

**ACRA Consulting**  
Civil & Structural Engineer's

**FLOOD RISK ASSESSMENT**

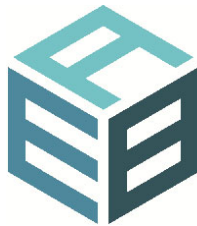
**FOR**

**PROPOSED ERECTION DETACHED  
DWELLING**

**AT**

**LAND NORTH OF  
STREET VIEW  
MAIN STEET  
ASSELBY  
EAST YORKSHIRE**

**FOR**



**ARCHITECTURE  
AND DESIGN LTD.**

**Project Ref: FRA-ASSEL102**

**Issue: 02**

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## 1.0 **Brief**

ACRA Consulting were requested by AEB Architecture & Design on behalf of the client to prepare a flood risk assessment for the proposed erection of a detached dwelling at land north of Street View, Main Street, Asselby, East Yorkshire.

The purpose of the assessment is to demonstrate compliance with local planning policy as outlined within the Hull City Council Strategic Flood Risk Assessment (SFRA)<sup>1</sup> and the National Planning Policy Framework (NPPF)<sup>2</sup>.

## 2.0 **Description of Existing Site**

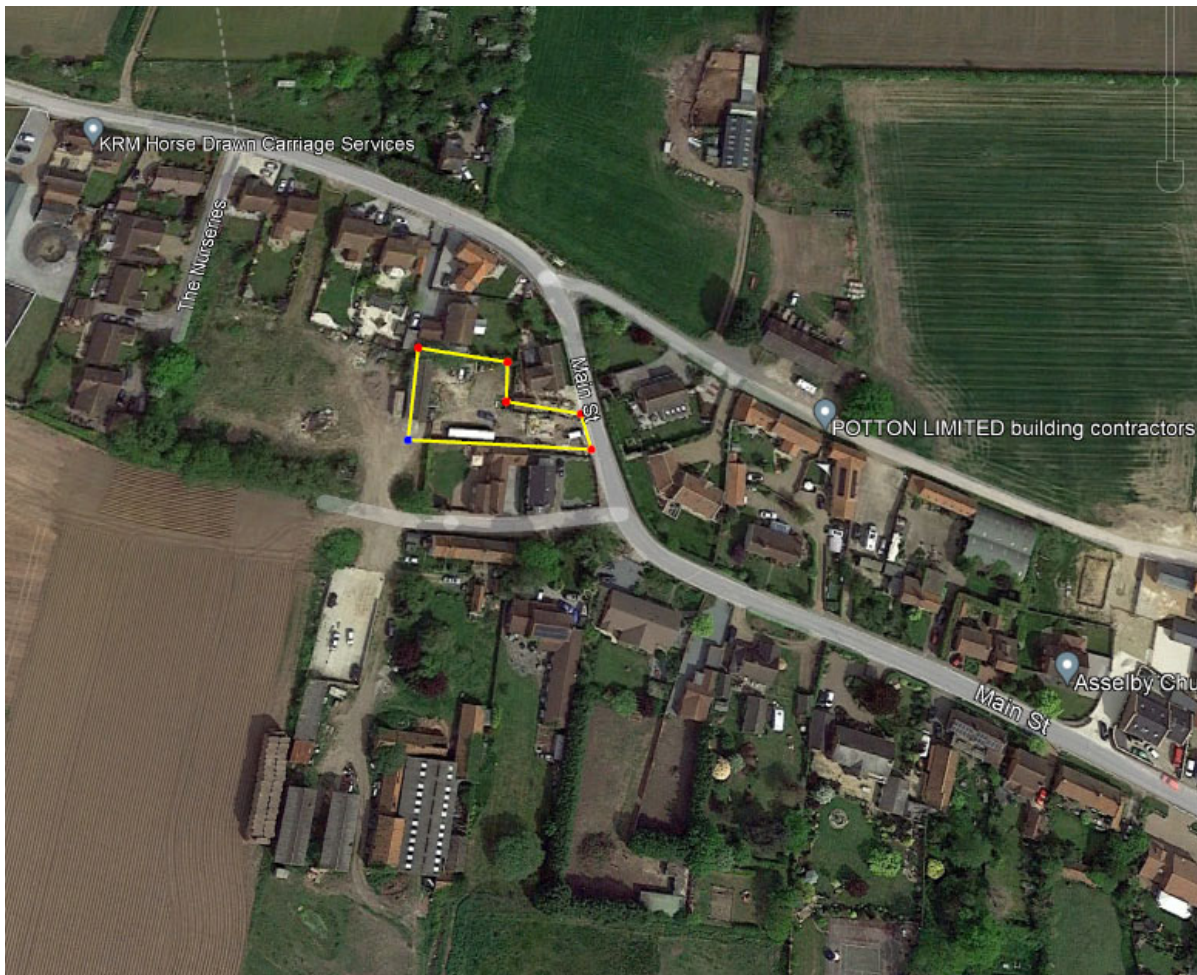
The proposed site is located off Main Street, Asselby.

The site location plan is included in Appendix I. The site is approximately 0.1ha in area.

The OS National grid reference of the centre of the site is approximately SE 71508 28183.

An existing and proposed plan are included within Appendix I.

Levels are unknown, however from LiDAR data it is suggested to be around 5.60m AOD.



**Extract from Google Earth – Showing the site in its existing condition**

## 3.0 **Proposed Development**

It is proposed to erect a single detached dwelling within the garden and a garage to the rear of the plot.

See Appendix I for the proposed site layout plan.

The proposed development is in a known area of flood risk as outlined by the Environment Agency's flood risk map.

A level 1 and 2 Strategic Flood Risk Assessment (SFRA) has been prepared for the East riding of Yorkshire Council by CAPITA<sup>1</sup>.

A key element of the SFRA is that it has collated all known sources of flooding, including tidal, river, surface water (local drainage), sewers and groundwater.

The proposed development is in a known area of flood risk as outlined by the Environment Agency's flood risk map.

With reference to the latest SFRA<sup>1</sup> indicative Flood Risk map, the proposed development site lies entirely within **Flood Zone 3a**.

Table 1 of the NPPF technical guide<sup>3</sup> states all development proposals in this zone should be accompanied by a detailed flood risk assessment.

