FLOOD RISK ASSESSMENT

Proposed Industrial Development
Fleet Road,
Fleet Hargate,
Spalding.
PE21 8AP

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FLOOD RISK ASSESSMENT FOR PROPOSED INDUSTRIAL DEVELOPMENT FLEET ROAD, FLEET HARGATE, SPALDING. PE21 8AP

INTRODUCTION

The Government has placed increasing priority on the need to take full account of the risk associated with flooding at all stages of the planning and development process. This seeks to reduce the future damage to property and the risk to life from incidents of flooding. Their expectations relating to flooding are contained in the National Planning Policy Framework July 2021, (NPPF), which identifies how the issue of flooding is dealt with in the drafting of planning policy and the consideration of planning applications by avoiding inappropriate development in areas at risk from flooding and to direct development away from areas at highest risk.

The NPPF provides that development in areas at risk of flooding should be avoided and seeks to direct development away from areas at highest risk. There is a sequential, risk-based approach to the location of development avoiding where possible, flood risk to people and property managing any residual risk and taking account of the impacts of climate change.

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APPLICATION SITE

The site is located at Fleet Road, Fleet, Holbeach. PE12 8LD within the administrative area of South Holland District Council. The National Grid Reference is TF 38009 24889, the site area is 0.45Ha or thereabouts. **Plan 1**

This flood risk assessment has been prepared for a full planning application for the redevelopment of a former horticultural site with 8 No industrial units and associated infrastructure for E g)(iii) Industrial processes and will be accessed from Fleet Road. **Plan 2**

The Site would be classed as Major Development applying the National Planning Policy Guidance (NPPG) as the site is to be developed for a floor space over 1000sm.

The National Planning Policy Framework Technical Guidance NPPF defines three levels of flood risk depending upon the annual probability of fluvial flooding occurring.

Zone 1 – Low Probability (<0.1%)

Zone 2 – Medium Probability (0.1 – 1.0%

Zone 3 – High Probability (>1.0%)

The proposed development site is shown mainly to be within Flood Zone 3 High Probability' as detailed on the Environment Agency's Flood Zone Maps **without defences**, and as defined in Table 1 of NPPG**. Map 1**

Table 1: Flood Zones Definition

Flood Zone 3- High Probability
Definition Land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year. The water-compatible and less vulnerable uses of land are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone. The more vulnerable and essential infrastructure uses should only be permitted in this zone if the Exception Test is passed. Essential Infrastructure permitted in this zone should be designed and constructed to remain operational and safe for uses in times of flood Flood Risk Assessments requirements All proposals in this zone should be accompanied by a Flood Risk Assessment. Policy aims Developers and local authorities should seek opportunities to: • reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage techniques. • relocate existing development to land with a lower probability of flooding. • create space for flooding to occur by allocating and safeguarding open space for flood storage.

Applying the Flood Risk Vulnerability Classification in Table 2 of NPPG, both the existing and proposed use for the site is classified as “Less Vulnerable,” Table 1 of NPPG states that such uses are permitted in this zone.

Table 2: Flood Risk Vulnerability Classification

Less Vulnerable
• Police ambulance and fire stations that are not required to be operational during flooding • Buildings used for shops, financial, professional, and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in “more vulnerable” and assembly and leisure. • Land and buildings used for agricultural and forestry. • Waste treatment (except land fill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works that do not need to remain operational during times of flood. • Sewage treatment works (if adequate measures to control pollution and manage sewage during flood events are in place).

Site Levels

From the topographical survey, the site is a reasonable level rectangular shape, land levels vary from 3.00m to 3.35mODN with an average of 3.20mODN and Fleet Road level is 3.35mODN, **Plan 3**

DRAINAGE AUTHORITIES

Environment Agency

The Environment Agency has permissive powers for reducing the risk of flooding from designated main rivers and from the sea.

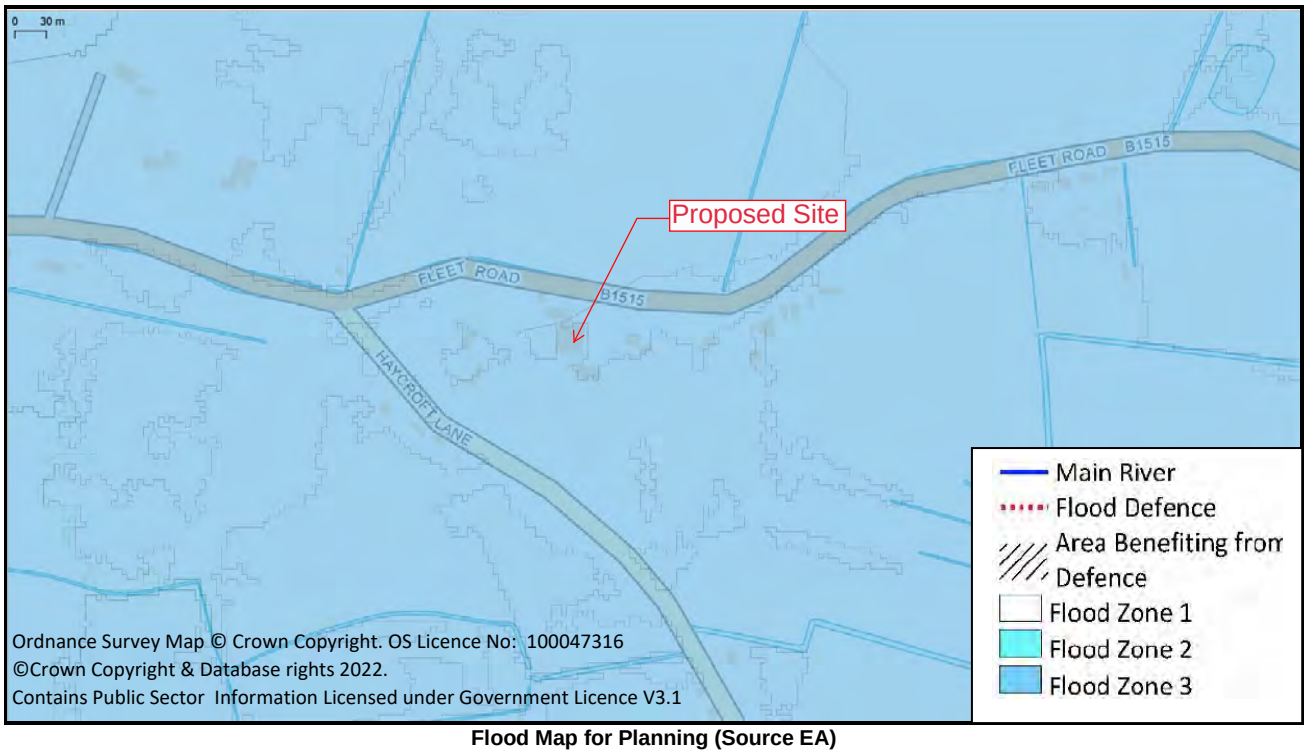
The following potential sources of flooding affecting the development site have been identified as:

- From the tidal Wash/River Nene

The flood zone maps indicate that the area would be flooded without flood defences.). The Flood Map indicates the area at risk of flooding, **assuming no flood defences exist**, for a flood event with a 0.5% chance of occurring in any year for flooding from the sea, or a 1% chance of occurring for fluvial (river) flooding. It also shows the extent of the Extreme Flood Outline which represents the extent of a flood event with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater. In some locations, such as around the fens and the large coastal floodplains there are many kilometres of raised flood defences. To meet the requirements of the National Planning Policy Framework, these defences are removed in their entirety to produce the Flood Map for Planning (Rivers and Sea). The map therefore shows the full extent of areas that would be at risk of flooding if no defences existed, and water could spread out across the floodplain.

