



Flood Risk Assessment

Project:

Land to the Rear of No. 2, Cranmore Lane, Holbeach

Client:

Mr Jonathan Bingham

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This flood risk assessment has been prepared solely to support the planning application. The author has made every effort to provide an accurate assessment of the flood risk but accepts no liability should the information be found to be incorrect or incomplete, or if it is used for any other purposes other than for which it was originally commissioned.



Introduction

Jackson Consulting Engineers have been appointed by Mr Jonathan Bingham, to undertake a flood risk assessment, forming part of the supporting evidence for the planning submission of a residential development to land at the rear of no. Cranmore Lane. The following document is to assist the planners in showing that the development is acceptable in terms of flood risk.

Development Site and Location

The proposed site is located at no. 2 Cranmore Lane, Holbeach, PE12 7HT. The overall site, including the existing dwelling to remain is shown in in figure 1 below.



Figure 1 - aerial view of the site

The current site contains a semi-detached house with a generous garden. The garden is generally flat, with some small trees and planting. The garden is approximately 30 metres long from the rear boundary to the external brick outbuilding. The total site area is approximately 640m². The area of the proposed development would be considered as undeveloped greenfield land.

The site access is off Cranmore Lane and is bounded by rear gardens to the south and north and open fields to the west.

The site falls within the South Holland Internal Drainage Board's catchment, with the closest IDB maintained watercourse being 'New River', identified as DRN197P3703 by the IDB – shown in figure 2. This watercourse is located roughly 120m from the rear of the site to the west. There appears to be privately/riparian owned watercourses/ditches to rear of the property and to the boundaries of the fields.

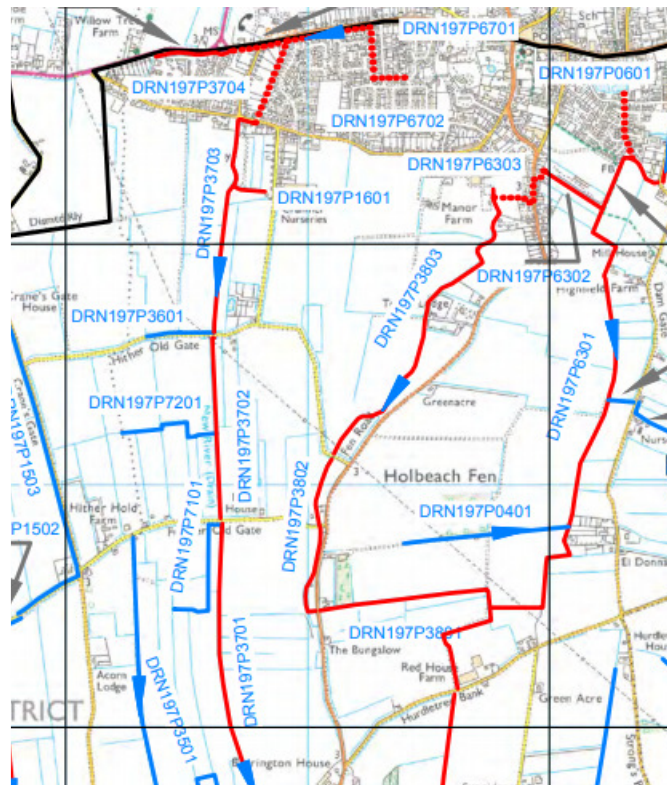


Figure 2 - Local IDB Watercourses

As shown in the Anglian Water asset map extract in the figure below, there is a foul water sewer located in Cranmore Road, which the existing dwelling connects into. As there is no surface water sewer shown it is unknown if the existing dwelling discharges into a rear garden soakaway, the riparian ditch or into the AW foul sewer rendering it a combined system.