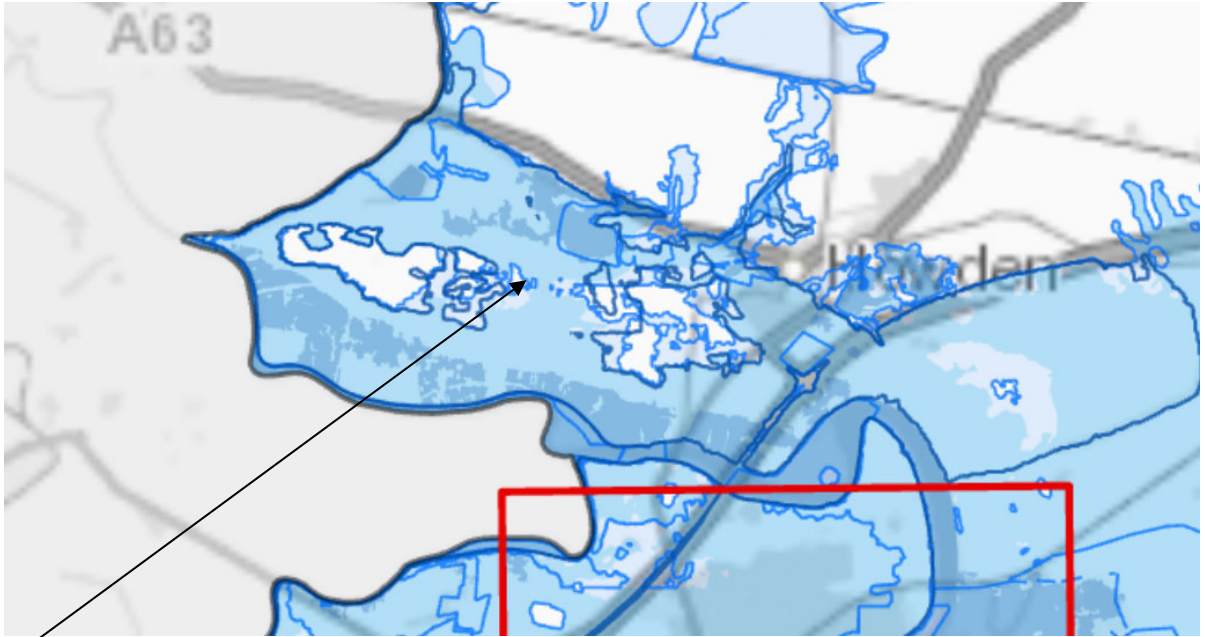
The proposed development comprises three new dwellings and is therefore classified as 'non-major' development.

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<sup>1</sup> East Riding of Yorkshire Council Strategic Flood Risk Assessment, CAPITA, November 2019.

<sup>2</sup> National Planning Policy Framework, Communities & Local Government, March 2012.

<sup>3</sup> Technical Guidance to the National Planning Policy Framework, Communities & Local Government, March 2012



Extract from East Riding of Yorkshire Council SFRA Flood Risk Map<sup>1</sup>

Site Location

### FLOOD ZONE 3

**area that benefits from flood defences**

Land and property in this flood zone would have a high probability of flooding without the local flood defences. These protect the area against a river flood with a 1% chance of happening each year, or a flood from the sea with a 0.5% chance of happening each year.

[More information about flood zones](#)

- 1** You may need to complete a [flood risk assessment](#) for development in an area benefiting from flood defences
- 2** Find out about the level of flood protection offered at your development's location. You can do this by [contacting the Environment Agency](#). You'll also need to obtain a Flood Defence Breach Hazard Map (also known as a 'Product 8' by planning authorities).
- 3** For some types of development in flood zone 3 you must follow the [Environment Agency's standing advice for carrying out a flood risk assessment](#)
- 4** You can also [read more about flood risk assessments for planning applications](#)

[Learn more about the potential sources of flood risk in this area](#)

Extract from East Riding of Yorkshire Council SFRA Flood Risk Map<sup>1</sup>



**4.0 Flood Risk Vulnerability Classification of the Proposed Development**

With reference to Table 2 of the NPPF technical guide<sup>3</sup>, the proposed use of the site for residential development is classified as ‘**more vulnerable**’.

With reference to Table 3 of the technical guide<sup>3</sup>, developments with ‘more vulnerable’ classifications within zone 3a should only be permitted if the sequential test and exception test can be adequately passed.

**Table 3: Flood risk vulnerability and flood zone ‘compatibility’**

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	*	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	*	*	*

**Key:**     ✓ Development is appropriate.  
               \* Development should not be permitted.

**Table 3 from NPPF Technical Guide<sup>3</sup>**

**4.1 Requirements of the Flood Risk Assessment**

A detailed flood risk assessment has been requested by the council. Following a review of the Spatial Planning and Development Control Recommendation Matrix<sup>1</sup>.

Finish floor level shall be set 0.6m above the average site level or adjacent road level whichever is the higher.

Additional 0.3m of flood proofing shall be provided.

Section 6 onwards shall consider the flood risk to the site in detail and confirm that the development will be safe.

FLOOD ZONE				
Recommendation	Development within Goole and Hedon should refer to the latest Level 2 SFRAs for these two areas. The Level 2 SFRAs provides additional guidance and recommendations for these areas and these must be considered over and above the recommendations provided for the flood zones in this table.			
	Zone 3b (Functional Floodplain)	Zone 3a (High Probability)	Zone 2 (Medium Probability)	Zone 1 Low Probability
<b>Buffer Zone</b>	Development free buffer zones around watercourses should be provided according to the following risk management authority by-laws. Buffer zones should be free of buildings and structures, trees, shrubs, willow or similar growth. <ul style="list-style-type: none"> <li>Environment Agency: Works in, over, under or within a 'Main River' (as shown on maps in Appendix D), and within 8metres of 'Main Rivers' (or flood defence where present), will require an Environmental Permit from the Environment Agency. This buffer zone increases to 10metres on tidal 'Main Rivers' and from sea defences. There must be no new development in these areas.</li> <li>IDBs: with the exception of Thorntree IDB, IDBs in East Riding require a minimum 9 metre wide buffer zone around IDB and ordinary watercourses.</li> <li>Thorntree IDB: 6 metre wide buffer zone around IDB watercourses.</li> </ul>			
<b>Compensatory storage</b>	Where proposed development will result in a reduction in the total volume of flood storage, developers should provide compensatory storage. The compensatory flood storage should be provided within areas currently outside of Flood Zones 3b, 3a and 2. Flood water must be able to flow in and out unaided, and must be provided on a level for level, volume for volume basis within the site boundary. The compensation should be considered in the context of the 1% AEP flood level and include an allowance for climate change. If the land is not inside the site boundary, the compensatory storage should be in the immediate vicinity of the site and under the developer's ownership/control. All proposed compensatory storage should be supported by a site specific FRA which needs to demonstrate there is no loss of flood storage capacity, no subsequent effect on flood risk elsewhere, and must include details of an appropriate maintenance regime to ensure it continues to function throughout the lifetime of the development. Guidance on how to address storage is provided in Appendix A3 of the CIRIA publication C624. Compensatory storage areas should be included within the Functional Floodplain layer to protect the land against any development in the future.		An assessment of 'Other sources of flooding' risk should consider the implications of flood risk on others, and the need for floodplain compensation. A starting point for this assessment should be the 'design flood event'. Appropriate allowances should be incorporated for assessing climate change. Developments would not normally be required to compensate for groundwater, or artificial source of flooding, however this should be confirmed with the relevant risk management authority.	
	In areas where floodplain compensation is necessary but cannot be provided in line with the guidance (e.g. because the site is entirely within Flood Zone 3, or other restrictions), a pragmatic approach to providing compensatory storage will be considered if appropriate. In these circumstances, the relevant risk management authorities should be contacted early (e.g. pre-application stage). Where there are multiple sources of flood risk, each individual source should be considered; and ensuring that the overall scheme does not increase the risk of flooding onsite or to others.			
<b>Raising of ground levels</b>	Raising of ground levels should not be permitted in this Zone.	If modifying ground levels to raise the land above the required flood level is proposed care must be taken to ensure there is no subsequent effect on flood risk elsewhere and compensatory storage should be provided within areas that currently lie outside of Flood Zones 2 and 3 to ensure compensation is provided on a 'level for level' and 'volume for volume' basis, without affecting flood flow routes. All proposals should be supported by a detailed site specific flood risk assessment. The FRA should also show that raising of ground levels will not cause increased ponding or build-up of surface water on third party land or property, including those in Flood Zone 1. The raising of ground levels may also affect the residual flood risks to others (e.g. by redirecting flow). In these cases, the FRA must demonstrate that residual flood risks to others is not significantly increased (e.g. by increasing the predicted flood hazard or speed of onset).		Any alteration of ground levels should not cause increased ponding or build-up of surface water on third party land or property.
<b>Flood Resistance</b>	Flood resistance involves measures designed to keep flood water out of properties and businesses where the predicted flood depths are expected to be less than 0.6 metres (or 600mm). These should ideally be passive. Active resistance measures cannot be achieved and where a plan exists that ensures these measures are effective and can be implemented prior to the onset of flooding. In cases where flood risk remains to a development, for example residual risk, additional measures can be implemented to reduce damage. These measures should not be relied upon as an appropriate mitigation measure and their effectiveness is often reliant on a reliable forecasting and warning system to ensure measures are deployed in time.			