Flood Zones

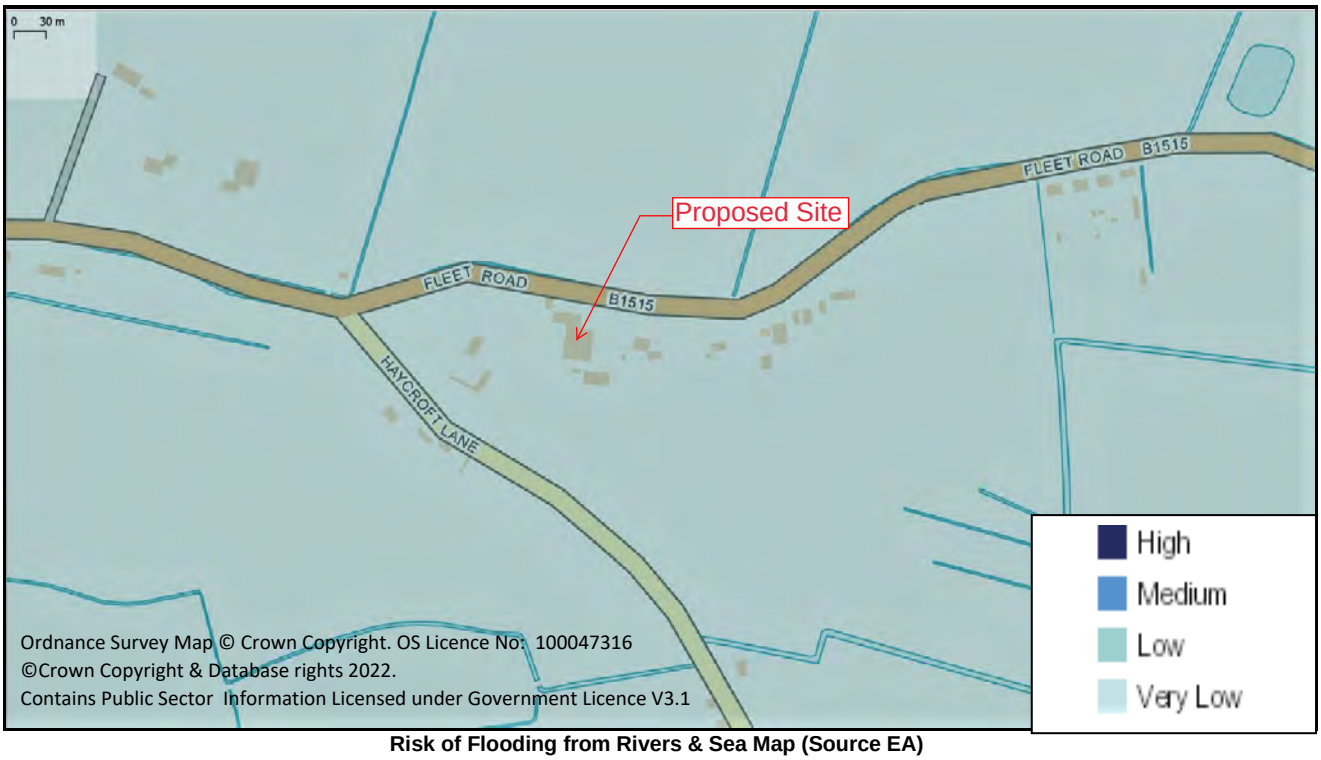
These maps show that the site is considered at risk from tidal flooding as it is all located within an area zoned as Flood Zone 3.The maps indicate that the area would be flooded without flood defences, which are in place, (with an annual probability of more than 0.5% i.e., return frequency of less than 1 in 200 years for tidal flooding or more than 1.33% return frequency of less than 1 in 100 years for fluvial flooding).



Flood Map for Planning (Source EA)

Risk of Flooding from Rivers & Sea

The Risk of flooding from Rivers and Sea shows that the site is at Low risk. **Low risk** means that each year this area has a chance of flooding of between 1% and 3.3%. This takes into account the effect of any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped or fail.



Risk of Flooding from Rivers & Sea Map (Source EA)

Fluvial Flooding

The site is not considered to be at risk from fluvial flooding from Main River

Tidal Flooding

The flood banks for the Wash and River Nene, which both lie approximately 11km from the site, constitute the first line of defence against any tidal flooding. In this area, these consist of earth banks, within in a relatively sheltered environment, which is less of a hazard from wave action than the North Sea coastline.

Schemes in the Area

There are no ongoing capital projects to reduce or sustain the current flood risk to this site.

Breach Analysis to Wash/Nene Tidal Defences

From Lincolnshire & Northamptonshire Area Tidal Modal Analysis, levels for East Coast and Wash: Immingham to the West Lighthouse have an assessment date of 2017, which should be used in any consideration of future increases due to climate change. **Map 1**

Peak tide levels (2017) for the 1 in 200-year 50% confidence bound tide level (2017) is 5.82mODN at West Lighthouse.

The Higher Central Peak 1 in 200-year tide levels (2122) is 5.82mODN plus 1.06m climate change allowance is 6.88mODN.

Taking the precautionary approach, the Hazard Rating following a breach which in Flood Risk Assessment (FD 2320) Guidance for New Development Phase 2 R& D Technical Report these are classified as low <0.75, moderate 0.75-1.25, significant 1.25-2.50 and extreme >2.50 based upon an empirical measure of velocity and depth.

Flood Hazard			**Description**
	<0.75	Low	**Caution –** Flood Zone with shallow flowing water or deep standing water.
	0.75 – 1.25	Moderate	**Danger for Some –** (i.e. children) Danger Flood Zone with deep or fast flowing water.
	1.25 – 2.0	Significant	**Danger for Most –** Danger Flood Zone with deep fast flowing water.
	>2.0	Extreme	**Danger for All** – Extreme Danger Flood Zone with deep fast flowing water.

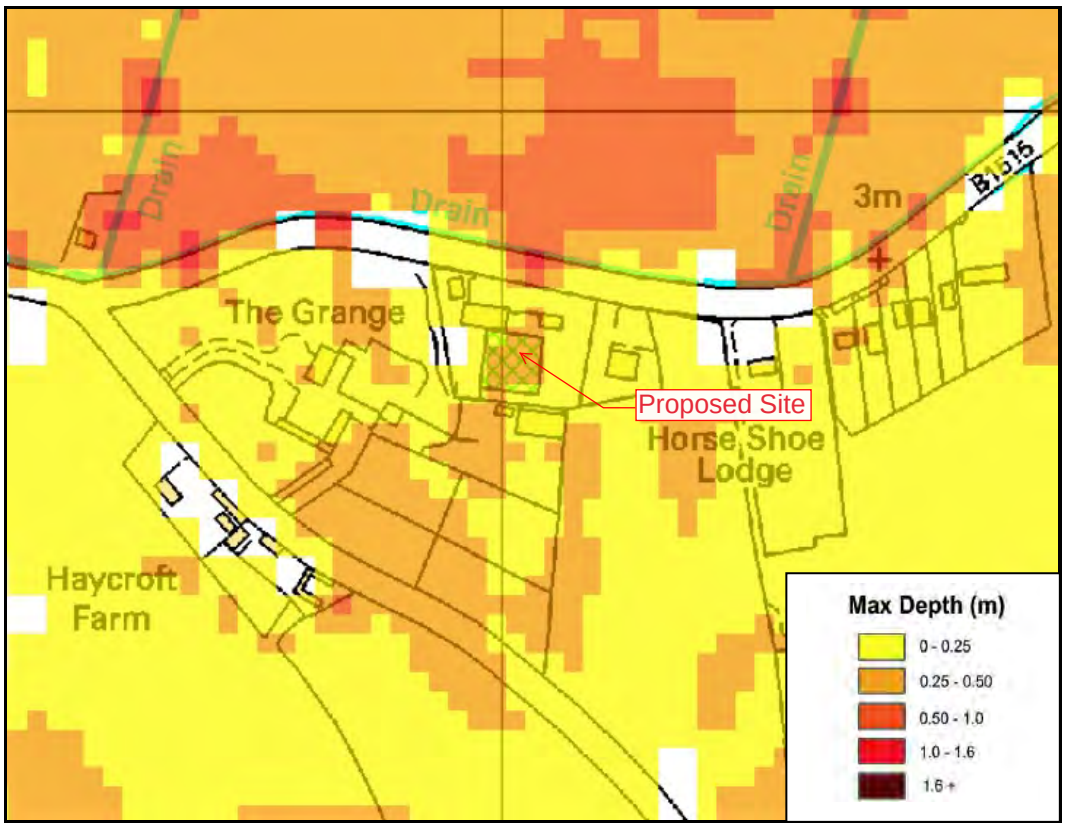
HR = d x (v + 0.5) +DF

Where V = Flood flow velocity (m/sec) D = Flood depth (m)

DF = A debris factor included to represent the greater damage, or risk of injury to people, that can occur if debris is swept along with the water. = 0.5 for depths <0.25 or 1.0 for depths

The Environment Agency has carried out a Tidal Hazard Mapping for the Wash following a breach to the defences. The Lincolnshire & Northamptonshire Area Tidal Hazard Maps for Scenario year 2006 for the 1 in 200-year event show that the site for the development is not within a Hazard Rating area.