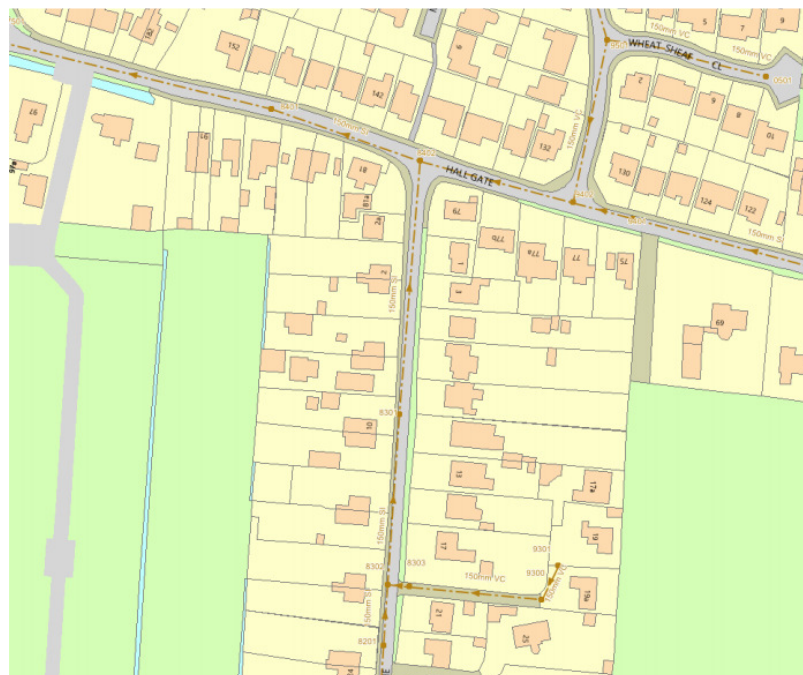


Figure 3 - Extract of AW Asset Map



Development Proposals

The client is proposing to section off part of the existing garden and use this area to build a new dwelling.

Access will be through Cranmore Lane, through the existing access of the dwelling. The existing site is approximately 640m², and it would be safe to say the site will be split approximately in half giving a proposed development size of 320m². Final access arrangements are to be determined by the Architect.

Outline details of the proposed development will be provided with the overall application.

This residential development is considered to have a lifetime in excess of 100 years. In accordance with the EA's 'Table 2: Flood risk vulnerability classification', the development would be considered to be more vulnerable.

Requirements of this Assessment

As demonstrated in the figure below, the site sits wholly within flood zone 3, and therefore a flood risk assessment should be completed for this development which follows the Environment Agency's standing advice for carrying out flood risk assessments.

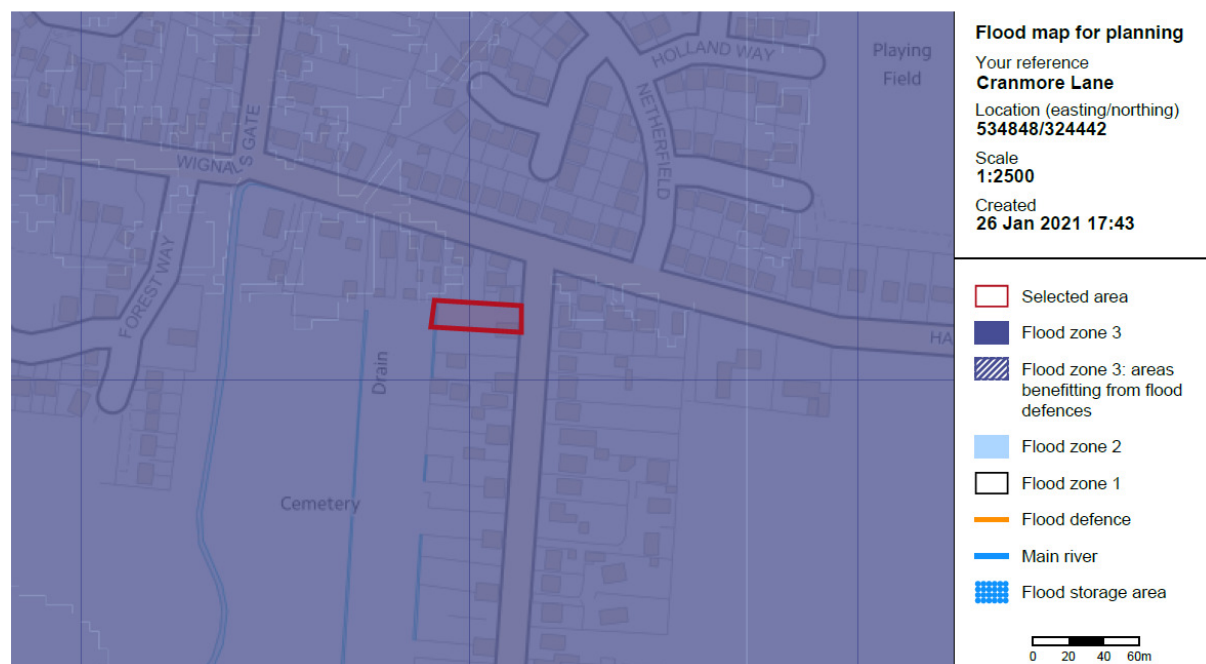


Figure 4 - Flood Zones

The flood maps have been created to assist Planning Authorities and other Statutory Consultees of the Flood Risks in relation to new and existing development. The flood zone above shows flooding from rivers and sea only and does not include other sources of flooding. The flood map for planning ignores the presence of defences.