FLOOD ZONE				
Recommendation	Development within Goole and Hedon should refer to the latest Level 2 SFRAs for these two areas. The Level 2 SFRAs provides additional guidance and recommendations for these areas and these must be considered over and above the recommendations provided for the flood zones in this table.			
	Zone 3b (Functional Floodplain)	Zone 3a (High Probability)	Zone 2 (Medium Probability)	Zone 1 Low Probability
<b>DEVELOPMENT MANAGEMENT RECOMMENDATIONS</b>				
<b>Sequential Test</b>	Required.	Required (unless the site falls under one of the circumstances below).	Required (unless the site falls under one of the circumstances below).	Not required unless information shows there may be flooding issues now or in the future from any source. The Level 1 SFRA climate change maps should be used as a starting point to identify areas that may be at risk from fluvial or tidal flooding in the future. If information shows the site may be at risk in the future, the Sequential Test should be undertaken to determine if there are more appropriate sites for the development.
	Need not apply if the site is allocated in the Local Plan unless the proposal is for a use for which the site was not allocated for or if evidence suggests the level of flood risk has increased since the site was allocated. Minor developments (as defined by the Planning Practice Guidance) need not undertake the Sequential Test. Sequential Test does not need to be applied to minor developments and changes of use, except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site. Replacement dwellings with no increase in the number of dwellings or footprint of dwellings need not undertake the Sequential Test.			
<b>Detailed FRA</b>	Required, including minor development and change of use.	Required – including minor development and change of use.	Required – including minor development and change of use.	Required for sites greater than 1 ha in areas. Required for sites where they could be affected by other sources of flooding other than rivers and sea.
	Consider it Environment Agency National Flood Risk Standing Advice applies. An assessment of the residual risk of flooding will be required for FRAs where sites are protected by flood defences. Applicants are encouraged to demonstrate their proposal will deliver a positive reduction in flood risk overall. If this is not possible then consideration needs to be given to whether a contribution to flood risk management infrastructure may be appropriate. The FRA should specify whether the site is in an area of surface water or groundwater risk and, if so, provide an explanation of how the risk will be addressed.			
<b>Finished Floor Level</b>	To be agreed on a site by site basis.	Finished floor levels to be set at 600mm above average site level or adjacent road frontage level, 'design flood' level or maximum historic flood level (if available), whichever is higher. An additional 300mm flood proofing should also be provided. (Road frontage level defined as the average between the gutter and the crown of the road).	Finished floor levels to be set at 300mm above average site level or adjacent road frontage level, 'design flood' level or maximum historic flood level (if available), whichever is higher. An additional 300mm flood proofing should also be provided. (Road frontage level defined as the average between the gutter and the crown of the road).	No minimum level stipulated however this should be informed by the site specific Flood Risk Assessment, considering the predicted impacts of climate change and other sources of flooding. Where not specified, Finished Floor Levels should be raised 150mm above average ground levels or adjacent road frontage (whichever is highest), providing a nominal level of protection.

