. Residual Risks

- What flood-related risks will remain after you have implemented the measures to protect the site from flooding?
- How, and by whom, will these risks be managed over the lifetime of the development? (E.g., flood warning and evacuation procedures).

6.2 Pluvial Flood Risk

6.4.1 Environment Agency Maps

Surface Water Flood Maps available from the www.gov.uk website indicate that there is an established flow route through the site in Trawden.

The deepest area of flooding is isolated to the low-lying access area along the east boundary.

The surface water flow route is a result of under capacity issues within the watercourse, water then overtops the banks and surfaces flowing overland following the topography of the surrounding area.

A secondary flow route passes in a northerly direction through the site as a result of ponding from the car parking area associated with The Rock Business Centre south.

Mapping illustrates the chance of occurrence, potential depths, velocities and direction of flow for surface water flood routes. The definitions for varying probability events are provided below:

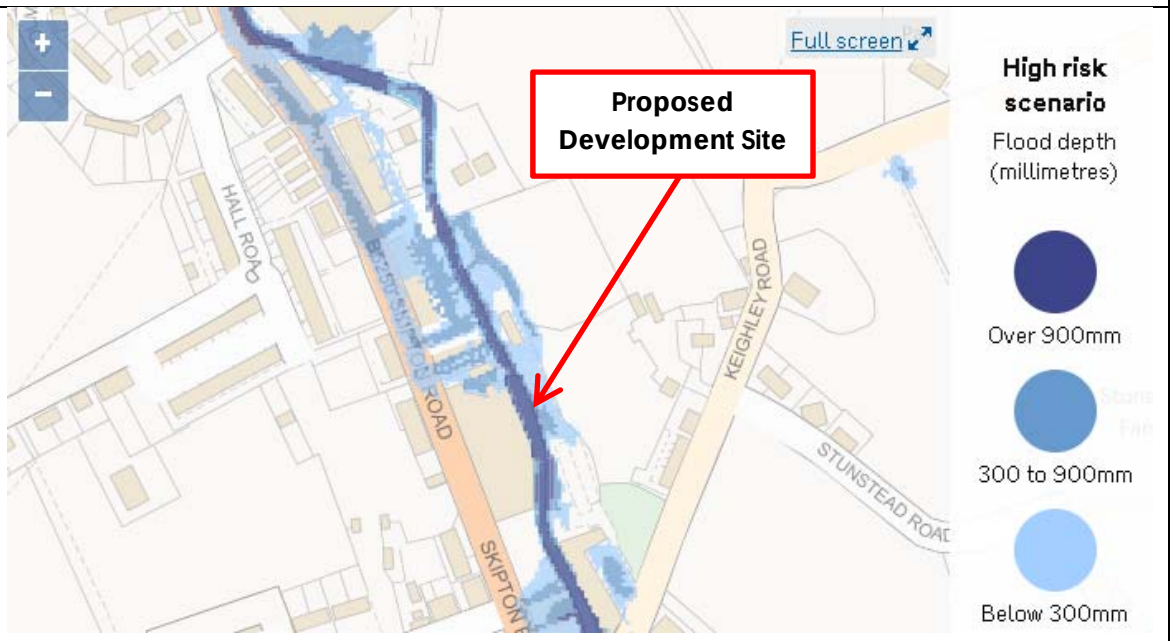
- High - Chance of flooding is greater than 1 in 30 in any one year (3.3% AEP).
- Medium - Chance of flooding is between 1 in 100 (1% AEP) and 1 in 30 (3.3% AEP) in any one year.
- Low - Chance of flooding is between 1 in 1000 (0.1% AEP) and 1 in 100 (1% AEP in any one year).
- Very Low - Chance of flooding of less than 1 in 1000 (0.1% AEP) in any one year.

6.4.2 High Probability Event

During the high probability event the site would experience a small amount of flooding within the north east proportion and within the area west of the bridge,

The east has a depth below 300mm and a velocity of less than 0.25m/s, west of the bridge has a depth below 300mm and a velocity of less than 0.25m/s.

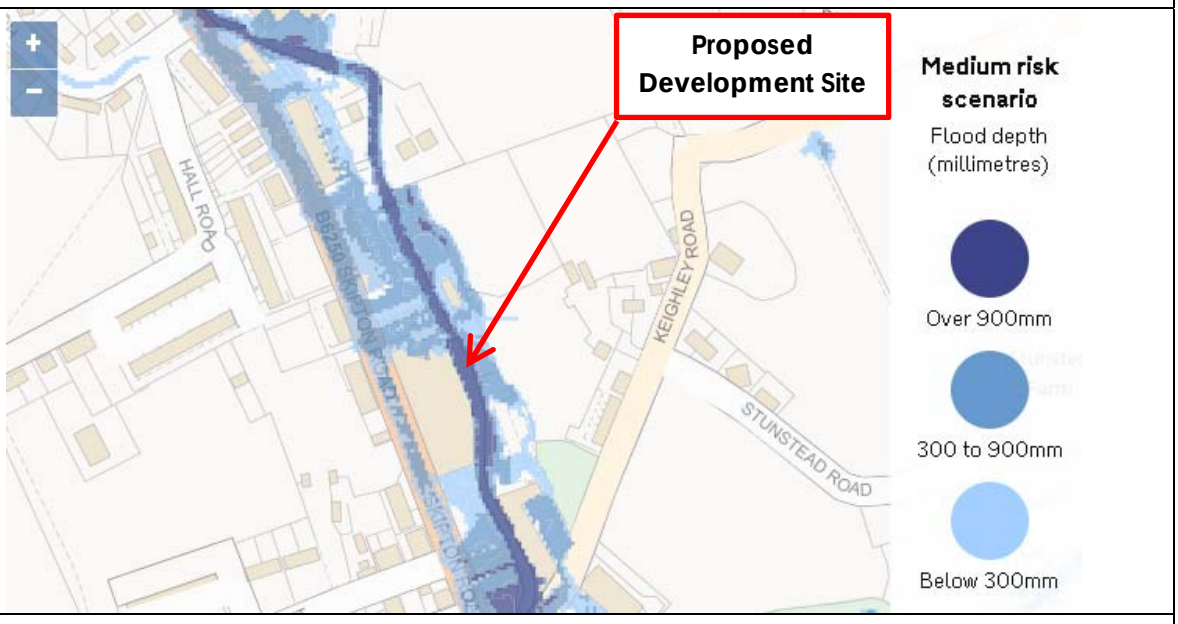
Figure 6.1: Surface Water Depth – High Probability Event



Source: www.gov.uk

6.4.3 Medium Probability Event

Figure 6.2: Surface Water Depth – Medium Probability Event



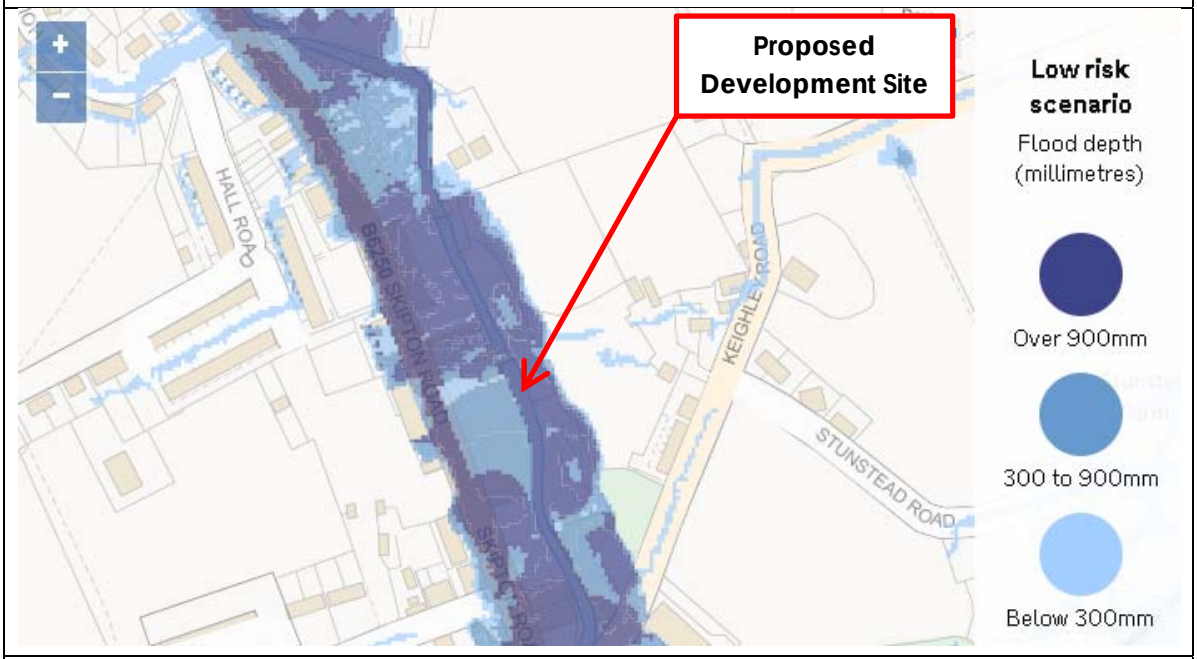
Source: www.gov.uk

During the medium probability event the Environment Agency Surface Water Flood map shows that the site will become flooded from the east as a result of under capacity within the watercourse and from the south where a flow route enters from the south making its way overland into the watercourse.

Flows on the site are expected to be at a depth of between 300mm and 900mm with a velocity of over 0.25m/s, the centre of the site will remain dry.

6.4.4 Low Probability Event

Figure 6.3: Surface Water Depth – Low Probability Event



Source: www.environment-agency.gov.uk

The figure shows that during the low probability event the proposed development would experience flooding across the whole of the site to depths over 900mm with velocity greater than 0.25m/s.

6.4.5 Flood Hazard Rating

The risk to people has been evaluated below using the methodology within the document FD2321/TR2 published by Defra and the Environment Agency.

Where Hazard Rating = Depth x (Velocity + 0.5) + Debris Factor

For flood depths <300mm, the Debris Factor = 0.5, and

For flood depths >300mm, the Debris Factor = 1.0

Therefore using the map information, the hazard rating for each probability event is as follows:

<u>High Probability:</u>

Flood Depth: <300mm
Velocity: <0.25

Debris Factor: 0.5

High Probability Hazard Rating = 0.3 x (0.25 + 0.5) + 0.5 = **0.725 (low)**

Medium Probability:

Flood Depth: <700mm
Velocity: >0.25 (0.5m/s used for calculation purposes)
Debris Factor: 1.0

Medium Probability Hazard Rating = 0.7 x (0.5 + 0.5) + 0.5 = **1.200 (moderate)**

Low Probability:

Flood Depth: <900mm
Velocity: >0.25 (1.0m/s used for calculation purposes)
Debris Factor: 1.0

Low Probability Hazard Rating = 0.9 x (1.0 + 0.5) + 0.5 = **1.850 (significant)**

Table 5: Velocity, Depth and Flood Hazard Matrix

Velocity (m/s)	Depth (m)									
	DF = 0.5			DF = 1.0						
	0.1	0.2	0.25	0.5	0.75	1.00	1.25	1.50	1.75	2.00
0.00	0.55	0.60	0.625	1.25	1.00	1.50	1.63	1.75	1.88	2.00
0.50	0.60	0.70	0.75	1.50	1.37	2.00	2.25	2.50	2.75	3.00
1.00	0.65	0.80	0.88	1.75	2.12	2.50	2.88	3.25	3.63	4.00
1.50	0.70	0.90	1.00	2.00	2.50	3.00	3.50	4.00	4.50	5.00
2.00	0.75	1.00	1.13	2.25	2.88	3.50	4.13	4.75	5.38	6.00
2.50	0.80	1.11	1.25	2.50	3.25	4.00	4.75	5.50	6.25	7.00

	<0.75	Low flood hazard (caution is required)
Class 1	0.75 – 1.25	Moderate hazard - Danger for some (children, the elderly & infirm)
Class 2	1.25 – 2.00	Significant hazard - Danger for most (the general public)
Class 3	>2.00	Extreme hazard - Danger for all (includes the emergency services)

In conclusion Ordnance Survey maps indicate that the development is situated within a valley, with peaks in topography within the centre of the site which provide a narrow corridor running around the west and east of the site into Trawden Brook.