Sequential Test

This site, along with the majority of the Boston Borough area and large parts of the South Holland district lie within flood zone 3. For this reason, it is necessary to use the refined flood risk information (hazard and depth maps) to assist with the application of the sequential test.

The refined flood risk hazard and depth maps can be found in 'South East Lincolnshire Strategic Flood Risk Assessment March 2017', with relevant extracts shown in the figures below.



Figure 5 - Residual Flood Hazard, Present Day 1% Fluvial, 0.5% Tidal Event Probability

The absence of colouring (the site location is indicated by a red dot), shows that at present day the site is not at risk of flooding for the 1 in 100-year river and 1 in 200-year tidal events. The refined map shows that the site falls into the equivalent flood zone 1, and as a result a sequential test is not required. The following sections further assess other sources of flooding and any mitigation measures required.

Sources of Potential Flooding

Existing Water Courses

As highlighted in the site description, the site has an SHIDB ditch to the west of the site. There is also a small section of riparian drain to western boundary of the site and local field drainage between the site and the IDB drain.

The IDB drain would be considered as the main watercourse for the area, and the smaller riparian and field drains would feed into this. Given the land levels and the sub-catchments serving these drains there will be no flood risk if these were to fail as the water would enter the IDB drain, before being able to enter the building.

There are two main mechanisms of failure to the IDB drain; blockages and if a storm event greater than the IDB's design scenario of 1 in 50-year return period is exceeded. The likely hood of the drain becoming blocked is low. The drain has good capacity, and it is unlikely that any blockages (such as land slip, tree falls, lack of maintenance) would cause total blockage and could be repaired in a timely



manner. As seen on the wider IDB map this drain flows south into the Little Holland South Drain – the majority of which being through open watercourse. The IDB watercourses are generally well maintained, and any serious issues will be rectified quickly or simply be able to flow over the blockage. Secondly, the IDB provides a standard of 0.90 metre freeboard to the general low land of each pumped catchment. This freeboard and the low-lying land means that flooding from this source is low and can be mitigated by providing a slightly raised finished floor level. The IDB reviews its system regularly to ensure that equipment has capacity for increased flood risk.

Another potential source of flooding could occur if the Sutton bridge outfall sluice were to fail as a result of mechanical or power outage. If this low chance event was ever to occur it is assumed the IDB have action plans in place, and any failures will be overcome by temporary solutions.

If flooding as a result of the IDB/river were to ever happen this would be over a number of days and the EA/IDB would be able to put into place evacuation plans. As the area is very flat there is a very low risk of flash flooding, and flooding would be dispersed over a large area.

This subsection demonstrates that the risk of flooding from watercourses is **low**.

Highways Drainage

Highway drainage is present within Cranmore Lane via. kerb outlets and within Hallgate via. traditional gullies. There are no known flooding issues from this source. Highway drainage is regularly inspected and maintained by Lincolnshire County Council.

If any of the elements were to fail, LIDAR mapping shows that Cranmore lane falls from Hall Gate, to lower elevations as the road travels south down Cranmore Lane. The existing dwellings FFL's along this road are generally higher than the carriageway levels and the road is bounded with upstand kerbs. If the highways drainage were to fail it would either travel south down Cranmore Lane until it enters a different gully, or until it enters the open fields located at the end of the housing.

There are no exception risks of flooding from highway sources and therefore the risk of flooding from this source is considered to be **low**.

Existing Sewers

As seen in the AW asset map there is only a foul sewer located within Cranmore Lane. The closest surface water sewer is located in Hall Gate, which connects into New River to the west and will not impact on the proposed development.

Considering the number of dwellings served by the existing foul sewer, it is unlikely that they will be running at capacity. If there are any capacity issues to this sewer then AW will be responsible for upgrading the network. The impact of connecting an additional dwelling into the existing foul sewer will be negligible.

