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The Hurt Arms
Flood Risk Assessment

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Preface

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Executive Summary

The Hurt Arms in Ambergate has been surveyed and assessed for flood risk following a recent flood event in November 2019. Initial analysis of the Environment Agency flood map showed the site to lie partially within flood zone 3 with a greater than 1% (1 in 100) chance of flooding from the nearby River Amber and River Derwent.

The EA have provided detailed modelling for both the River Amber and River Derwent. The Modelled extents from the River Amber does not reach the site boundary up to the 0.1% (1 in 1000) return period whereas the 10% (1 in 10) flood level from the River Derwent is predicted to inundate the site location. Therefore, the River Derwent is the dominant fluvial mechanism to affect the site boundary.

The recent fluvial flood event in November 2019 inundate the site boundary up to a level of 67.83mAOD. When this level is compared to the River Derwent flood levels it is shown to be just below the 2% (1 in 50) in-channel level. Given the distance between the site and the river, 150m, it is expected that flood levels across the floodplain will reduce and therefore the onsite flood level of 67.83mAOD would likely be greater in the centre of the river channel. Therefore, the November 2019 flood event is estimated to have a return period of between 2% (1 in 50) and 1% (1 in 100).

The November 2019 flood event flooded the basement area onsite to depths of 2.35m and the ground floor of the public house to 0.2m. This was sufficient to damage beverage dispensing equipment, AC units and boiler equipment in the basement as well as ground floor fixtures and fittings and kitchen appliances which resulted in an insurance claim of around £1million.

The risk from pluvial (surface water) has been deemed very low on the EA surface water flood maps which is largely considered accurate based on the ground levels taken during the site survey which show a steady fall in ground level from east to west towards the River Derwent and hence prohibits significant build-up of surface water. However, the basement area is accessed by a doorway which is located down a rampway approximately 0.5m lower than the surrounding ground and therefore provides a route of flood water ingress during periods of prolonged heavy or extreme bursts of rainfall.

Following the site survey, the client had installed a flood door to the basement area, however, due to the depth of flooding experienced in November 2019 the door did not withstand the imposed loading and buckled. The client has also installed a sump and pump system within the basement area to deal with ingress from minor surface water flood events.

Following the November 2019 flood event, a number of flood alleviation options have been proposed in this report to further increase the flood resistance and/or resilience of the property in the event of a repeat flood scenario.

Taking this into account The Hurt Arms in Ambergate has been deemed at significant risk from fluvial flooding from the River Derwent from flood events with a 10% (1 in 10) probability of occurrence, a very high chance as well as surface water flooding to the basement area only. Flood risk arising from coastal/tidal is considered negligible. Therefore, recommendations have been made within this report to further increase the flood resistance and/or resilience of the building to flood water ingress.

Flood Risk Report

1.0 Introduction

Following instruction given to FCI by Allianz Insurance, a flood risk assessment has been carried out at The Hurt Arms in Ambergate following a recent flood event at the property. A site visit was carried out on the 18th of November 2019 with the client present. This report will discuss any flood risk that has been identified and give recommendations to mitigate if required.

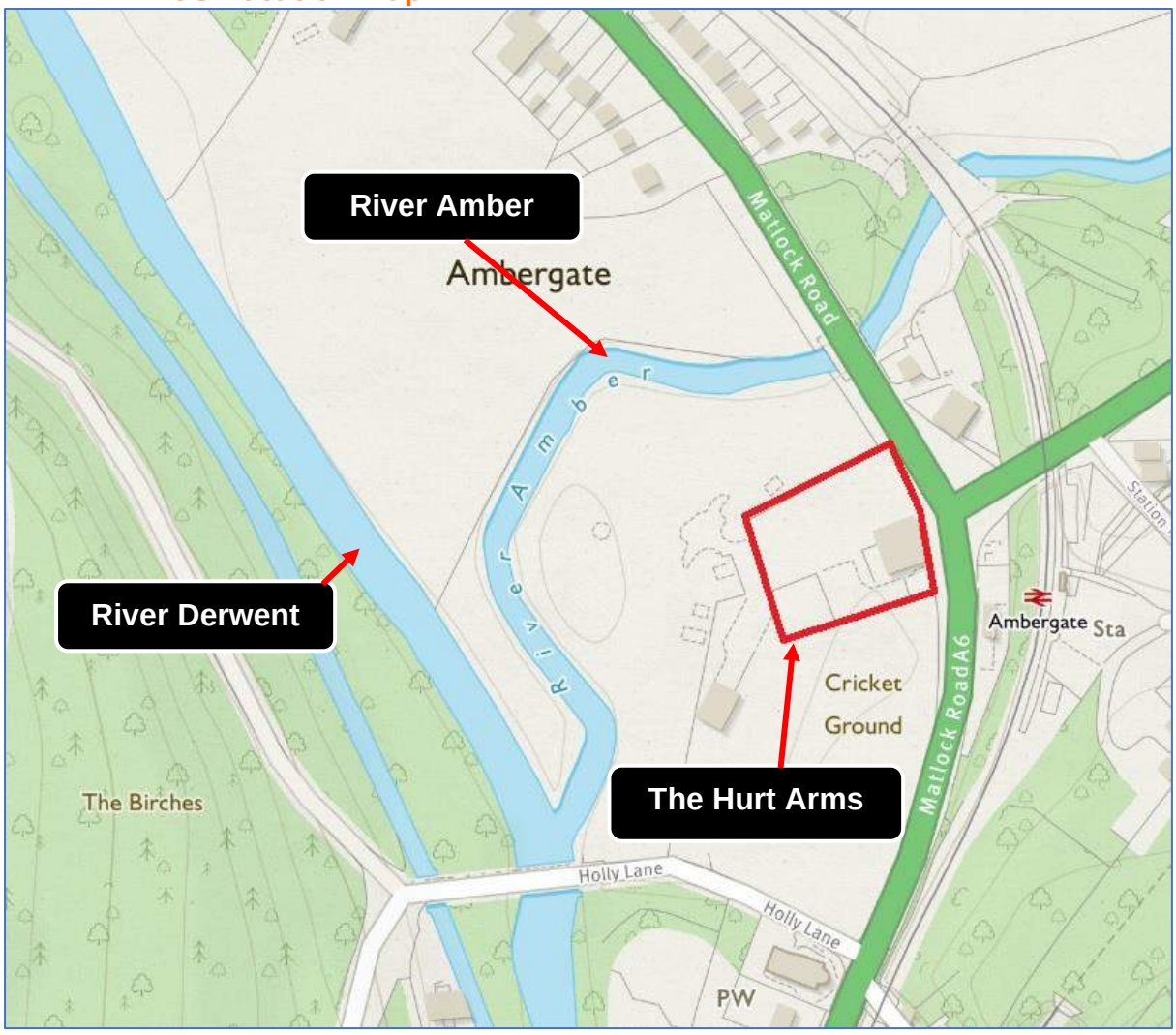
2.0 Background Information

The Hurt Arms is located at grid reference SK 34830 51608 in eastern Ambergate where access into the grounds is gained from Derby Road.

The River Amber lies approximately 60m north west of the site with the River Derwent located 150m south west which can be seen on the following OS and aerial image.

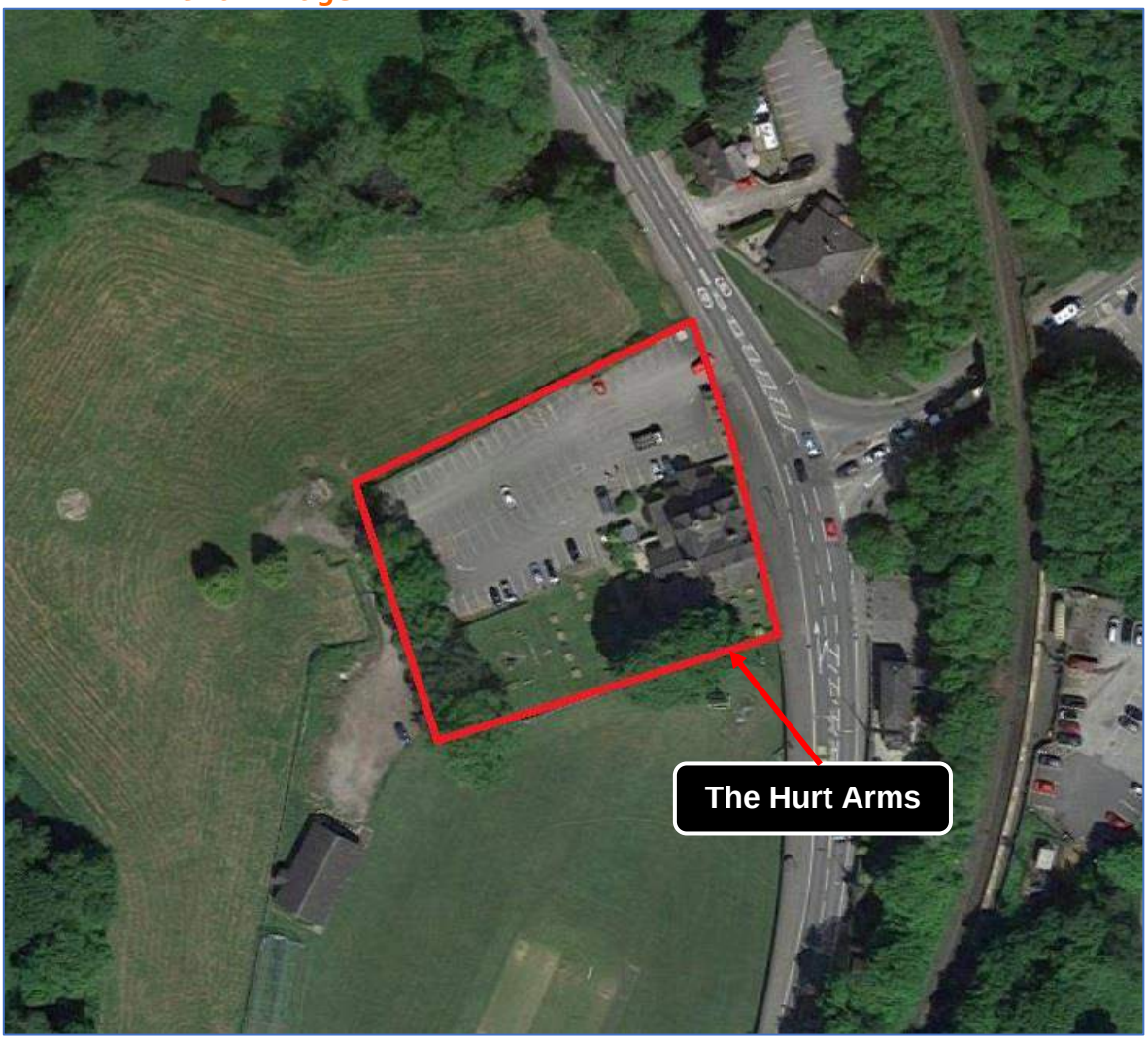
The site is a hotel, public house and wedding venue and consists of guest accommodation, restaurant and function room.