Calculations indicate that the surface water flood route presents a low hazard to people during the highest probability event, which increases to a moderate hazard with increased potential flood depths and flow velocities attributed to medium probability flood event, the hazard then increases to significant during the low probability event. As such it is highly recommended that a robust evacuation plan is devised and practised due to the vulnerability of end users.

Providing that finished floor levels for habitable dwellings are elevated 600mm above the 100 year + 70% climate change fluvial flood level the risk of surface water ingress into the building is considered to be low.

6.3 Fluvial: Trawden Brook

6.3.1 General

The site is located within Flood Zones 2 and 3 of the Environment Agency Flood Map; as such has a medium and high risk associated with fluvial flooding.

An initial review has determined that the main fluvial flood risk associated with the site is from the watercourse known as Trawden Brook which flows through the centre of the site.

The aim of this section of the report to determine flood depths across the site and the level of risk using a comparison of Environment Agency flood data associated with the watercourse and levels onsite.

6.3.2 Environment Agency Data

The Environment Agency have provided in channel levels and flood levels associated with Trawden Brook at a number of node locations for both the defended and undefended scenarios.

It is worth noting that the EA have not provided any information relating to the flood defences within the area.

6.3.3 In-Channel Levels Node Ref: 7454

The in-channel levels have been tabulated below for both the defended and undefended scenarios.

Table 6: EA Flood Levels Node Ref: 7454

Return Period	Defended	Undefended
1000 Year	-	175.100
100 Year + 70% Climate Change	-	175.256
100 Year + 20% Climate Change	-	174.980
100 Year	175.000	174.930
50Year	-	174.870
25 Year	-	174.810

*The Environment Agency did not provide flood levels for the 100 year plus 70% climate change event in accordance with current EA guidance, as such interpolation was used in order to estimate the flood level for this return period.

Due to the lack of defended flood levels the undefended scenario has been used in order to estimate the depth of flooding at the site.

6.3.4 Overtopping 100 Year Event (Undefended)

During the 100 year event within Trawden Brook the flood level associated with the watercourse is 174.930m AOD, the general ground level on the west is approximately 174.500m AOD, the general ground level on the east is approximately also 174.500m AOD

As such during this event the site is expected that the northern half of the site will flood to depth of approximately 0.430m.

6.3.5 Overtopping 100 Year+ 70% Climate Change Event (Undefended)

During the 100 year + 70% climate change event within Trawden Brook the flood level associated with the watercourse is 175.256 AOD, the average ground level on site is 174.500m AOD.

During this event it is anticipated that the majority of the site will flood to a depth of 1.756m.

6.3.6 Overtopping 1000 Year Event (Undefended)

During the 1000 year event within Trawden Brook the flood level associated with the watercourse is 175.100 AOD.

During this event it is anticipated that the site will flood to a depth of 0.600m.

6.3.7 Conclusion

Following evaluation of fluvial flooding of Trawden Brook the site will flood during all return periods from the 25-year event up to the 100 year + 70% climate change event and the 1000-year event, which corresponds well with the EA Flood Map, concluding that the risk associated with fluvial flooding within the site is considered to be medium and high.

6.4 Surface Water Runoff

6.4.1 General

At present the proposed development site comprises of the mill building and storage area with a small percentage of grassed area; as such the site is considered 'greenfield' with a percentage urban. The site has an overall area of approximately 0.41 Hectares.

6.4.2 Existing Sewers

United Utilities sewer records identify that a 225mm diameter combined sewer is located within Keighley Road and a 375mm diameter combined sewer is located within Skipton Road.

6.4.3 Post Development Drainage

At present no development proposals have been prepared therefore an estimate of the proposed impermeable area has been assumed for assessment purposes.

The area of the redline boundary of the proposed development site is 0.41 Hectares.

Following development, it has been estimated the impermeable area of the development site will decrease from 0.29Ha i.e. 70% to 0.27Ha i.e. 65% impermeable which is considered appropriate for residential development.

6.4.4 Existing Runoff Rates

Engineering judgment suggests that the site does not have positive drainage infrastructure, therefore greenfield runoff rates have been calculated using the ICP SUDS method derive existing runoff rates for a range of return periods with 70% urban applied, these are shown below:

Table 7: Existing Surface Water Runoff 0.41Ha 70% Urban

Return Period	Discharge Rate l/s
1 Year	6.5
30 Year	10.9
100 Year	11.9

6.4.5 Surface Water Drainage Hierarchy

The hierarchy for disposal of surface water from new developments is outlined within the Building Regulations Approved Document H and specifies the following methods in order of preference:

- Infiltration via soakaway or other suitable infiltration device
- Discharge to watercourse
- Discharge to public surface water sewer
- Discharge to public combined sewer

Infiltration

Following a non-intrusive desk top study infiltration at the site is not considered to be feasible, a review of Soilscape maps identifies the site to be located on land which is considered to be *slowly permeable seasonally wet acid loamy and clayey soils.*

Borehole logs taken from approximal 100m west of the site using the BGS online service identify that the ground comprises of clay and coal, as such the ground conditions suggest that they are not considered to be suitable for infiltration devices.

*See appendix for both soil scape map and borehole log.

Watercourse

The nearest watercourse to the proposed development is Trawden Brook located centrally within the boundary of the site.

As such disposal of surface water to watercourse is considered the most feasible option due to the fact that the underlying ground seems to be unsuitable for the use of soakaways.

Due to the watercourse being considered to be a Main River consultation with the Environment Agency must be undertaken prior to making a connection in accordance with the Land & Drainage Act 1991 & 1994.

6.4.6 Sustainable Urban Drainage Systems (SUDS)

SUDS act to reduce the impact of surface water runoff from the development by limiting runoff volumes and rates from leaving the site.

Undertaking an assessment using the SUDS Planner Module within MicroDrainage Windes revealed that a number of different methods could be retrofitted to the Holme Mill building development. A summary of the results is tabulated below:

Table 8: SUDS Planner

SUDS Criteria	Rank 1	Rank 2	Rank 3
Hydrological	Permeable Pavements	Infiltration Trench/Soakaway	Infiltration Basin
Land Use	Infiltration Trench/Soakaway	Bioretention Area	Infiltration Basin
Site Features	Permeable Pavements	Green Roofs	Filtration Techniques
Community & Environment	Bioretention Area	Grassed Filter Strips	Stormwater Wetlands
Economics & Maintenance	Wet Ponds	Grassed Filter Strips	Dry Detention
Total	**Online/Offline Storage**	**Permeable Pavements**	**Green Roofs**

1. Source Control

The inclusion of source control in SUDS schemes is one of the more important principles of SUDS design, and source control components should be upstream of any pond, wetland or other SUDS component.

Source control can help provide interception storage which can handle and treat some of the more frequent but smaller, polluting events (at least 5mm).

Most source control components could be located within the private properties or highway areas. Their purpose is to manage rainfall close to where it falls, not allowing it to become a problem elsewhere.

The main types of source control include:

- Green roofs
- Rainwater harvesting
- Permeable paving
- Other permeable surfaces

Source control methods look to maximize permeability within a site to promote attenuation, treatment and infiltration, thereby reducing the need for off-site conveyance.

a) Green Roofs

Green roof solutions generally comprise of a multi-layered system that covers the roof of a building with vegetation cover, and/or landscaping over a drainage layer, designed to intercept and retain rainfall.

The incorporation of green roofs is to be decided by the architect/developers during the final design stage and is largely dependent on the final building design.

The likelihood of green roofs being utilised is considered to be low due to the increase in structural cost of the development.

b) Rainwater Harvesting

Rainwater harvesting provides a source of non-potable water, for purposes such as car washing; and landscaped area irrigation etc… and can be used for some industrial processes to reduce consumption of water from conventional supplies.

This SUDS solution, like green roof technology, is also designed to provide interception storage i.e. acts to reduce the volume of surface water leaving the proposed development; thereby helping to alleviate the current pressures on the receiving watercourse.

Rainwater harvesting can be installed at relatively low costs dependant on the chosen structure providing that the development site has scope.

c) Permeable Paving

Pervious surfaces can be either porous or permeable. The important distinction between the two is:

Porous surfacing is a surface that infiltrates water across the entire surface. Permeable surfacing is formed of material that is itself impervious to water but, by virtue of voids formed through the surface, allows infiltration through the pattern of voids.

Pervious surfaces provide a surface suitable for pedestrian and/or vehicular traffic, while allowing rainwater to infiltrate through the surface and into underlying layers.

The water can be temporarily stored before infiltration to the ground, reused, or discharged to a watercourse or other drainage system. Surfaces with an aggregate sub-base can provide good water quality treatment.

*In this specific scenario permeable paving is not considered to be appropriate as flood water and silt can affect the porosity of the surface and prevent water from entering into the system.

2. On/Offline Storage

This is a traditional form of surface water attenuation and may be provided via online or offline structures such as oversized pipes; or shallow attenuation structures such as geo-cellular crate systems e.g. Hydro-International's Stormcell System or similar. These structures may be easily placed within either hardstanding or landscaped areas to provide ease of access for maintenance purposes.

*On/offline storage is considered the most appropriate solution in terms of this site, due to lack of available space for soft landscaping SUDs.

6.4.7 Indicative Attenuation Volumes

Indicative attenuation volumes have been calculated for a range of return periods (with the inclusion of 40% climate change), based on flows restricted to predevelopment runoff rates.

Table 9: Indicative Attenuation Volumes

Return Period	Volume (m^3)
1 Year + 40 % Climate Change	8.6 – 24.0
30 Year + 40% Climate Change	29.0 – 62.0
100 Year+ 40% Climate Change	78.0 – 144.0

6.4.8 Residual Flood Risk

The proposed drainage system should be designed such that attenuation will be provided to accommodate surface water runoff for storms with a return period of up to the 1 in 30 year event incorporating an additional 20-40% to accommodate climate change over the lifetime of the development; in accordance with the LPAs requirements.

Within the on-site drainage system however, the 1 in 100 year plus climate change event is allowed to flood at surface level within the development. However, it is highlighted that the resulting flood water must be retained within the site; and will not be allowed to inundate property within the development; or migrate beyond the boundary of the site, thereby increasing flood risk elsewhere.

6.5 Foul

Foul from the east proportion of the site should be directed to the 225mm diameter public combined sewer located within Keighley Road via a pumped solution.

Foul from the west proportion of the site should be directed to the 375mm diameter public combined sewer located within Skipton Road.

Failing a connection to the public sewer a Package Treatment Plant could be located onsite with treated effluent directed to watercourse.

7.0 Development Constraints & Flood Mitigation

7.1 Residential Development Constraints

In accordance with the NPPF finished floor levels should be set to no less than 600mm above the 100 year plus 70% climate change event.

As such the finished floor level for the habitable part of any dwelling should be set to no less than:

- 175.256m AOD + 0.600m = **175.856m AOD**

On average the levels onsite are approximately 174.5m AOD, taking this into account the floor levels will be elevated by 1.356m.

Given the minimum required elevation for habitable accommodation, the following recommendations in regard to the type of residential development best suited for the site are as follows:

- Retained/redeveloped existing mill building – ground floor use for communal/non-habitable areas, with habitable living space provided from the first floor upwards
- Demolition/New build – apartment units, with flood void/undercroft space at ground floor level; or town house type dwellings with non-habitable space such as garages at ground floor level.

New development will need to be offset at least 8m from the banks of the watercourse to reduce impact associated with rapid inundation due to overtopping, and in order to remove the need for applying to the Environment Agency for an Environmental Permit.

External ground levels within the site must not be raised above existing within Flood Zone 3 unless there is space available in close proximity to the site where flood storage compensation can be provided.