With climate change, the tidal Hazard Maps for Scenario year 2115 for the 1 in 200 event shows that the majority of the site for the development is within a Hazard Rating areas of less than 0.75 Low Hazard, depth of flow for the majority of the site is within the range 0 – 0.25m with a maximum velocity of 0.3 – 1.0m/sec. **Map 2**



Tidal Breach 1 in 200-year Depth Map 2115

The Environment Agency has also produced maps based on computer modelling of simulated overtopping of defences along the coastline for specific tidal scenarios. The maps only consider the consequences of overtopping of defences and do not show the possible consequences of breaches of the tidal defences. For future climate change scenarios, it is assumed that the defences remain at 2006 heights.

The site is not affected by overtopping of the defences for all scenarios.

Finished Floor Levels

The proposed development is classified as “Less Vulnerable” industrial development and therefore it can be considered in accordance with details contained in the Standard Advice Matrix in the South East Lincolnshire Local Plan.

The majority hazard rating on the site is less than 0.75 (Low Hazard) and therefore the site can be considered to be in cell F4.

The Environment Agency advice shown for cell F4 is “No comment”.

It is proposed that the minimum ground floor level for the proposed single-storey workshops be raised 150mm above the surrounding ground level set at a minimum level of 3.35mODN.

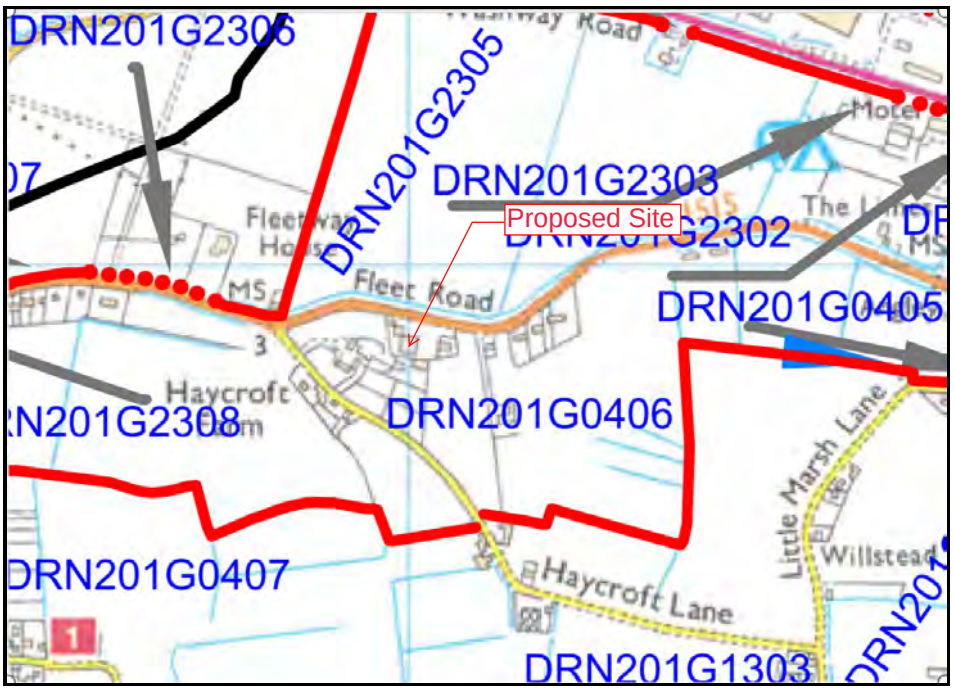
South Holland Internal Drainage Board

The proposed development site is located within the Lutton Lean (C) catchment of the South Holland Internal

Drainage Board.

The Board provide a standard of drainage for a 1 in 50-year event and normally a freeboard of 900mm to the lowest land level is provided,

The Board are therefore responsible to operate and maintain the arterial fluvial system. The Board do not have any maintained drains close to the site the site.



Extract from South Holland IDB Drainage Map

With the finished floor levels of the proposed units being raised 150mm above the existing ground level to mitigate the tidal flood risk for the site, this will provide adequate mitigation against flooding from IDB systems. Consent will be required from the Board to undertake works such as:

- Works in, over, under or within 9 metres of a Board maintained watercourse.
- Installation of a culvert, weir or other like obstruction within any watercourse.
- Any works that increase the flow of surface water or treated foul effluent to any watercourse within the Board's District.

FLOODING FROM OTHER SOURCES

Flooding is a natural process and can happen at any time from sources other than watercourses and the sea.

- Flooding from land can occur from intense rainfall, often over short duration of time that is unable to soak into the ground or enter the drainage system. However, with the natural topographic nature of the ground being flat, with no high ground around the site this will not cause any rapid inundation of the site and is likely only lead to local ponding of shallow depth and low velocity. The ground floor level for the

development is to be raised 150mm above the existing ground level. It is concluded that flooding from this source is limited to minor isolated cases and is not of strategic significance as regards to flood risk.

- The area is not known to suffer from any groundwater problems.

- Flooding from sewers can occur from overloading from heavy rainfall caused by blockages or having inadequate capacity. However, with the natural topographic nature of the ground being flat, with no high ground around the site this will not cause any rapid inundation of the site and is likely only lead to local ponding of shallow depth and low velocity. The ground floor level for the development is to be raised 150mm above the existing ground level. It is concluded that flooding from this source is limited to minor isolated cases and is not of strategic significance as regards to flood risk.

- Non-natural or artificial sources of flooding such as reservoirs, lakes, or canals where water is stored above natural ground level could cause flooding if the structure fails or is over topped. There are no known sources within the vicinity of the site.

RESIDUAL RISKS

There is always a possibility of a flood more than that allowed for which might conceivably cause some flooding to the properties. However, such an event would have a very low probability and the risk of flooding to the property would be extremely small. It is therefore considered that the residual risks associated with flooding are not significant.

