



# Holbeach Food Enterprise Zone (FEZ), Lincolnshire

## Flood Risk Mitigation Strategy

On behalf of **South Holland District Council**



Project Ref: 332511500/4001/002 | Rev: B | Date: June 2023

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## Document Control Sheet

**Project Name:** Holbeach FEZ, Lincolnshire  
**Project Ref:** 332511500/4001/002  
**Report Title:** Flood Risk Mitigation Strategy  
**Doc Ref:** Revision B  
**Date:** June 2023

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Revision	Date	Description	Prepared	Reviewed	Approved
A	11/07/18	Minor amends to incorporate revised proposals	E. Edney	R. Fisher	A. Hensler
B	16/06/23	<b>Update to extend the LDO and allow for updated masterplan.</b>	<b>Hugh Leekam</b>	<b>Richard Fisher</b>	<b>Amy Hensler</b>

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## Contents

<b>Executive Summary</b> .....	<b>5</b>
<b>Summary of Key FRA Data</b> .....	<b>6</b>
<b>Abbreviations</b> .....	<b>8</b>
<b>1 Introduction</b> .....	<b>9</b>
1.1 Scope of Report .....	9
1.2 Sources of Information .....	9
1.3 Caveats and Exclusions .....	9
<b>2 Planning Policy Context</b> .....	<b>11</b>
2.1 National Policy and Guidance .....	11
2.2 Climate Change Impacts .....	11
2.3 Local Policy and Guidance .....	13
2.4 South Holland Strategic Flood Risk Assessment (SFRA) .....	16
<b>3 Site Setting</b> .....	<b>17</b>
3.1 Site Description .....	17
3.2 Proposed Development .....	17
3.3 Topography .....	19
3.4 Hydrological Setting and Existing Flood Defences .....	19
3.5 Existing Drainage Arrangements .....	21
3.6 Geology and Hydrogeology .....	22
<b>4 Assessment of Flood Risk</b> .....	<b>23</b>
4.2 EA Flood Maps .....	23
4.3 South Holland Strategic Flood Risk Assessment (SFRA) .....	25
4.4 South Holland IDB Hydraulic Modelling .....	27
4.5 EA Tidal Breach and Overtopping Modelling .....	28
4.6 Groundwater Flood Risk .....	30
4.7 Anglian Water Information .....	30
4.8 Summary of Flood Risk .....	31
<b>5 Flood Mitigation Strategy</b> .....	<b>32</b>
5.1 Introduction .....	32
5.2 Ground Floor Levels .....	32
5.3 Flood Storage and Flow Routes .....	32
5.4 Safe Access Arrangements .....	33
5.5 Surface Water and SuDS .....	34
<b>6 Conclusions</b> .....	<b>35</b>

## Figures

Figure 3-1: Site Location Plan .....	17
Figure 3-2: Proposed Site Layout.....	18
Figure 3-3: Overview of Site Topography (LiDAR data).....	19
Figure 3-4: Extract of SFRA Map 5 'Tidal and Fluvial Defences.....	20
Figure 3-5: View south across A151 showing section of Gander Ground watercourse east of site .....	22
Figure 4-1: EA Flood Zone Map .....	23
Figure 4-2: EA Flood Risk from Surface Water Map.....	25
Figure 4-3: Extract of SFRA 'Residual Risk Extent District Year 2115 1% Fluvial / 0.5% Tidal Event'. 27	
Figure 4-4: Extract of EA 2115 1 in 200 (0.5%) Annual Probability Breach Scenario (Max Depth).....	29

## Tables

Table 2-1: Climate Change – Peak River Flow - Central Allowances.....	12
Table 2-2: Climate Change – Peak Rainfall Intensity Allowances .....	12
Table 2-3: Climate Change – Sea Level Rise .....	13
Table 4-1: Climate Change – Peak Rainfall Intensity Allowances EA Still Water Tide Levels.....	26
Table 4-2: IDB Modelled Flood Levels .....	28
Table 4-3: EA Tidal Breach Modelling – Summary of Impacts at Site .....	30
Table 4-4: Summary of Sources of Flood Risk.....	31

## Appendices

Appendix A	Site Masterplan
Appendix B	Topographic Information
Appendix C	South Holland IBD Correspondence
Appendix D	SHDC SFRA Maps
Appendix E	Environment Agency Information and OpenData Flood Maps



## Executive Summary

The 'Flood Risk Mitigation Strategy' Report was prepared in 2018, on behalf of South Holland District Council (SHDC), as part of a Local Development Order for a proposed 'Food Enterprise Zone' (FEZ) to the west of Holbeach in Lincolnshire.

The LDO was approved and is being implemented and built out, and this update to the Flood Risk Mitigation Strategy has been undertaken to aid South Holland District Council in the process of reviewing the Local Development Order (LDO), to extend its lifetime beyond the originally approved 5 years.

In accordance with the fundamental objectives of the National Planning Policy Framework (NPPF), this report focusses on assessing the practical flood risk issues at the site, which include:

- (i) Identification of sources of flooding to the site and assessment of the flood risk, both current and including the potential impact of climate change;
- (ii) National, regional and local planning policy in relation to flood risk;
- (iii) Consideration of the flood risk implications, taking into account the potential allowance for climate change over the lifetime of any development;
- (iv) The identification of flood risk constraints and the proposed design parameters to provide mitigation.

The Environment Agency (EA) data confirms that the site is located within tidal Flood Zone 3, defined as:

**Flood Zone 3 'High Probability' greater than a 1 in 100 (1%) Annual Probability of river flooding or greater than a 1 in 200 (0.5%) Annual Probability of flooding from the sea.**

This classification ignores the presence of flood defences. The proposed development is classed as mainly 'Less vulnerable' use ("*Buildings used for...professional and other services...offices...general industry*") which is considered appropriate within Flood Zone 3a and do not require the Exception Test.

It has been proposed that a hotel be included as a potential ancillary use on the site. Such development would be a 'More vulnerable' land use and would require the Exception Test to be passed. This report has been updated to incorporate any further mitigation requirements if a hotel was to be included.

In conclusion, the report confirms that appropriate mitigation can be incorporated into the proposed FEZ to address the flood risk to the site, to ensure the development is safe and there is no detrimental impact on third parties.

## Summary of Key FRA Data

Aspect of flood risk	Applicable Guidance/ Source of Data	Summary	Section of FRA
Site Location	n/a	Land to the west of Holbeach, Lincolnshire, Spalding, PE12 7PY (site centre OS grid reference 534,730m E, 325,750m N).	3.1
Existing Ground Levels	Topographic Survey by Axis Surveys in August 2016	Site levels vary between approximately 2.8m AOD and 3.7m AOD.	3.3
Primary source of flood risk	n/a	Tidal flooding from the River Welland, in the event of a breach.	4.2
Presence of flood defences	n/a	EA maintained primary embankment defences and engineered high ground along the River Welland.	3.4
Proposed Development	Proposals by Robert Doughty Consultancy and Pick Everard Consultants	Proposal for a new 'Food Enterprise Zone' (FEZ); a centre of excellence for research and development in the field of food and agriculture.	3.2
<b>Planning Aspects</b>			
Flood Risk Vulnerability	Planning Practice Guidance (PPG) 'Flood Risk and Coastal Change'	The proposed 'FEZ' development is classed as 'Less Vulnerable' development.	3.2.5
		The proposed hotel within the 'FEZ' development is classed as 'More Vulnerable' development.	
Flood Zone		Flood Zone 3a 'High Probability'	4.2.2
Sequential Test		Sequential Test passed	3.2.6
Exception Test	Exception Test passed	3.2.6	
Applicable Climate Change Allowances	EA climate change allowances guidance	Welland Management Catchment +17% (Central, 2080s Epoch)	2.2.1
<b>Reference Flood Levels</b>			
Present Day	EA tidal breach modelling (2015)	n/a – site unaffected in present day breach scenarios	4.5
Climate Change		2115 1 in 200 annual probability breach level = 3.2m AOD 2115 1 in 1000 annual probability breach level = 3.3m AOD	4.5
<b>Proposed Mitigation Measures</b>			
Ground Floor Levels	Gov.uk/guidance/flood-risk-assessment-standing-advice	Recommended minimum floor level of 3.2m AOD – i.e. at design breach scenario level and a minimum freeboard of over 500mm above the modelled local IDB channel 1 in 100 annual probability plus climate change flood level.  If 'More vulnerable' development (e.g. a hotel) is proposed on the site, the ground floor levels should be set at a minimum of 3.3m AOD, i.e. above the breach 1 in 1000 (0.1%) annual probability tidal flood level.	5.2

<b>Floodplain Storage</b>	n/a	Recommended that an appropriate buffer zone is provided either side of the IDB channels.	<b>5.3</b>
<b>Flood Flow Routes</b>	n/a	-	
<b>Safe Access</b>	n/a	<p>Due to the considerable low-lying nature of the area, in a major breach flood event it is not feasible to provide a raised pedestrian safe access route beyond the site to continuous higher land.</p> <p>As the development of 'Less Vulnerable' uses, no sleeping accommodation is proposed the development could be vacated and secured in the event of potential flooding in the area.</p>	<b>5.4</b>
<b>Surface Water Drainage</b>	South Holland Internal Drainage Board (IDB)	See - Holbeach Surface Water Drainage Strategy Report (report ref. 332511500/4002/002)	<b>5.5</b>

## Abbreviations

ABI	-	Association of British Insurers
AP	-	Annual Probability
BGS	-	British Geological Survey
CDM	-	Construction (Design and Management)
CIRIA	-	Construction Industry Research and Information Association
DDA	-	Disability Discrimination Act
DEFRA	-	Department for Environment, Food and Rural Affairs
EA	-	Environment Agency
FAS	-	Flood Alleviation Scheme
FEZ	-	Food Enterprise Zone
FRA	-	Flood Risk Assessment
FRAP	-	Flood Risk Activity Permit
FRMP	-	Flood Risk Management Plan
FRMS	-	Flood Risk Mitigation Strategy
GIS	-	Geographic Information System
IDB	-	Internal Drainage Board
LLFA	-	Lead Local Flood Authority
LDO	-	Local Development Order
M. AOD	-	Metres Above Ordnance Datum (Newlyn)
NPPF	-	National Planning Policy Framework
PFRA	-	Preliminary Flood Risk Assessment
PPG	-	Planning Practice Guidance
RoSWF	-	Risk of Surface Water Flooding
SuDS	-	Sustainable Drainage Systems
SFRA	-	Strategic Flood Risk Assessment
SHDC	-	South Holland District Council

# 1 Introduction

## 1.1 Scope of Report

- 1.1.1 This 'Flood Risk Mitigation Strategy' Report (Rev A) was originally prepared in June 2018 by Stantec UK Ltd, on behalf of our client, South Holland District Council (SHDC), to support a Local Development Order for a proposed 'Food Enterprise Zone' (FEZ) development, on land to the west of Holbeach in Lincolnshire.
- 1.1.2 The LDO is being implemented and built out, and this 'Revision B' of the report has been produced to extend the life of the LDO beyond the original 5-year period.
- 1.1.3 This Flood Risk Mitigation Strategy (FRMS) will cover the same area, as that covered by the original LDO and the supporting FRMS document, previously provided in 2017.
- 1.1.4 This report should be read in conjunction with the **Surface Water Drainage Strategy** report ref. **332511500/4002/002**.
- 1.1.5 The report is based on the available flood risk information for the site as detailed in **Section 1.2** and prepared in accordance with the planning policy requirements set out in **Section 2**.