7.2 Displacement of Flood Storage

Due to the site being located predominantly within Flood Zone 3 flood waters are not allowed to be displaced by properties or elevation of site levels, as this could result in properties downstream becoming flooded.

In this scenario the habitable part of the dwelling will have to be elevated above the existing ground level, therefore it is recommended that the ground floor of the properties should be allocated as garage space.

The garage should be designed so that flood water can easily migrate through the footprint of the property in the event of the onset of flooding, this is generally achieved by the incorporation of louvered garage doors which will allow water to escape following a flood even.

7.3 Fencing

During the design phase boundary treatments should consider that existing flood flow routes should not be obstructed from their existing course, if this happens it has the potential to

displace volumes which may result in flooding of properties downstream of the application site which can increase flood risk to the wider area.

As such it is recommended that boundary treatments comprise of vegetation/hedging and/or open style fencing.

Figure 6.4: Example Town Houses with Non-habitable space at Ground Floor

Source: FRC

7.4 Safe Access and Egress

East Proportion of the Site

If it is proposed that the access over the bridge onto Skipton Road is to be the main vehicular access point for the east proportion of the site it should be noted that this route should not be used during a flood event.

LIDAR Data suggests that the level on the bridge is 173.900m AOD, therefore during minor flood events the access is considered to be under water by a considerable depth e.g. 1.356m deep during the 100 year plus 70% climate change event and therefore should not be used.

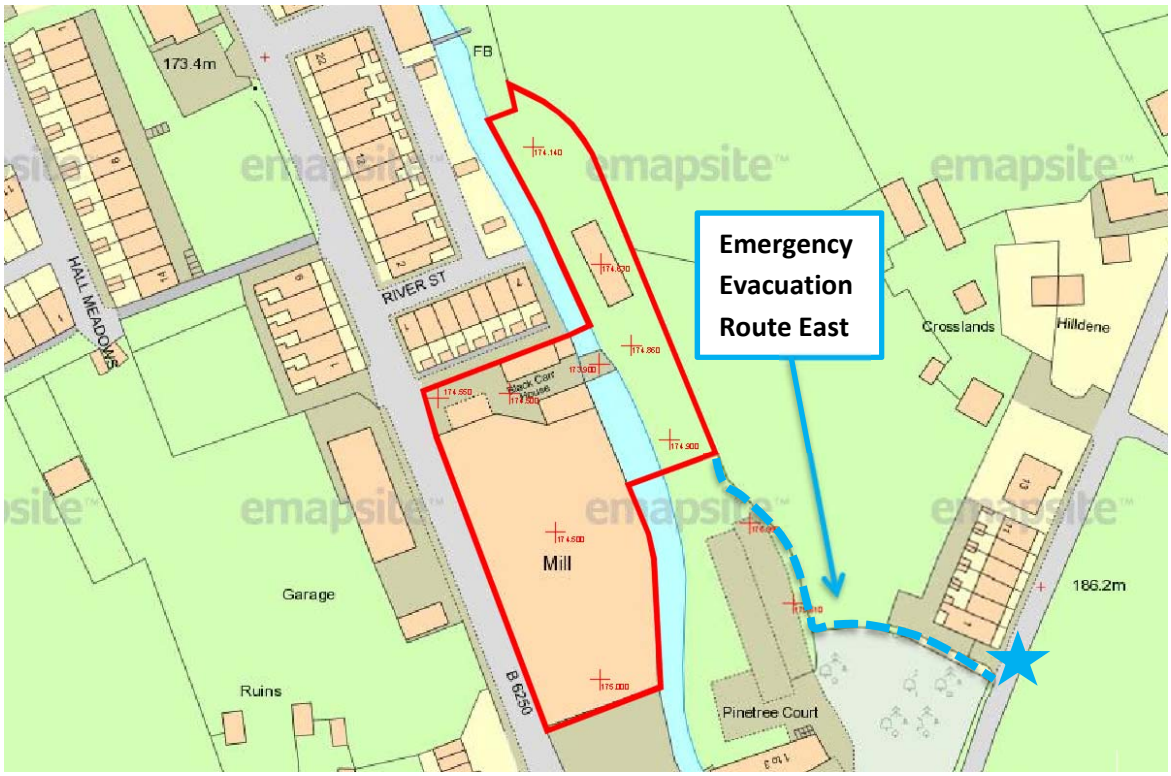
If vehicular access is not achievable from the south then it is recommended that residents have right of access on foot through the field to the north of the Rock Business Centre towards Rock Lane into Flood Zone 1 during emergencies.

West Proportion of the Site

The west proportion of the site is located within Flood Zone 3 along with the majority of Skipton Road adjacent to the site, therefore it is recommended that residents evacuate the site prior to any actual onset of flooding south along Skipton Road then onto Church Street and into Flood Zone 1.

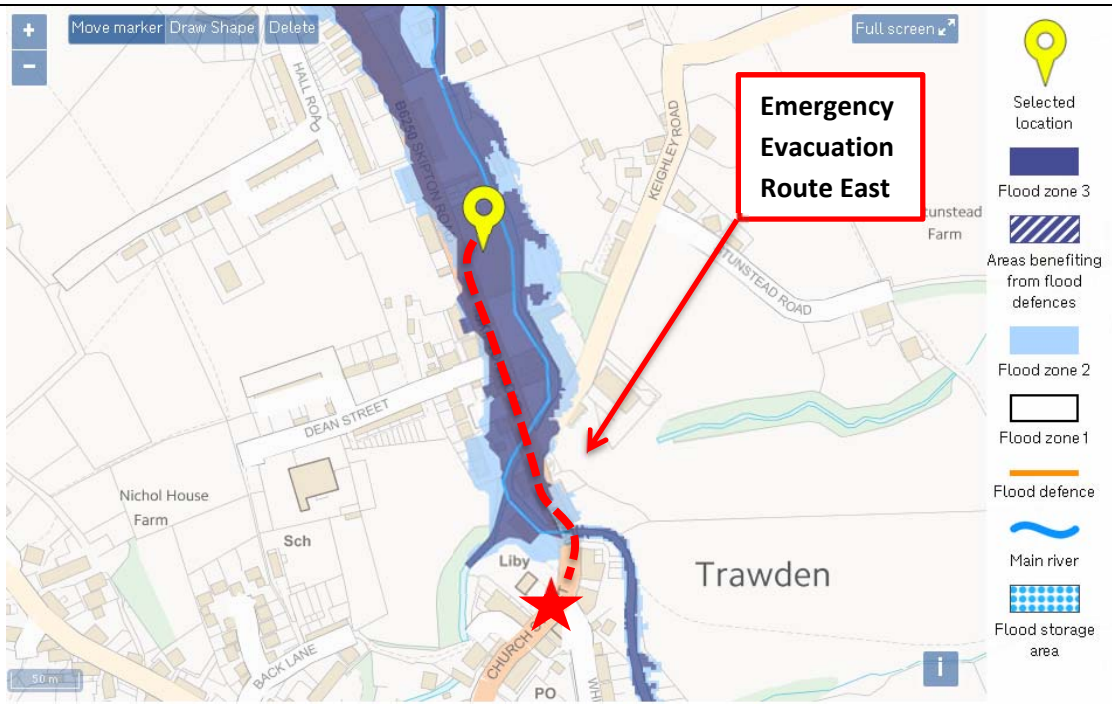
Residents should not evacuate the site over the bridge as flooding is expected to be at its greatest depth at this location.

Figure 6.5: Preferred Access Route East Proportion of the Site



Source: FRC

Figure 6.6: Preferred Access Route West Proportion of the Site



Source: FRC

7.5 Flood Warnings

The proposed development is covered by the Environment Agency's Flood Warnings Direct Service.

Therefore, it is recommended that residents sign up to receive the alerts via the website https://www.gov.uk/sign-up-for-flood-warnings, which will allow residents to evacuate or move property well in advance of any actual onset of flooding.

Using the latest available technology, the Environment Agency is able to monitor rainfall, river levels and sea conditions 24 hours a day and use the information to forecast the possibility of flooding.

If flooding is forecast, they are able to issue alerts using a set of three different types.

Table 10: Environment Agency Flood Warning Codes

Flood Warning Code	What it means	When it's used	What to do
	Flooding is possible. Be Prepared	2 hours – 2 days in advance of flooding.	• Be prepared to act on you flood plan • Prepare a flood kit • Monitor local water levels and the flood forecast of the EA website
	Flooding is expected. Immediate action is required.	½ hour – 1 day in advance of flooding.	• Move people to a safe place • Turn of gas, electricity and water supplies if safe to do so • Put flood protection equipment in place
	Severe flooding. Danger to life.	When flooding poses a significant threat to life.	• Stay in a safe place with means of escape • Be ready to evacuate • Co-operate with the emergency services • Call 999 if you are in immediate danger
Warnings no longer in force	No further flooding is currently expected in your area	When river or sea conditions begin to return to normal	• Be careful as flood water may still be around for several days • If you have been flooded, ring your insurance company as soon as possible

Flood Alerts can be accessed online via the following:

- Three day flood risk forecast
- River and sea levels
- Floodline Warnings Direct - FREE flood warning service

- Flood warnings on Facebook
- Live Flood Warning map

7.6 Flood Alarm

In order to give additional warning to residents about the onset of flooding it is advised that a proprietary flood alarm system is incorporated into the development proposals, allowing residents to remove valuables and/or evacuate the site well in advance of any flooding onsite.

An example of a typical flood alarm system is depicted below:

Figure 6.7: Typical Flood Alarm

Source: Flood Safe

7.7 Evacuation Plan

Once a development plan has been developed and access routes established a robust evacuation plan should be formalised to ensure that all residents can evacuate the property well in advance of the onset of flooding.

Guidance on developing a Flood Plan has been attached within Appendix C.

8.0 Conclusions & Recommendations

The development boundary covers an area approximating 0.41 Hectares and is shown to be situated within Flood Zone's 2 and 3 of the Environment Agency Flood Map.

The primary flood sources are identified to be fluvial (Trawden Brook) and Pluvial (surface water).

The nearest watercourse to the development site is of Trawden Brook, which flows through the centre of the site.

There is no site specific topographical survey information available for the site, as such to progress the assessment, existing ground levels have been extracted from LIDAR data for the surrounding area.

Levels along the east of Trawden Brook boundary are shown to range from 174.000m AOD at the north up to 175.000 AOD at the north, and levels associated with the mill building west of Trawden Brook range from 174.500m AOD at the north up to 175.500m AOD at the south.

Pluvial:

Hazard rating calculations indicate that the surface water flood route presents a low hazard to people during the highest probability event, which increases to a moderate hazard with increased potential flood depths and flow velocities attributed to medium probability flood event, the hazard then increases to significant during the low probability event. As such it is highly recommended that a robust evacuation plan is devised and practised due to the vulnerability of end users.

Furthermore, mitigation measures adopted at the site will also be suitable to provide flood protection from surface water sources.

Fluvial:

Following evaluation of fluvial flooding of Trawden Brook the site will flood during all return periods from the 25-year event up to the 100 year + 70% climate change event and the 1000-year event, which corresponds well with the EA Flood Map, concluding that the risk associated with fluvial flooding within the site is considered to be medium and high.

Providing that finished floor levels for habitable dwellings are elevated 600mm above the 100 year + 70% climate change fluvial flood level the risk of surface water ingress into the building is considered to be low.

Drainage:

Following a non-intrusive desk top study infiltration at the site is not considered to be feasible, a review of Soilscape maps identifies the site to be located on land which is considered to be *slowly permeable seasonally wet acid loamy and clayey soils.*

Borehole logs taken from approximal 100m west of the site using the BGS online service identify that the ground comprises of clay and coal, as such the ground conditions suggest that they are not considered to be suitable for infiltration devices.

The nearest watercourse to the proposed development is Trawden Brook which flows through the centre of the site.

As such disposal of surface water to watercourse is considered the most feasible option due to the fact that the underlying ground seems to be unsuitable for the use of soakaways.

