Flood Risk Assessment for Planning

Prepared for:
Mannan Iqbal

May 2021

Location:
49 -51 Colne Road
Huddersfield
HD1 3AY

Our reference:
90579-Iqbal-ColneRd

Unda Consulting Limited, Southpoint, Old Brighton Road, Gatwick, West Sussex, RH11 0PR
+44 (0) 1293 214 444
enquiries@unda.co.uk

Document Issue Record

Project:	Flood Risk Assessment for Planning
Client:	Mannan Iqbal
Location:	49 -51 Colne Road, Huddersfield, HD1 3AY
Application:	Change of use from 2 residential dwellings to 2 shops on the ground floor and 2 x flats above
Our reference:	90579-Iqbal-ColneRd
Version:	v1.2 240521

Lead Consultant:	Mrs Emma Jeffery
Document Check:	Ms Jackie Stone
Authorisation:	Mr Edward Bouët

This report (including any enclosures and attachments) has been prepared for the exclusive use and benefit of the commissioning party and solely for the purpose for which it is provided. Unless we provide express prior written consent, no part of this report should be reproduced, distributed or communicated to any third party. We do not accept any liability if this report is used for an alternative purpose from which it is intended, nor to any third party in respect of this report. Any data and information provided by third parties and referred to herein has not been checked or verified by us unless otherwise expressly stated within this report. This report was checked and approved on the date it was issued and is therefore valid on this date. Understanding, circumstances, regulations and professional standards do change, which could subsequently affect the validity of this report.

Unda Consulting Limited, Southpoint, Old Brighton Road, West Sussex, RH11 0PR

+44 (0) 1293 214 444

www.unda.co.uk

1. Key Facts

Flood Risk Posed:

- EA Flood Zone 3 (High Risk).
- Fluvial flood risk originating from the River Colne.
- No historic records of flooding at the site.
- Risk of pluvial flooding would appear to be very low.
- SFRA shows site within an area with >=50% <75% susceptibility to groundwater flooding.
- Risk of sewer surcharge flooding would appear to be low.

Flood Risk Management:

- There will be a reduction in vulnerability at ground floor level post development.
- All residential uses will be located at first floor level.
- Safe escape as per the definitions within the NPPF can be provided.
- To help protect against flooding during extreme events, the applicant has agreed to implement flood resistant design measures into the properties. These measures will include the following:

    - Closed-cell foam used in wall cavities;
    - Boilers, control and water storage / immersion installed first floor level;
    - Plumbing insulation of closed-cell design;
    - Non-return valves fitted to all drain and sewer outlets;
    - Manhole covers secured;
    - Anti-syphon fitted to all toilets;
    - Kitchen units of solid, water resistant material at ground floor level;
    - Use of MDF carpentry (i.e. skirting, architrave, built-in storage) avoided at ground floor level;
    - Stairs of solid construction with wood faces treated to resist water penetration.
    - The applicant will also use demountable flood defence barriers to defend ground level doorways and low windows.

- A flood warning and evacuation plan will be implemented post development.

Assuming accordance with these flood risk management measures, Unda Consulting Limited consider the proposed application to be suitable in flood risk terms.

2. Introduction

Unda Consulting Limited have been appointed by Mannan Iqbal (hereinafter referred to as "the applicant") to undertake a Site-Specific Flood Risk Assessment (FRA) for Planning on Barn at 49 -51 Colne Road, Huddersfield, HD1 3AY (hereinafter referred to as "the site"). The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) and the associated technical guidance.

The site appears to be located within Flood Zone 3 as defined by the Environment Agency (EA) on their Flood Map for Planning. Under the National Planning Policy Framework (NPPF), a FRA is required if a proposed development:

- includes building or engineering works in Flood Zone 2 or 3;
- includes building or engineering works on land classified by the Environment Agency as having critical drainage problem;
- changes the use of land or buildings in a location at risk of flooding from rivers or the sea, or with critical drainage problems;
- changes the use of land or buildings in a way that increases the flood vulnerability of the development where it may be subject to other sources of flooding;
- is larger than 1 hectare.

Given that the proposed application site is located in Flood Zone 3 (High Risk of flooding from rivers or the sea), and includes change of use works, the applicant is required to submit a FRA under the NPPF. The assessment should demonstrate to the Local Planning Authority (LPA) and EA how flood risk will be managed now and over the development's lifetime, taking climate change into account, and with regard to the vulnerability of its potential users.

The objectives of a FRA to support a planning application are to establish:

- whether the proposed development is likely to be affected by current or future flooding from any source;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate.

3. Existing Situation

3.1. Site Usage:

The site is currently used as 2 residential dwellings. The application site consists of 2 terraced houses, bordered by a takeaway restaurant and student accommodation. The change of use affects the entirety of the 2 buildings.

Figure 1: Aerial view of the site (Source: Google Earth)

3.2. Topography:

The site is located approximately 65m to the North of the River Colne, West Yorkshire, which is classified as a 'Main River'.

Environment Agency LiDAR has been used to assess the topography across the site and wider area. Light Detection and Ranging (LIDAR) is an airborne mapping technique, which uses a laser to measure the distance between the aircraft and the ground surface. Up to 100,000 measurements per second are made of the ground, allowing highly detailed terrain models to be generated at high spatial resolutions. The EA's LIDAR data archive contains digital elevation data derived from surveys carried out by the EA's specialist remote sensing team. Accurate elevation data is available for over 70% of England. The LiDAR technique records an elevation accurate to ±0.3m every 2m. This dataset is derived from a combination of the EA's full dataset which has been merged and re-sampled to give the best possible coverage. The dataset can be supplied as a Digital Surface Model (DSM) produced from the signal returned to the LIDAR (which includes heights of objects, such as vehicles, buildings and vegetation, as well as the terrain surface) or as a Digital Terrain Model (DTM) produced by removing objects from the Digital Surface Model. 1.0m horizontal resolution DTM LiDAR data has been used for the purposes of this study.

Remotely sensed LiDAR data shows the site to be relatively flat, ranging from 69.25mAOD (at the rear of 49 Colne Rd) to 69.65mAOD (by the entrance of 51 Colne Rd).

Figure 2: 1m LiDAR DTM showing topographic site levels. Transect runs from south to north (Source: EA 1m LiDAR, OS Mapping overlain)

3.3. Geography and Soil:

The British Geological Survey (BGS) Map indicates that the bedrock underlying the site is Soft Bed Flags - Sandstone. Sedimentary Bedrock formed approximately 318 to 319 million years ago in the Carboniferous Period. Local environment previously dominated by swamps, estuaries, and deltas.

The British Geological Survey (BGS) Map indicates that the superficial deposits underlying the site are Glaciofluvial Deposits, Mid Pleistocene - Sand and Gravel. Superficial Deposits formed up to 2 million years ago in the Quaternary Period. Local environment previously dominated by ice age conditions (UGF).

The soil type taken from the UK Soil Observatory website shows deep soils from Riverine clay, sands, and gravels soil parent material. The soil texture is clay to sandy loam.

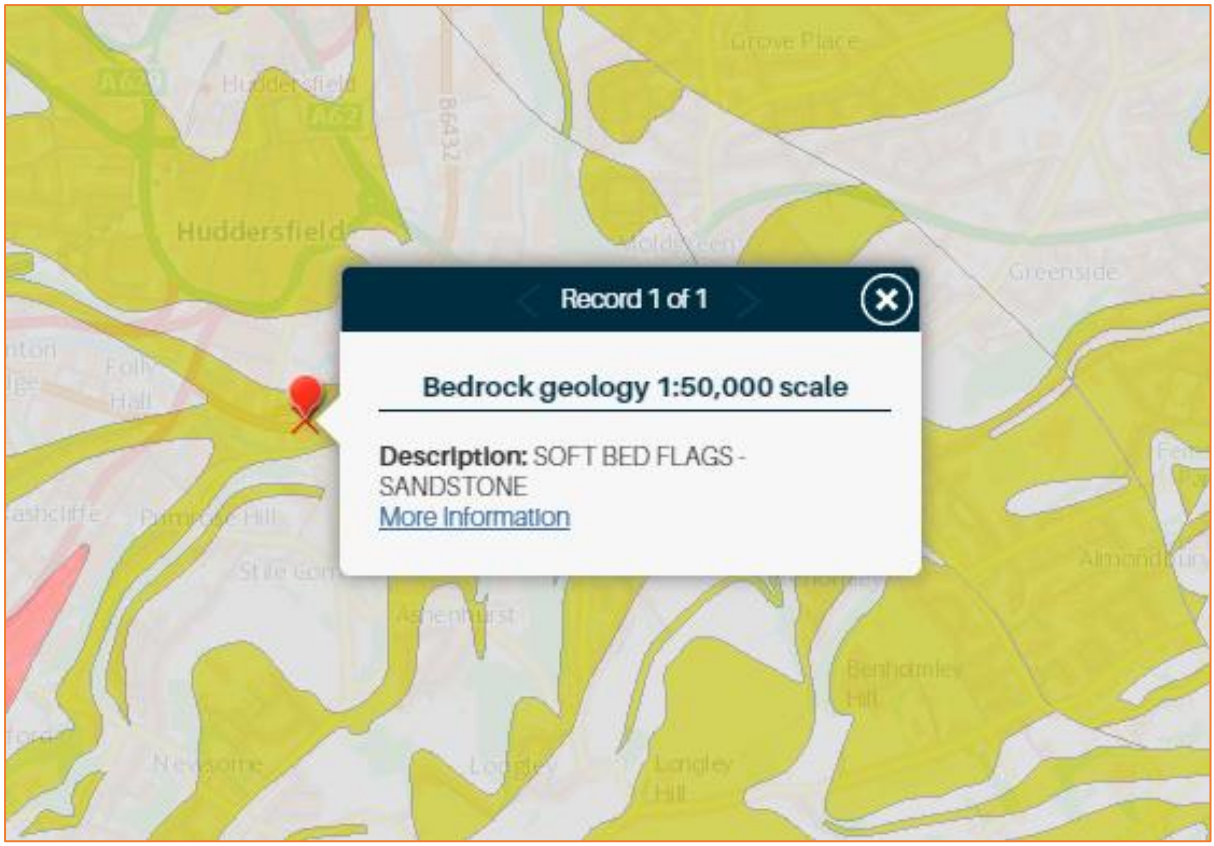


Figure 3: Bedrock geology (Source: BGS)