The risk of flooding from existing surface water sewers is non, and from foul water sewers is **very low**.

Existing Rivers or the Sea

As previously highlighted, the Strategic Flood Risk Assessment shows that there is no risk to the site for the 1 in 100-year event and the 1 in 200-year tidal event.

The fens are protected by flood embankments to the Wash and River Nene which provide protection for the 1 in 200-year event. These flood defences have a minimum embankment of 7.00m AOD. These



are considered as the first line of defence and the site is further protected by a second line of defence with embankment levels of a minimum of 6.00m AOD, which would protect the area if the initial defences were to breach, or if localised overtopping from waves/wind occurred. With the defences in place there is currently no risk of flooding for the 1 in 100-year event or 1 in 200-year event for the river and sea, respectively.

The EA have provided mapping of the of the flood water if the flood defences were to breach, which are shown in the figure below. The mapping represents the Tidal breach for the 1 in 1000-year event with an allowance for climate change. In the unlikely event that this were to happen the site would be rated as a 'low hazard' – being less than 0.75 (considered no danger to people), the maximum depth of water would be up to 250mm and the maximum velocity would be up to 0.3m/s. These flood defences are very well maintained, and the risk of a breach is **very low**.

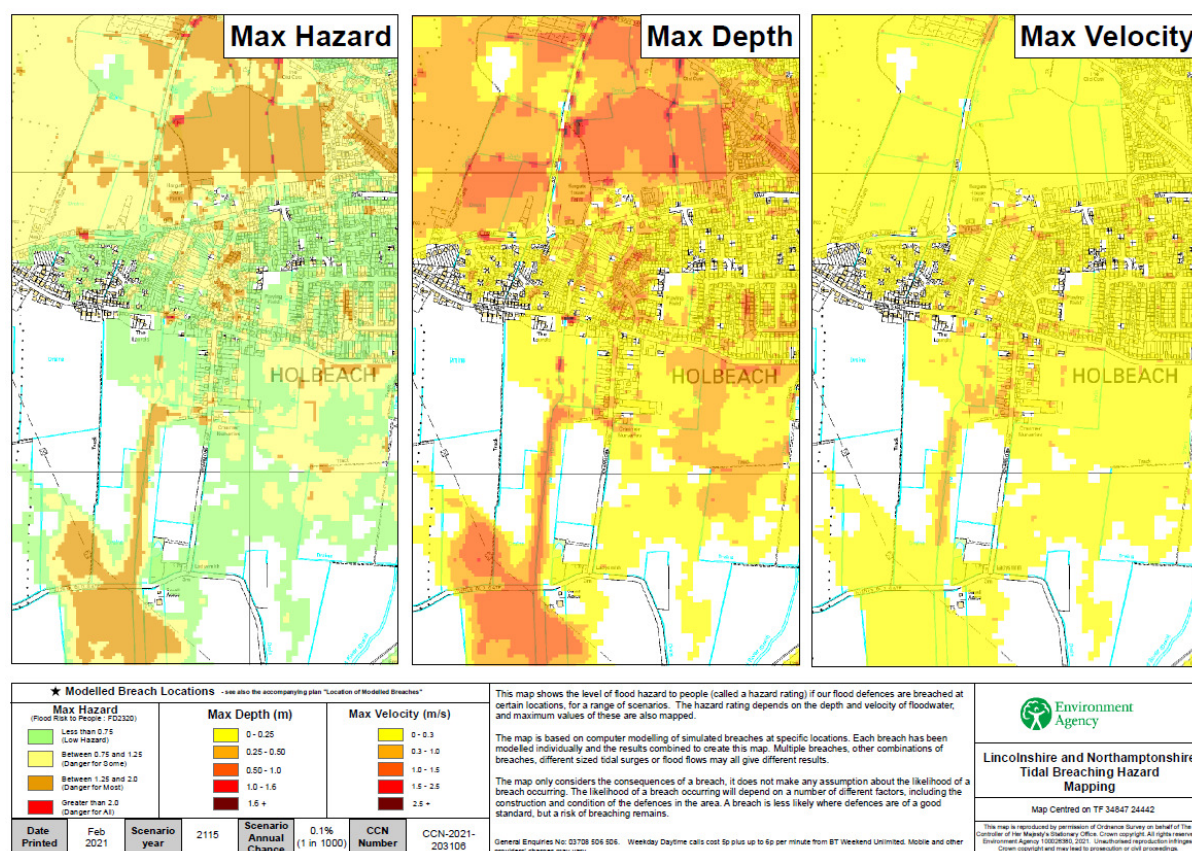


Figure 6 - Breach 1 in 1000-year event + climate change

Surface Water

Data obtained from the EA's website shows that the risk of surface water flooding for the site is very low, as shown in the figure below.