Table 8-3: Spatial Planning and Development Management Recommendations

FLOOD ZONE				
Recommendation	Development within Goole and Hedon should refer to the latest Level 2 SFRAs for these two areas. The Level 2 SFRAs provides additional guidance and recommendations for these areas and these must be considered over and above the recommendations provided for the flood zones in this table.			
	Zone 3b (Functional Floodplain)	Zone 3a (High Probability)	Zone 2 (Medium Probability)	Zone 1 Low Probability
<b>SPATIAL PLANNING RECOMMENDATIONS</b>				
<b>Sequential Test</b>	Required.	Required (unless the site falls under one of the circumstances below).	Required (unless the site falls under one of the circumstances below).	Not required unless information shows there may be flooding issues now or in the future (see Sequential Test map). If information shows the site may be at risk in the future, the Sequential Test should be undertaken to determine if there are more appropriate sites for the development.
	Minor developments (as defined by the Planning Practice Guidance) need not undertake the Sequential Test. Sequential Test does not need to be applied to minor developments and changes of use, except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site. Replacement dwellings with no increase in the number of dwellings or footprint of dwellings need not undertake the Sequential Test.			
<b>Exception Test</b>	Must be passed for Essential Infrastructure	Must be passed for More Vulnerable development and Essential Infrastructure	Must be passed for Highly Vulnerable development	Not required
<b>Land Use</b>	Should be restricted to Water Compatible development. Essential Infrastructure only permitted if Exception Test is passed.	Should be restricted to Water Compatible, Essential Infrastructure or Less Vulnerable development. More Vulnerable development and Essential Infrastructure only permitted if Exception Test can be passed.	Should be restricted to Water Compatible, Less Vulnerable, and Essential Infrastructure or More Vulnerable development. Highly Vulnerable only permitted if Exception test can be passed.	All allowed.
<b>Buffer Zone</b>	Development free buffer zones around watercourses should be provided according to the following risk management authority by-laws. Buffer zones should be free of buildings and structures, trees, shrubs, willow or similar growth. <ul style="list-style-type: none"> <li>Environment Agency: Works in, over, under or within a 'Main River' (as shown on maps in Appendix D), and within 8metres of 'Main Rivers' (or flood defence where present), will require an Environmental Permit from the Environment Agency. This buffer zone increases to 10metres on tidal 'Main Rivers' and from sea defences. There must be no new development in these areas.</li> <li>IDBs: with the exception of Thorntree IDB, IDBs in East Riding require a minimum 9 metre wide buffer zone around IDB and ordinary watercourses.</li> <li>Thorntree IDB: 6 metre wide buffer zone around IDB watercourses.</li> </ul> Where developments contain different elements of vulnerability, the highest vulnerability category should be used, unless the development is considered in its component parts.			
<b>Important Considerations</b>	Essential Infrastructure that has to be in Zone 3b and has passed the Exception Test, and Water Compatible development should <ul style="list-style-type: none"> <li>be designed and constructed to remain operation and safe for users in times of flood.</li> <li>Result in no net loss of floodplain.</li> <li>Not impede water flows and not increase flood risk elsewhere.</li> </ul>	Essential Infrastructure should be designed and constructed to remain operation and safe in times of flood.	As flows increase in the future there is a chance that areas that are currently in Flood Zone 2 could become Flood Zone 3 as a result of climate change. Plan makers should take climate change into account when applying the sequential approach to site selection.	Sites in Zone 1 may be at risk from other sources of flooding e.g. surface water, groundwater, and artificial sources. The Local Planning Authority should assess this risk as provide an explanation of how the risk will be addressed/managed. Flood Zones do not normally include risk from watercourses with a catchment area less than 3km <sup>2</sup> . Risk from these watercourses will need to be considered as part of a detailed FRA. These are areas on the flood zones maps where a watercourse is shown on Ordnance Survey mapping but no flood zones exist.

## 5.0 Sequential & Exception Test

With reference to Technical Guidance of the NPPF<sup>3</sup>, the SFRA should form the basis for applying the Sequential Test.

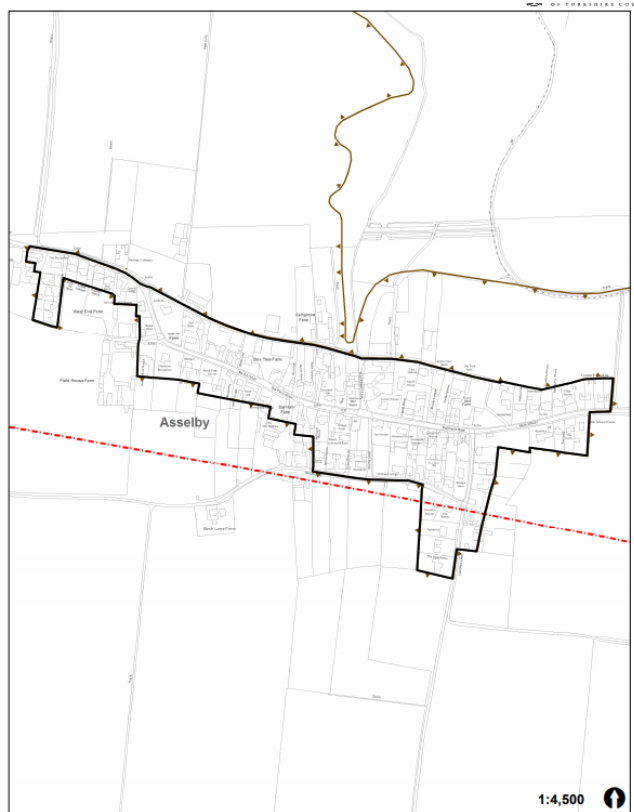
The Sequential Test will therefore be based on the East Riding of Yorkshire Council SFRA<sup>1</sup> Flood Zones along with the East Riding of Yorkshire Local Plan.

The following Sequential Test is undertaken in line with current Environment Agency Flood Risk Standing Advice<sup>5</sup>.

With reference to table 3 of NPPF<sup>3</sup>, **More Vulnerable** development is appropriate within Flood Zone 3a - subject to the sequential test, and exception test, being passed.

The Sequential Test is to be applied to the area within the village of Asselby.

No allocated site are located within Asselby. In addition to this an internet search has been conducted with no available plots on the market to buy in the village or located in a lower flood risk zone



**Policies Map - July 2016** **Asselby**  
**East Riding Local Plan (2012-2029)** **Inset 60**

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### Extract from EROYC "Local Plan" Asselby

The local plan supported developments in villages and the countryside in the form of New housing, usually comprising a single dwelling. Asselby is listed within Appendix B of the local plan for the purpose of policy S4.

It is therefore deemed; appropriate level of development is preferable given flood risk measures are implemented.

**The Sequential Test is therefore satisfied**



## 6.0 Flood Risk

As part of the production of the SFRA for the East Riding of Yorkshire Council<sup>1</sup>, flood risk from numerous sources were modelled and subsequently used to establish the boundaries of each particular flood zone.

Other sources of information, including The Environment Agency, and the British Geological Survey shall also be used to assess the flood risk to the site.

The Flood Risk to the site can be divided into 5 main elements;

1. Overtopping of the River Ouse defences
2. A breach of the River Ouse defences
3. Surface Water flooding
4. Groundwater flooding
5. Historical flooding

## 6.1 Overtopping of the River Ouse defences

The highest recorded tide level in the River Ouse near Goole is 6.04mAOD on 5<sup>th</sup> December 2013<sup>17</sup>. Therefore, in theory, the site is at risk from tidal flooding. This explains the classification by the Environment Agency and East Riding of Yorkshire Council as Zone 3a.

The existing River Ouse defences to the South of the site comprise earth embankment.

Flood defence levels directly to the North of this site are quoted within the EA data to be at 5.800m AOD (Section 29349).