## 1.2 Sources of Information

- 1.2.1 This section provides an overview of the current and future flood risk to the site, based on the following information:
- EA online flood maps <https://flood-map-for-planning.service.gov.uk/> (see **Appendix E**);
  - The EA Northern Area Tidal Hazard Mapping Study' and **Flood Mapping & Hydraulic Wash Model** (EA reference - CCN/ 2023/ 303845, April 2023) including modelled breach hazard mapping and tidal flood data (see **Appendix E**);
  - **The South East Lincolnshire (2011-2036) Local Plan** (adopted in March 2019), with particular reference to **Policy 4: – 'Approach to Flood Risk'**;
  - **The South East Lincolnshire Strategic Flood Risk Assessment**, (SFRA) released in March 2017, which consolidates information from the **South Holland District Council 'Update of Strategic Flood Risk Assessment'** (SFRA) dated February 2017;
  - Email correspondence with the **South Holland IDB** (see **Appendix C**);
  - **Anglian Water** online mapping.
- 1.2.2 **Section 4** provides a summary of the key flood risk data, based on a review of the above information.

## 1.3 Caveats and Exclusions

- 1.3.1 This report has been prepared in accordance with the NPPF, the associated PPG and local planning policy. The conclusions are based on data available at the time of the study and on the subsequent assessment that has been undertaken in relation to the development proposals as outlined in **Section 1.2**.
- 1.3.2 Activities during the construction phase may have an impact on the existing and future flood risk. Thus, an assessment of the risks and appropriate mitigation measures should be identified and managed by the contractor.

- 1.3.3 The Construction (Design and Management) Regulations (CDM Regulations) will apply to any future development of this site which involves “construction” work, as defined by the CDM Regulations. As such it is the responsibility of the proposed developer (ultimate client) to fulfil its duties under the CDM Regulations.
- 1.3.4 It should be noted that the insurance market applies its own tests to properties in terms of determining premiums and the insurability of properties for flood risk. Those undertaking development in areas which may be at risk of flooding are advised to contact their insurers or the Association of British Insurers (ABI) to seek further guidance prior to commencing development. Stantec does not warrant that the advice in this report will guarantee the availability of flood insurance either now or in the future.

## 2 Planning Policy Context

### 2.1 National Policy and Guidance

- 2.1.1 National policy in relation to flood risk is contained within the **National Planning Policy Framework (NPPF)**, updated July 2021, issued by the Department for Levelling Up, Housing and Communities, with reference to Section 14 'Meeting the challenge of climate change, flooding and coastal change'.
- 2.1.2 The latest version of the associated **Planning Practice Guidance (PPG)** 'Flood Risk and Coastal Change' section was updated August 2022.
- 2.1.3 The NPPF and PPG demonstrate a flood risk management approach for the lifespan of the proposed development considering the effects of climate change. The document sets the framework to minimise vulnerability, provide resilience to the impacts of climate change, and to fully consider the potential impacts of climate change for the lifetime of the development within the mitigation measures.
- 2.1.4 The guidance on the application of climate change allowances in FRAs is linked via the PPG and was most recently updated in May 2022. The guidance provides contingency allowances for the potential increases in peak river flow, peak rainfall intensity and sea level rise which are considered accordingly subject to the site conditions – discussed further below.
- 2.1.5 The NPPF and PPG place emphasis on the need to fully consider – and design for – the impacts of climate change as set out in the 'Flood risk assessments: climate change allowances' planning guidance accessible at the following link:

<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

- 2.1.6 This guidance provides contingency allowances for potential increases due to climate change in peak river flow, sea level rise and rainfall intensity. These allowances are key for designing appropriate mitigation into the development to consider the flood risks over the lifetime of the development (peak river flow and/or sea level rise), and for the management of surface water over the site (peak rainfall intensity). The relevant allowances for consideration and the impacts to the development are discussed further below.

It is necessary to fully consider the potential impacts of climate change over the lifetime of new development. The applicable allowances to take into consideration are detailed in the 'Flood risk assessments: climate change allowances' planning guidance and discussed below.

### 2.2 Climate Change Impacts

#### Peak River Flow

- 2.2.1 The peak river flow allowances provide a range of allowances based on percentile (i.e. the degree of certainty of an event occurring, based on the range of climate change scenarios assessed through scientific investigations). The applicable values for a Site are dependent on the 'River Management Catchment' in which the site is located, which can be confirmed via the online mapping tool embedded within the guidance.
- 2.2.2 The Central allowance is identified as the design standard for most forms of proposed development in all appropriate Flood Zones (the exception being 'Essential Infrastructure' which requires the 'Higher Central' value). The peak river flow allowances to be considered as part of the FRMS are as detailed in **Table 2-1: Climate Change – Peak River Flow - Central Allowances**.

**Table 2-1: Climate Change – Peak River Flow - Central Allowances**

River Management Catchment	Flood Zone	Flood Risk Vulnerability Classification	Applicable Climate Change Allowance (2080s Epoch – 2070-2115)
			Central
<i>Welland Management Catchment</i>	<i>Flood Zone 1</i>	<i>'More Vulnerable'</i>	<b>+17%</b>

2.2.3 The peak river flow climate change allowance set out above, will apply to the IDB channels that are in relation to the site, guidance for fluvial impacts applying a +17% allowance for climate change will be discussed further in **Section 4.4**.

### Peak Rainfall

2.2.1 The potential increase in peak rainfall intensity needs to be considered in the surface water drainage strategy for new developments.

2.2.2 The EA climate change allowances guidance was updated in May 2022 to include a GIS based 'peak rainfall allowances' map showing the anticipated changes in rainfall intensity based on river management catchment. The anticipated changes in peak rainfall intensity in small catchments (less than 5km<sup>2</sup>), or urbanised drainage catchments are summarised in **Table 2-2: Climate Change – Peak Rainfall Intensity Allowances**. For large rural drainage catchments, the peak river flow allowances are applied.

**Table 2-2: Climate Change – Peak Rainfall Intensity Allowances**

<i>Welland Management Catchment</i>	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)	
	<i>Central</i>	<i>Upper End</i>
<i>3.3% (1 in 30-year) rainfall</i>	25%	35%
<i>1% (1 in 100-year) rainfall</i>	25%	<b>40%</b>

2.2.3 As the development proposals are considered as having a design life of 100 years, a 40% climate change allowance will be assessed within the surface water drainage strategy at this stage.

### Sea Level Rise

2.2.4 The climate change guidance sets out per annum impact of climate change on sea level rise in 'Table 1' of the guidance, based on the river basin district of the subject site. Data is provided



for both the ‘Higher Central’ and ‘Upper End’ scenarios and the guidance advises that both scenarios are reviewed within any assessment of tidal flood risk.

- 2.2.5 The site lies within the Welland Management Catchment; therefore, the ‘Anglian’ sea-level rise allowance is considered for the present study (see **Table 2.3**).

**Table 2-3: Climate Change – Sea Level Rise**

Timescale	Sea Level Rise (metres) (Allowance per year (mm) and cumulative (mm))	
	Higher Central	Upper End
<i>Present Day/Baseline to 2035</i>	<b>5.8 (203)</b>	<b>7 (245)</b>
<i>2036 to 2065</i>	<b>8.7 (261)</b>	<b>11.3 (339)</b>
<i>2066 to 2095</i>	<b>11.6 (348)</b>	<b>15.8 (474)</b>
<i>2096 to 2125</i>	<b>13 (390)</b>	<b>18.1 (543)</b>
<i>Total increase</i>	<b>1.20m</b>	<b>1.60m</b>

- 2.2.1 Considering a design life of 100 years the cumulative rise is 1.20m and 1.60m for the Higher Central and Upper End allowance, respectively.
- 2.2.2 Given that the primary elements of the development will include uses for engineering, development and research, the proposed ‘Less Vulnerable’ buildings are considered to have a potentially lower development life than 100 years, and therefore the assessed impact of climate change is considered to be conservative.
- 2.2.3 One element of the scheme is for a proposed hotel, and a proposed 100 year design life is applicable for such development.
- 2.2.4 The potential impacts of climate change are taken into account in the EA modelled flood data discussed in **Section 4.5** through the provision of flood levels based on sea level rise projected to the year 2115 (i.e. approximate 100-year development design life).

## 2.3 Local Policy and Guidance

### The South East Lincolnshire Local Plan (2011-2036)

- 2.3.1 Local planning policy is contained within **The South East Lincolnshire (2011-2036) Local Plan** (adopted in March 2019), with particular reference to drainage design policy’s – **Policy 2: – ‘Development Management’**, **Policy 3: – ‘Design of New Development’** and **Policy 4: – ‘Approach to Flood Risk’**, which are reproduced overpage:

## **Policy 2: Development Management**

*“Proposals requiring planning permission for development will be permitted provided that sustainable development considerations are met, specifically in relation to:*

- 1) sustainable drainage and flood risk;*

*The primary purpose of ‘sustainable drainage systems’ (SuDS) is to minimise the impact of urban development on the water environment, reduce flood risk and provide habitats for wildlife. Opportunities for incorporating a range of SuDS in all new development must be taken wherever possible.*

*There are many different SuDS features available to suit the constraints of a site which could come in the form of green roofs or by providing new wildlife habitats such as ponds, wetlands and swales. Hard-engineered elements are often used in high-density, commercial and industrial developments, including permeable paving, canals, treatment channels, attenuation storage and soakaways.*

*However, the discharge of surface water to soakaways or other infiltration devices must be considered first before alternative methods are investigated. SuDS should be designed into the landscape of all new development and should be included as part of a wider approach across South East Lincolnshire to improve water quality and provide flood mitigation. Maintenance will also be required, appropriate to the type of development and location proposed.”*

## **Policy 3: Design of New Development**

*“All development will create distinctive places through the use of high quality and inclusive design. Development proposals will demonstrate how the following issues, where they are relevant to the proposal, will be secured:*

- 1) the mitigation of flood risk through flood-resistant and flood-resilient design and sustainable drainage systems (SuDS);*

*A development will make buildings and places more resilient to flooding by, for example, raising the floor level, and adapting the internal materials, electrical South East Lincolnshire Local Plan 2011-36 circuits and plumbing to cope better with any flood event.*