2.1 OS Location Map



(OS Copyright)

2.2 Aerial Image



(Google Copyright)

3.0 Survey Level Information

In order to better understand the topography of the site in relation to any flood risk that may potentially exist, a level survey was carried out across the site compound. All levels were taken off a predetermined benchmark obtained from GPS surveying equipment in metres above ordnance datum (mAOD). This report will use this information, as well as the following modelled flood level information to form its findings. All surveyed levels can be seen in APPENDIX G.

4.0 Flood Risk Assessment

4.1 Modelling Introduction

FCI set out to use the most accurate flood risk modelling information that is available which will cover flood risk from Fluvial (River), Pluvial (Surface Water) and Tidal (Coastal Flooding). Below, each potential flood risk will be discussed separately.

4.2 Fluvial Flooding

4.2.1 Flood Zone

Based on the Environment Agency flood map for planning, the site is shown to lie within flood zone 3 which equates to a greater than 1% (1 in 100) chance of flooding in any given year from the nearby River Amber and River Derwent. The EA flood map for planning can be seen in APPENDIX A.

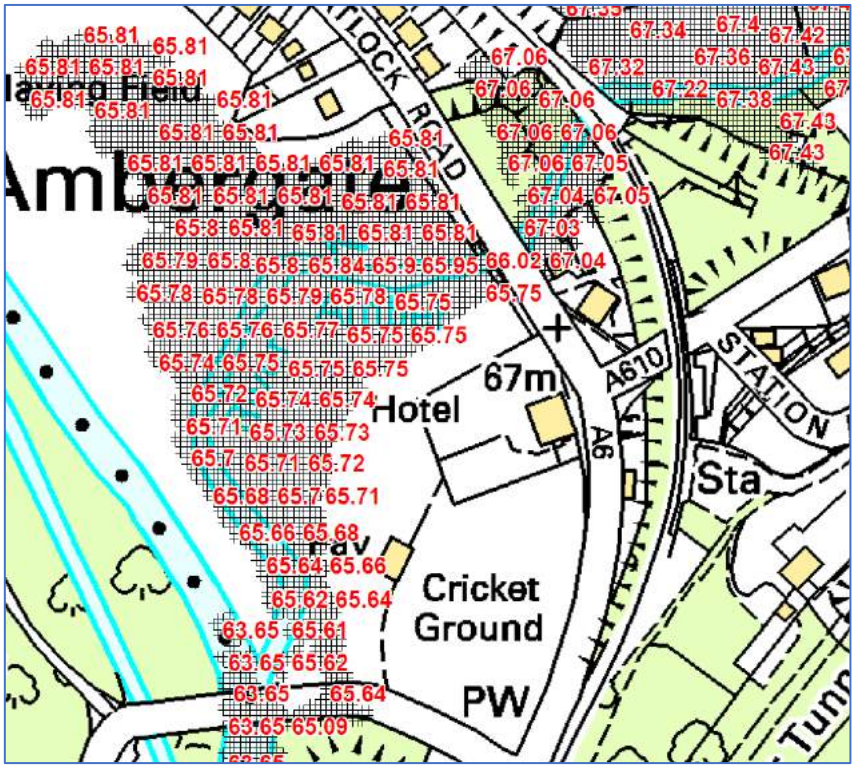
4.2.2 Modelled Flood Levels

Following the searches conducted, the most up to date fluvial modelling information for the site was obtained from the Environment Agency. The River Amber and Derwent lies 60m north west and 150m south west of the site respectively for which detailed flood levels have been obtained. The flood risk associated with the River Amber and River Derwent will be discussed individually below.

4.2.2.1 River Amber

The River Amber in the locality has been modelled in detail for both the river channel (1D) and the floodplain (2D).

The outputs from the floodplain modelling show that flood levels do not exceed 66.00mAOD near to the site location to the north west from the extreme 0.1% (1 in 1000) return period. When compared to the site ground levels in the car park area on the northern boundary of the site where the minimum surveyed level was 66.29mAOD, the car park is more than 0.3m above the maximum flood level from the River Amber and therefore inundation purely from the River Amber is not expected up to the 0.1% (1 in 1000) return period. The floodplain levels for the 0.1% (1 in 1000) return period can be seen below:



Taking this into account, the dominant fluvial flood risk to the site location is considered to be from the River Derwent as opposed to the River Amber.

4.2.2.2 River Derwent

The River Derwent lies approximately 150m south west of the site at the closest point for which only the river channel (1D) has been modelled in detail. The below table lists the flood levels from the nearest upstream and downstream node point to the site.

River Derwent		
Return Period	**Upstream Modelled Level (mAOD)**	**Downstream Modelled Level (mAOD)**
10% (1 in 10)	67.23	66.95
5% (1 in 20)	67.60	67.32
2% (1 in 50)	68.02	67.72
1.3% (1 in 75)	68.12	67.78
1% (1 in 100)	68.16	67.82
1%+CC (1 in 100 + CC)	68.54	68.18
0.5% (1 in 200)	68.46	68.11
0.1% (1 in 1000)	69.23	68.83

The levels in the above table are representative of 'in-channel' flood levels and therefore as water overtops the banks and disperses across the floodplain the levels will reduce from the modelled levels within the channel.

In order to better estimate the flood exposure at the site location, an interpolated node point between the upstream and downstream node point will be calculated for al return periods listed above, this can be seen in the below table:

River Derwent			
Return Period	**Upstream Modelled Level (mAOD)**	**Downstream Modelled Level (mAOD)**	**Interpolated Modelled Level (mAOD)**
10% (1 in 10)	67.23	66.95	67.10
5% (1 in 20)	67.60	67.32	67.47
2% (1 in 50)	68.02	67.72	67.87
1.3% (1 in 75)	68.12	67.78	67.93
1% (1 in 100)	68.16	67.82	68.00
1%+CC (1 in 100 + CC)	68.54	68.18	68.35
0.5% (1 in 200)	68.46	68.11	68.28
0.1% (1 in 1000)	69.23	68.83	69.05

Taking into account that the lowest level external to the building in the car park of 66.29mAOD, it is considered that this area would be subject to flooding from a 10% (1 in 10) probability flood from the River Derwent, a very high chance.

The following sections of this report will utilise the above modelled flood levels for the River Derwent when considering the potential impacts to the building, severity of the recent flood event of November 2019 and an appropriate standard to implement flood resistance or resilient measures.

4.2.3 Fluvial Flood Defences

The EA have confirmed that the River Amber or Derwent do not have any flood defence measures currently implemented in the locality of Ambergate.

4.3 Coastal/Tidal Flooding

The site location is over 50 miles from the nearest tidal body of water as well as more than 66m above mean sea level. Therefore, the flood risk associated with coastal/tidal sources is negligible.

4.4 Surface Water Flooding

Based on the EA indicative flood map for surface water, the site is deemed at very low risk of flooding from this source equating to less than 0.1% (1 in 1000) probability. The EA surface water flood map can be seen in APPENDIX D.

This is considered to be largely accurate, however, there is a basement within the building which is prone to surface water flooding during periods of prolonged heavy or extreme bursts of rainfall. This is not shown on the surface water flood maps as the specific topography leading to the basement doorway is not included on the digital surface model.

The topography across the site boundary is such that flows of surface water would freely dissipate to the surroundings before reaching sufficient depths to affect the building onsite, with the exception of the basement area.

4.5 Reservoir Flooding

The site location is shown to be susceptible to flooding during a reservoir breach from the 27 reservoirs located further upstream of the site in the Howden Moors.

During the event of a breach, flood depths across the site boundary are likely to exceed 2.0m and would lead to catastrophic consequences. However, all reservoirs with a capacity in excess of 10,000m^3 in the UK are regulated by the Reservoirs Act 1975 which states that all reservoirs over this capacity must be inspected and supervised by appointed panel engineers.

Therefore, reservoir flooding is extremely rare and would only occur due to the embankments or outfalls failing in the event of very poor maintenance or potentially a terrorist attack. Therefore, the likelihood of flooding from this source is considered very low. The EA reservoir flood map can be seen in APPENDIX E.

5.0 Site Flood Depths

The below section will detail the likely impacts of flooding to all areas of the site including the ground floor, basement and car park area. The predicted severity of flooding to each area will be evaluated based on the interpolated flood levels in section 4.2.2.2 compared with the surveyed levels during the site visit. The topographic survey can be seen in APPENDIX G.

5.1 Ground Floor

The ground floor of the public house had a minimum surveyed threshold level of 67.63mAOD which when compared to the interpolated in-channel flood levels for the River Derwent would suffer inundation from a 2% (1 in 50) probability flood event, however, this is likely to be overstated due to the distance between the river and the building being 150m.

When considering the distance between the river and the building it is expected that the floor level would remain resilient to inundation up to the 2% (1 in 50) return period but flood events exceeding this in magnitude would result in inundation.

The ground floor of the public house consists of a bar and restaurant area, exhibition room, kitchen, toilets and the main electrical supply point to the building all of which would suffer damage if contacted by flood water.

During November 2019 the ground floor of the public house was inundated to approximately 0.2m in depth result in all low-level fixtures and fittings being condemned and ripped out as well as numerous large kitchen appliances being contacted by flood water and hence requiring replacement.