Consents:

Due to the watercourse being considered to be a Main River consent will be required from the Environment Agency must be undertaken prior to making a connection in accordance with the Land & Drainage Act 1991 & 1994, for any works within 8m of the river bank, including discharge of surface water runoff.

SUDS:

In this specific scenario permeable paving is not considered to be appropriate as flood water and silt can affect the porosity of the surface and prevent water from entering into the system.

On/offline storage is considered the most appropriate solution in terms of this site, due to lack of available space for soft landscaping SUDs.

Furthermore, the developer should consider source control methods such as green roofs and rain water harvesting.

Existing runoff rates have been calculated using the ICP SUDS method for the 1 year, 30 year and 100 year return periods as 6.5l/s, 10.9l/s and 11.9l/s.

Indicative attenuation volumes have been calculated restricting discharge rates to no more than greenfield runoff for the 100 year + 40% climate change as 78-144m^3, based on 65% impermeable area to allow for landscaping.

Foul from the east proportion of the site should be directed to the 225mm diameter public combined sewer located within Keighley Road via a pumped solution.

Foul from the west proportion of the site should be directed to the 375mm diameter public combined sewer located within Skipton Road.

Failing a connection to the public sewer a Package Treatment Plant could be located onsite with treated effluent directed to watercourse.

Site Constraints

- In accordance with the NPPF finished floor levels should be set to no less than 600mm In accordance with the NPPF finished floor levels should be set to no less than 600mm above the 100 year plus 70% climate change event.

- As such the finished floor level for the habitable part of any dwelling should be set to no less than: 175.256m AOD + 0.600m = **175.756m AOD**

- The site is located predominantly within Flood Zone 3, and therefore the displacement of flood water volume from the site resulting from development is likely to increase the flood risk for others. Therefore, careful consideration must be provided to the development type proposed for the site.

- Development Type:

    - Retained/Redeveloped Mill Building – non-habitable space/communal areas located at ground floor with living space restricted to first floor level and above.

  - New development – apartment building with flood void/undercroft at ground floor level, and habitable accommodation set at first floor level and above.
  - New development – town house style dwellings with non-habitable space such as garages set at ground floor level; and habitable accommodation at first flood level and above.

- During the design phase, boundary treatments should be carefully considered to ensure that existing flood routes are not impeded. Obstruction to established flood routes may have the potential to increase flood risk to others. As such it is recommended that boundary treatments comprise of vegetation/hedging and/or open style fencing.

- LIDAR Data suggests that the level on the bridge is 173.900m AOD, therefore during minor flood events the access is considered to be under water by a considerable depth e.g. 1.356m deep during the 100-year plus 70% climate change event and therefore should not be used.

- It is recommended that for the east part of the site, the emergency access and egress route should direct people towards the field north of the Rock Business Centre, and onto Keighley Road, as this would provide a direct route into Flood Zone 1.

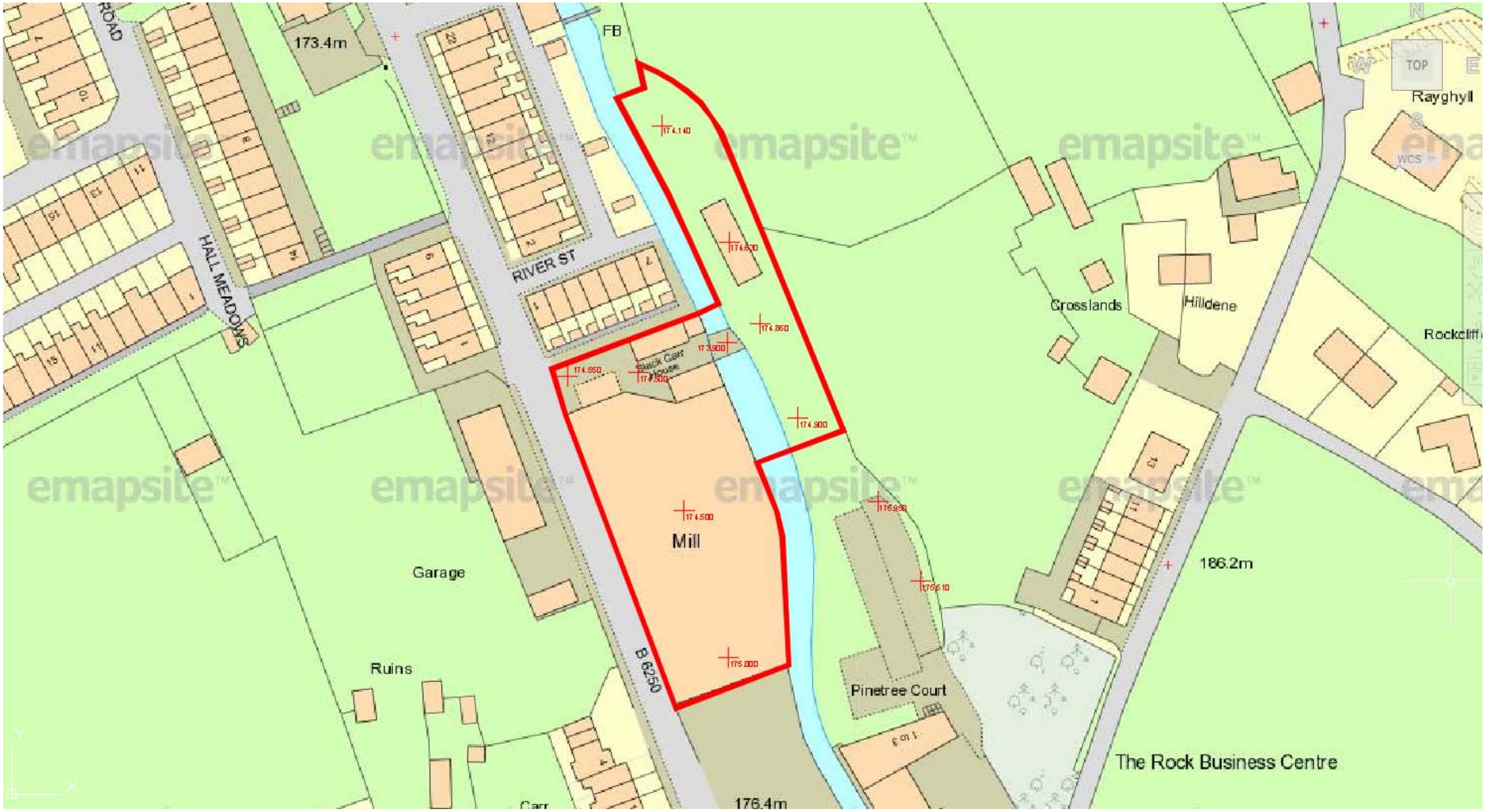
- It is recommended that residents in the west proportion of the site should exit the site prior to the onset of flooding south onto Church Street and into Flood Zone 1.

- It is concluded that secondary sources of flood risk i.e. groundwater; overland flows and artificial water sources present a low risk to the proposed development.

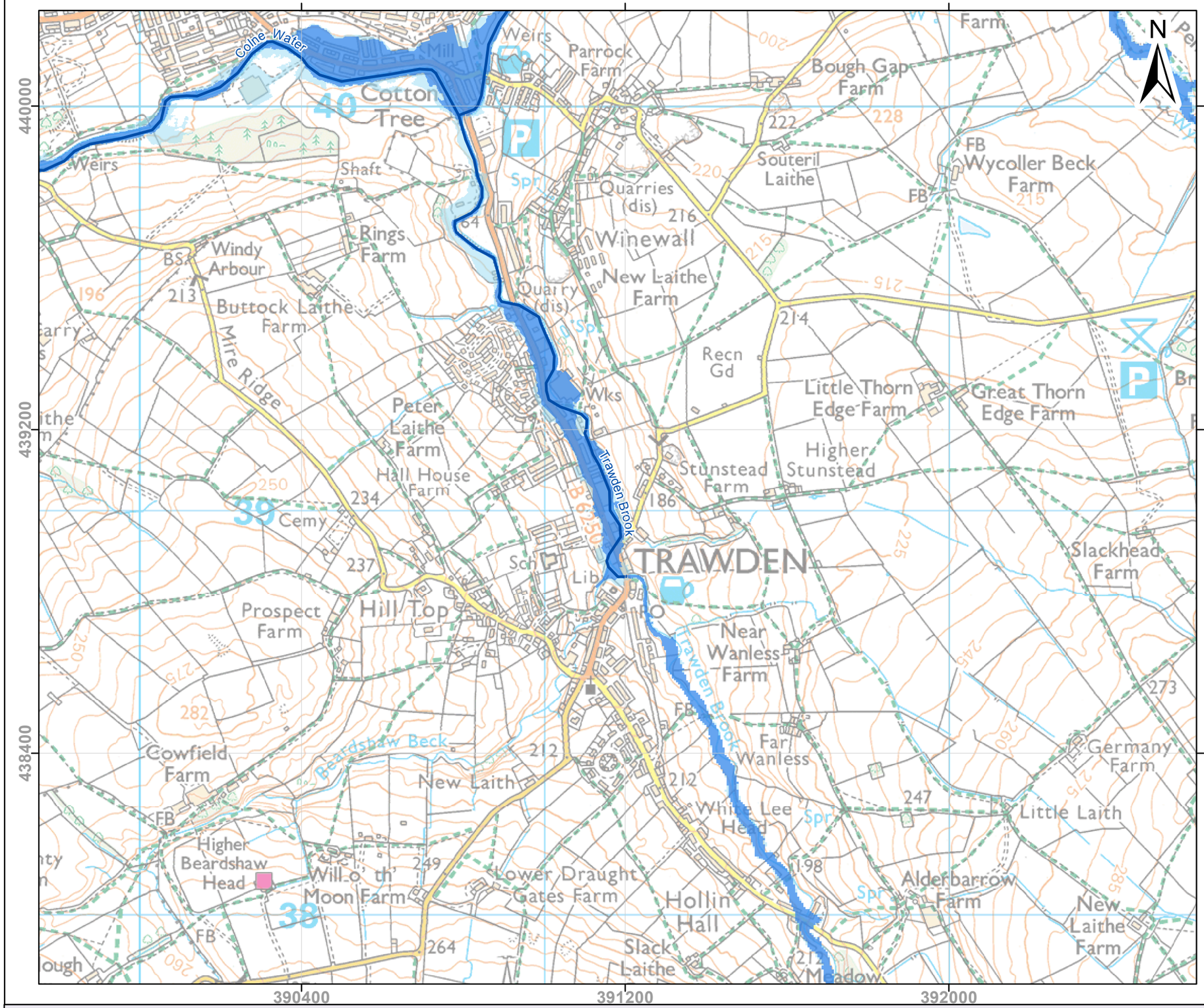
- A robust flood evacuation plan should be formultade to support planning application for residential development at the Black Carr Mill Site to ensure that all residents can safely evacuate to an area with a lower flood risk, well in advance of the onset of flooding.

APPENDICES

Appendix A: - LIDAR DATA


ROAD
173.4m
FB
RIVER ST
HALL MEADOWS
174.140
174.630
174.860
173.900
174.550
174.500
174.900
Mill
175.000
Garage
Ruins
B 6250
Carr
176.4m
Crosslands
Hillene
TOP
Rayghyll
WCS
Rockcliff
176.950
175.610
186.2m
Pinetree Court
The Rock Business Centre

Appendix B: - Environment Agency Data



Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Environment Agency

Flood Zones Map: Black Carr Mill, Trawden

Produced: 12 April 2018
Our Ref: CL81848
NGR: 391,181 439,033

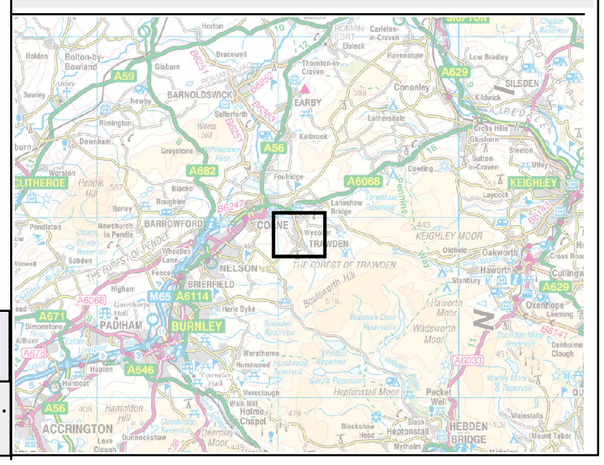
Key

- Main River
- Areas Benefitting from Defences
- Flood Zone 3
- Flood Zone 2

Flood Zone 3 shows the area that could be affected by flooding:
- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1.0% or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to 0.1% chance of occurring each year.