Modelled levels for the River Humber are as follows (Node OUSE EA12322023OUSE\_22416 & 22416i);

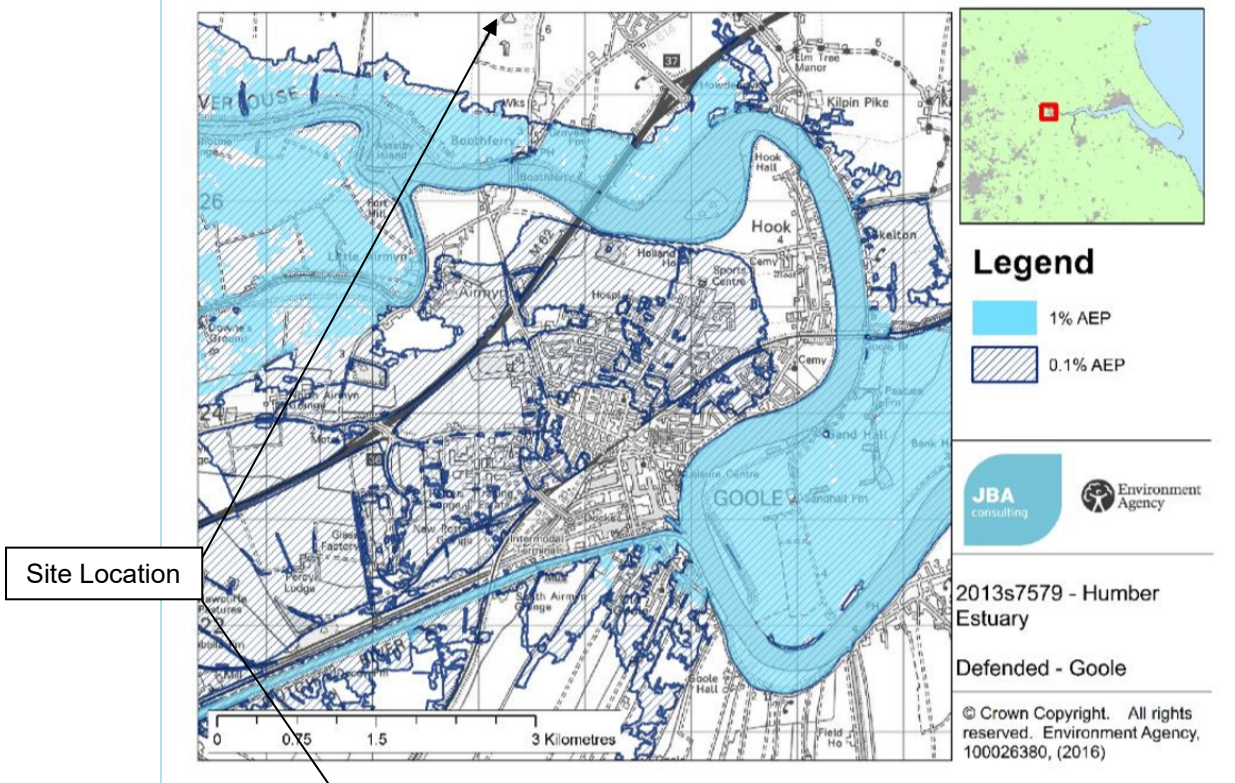
<b>22416</b>		<b>22416i</b>	
1:100 + CC (Fluvial)	5.776mAOD	1:100 + CC (Fluvial)	5.768mAOD
1:200 + CC (Tidal)	6.201mAOD	1:200 + CC (Tidal)	6.219mAOD

The site is therefore only considered to be at a potential risk when during or greater than the 1:200 year AEP event.

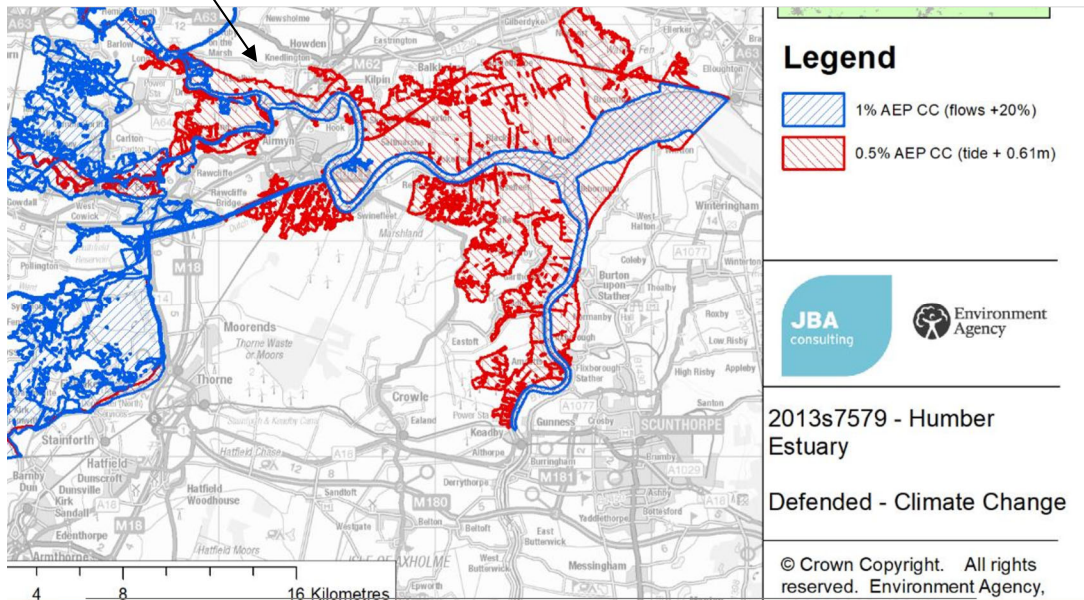
Following a review of the "New Humber Model" data. Asselby is not shown to be affected during an overtopping event as shown below;

Goole

Figure 6-16: Defended flood outlines - Goole



Extract from EA "New Humber Model" Defended Map



Extract from EA "New Humber Model" Defended Map with Climate Change

The model outlines that the south bank of the three main rivers in the area takes most of the water from an overtopping event.

Most of the water in the area occurs from upstream overtopping into floodplains that flow paths convey a large volume of water from 8km upstream.