5.2 Basement

The basement area is home to beverage dispensers and stock, boiler equipment and AC units. The floor level of the basement varied between 65.48mAOD and 65.63mAOD which below the 10% (1 in 10) flood level for the River Derwent and therefore has a very high susceptibility to flooding from fluvial sources as well as overland flow from surface water as the basement doorway entrance is situated at the bottom of a rampway where the ground level falls more than 0.5m.

During the November 2019 flood event, the basement area was flooded above the roof level, approximately 2.35m in depth, which was sufficient to damage the beverage dispensers, AC units and boilers as well as the existing doorway (fitted with a flood door) which buckled under the loading imposed.

5.3 Car Park

The car park area had surveyed ground levels of generally between 66.30mAOD and 66.90mAOD which when compared to the forecast flood levels from the River Derwent are below the 10% (1 in 10) interpolated flood level of 67.10mAOD and therefore is at very high risk of flooding from fluvial sources.

Surface water flooding is not expected to cause major disruption to the car park area due to the sloping topography which would prohibit significant build up, however, isolated pooling in the lowest lying areas can be expected.

During November 2019, based on the flood level taken from site of 67.83mAOD, the car park would have been subject to depths of up to 1.53m.

5.4 ENW Substation

There is a Western Power Distribution (WPD) substation named ‘Hurt Arms’ which is not the responsibility of the cleint. However, the surveyed foundtion level outside of the substation was 66.84mAOD which when compared to the November 2019 flood level of 67.83mAOD produces a flood depth of 0.99m. As access was unable to obtained to the substation it is unclear as to whether internal flooding up to 0.99m would adversely affect operation, however, based on FCI’s substantially previous experience of electricity substations it is considered that internal flooding up to 0.99m would be greatly than the lowest vulnerable point.

Although the substation is not the responsibility of the client, the power supply to the building could cease in the re-occurrence of the November 2019 flood event and therefore it is considered that the further dialogue between the client and Western Power Distribution is undertaken with a view to defending the substation or the client should find an alternative source of backup power in the event of an outage.

5.5 Site Access and Egress

The main site access road, Derby Road, had a minimum surveyed level of 66.65mAOD which when compared to the November 2019 flood level of 67.83mAOD would produce flood depths of up to 1.18m. Flooding to this depth is sufficient to render access to the site on foot or by motor vehicle impossible with the only remaining access option via boat.

6.0 Flood History

There have been numerous severe flood events along the River Derwent valley with major flooding occurring in January 1947, January 1960, January 1965, autumn 2000 and November 2019.

The January 1965 flood event is the worst recorded flood event on the River Derwent which had an estimated return period of 1.25% (1 in 80). Further details of this flood event local to the site are not able to be obtained, however, it is considered that the effects would have been similar to those experienced in the recent flood event of November 2019.

In early November 2019 the site location suffered severe flooding from the River Derwent with a flood level of 67.83mAOD taken from a wrack mark during the site survey. When compared to the modelled flood levels, this level of flooding is seen to be just below the in-channel 2% (1 in 50) flood level, however, given that the site is over 150m from the bank of the River Derwent and hence in-channel levels will be greater than on the floodplain, it is estimated that the November 2019 flood event had a return period of between 2% (1 in 50) and 1% (1 in 100).

The public house was significantly affected during the recent flood event where flood depths of up to 0.2m were experienced above ground floor level and approximately 2.35m above the basement floor level. This led to an insurance claim for damages and business interruption totalling around £1million.

7.0 Existing Flood Alleviation Measures

The public house has previously implemented some flood alleviation measures in the basement area which include a sump and pump system and a flood door fitted at the entrance to the basement from the car park. These can be seen below:

Flood Door



The flood door was subject to external depths of up to 2.35m during the recent flood event of November 2019 which led to the door structurally failing and therefore allowing flood water ingress into the basement area.

Sump & Pump System



It is considered that the flood door and sump and pump system would be somewhat effective at reducing flood water ingress to the basement area from surface water flood events, however, the defence measures were overwhelmed by more prolonged and severe flooding from the nearby rivers and therefore would not provide any protection.

8.0 Recommendations

Following the November 2019 flood event, the client is looking to implement flood protection measures in order to reduce or potentially mitigate a repeat of the loss recently experienced. The below section will therefore detail potential flood defence options which could be implemented at the site location based on the previous level of flooding, 67.83mAOD + 0.30m freeboard, a protection level of 68.13mAOD.

8.1 Replacement Flood Door

FCI would recommend that the existing flood door at the entrance to the basement from the car park is replaced with a more robust version capable of withstanding the imposed loading of flood water backed up by structural calculations to ensure the product performs as intended.

The basement walls are constructed from 200mm thick reinforced concrete which are considered sufficient to take the loading imposed by flood depths of up to 2.5m and also provides a suitable fixing surface for a new flood door.

Indicative costs: £7,000.00 to £10,000.00

8.2 Basement Entrance Enclosure

Discussions were held with the client onsite regarding a possible enclosure around the basement doorway entrance from the car park, the approximate outline (yellow) of this can be seen below:



The proposed enclosure would extend to approximately 0.5m above ground level, circa 66.52mAOD, and will tie into the building walls at either end. The purpose of the enclosure would be to permit access to the basement doorway under shallower flood conditions.

FCI believe this could be achieved by means of a civil structure (RC or brick wall) with a swinging/demountable flood barrier access point or a fully demountable flood barrier system which would require a new foundation to provide a suitable fixing surface.

Indicative costs: Demountable barrier system £1,200.00 to £1500.00 per m^2 (excluding civil works).

8.3 Basement Tanking

The client is planning to tank the inside of the external walls of the basement as well as the floor with a waterproof membrane such as Sika-1 or similar. During the recent flood event water was observed to be entering the basement through the structure and hence FCI would consider tanking of the floors and walls where possible to be a necessary step to keep flood water ingress via this route to a minimum.

8.4 Additional Sump & Pumps

As mentioned above the client does already have one sump and pump system located within the basement area. However, FCI would consider than additional sump and pumps are necessary within the basement area in order to keep any flood water ingress though the structure to a controlled level.

Taking this into account, installing either one large sump or 2/3 smaller pumps within the building would attempt to keep any seepage through the building walls, floors and through installed flood protection to a minimum.

The below table will outline costs for installation of smaller pumping systems as well as larger capacity package pumping systems:

Solution	Installed Cost
200l/min Pump	£900.00 to £1,500.00 (excludes wiring)
500l/min Pump	£1,800.00 to 3,500.00 (excludes wiring)
Package Pumping Station (1000l/min)	£5,000.00 to 8,000.00 (excludes wiring)

The cost variance for the pumping systems is due to specification and additional features (i.e. non-return valves, vortex impellers, operation type (float switch/sensor)). FCI can assist with further pump specification if required.

8.5 Penetration Sealing

There are three voids through the basement wall on the western side where cables from AC units enter the structure. There is also a cable entry point through the building floor level on the ground floor where the main electrical supply point is located. These entry points can be seen below.

AC Unit Cable Void (3 no.)



Main Electrical Supply Point



FCI would recommend that these voids are sealed using an approved water resistance sealant, such as CSD Rapid Rise, which is certified to be water, fire and blast resistant. An example photograph of sealed cable entries can be seen below:



Typical rates for CSD Rapid Rise are as follows:

100mm diameter duct - £175.00
150mm diameter duct - £295.00
200mm diameter duct - £465.00

Duct sealing is a specialist flood defence measure and therefore it is recommended that any sealing works are carried out by a specialist flood defence contractor.

8.6 Non-Return Valves (NRV's)

The property is served by foul drainage which based on information received from the client exits the property to the south through a series of manhole covers. One of the manhole covers located within the basement area can be seen below.



Modifying the foul drainage leaving the property is an essential part of flood defence works as external flood levels will equalise internally by backing up through drainage leaving the building from toilets, sinks, showers etc. At present if the November 2019 flood event re-occurred then a similar loss would be experienced as a result of the drainage not being taken into account.

It is firstly recommended that a CCTV drainage survey is carried out at the property to accurately identify where the foul drainage exits the property and connects to the local drainage network. This will be key to establishing how many non-return/flap valves will be required to seal off the foul drainage from hydraulic back surge. FCI would estimate that a CCTV survey at the property would cost between £900.00 and £1400.00 to complete.

As soon as the number of points at which drainage exits has been confirmed, non-return/flap valves can be installed which will close when back pressure occurs in the foul drainage network to prevent foul water flooding the property through toilets, sink and showers.

NRV's are available in a number of styles and materials, summarised below:

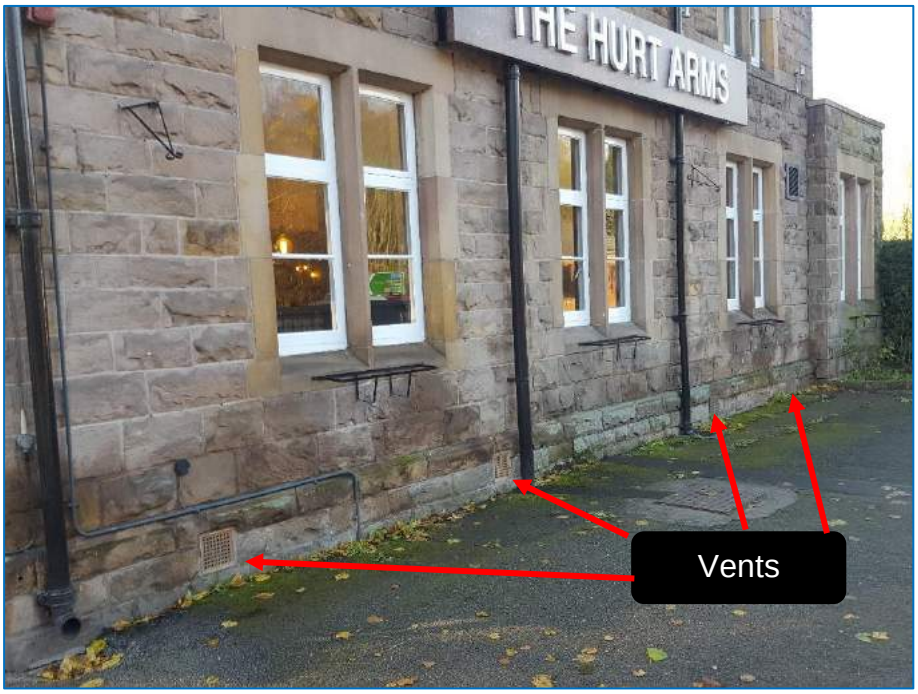
Valve Type	Cost	Positive	Negative
Plastic Flap Valve	• £45-130 (100mm) • £50-150 (150mm)	• Relatively inexpensive • Easy to install	• Maintenance required • Less durable that cast iron
Cast Iron Single Valve	• £400 (100mm) • £800 (150mm)	• Durable, long lasting	• Maintenance required • Greater expense • Longer Install
Cast Iron Double Valve	• £570 (100mm) • £900(150mm)	• Durable, long lasting	• Maintenance required • Greater expense