ABDs (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1.0% fluvial flood event.



Historic Flooding Map: Black Carr Mill, Trawden

Produced: 12 April 2018
Our Ref: CL81848
NGR: 391,181 439,033

Key

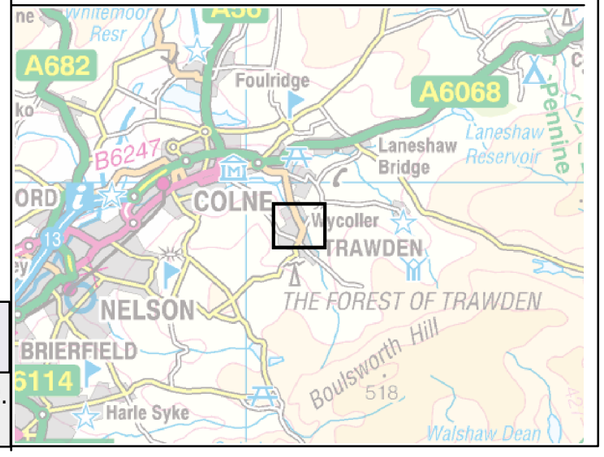
Main River

8 October 2010

Flood Zone 3 shows the area that could be affected by flooding:
- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1.0% or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to 0.1% chance of occurring each year.

ABDs (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1.0% fluvial flood event.



Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Historic Flooding Map: Black Carr Mill, Trawden

Produced: 16 April 2018
Our Ref: CL81848
NGR: 391,181 439,033

Key

- Wrack Marks
- Main River
- 26 December 2015

Flood Zone 3 shows the area that could be affected by flooding:
- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1.0% or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to 0.1% chance of occurring each year.

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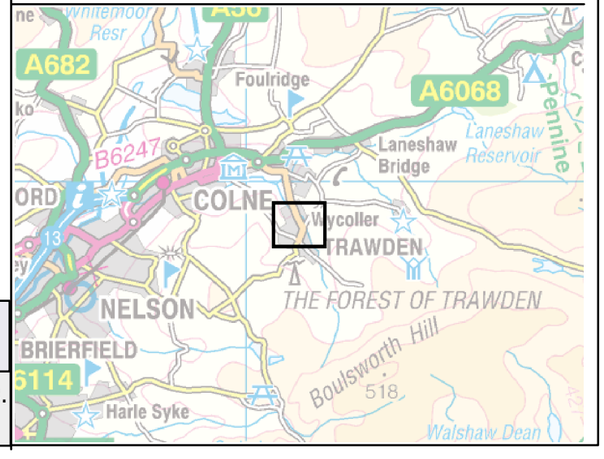

Wrack data given in mAOD (metres above ordnance datum)

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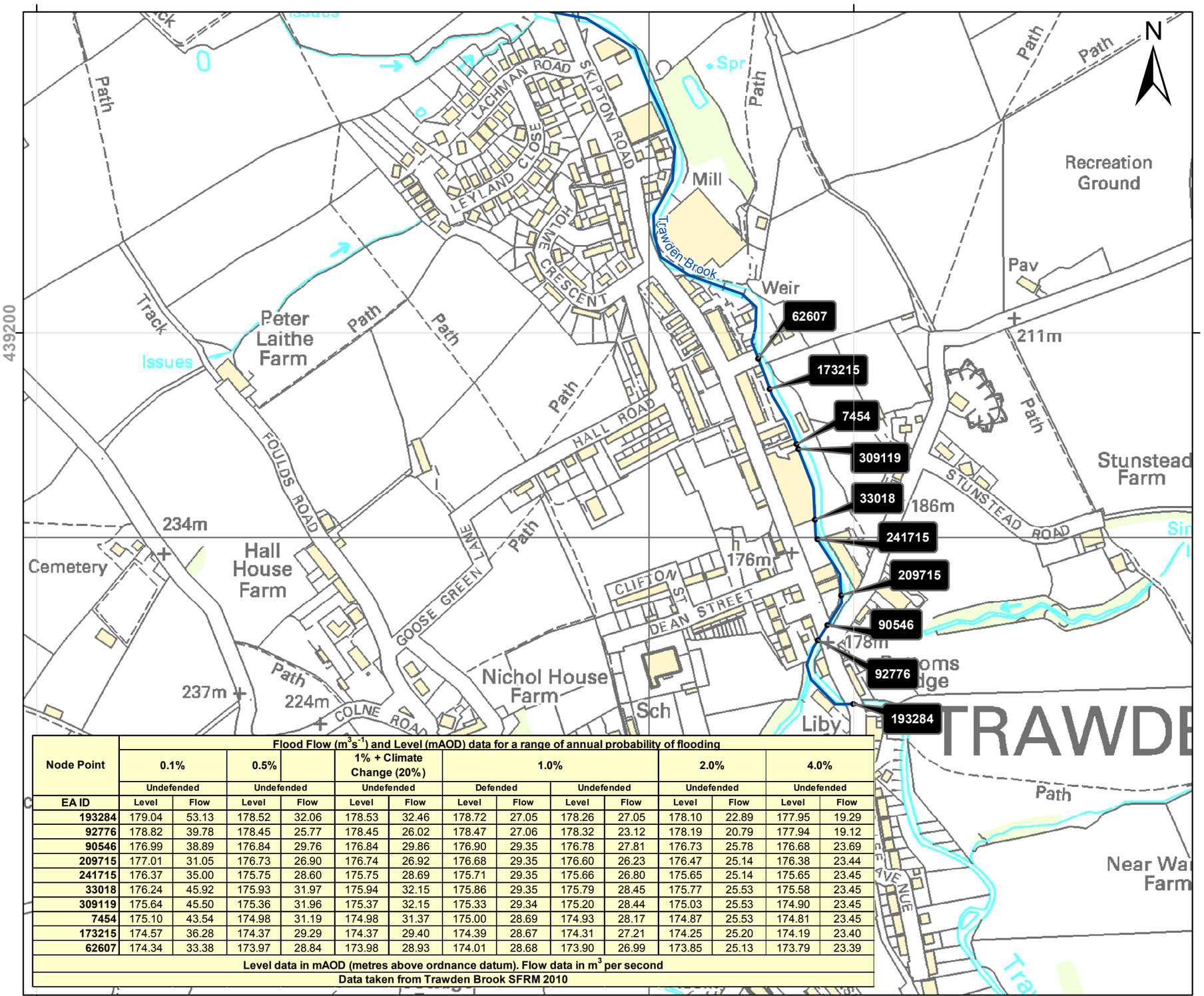

Node Point	Flood Flow (m^3s^{-1}) and Level (mAOD) data for a range of annual probability of flooding													
	0.1%		0.5%		1% + Climate Change (20%)		1.0%				2.0%		4.0%	
	Undefended		Undefended		Undefended		Defended		Undefended		Undefended		Undefended	
EA ID	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
193284	179.04	53.13	178.52	32.06	178.53	32.46	178.72	27.05	178.26	27.05	178.10	22.89	177.95	19.29
92776	178.82	39.78	178.45	25.77	178.45	26.02	178.47	27.06	178.32	23.12	178.19	20.79	177.94	19.12
90546	176.99	38.89	176.84	29.76	176.84	29.86	176.90	29.35	176.78	27.81	176.73	25.78	176.68	23.69
209715	177.01	31.05	176.73	26.90	176.74	26.92	176.68	29.35	176.60	26.23	176.47	25.14	176.38	23.44
241715	176.37	35.00	175.75	28.60	175.75	28.69	175.71	29.35	175.66	26.80	175.65	25.14	175.65	23.45
33018	176.24	45.92	175.93	31.97	175.94	32.15	175.86	29.35	175.79	28.45	175.77	25.53	175.58	23.45
309119	175.64	45.50	175.36	31.96	175.37	32.15	175.33	29.34	175.20	28.44	175.03	25.53	174.90	23.45
7454	175.10	43.54	174.98	31.19	174.98	31.37	175.00	28.69	174.93	28.17	174.87	25.53	174.81	23.45
173215	174.57	36.28	174.37	29.29	174.37	29.40	174.39	28.67	174.31	27.21	174.25	25.20	174.19	23.40
62607	174.34	33.38	173.97	28.84	173.98	28.93	174.01	28.68	173.90	26.99	173.85	25.13	173.79	23.39

Level data in mAOD (metres above ordnance datum). Flow data in m^3 per second

Data taken from Trawden Brook SFRM 2010

Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

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Environment Agency

Fluvial Flood Levels Map: Black Carr Mill, Trawden

Produced: 12 April 2018
Our Ref: CL81848
NGR: 390,959 439,033

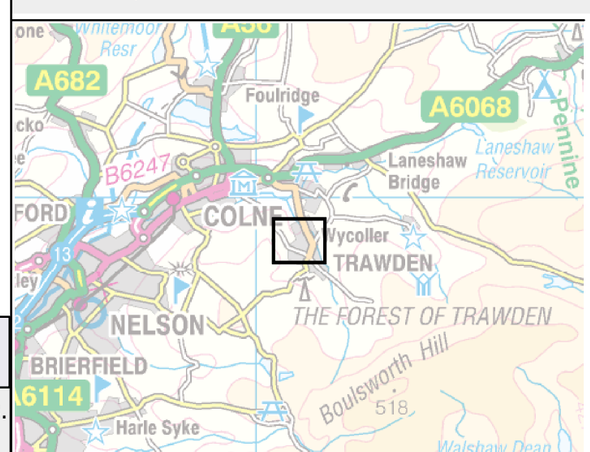
Key

- Node Points
- Main River

Flood Zone 3 shows the area that could be affected by flooding:
- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1.0% or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to 0.1% chance of occurring each year.

ABDs (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1.0% fluvial flood event.