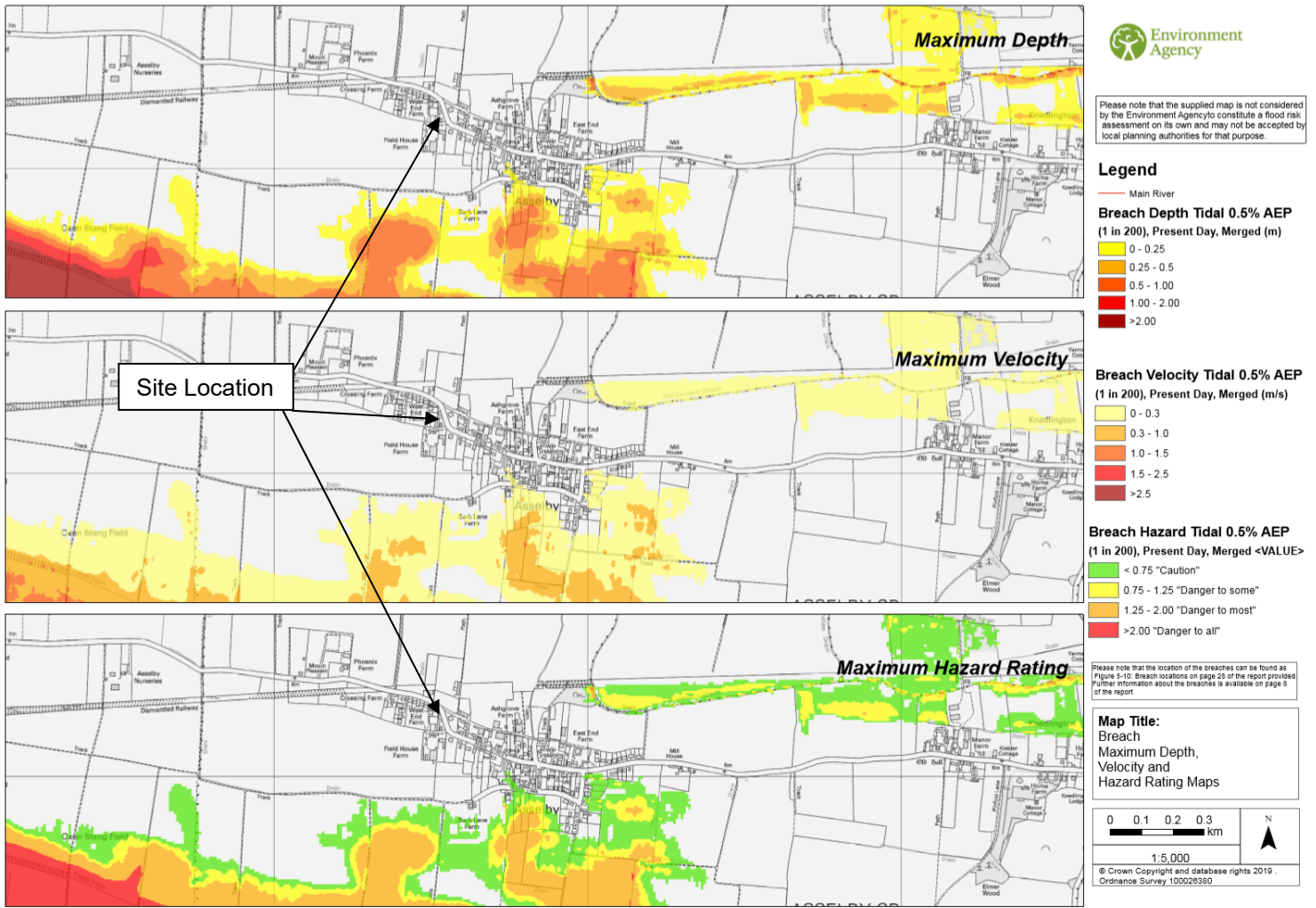
The risk posed by overtopping of the River Ouse defences is therefore considered to be Low.

**6.2 A Breach of the River Ouse defences**

The River Ouse defences immediately to the South of the site are primarily ‘soft embankments.

In order for a breach to form, it is generally accepted that water must flow over the embankment and cause erosion to the landward face which subsequently weakens the structure causing eventual collapse.

The data provided by the EA shown below only represents present day and not taking account for climate change.



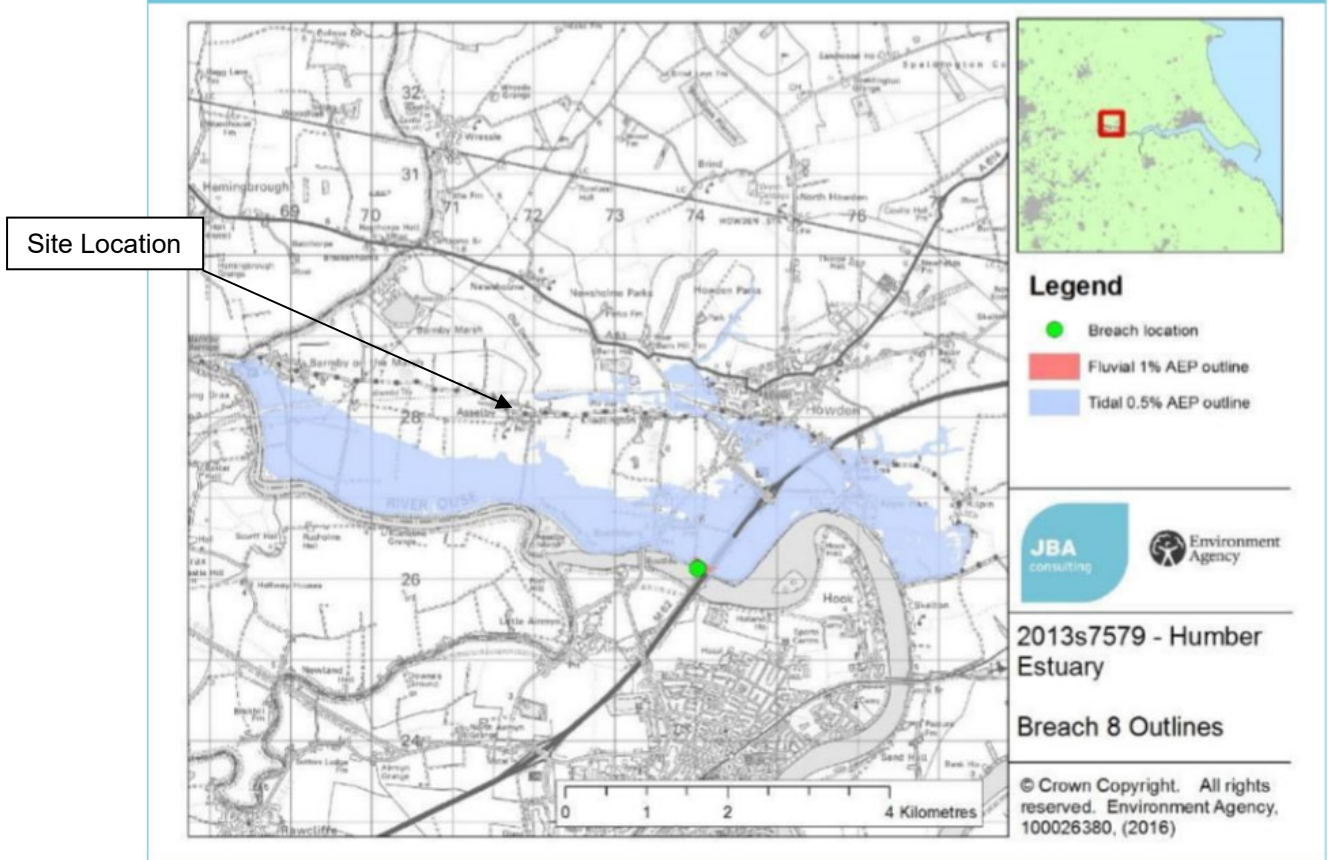
**Extract from EA Breach Map**

From the above map the site is located in an area that would **NOT** be affect by flood ingress or shown to be at risk based on the present day 1:200 year AEP.