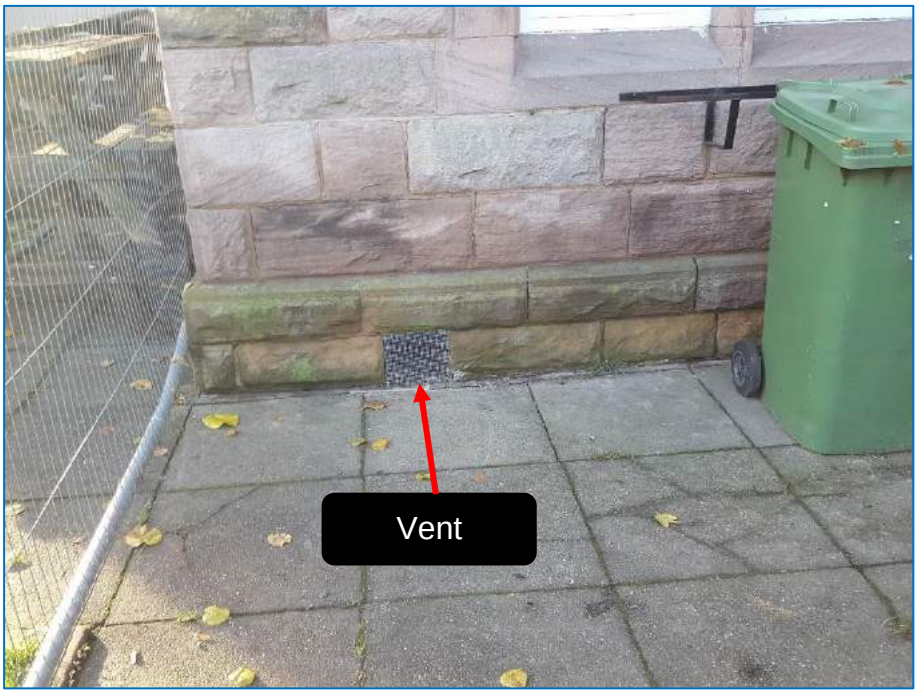
			• Longer Install

It should be noted that NRV's will not affect the normal drainage flow during non-flood conditions however, once the valve is closed, wastewater can no longer leave the building until flood water subsides.

8.7 Airbricks/Ventilation Outlets

There are six ventilation outlets located on the eastern perimeter of the building which are below the level of flooding experienced in November 2019 which did lead to flood water ingress into the ground floor of the public house. These can be seen below.







FCI would recommend that the existing ventilation outlets are defended against flood water ingress by means of either blocking up and relocating above the flood level or installing self-closing airbricks which close when contacted by flood water and then re-open when flood water recede.

Indicative costs: £60.00 to £100.00 for a single self-closing airbrick (plus installation)

8.8 Ground Floor Entrance Points

The ground floor level of the public house as three double door entrances and seven full height window sections all of which can be seen in the below images.

Main double door entrance



Emergency Exit Double Door



Emergency Exit Double Door – Extension



Full Height Windows – Extension Southern Perimeter



Full Height Windows – Extension Western Perimeter



Full Height Windows – Extension Northern Perimeter



The opening sizes and surveyed threshold levels of all of the above entrance points can be seen in the below table:

Description	Opening Width (mm)	Threshold Level (mAOD)	Flood Depth (m
Main Entrance Double Door	1785	67.63	0.5
Emergency Exit Double Door	1385	67.63	0.5
Emergency Exit Double Door – Extension	1780	67.62	0.51
Full Height Windows – Extension Southern Perimeter	2680 (all)	67.65	0.48
Full Height Windows – Extension Western Perimeter	1780 (small) 5430 (large)	67.66	0.47
Full Height Windows – Extension Northern Perimeter	2685 (all)	67.65	0.48

Flood depth based on previous level of flooding + 0.3m, 68.13 mAOD.

It is considered that the entrance points listed above can be defended against flood water ingress by installing demountable flood barriers across the existing reveals. It is recommended that any flood barriers installed to emergency exit doorways are fitted internally as fitting externally would prevent the doors from opening during an emergency scenario.

With regard to the full height windows on the extension of the public house it is considered that barriers cannot be fitted externally due to the lack of fixing space and unsuitable structure (rendered wall). It is therefore proposed that barriers are installed between the internal reveals of the windows where there is sufficient space for fixing and the reinforced concrete floor is structurally suitable for fixing also. The barriers would tie into the internal building walls (concrete block) at either end, see below image:



Indicative costs for proposed barriers at all locations discussed above can be seen in the below table:

Description	Opening Width (mm)	Flood Protection Height (mm)	Indicative Cost (£)
Main Entrance Double Door	1785	500	1500 to 2000
Emergency Exit Double Door	1385	500	1200 to 1500
Emergency Exit Double Door – Extension	1780	500	1500 to 2000
Full Height Windows – Extension Southern Perimeter	2680 (all)	500	2000 to 2500
Full Height Windows – Extension Western Perimeter	1780 (small) 5430 (large)	500	1500 to 2000 (small) 4000 to 4500 (large)
Full Height Windows – Extension Northern Perimeter	2685 (all)	500	2000 to 2500
		Total	**13700 to 17000**

8.9 Flood Alarm System

A flood alarm or river level monitoring system would provide the earliest indication that the River Derwent is close to overtopping. These systems come in a variety of forms dependent on the complexity of the system desired.

Basic systems usually consist of a sensor mounted on a riverbank or external to a property which contain a float switch. When water levels have risen to sufficient levels to activate the float switch, a notification by means of audible alarm or text message is sent out to a predetermined location or number. There are a number of systems similar to this on the market which generally range between £600.00 and £3000.00.

More complex systems can be attained which provide a greater level of information and reliability. Complex flood alarms can incorporate the following:

- Two float switches which reduces the likelihood of an incorrect reading and requires less regular maintenance.

- Real time data presentation showing river levels on a laptop, tablet or phone at any given time. Threshold levels can be included within the presentation to show to height of the river compared to roads or buildings.
- Hardened outer casings to provide great durability which can also be camouflaged to the surroundings to reduce the risk of vandalism.

Consequently, these complex flood warning systems are costlier with prices ranging from £5000.00 to £10,000.00 but will give the clearest indication of an impending flood event.

8.10 Kitchen Appliances

Following the recent flood event, a number of the major kitchen appliances (fridges, freezers, ovens etc.) were contacted by flood water and hence had to be replaced. The client has informed FCI that replacement equipment will be elevated a high as practically possibly so that in a repeat flood scenario the equipment would be more resilient to flood damage.

8.11 Further Comments

There is a section of the basement area underneath the extension where the floor is permeable earth and hence would susceptible to flooding through the ground when external flood levels exceed the basement floor level.

This could be addressed by constructing a solid concrete floor over the current permeable earth which would likely reduce any groundwater infiltration to manageable levels when utilising pumps within the basement.

Alternatively, the area of permeable ground could be sealed off from the remainder of the basement area by means of installing a flood door or demountable barriers at the entrance (to the right of the current flood door when looking from the outside).

Further information on any of the recommendations made above can be attained by contacting flood consult international.

9.0 Conclusion

The Hurt Arms located in Ambergate has deemed at significant risk of fluvial flooding from the nearby River Derwent with flooding predicted to affect the property during a 10% (1 in 10) flood scenario.