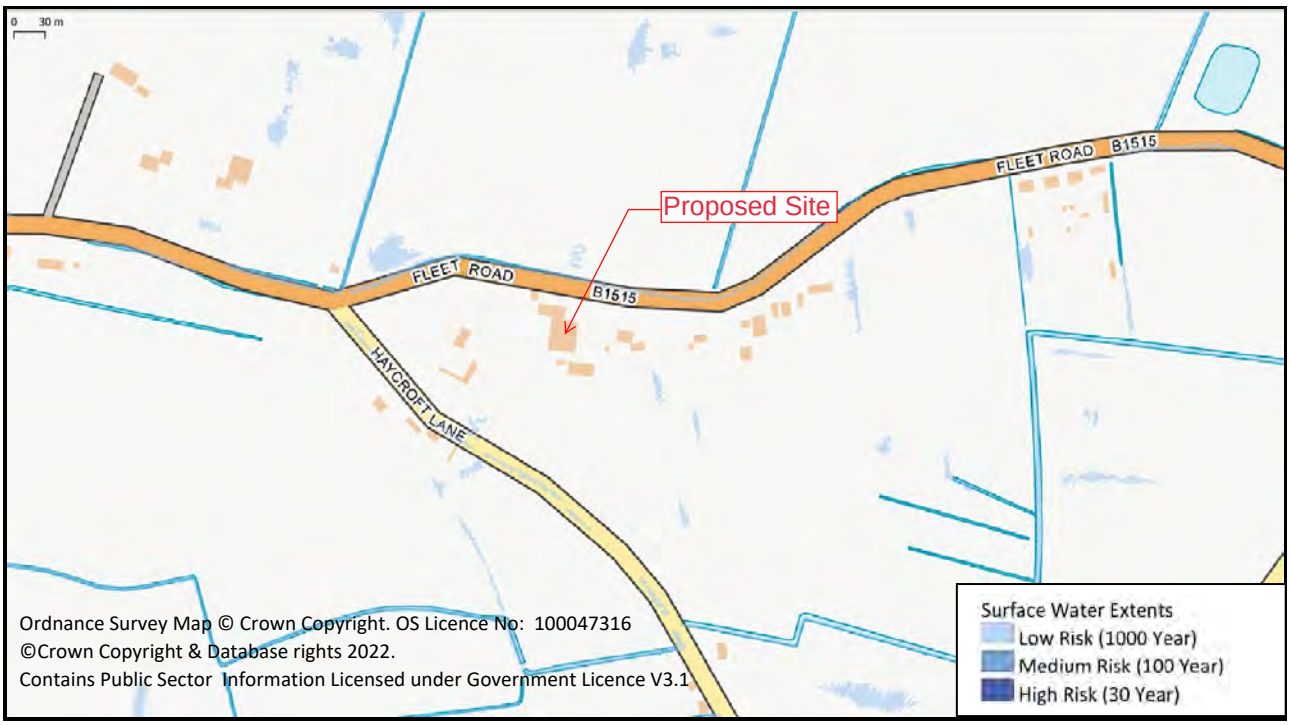
SURFACE WATER FLOODING

The majority of the proposed development site is shown on the Low-Risk scenario Surface Water flood maps, for the 1 in 1000-year event, not to be affected from surface water flooding, there is however a small area in the northern part to be affected with depths below 150mm.

The maps for surface water and revised maps for river and sea flooding define the risk as High, Medium, Low and Very Low. The chance of flooding for the area defined in any given year is shown below:

- **High:** greater than 1 in 30 (3.3%).
- **Medium:** between 1 in 100 (1%) and 1 in 30 (3.3%).
- **Low:** between 1 in 1000 (0.1%) and 1 in 100 (1%).
- **Very Low:** less than 1 in 1000 (0.1%)

Unlike the fluvial mapping, which is based on a detailed hydraulic model, this mapping is based purely on applying rainfall to a digital terrain model. As such this mapping serves to represent a worst-case scenario which may well overstate the actual probability of flooding in this area with low depressions shown to be affected



Risk of Flooding from Surface Water Map (Source EA)

There is a caveat on the Defra Data website, as to the use of these maps and that they are not to be used to identify that an individual property will flood. Because of the way they have been produced and the fact that they are indicative, these maps are not appropriate to act as the sole evidence for any specific planning or regulatory decision or assessment of risk in relation to flooding at any scale without further supporting studies or evidence.

The Environment Agency and the Lead Local Flood Authority (custodians of the surface water flood risk dataset) have subsequently confirmed that the published high-level data should not be used on a site-specific basis and that mapping is only suitable for National to County Scale use.

SEQUENTIAL APPROACH

When applying the sequential approach for flood risk in accordance NPPF the site of the development would fall into Flood Zone 3 (High Probability) as the site is shown to be within the tidal flood plain as shown on the Environment Agency's Flood Map without defences in place.

The Environment Agency categorise land into one of three Flood Zones.

- Flood Zone 1 is land outside the 0.1% floodplain (with a chance of flooding of less than 0.1% chance in any given year)

- Flood Zone 2 is land that falls between the 1 in 100-year extent and the 1 in 1000-year extent (a chance of flooding between 1% and 0.1% in any given year)

- Flood Zone 3a is land which falls within the 1 in 100-year flood extent (has a 1% chance of a flood occurring in any given year).

Applying the Flood Risk Vulnerability Classification in Table 2 of NPPG, the proposed development for industrial use is classified as, “Less Vulnerable” with Table 1 of NPPG stating that such uses are appropriate in this zone (as summarised in Table 3 NPPG).

Sequential Test and Exceptions Test

NPPF Guidance Paragraphs 159 - 169 requires development within high areas of flood risk be determined using a sequential risk-based approach to the location of development to avoid where possible flood risk to people and property and manage any residual risk, taking account the impacts of climate change.

The aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. The NPPF states that development should not be permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower probability of flooding. It is important to note that the Sequential Test does not specifically mean that sites such as this cannot be developed, rather that sites at less risk should be developed first.

Table 3: Flood Risk Vulnerability and Flood Zone ‘Compatibility’

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Flood Zone 1	✓	✓	✓	✓	✓
	Flood Zone 2	✓	✓	Exception Test Required	✓	✓
	Flood Zone 3a	Exception Test Required	✓	✘	Exception Test Required	✓
	Flood Zone 3b Functional Floodplain	Exception Test Required	✓	✘	✘	✘

Policy 7 in the adopted Local Plan supports proposals which assist in the delivery of economic prosperity for employment. The regeneration of the site will provide opportunities for extra employment. It is therefore considered that the Sequential test has been satisfied. With the application being for less vulnerable uses the Exceptions Test is not required.

CLIMATE CHANGE

Global warming is now recognised that it is likely to affect the frequency and severity of extreme events as both tidal and fluvial flooding. The Climate change allowances in the NPPF Guidance was updated on the 20th of July 2021.

Peak River Flow Allowances

For flood risk assessments use the Management Catchment Climate Changes for the peak river flow map. Management catchments are sub-catchments of River Basin Districts.

The site is located within the Nene Management Catchment within the Anglian River Basin District, for sites within Flood Zone 2 or 3a and for “More Vulnerable” land uses, the Central allowances figures, in the Table below, should be used.

Peak River flow allowances within the Management Catchment Allowances				
River Basin District /Management Catchment	Allowance category	Total potential change anticipated for ‘2020s’ (2015 to2039)	Total potential change anticipated for ‘2050s’ (2040 to2069)	Total potential change anticipated for ‘2080s’ (2070 to2115)
Anglian/ Nene	Upper End	18%	13%	36%
	Higher Central	4%	0%	17%
	Central	-2%	-7%	4%

The effect of global warming on peak rainfall allowances is given in Table 1.

Table 1 Peak Rainfall Intensity

Table 1 Peak rainfall intensity allowance in small and urban catchments (1961 to1990 baseline)			
Applies across all of England	Total potential change anticipated for 2010 to 2039	Total potential change anticipated for 2040 to 2059	Total potential change anticipated for 2060 to 2115
Upper End	10%	20%	40%
Central	5%	10%	20%

The annual sea rise due to climate change is given in NPPF and the recommended contingency allowances are stated in Table 2.

Table 2 Peak Sea Level Rise

Table 2 Peak Sea level allowance for each epoch in (mm) per year with cumulative sea level rise for each epoch in brackets (use 1981to 2000 baseline)						
Area of England) (Use River Basin	Allowance	2000 to 2035	2036 to 2065	2066 to 2095	2096 to 2125	Cumulative Rise 2000 to 2125 (m)
Anglian	Higher Central	5.8 (203mm)	8.7 (261mm)	11.6 (348mm)	13 (390mm)	1.20m
Anglian	Upper End	7 (245mm)	11.3 (339mm)	15.8 (474mm)	18.1 (543mm)	1.6m

DRAINAGE STATEMENT

Surface Water Drainage

Applications for developments where the proposals will result in the increase the amount of surface water run-off require that an appropriate drainage strategy to be undertaken to ensure that the surface water discharge mimics the existing pre-development regime.