Modelled Flood Outlines Map: Black Carr Mill, Trawden

Produced: 12 April 2018
Our Ref: CL81848
NGR: 390,959 439,033

Key

Fluvial Undefended Scenario
20.0% Annual Probability of Flooding

Main River

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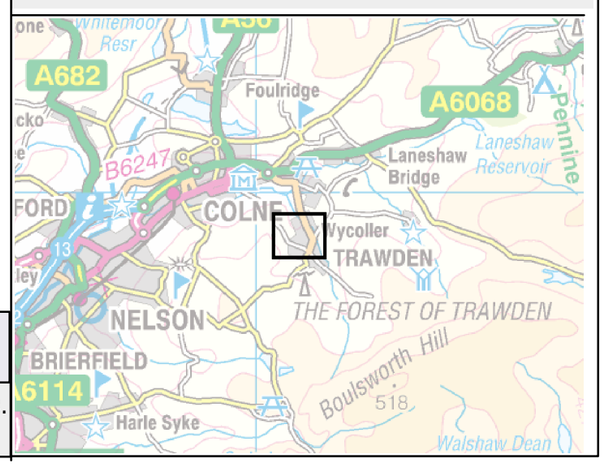

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Modelled Flood Outlines Map: Black Carr Mill, Trawden

Produced: 12 April 2018
Our Ref: CL81848
NGR: 390,959 439,033

Key

Fluvial Undefended Scenario 4.0% Annual Probability of Flooding

Main River

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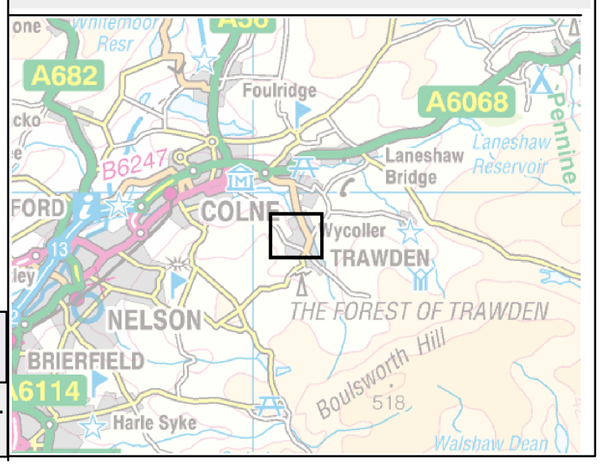

Data taken from Trawden Brook SFRM 2010

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Modelled Flood Outlines Map: Black Carr Mill, Trawden

Produced: 12 April 2018
Our Ref: CL81848
NGR: 390,959 439,033

Key

Fluvial Undefended Scenario 2.0% Annual Probability of Flooding

Main River

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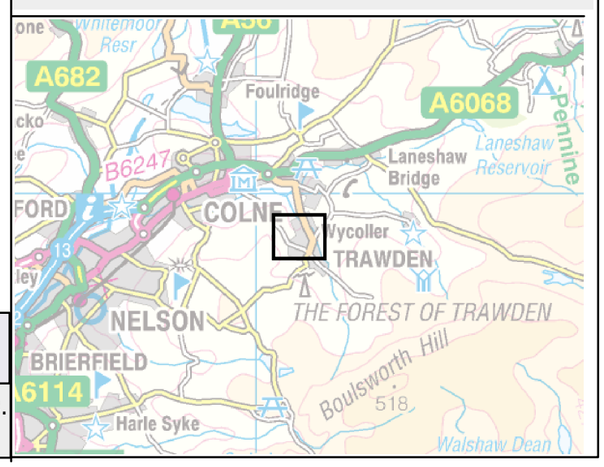

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Modelled Flood Outlines Map: Black Carr Mill, Trawden

Produced: 12 April 2018
Our Ref: CL81848
NGR: 390,959 439,033

Key

Fluvial Defended Scenario 1.0% Annual Probability of Flooding

Main River

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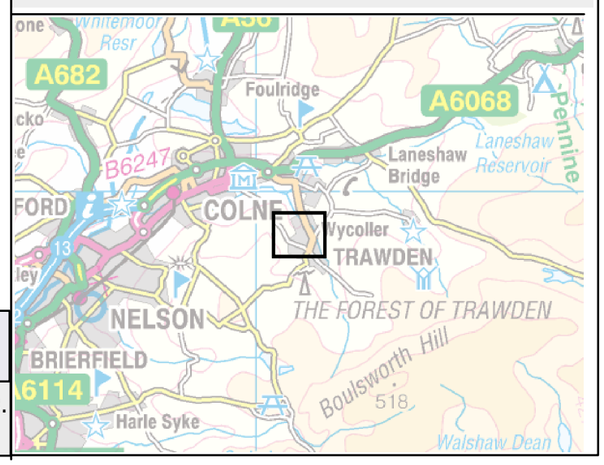

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Modelled Flood Outlines Map: Black Carr Mill, Trawden

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Key

Fluvial Undefended Scenario 1.0% Annual Probability of Flooding

Main River

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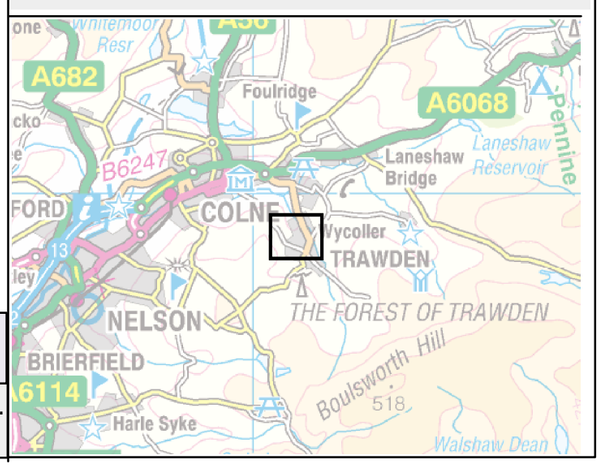

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Modelled Flood Outlines Map: Black Carr Mill, Trawden

Produced: 12 April 2018
Our Ref: CL81848
NGR: 390,959 439,033

Key

Fluvial Undefended Climate Change (+20%) Scenario 1.0% Annual Probability of Flooding

Main River

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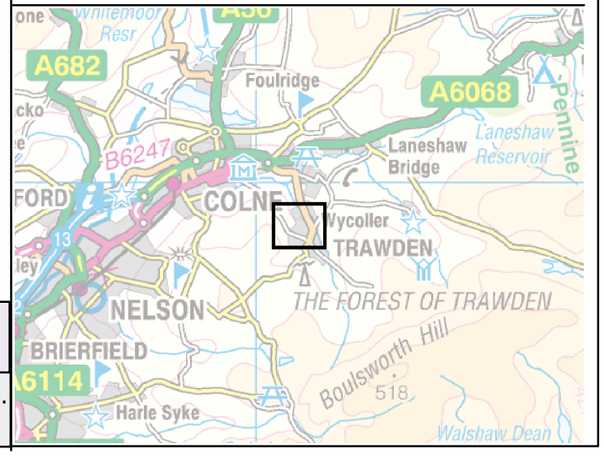

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Modelled Flood Outlines Map: Black Carr Mill, Trawden

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Our Ref: CL81848
NGR: 390,959 439,033

Key

Fluvial Undefended Scenario 0.5% Annual Probability of Flooding

Main River

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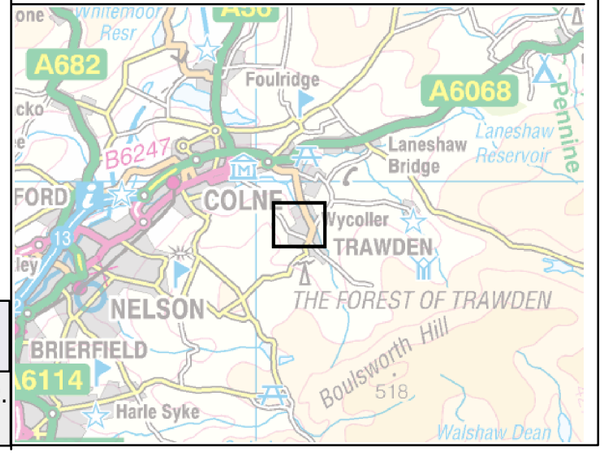

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Modelled Flood Outlines Map: Black Carr Mill, Trawden

Produced: 12 April 2018
Our Ref: CL81848
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Key

Fluvial Undefended Scenario 0.1% Annual Probability of Flooding

Main River

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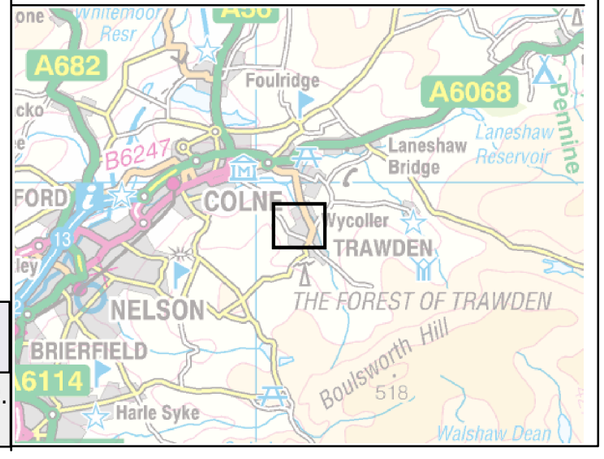

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Appendix C: -Flood Plan Guidance

Environment Agency

flooding- minimising the risk

Flood plan guidance for communities and groups

Practical advice to help you create a flood plan

We are the Environment Agency. It's our job to look after your environment and make it a better place – for you, and for future generations.

Your environment is the air you breathe, the water you drink and the ground you walk on. Working with business, Government and society as a whole, we are making your environment cleaner and healthier.

The Environment Agency. Out there, making your environment a better place.

Published by:

Environment Agency
Horizon House,
Deanery Road,
Bristol BS1 5AH
Tel: 0870 8506506
Email: enquiries@environment-agency.gov.uk
www.environment-agency.gov.uk

October 2012

LIT 5286 / 643_12

Why you should read this guidance

Understanding the risk of flooding and preparing for it now will help save lives and minimise the damage and distress flooding can cause.

Working together as a community or group will help you respond quickly and efficiently in a flood.

Who is this guidance for?

This guidance is for anyone involved in supporting communities or groups to improve their ability to plan for a flood.

This could be:

- people active in the local community;
- leaders of community groups;
- schools, hospitals or residential care homes;
- local responders;
- people working in the voluntary sector.

As well as any other interested members of the community.

This guidance outlines things to consider and steps that you can take to inspire and involve residents, local communities and groups to work together to improve how you prepare for the risk of flooding.

Contents

The importance of planning

Having a flood plan forms an important part of your community emergency plans. There are other situations for which you might require an emergency plan, such as pandemic flu, extreme hot and cold weather, and transport problems. Recovery from any emergency can be a complex and long-running process.

By planning in advance, you will not only be better prepared to respond in an emergency, but you will be better equipped to recover in the long-term.

The benefits of flood plans

Working together as a community or group to complete a plan will help you respond quickly when flooding happens. It can help you decide what practical actions to take before and during a flood, helping reduce the damage flooding can cause. Don't wait until it happens, you may not have time.

Being prepared in an emergency can help to reduce stress, panic and avoid loss of life.

Information to help you get started

First steps

The Civil Contingencies Secretariat (CCS) within the Cabinet Office works in partnership to enhance the UK's ability to prepare for, respond to, and recover from, emergencies.

It provides lots of information on community resilience, as well as tools and products that may help you develop your community emergency plan, including a useful guide, *Preparing for Emergencies – Guide for Communities*. It will help you think about how you can help your community be prepared for an emergency, including flooding.

Visit the CCS website for guidance and information on developing a community emergency plan – including a template – **www.cabinetoffice.gov.uk/content/community-resilience**

Developing your flood plan

To help you develop a plan, we have provided a template that you can use and amend. You can dowload the template from our website www.environment-agency.gov.uk/homeandleisure/floods/38329.aspx.

You should describe how information will be supplied, received and recorded during a flood. Include:

- details of local flood co-ordination centre;
- means of reporting incidents;
- location of emergency evacuation rest centres;
- methods of passing on information, for example, notice boards;
- details about the areas at risk.

You can use and modify this template to suit your needs. Try to keep your plan simple – there's no need for it to be long and complicated.

And remember that building relationships and ways of communicating can be as important as the plan itself.

Your guide to completing the template

Step 1 (Section 1 A of the template)

From the information you have available make a list of the areas that flood and the level of warning each area would receive.

Information on flood warnings and codes can be found in Appendix 1.

1 Locations at risk of flooding **A** **Flood warnings**

From the information you have available make a list of areas liable to flood and the level of warning which would affect them.

Area number	Location at risk	Trigger level	Actions
Area 1	Brook Terrace	Flood Alert	Call the Environment Agency's Floodline (0845 988 1188) for more information using the quickdial number XXXXX

Step 2 (Section 1 B of the template)

Floods can happen anywhere at any time. They're caused by rising ground water levels, burst water drains, rainwater running off hillsides as well as flooding from rivers and the sea. Even if you live miles away from the coast or a river, there's still a chance flooding could affect you. The most common sources of flooding are explained in Appendix 2.