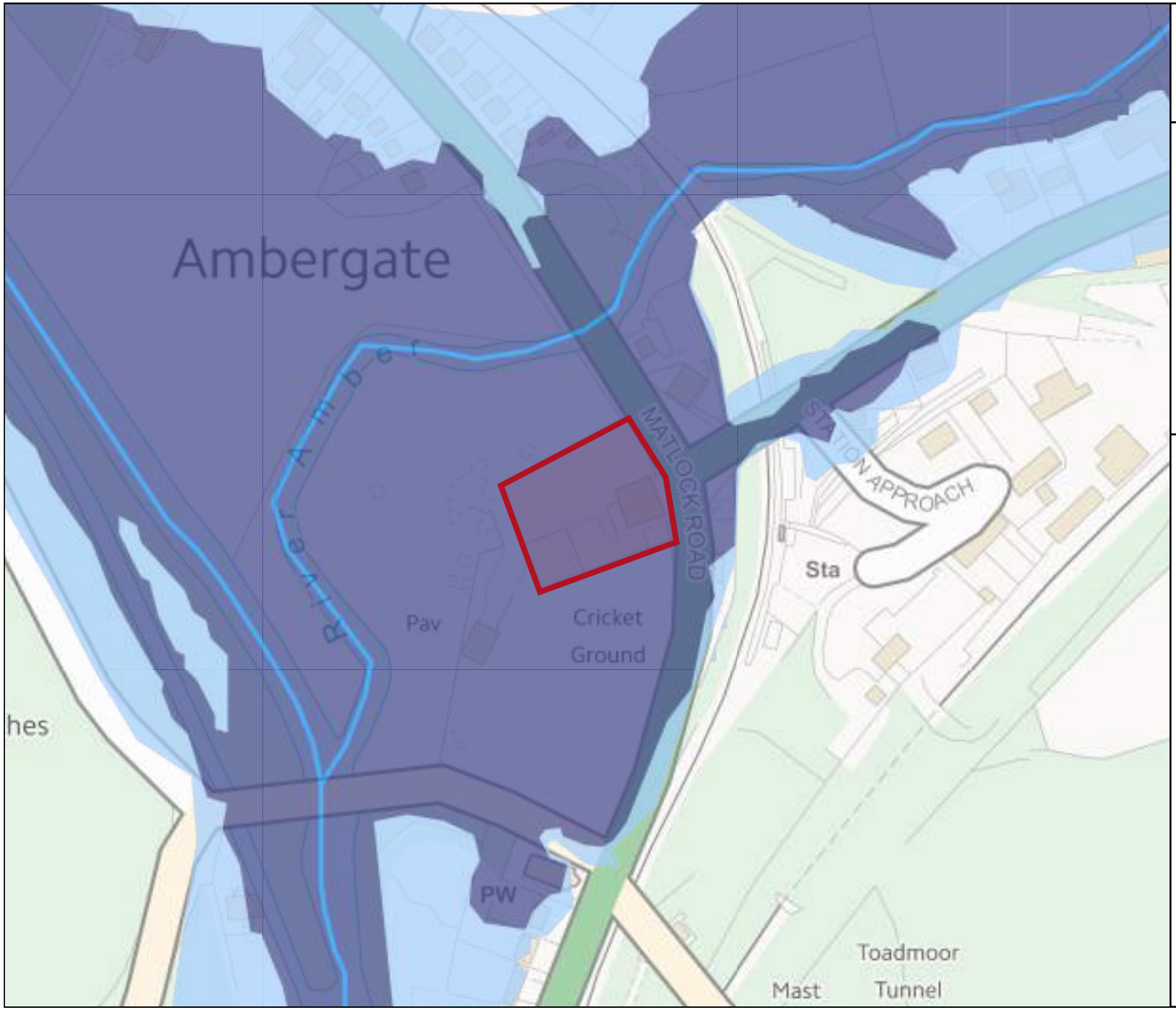
The recent flood event of November 2019 from the River Derwent flooded the basement area to depths of up to 2.35m and the ground floor up to 0.2m in depth. Comparisons of the level of flooding onsite to the detailed modelling of the River Derwent had led to an estimated return period of the November 2019 flood event of between 2% (1 in 50) and 1% (1 in 100).

The basement area of the site is also considered susceptible to surface water flooding as external topography slopes down towards the doorway entrance. The remainder of the site location is not considered susceptible to surface water flooding.

Flood risk from coastal/tidal flooding is not considered to pose a risk to the site due to the geographical location.

Taking this into account, recommendations have been made within this report with a view to reducing the potential impacts of a repeat of the November 2019 flood event.

APPENDIX A
EA Flood Map



Environment Agency

Flood map for planning

Your reference
The Hurt Arms

Location (easting/northing)
434806/351607

Scale
1:2500

Created
20 Dec 2019 12:50

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

0 20 40 60m

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APPENDIX B
1D Modelled Flood Levels – River Amber & Derwent

EMD151301

No floodplain heights/depths are available for the Derwent model.

Flood Map for Planning

The Flood Map for Planning is now classed as Open Data. As such it can be downloaded free of charge under an open data licence from the following address: https://data.gov.uk/publisher/environment-agency

Alternatively it can be viewed at the following address: https://flood-map-for-planning.service.gov.uk/

Modelled Information

Node point reference	Location	20% (1 in 5 year) modelled level (mAOD)	20% (1 in 5 year) modelled flow (m^3/s)	10% (1 in 10 year) modelled level (mAOD)
AMB_314	SK 34816 51694	64.90	31.07	65.49
AMB_195	SK 34696 51660	64.34	31.07	64.88
AMB_0	SK 34707 51518	64.07	31.07	64.64

Source: River Amber Hazard Mapping Study, JBA, May 2012

Node point reference	Location	10% (1 in 10 year) modelled flow (m^3/s)	5% (1 in 20 year) modelled level (mAOD)	5% (1 in 20 year) modelled flow (m^3/s)
AMB_314	SK 34816 51694	46.64	65.75	53.62
AMB_195	SK 34696 51660	46.64	65.09	53.64
AMB_0	SK 34707 51518	46.64	64.86	53.63

Source: River Amber Hazard Mapping Study, JBA, May 2012

Node point reference	Location	2% (1 in 50 year) modelled level (mAOD)	2% (1 in 50 year) modelled flow (m^3/s)	1.33% (1 in 75 year) modelled level (mAOD)
AMB_314	SK 34816 51694	66.07	62.93	66.23
AMB_195	SK 34696 51660	65.32	62.89	65.43
AMB_0	SK 34707 51518	65.10	62.92	65.21

Source: River Amber Hazard Mapping Study, JBA, May 2012

Node point reference	Location	1.33% (1 in 75 year) modelled flow (m^3/s)	1% (1 in 100 year) modelled level (mAOD)	1% (1 in 100 year) modelled flow (m^3/s)
AMB_314	SK 34816 51694	67.59	66.34	70.45
AMB_195	SK 34696 51660	67.36	65.50	69.92
AMB_0	SK 34707 51518	67.57	65.28	70.42

Source: River Amber Hazard Mapping Study, JBA, May 2012

Node point reference	Location	0.5% (1 in 200 year) modelled level (mAOD)	0.5% (1 in 200 year) modelled flow (m^3/s)	0.1% (1 in 1000 year) modelled level (mAOD)
AMB_314	SK 34816 51694	66.67	74.42	67.03
AMB_195	SK 34696 51660	65.59	73.11	65.78
AMB_0	SK 34707 51518	65.37	74.28	65.55

Source: River Amber Hazard Mapping Study, JBA, May 2012

Node point reference	Location	0.1% (1 in 1000 year) modelled flow (m^3/s)	1% + 20% flow (1 in 100 year plus climate change) modelled level (mAOD)	1% + 20% flow (1 in 100 year plus climate change) modelled flow (m^3/s)
AMB_314	SK 34816 51694	83.30	66.79	77.22
AMB_195	SK 34696 51660	79.36	65.65	75.29
AMB_0	SK 34707 51518	83.07	65.43	77.15

Source: River Amber Hazard Mapping Study, JBA, May 2012

Node point reference	Location	10% (1 in 10 year) modelled level (mAOD)	10% (1 in 10 year) modelled flow (m^3/s)	5% (1 in 20 year) modelled level (mAOD)
DE108	SK 34443 51874	67.23	187.13	67.60
DE107B	SK 34687 51481	66.95	140.49	67.32
DE106U-1	SK 34741 51193	66.15	230.95	66.47

Source: Matlock and Belper SFRM, Capita Symonds, March 2011

Node point reference	Location	5% (1 in 20 year) modelled flow (m^3/s)	2% (1 in 50 year) modelled level (mAOD)	2% (1 in 50 year) modelled flow (m^3/s)
DE108	SK 34443 51874	221.51	68.02	269.72
DE107B	SK 34687 51481	141.15	67.72	141.87
DE106U-1	SK 34741 51193	271.59	66.84	330.70

Source: Matlock and Belper SFRM, Capita Symonds, March 2011

Node point reference	Location	1.33% (1 in 75 year) modelled level (mAOD)	1.33% (1 in 75 year) modelled flow (m^3/s)	1% (1 in 100 year) modelled level (mAOD)
DE108	SK 34443 51874	68.12	298.90	68.16
DE107B	SK 34687 51481	67.78	141.70	67.82
DE106U-1	SK 34741 51193	66.89	338.99	66.92

Source: Matlock and Belper SFRM, Capita Symonds, March 2011

Node point reference	Location	1% (1 in 100 year) modelled flow (m^3/s)	0.5% (1 in 200 year) modelled level (mAOD)	0.5% (1 in 200 year) modelled flow (m^3/s)
DE108	SK 34443 51874	301.99	68.46	346.44
DE107B	SK 34687 51481	141.78	68.11	142.24
DE106U-1	SK 34741 51193	344.77	67.22	395.12

Source: Matlock and Belper SFRM, Capita Symonds, March 2011

Node point reference	Location	0.1% (1 in 1000 year) modelled level (mAOD)	0.1% (1 in 1000 year) modelled flow (m^3/s)	1% + 20% flow (1 in 100 year plus climate change) modelled level (mAOD)
DE108	SK 34443 51874	69.23	481.08	68.54
DE107B	SK 34687 51481	68.83	143.33	68.18
DE106U-1	SK 34741 51193	68.09	547.32	67.31

Source: Matlock and Belper SFRM, Capita Symonds, March 2011

Node point reference	Location	1% + 20% flow (1 in 100 year plus climate change) modelled flow (m^3/s)
DE108	SK 34443 51874	359.57
DE107B	SK 34687 51481	142.30
DE106U-1	SK 34741 51193	410.53

Source: Matlock and Belper SFRM, Capita Symonds, March 2011

Please note: The flows provided represent **in channel flow only** and do not take into account flow on the floodplain.

Updated Climate Change Guidance

On 19th February 2016, the Flood risk assessments: climate change allowances' was published on www.gov.uk website. It has replaced previous guidance Climate Change Allowances for Planners.

The climate change guidance can be found at: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances
If your RFI is to assist with a Flood Risk Assessment (FRA) for a future planning application, please review this guidance to consider which allowances should be used for your site.

The climate change allowance provided with this RFI is a 20% increase in the peak river flow for the 1% Annual Exceedance Probability (1 in 100 year) scenario.

Defence Information

There are no Environment Agency maintained raised defences in this area.

Historic Information

We have records of historic fluvial flooding at this location in 1947 and 1965. Please note that we may or may not hold the original records in question. We do not make any claim as to the reliability of recorded flood extents or that all flood events in the area have been recorded. Please also be aware that flood defences may have been built subsequent to these historic flood events. Note - This information relates to the area the above named property is in, and is not specific to the property itself - it ***does not*** provide an indicator of flood risk ***at individual property level***.