Any proposed surface water drainage system will need to be designed to account for the effects of climate change over the lifetime of the development. Based on the recommendations the proposed drainage systems should be sized for the critical 1 in 100-year storm event and to allow for a 40% increase in rainfall intensity for climate change.

A detailed Surface and foul water drainage strategy has been prepared by Terry Stafford I. E. and their report should be read in conjunction with this FRA.

FLOOD RESILIENCE CONSTRUCTION

Any impact of damage to the properties can be foreseen and mitigated against by relatively simple design and construction techniques. There are two forms of flood protection works: -

- **Flood-resistance or proofing works**- these try to reduce the amount of water entering a building.
- **Flood-resilient works**: - these reduce the amount of damage caused by water entering the building.

The proposed development will have the following resilient measures incorporated in the construction in accordance with “Improving the flood performance of new buildings” CLG (2007).

- The ground floor living accommodation for the proposed industrial units is to be raised 150mm above the existing average ground level to be set at a minimum level of 3.35mODN.

- Water, electricity, and gas meters: should be located above the predicted flood level. Electrical services: electrical sockets, heating systems: boiler units and ancillary devices should be installed at least 500mm above the ground floor level to minimise damage to electrical services Electric ring mains should be installed at high level with drops to ground floor sockets and switches.

- The ground floor to be constructed with a solid concrete floor with no voids beneath and no low-level wall vents.

- Avoid the use of mineral fibre insulation to the ground floor level (walls & floor) and use a rigid closed cell material as these retain integrity and have low moisture take-up.

- Where possible, all service entries should be sealed (e.g., with expanding foam or similar closed cell material). Closed cell insulation should be used for pipes which are below the predicted flood level.

- As this site is in an area that is capable of receiving flood warnings from the Environment Agency Floodline Warning Direct system. It is recommended that the property Owner contact the Environment Agency’s Floodline on 0845 988 1188 to register the property to receive advance warning of flooding by telephone, mobile, fax, SMS text, email or pager. The Environment Agency aim to issue a ‘severe flood warning’ approximately 2 hours before existing defences are overtopped.

CONCLUSION

- The site does have the protection of flood defences which are well maintained by the Environment Agency.

- The site for the proposed development is shown to be within Flood Zone 3 ‘High Probability' as detailed on the Environment Agency's Flood Zone Maps without defences.

- Taking the maps from the Lincolnshire & Northamptonshire Area Tidal Hazard Maps The site is not affected by breaching of the defences for the present day (2006) scenarios. With climate change up to year 2115, for the 1 in 200-year event. the maps show that the majority of the site is within in a Hazard rating Less than 0.75 (Low Hazard) with a maximum predicated depth of flow 0 – 0.25m and maximum velocity of flow 0.3 – 1.0m/sec the remainder lies within a no hazard area.

- The ground floor living accommodation for the proposed units is to be raised 150mm, set at a minimum level of 3.35mODN.

- The Flood Risk Vulnerability Classification in Table 2 of NPPG the proposed industrial development is classified as “Less Vulnerable”, with Table 1 of NPPG stating that such uses are appropriate in this zone.

- Any impact of damage to the property can be foreseen and mitigated against by relatively simple design and construction techniques. They will be constructed using materials which are flood resilient construction as outlined in the report.

- Flooding from other sources is unlikely to affect the site.

- No obvious constraints have been identified that may impact the proposed development and the type of mitigation measures that can be used to reduce the flood risk, there is no increase in the flood risk to others.

- It is therefore concluded that the proposed development can be constructed, safely and sustainably, to meet the requirements of NPPF.

East Coast and Wash - 2018 Coastal Flood Boundary [CFB] Dataset
Key Node Points

Map 1


Immingham
Haborough Marsh
Grimsby
Buck Beck
Tetney
Donna Nook
Saltfleet
Boygrift
Gibraltar Point
Boston Barrier
Hobhole
Fosdyke Bridge
West Lighthouse
Marsh Road
Spalding
Wisbech
Dog in a Doublet
Humber Gateway
Spurn Head
Lincolnshire Wolds
Race
Inner Dowsing & Lincs
Brancaster Roads
Norfolk Coast
THE WASH
LINCOLNSHIRE
Scunthorpe
Doncaster
Gainsborough
Lincoln
Skegness
Boston
Sleaford
Grantham
Nottingham
Mansfield
Newark-on-Trent
Peterborough
Stamford
Leicester
Loughborough
Melton Mowbray
Rotherham
Worksop
King's Lynn
Swaffham
Hunstanton
Wells-next-the-Sea
Louth
Mablethorpe
Alford
Horncastle
Spilsby
Holbeach
Sutton Bridge
Wisbech
Market Deeping
Bourne
Oakham
Uppingham
Hinckley
Coalville
Ashby-de-la-Zouch
Ripley
Southwell
Retford
Gainsborough
Barnsley
Pontefract
Wakefield
Goole
Howden
Barton-upon-Humber
Brigg
Caistor
Louth
Legbourne
Mablethorpe
Skegness
Lynn
Wainfleet All Saints
Burnham Market
Fakenham
Dersingham
Great Massingham
Castle Acre
Dereham
Swaffham
Fincham
Watton
Attleborough
Wymondham
Downham Market
Stoke Ferry
March
Whittlesey
Thorney
Crowland
Deeping St James
Uffington
Stamford
Rutland Water
Oakham
Melton Mowbray
Loughborough
Shepshed
Coalville
Ashby-de-la-Zouch
Measham
Swadlincote
Burton upon Trent
Uttoxeter
Derby
Nottingham
Long Eaton
Ilkeston
Heanor
Ripley
Alfreton
Chesterfield
Bolsover
Staveley
Rotherham
Swinton
Mexborough
Conisbrough
Doncaster
Bentley
Hoyland
Barnsley
Wakefield
Pontefract
Castleford
Normanton
Knottingham
Selby
Howden
Goole
Crowle
Thorne
Askern
Scunthorpe
Epworth
Winterton
Barton-upon-Humber
Immingham
Grimsby
Cleethorpes
Humberside
Keelby
Ulceby
Caistor
Brigg
Louth
Legbourne
Mablethorpe
Alford
Chapel St Leonards
Burgh le Marsh
Spilsby
Horncastle
Woodhall Spa
Tattershall
Billinghay
Ruskington
Metheringham
Navenby
Lowdham
Hucknall
Bingham
Ruddington
Long Eaton
East Midlands
Shepshed
Coalville
Markfield
Syston
Wigston
Hinckley
Uppingham
Oakham
Rutland Water
Stamford
Deeping St James
Market Deeping
Bourne
Colsterworth
Ropsley
Grantham
Sleaford
Heckington
Ancaster
Fulbeck
Navenby
Waddington
Saxilby
Gainsborough
Beckingham
Blyton
Epworth
Crowle
Thorne
Askern
Swinton
Rotherham
Worksop
Retford
Tuxford
Ollerton
Mansfield
Collingham
Newark-on-Trent
Southwell
Ripley
Alfreton
Chesterfield
Bolsover
Staveley
Market Warsop
North Hykeham
Lincoln
Waddington
Welton
Wragby
Market Rasen
Louth
North Thoresby
North Somercotes
Saltfleet
Tetney
Donna Nook
Buck Beck
Immingham
Haborough Marsh
Grimsby
Cleethorpes
Humber Gateway
Spurn Head
Race
Inner Dowsing & Lincs
Lincolnshire Wolds
Brancaster Roads
Norfolk Coast
THE WASH
Hunstanton
Heacham
Burnham Market
Dersingham
Fakenham
Great Massingham
King's Lynn