Investigate the range and extent of flooding in your area. You should consider the timing and direction of flooding (flow route). Often, the source of flooding is not immediately obvious; check local drainage and small watercourses. Find out about previous flooding in your area. Sources of information include the Environment Agency, your council and local library archives. Local knowledge, particularly from long-standing residents, is invaluable.

Add the details of areas at risk from flooding and the direction of flooding into your plan. Include maps and if possible details of existing flood schemes.

1 Actions to be taken before a flood **B** **Locations at risk of flooding / Source of flooding**

Insert details of areas at risk from flooding and the direction of flooding. Include maps and if possible details of existing defences.

Area number	Location at risk	Source of flooding	Direction of flooding
Area 1	Brook Terrace	River	Water flows down footpath Via High Street (B313)

Step 3 (Section 2 A of the template)

Prepare in advance

With careful planning, you can take action to help reduce the impact of flooding. For example placing floodboards across openings, blocking airbricks, creating sandbag walls or temporary defence systems. It is impossible to completely flood-proof a property but there are lots of things you can do to reduce flood damage.

You can find more information on preparing your property for flooding on our website - **www.environment-agency.gov.uk/flood**

Some people may need help or support to prepare for flooding. As part of your flood planning, we recommend you think about who may need help and who you can ask for assistance before, during and after a flood.

2 Actions to be taken during a flood **A** Local flood actions

Identify local flood actions

Area number	Location at risk	Action / trigger	Local action	Equipment required	Time required
Area 1	Brook Terrace	Flood warning	Block the flow route where the footpath joins the High Street	Sandbags and polythene sheeting	1 hour and 30 min
Area 2					

Step 4 (Section 2 B of the template)

Compile a list of local volunteers/flood wardens who can be contacted in an incident. The CCS emergency plan toolkit has information on how you can assess skills and resources for these volunteer roles.

In a flood, volunteers may need to help people move furniture and other possessions so they should be reasonably active or fit. Consider using other volunteers as communicators, administrators or to help people who may need extra support during an incident. These volunteers could be registered on our Floodline Warnings Direct (FWD) service so they receive flood warnings.

Flood water is dangerous. Remember that you should not put yourself or others at risk. The emergency services are responsible for ensuring public safety and co-ordinating the incident response.

Step 5 (Section 2 C of the template)

Make a list of important telephone numbers so all the information you need during an incident is readily available.

Names and contact phone numbers need to be listed and made available to all potential emergency team members within your community. Once the list is prepared, it's also important that someone is given the task of updating any changes to the team. Members of your group will probably be first on the list and be allocated tasks, for example, phoning external agencies and local contacts, or alerting vulnerable residents. It is vital that the flood plan outline is discussed with the relevant individuals and organisations including your council, local Environment Agency office, landowners and water companies.

2 Actions to be taken during a flood **C** Important telephone numbers

Make a list of important telephone numbers so all the information you require during an incident is readily available.

Organisation	Telephone (office hours)	Telephone (out of hours)	Fax
Floodline	0845 988 1188	0845 988 1188	
Environment Agency			

Step 6 (Section 2 D of the template)

It's really important that you are aware of the actions taken by all organisations that respond to flooding. This will help you contact the correct organisation when you need help. Details of who does what during a flood is available in Appendix 3. Identify the resources available to you and your community.

2 Actions to be taken during a flood **D** Available resources

Identify available resources.

Organisation	Resource	Number	Location	Notes
Local Health Centre/Doctors Surgery Contact Details: Dr Knott tel no: Mrs Clark tel no:	Evacuation centre	The health centre can hold up to 100 people. Anyone evacuated should take with them: warm clothing, a torch, food, drink, medication, children's toys and pets requirements etc	The health centre is situated on the outside of the flood risk area and access to the surgery can be made without driving or walking through floodwater.	Dr Knott and Mrs Clark are both key holders to the health centre
Local storage facility? District Council Contact details:	Sandbags, shovels, polythene sheeting, floodboards, torches etc		Local shopkeepers store	Shopkeeper has provided a key for access to equipment in his/her absence

Step 7 (Section 2 E of the template)

Details of specific arrangements between the various authorities can be included within this section of the template.

Step 8 (Section 2 F of the template)

Certain groups, the elderly or infirm for example, may require assistance in a flood. You should establish who these people are and what their needs are in advance. Encourage people who may need more time during a flooding event to prepare now. In an emergency these people may, for example, need help obtaining medicine/supplies or need help to secure their property.

Some locations may be more vulnerable than others. Identify properties which may flood first. Any schools, residential care homes or campsites in your area may require assistance or an early warning. We recommend that people in charge of such properties should also develop their own flood plan.

List vulnerable people, properties and locations where early assistance may be required. The CCS toolkit gives more information on how to gather information and how to find out about your vulnerable community members. This can be found at www.cabinetoffice.gov.uk/content/community-resilience

Step 9 (Section 3 A of the template)

Make a list of reputable contractors who may be required after a flood.

After a flood, be careful of bogus trade people calling door-to-door. Always check references and do not pay in advance.

How will you know when to activate your plan?

The Environment Agency offers a free flood warning service in many areas at risk of flooding from rivers and the sea. FWD gives you an advance warning for your area by telephone, mobile, fax, text message or email. All you need to register is a telephone number that we can use to send you flood warnings at any time of the day or night.

Flood warnings are not available in every area. Find out if you can receive flood warnings for your area by calling Floodline, our 24-hour telephone information service, on **0845 988 1188** or going online at **www.environment-agency.gov.uk/flood**.

You can also get up to date information about potential flooding or flood warnings for your area by:

- calling Floodline and asking for a quick-dial number that will give you direct access to recorded flood warnings for your local area;
- visiting our website (**www.environment-agency.gov.uk/flood**) for flood risk forecasts, live flood warnings and alerts;
- listening to local radio and TV for weather information.

If flood warnings are not available for your area

If there is no flood warning service available for your area, then you need to have your own system in place for activating your plan. The following points should help to establish when to activate your plan:

- use local information and observations. You are the local experts and will know, for instance, whether the river responds rapidly or not to heavy rainfall;
- the plan should be activated when river levels are approaching bank full. If the river responds rapidly, you may need to set a lower level as your trigger point;
- consider putting a depth marker by the river to help gauge levels. A marker will help confirm whether the river is rising or falling. Alternatively use an existing structure such as a bridge or other local reference on the river that shows you when the river is getting to dangerous levels;
- decide what level the water needs to reach in order for you to activate your plan and write this in your flood plan.

We can advise you on monitoring techniques and flood warning methods. If you need help with flood warning arrangements ring your local Environment Agency office.

Raise awareness and promote your plan

You have worked hard to help prepare the community, so you should let them know the flood plan exists. Consider promoting the plan at local meetings, through parish newsletters, leaflets, drop-ins in affected areas, through the local press or at flood exhibitions.

We may be able to help you raise awareness and promote your plan. Call 03708 506 506* (Mon-Fri, 8am - 6pm) and ask to be put through to your local Flood Resilience team.

Remind local residents that they have a responsibility to prepare and protect their lives and property. Encourage them to check to see if they can receive a flood warning, and to develop their own personal flood plan, including preparing for possible evacuation. A template for producing a personal flood plan can be found on our website here www.environment-agency.gov.uk/homeandleisure/floods/38329.aspx.

Test your flood plan

The next step is to see if your plan works. You could ask your local Environment Agency office and local authority to help you carry out a simulated flooding event. This would also help to check that communications are correctly set up and that contact numbers are up to date.

Keep your plan up to date

Your plan has been designed and developed by you and your community. It belongs to you and not the Environment Agency or your local council. You will need to ensure that the details in your plan are checked and updated regularly so that all details remain up to date with current contact numbers.

Where to get further information

Web links:

- Civil Contingencies Secretariat - information and tools **www.cabinetoffice.gov.uk/content/community-resilience**
- National Flood Forum **www.floodforum.org.uk/**
- Flood Group UK – a Facebook community for people and community groups affected by or at risk of flooding **www.facebook.com/floodgroupuk**
- Health Protection Agency **www.hpa.org.uk/flooding**
- Your council – list of councils available here **www.direct.gov.uk/localcouncils**

Other publications:

- Living on the edge **https://publications.environment-agency.gov.uk/PDF/FLHO0912BWUP-E-E.pdf**
- What to do before, during and after a flood **https://publications.environment-agency.gov.uk/pdf/flho1110btfk-e-e.pdf**
- Prepare your property for flooding **http://publications.environment-agency.gov.uk/pdf/GEHO1009BRDL-e-e.pdf**

*Calls to 03 numbers cost no more than a national rate call to an 01 or 02 number and must count towards any inclusive minutes in the same way as 01 and 02 calls. These rules apply to calls from any type of line including mobile, BT, other fixed line or payphone.

ONLINE FLOOD RISK FORECAST

Meaning

Be aware.

Keep an eye on the weather situation.

General advice

- Check weather conditions.
- Check for updated flood forecasts on the Environment Agency website.

FLOOD ALERT

Meaning

Flooding is possible

Be prepared.

General advice

- 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.

FLOOD WARNING

Meaning

Flooding is expected.

Immediate action required.

General advice

- 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.

SEVERE FLOOD WARNING

Meaning

Severe flooding.

Danger to life.

General advice

- Stay in a safe place with a means of escape.
- Be ready should you need to evacuate.
- Co-operate with the emergency services.
- Call 999 if you are in immediate danger.

WARNING NO LONGER IN FORCE

Meaning

No further flooding is currently expected in your area.

General advice

- Be careful. Flood water may still be around for several days.
- If you've been flooded, ring your insurance company as soon as possible.

Understanding different sources of flooding

Floods can happen anywhere at any time, caused by rising ground water levels, burst water drains, rainwater running off hillsides as well as flooding from rivers and the sea.

Even if you live miles away from the coast or a river, there's still a chance flooding could affect you.

The most common sources of flooding are:

- **River flooding** happens when a watercourse cannot cope with the water draining into it from the surrounding land. This can happen, for example, when heavy rain falls on an already waterlogged catchment.
- **Coastal flooding** results from a combination of high tides and stormy conditions. If low atmospheric pressure coincides with a high tide, a tidal surge may happen which can cause serious flooding.
- **Surface water flooding** happens when heavy rainfall overwhelms the drainage capacity of the local area. It is difficult to predict and pinpoint, much more so than river or coastal flooding.
- **Sewer flooding** happens when sewers are overwhelmed by heavy rainfall or when they become blocked. The likelihood of flooding depends on the capacity of the local sewerage system. Land and property can be flooded with water contaminated with raw sewage as a result. Rivers can also become polluted by sewer overflows.
- **Groundwater flooding** results from water levels in the ground rising above surface levels. It is most likely to occur in areas situated over permeable rocks, called aquifers. These can be extensive, regional aquifers, such as chalk or sandstone, or may be more local sand or river gravels in valley bottoms underlain by less permeable rocks. This is not a significant source of flooding in Wales.
- **Reservoir flooding.** Some reservoirs hold large volumes of water above ground level, contained by walls, or 'dams'. Although the safety record for reservoirs is excellent, it is still possible that a dam could fail. This would result in a large volume of water being released very quickly.

Who does what during a flood?

This lists the principle actions of each organisation. It may not always be possible for all actions to be carried out during a flood event.

Responding organisations have limited resources so may not be able to provide assistance in all circumstances. In such cases the owners and occupiers need to be aware that they should make their own arrangements to protect their property from flooding. This should be clearly stated in the plan.

Environment Agency

- issues flood warnings for flooding from rivers, the sea and groundwater;
- receives and records details of flooding incidents;
- monitors the situation and advises other organisations;
- deals with emergency repairs and blockages on main rivers and own structures;
- responds to pollution incidents;
- advises on waste disposal issues.

County Council and Unitary Authority

- co-ordinates emergency arrangements;
- maintains safe conditions on the roads;
- puts flood warning signs on the highway;
- organises road closures and traffic diversions;
- clears blockages on highway drainage systems;
- may take action to protect property from flooding by water from the highway where there is a failure of the highway drainage system.