Open Data Information

The below datasets are now classed as Open Data and as such can be downloaded free of charge under an open data licence from the following address: https://data.gov.uk/publisher/environment-agency

- Risk of Flooding from Rivers and Sea (RoFRS) data
- LiDAR Data
- Flood Map for Planning (Rivers and Sea)
- Historic Flooding Data

Permitting Information

Under the Environmental Permitting (England and Wales) Regulations 2016, any permanent or temporary works in, over or under a designated main river will require an Environmental Permit for Flood Risk Activities from the Environment Agency.

Any permanent or temporary works within 8 metres of the top of bank of a designated main river, or landward toe of a flood defence may require an Environmental Permit for Flood Risk Activities from the Environment Agency. In addition, any permanent or temporary works within the floodplain of a designated main river may also require an Environmental Permit for Flood Risk Activities.

To find out whether your activity requires a permit or falls under a relevant exclusion, exemption or standard rule please follow the link below:
https://www.gov.uk/guidance/flood-risk-activities-environmental-permits

Please note that a permit is separate to and in addition to any planning permission granted.

Product Information

Below is a brief overview of which Product is likely to be most appropriate for your needs. This information will only be provided where it is available as we do not hold detailed information on all watercourses.

Product 4 – Producing a Flood Risk Assessment (FRA) where you:

- Require mapped and tabulated outputs from an Environment Agency model *e.g flood levels for a range of events*
- Require information on local defences and historic flooding events
- Do not need to undertake additional hydraulic modelling

Product 6 – Producing a Flood Risk Assessment (FRA) where you:

- Require raw modelling results files
- Require modelling results in GIS format

Product 7 - Producing a Flood Risk Assessment (FRA) where you:

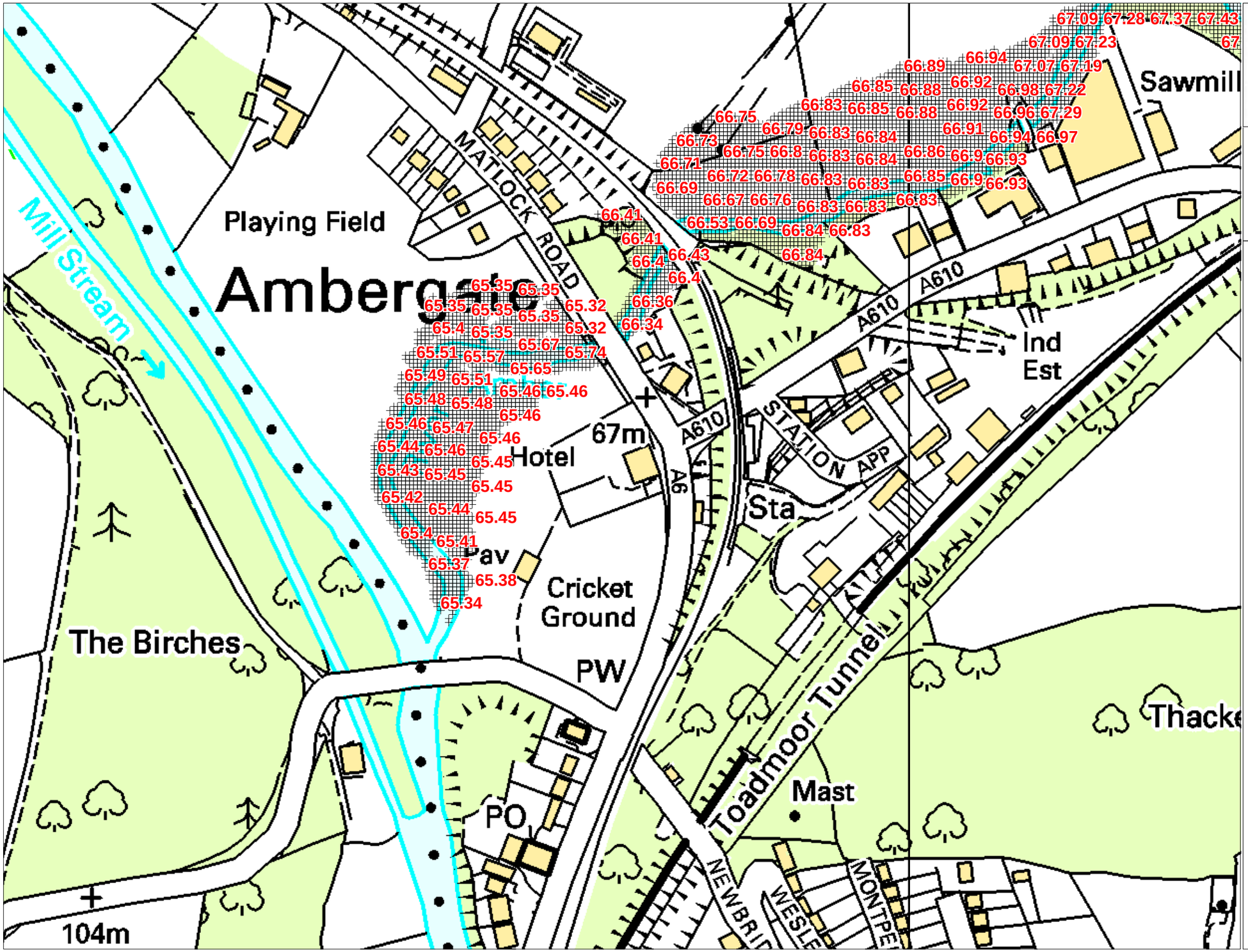
- Do need to undertake additional hydraulic modelling using an existing Environment Agency model

In most instances to supply Product 6 and Product 7 data a hard drive will need to be supplied due to the large file sizes associated with this information. Please note that this information will require specialist modelling software to view and run.

A Product 5 (Model Report) will be supplied with all Product 6 and 7 requests and can also be requested separately.

APPENDIX C
2D Modelled Fluvial Flood Levels – River Amber

Floodplain Heights Map centred on Derby Road, Ambergate - created 21 November 2019 Ref: [EMD151301]



Environment Agency

Scale 1:2,500

N W E S

Legend

x.xx — 1 in 100 year Floodplain Level (mAOD)

Source:
River Amber Hazard Mapping Study, JBA, May 2012

A Strategic Flood Risk Assessment may be available, providing further information for this site. Please contact your Local Planning Authority to access this information as it will need to be considered within any Flood Risk Assessment submission.

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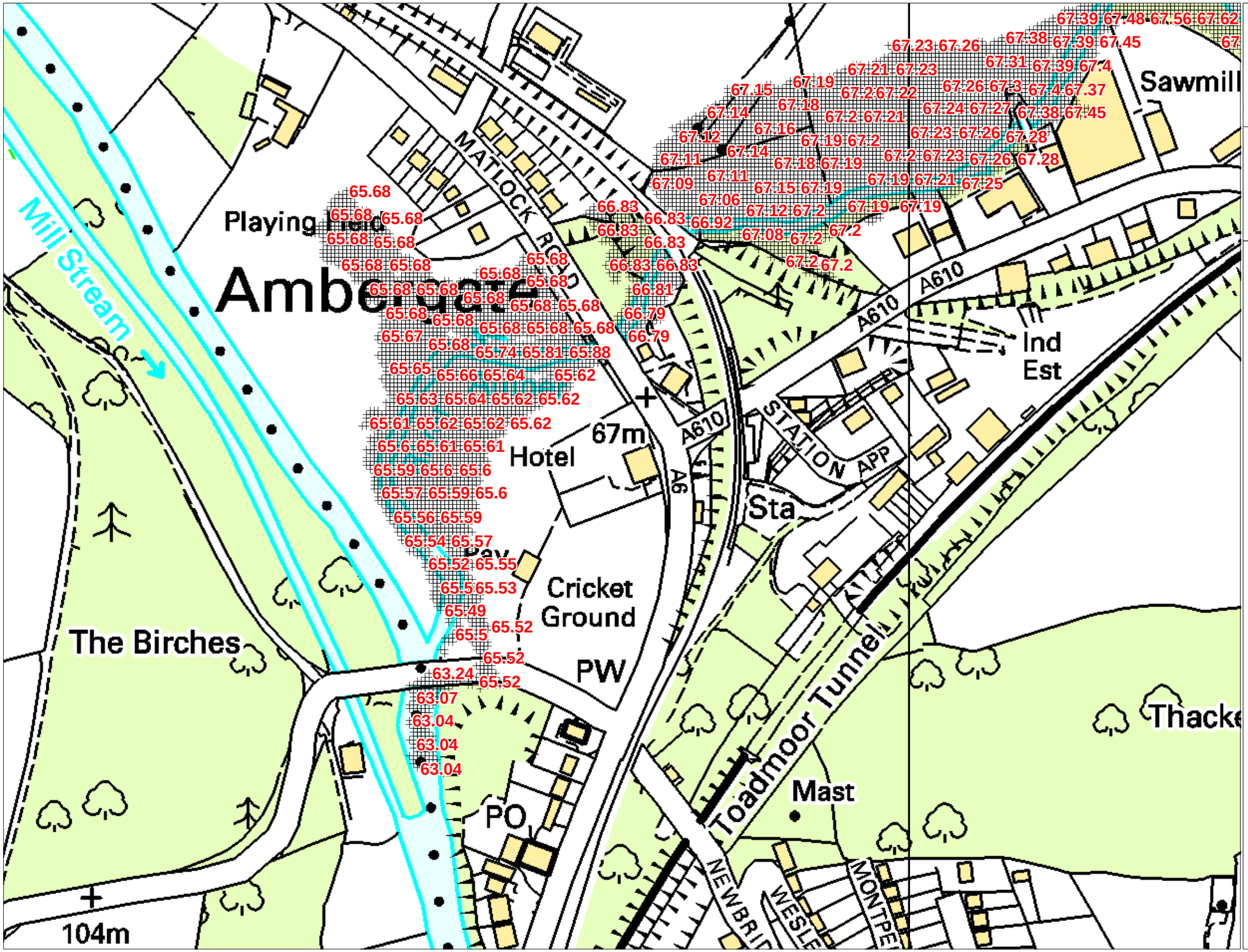
Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Floodplain Heights Map centred on Derby Road, Ambergate - created 21 November 2019 Ref: [EMD151301]



Environment Agency

Scale 1:2,500

N W E S

Legend

x.xx — 1 in 100 year (including climate change forecast) Floodplain Level (mAOD)

Source:
River Amber Hazard Mapping Study, JBA, May 2012

A Strategic Flood Risk Assessment may be available, providing further information for this site. Please contact your Local Planning Authority to access this information as it will need to be considered within any Flood Risk Assessment submission.