East Coast and Wash: Immingham to the West Lighthouse

2018 Coastal Flood Boundary Extreme Sea Levels

CFB Ref	Location	Easting	Northing	Annual Chance (1 in x) of Tide Level in metres ODN																	
				1			10			50			100			200			300			1000		
				Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound		
				2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%	2.5%	50%	97.5%
3888	Immingham	520440	417625	4.16	4.17	4.19	4.50	4.53	4.62	4.73	4.80	5.00	4.83	4.93	5.19	4.93	5.06	5.41	4.98	5.14	5.55	5.15	5.38	6.01
3890	Haborough Marsh	522100	416512	4.14	4.15	4.17	4.48	4.51	4.60	4.70	4.77	4.97	4.80	4.90	5.16	4.90	5.03	5.38	4.94	5.10	5.51	5.11	5.34	5.97
3898	Grimsby	529295	413162	3.98	3.99	4.01	4.31	4.34	4.43	4.53	4.60	4.80	4.61	4.71	4.97	4.71	4.84	5.19	4.74	4.90	5.31	4.88	5.11	5.74
3906	Buck Beck	534709	407369	3.87	3.88	3.90	4.19	4.23	4.31	4.41	4.50	4.68	4.50	4.61	4.86	4.61	4.75	5.10	4.64	4.82	5.22	4.80	5.05	5.66
3910	Tetney	538035	405537	3.85	3.86	3.89	4.17	4.22	4.30	4.40	4.50	4.67	4.49	4.61	4.86	4.60	4.75	5.10	4.63	4.82	5.21	4.80	5.06	5.66
3918	Donna Nook	544641	401997	3.82	3.83	3.86	4.14	4.19	4.27	4.38	4.48	4.65	4.47	4.60	4.85	4.58	4.74	5.10	4.63	4.82	5.22	4.81	5.08	5.68
3928	Saltfleet	549131	393360	3.78	3.79	3.82	4.11	4.16	4.26	4.36	4.46	4.64	4.47	4.59	4.86	4.57	4.74	5.11	4.63	4.83	5.25	4.83	5.11	5.74
3942	Boygrift	555131	380860	3.72	3.74	3.77	4.06	4.11	4.22	4.33	4.43	4.65	4.43	4.57	4.87	4.56	4.73	5.13	4.62	4.83	5.28	4.85	5.15	5.82
3968	Gibraltar Point	557652	356181	4.16	4.17	4.20	4.51	4.56	4.67	4.76	4.85	5.08	4.85	4.97	5.27	4.94	5.10	5.49	4.99	5.18	5.63	5.14	5.41	6.09
3992_14	Hobhole	535990	340116	4.96	4.97	5.01	5.40	5.44	5.56	5.66	5.76	5.98	5.78	5.90	6.20	5.88	6.04	6.44	5.92	6.11	6.57	6.03	6.31	6.99
	Grand Sluice*	532366	344510	4.93	4.94	4.98	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
3992_9	Boston Barrier	532754	342852	4.93	4.94	4.98	5.41	5.45	5.57	5.73	5.83	6.05	5.85	5.97	6.27	5.93	6.09	6.49	5.94	6.13	6.59	5.98	6.26	6.94
3992_5	Fosdyke Bridge	531886	332234	4.87	4.88	4.92	5.31	5.35	5.47	5.58	5.68	5.90	5.71	5.83	6.13	5.82	5.98	6.38	5.87	6.06	6.52	6.01	6.29	6.97
4008	West Lighthouse	550094	329971	4.87	4.88	4.91	5.21	5.26	5.37	5.46	5.56	5.78	5.56	5.68	5.98	5.66	5.82	6.21	5.71	5.90	6.35	5.86	6.14	6.81
-	Marsh Road	525988	324065	-	5.04	-	-	5.44	-	-	5.73	-	-	5.85	-	-	5.98	-	-	-	-	-	-	-
-	Wisbech	546110	309940	-	4.83	-	-	5.25	-	-	5.53	-	-	5.66	-	-	5.78	-	-	-	-	-	-	-
-	Dog-in-a-Doublet	527200	299287	-	3.67	-	-	4.00	-	-	4.22	-	-	4.32	-	-	4.42	-	-	-	-	-	-	-

See next page for notes

Customer services line: 03708 506 506
Calls to 03 numbers cost the same as calls to standard geographic numbers
(i.e. numbers beginning with 01 or 02)

Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

East Coast and Wash: Immingham to the West Lighthouse

2018 Coastal Flood Boundary Extreme Sea Levels

NOTES:

The following notes apply to all CFB sites (ie all on table excluding Marsh Road, Wisbech, Dog-in-a-Doublet)

- The base date for the data is 2017.
- The levels are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- Levels for other annual chance probabilities are available if required.
- For additional information relating to the 2018 Coastal Flood Boundary Extreme Sea Levels or to access the full dataset for the above sites or intermediate locations refer to the Defra Metadata Catalogue at https://deframetadata.com/geonetwork/srv/eng/catalog.search#/metadata/84a5c7c0-d465-11e4-b0bd-f0def148f590

The following notes apply to all Marsh Road, Wisbech, Dog-in-a-Doublet

- The base date for the data is 2006
- The levels are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- Levels for other annual chance probabilities are available if required.
- These levels will be updated as their respective tidal river models are updated.

The following notes apply to Grand Sluice

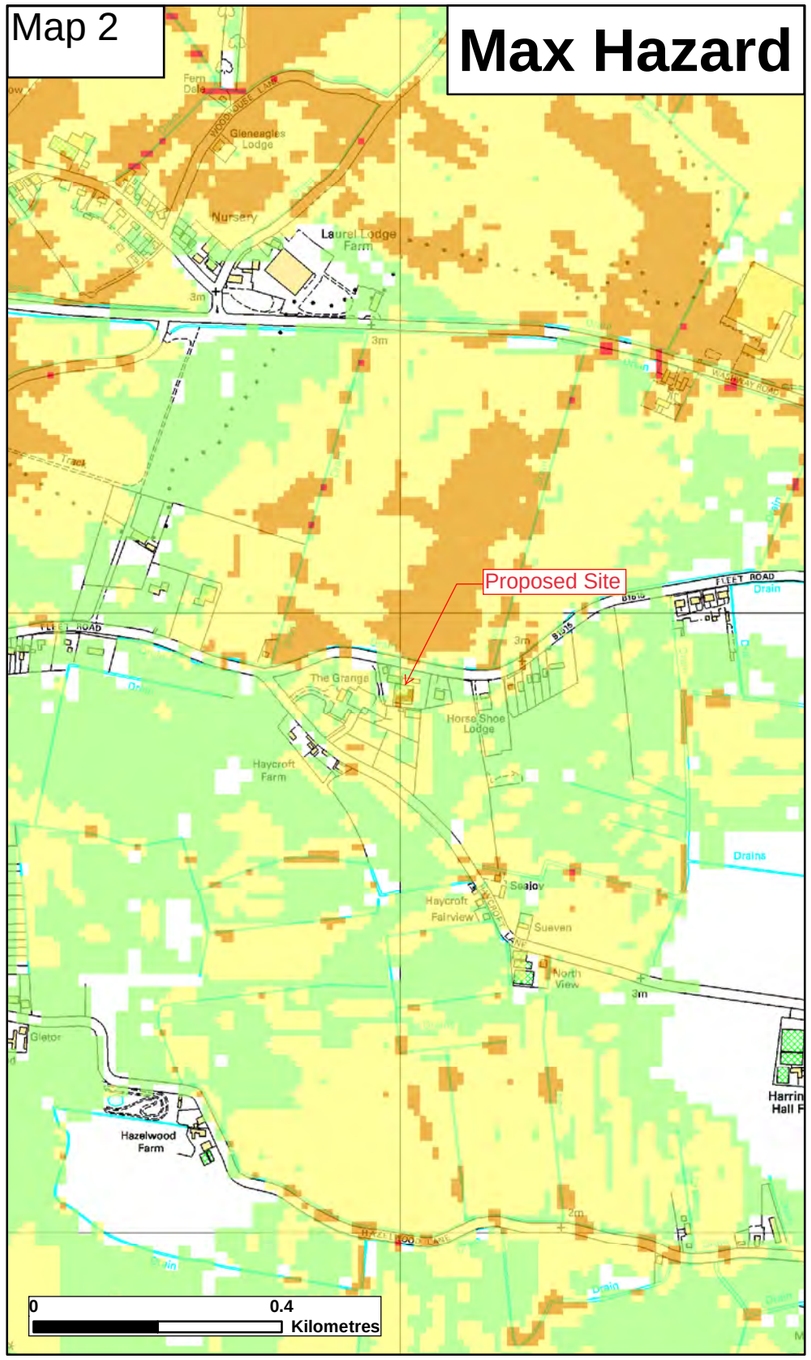
- The data is based on CFB 2018 data for Boston Barrier site, capped at 5.3mAOD to reflect use of the barrier.
- The base date for the data is 2017
- The levels are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- For additional information relating to the 2018 Coastal Flood Boundary Extreme Sea Levels or to access the full dataset for the above sites or intermediate locations refer to the Defra Metadata Catalogue at https://deframetadata.com/geonetwork/srv/eng/catalog.search#/metadata/84a5c7c0-d465-11e4-b0bd-f0def148f590