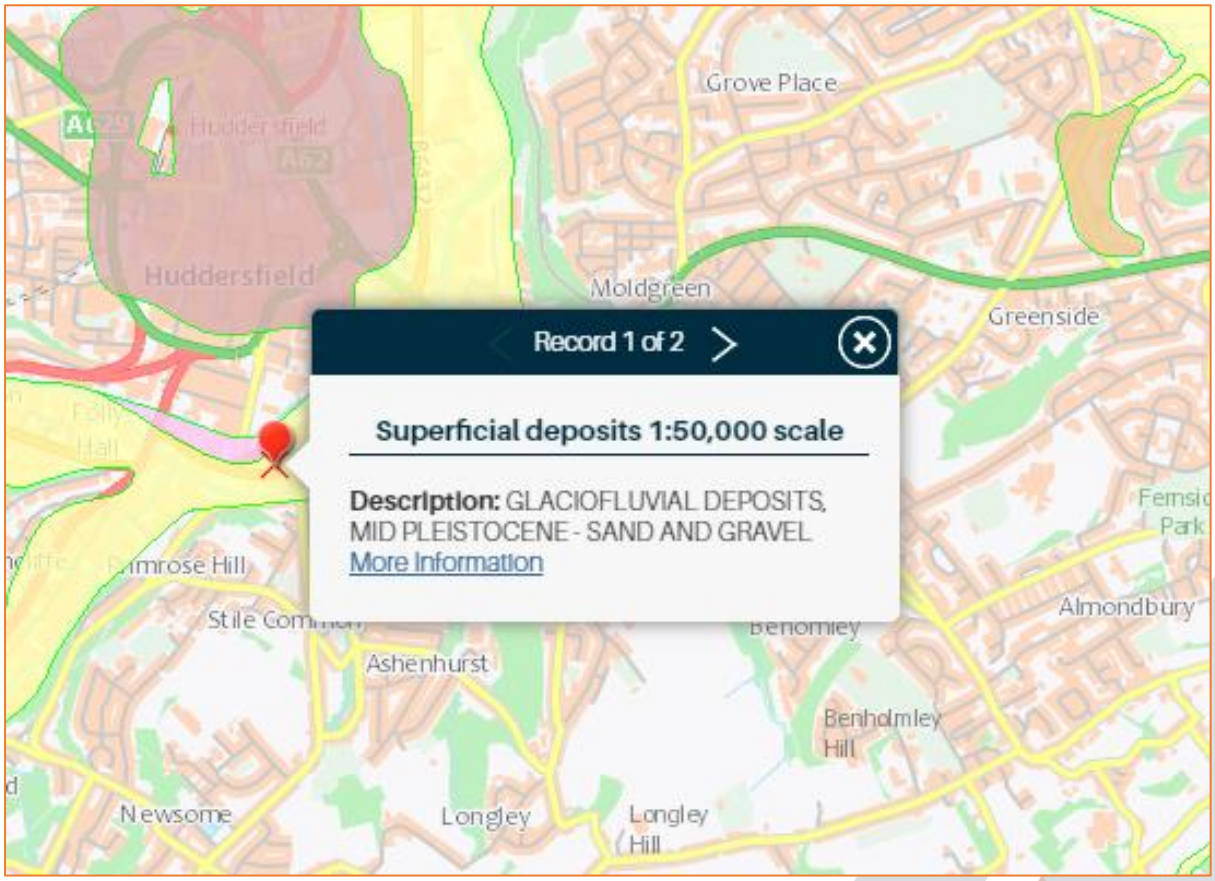


Figure 4: Superficial Deposits (Source: BGS)

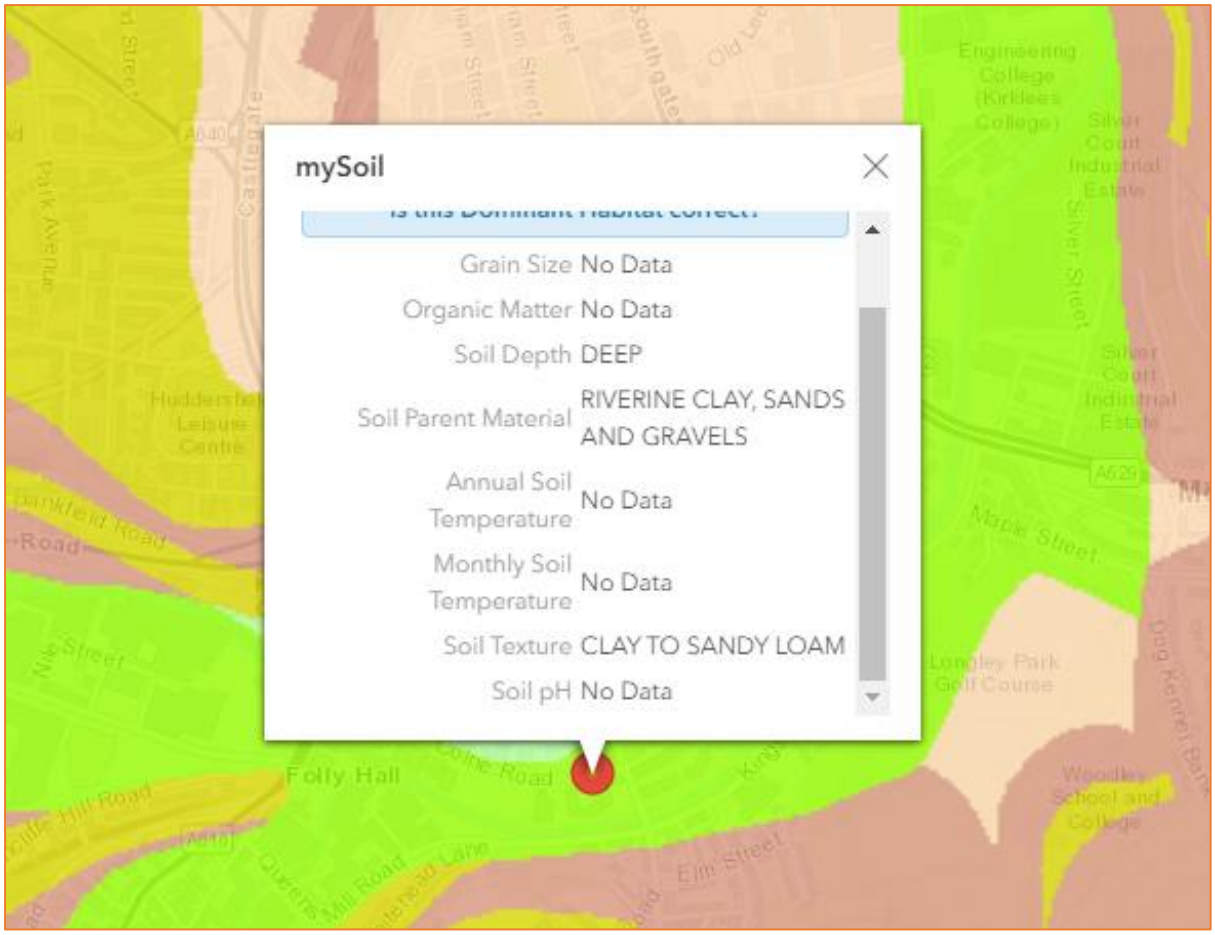


Figure 5: Local soil types (Source: UKSO)

4. Proposed Development

The proposed application is for the change of use from 2 residential dwellings (at 49-51 Colne Rd) to 2 shops on the ground floors and 2 x residential flats above.

Proposed plans can be found in the report Appendix.

Figure 6: Proposed Site Plan (Source: HUDDS DESIGN)

5. Assessment of Flood Risk

5.1. Flood Zones:

Within planning, Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's Flood Map for Planning (Rivers and Sea), available on the Environment Agency's web site.

Flood Zone	Definition
Zone 1 **Low Probability**	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 **Medium Probability**	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a **High Probability**	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b **The Functional Floodplain**	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Table 1: Flood Zones

The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.