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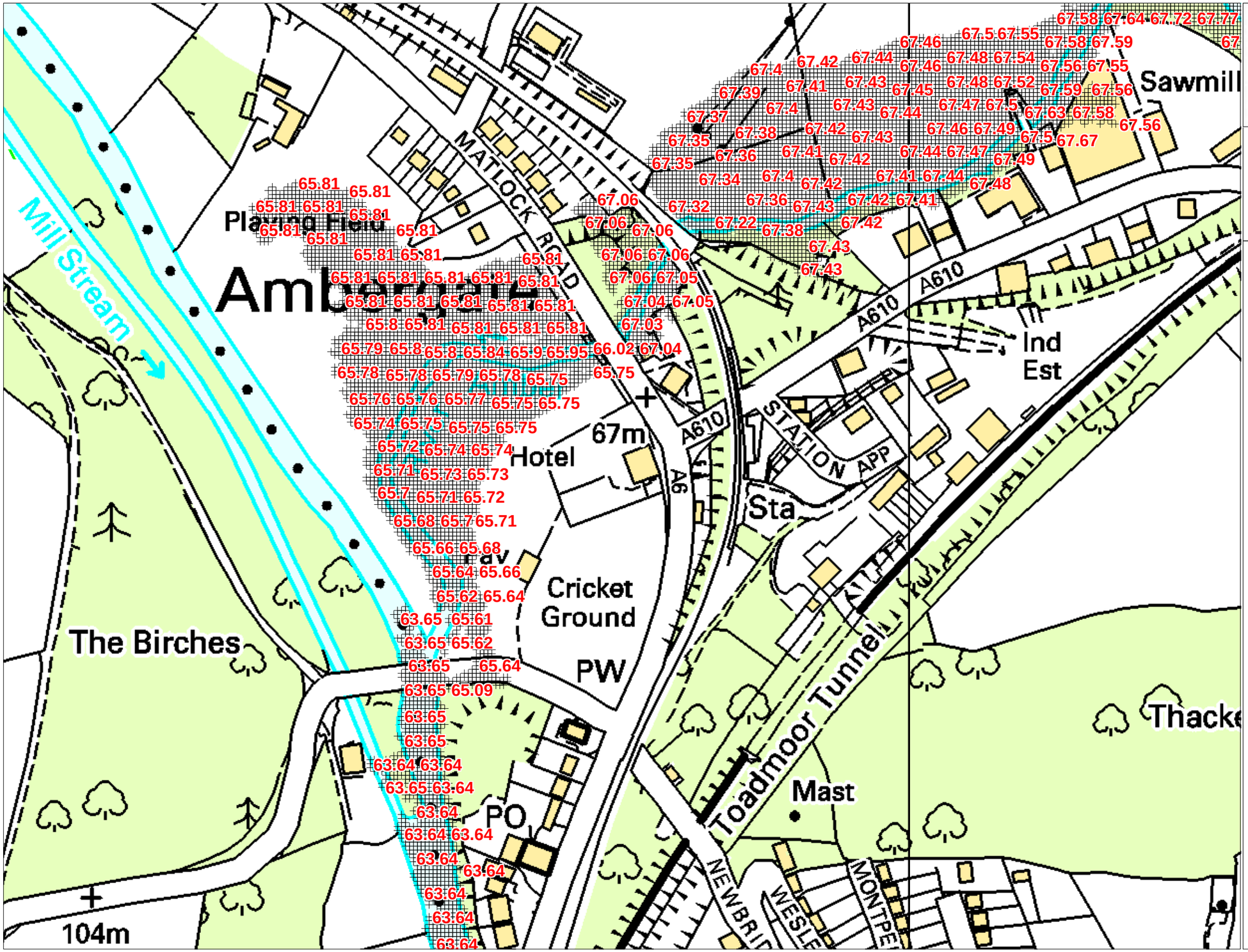
Floodplain Heights Map centred on Derby Road, Ambergate - created 21 November 2019 Ref: [EMD151301]



Environment Agency

Scale 1:2,500

N W E S

Legend

x.xx — 1 in 1000 year Floodplain Level (mAOD)

Source:
River Amber Hazard Mapping Study, JBA, May 2012

A Strategic Flood Risk Assessment may be available, providing further information for this site. Please contact your Local Planning Authority to access this information as it will need to be considered within any Flood Risk Assessment submission.

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MFO Map Legend

- 1 in 5 year Modelled Extent
- 1 in 10 year Modelled Extent
- 1 in 20 year Modelled Extent
- 1 in 50 year Modelled Extent
- 1 in 100 year Modelled Extent
- 1 in 150 year Modelled Extent
- Modelled Node Location and Reference

Source:
Matlock and Belper SFRM,
Capita Symonds,
March 2011

- 1 in 100 year Modelled Extent (including climate change forecast)
- 1 in 200 year Modelled Extent
- 1 in 1000 year Modelled Extent

Floodplain Heights Map Legend

Floodplain Depths Map Legend

x.xx — 1 in xxxx year
Floodplain Depth (m)

Source:
INSERT MODEL NAME

FD Map Legend

- Flood Defence Locations

Hazard Map Legend

Hazard Rating (FD2320)
1 in xxxx year

- Danger for all (greater than 2)
- Danger for most (1.25 - 2)
- Danger for some (0.75 - 1.25)
- Low (less than 0.75)

Source:

INSERT MODEL NAME

Derwent 2011 Model MFO Map Legend

- 1 in 10 year Modelled Extent (with 2 year flow on River Trent)
- 1 in 25 year Modelled Extent (with 2 year flow on River Trent)
- 1 in 50 year Modelled Extent (with 5 year flow on River Trent)
- 1 in 75 year Modelled Extent (with 5 year flow on River Trent)
- 1 in 100 year Modelled Extent (with 5 year flow on River Trent)
- 1 in 100 year Modelled Extent Including climate change forecast (with 5 year flow on River Trent)
- 1 in 200 year Modelled Extent (with 10 year flow on River Trent)
- 1 in 1000 year Modelled Extent (with 25 year flow on River Trent)
- Modelled Node Location and Reference

Source:
River Derwent SFRM, JBA, July 2011

Tidal Trent MFO Map Legend (FLUVIAL)

- 1 in 5 year Modelled Extent (with 5 year Tidal flow)
- 1 in 10 year Modelled Extent (with 5 year Tidal flow)
- 1 in 20 year Modelled Extent (with 5 year Tidal flow)
- 1 in 50 year Modelled Extent (with 5 year Tidal flow)
- 1 in 75 year Modelled Extent (with 5 year Tidal flow)
- 1 in 100 year Modelled Extent (with 5 year Tidal flow)
- 1 in 100 year Modelled Extent including climate change forecast (with 5 year Tidal flow)
- 1 in 200 year Modelled Extent (with 5 year Tidal flow)
- 1 in 1000 year Modelled Extent (with 5 year Tidal flow)
- Modelled Node Location and Reference

Source:
Tidal Trent SFRM, Mott Macdonald, 2013
(includes updated 2014 interim water levels)

Tidal Trent Breach Heights Map Legend

- Breach Location

x.xx — 1 in 100 year
(including climate change forecast)
Breach Floodplain Level (mAOD)

Source:
Tidal Trent SFRM, Mott Macdonald, 2013
(includes updated 2014 interim water levels)

Tidal Trent MFO Map Legend (TIDAL)

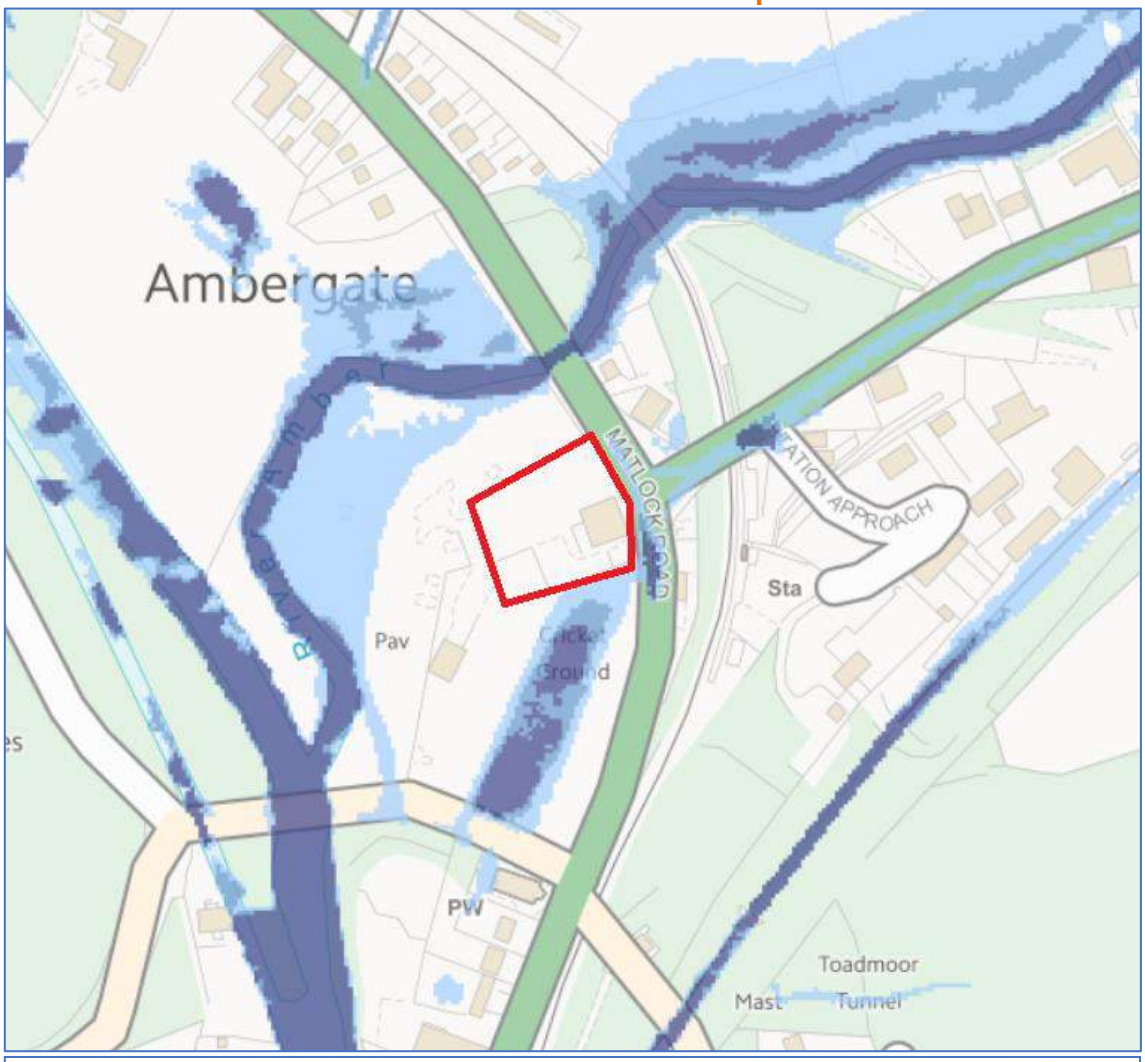
- 1 in 10 year Modelled Extent (with 2 year Fluvial flow)
- 1 in 20 year Modelled Extent (with 2 year Fluvial flow)
- 1 in 50 year Modelled Extent (with 2 year Fluvial flow)
- 1 in 100 year Modelled Extent (with 2 year Fluvial flow)
- 1 in 200 year Modelled Extent including climate change forecast (with 2 year Fluvial flow)
- 1 in 200 year Modelled Extent (with 2 year Fluvial flow)
- 1 in 1000 year Modelled Extent (with 2 year Fluvial flow)
- Modelled Node Location and Reference