Customer services line: 03708 506 506
Calls to 03 numbers cost the same as calls to standard geographic numbers
(i.e. numbers beginning with 01 or 02)

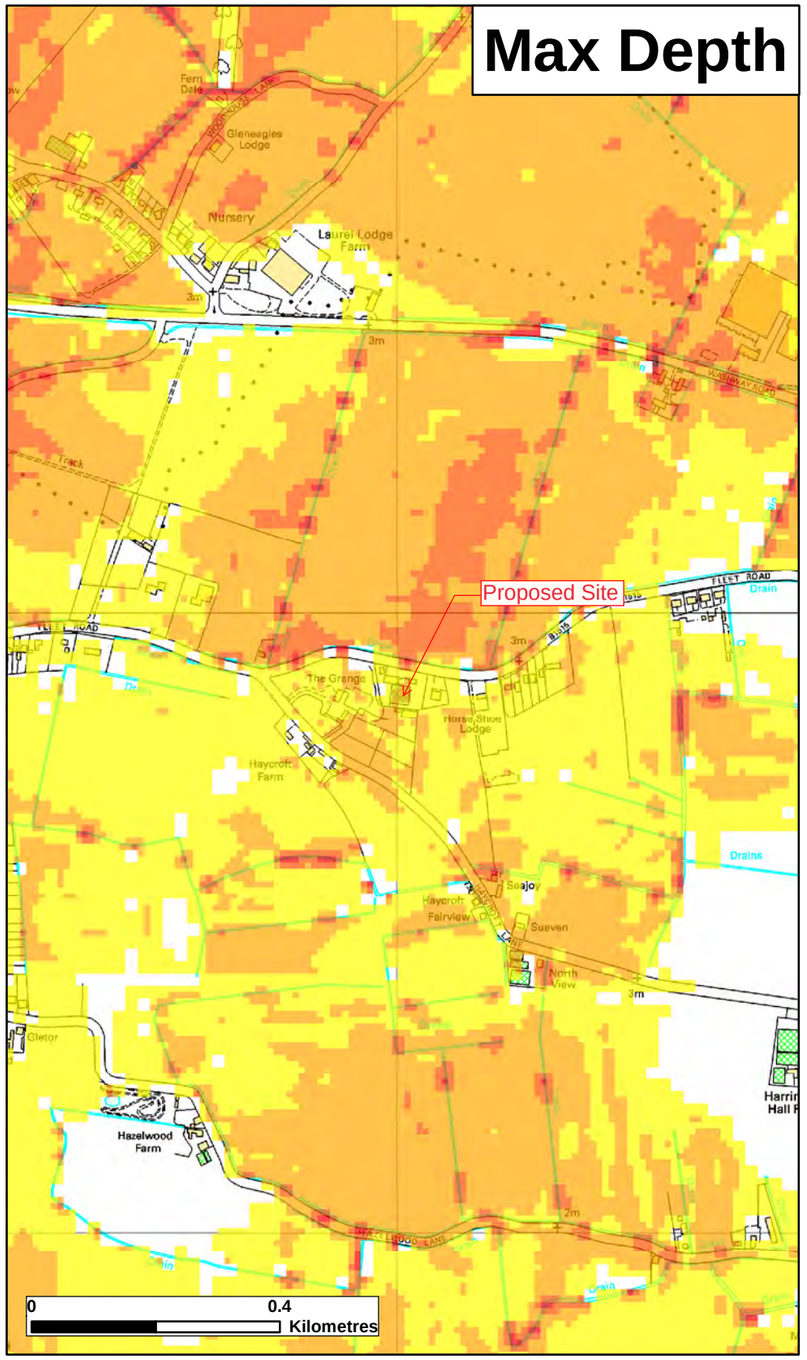
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

Map 2

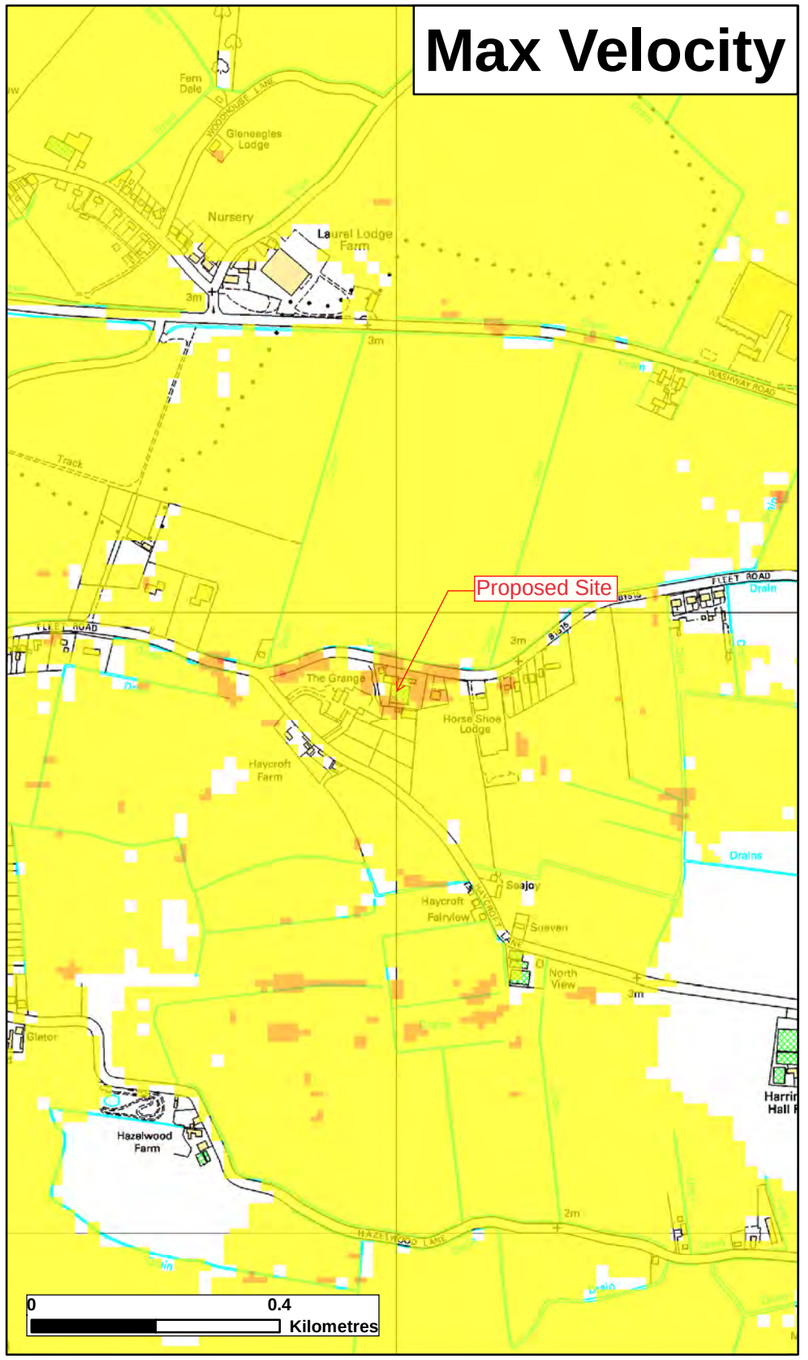
Max Hazard



Max Depth



Max Velocity



★ **Modelled Breach Locations** - see also the accompanying plan "Location of Modelled Breaches"