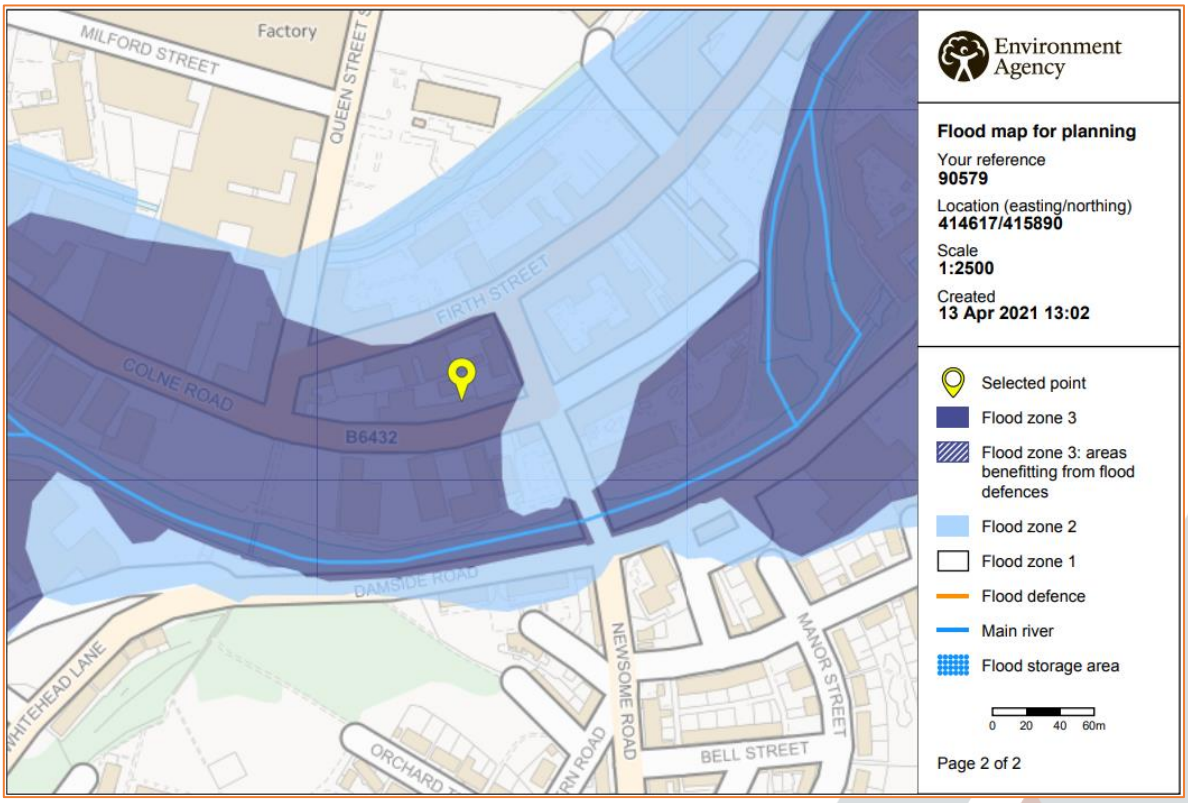


Figure 7: Environment Agency Flood Map for Planning (Rivers and Sea) (Source: EA)

The site is located within Flood Zone 3 (High Probability), which means it is defined as land having a greater than 1:100 annual probability of fluvial flooding.

The risk would appear to be predominantly fluvial, and originate from the River Colne.

5.2. Fluvial (River Colne, West Yorkshire):

The River Colne in West Yorkshire is formed at the confluence of two brooks that originate in the Pennines close to Marsden. It flows in an easterly direction through the Colne Valley and Huddersfield towards Cooper Bridge where it flows into the River Calder. The river Colne in West Yorkshire has a length of 19km and a basin size of 245km sq.

5.2.1. Modelled flood levels and extents:

Modelled flood data has been received from the EA as part of a 4 data request.

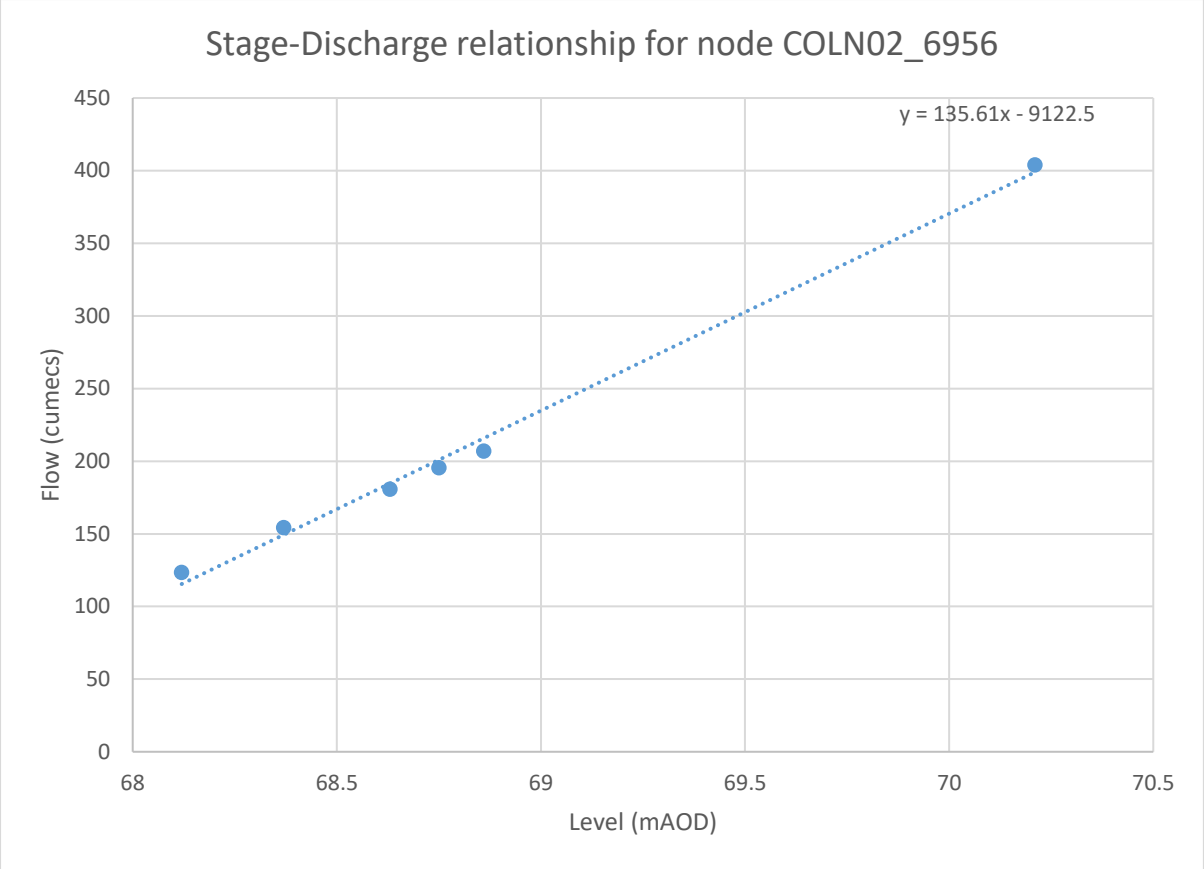
Modelled in-channel flood levels have been provided for the River Colne. Node COLN02_6956 is the most appropriate upstream in-channel node to the site. A modelled 1:100 year and 1:1000 year flood level of 68.86mAOD and 70.21mAOD respectively have been provided.

Comparison of these modelled flood levels with topographic site levels (69.25mAOD to 69.65mAOD) shows that the site is above the modelled in-channel 1:100 year flood level, but below the modelled in-channel 1:1000 year flood level.

The development is classified as both “Less Vulnerable” and “More Vulnerable” and is located within Flood Zone 3. The Flood Risk Assessments – Climate Change Allowances Guidance states that for “More Vulnerable” development within Flood Zone 3, the Upper End and Higher Central allowances should be used. The site falls within the Humber River Basin District Area, where the Upper End and Higher Central allowances are a 50% and 30% increase in flows respectively.

The data provided by the EA does not include these climate change allowances.

As such, in line with EA guidance the Intermediate Approach is applied, where a Stage-Discharge relationship is derived from the modelled flood levels and flows provided, and then interpolated / extrapolated to estimate a flood level for a 30% and 50% increase in flows.



As such, the stage-discharge relationship is extrapolated to give a 1:100 year climate change Higher Central (+30%) flood level of 69.25mAOD, and an Upper End (+50%) flood level of 69.56mAOD.

Comparison of these modelled flood levels with topographic site levels (69.25mAOD to 69.65mAOD), shows that the minimum elevation on site is the same as the Higher Central flood level, and for the Upper End event the site could be inundated with up to 0.31m of floodwater, however parts of the site are up to 0.09m above the flood level.

Based on the plans provided, the finished floor level of the existing building is approximately 0.30m above external ground levels.

5.2.2. Flood defences:

The EA has confirmed that there are no formal flood defences owned or maintained by the EA in the area of the site, however there are informal flood defences located around the River Colne within close proximity of the proposed development. The informal flood defences that are in place consist of Informal high ground flood defences, with a design standard of 1:20 year.