*These issues may be successfully incorporated in buildings that follow traditional or contemporary design in accordance with Building Regulations. In addition, owing to flood risk new activities may need to be deterred in certain areas based on their intrinsic hazard from water. The hazard may result from a combination of the activity type, its duration and the potential for failure of flood-control measures.”*

#### **Policy 4: Approach to Flood Risk**

*“Development proposed within an area at risk of flooding (Flood Zones 2 and 3 of the Environment Agency’s flood map or at risk during a breach or overtopping scenario as shown on the flood hazard and depths maps in the Strategic Flood Risk Assessment) will be permitted, where:*

- 2) It can be demonstrated that essential infrastructure in FZ3a & FZ3b, highly vulnerable development in FZ2 and more vulnerable development in FZ3 provide wider sustainability benefits to the community that outweigh flood risk.*
- 3) The application is supported with a site-specific flood risk assessment, covering risk from all sources of flooding including the impacts of climate change and which: a. demonstrate that the vulnerability of the proposed use is compatible with the flood zone;*
- 4) identify the relevant predicted flood risk (breach/overtopping) level, and mitigation measures that demonstrate how the development will be made safe and that occupants will be protected from flooding from any source;*
- 5) propose appropriate flood resistance and resilience measures (following the guidance outlined in the Strategic Flood Risk Assessment), maximising the use of passive resistance measures (measures that do not require human intervention to be deployed), to ensure the development maintains an appropriate level of safety for its lifetime;*
- 6) include appropriate flood warning and evacuation procedures where necessary (referring to the County’s evacuation routes plan), which have been undertaken in consultation with the authority’s emergency planning staff;*
- 7) incorporates the use of Sustainable Drainage Systems (SuDS) (unless it is demonstrated that this is not technically feasible) and confirms how these will be maintained/managed for the lifetime of development (surface water connections to the public sewerage network will only be permitted in exceptional circumstances where it is demonstrated that there are no feasible alternatives);*
- 8) demonstrates that the proposal will not increase risk elsewhere and that opportunities through layout, form of development and green infrastructure have been considered as a way of providing flood betterment and reducing flood risk overall; g. demonstrates that adequate foul water treatment and disposal already exists or can be provided in time to serve the development;*
- 9) ensures suitable access is safeguarded for the maintenance of water resources, drainage and flood risk management infrastructure.*

*Mitigation may also be incorporated in SuDS which are likely to be required irrespective of the flood risk. All major developments will be expected to incorporate Sustainable Drainage Systems (SuDS) as standard. SuDS can vary substantially in terms of what is required, from rain water harvesting to water retention and treatment (e.g. through reed beds).*

*Some SuDS may be an adequate response to surface water flood issues. Surface water connections to the public sewerage network should only be made in exceptional circumstances where it can be shown where there are no feasible alternatives.”*

## 2.4 South Holland Strategic Flood Risk Assessment (SFRA)

- 2.4.1 **The updated South Holland Strategic Flood Risk Assessment (SFRA)** was released in **February 2017** and provides an overview of the flood risk issues across the district and an assessment of the risks associated with a breach in the sea defences including further information on the flood hazard, should a breach occur in the defences, and the relative probability of flooding.
- 2.4.2 The 2D hydraulic modelling outputs for the South Holland District have been used to develop the fluvial & tidal hazard, depth, velocity and breach flood mapping presented within The South East Lincolnshire SFRA (2017) - see **Appendix D** .

### The South East Lincolnshire Strategic Flood Risk Assessment

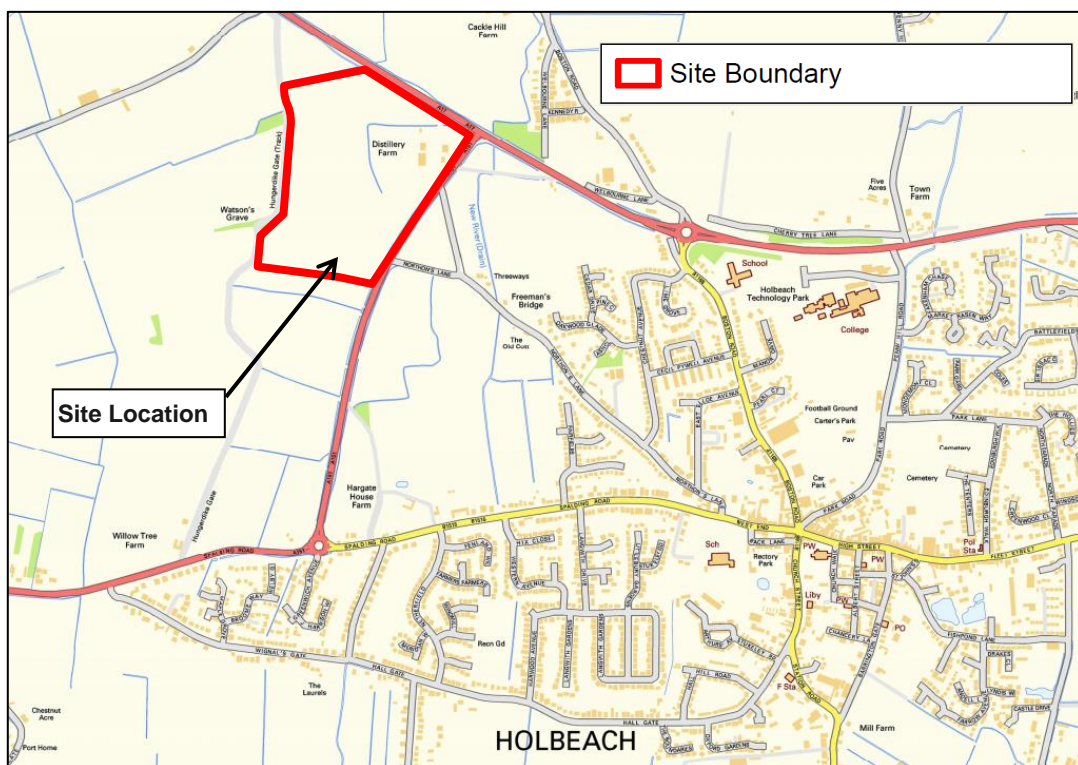
- 2.4.3 **The South East Lincolnshire Strategic Flood Risk Assessment (SFRA)** was released in **March 2017** and forms part of the Local Plan evidence base, to inform future spatial planning and to assist in developing planning policies to address flood risk. Moreover, the document provides an overall understanding of the flood risk within the study area taking into account all potential sources.
- 2.4.4 It is essential therefore that the Council is in a position to take informed decisions, providing a careful balance between the risk of flooding and other unrelated planning constraints that may place pressure upon *'at risk'* areas.
- 2.4.5 The South East Lincolnshire SFRA is accompanied by mapping which shows the variation in flood risk for land within the South East Lincolnshire joint planning area.
- 2.4.6 The site is in the South Holland District (SHD) within the South East Lincolnshire joint planning area. The SHD SFRA Fluvial & Tidal (Present day / Year 2115) Hazard, Depth, Velocity and Breach flood mapping is shown in **Appendix D** .
- 2.4.7 It should be noted that the content from the South Holland Strategic Flood Risk Assessment (February 2017) has been used to update the South East Lincolnshire SFRA (March 2017); as such the South East Lincolnshire SFRA includes the same information and accompanied flood mapping as the South Holland SFRA.

### 3 Site Setting

#### 3.1 Site Description

- 3.1.1 The 16ha hectare (ha) site consists of primarily agricultural land and a distillery farm on the western flank of the town of Holbeach in Lincolnshire (site centre OS grid reference 534,735m E, 325,745m N) – see **Figure 3-1**.
- 3.1.2 Holbeach lies within the administrative boundary of South Holland District Council (SHDC).

**Figure 3-1: Site Location Plan**



- 3.1.3 The site is bordered to the east by the A151 and the A17 Washway Road to the north, by the Hungerdike Gate to the west and agricultural land to the immediate south.
- 3.1.4 The south-eastern part of the site was the subject of an outline planning application by the University of Lincoln for a 'Centre Of Excellence' and associated works (SHBC planning reference H09-0771-16, approved November 2016). This will form part of the wider FEZ and it is anticipated the wider site will utilise the proposed main access via a roundabout off the A151 (the application also included for a new roundabout at the junction of the A17 and A151 (the Peppermint Junction).
- 3.1.5 There are several ordinary watercourses and drainage channels, that boarder the site boundary and surround the site area.

#### 3.2 Proposed Development

- 3.2.1 The proposal is for the extension of the LDO for a 'Food Enterprise Zone' (FEZ); a centre of excellence for research and development in the field of food and agriculture.



- 3.2.2 The masterplan for the site by Pick Everard Consultants provided in **Appendix A** .
- 3.2.3 The south-eastern part of the site was recently the subject of an outline planning application by the University of Lincolns for a 'proposed centre of excellence in agri food' and associated works (SHBC planning reference H09-0771-16, approved November 2016). This will form part of the wider FEZ and it is anticipated the wider site will utilise the proposed main access via a roundabout off the A151 (the application also included for a new roundabout at the junction of the A17 and A151 (the Peppermint Junction).
- 3.2.4 Details of the proposals by Robert Doughty Consultancy and Pick Everard Consultants are included in **Appendix C** while an extract of proposed site layout is shown in **Figure 3-2** (Pick Everard – Outline Masterplan Drawing – 210649-PEV-XX-ZZ-DR-A-0010, November 2022).

**Figure 3-2: Proposed Site Layout**



- 3.2.5 The NPPF Annex 3 confirms the 'Flood risk vulnerability classification' of a site, depending upon the proposed usage.
- The proposed 'FEZ' development is classed as 'Less Vulnerable' development.
  - The proposed hotel within the FEZ development is classed as 'More Vulnerable' development.