The map highlights that the local area benefits from a large number of drains which are both owned privately and maintained by the IDB. As the majority of the private ditches will discharge into the well maintained IDB drain it is very likely that the series of local ditches successfully keeps the surface water levels down, and as the general topography of the surrounding land is flat, there are no areas for surface water to accumulate.



Therefore, flooding from this source is considered **very low risk** and would easily be directed around proposed buildings provided they are slightly raised above the finished ground levels.

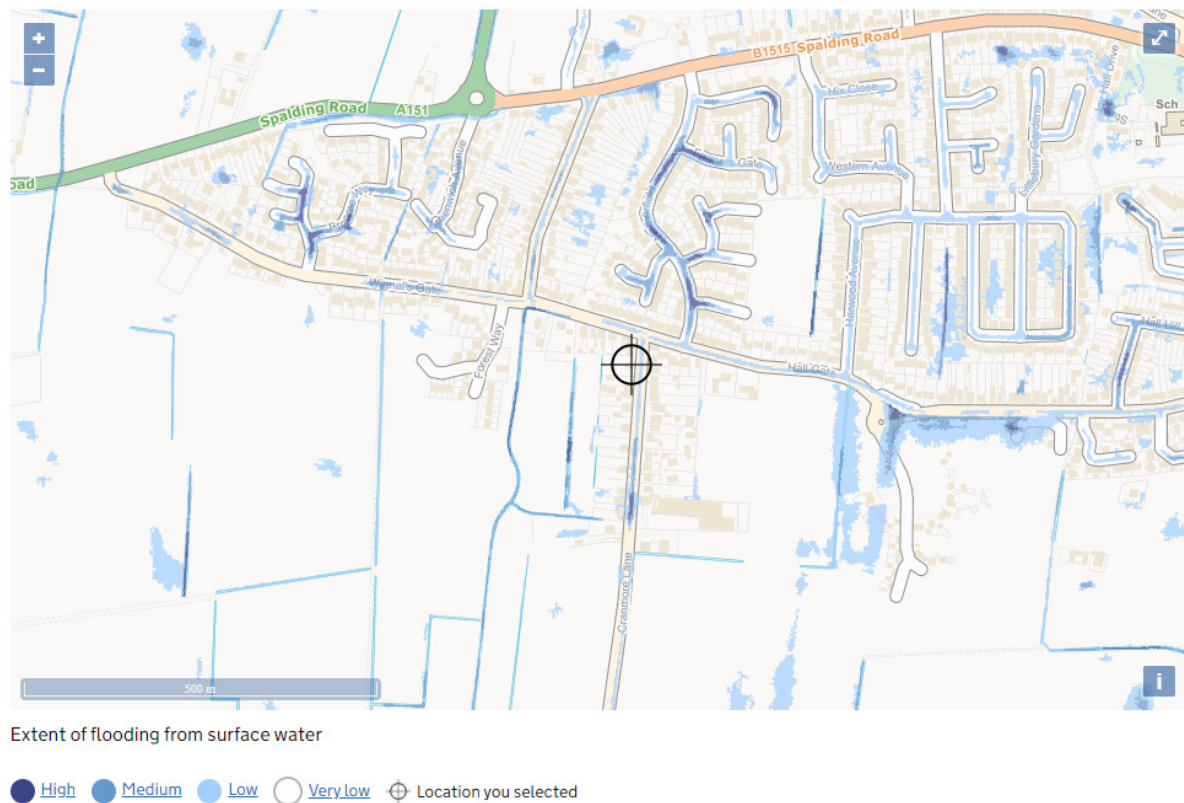


Figure 7 - Extent of flooding from surface water

Flooding from Reservoirs

The EA map shows that there is no risk of flooding from reservoirs and this can be discounted for flood risk.