5.2.3. Residual risk (breach or overtopping of flood defences):

Breaching of flood defences can cause rapid inundation of areas behind flood defences as flow in the river channel discharges through the breach. A breach can occur with little or no warning, although they are much more likely to concur with extreme river levels or tides when the stresses on flood defences are highest. Flood water flowing through a breach will normally discharge at a high velocity, rapidly filling up the areas behind

the defences, resulting in significant damage to buildings and a high risk of loss of life. Breaches are most likely to occur in soft defences such as earth embankments although poorly maintained hard defences can also be a potential source of breach.

Overtopping of flood defences occurs when water levels exceed the protection level of raised flood defences. The worst case occurs when the fluvial or tidal levels exceed the defence level as this can lead to prolonged flooding. Less severe overtopping can occur when flood levels are below defence levels, but wave action causes cyclic overtopping, with intermittent discharge over the crest level of the defence. Flood defences are commonly designed with a freeboard to provide protection against overtopping from waves. The risk from overtopping due to exceedance of the flood defence level is much more significant than the risk posed by wave overtopping. Exceedance of the flood defence level can lead to prolonged and rapid flooding with properties immediately behind the defences at highest risk.

No flood defences would appear to act to defend the site from direct inundation to a significant degree, meaning there is negligible residual risk from breach and overtopping of flood defences.

5.2.4. Historical flood events:

The EA has provided no records of historic flood events at the site previously. The Calder Catchment Strategic Flood Risk Assessment (SFRA) – Volume II (2016) also shows no records of historic flooding at the site.

5.3. Pluvial (Surface Water):

Pluvial (surface water) flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead.

In 2013 the EA, working with Lead Local Flood Authorities (LLFAs), produced an updated Flood Map for Surface Water. It is considered to represent a significant improvement on the previous surface water flood maps available, both in terms of method and representation of the risk of flooding. The modelling techniques and data used and considerably improved, and also incorporated locally produced mapping where this is available to represent features best modelled at a local scale.

The Flood Map for Surface Water assesses flooding scenarios as a result of rainfall with the following chance of occurring in any given year (annual probability of flooding is shown in brackets):

- 1:30 (3.3%)
- 1:100 (1%)
- 1:1000 (0.1%)

The mapping below shows the Risk of Flooding from Surface Water centred on the site. Please note that the EA do not consider this information suitable to be used to identify the risk to individual properties or sites. It is useful to raise awareness in areas which may be at risk and may require additional investigation.

The EA Risk of Flooding from Surface Water Map suggests that the proposed development itself lies in an area of “Very Low” risk of flooding from surface water.

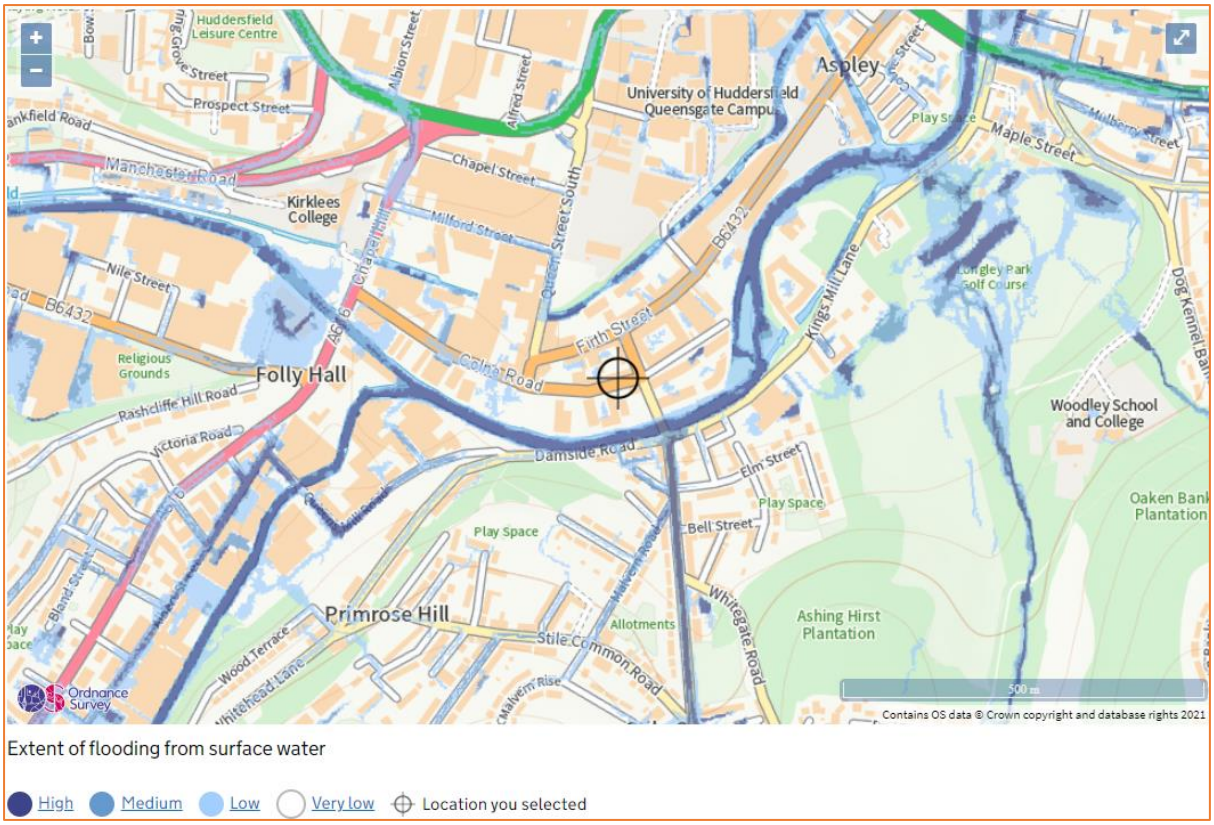


Figure 8: Extract from EA Risk of Flooding from Surface Water Map (Source: EA)

5.4. Groundwater:

Groundwater flooding occurs as a result of water rising up from the underlying rocks or from water flowing from abnormal springs. This tends to occur after much longer periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low. In low-lying areas, the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks. Groundwater flooding takes longer to dissipate because groundwater moves much more slowly than surface water and will take time to flow away underground.

No information has been provided to suggest that the site has previously been affected from groundwater flooding. The Calder Catchment Strategic Flood Risk Assessment (SFRA) – Volume II (2016) shows the site to be located in an area with a >=50% <75% susceptibility to groundwater flooding.

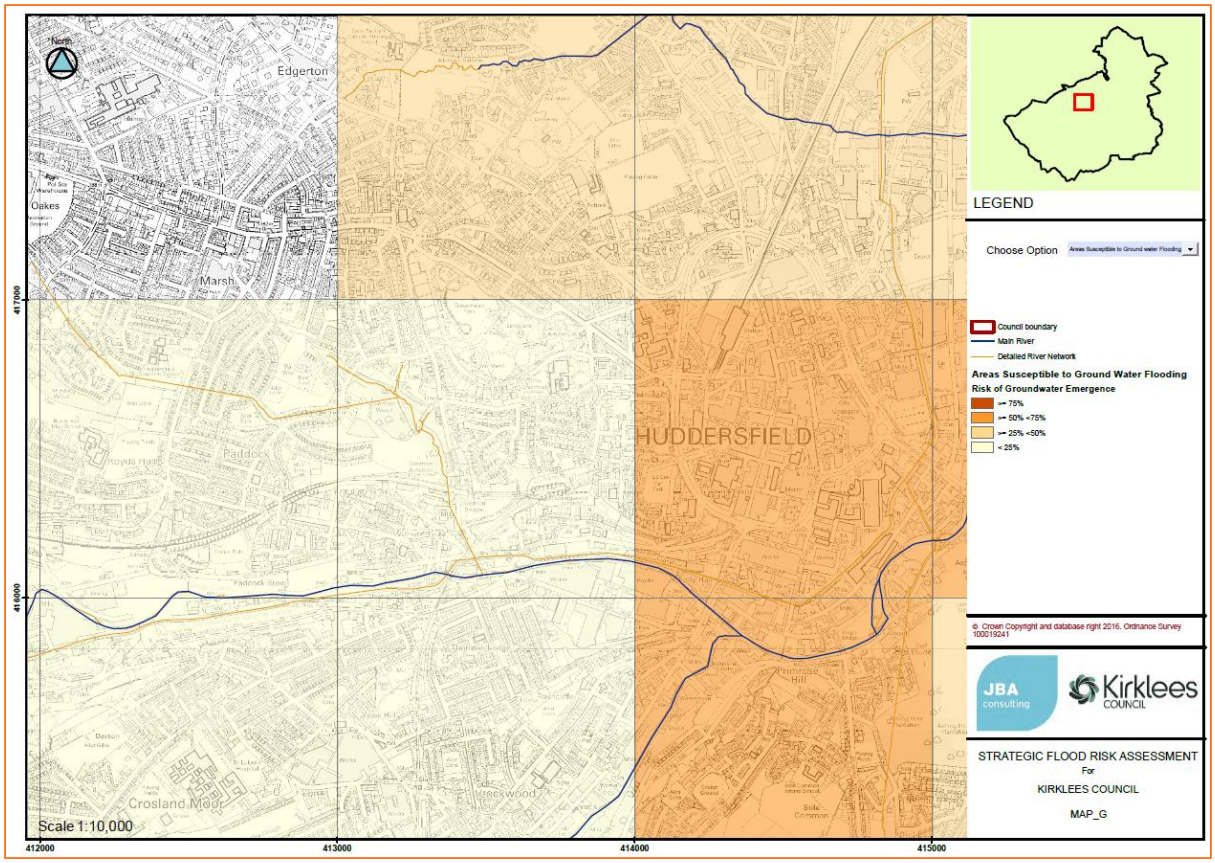


Figure 9: Calder Catchment Strategic Flood Risk Assessment (SFRA) Groundwater Map (Source: SFRA)

5.5. Sewer Surcharge:

Sewer flooding occurs when the sewer network cannot cope with the volume of water that is entering it. It is often experienced during times of heavy rainfall when large amounts of surface water overwhelm the sewer network causing flooding. Temporary problems such as blockages, siltation, collapses and equipment or operational failures can also result in sewer flooding.