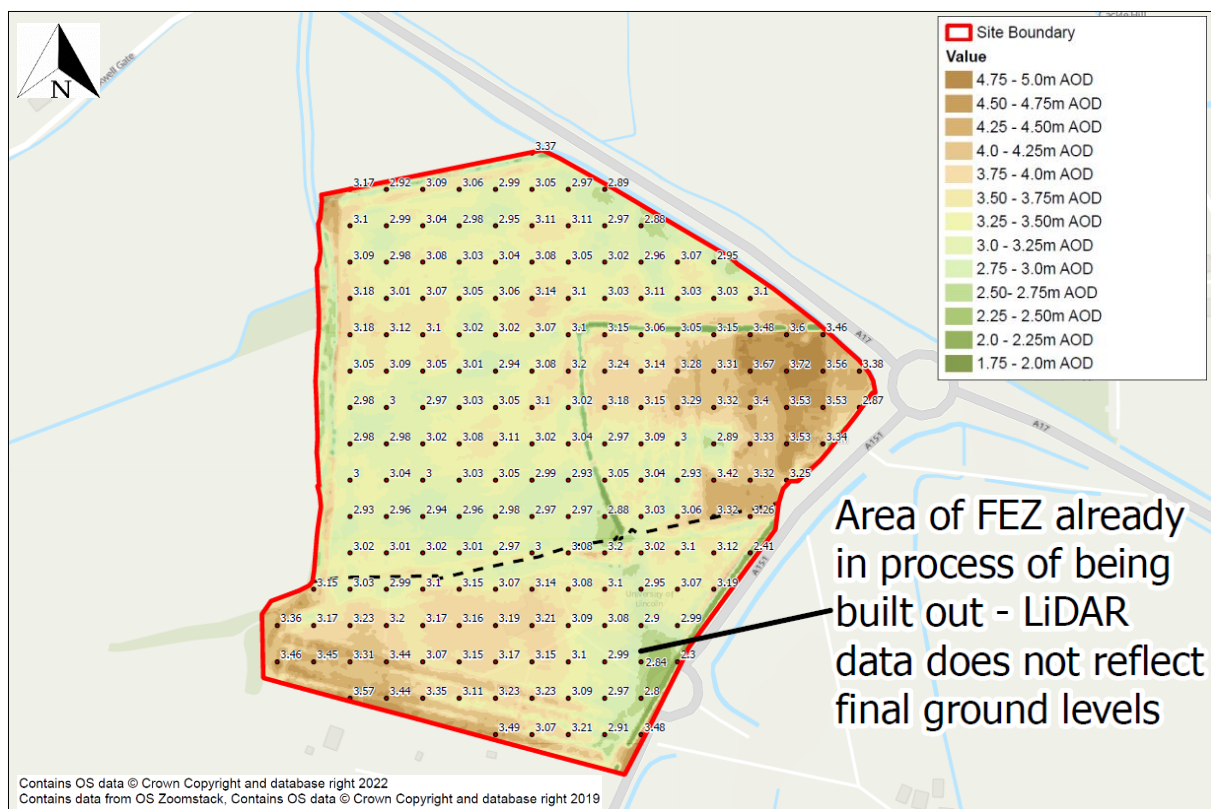
3.2.6 The proposed 'Less Vulnerable' developments within the FEZ are acceptable at the location. The flood mitigation requirements outlined in this report allow for all proposed 'More Vulnerable' developments to be suitably located within the FEZ.

### 3.3 Topography

3.3.1 EA Opensource LiDAR data has been obtained for the site and spot levels are shown on **Figure 3.3**. This indicates site levels vary between approximately 2.25m AOD and 3.8m AOD. As noted, the southern part of the site is in the process of being built out as part of the FEZ, so the LiDAR mapping may not fully reflect the post-development ground levels over this part of the site.

3.3.2 There are high spots (denoted in orange/brown) in the north-western, south-western and eastern parts of the site. Levels fall nominally from these high spots towards the south, central and northern areas of the site.

Figure 3-3: Overview of Site Topography (LiDAR data)



3.3.3 A detailed topographic survey of the site has been undertaken by Axis Surveys in August 2016 and is included in **Appendix B**. This confirms levels are consistent with the LiDAR information discussed above.

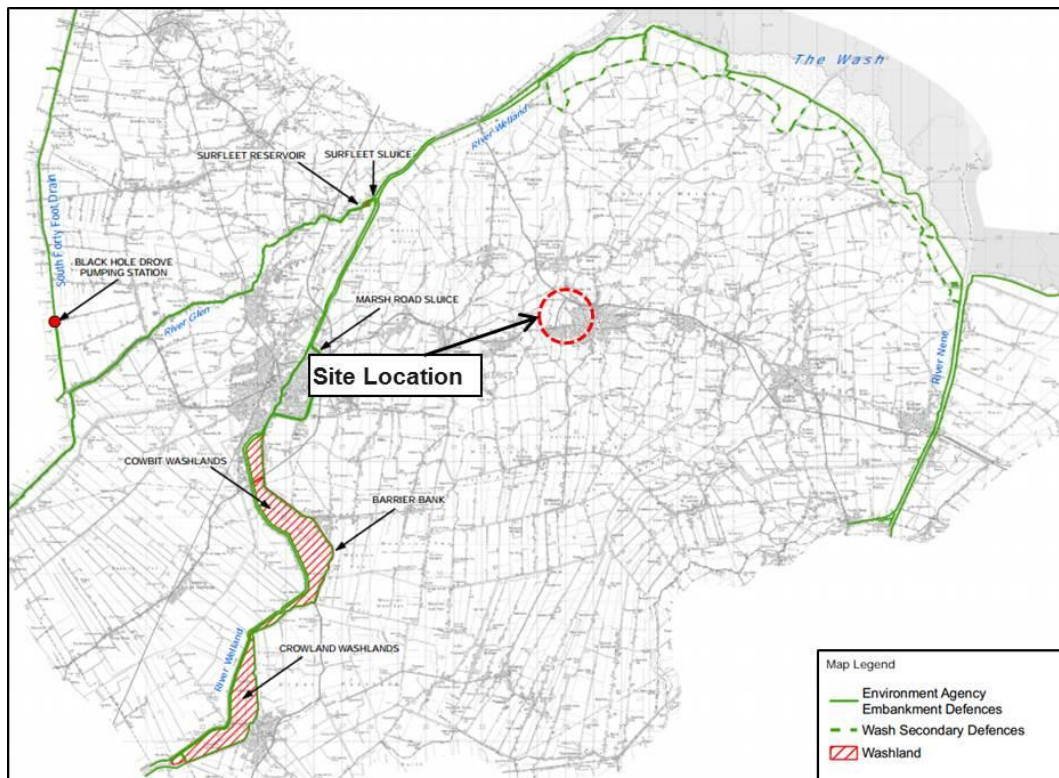
### 3.4 Hydrological Setting and Existing Flood Defences

3.4.1 The **River Welland** is the nearest 'main river' watercourse and is located approximately 7km to the north of the site.

3.4.2 The Welland is one of four main river watercourses that flow through South Holland District – the others being the Nene, the Glen and the South Forty Foot Drain – draining the low lying fens and ultimately discharging to the Wash estuary and is tidally influenced downstream of Spalding.

3.4.3 All watercourses in the region drain into The Wash, located approximately 12km to the north-west of the site. SFRA Figure 5, an extract of which is displayed in **Figure 3-4**, confirms the location of EA maintained embankment defences along the River Welland, whilst the coastline with the Wash is defended by an EA-controlled line of ‘primary’ flood defences with lines of ‘secondary’ and ‘tertiary’ defences under the control of local landowners.

**Figure 3-4: Extract of SFRA Map 5 ‘Tidal and Fluvial Defences**



3.4.4 The SHDC SFRA confirms that “the main river watercourses are embanked and so have no direct floodplain in the District other than at designated flood storage areas... However, they do have indirect floodplains being that which would arise if there was a failure in one of the embankments”.

3.4.5 SFRA Table 3R shows the reference tidal flood levels and the comparison with the right bank defence crest levels along the tidal River Welland. This confirms that:

- the defences are not overtopped in the current 1 in 200 (0.5%) annual probability or the extreme 1 in 1000 (0.1%) annual probability tidal flood events.
- allowing for sea level rise projected to the year 2115, the crest levels are still above the 1 in 200 (0.5%) annual probability level, although isolated locations drop marginally below the extreme 1 in 1000 (0.1%) annual probability tidal flood events (albeit by less than 300mm).

3.4.6 Further afield, the area is protected from severe tidal flooding by The Wash estuary and is necessarily defended against tidal inundation by substantial sea defences which prominently feature along the Lincolnshire coastline. In addition to protection of the major settlements, these defences protect an extensive area of valuable fenland and numerous properties from flooding.

3.4.7 The EA has confirmed in their email of 11<sup>th</sup> April 2023 (see copy in **Appendix E** that:



*“The existing tidal defences protecting this site consist of earth embankments. They are in fair condition and reduce the risk of flooding (at the defence) to a 0.67% (1 in 150) chance of occurring in any year. We inspect these defences routinely to ensure potential defects are identified”.*

- 3.4.8 However, the SFRA indicates that the flood defences along the frontage of the Wash currently have insufficient freeboard above the current 1 in 200 (0.5%) annual probability tidal flood event, with isolated points below this level.
- 3.4.9 When the allowance for sea level rise as a result of climate change is also considered, the SFRA confirms that *“none of the Wash front line defences would have adequate freeboard to be considered secure”* and recommends improvements to both primary and secondary defences in the area. Notwithstanding this point, the significant distance of Holbeach from the coastline would ensure that any minor overtopping due to the deficiencies in the defence crest level would not impact the area (see EA data in **Section 4.5** for further details).

### Future Flood Defences

- 3.4.10 The site is located with the area covered by the EA River Welland Catchment Flood Management Plan (CFMP), which sets out the policies proposed for the long term management of flood risk for the catchment – see **Section 2.3**. The CFMP confirms that the long term strategy is to maintain the existing defence standards for the District, along with those in other fenland areas. Under these policies they would aim to enhance the defences over time as may become necessary to keep pace with climate change effects.
- 3.4.11 If the policies are put into effect, then the present-day flood risks identified by the SFRA would remain in the future, but the potential increase in flood risk (i.e. resulting from potential climate change impacts) would not arise.
- 3.4.12 The main risk of flooding to the site is from a potential breach in the flood defences, either on the tidal River Welland to the north-west or from the tidal defences along the coastline to the north-east. The potential improvements to such tidal defences would have the potential to significantly reduce the residual risk of a breach impacting the area.

## 3.5 Existing Drainage Arrangements

### IDB Watercourses

- 3.5.1 The land drainage in the Holbeach area is managed by the South Holland Internal Drainage Board (IDB), whose role is to manage surface water discharge and land drainage through a network of arterial drainage channels which discharge into the higher-level main rivers, with water level control assisted by pumping stations and sluices.
- 3.5.2 The South Holland IDB have provided maps showing the network of the IDB watercourses in the area, which form part of the **Holbeach River** catchment (see **Appendix C**) The map shows that the site is bordered by riparian owned watercourses which drain to the nearby **IDB P09 ‘Distillery Channel’** in the north-eastern corner of the site.
- 3.5.3 The **IDB P16 ‘Gander Ground’** watercourse is located approximately 90m to the south of the site and some of the riparian watercourses traversing the eastern boundary of the site drain to this watercourse before it passes under the A151 (see **Figure 3.5**).

Figure 3-5: View south across A151 showing section of Gander Ground watercourse east of site



3.5.1 These channels drain into the **'Holbeach New River' (Drain)** – IDB reference P20 – which runs north through the land east of the A151 and outfalls into the Holbeach River to the north of Holbeach. From this point the Holbeach River continues north, to eventually outfall into the River Welland via Holbeach River Sluice.