Flooding from Groundwater

The landowner has stated that there are no issues as a result of flooding from ground water sources. This area is very flat and ground water flooding will be controlled by the extensive series of ditches and watercourse.

The risk of flooding from ground water sources is considered to be **very low**.

Flooding from Other Sources

During the FRA investigations flooding for the local area was researched. Lincolnshire County Council holds records and investigations of flooding, known as 'Section 19 Investigations' covering the entire LCC area, which has been maintained and updated from the 23rd December 2012 through to the most recent record of the 11th June 2019. Section 19 investigations are part of The Flood and Water Management Act and it outlines the local authority's responsibility to investigate a flooding incident under their role as the Lead Local Flood Authority (LLFA). The section 19 clause is shown in the figure below. A search through the list of Section 19 investigations shows that there has been one report of flooding in the Holbeach area, but none for Cranmore Lane. The closest reported flooding was over 1.5km away in 2019 and affected 1 residential property. This is likely to have been an isolated incident



related to a blockage and has no impact on the flood risk for this site, therefore there is **no risk** from this source.

19 Local authorities: investigations

- (1) On becoming aware of a flood in its area, a lead local flood authority must, to the extent that it considers it necessary or appropriate, investigate—
 - (a) which risk management authorities have relevant flood risk management functions, and
 - (b) whether each of those risk management authorities has exercised, or is proposing to exercise, those functions in response to the flood.
- (2) Where an authority carries out an investigation under subsection (1) it must—
 - (a) publish the results of its investigation, and
 - (b) notify any relevant risk management authorities.

Figure 8 - Section 19 definition

From searching through the Section 19 database, there is no reported flooding events local to the development site. And therefore, no flood risks have been identified from this source.

Climate Change

It is expected that the development will be designed to last up to 100 years. In all of the data collected from the EA, climate change has been included as part of their provided information, which has been used to inform this FRA.

Finished Floor Levels

Appendix C of the South East Lincolnshire Strategic Flood Risk Assessment provides a risk matrix for the hazard of flooding against the development type, an extract of this matrix is shown in the figure below.



Please refer to the National Planning Practice Guidance (Table 3) for advice on when the Sequential and Exception Tests are	Essential Infrastructure Essential Infrastructure Essential Infrastructure Essential Infrastructure Essential Infrastructure Essential Infrastructure Essential Infrastructure Essential Infrastructure Essential Infrastructure Essential Infrastructure	Danger to ALL (Hazard Rating >2)	Danger to MOST (Hazard Rating 1.25 - 2)	Danger to SOME (Hazard Rating 0.75 - 1.25)	Low Hazard (Hazard Rating 0 - 0.75)	Flood Zone 3	Flood Zone 2
Water Compatible (excluding development that includes essential ancillary sleeping or residential accommodation)	Consult EA	Appropriate Mitigation	Appropriate Mitigation	Appropriate Mitigation	Appropriate Mitigation	No Comment	No Comment
Major & Non-major 'Less Vulnerable' uses, e.g. commercial/industrial development	Consult EA	Consult EA	Appropriate Mitigation	Appropriate Mitigation	No Comment	No Comment	No Comment
Tidal Risk Scenario advice only. New short-let Camping and Caravan Sites (incl. log cabins & chalets) - subject to flood warning and evacuation	Consult EA	Appropriate Mitigation	Appropriate Mitigation	Appropriate Mitigation	Appropriate Mitigation	Appropriate Mitigation	Appropriate Mitigation
Fluvial Risk Scenario advice only. New short-let Camping and Caravan Sites (incl. log cabins & chalets) subject to flood warning and evacuation	Consult EA	EA OBJECTS to the principle of development due to risk to life	EA OBJECTS to the principle of development due to risk to life	Appropriate Mitigation	Appropriate Mitigation	Appropriate Mitigation	Appropriate Mitigation
Change of Use - Less Vulnerable to More Vulnerable or within More Vulnerable category, involving increase in risk to people - <i>please see note for other categories & exclusions</i>	Consult EA	Consult EA	Consult EA	Appropriate mitigation	Appropriate mitigation	No Comment	No Comment
Non-major 'More Vulnerable' uses, including residential development & residential holiday accom. (less than 10 dwellings/units or less than 0.5ha in size), <i>except short-let caravan sites - see 4.5 & 4.6 above</i>	Consult EA	Consult EA	Appropriate Mitigation	Appropriate Mitigation	Appropriate Mitigation	No Comment	No Comment
Major 'More Vulnerable' uses including residential development & residential holiday accom (not including camping/caravan sites) - greater than 10 dwellings/units or 0.5ha in size	Consult EA	Consult EA	Consult EA	Consult EA	Consult EA	Consult EA	No Comment
Essential Infrastructure	Consult EA	Consult EA	Consult EA	Consult EA	Consult EA	Consult EA	No Comment
Highly Vulnerable uses, e.g. caravans, mobile homes and park homes intended for permanent residential use - 'with the Exception of buildings and infrastructure explicitly for use in emergencies (which should be referred to the EA for bespoke advice)'	Consult EA	Object - Contrary to NPPF	Object - Contrary to NPPF	Object - Contrary to NPPF	Object - Contrary to NPPF	Object - Contrary to NPPF	Consult EA
<i>* definition taken from T&CP Direction 2009</i>							