Source:
Tidal Trent SFRM, Mott Macdonald, 2013
(includes updated 2014 interim water levels)

- 1% (1 in 100 year) floodplain
- 0.1% (1 in 1000 year) floodplain
- Main River
- Bank Top ePlanning Tool
- Areas Benefiting from Defences
- Flood Storage Area

The information on the Flood Map for this area is currently under review. Any revisions to the Flood Zone and Areas Benefiting from Defences outlines will be published in November 2011.

APPENDIX D
EA Surface Water Flood Map



Customers in Wales - From 1 April 2013 Natural Resources Wales (NRW) will take over the responsibilities of the Environment Agency in Wales.
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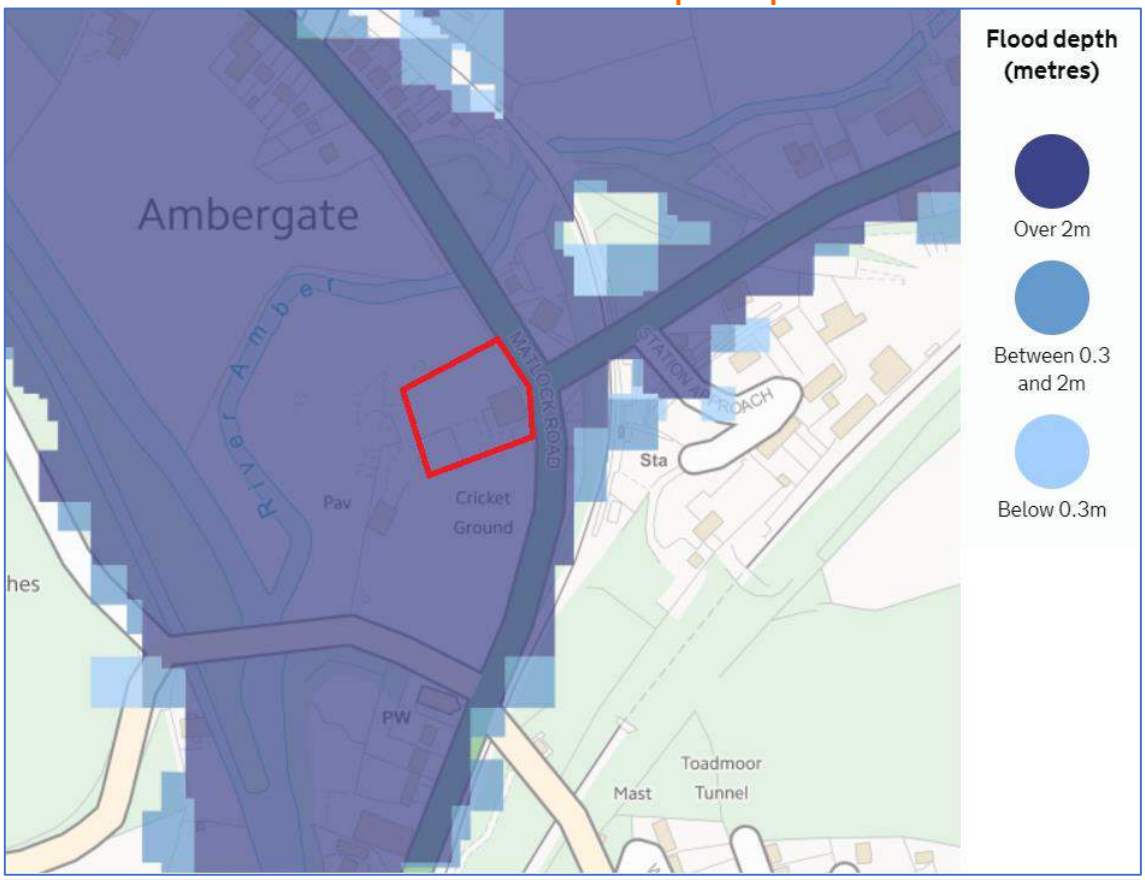
APPENDIX E
EA Reservoir Flood Depth Map



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APPENDIX F
Site Photos

Photo 1 – Eastern perimeter of the building from Derby Road



Photo 2 – Northern perimeter of the building showing main entrance



Photo 3 – Doorway Entrance to the basement



Photo 4 – Patio area on the western perimeter



Photo 5 – Southern perimeter of the building showing full height windows



Photo 6 – Boiler equipment within the basment



Photo 7 – Beverage dispenser equipment in the basement



Photo 8 – Bar/restaurant area on the ground floor



Photo 9 – Bar/restaurant area on the ground floor



Photo 10 – Kitchen area on the ground floor



Photo 11 – Exhibition room on the ground floor

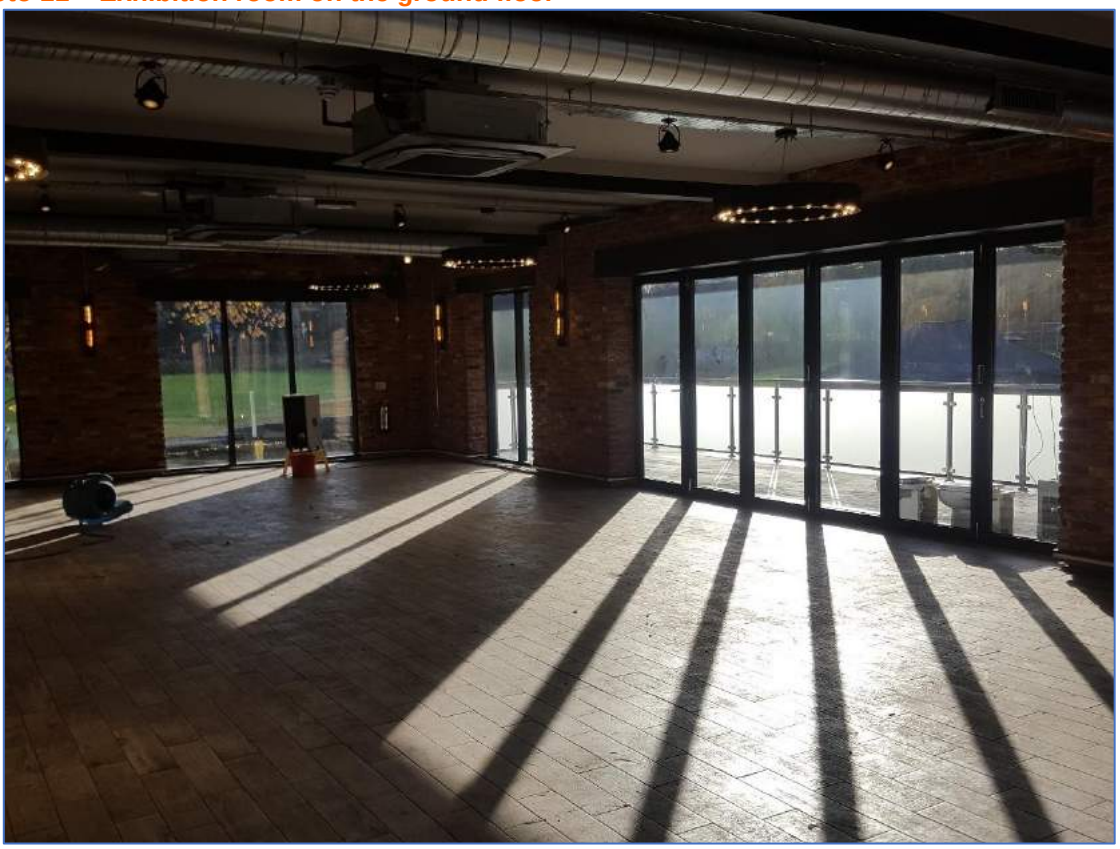

Photo 12 – WPD substation in the car park area



APPENDIX G
Site Topographic Survey

Key:
GL = Ground Level
DTH = Doorway Threshold
WTH = Windown Threshold
SL = Slab Level

All levels are given in metres above ordnance datum Newlyn (mAOD).

Helipad

HURT ARMS

DERBY ROAD

Pavilion

67.7m

Drawn: NW	Date: 19/12/19
Checked: SLG	Date: 20/12/19
Scale: NTS	Sheet Size: A2
Project: The Hurt Arms Topographical Survey	
Drawing No: FCI00132	Rev: 0
Company Details:	

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