Max Hazard
(Flood Risk to People : FD2320)

- Less than 0.75 (Low Hazard)
- Between 0.75 and 1.25 (Danger for Some)
- Between 1.25 and 2.0 (Danger for Most)
- Greater than 2.0 (Danger for All)

Max Depth (m)

- 0 - 0.25
- 0.25 - 0.50
- 0.50 - 1.0
- 1.0 - 1.6
- 1.6 +

Max Velocity (m/s)

- 0 - 0.3
- 0.3 - 1.0
- 1.0 - 1.5
- 1.5 - 2.5
- 2.5 +

Date Printed	July 2017	Scenario year	2115	Scenario Annual Chance	0.5% (1 in200)	CCN Number	CCN-2017-51883

This map shows the level of flood hazard to people (called a hazard rating) if our flood defences are breached at certain locations, for a range of scenarios. The hazard rating depends on the depth and velocity of floodwater, and maximum values of these are also mapped.

The map is based on computer modelling of simulated breaches at specific locations. Each breach has been modelled individually and the results combined to create this map. Multiple breaches, other combinations of breaches, different sized tidal surges or flood flows may all give different results.

The map only considers the consequences of a breach, it does not make any assumption about the likelihood of a breach occurring. The likelihood of a breach occurring will depend on a number of different factors, including the construction and condition of the defences in the area. A breach is less likely where defences are of a good standard, but a risk of breaching remains.

General Enquiries No: 03708 506 506. Weekday Daytime calls cost 5p plus up to 6p per minute from BT Weekend Unlimited. Mobile and other providers' charges may vary

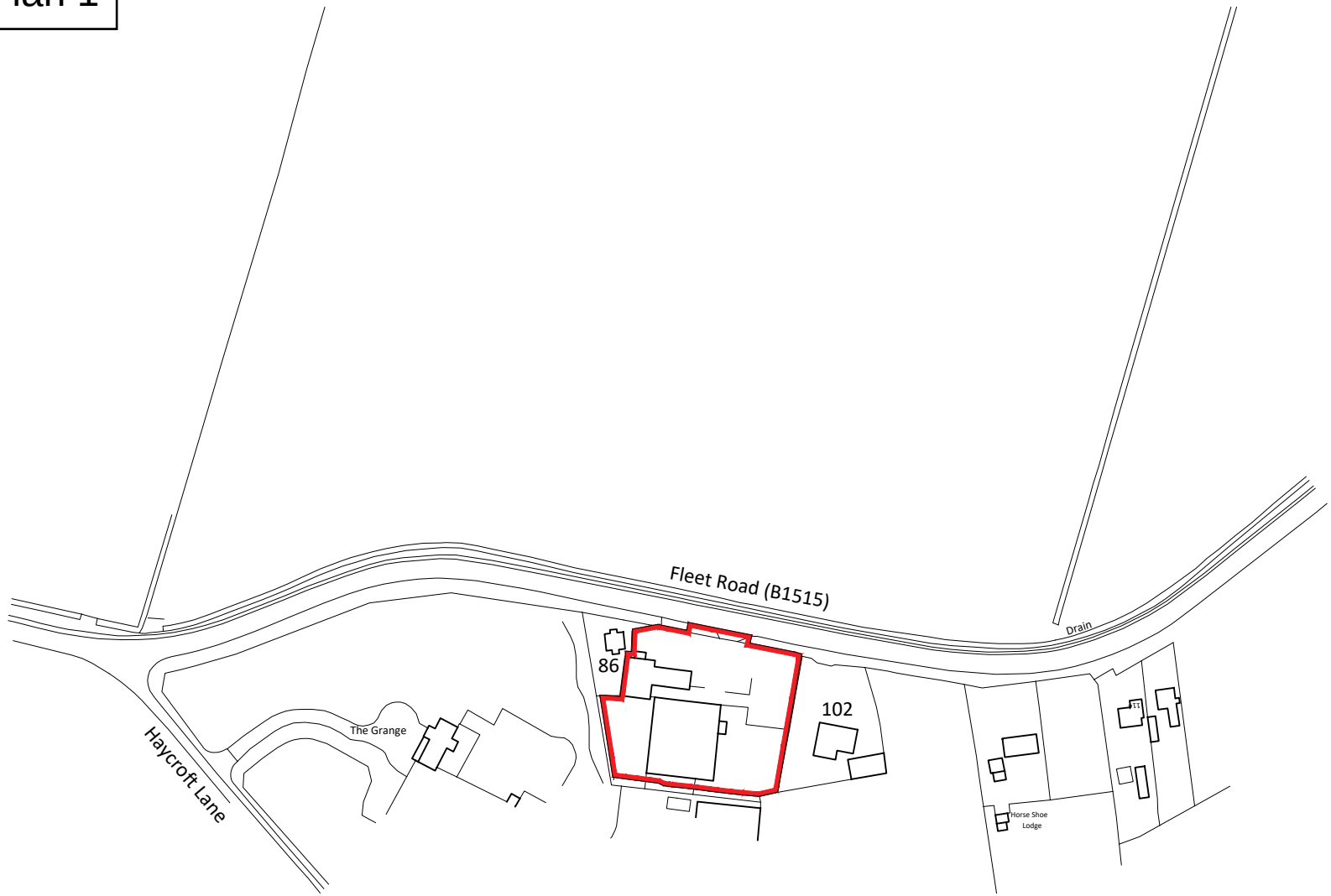
Environment Agency

Lincolnshire and Northamptonshire Breach Hazard mapping

Map Centred on TF 38008 24891

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Plan 1



N

0 20 40 60 80 100m

Notes

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Rev	Description	Date
-	-	-

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Web: www.rdc-landplan.co.uk

Client
Applegate Homes (Lincs) Ltd

Project
Redevelopment
Land off Fleet Road, Holbeach

Drawing
Location Plan

Scale @ A4	Date
1: 2500	24/06/22

Drawn By	Checked By
WW	LMS

Job Number	Status	Purpose of Issue
1459-4	SK	Discussion

Drawing No.	Rev
1459-4_SK_LP01	-

Plan 2



Notes

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CDM 2015
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N

0 5 10 15 20 25m

Rev	Description	Date
C	Footprints updated	23.06.22
B	Parking revised. Minor building realignment	28.04.22
A	Building footprints revised	21.04.22

rdc
Robert Doughty Consultancy

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Web: www.rdc-landplan.co.uk

Client
Applegate Homes (Lincs) Ltd

Project
Redevelopment
Land off Fleet Road, Holbeach

Drawing
Proposed Site Plan

Scale @ A3	Date
1: 500	01/12/21

Drawn By	Checked By
WW	LMS

Job Number	Status	Purpose of Issue
1459-4	SK	Discussion

Drawing No.	Rev
1459-4_SK_SP01	C

Plan 3

324950N

538000E

0 2 4 6 8m 12 16 20

Metres
1:200

Dyke

Inv 2.14

KFACE (continues)

FENCE (fallen (200)

TARMAC

GRAVEL

CONCRETE

GULLY

CHANNEL CLOSED

FOLIAGE

4m high hedging beyond fence from here

RL12.98

RL8.99

RL8.78

RL8.47

EL5.28

EL5.22 POST BT

RL8.54 KERB

RL6.85

RL6.83

EL6.34

EL6.32

EL6.28

RL10.87 RL

RL10.89 RL

RL9.00 FL9.22

EL7.90 TP

SIGN

POST BT

WATER

EARTH

IC

LP