3.5.2 With regard to the standard of protection provided by the IDB watercourses, the South Holland SFRA states:

*"In the present-day 1% annual probability event, the IDBs consider that most of their drains may reach bank-full conditions but in urban areas there should be no flooding to property. In agricultural areas there would probably be shallow flooding of the lower lying parts but with only isolated instances of flooding to properties or roads".*

3.5.3 Modelled flood data provided by the IDB is discussed in **Section 4.4**.

### **3.6 Geology and Hydrogeology**

3.6.1 An initial overview of the site geology has been made by using the online British Geological Society (BGS) 'Geology of Britain Viewer'. This advises that the Holbeach area geology is a bedrock of *'West Walton Formation - Mudstone and Siltstone'*, with superficial deposits of *'Tidal Flat Deposits - Clay and Silt'*.

3.6.2 The Cranfield University 'Soilscapes' resource indicates the land is 'Loamy and clayey' and described as *'Loamy and clayey soils of coastal flats with naturally high groundwater'*.

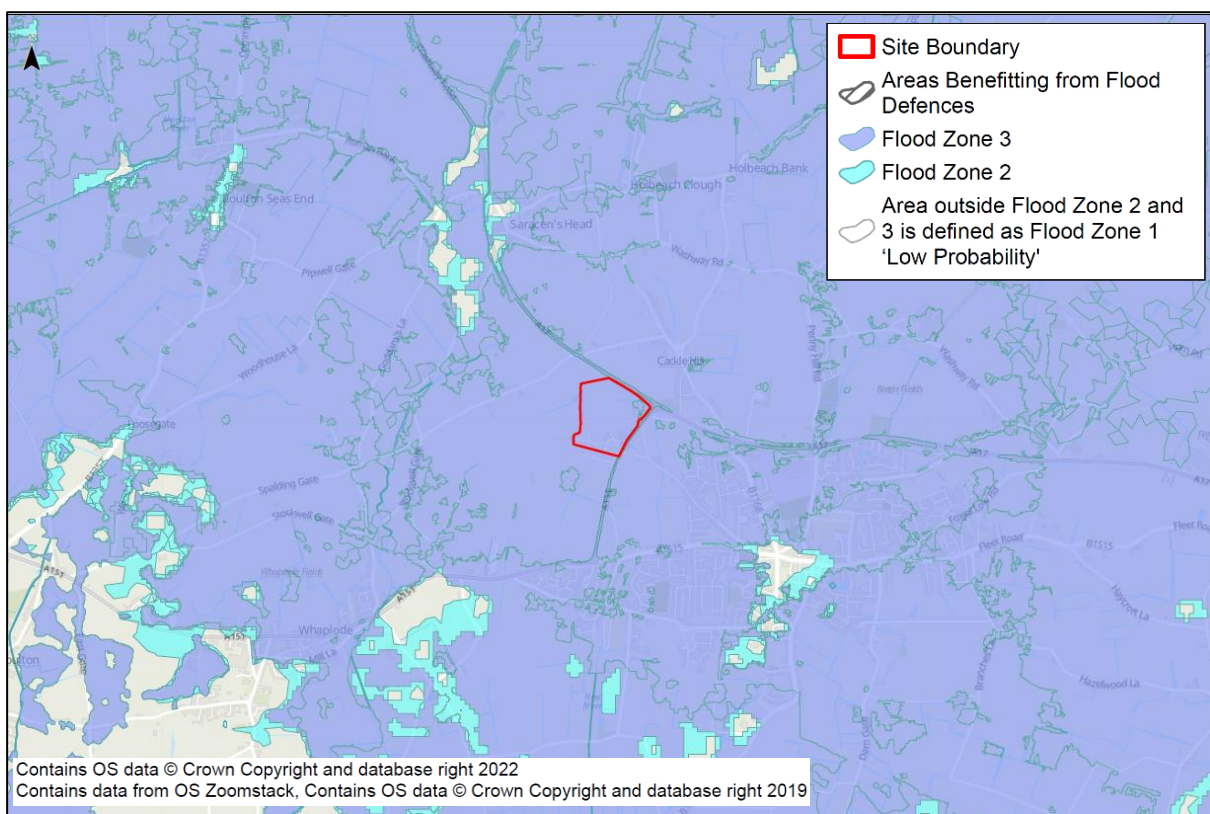
## 4 Assessment of Flood Risk

- 4.1.1 The assessment of flood risk has been undertaken based on the sources of information listed in **Section 1.2**.
- 4.1.2 The baseline flood maps have been taken from the Stantec GIS flood maps report in Appendix A, utilising the EA Open Data datasets available online and reproduced with OS mapping under licence to Stantec.

### 4.2 EA Flood Maps

- 4.2.1 The first phase in identifying whether a site is potentially at risk of flooding is to consult the EA's Flood Zone maps, available on the EA's website. This provides an initial indication of the extent of the Flood Zones, which is refined by the use of more detailed site-specific level survey and modelled flood levels.

Figure 4-1: EA Flood Zone Map



- 4.2.2 As shown on **Figure 4-1**, the site lies within **Flood Zone 3 'High Probability'** (greater than 1 in 100 (>1.0%) annual probability of river flooding or greater than 1 in 200 (>0.5%) annual probability of tidal flooding).
- 4.2.3 The tidal Flood Zone 3 is extensive across the low lying area behind the Lincolnshire coastline, extending inland either directly from the coastline (the Wash estuary, approximately 12km to the north-west), or via a tidally influenced watercourse (the nearest 'main river' being the River Welland, located approximately 7km to the north of the site).
- 4.2.4 It is noted that the IDB channels in the area are not marked as bold blue lines on the above drawing, confirming their status as ordinary watercourses.

### EA Flood Risk from Reservoirs Map

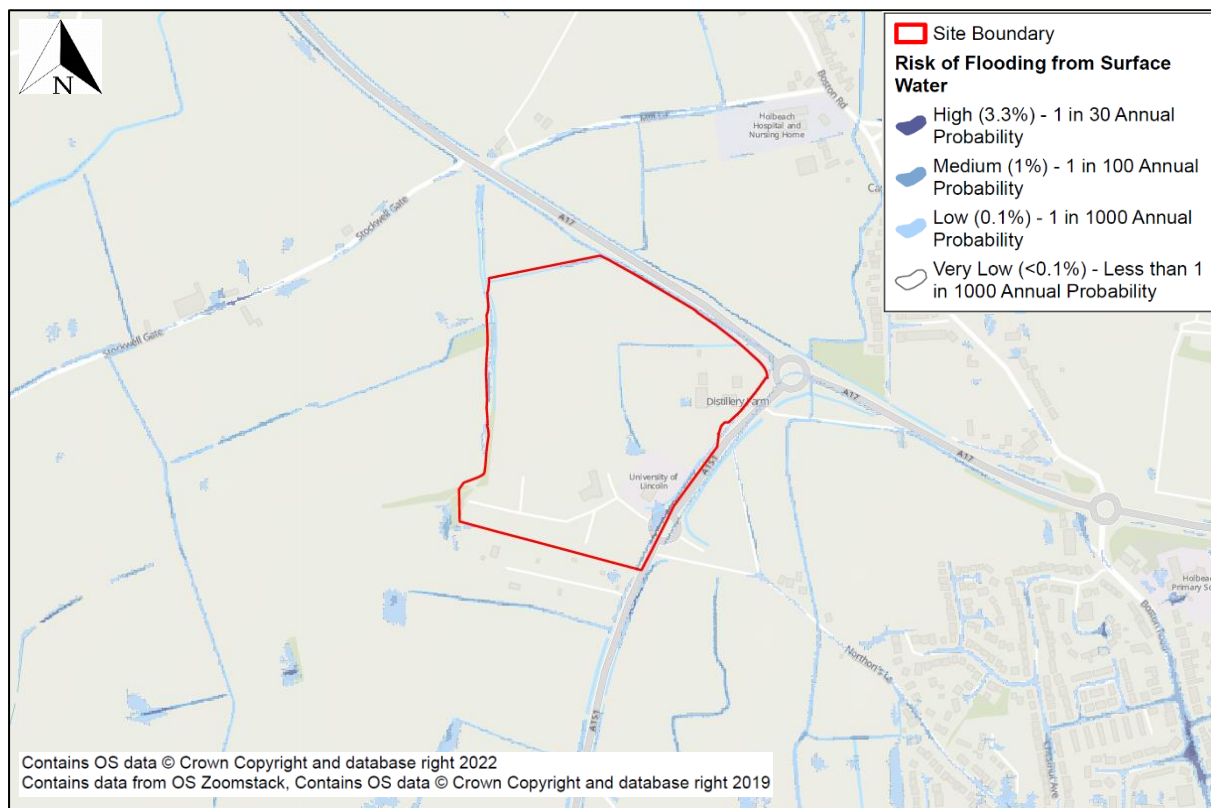
- 4.2.5 The EA provides maps showing the risk of flooding in the event of a breach from reservoirs, based only on large reservoirs (over 25,000 cubic metres of water). These confirm that the Holbeach area is not at risk of flooding from such sources. The EA provides maps showing the risk of flooding in the event of a reservoir failure. The reservoir breach extents are captured in the baseline flood maps have been taken from the Stantec GIS flood maps report in **Appendix E**.
- 4.2.6 The EA reservoir maps show two flooding scenarios, a 'dry-day' and a 'wet-day'. The 'dry-day' scenario predicts the flooding that would occur if the dam or reservoir failed when rivers are at normal levels. The 'wet day' scenario predicts how much worse the flooding might be if a river is already experiencing an extreme natural flood.
- 4.2.7 A review of the online map shows that the site lies outside of an area at risk of reservoir flooding. This confirms that the Holbeach area is not at risk of flooding from such sources.

### EA Flood Risk from Surface Water

- 4.2.8 The EA 'Risk of Flooding from Surface Water' mapping identifies areas that could be susceptible to surface water flooding in various rainfall events. It should be noted that these are generated using a relatively coarse methodology whereby rainfall inflows are routed over a ground surface model. As such, the analysis does not take account of any below-ground drainage infrastructure but does provide a guide to potentially vulnerable areas based on the general topography of an area. The latest mapping assesses flooding resulting from severe rainfall events based on the following three scenarios:
- 'High' Risk: 1 in 30 (3.3%) or greater AP rainfall event;
  - 'Medium' Risk: Between a 1 in 100 (1%) and 1 in 30 (3.3%) AP rainfall event;
  - 'Low' Risk: Between 1 in 1000 (0.1%) and 1 in 100 (1%) AP rainfall event;
  - 'Very Low' Risk: Lower than 1 in 1000 (0.1%) AP rainfall event.



Figure 4-2: EA Flood Risk from Surface Water Map



4.2.9 **Figure 4-2** indicates that the site lies mainly within the (unshaded) 'Very Low' risk areas – i.e. less than 1 in 1000 (<0.1%) annual probability of surface water flooding.