Lead Local Flood Authorities (LLFA)

- leads the co-ordination of flood risk management in their areas;
- develops local flood risk management strategies for local sources of flooding;
- manages surface water and groundwater flooding;
- maintains a register of structures or features which have a significant effect on flood risk in their area;
- investigates flooding incidents in its area.

District Council

- co-ordinates emergency response for its own area;
- issues flood warnings (by local agreement with Environment Agency);
- provides emergency assistance including providing sandbags;
- clears blocked watercourses (Land Drainage Act powers);
- deals with environmental health issues ,including pollution;
- clears blocked road channels and gully gratings and street cleaning;
- runs emergency planning support groups.

Town and Parish Council
- issues flood warnings (by local agreement with Environment Agency);
- some distribute sandbags.

Police
- takes an overall co-ordination role during an incident.

Fire and Rescue Service
- responds to all emergency incidents as required;
- assists the public where a need is identified and the use of Fire Service personnel and equipment is required.

Water companies
- clears blockages in public sewers;
- may take action to protect property from flooding by water from the public water mains or discharges from the public sewerage systems.

Electricity, gas and telecommunication companies
- attends to emergencies relating to their service at properties where life is at risk as a result of flooding;
- attends to flooding emergencies at their own serviced installations.

Large industrial companies
- protects own premises and installations;
- provides resources which could be hired.

Property owners
- moves to a safe area if life at risk;
- prevents water from entering property if possible;
- switches off electricity and gas supplies at mains;
- moves valuable possessions above areas liable to be flooded.

Flood plan co-ordinator
- is aware of the current situation;
- contacts flood wardens or volunteers and advises on actions to prepare for flooding;
- liaises with the local authority, Environment Agency and other organisations;
- updates the flood wardens if the situation changes;
- maintains emergency contacts.

Flood wardens/volunteers
- acts on the advice received from the flood plan co-ordinator or their assistant;
- puts flood protection measures in place;
- helps and advises vulnerable people and helps move them to safety early if required;
- informs the community of the situation and advises them to prepare by moving cars, putting sandbags or floodboards in place etc.

Would you like to find out more about us, or about your environment?

Then call us on

03708 506 506* (Mon-Fri, 8am - 6pm)

email

enquiries@environment-agency.gov.uk

or visit our website

www.environment-agency.gov.uk

incident hotline 0800 80 70 60 (24hrs)
floodline 0845 988 1188

***Calls to 03 numbers cost no more than a national rate call to an 01 or 02 number and must count towards any inclusive minutes in the same way as 01 and 02 calls. These rules apply to calls from any type of line including mobile, BT, other fixed line or payphone.**

Environment first: Are you viewing this on-screen? Please consider the environment and only print if absolutely necessary. If you're reading a paper copy, please don't forget to reuse and recycle if possible.

LIT 5286

Personal flood plan

Name

Environment Agency

Are you signed up to receive flood warnings?
If not call Floodline on 0345 988 1188 to see if your area receives free flood warnings.

Let us know when you've completed your flood plan by calling Floodline on **0345 988 1188.** This will help us learn more about how people are preparing for flooding.

General contact list	Company name	Contact name	Telephone
Floodline	Environment Agency		0345 988 1188
Electricity provider			
Gas provider			
Water company			
Telephone provider			
Insurance company and policy number			
Local council			
Local radio station			
Travel/weather info			

Key locations

Service cut-off	Description of location
Electricity	
Gas	
Water	

Who can help/who can you help?

Relationship	Name	Contact details	How can they/you help?
Relative			
Friend or neighbour			

Be prepared for flooding. Act now

Personal flood plan

What can I do NOW?

Environment Agency

- Put important documents out of flood risk and protect in polythene ☐
- Check your insurance covers you for flooding ☐
- Look at the best way of stopping floodwater entering your property ☐
- Make a flood plan and prepare a flood kit ☐
- Find out where you can get sandbags ☐
- Identify who can help you/ who you can help ☐
- Identify what you would need to take with you if you had to leave your home ☐
- Understand the flood warning codes ☐

What can you do if a flood is expected in your area?

Actions	Location
Home	
• Move furniture and electrical items to safety	
• Put flood boards, polythene and sandbags in place	
• Make a list now of what you can move away from the risk	
• Turn off electricity, water and gas supplies	
• Roll up carpets and rugs	
• Unless you have time to remove them hang curtains over rods	
• Move sentimental items to safety	
• Put important documents in polythene bags and move to safety	
Garden and outside	
• Move your car out of the flood risk area	
• Move any large or loose items or weigh them down	
Business	
• Move important documents, computers and stock	
• Alert staff and request their help	
• Farmers move animals and livestock to safety	
Evacuation - Prepare a flood kit in advance	
• Inform your family or friends that you may need to leave your home	
• Get your flood kit together and include a torch, warm and waterproof clothing, water, food, medication, toys for children and pets, rubber gloves and wellingtons	

There are a range of flood protection products on the market to help you protect your property from flood damage. A directory of these is available from the **National Flood Forum** at **www.bluepages.org.uk**

Be prepared for flooding. Act now

GEHO0709BQPU-E-E

Appendix D: - United Utilities Sewer Records

How to contact us:

United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

Flood Risk Consultancy Ltd

c54 Northbridge House
c54 Northbridge House, Elm Street
Burnley, Lancashire
BB10 1PD

FAO:

Your Ref: DM005
Our Ref: UUPS-ORD-36591
Date: 11/06/2018

Dear Sirs

Location: black carr mill

I acknowledge with thanks your request dated 08/06/2018 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. http://www.unitedutilities.com/work-near-asset.aspx .

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please contact us .

Yours Faithfully,

Karen McCormack
Property Searches Manager

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

TERMS AND CONDITIONS - WASTERWATER AND WATER DISTRIBUTION PLANS

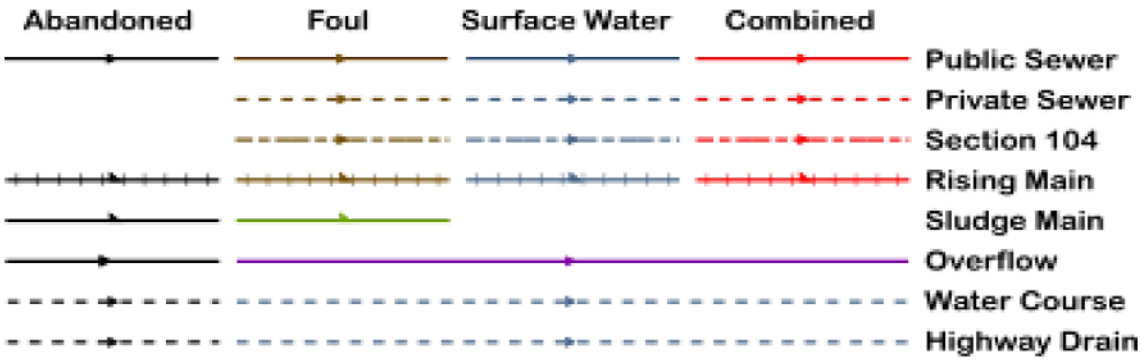
These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

TERMS AND CONDITIONS:

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.

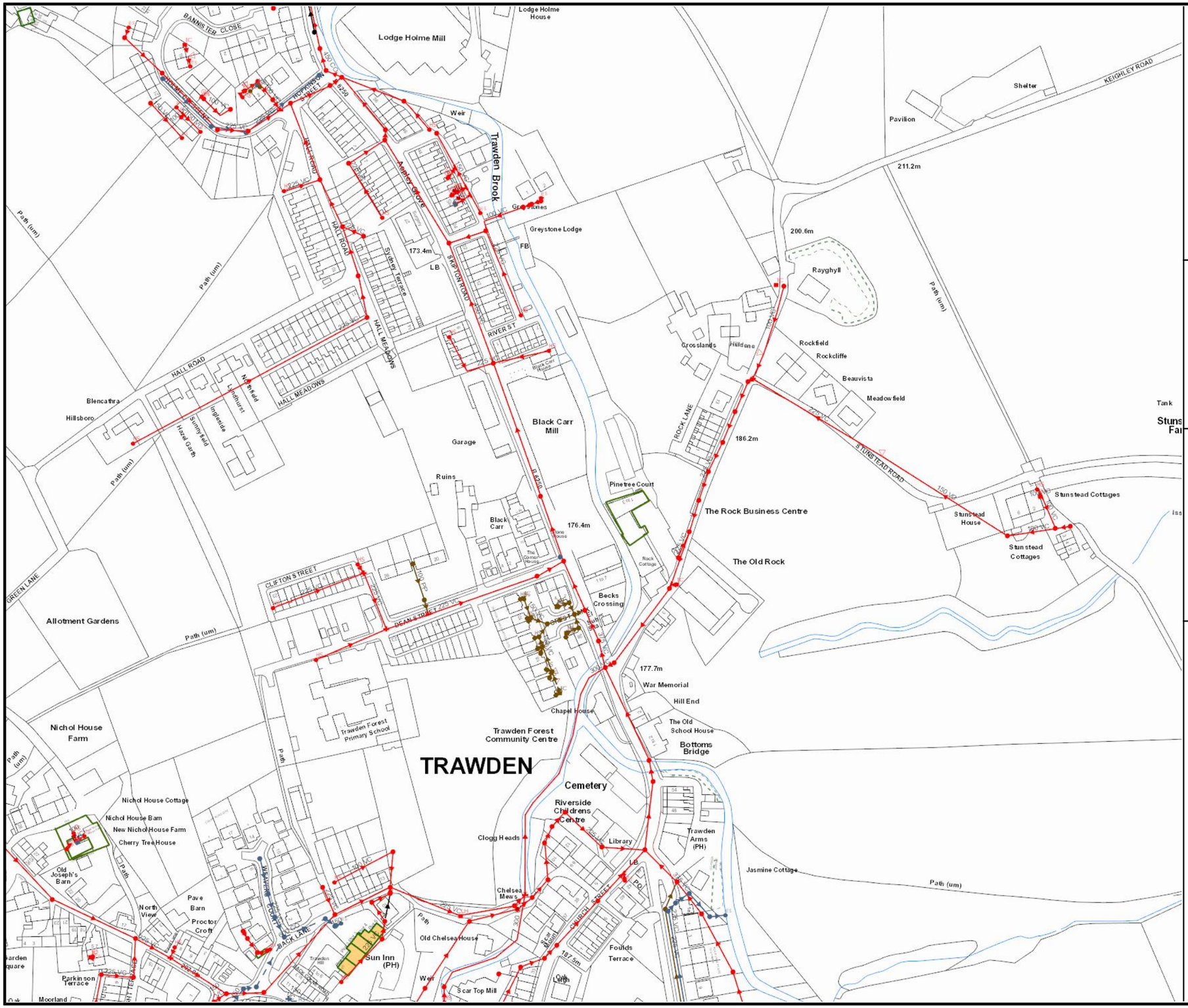
United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

Wastewater Symbology



All point assets follow the standard colour convention: red – combined, brown - foul, blue – surface water, purple - overflow

- Manhole
- HS Head of System
- ES Extent of Survey
- RE Rodding Eye
- IN Inlet
- DP Discharge Point
- HY Vortex
- PE Penstock
- WO Washout Chamber
- VA Valve
- AV Air Valve
- NRV Non Return Valve
- SO Soakaway
- GU Gully
- CA Cascade
- FM Flow Meter
- HA Hatch Box
- OI Oil Interceptor
- SM Summit
- DS Drop Shaft
- OP Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- IC Inspection Chamber
- Bifurcation Chamber
- LH Lamp Hole
- T Junction / Saddle
- CA Catchpit
- VC Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- T Network Storage Tank
- V Sewer Overflow
- WwTW Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- CK Control Kiosk
- Change of Characteristic



United Utilities
helping life flow smoothly

SEWER RECORDS

Address or Site Reference

black carr mill,

Scale: 1:2500
Date: 11/06/2018

Printed by: Property Searches

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.