All Water Companies have a statutory obligation to maintain a register of properties/areas which have reported records of flooding from the public sewerage system, and this is shown on the DG5 Flood Register. This includes records of flooding from foul sewers, combined sewers and surface water sewers which are deemed to be public and therefore maintained by the Water Company. The DG5 register records of flood incidents resulting in both internal property flooding and external flooding incidents. Once a property is identified on the DG5 register, water companies can typically put funding in place to address the issues and hence enable the property to be removed from the register. It should be noted that flooding from land drainage, highway drainage, rivers/watercourses and private sewers is not recorded within the register.

For a sewer to remain adoptable, any storage capacity above the 1.3% AEP (1 in 30 year) storm volume must be incorporated as an offline storage feature outside the online sewer network.

No records have been provided to suggest that the site has flooded from sewer flooding previously.

5.6. Other Sources:

The site is located inside of the maximum inundation extent on the EA Reservoir Inundation Map. The EA also advise on their website that reservoir flooding is extremely unlikely. All major reservoirs have to be inspected by specialist dam and reservoir Engineers. These inspections are monitored and enforced by the EA

themselves. The risk to the site from reservoir flooding is therefore minimal and is far lower than that relating to the potential for fluvial flooding to occur.

The Huddersfield Narrow Canal flows from the south west boundary of the district, near Marsden, to where it joins the Huddersfield Broad Canal at Firth Street, Huddersfield. The risk of flooding along each canal is dependent on a number of factors. As they are manmade systems and heavily controlled, it is unlikely they will respond in the same way as a natural watercourse during a storm event. Flooding is more likely to be associated with residual risks, similar to those associated with river defences, such as overtopping of canal banks, breaching of embanked reaches or asset (gate) failure. The Huddersfield Narrow Canal is located approximately 100m to the north of the site. No records of canal flooding have been provided.

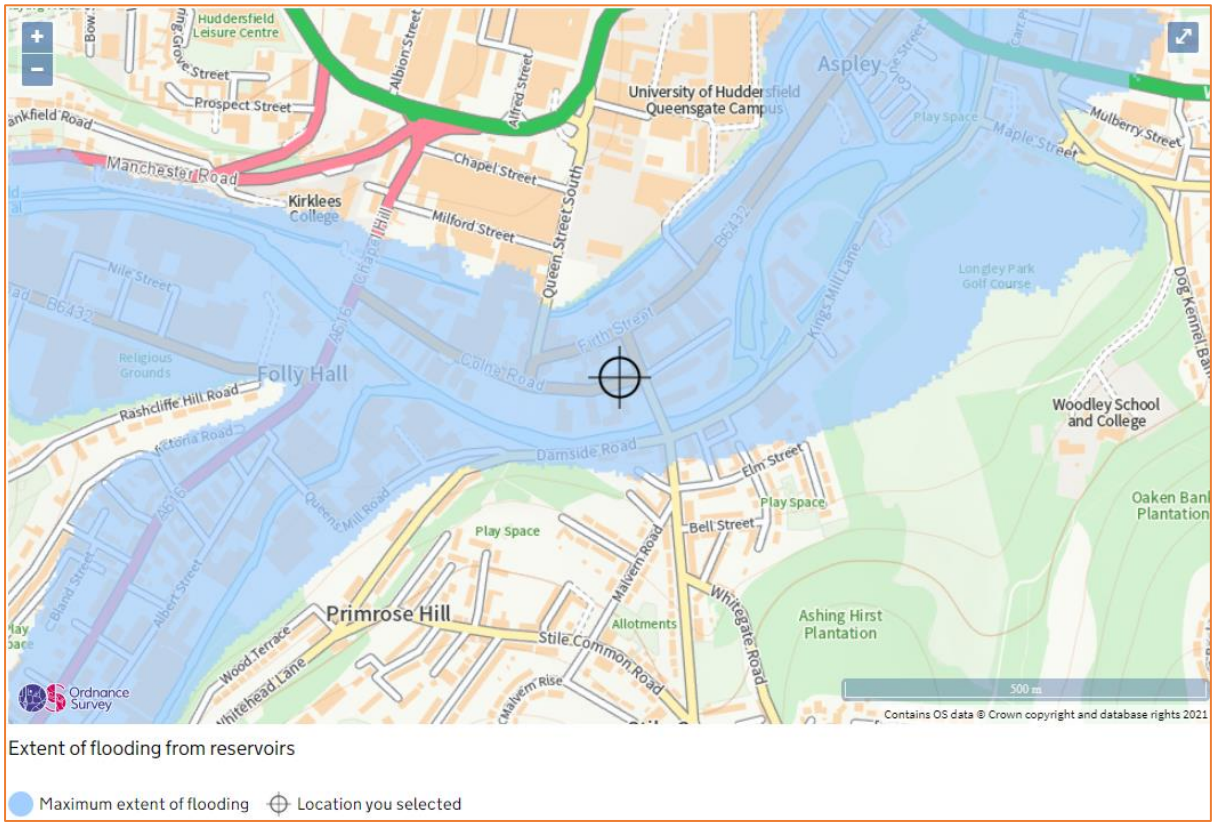


Figure 10: Extract from Environment Agency Risk of Flooding from Reservoirs Map (Source: EA)

6. Flood Risk Management Measures

6.1. Vulnerability to flooding:

The NPPF classifies property usage by vulnerability to flooding.

The existing site is 2 residential dwellings and is therefore classified as “more vulnerable” throughout under the NPPF.

Post development, the site will become “less vulnerable” on the ground floor and remain “more vulnerable” on the first floor, as the planning application is for the change of use from 2 residential dwellings to 2 shops on the ground floor and 2 x flats above. Accordingly, it is considered that the vulnerability of the site as a whole is not increased post development – there will be a reduction in the vulnerability of the ground floor, and no additional residential (more vulnerable) units will be introduced.

6.2. EA Standing Advice:

The EA Standing Advice guidance is for domestic extensions and non-domestic extensions where the additional footprint created by the development does not exceed 250m^2. It should not be applied if an additional dwelling is being created, e.g. a self-contained annex or additional commercial unit.

6.3. Physical Design Measures:

The NPPF requires finished floor levels to be 300mm above the modelled 1:100-year flood level with allowance for Climate Change.

Based on the plans provided the finished floor level of the buildings is approximately 0.30m above external ground level. The proposal is for the change of use of the existing structure, and as such there will be no change to the existing floor levels.

Post development, all residential (and therefore More Vulnerable uses) will be located at first floor level, which is shown to be 3.36m above ground floor level based on the plans provided.

To help protect against flooding during extreme events, the applicant has agreed to implement flood resistant design measures into the properties. These measures will include the following:

- Closed-cell foam used in wall cavities;
- Boilers, control and water storage / immersion installed first floor level;
- Plumbing insulation of closed-cell design;
- Non-return valves fitted to all drain and sewer outlets;
- Manhole covers secured;
- Anti-syphon fitted to all toilets;
- Kitchen units of solid, water resistant material at ground floor level;
- Use of MDF carpentry (i.e. skirting, architrave, built-in storage) avoided at ground floor level;
- Stairs of solid construction with wood faces treated to resist water penetration.

The applicant will also use demountable flood defence barriers to defend ground level doorways and low windows.

6.4. Safe Escape:

The NPPF requires a route of safe escape for all residents and users to be provided from new residential properties in Flood Zone 3. Safe escape is usually defined as being through slow moving flood water no deeper than 25cm during the 1:100 year plus allowance for climate change flood event.

Site users should exit the site and travel west along Colne Road and the north along Queen Street South. Based on comparison of the modelled 1:100year plus Upper End flood level (69.56mAOD) with topographic levels along this escape route shows that a maximum flood depth of 0.13m is experienced along this route, which is below the tolerable 0.25m.