4.2.10 There are small areas within the 'Low' (between 1 in 100 (1.0%) and 1 in 30 (3.3%) annual probability) risk area; these consist of isolated ponding in the fields or alongside the existing drainage channels through the area.

4.2.11 It should be noted that the surface water maps are generated using a generic methodology on a national scale, whereby rainfall is routed over a ground surface model. The analysis does not take account of any specific local information on below-ground drainage infrastructure and infiltration, although an adjustment is included in urban areas to account for the impact of sewerage and a standard infiltration allowance based on soil type. Consequently, the mapping provides a guide to potentially vulnerable areas based on the general topography of an area.

### 4.3 South Holland Strategic Flood Risk Assessment (SFRA)

4.3.1 The SHDC 'Update of Strategic Flood Risk Assessment' Report was issued in February 2017. The document provides an overview of the flood risk issues across the District and an assessment of the risks associated with a breach in the sea defences including further information on the flood hazard, should a breach occur in the defences, and the relative probability of flooding. This data is replicated within the South East Lincolnshire Strategic Flood Risk Assessment (SFRA), that was released in March 2017. As such the South East Lincolnshire SFRA includes the same information and accompanied flood mapping as the South Holland SFRA.

- 4.3.2 Copies of referenced maps are included in **Appendix D**. Flood velocity mapping presented in the South Holland SFRA, shows the same data as the updated EA flood maps and have not been included within the appendices.
- 4.3.3 The reference tidal flood levels for the area are as set out in **Table 4-1** below. These are taken from the SFRA Appendix A and are the reference flood levels at the outfall of the River Welland into the Wash (location reference 'W1' on SFRA Figure A1). There is some variation of the reference tidal levels moving along the Lincolnshire coastline in the vicinity of the site but this variation is typically less than 50mm.

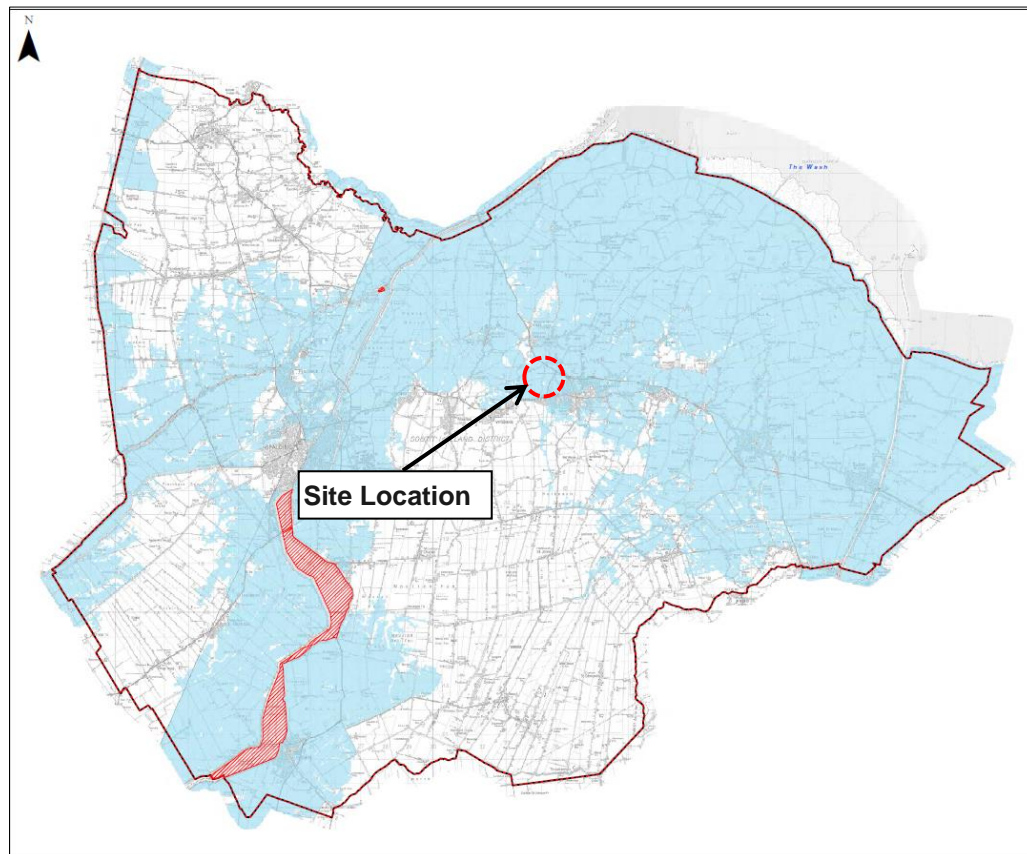
**Table 4-1: Climate Change – Peak Rainfall Intensity Allowances EA Still Water Tide Levels (see SFRA Fig. A1)**

Flood Event (Annual Probability)	Year	Still Water Tidal Level (m AOD)
1 in 200 (0.5%)	2007	5.98
	2055	6.31
	2115	7.12
1 in 1000 (0.1%)	2007	6.32
	2055	6.50
	2115	7.46

- 4.3.4 The SFRA states “*There are no reports of groundwater flooding occurring in the District. This issue is therefore taken as having no strategic significance in relation to flood risk.*”
- 4.3.5 SFRA Maps presented in **Appendix D**, show the residual flood risk across the South Holland district for a present day event and year 2115 climate change event, based on a 1 in 100 (1.0%) annual probability fluvial and a 1 in 200 (0.5%) annual probability tidal scenario.
- 4.3.6 The SFRA maps are not labelled with specific drawing reference numbers and are therefore discussed below in the order provided in the SFRA:
- **Residual Peak Depth – Present Day 1% Fluvial / 0.5% Tidal Event Probability Map** – shows the peak flood depths under present day condition. The highest recorded flood depths are in areas that are confined to land immediately behind the Wash coastline and primarily along the north-western boundary of the district. The Holbeach area is shown to be on land that is unaffected by this present day flood scenario;
  - **Residual Peak Depth – Year 2115 Climate Change 1% Fluvial / 0.5% Tidal Event Probability** - shows the peak flood depths projected to the year 2115 climate change event. The SFRA mapping shows extensive flooding across the district, particularly inland along the Wash coastline and along the floodplain of the River Welland. Flood depths are shown to reach between 0.25m – 1m across the site area, reaching as far as the A151 road that runs along the eastern boundary of the site;
  - **Residual Risk Extent - Present day 1% Fluvial / 0.5% Tidal Event Probability** - shows the flood risk extents under present day conditions. The area at highest probability of flooding is shown to be in areas that are confined to land immediately behind the Wash coastline and primarily along the north-western boundary of the district. The Holbeach area is shown to be on land that is unaffected by this present day flood scenario;

- **Residual Risk Extent - Year 2115 1% Fluvial / 0.5% Tidal Event Probability** - shows the flood risk extents projected to the year 2115 climate change event. The SFRA mapping shows extensive flooding across the district, particularly inland along the Wash coastline and along the floodplain of the River Welland. Flooding is shown to extend across the site, as far as the A151 road that runs along the eastern boundary of the site – see **Figure 4-3** below.

**Figure 4-3: Extract of SFRA 'Residual Risk Extent District - Year 2115 1% Fluvial / 0.5% Tidal Event Probability'**



- 4.3.7 The **SFRA** has no historic records of flooding over the site.
- 4.3.8 It should be noted that the analysis contained within the SFRA is inherently conservative as it does not consider any potential improvements to existing flood defence levels, and it is superseded by the more detailed EA modelling discussed in **Section 4.5**.

#### **4.4 South Holland IDB Hydraulic Modelling**

- 4.4.1 As discussed in **Section 3.5**, the South Holland IDB has responsibility for the land drainage across the South Holland area, and the site is bordered by riparian owned drainage channels draining into the IDB Distillery Channel in the north-eastern corner of the site, which outfalls into the Holbeach New River a short distance east of the site.
- 4.4.2 The IDB undertook hydraulic modelling in 2015 of their land drainage network in the area and provided results as detailed in **Table 4-2** in the vicinity of the Holbeach site (the result is provided on the Holbeach New River to the east of the site – see IDB email and attachment dated 12<sup>th</sup> January 2017 in **Appendix C**). The IDB have confirmed via email that these flood levels within the hydraulic model (2015) are still valid and have not been superseded, and have also indicated that the catchment is being re-modelled later in 2023 – see IDB email response dated 2<sup>nd</sup> June 2023 in **Appendix C**.

Table 4-2: IDB Modelled Flood Levels

Flood Event (Annual Probability)	Flood level (Holbeach New River) m AOD
1 in 10 (10%)	2.05
1 in 50 (2%)	2.34
1 in 100 (1%)	2.45
1 in 100 plus climate change (to 2085)	2.67

- 4.4.3 The IDB has advised in the original response that the modelling indicates a 300mm to 600mm freeboard in the area, and comparison with site ground levels (see [Section 3.3](#)) confirms ground levels over the site are above these flood levels.
- 4.4.4 It is noted the IDB advises that their modelling was undertaken based on climate change peak river flow scenarios as per the guidance rainfall in 2015 – i.e. prior to the release of the new EA guidance discussed in [Section 2.2](#). The previous guidance ('Climate change allowances for planners', September 2013) required consideration of a +20% increase in peak river flow to the year 2085, whereas the latest EA guidance requires consideration of a +17% allowance for the period to 2115 – as such it is clear that the results are precautionary as the current allowance is a reduction on the previous value used in the modelling.
- 4.4.5 The potential impacts of climate change emphasise the need to ensure development does not place greater demands on the IDB network, through incorporation of a sustainable surface water drainage with a controlled discharge rate agreed with the IDB. It is also recommended that ground floor levels include a significant freeboard above the reference IDB modelled flood levels.

## 4.5 EA Tidal Breach and Overtopping Modelling

- 4.5.1 The EA has also provided details of their tidal breach/overtopping hazard mapping in the area. These provide modelled flood extents based on the modelled overtopping and the composite maximum flood extents from the series of simulated breaches in the flood defences along the Lincolnshire coastline.
- 4.5.2 The overtopping scenario model and the breach scenario model are two discrete EA models, constructed as part of the 'Northern Area Tidal Hazard Mapping Study' and are considered the best available information on tidal flood risk to the area.
- 4.5.3 One important distinction between the two scenarios is that the overtopping scenario is representative of the 'actual' flood risk to the site (as the probability and consequence are clearly assessed), whereas it is a point of debate as to whether a breach scenario is realistic to assess in respect of third party impacts, as this is a residual (hypothetical rather than an actual) flood risk and the probability of flood defence failure combined with such a flood event is considered very small.
- 4.5.4 The EA flood data (EA reference CCN-2016-18410) is provided in [Appendix E](#) and discussed below.