Reviewing the “New Upper Humber Model” a breach located has been modelled at Howden to the east of the site. Breach node 8 as shown below;



Figure 6-23: Breach results at Howden



Extract from EA "New Humber Model" undefended Map

The model shows Asselby **NOT** to be affected during a breach event up to the 1:200-year AEP.

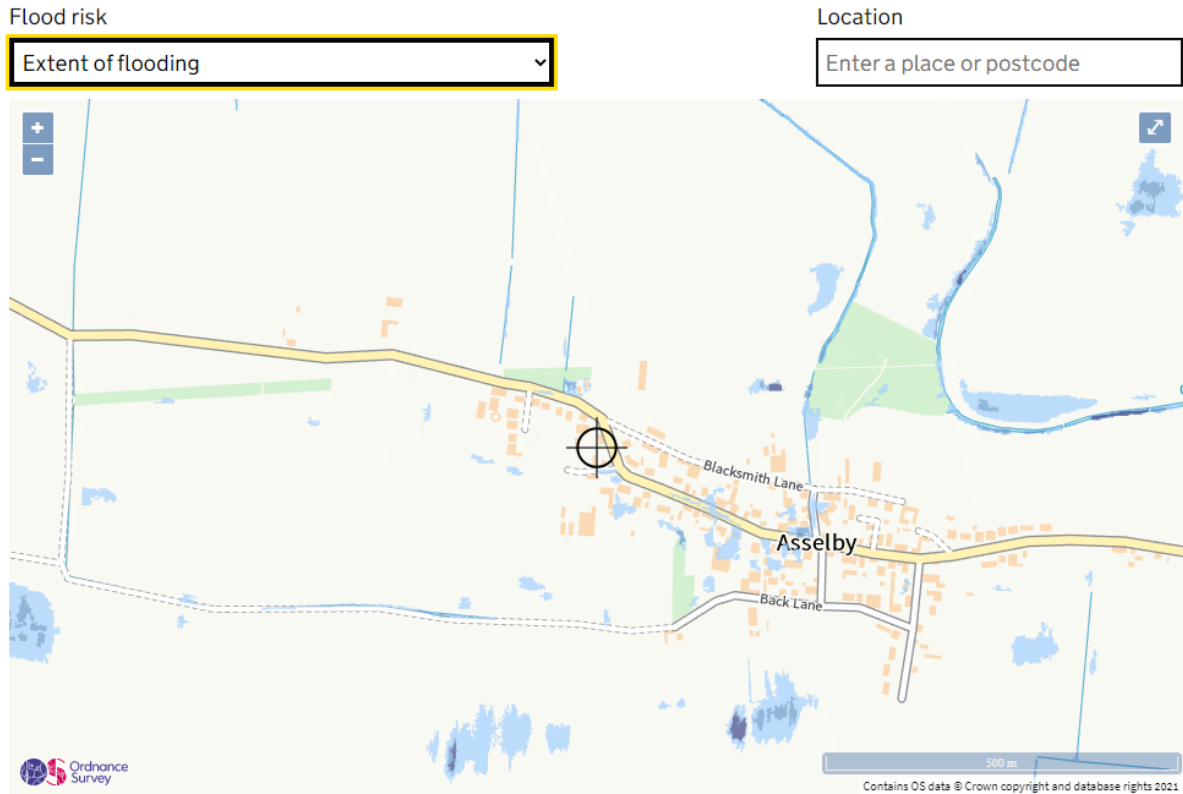
The Environment Agency has also committed to ensuring that the flood defences are maintained, and raised, to ensure that the current level of protection is maintained with climate change.

**The risk posed by a breach of the River Ouse is therefore, considered to be low.**

## 6.3 Pluvial/Surface Water Flooding

Surface water flood risk has recently been assessed on a national level by The Environment Agency. Maps were released in December 2013, which are some of the most comprehensive surface water flood risk maps in the world.

‘The Surface water mapping involves cutting edge technology, with flood experts using models to observe how rain water flows and ponds, and producing maps that take local topography, weather patterns and historical data into account.’



Extent of flooding from surface water

● High ● Medium ● Low ○ Very low ⊕ Location you selected

### Extract from EA Online Surface Water Flood Map

From the above map the site is **NOT** within an area at risk of surface water flooding.

Raised floor levels will be also reduce any potential future risk from surface water that may occur in the future.

Surface water from the proposed dwelling shall be managed using SUDS.

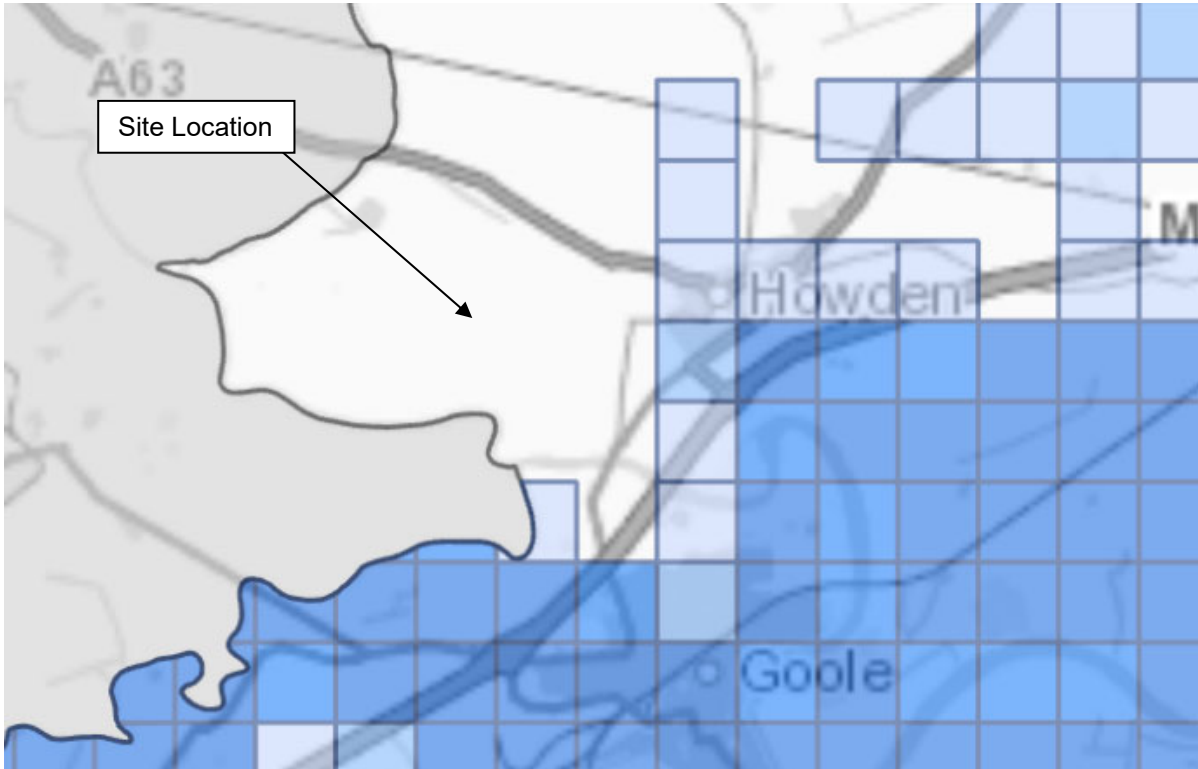
**With reference to the National Surface Water Flood Risk map, flood risk to the site is Very Low.**