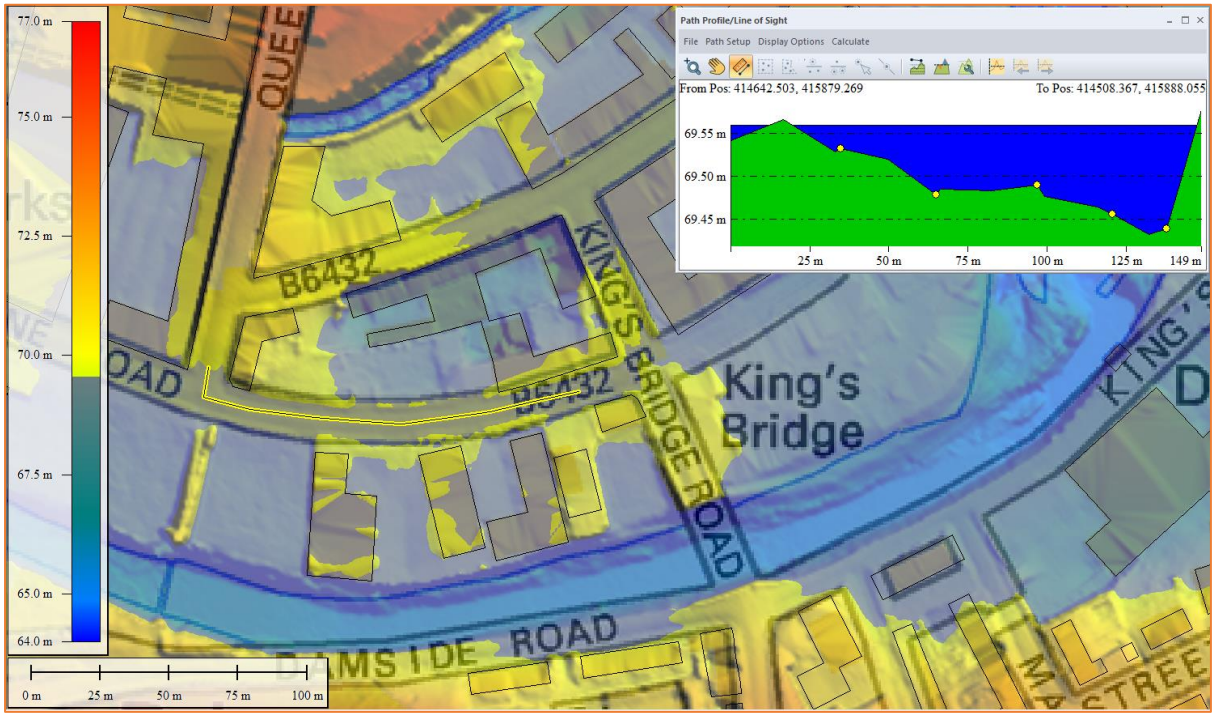


Figure 11: 1m LiDAR DTM showing land below 1:100yr+Upper End flood level (69.56mAOD) shaded blue. Proposed escape route shown by yellow line, transect inset shows flood depths along the escape route (Source: EA 1m LiDAR, OS Mapping overlain)

6.5. Flood Warning:

The EA is responsible for issuing flood warnings. Flood warnings are issued to the emergency services and local authorities. Both private individuals and organisations can sign-up to receive warnings via phone, text or email. This system of receiving warnings is currently voluntary.

Advice regarding severe flood warnings will generally be given during weather forecasts on local radio and TV. In the case of extreme events, warnings can also be disseminated via door to door visits by the police or locally appointed flood wardens.

To further conform to the EA Standing Advice, the applicant has agreed to implement a flood warning and evacuation plan post development, and subscribe to the EA's flood warning service.

The site lies within the River Colne at Huddersfield –Aspley and Bradley Mills Flood Warning Area.

The EA issue flood warnings to specific areas when flooding is expected. The applicant has agreed to register online with the free Environment Agency Floodline Warnings Direct service at https://fwd.environment-agency.gov.uk/app/olr/register to receive flood warnings by phone, text or email.

The flood warning service has three types of warnings that will help you prepare for flooding and take action:

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

Table 2: Flood Warnings

6.6. Flood Plan:

It is recommended that the applicant and future owners, occupiers and Landlords of the proposed development prepare a flood plan to protect life and property during a flood event:

Before a flood:

- Find out if you are at risk of flooding.
- Find out if you can receive flood warnings.
- Prepare and keep a list of all your important contacts to hand or save them on your mobile phone.
- Think about what items you can move now and what you would want to move to safety during a flood such as pets, cars, furniture, and electrical equipment.
- Know how to turn off gas, electricity and water supplies .
- Prepare a flood kit of essential items and keep it handy. It can include copies of important documents, a torch, a battery-powered or wind-up radio, blankets and warm clothing, waterproofs, rubber gloves and a first aid kit including all essential medication.
- Consider buying flood protection products such as flood boards and airbrick covers to help reduce flood water getting into your property.

During a flood:

- Tune into your local radio station on a battery or wind-up radio.
- Fill jugs and saucepans with water.

- Grab your flood kit - if you have prepared one.
- Collect blankets, torch, first aid kit, medication and food.
- Move important documents, personal items, valuables, and lightweight belongings upstairs or to high shelves.
- Raise large items of furniture, or put them in large bags if you have them.
- Move people, outdoor belongings, cars and pets to higher ground.
- Switch off water, gas and electricity at mains when water is about to enter your home. Do not touch sources of electricity when standing in water.
- Fit flood protection products, if you have them, for example flood boards, airbrick covers, sandbags.
- Put plugs in sinks and baths. Weigh them down with a pillowcase or plastic bag filled with soil.
- If you do not have non-return valves fitted, plug water inlet pipes with towels or cloths.
- Move your family and pets upstairs or to a high place with a means of escape.
- Listen to the advice of the emergency service and evacuate if told to do so.
- Avoid walking or driving through flood water. Six inches of fast-flowing water can knock over an adult and two feet of water can move a car.

After a flood:

- If you have flooded, contact your insurance company as soon as possible.
- Take photographs and videos of your damaged property as a record for your insurance company.
- If you don't have insurance, contact your local authority for information on grants and charities that may help you.
- Flood water can contain sewage, chemicals and animal waste. Always wear waterproof outerwear, including gloves, wellington boots and a face mask.
- Have your electrics, central heating and water checked by qualified engineers before switching them back

The site lies in an Environment Agency Flood Warning Area. The EA issue flood warnings to specific areas when flooding is expected. It is recommended that the applicant registers online with the free Environment Agency Floodline Warnings Direct service at https://fwd.environment-agency.gov.uk/app/olr/register to receive flood warnings by phone, text or email.

6.7. Off-Site Impacts

6.7.1. Fluvial floodplain storage:

The NPPF requires that where development is proposed in undefended areas of floodplain, which lie outside of the functional floodplain, the implications of ground raising operations for flood risk elsewhere needs to be considered. Raising existing ground levels may reduce the capacity of the floodplain to accommodate floodwater and increase the risk of flooding by either increasing the depth of flooding to existing properties at risk or by extending the floodplain to cover properties normally outside of the floodplain. Flood storage capacity can be maintained by lowering ground levels either within the curtilage of the development or elsewhere in the floodplain, in order to maintain at least the same volume of flood storage capacity within the floodplain.

For development in a defended flood risk area, the impact on residual flood risk to other properties needs to be considered. New development behind flood defences can increase the residual risk of flooding if the flood defences are breached or overtopped by changing the conveyance of the flow paths or by displacing flood water elsewhere. If the potential impact on residual risk is unacceptable then mitigation should be provided.

The proposed development is for the change of use from residential dwellings to 2 shops on the ground floor and 2 x flats above, as such there will be no increase in built footprint, there will be no loss of fluvial floodplain storage.

6.7.2. Surface Water Drainage Statement:

The proposed development is for the change of use of the existing building on site, and as such there will be no change in the building footprint or impermeable coverage on site post development. Post development there will be no change in the existing drainage arrangements.

7. Sequential and Exception Test

The Sequential Test aims to ensure that development does not take place in areas at high risk of flooding when appropriate areas of lower risk are reasonably available. The site is situated in Flood Zone 3 when using the Environment Agency Flood Map for Planning (Rivers and Sea). Post development, the site will become "less vulnerable" on the ground floor, and remain "more vulnerable" on the first floor.

Flood Zones	**Flood Risk Vulnerability Classification**				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a	Exception Test required	✗	Exception Test required	✓	✓
Zone 3b	Exception Test required	✗	✗	✗	✓

Table 3: Flood risk vulnerability and flood zone 'compatibility'

Using the table above, the proposed application is considered to be suitable within Flood Zones 3. Minor development and Change of Use applications are not required to pass the Sequential and Exception Tests.

8. Conclusion

Unda Consulting Limited have been appointed Mannan Iqbal to undertake a Site-Specific Flood Risk Assessment (FRA) for Planning on Barn at 49 -51 Colne Road, Huddersfield, HD1 3AY. The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) and the associated technical guidance.

The proposed development is for the Change of use from 2 residential dwellings to 2 shops on the ground floor and 2 x flats above.

The site is currently used as 2 residential dwellings. The application site consists of 2 terraced houses, bordered by a takeaway restaurant and student accommodation. The change of use affects the entirety of the 2 buildings.

The existing site is 2 residential dwellings and is therefore classified as “more vulnerable” under the NPPF.

Post development, the site will become “less vulnerable” on the ground floor and remain “more vulnerable” on the first floor, as the planning application is for the change of use from 2 residential dwellings to 2 shops on the ground floor and 2 x flats above. Accordingly, it is considered that the vulnerability of the site as a whole is not increased post development – there will be a reduction in the vulnerability of the ground floor, and no additional residential (more vulnerable) unit will be introduced.

The site is located within Flood Zone 3 (High Probability), which means it is defined as land having a greater than 1:100 annual probability of fluvial flooding.

The risk would appear to be predominantly fluvial, and originate from the River Colne.