### Overtopping Model

- 4.5.5 The EA response confirms that the site is not affected in the conventional 'overtopping scenario', in either the 1 in 200 (0.5%) annual probability tidal event, or in the extreme 1 in 1000 (0.1%) annual probability tidal event.



4.5.6 This applies both under current conditions and when considering sea level rise to the year 2115.

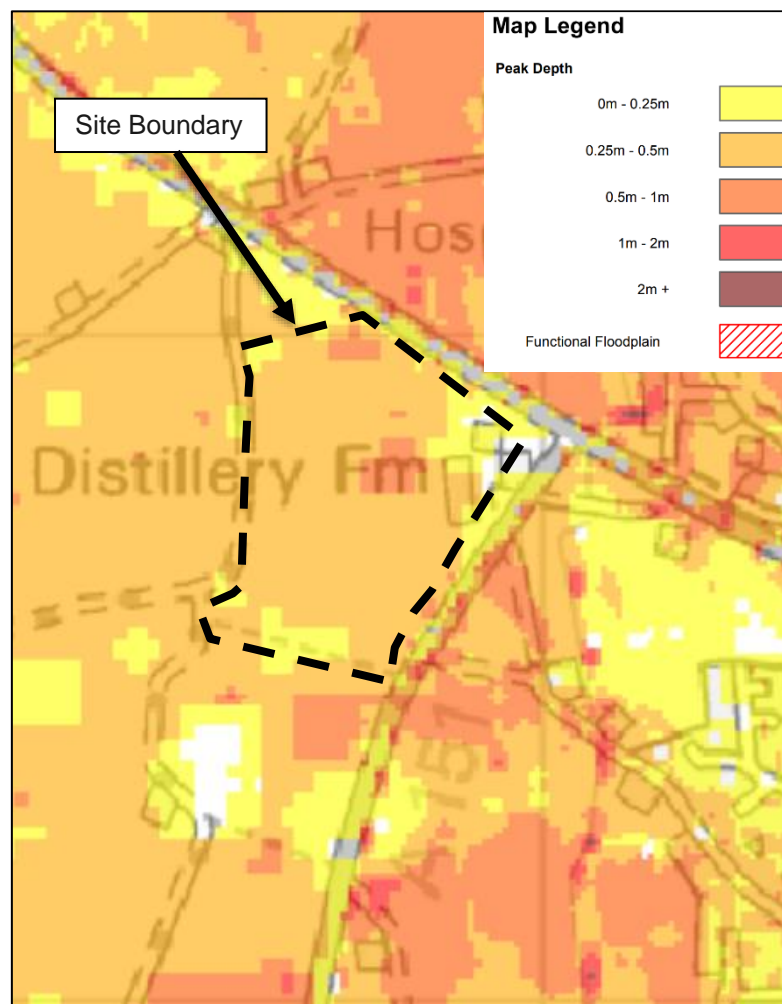
### Breach Model

4.5.7 The EA results indicate the site is unaffected in a 1 in 200 (0.5%) annual probability tidal breach event, or in the extreme 1 in 1000 (0.1%) annual probability tidal breach event under current conditions (as confirmed in the EA correspondence dated 25<sup>th</sup> July 2016 – see [Appendix E](#) .

4.5.8 When allowing for sea level rise to the year 2115, the site is affected in both the 1 in 200 (0.5%) annual probability breach scenario and the extreme 1 in 1000 (0.1%) annual probability breach scenario.

4.5.9 The maximum depth output for the 2115 1 in 200 (0.5%) annual probability breach scenario is shown in [Figure 4-4](#).

Figure 4-4: Extract of EA 2115 1 in 200 (0.5%) Annual Probability Breach Scenario (Max Depth)



4.5.10 The key results of the breach modelling in relation to the site can be summarised as set out in [Table 4-3](#).

Table 4-3: EA Tidal Breach Modelling – Summary of Impacts at Site

Breach Scenario		Impact at Site	
Year	Annual Probability	Maximum Hazard	Maximum Depth
2006	1 in 200 (0.5%)	Site unaffected	
	1 in 1000 (0.1%)	Site unaffected	
2115	1 in 200 (0.5%)	10% 'Low Hazard' 88% 'Danger for Some' 2% 'Danger for Most'	30% 0 to 0.25m 65% 0.25m to 0.5m 5% 0.50m to 1.0m
	1 in 1000 (0.1%)	5% 'Low Hazard' 90% 'Danger for Some' 5% 'Danger for Most'	22% 0 to 0.25m 70% 0.25m to 0.5m 8% 0.50m to 1.0m

4.5.11 A comparison between the topographic data and the EA flood depths grid provides indicative peak breach levels over the site as follows:

- 1 in 200 (0.5%) annual probability tidal breach flood level = 3.2m AOD,
- 1 in 1000 (0.1%) annual probability tidal breach flood level = 3.3m AOD.

4.5.12 The above flood levels across the site are indicative only and would be subject to further analysis using more detailed topographic information for the site. It should be reiterated that this is a residual flood risk, and the probability of flood defence failure combined with such a flood event is considered very small.

4.5.13 A request for site-specific flood levels was previously made to the EA but the response confirmed that these are not available for issue and the above methodology (i.e. comparison of level survey with modelled flood depths) is the conventional approach.

## 4.6 Groundwater Flood Risk

4.6.1 Online geology resources suggest there are superficial deposits of 'Tidal Flat Deposits - Clay and Silt' soils with a high water table at the site. An underlying geology of clayey soils indicates soils at the site have a low permeability. This reduces the risk of groundwater emerging and flooding the surface when heavy rainfall periods cause the water table to rise.

4.6.2 The SFRA states "There are no reports of groundwater flooding occurring in the District. This issue is therefore taken as having no strategic significance in relation to flood risk."

4.6.3 The risk of groundwater flooding at the site is considered to be **Low**.

4.6.4 Suitable mitigation requirements such as raising ground floor levels should be considered within the developments design, to mitigate the potential risks of a high water table identified at the site. This will be discussed further in the Mitigation Strategy detailed in **Section 5**.

## 4.7 Anglian Water Information

4.7.1 An online search on the 'DigDat' portal has confirmed that there are no Anglian Water public sewers within or in the immediate vicinity of the site.

## 4.8 Summary of Flood Risk

4.8.1 The following **Table 4-4** provides an overview of the flood risk to the site, based on the information obtained and detailed in **Section 4**.

**Table 4-4: Summary of Sources of Flood Risk**

Source of Flooding	Risk of Flooding to Site	Comment/Justification	Source of data	Mitigation requirements for new development (see Section 4 for further consideration)
Tidal	Yellow	The site is not impacted under the current 1 in 200 (0.5%) or 1 in 1000 (0.1%) annual probability overtopping or breach events.  The site is impacted in the 1 in 200 (0.5%) and 1 in 1000 (0.1%) annual probability plus climate change breach events.	EA Data (see Section 3.5)	Elevate floor levels above 2115 breach flood level (with suitable freeboard).  Incorporate flood resistance/resilience measures
Fluvial	Green	The site outside 1 in 1000 (0.1%) annual probability fluvial floodplain (the closest main-river watercourse is the River Welland)	South Holland SFRA (see Section 3.3)	n/a
Land Drainage (i.e. Surface Water/ Pluvial)	Yellow	The site is bordered by riparian watercourses and IDB drains are located to the south and east of the site.  South Holland IDB have undertaken hydraulic modelling of the system to verify the flood risk., which indicates the site is not impacted in the 1 in 100 annual probability flood event (to year 2085)	South Holland SFRA  South Holland IDB (see Section 1.4)	Allow for in floor level recommendations.  Provide buffer zone along IDB channels through site to allow for potential upgrades (if required)  Liaise with IDB in development of surface water drainage strategy
Ground water	Green	SFRA indicates no records of groundwater flooding. However, online geology resources suggest clayey soils with high water table.	South Holland SFRA  BSG Viewer  Soilscapes website	Allow for within floor level recommendations and consider within surface water drainage strategy.
Reservoir, Canals, Ponds and Other Artificial Sources	Green	There are no artificial sources of flooding in the vicinity of the site and the EA data indicates the site is not at risk in a potential breach of local reservoirs.  This is restated in the South Holland SFRA.	EA data (see Section 3.2)  South Holland SFRA	n/a
Sewers	Green	Anglian Water sewer records indicate there are no sewers running across the site.	Online search (see Section 3.6)	n/a
Key:	Green	<b>Low/Negligible Risk</b> – No noticeable impact to site and not considered to be a constraint to development		
	Yellow	<b>Medium Risk</b> – Issue requires consideration but not a significant constraint to development		
	Red	<b>High Risk</b> – Major constraint to development requiring active consideration in mitigation proposals		

## 5 Flood Mitigation Strategy

### 5.1 Introduction

5.1.1 The following section provides an overview of the flood risk constraints and opportunities/mitigation requirements for future development over the site, to inform the LDO and future proposals over the FEZ.

### 5.2 Ground Floor Levels

5.2.1 The site is at low probability of flooding from fluvial/tidal sources, but the majority of the site is potentially at residual risk of flooding to depths of up to approximately 500mm if a breach occurs in the tidal defences, with an estimated flood level of 3.2m AOD.

5.2.2 It is therefore recommended that ground floor levels are set a minimum of 3.2m AOD, with flood resilient measures incorporated up to 300mm above the reference flood level. Flood resilient measures are incorporated where it is accepted that, in severe flood events, water may enter parts of the building so it is necessary to ensure the building will remain useable after the floodwater has receded and the area has been cleaned. Therefore, the key issue is to incorporate materials that retain their structural integrity and have good drying and cleaning properties (e.g. the use of suitable tiling over areas, with water resilient grout). It is also recommended that services are secured and sockets etc. are located a suitable freeboard above floor level.

5.2.3 A minimum floor level of 3.2m AOD also ensures a minimum freeboard of over 500mm above the modelled IDB 1 in 100 annual probability plus climate change flood level (to year 2085).

5.2.4 If 'More vulnerable' development (e.g. a hotel) is proposed on the site, the ground floor levels should be set at a minimum of 3.3m AOD, i.e. above the 1 in 1000 (0.1%) annual probability tidal breach flood level. The incorporation of flood resistance/resilience measures is again recommended for consideration, to address the residual risk of a flood greater than the design event.

5.2.5 It is also recommended that a suitable freeboard is provided above surrounding ground (minimum 150mm) to mitigate the residual flood risk associated with excess surface water runoff in an extreme rainfall event. Similarly, exterior ground levels across the site should also be appropriately contoured to direct surface water away from buildings in such a scenario.

### 5.3 Flood Storage and Flow Routes

5.3.1 Any new development located in the vicinity of a watercourse should be constructed such that it does not detrimentally impact on flow routes or reduce the available fluvial floodplain storage over a site; either of which could potentially cause an increase in flood levels on-site or elsewhere. This requirement is considered up to the benchmark of the fluvial 1 in 100 (1.0%) annual probability plus allowance for climate change floodplain.