Figure 9 - Flood Matrix

As the development is considered to be a 'non-major, more vulnerable', and has a 'Low Hazard' rating, the matrix shows that the development would need 'appropriate mitigation'. In this instance, the appropriate mitigation is shown in the figure below.



The NPPF requires that the proposal is accompanied by a Flood Risk Assessment which contains evidence that appropriate mitigation measures/flood resilience techniques have been incorporated into the development.

Please refer to the following document for information on flood resilience and resistance techniques to be included: 'Improving Flood Performance of New Buildings - Flood Resilient Construction' (DCLG 2007).

FFL must be set 300mm above ground level for two storey proposals. Single storey proposals must set FFLs above the 0.1% event breach depth in the 2115 scenario.

Figure 10 - Appropriate Mitigation

The development type has not been confirmed yet but if the proposed dwelling is to be two-storey's then the finished floor level will need to be set a minimum of 300mm above the existing ground levels. If the applicant proposes a bungalow then the finished floor level will need to be set at above the '0.1% breach depth in the 2115 scenario', and as already determined the maximum flood level in this event will not exceed 250mm, therefore provided that the floor level is set at a minimum of 300mm above the existing ground level then the mitigation has been achieved and no further flood resilient construction is required.

Proposed Drainage Strategy

The drainage should be designed for the site to reflect, as far as reasonably practical, natural drainage. Current infiltration characteristics are unknown but given the scale of the development it would be reasonable to assume that infiltration is possible.

During detailed design, soakaway testing should be undertaken in accordance with BRE365 or Building Regulations, and the ground water levels tested. If infiltration is not deemed to be suitable then the local riparian ditches will need to be explored further and a proposed connection made into these, at a reduced rate, and subject to IDB permission.

Foul drainage will connect into the existing foul water sewer located in the Cranmore Road, subject to an Anglian Water section 106 application.

Conclusion

- The site has been assessed to be located in flood zone 1 from the updated SFRA.
- As the site is in flood zone 1, a sequential test is not required.
- All other sources of flooding have been assessed and all return low, very low or no risk and therefore the risk of flooding from these sources are acceptable and mitigated against by the proposed FFL's.
- Finished floor levels in accordance with the South East Lincolnshire matrix are to be a minimum of 300mm above existing ground levels for either a single-story dwelling or a multiple story dwelling.
- The finished floor levels above put the finished floor levels higher than the 1 in 1000 year + climate change breach flood level.
- The IDB drainage has a standard of protection of 1 in 50 year storm, with 900mm of freeboard being offered to the lowest land level of the catchment served by the pumping station.

Address: Red Lion Quarter, Red Lion Street, Spalding, Lincolnshire, PE11 1SX

Telephone: 01775 729259

Website: www.j-ce.co.uk

Email: enquiries@j-ce.co.uk

Jackson Consulting Engineers is a trading name of Ben Jackson Consulting Ltd - Brunel House, Centre Park, 320 Firecrest Court, Warrington, WA1 1RG, reg no. 11709531



- As the surrounding area is flat, it is unlikely that there would be concentrated points of flooding with any flooding being over a large area, below the FFL.
- If any flooding was to occur as a result of a lack of capacity with the IDB system, then there would be sufficient time to active evacuation plans.
- Surface water drainage is subject to confirmation of proposals, but it is anticipated that either soakaways or attenuated discharge to a watercourse would be viable solutions.