Comparison of the River Colne in-channel modelled flood levels with topographic site levels (69.25mAOD to 69.65mAOD) shows that the site is above the modelled in-channel 1:100 year flood level, but below the modelled in-channel 1:1000 year flood level.

Comparison of the modelled1:100 year flood levels with Higher Central and Upper End allowance for climate change, with topographic site levels, shows that the minimum elevation on site is the same as the Higher Central flood level, and for the Upper End event the site could be inundated with up to 0.31m of floodwater, however parts of the site are up to 0.09m above the flood level.

Based on the plans provided, the finished floor level of the existing building is approximately 0.30m above external ground levels. The proposal is for the change of use of the existing structure, and as such there will be no change to the existing floor levels.

Post development, all residential (and therefore More Vulnerable uses) will be located at first floor level, which is shown to be 3.36m above ground floor level based on the plans provided.

Safe escape as per the definitions within the NPPF can be provided.

In summary:

- EA Flood Zone 3 (High Risk).
- Fluvial flood risk originating from the River Colne.
- No historic records of flooding at the site.
- Risk of pluvial flooding would appear to be very low.
- SFRA shows site within an area with >=50% <75% susceptibility to groundwater flooding.
- Risk of sewer surcharge flooding would appear to be low.
- There will be a reduction in vulnerability at ground floor level post development.
- All residential uses will be located at first floor level.
- Safe escape as per the definitions within the NPPF can be provided.

-
- To help protect against flooding during extreme events, the applicant has agreed to implement flood resistant design measures into the properties. These measures will include the following:

    - Closed-cell foam used in wall cavities;
    - Boilers, control and water storage / immersion installed first floor level;
    - Plumbing insulation of closed-cell design;
    - Non-return valves fitted to all drain and sewer outlets;
    - Manhole covers secured;
    - Anti-syphon fitted to all toilets;
    - Kitchen units of solid, water resistant material at ground floor level;
    - Use of MDF carpentry (i.e. skirting, architrave, built-in storage) avoided at ground floor level;
    - Stairs of solid construction with wood faces treated to resist water penetration.
    - The applicant will also use demountable flood defence barriers to defend ground level doorways and low windows.

- A flood warning and evacuation plan will be implemented post development.

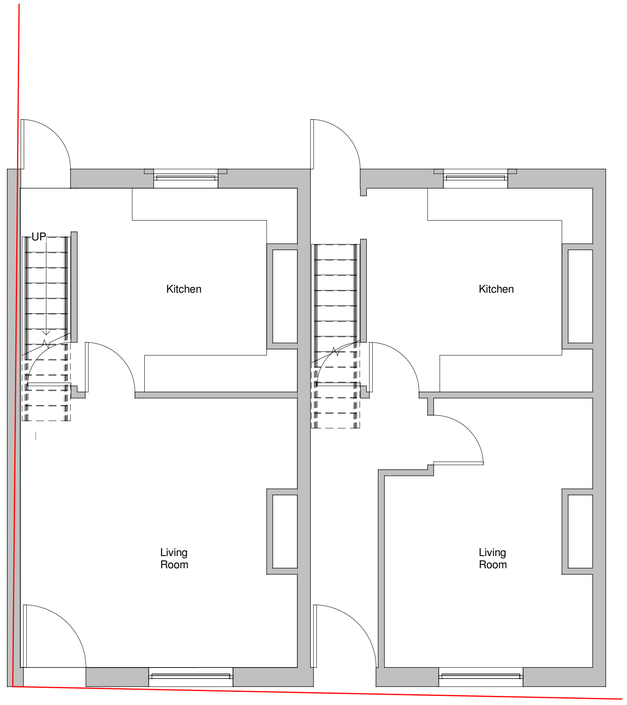
Assuming accordance with these flood risk management measures, Unda Consulting Limited consider the proposed application to be suitable in flood risk terms.

Appendix

- Plans and Drawings.
- Environment Agency Flood Data.

3 **Front Elevation**
1 : 50

5 **Rear Elevation**
1 : 50



1 **Level 0**
1 : 50

2 **Level 1**
1 : 50

Location Plan

North Point

The contractor must verify all dimensions on site before commencing any work orfabrication drawings. If this drawing exceeds the quantities taken in any way Hudds Design are to be informed before the work is initiated. Only figured dimensions are to be taken from this drawing. Do not scale off this drawing. Drawings are based on Ordnance Survey and / or existing record drawings - design and drawing content issubject to detailed Site Survey, Structural Survey, Site Investigations, Planning and Statutory Requirements and Approvals. Authorised reproduction from Ordnance Survey Map with permission of the Controller of Her Majesty's Stationery Office.Crown Copyright reserved. Hudds Design Copyright.

Drawing
Notes:

Rev:	Description	Revised By:	Issue Date:

Project:
49-51 Colne Road

Drawing
Existing Floor Plans and Elevations

Scale: 1 : 50@A1 | Original Issue Date:

Original Drawn MI | Original Checked JA

Drawing | Revision:
HD-A-952 -100

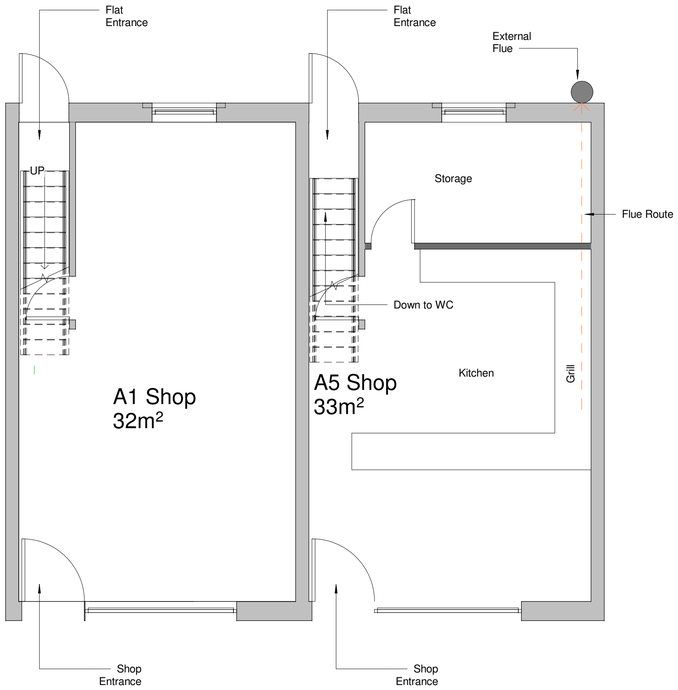
Reason For Issue:
Planning

HUDDS DESIGN

T: 01484 941051
eng@huddsdesign.co.uk
www.huddsdesign.com

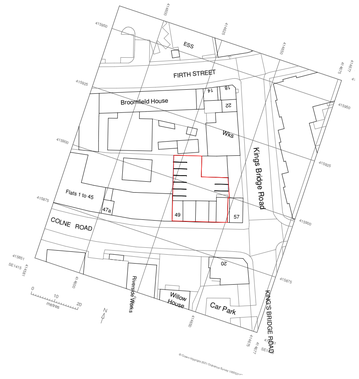
3 Front Elevation
1 : 50

5 Rear Elevation
1 : 50



1 Level 0
1 : 50

2 Level 1
1 : 50



4 Location Plan
1 : 1250

Location Plan

North Point

The contractor must verify all dimensions on site before commencing any work orfabrication drawings. If this drawing exceeds the quantities taken in any way Hudds Design are to be informed before the work is initiated. Only figured dimensions are to be taken from this drawing. Do not scale off this drawing. Drawings are based on Ordnance Survey and / or existing record drawings - design and drawing content issubject to detailed Site Survey, Structural Survey, Site Investigations, Planning and Statutory Requirements and Approvals. Authorised reproduction from Ordnance Survey Map with permission of the Controller of Her Majesty's Stationery Office.Crown Copyright reserved. Hudds Design Copyright.