## 6.4 Groundwater Flooding

The site is not identified as being within a potential groundwater emergence zone.

As part of the proposed development, floor levels are to be raised, consequently the risk posed by groundwater flooding is minimal.



Extract from East Riding SFRA Appendix I – Groundwater Flooding

The risk to the site from groundwater flooding is therefore considered to be Negligible.

## 6.5 Historic Flooding

The most recent flood events to affect the area were during 2007.

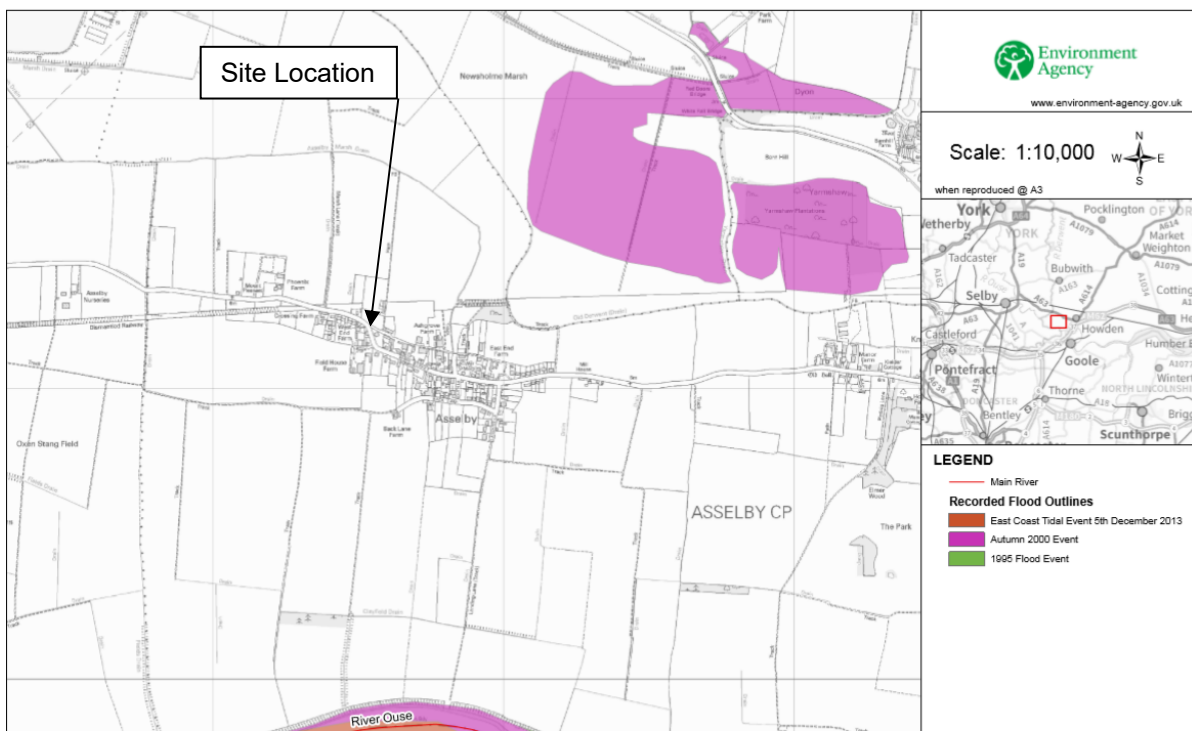
In June 2007, unprecedented levels of rainfall were experienced in the East Riding area. Subsequent flooding caused widespread disruption with damage to over 8600 residential properties and over 1300 businesses<sup>14</sup>.

Over 100mm of rain fell around the East Riding on June 25<sup>th</sup> 2007. The intensity of the rain resulted in widespread flooding.

The magnitude is described as being between 1 in 150 years<sup>16</sup> to 1 in 400years<sup>1</sup>.

The site is **NOT** identified as being affected by any historic flooding - see map extract below.

**RFI/2019/148309 Flood History Map centred on DN14 7HB.  
Date created: 29/11/2019**



© Environment Agency copyright and / or database rights 2010. All rights reserved. © Crown Copyright and database right. All rights reserved. Environment Agency, 100026380, 2010.  
Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S80 1BY. Tel: 03705 506 506(Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

**Extract from the Environment Agency Flood History map centred on the site.**

**The risk to the site from Historic flooding is therefore, considered to be Negligible.**

## 7.0 **Finished Floor Level/Flood Resilience Proposals**

A detailed flood risk assessment has been requested by the council. Following a review of the Spatial Planning and Development Control Recommendation Matrix<sup>1</sup>.

Finish floor level shall be set 0.6m above the average site level or adjacent road level whichever is the higher.

Additional 0.3m of flood proofing shall be provided.

However, following the detailed assessment of all sources of flood risk. The risk has been assessment to be lesser than what would warrant the requirement for the mitigation stated within the SFRA.

Consequently, proposed floor levels as follows;

<b>FFL: 0.150m Above average site level or Main Street road level. Whichever is the greater.</b>
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## 8.0 **Summary & Recommendations**

It has been demonstrated that the Sequential Test can be adequately passed.

The FRA proves that the risk to the site from all sources of flooding is low. The risk from an overtopping or breach event of the River Ouse has been determined not to affect the proposed site. Flood water that occurs during these events would fill a large low laying land area between Barmby on the Marsh to the south of Howden. Asselby is not deemed to be affected.

On this basis no mitigation is proposed other than a minimal finish floor level raise.

**FFL: 0.150m Above average site level or Main Street road level.  
Whichever is the greater.**

Surface water run-off from the proposed dwelling should be managed using appropriate SUDS solution.

It is recommended that all tenants of the proposed units sign up to the EA flood warning system.  
<https://www.gov.uk/sign-up-for-flood-warnings>

For AEB Architecture & Design

Report Written by:-



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Civil Engineer

## **APPENDIX I**

Site Location / Layout Plan