Drawing
Notes:

Rev:	Description	Revised By:	Issue Date:

Project:
49-51 Colne Road

Drawing
Proposed Plans And Elevations

Scale: As indicated@A1 | Original Issue Date:

Original Drawn MI | Original Checked JA

Drawing
HD-A-952-102

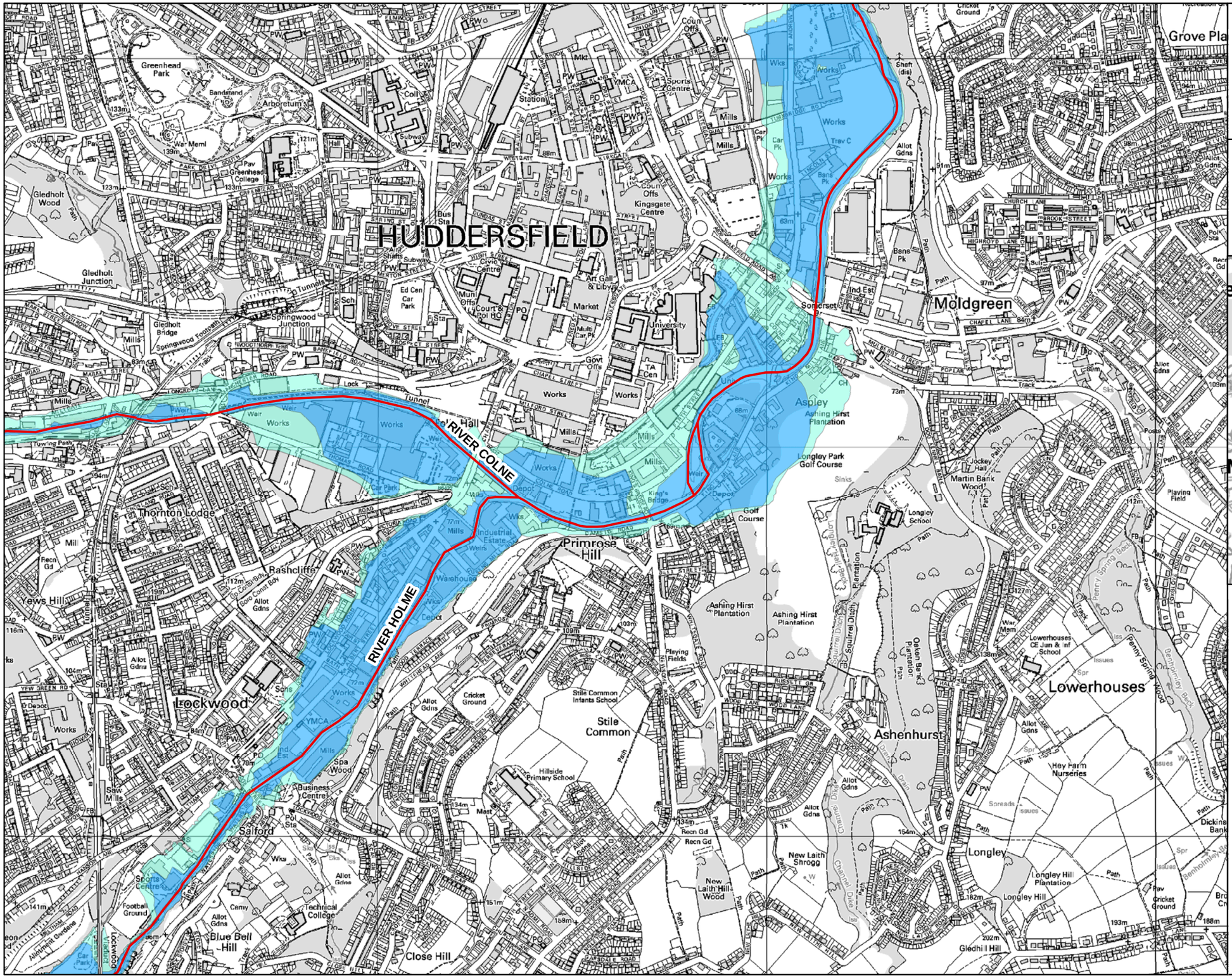
Revision:

Reason For Issue:
Planning

HUDDS DESIGN

T: 01484 941051
eng@huddsdesign.co.uk
www.huddsdesign.com

Flood Map for Colne Road, Huddersfield



Environment Agency

www.environment-agency.gov.uk

Scale: 1:10,000

when reproduced @ A3

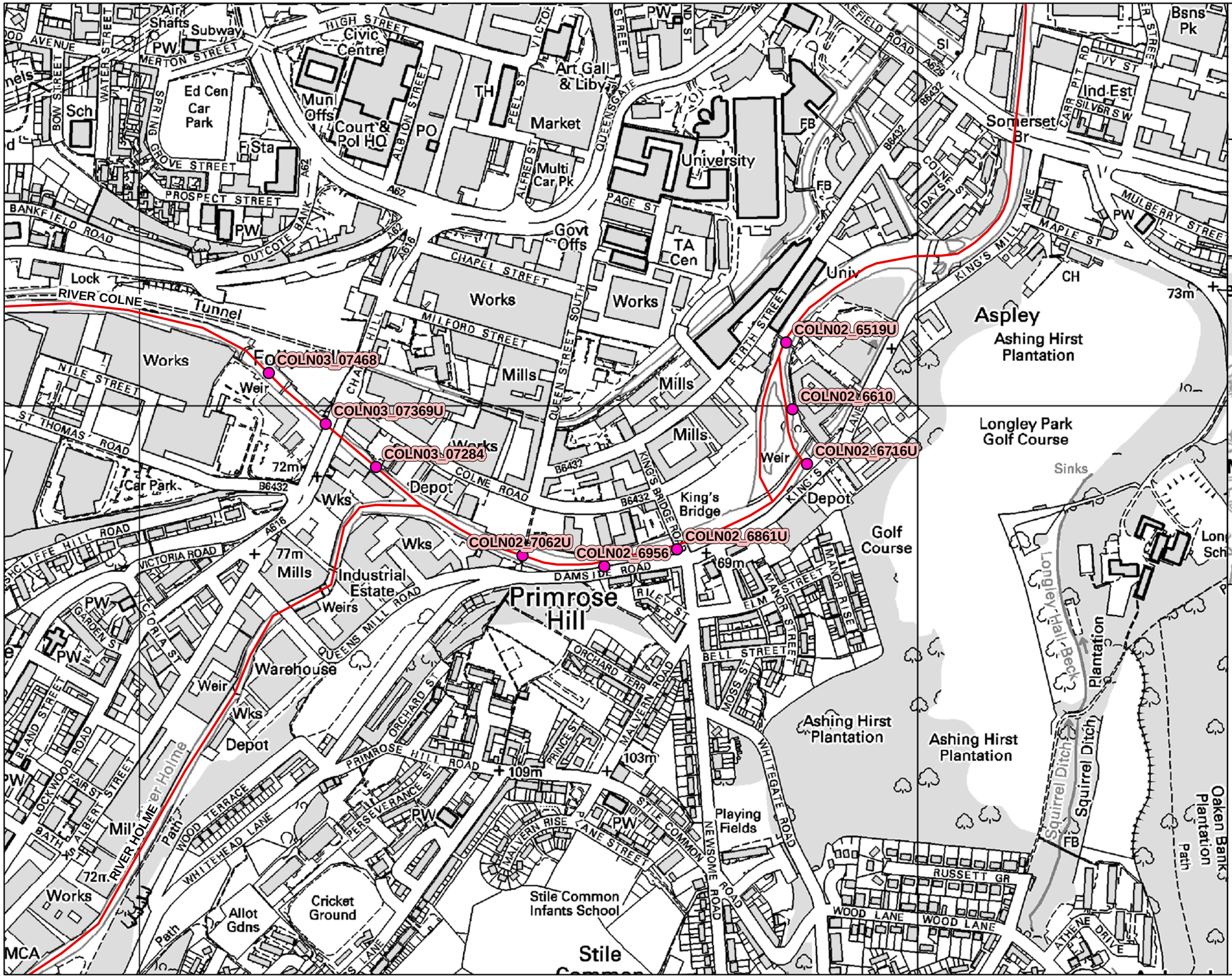
LEGEND

- Main River
- Flood Zone 3 (FZ3)
- Flood Zone 2 (FZ2)

© Environment Agency copyright and / or database rights 2013. All rights reserved. © Crown Copyright and database right. All rights reserved. Environment Agency, 100026380, 2013.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Node Point Location Map for Colne Road, Huddersfield



Environment Agency

www.environment-agency.gov.uk

Scale: 1:5,000

when reproduced @ A3

N
W E
S

LEGEND

Main River

Node Points

© Environment Agency copyright and / or database rights 2013. All rights reserved. © Crown Copyright and database right. All rights reserved. Environment Agency, 100026380, 2013.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 08708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

RFI no: 26983 River Calder Model Results (level - mAOD, Flow- m^3s)

	2010 model										2005 Model	
Label	10 Year		25 Year		50 Year		75 year		100 Year		1000 Year	
	10% annual probability		4% annual probability		2% annual probability		1.33% annual		1% annual probability		0.1% annual probability	
	Max Stage	Max Flow	Max Stage	Max Flow	Max Stage	Max Flow	Max Stage	Max Flow	Max Stage	Max Flow	Max Stage	Max Flow
COLN02_6519u	65.84	122.76	66.02	150.67	66.13	174.11	66.18	187.43	66.22	197.62	66.59	375.70
COLN02_6610	66.23	122.78	66.47	150.67	66.65	174.11	66.75	187.42	66.82	197.62	67.94	375.70
COLN02_6716u	67.03	123.45	67.30	154.37	67.48	180.76	67.57	195.55	67.63	206.86	68.43	404.00
COLN02_6861u	67.59	123.46	67.80	154.37	67.99	180.75	68.10	195.59	68.18	206.90	69.88	404.00
COLN02_6956	68.12	123.45	68.37	154.37	68.63	180.77	68.75	195.60	68.86	206.90	70.21	404.00
COLN02_7062u	68.81	47.04	69.15	58.51	69.37	68.22	69.46	71.74	69.68	81.47	71.17	196.70
COLN03_07284	69.08	46.92	69.38	58.21	69.57	66.72	69.65	71.73	69.83	80.24	71.29	196.70
COLN03_07369u	69.78	46.89	70.24	58.21	70.58	66.71	70.79	71.74	71.21	80.20	72.82	196.70
COLN03_07468	70.30	46.91	70.50	58.22	70.74	66.73	70.95	71.83	71.36	80.30	72.95	196.70