5.3.2 The site is shown as falling outside the fluvial floodplain of the River Welland. An IDB channel is located within the north-east corner of the site and riparian watercourses run in parallel to the northern and eastern boundary of the site and within the north-eastern part of the site.

5.3.3 The IDB Byelaw 10 states that nothing is permitted within 9m of any of the Board's watercourses without gaining consent from the Board.

5.3.4 It is therefore recommended that an appropriate riparian corridor is provided either side of the channels, with due consideration of the above requirement for the IDB channel in the north-east corner, to allow for any potential overtopping in extreme flood events.

## 5.4 Safe Access Arrangements

5.4.1 Safe access arrangements need to be appropriately considered for development on the site given the residual flood risk in a breach of the tidal defences. The situation can be summarised as follows:

- Under current conditions, continuous safe access is available for the site in both the 1 in 200 (0.5%) annual probability event and the extreme 1 in 1000 (0.1%) annual probability event. This applies under normal 'overtopping' conditions and in the event of a breach in the tidal flood defences.
- Under future (year 2115) conditions, continuous safe access is available for the site in both the 1 in 200 (0.5%) annual probability event and the extreme 1 in 1000 (0.1%) annual probability event under normal 'overtopping' conditions;
- In a breach scenario under future (year 2115) conditions, continuous safe access is potentially disrupted for the site in the 1 in 200 (0.5%) annual probability event and the extreme 1 in 1000 (0.1%) annual probability event, although maximum flood depths on the surrounding access roads are typically less than 250mm.

5.4.2 Due to the considerable low lying nature of the area, combined with the significant increases in peak tidal flood level resulting from the climate change allowances, the floodplain in a major breach flood event is extensive, and it is not feasible to provide a raised pedestrian safe access route beyond the site to continuous higher land.

5.4.3 It should be noted that as a development of primarily 'Less Vulnerable' uses, no sleeping accommodation is proposed and the development could be vacated and secured in the event of potential flooding in the area, due to the wider disruption of the flood event. Should 'more vulnerable' hotel development be constructed over the site, then an appropriate management plan should be developed that fully considers the residual risk of flooding in a breach of the tidal defences and appropriate evacuation/management procedures across the Lincolnshire area.

5.4.4 The EA operate a 'Flood Information Service', covering the Lincolnshire area. This service can be found online at the following address:

<https://flood-warning-information.service.gov.uk/warnings?location=lincolnshire>

5.4.5 The Flood Information Service provides an array of flood data for the area, including:

- An overview of the national flooding situation, identifying total number and location of flood alerts, flood warnings and severe flood warnings;
- A five-day flood risk overview;
- A feed of the local river level information (updated hourly) including peak river levels in the River Welland at Fosdyke Bridge.

5.4.6 The EA's service, where available, aims to minimize the risk to life and property from flooding from rivers and the sea. However, it would not claim in any way to eliminate the risk. There are limitations inherent within the operation of the flood warning system that mean the issue of a timely warning is in no way guaranteed.

5.4.7 In conclusion, the emphasis will be on:

- i. Ensuring the buildings over the development are safe and above reference flood levels;

- ii. A coordinated approach to flood warning over the site, with sign up to the EA's flood warning service to allow early indication of any defence breach which may hinder either access or egress to the development;
- iii. Provision of a site-wide 'Flood Risk Management Plan' to formalise the actions for users of the FEZ in the event of a severe tidal flood impacting the area.

## **5.5 Surface Water and SuDS**

- 5.5.1 The NPPF recognises that flood risk and other environmental damage can be managed by minimising changes in the volume and rate of surface runoff from development sites, and recommends that priority is given to the use of Sustainable Drainage Systems (SuDS) in new development, this being complementary to the control of development within the floodplain.
- 5.5.2 A standalone 'Surface Water Drainage Assessment' has been prepared by Stantec for the site. This outlines the relevant national, local and regional drainage policy/guidance and the SuDS principles to be incorporated into the strategy for the FEZ, following liaison with the South Holland IDB.

## 6 Conclusions

- 6.1.1 This 'Flood Risk Mitigation Strategy' Report has been prepared for South Holland District Council to support an extension of the Land Development Order (LDO) for the Food Enterprise Zone (FEZ) at Holbeach, Lincolnshire.
- 6.1.2 The report sets out the available information on flood risk, and identifies the requirements to mitigate the risk of flooding within the development, allowing for the potential impact of climate change.
- 6.1.3 The available information from the Environment Agency (EA) indicates the site lies within tidal Flood Zone 3a 'High Probability' (greater than 1 in 200 (>0.5%) annual probability of tidal flooding). This classification ignores the presence of flood defences; the site is a significant distance inland and is protected from tidal flooding by the series of raised embankments along the Wash coastline and along the tidal River Witham.

### Flood Risk

- 6.1.4 The detailed flood risk information obtained as part of this report confirms that:
- There are no historic records of flooding over the site;
  - The site is outside the modelled fluvial floodplain of the River Welland and outside the modelled 1 in 100 annual probability plus climate change floodplain (to 2085) of the South Holland Internal Drainage Board (IDB) system;
  - The EA modelling indicates the site is not affected in the conventional tidal 'overtopping' scenario, for either the 1 in 200 (0.5%) annual probability tidal event, or in the extreme 1 in 1000 (0.1%) annual probability tidal event. This applies both under current conditions and allowing for sea level rise to the year 2115;
  - The site is not affected in a 1 in 200 (0.5%) annual probability tidal breach event, or in the extreme 1 in 1000 (0.1%) annual probability tidal breach event under current conditions;
  - The site is affected in a 1 in 200 (0.5%) annual probability tidal breach event and in the extreme 1 in 1000 (0.1%) annual probability tidal breach event under future conditions (i.e. allowing for sea level rise to the year 2115). Maximum flood depths typically range from 0m to 0.5m across the site, and indicate a reference 1 in 200 (0.5%) annual probability 2115 breach flood level of 3.2m AOD.

### Mitigation Strategy

- 6.1.5 It is recommended that the new development within the FEZ incorporates appropriate mitigation measures as follows:
- **Ground floor levels** are to be set at are set a minimum of 3.2m AOD, with flood resilient measures incorporated up to 3.5m AOD (300mm above the reference breach flood level). It is recommended that a freeboard is provided above surrounding ground (minimum 150mm) to mitigate the residual flood risk associated with excess surface water runoff in an extreme rainfall event;
- If 'More vulnerable' development (e.g. a hotel) is proposed on the site, the ground floor levels should be set at a minimum of 3.3m AOD, i.e. above the breach 1 in 1000 (0.1%) annual probability tidal flood level, and would recommend flood resilient measures again incorporated up to 3.5m AOD (300mm above the reference breach flood level).



- **Safe access** is currently available, but in the event of a breach the wider area would potentially be severely impacted by tidal flooding. As such, the emphasis will be on ensuring the development itself is safe (safe refuge) and above any reference flood level, combined with a Flood Risk Management Plan to formalise the actions for users to vacate the site in the event of a severe tidal flood impacting the area.
- The **surface water drainage arrangements** for the development will be prepared based on sustainable drainage principles, incorporating on-site attenuation measures and limiting runoff to meet the requirements of the IDB. The proposed strategy is outlined in the PBA 'Surface Water Drainage Assessment' provided separately.

6.1.6 In conclusion, the report confirms that appropriate mitigation can be incorporated into the proposed FEZ to address the flood risk to the site, to ensure the development is safe and there is no detrimental impact on third parties.



## Appendix A Site Masterplan

**Pick Everard Consultants** – Outline Masterplan Drawing – 210649-PEV-XX-ZZ-DR-A-0010  
(November 2022)

NO DIMENSIONS TO BE SCALED FROM THIS DRAWING

CDM - RESIDUAL HAZARDS The following are considered to be significant risks relevant to this drawing, which could not be fully mitigated or removed through design:

Areas Schedule				
Plot	Area (sqm)	Building	No. Storeys	GEA Area (sqm)
1	5153	A	2	2094
2	3281	B	2	2412
3	3573	C	2	2580
4	3020	D	2	1800
5	4179	E	2	2730
6	9471	F	3	7524
7	5339	G	3	3285
8	9315	H	3	3456
9	1955	I	2	2762
10	13451	J	2	1960
		K	1.5	768
		L	2	1820
		M	3	1764
		N	3	1686
		O	3	311
		P	1	2325
11	4933	Q	1.5	2385
12	5932	R	1.5	2044
13	4406	S	2	
Road Linear Length (m)		810 (approx.)		
Overall Development Area		79,137sqm / 7.9ha		
Overall Non-Net Area		43,706sqm / 4.37ha		
Total Phase 2 Area		122,843sqm / 12.28ha		



\*Tracking to plots access only

\*Plot layout subject to tenant requirements

Plot	Description	Date	Author	Reviewer
P05	Plot outline colour and SOA update	06.10.22	RJM	RJT
P04	Revised Plot 9 to work as a B1 unit	27.09.22	RJM	RJT
P03	Revised Plots 8 and 9 as per IAgri Proposed Dev.	23.09.22	RJM	RJT
P02	Revised Plots 8 and 9 as per IAgri Proposed Dev.	15.10.21	NCD	RJT
P01	Draft Issue 01	06.08.21	NCD	RJT

Client

**Lincolnshire County Council**  
**Gleeds**

Project  
**Peppermint Park FEZ**

Drawing Title  
**Outline Masterplan**

Suitability Status

**S3 - Suitable for Review and Comment**

Job No. Scale Size Rev  
**210649 1:2500 @ A3 P05**

Drawing Number  
**210649-PEV-XX-ZZ-DR-A-0010**

Project Code - Originator - Zone - Level - Type - Role - Number

**PICK EVERARD**

T 0345 045 0050 www.pickeverard.co.uk

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## Appendix B Topographic Information

- Axis Survey Drawings AS2020/6 and AS2020/7 (August 2016)  
0/7 (August 2016)









## Appendix C South Holland IBD Correspondence

- IDB email dated 4<sup>th</sup> August 2016
- Watercourse Network Maps
- Catchment Map
- IDB email dated 12<sup>th</sup> January 2017 (providing model results).
- IDB email date 22<sup>nd</sup> May 2023.

## Richard Fisher

---

**Subject:** FW: Holbeach Food Enterprise Zone - Local Development Order  
**Attachments:** Holbeach New River SHDC.pdf

---

**From:** Dominic Morris [<mailto:Dominic@wlma.org.uk>]  
**Sent:** 04 August 2016 13:43  
**To:** Elizabeth Edney <[eedney@peterbrett.com](mailto:eedney@peterbrett.com)>  
**Cc:** Rachael Yeowell <[Rachael@wlma.org.uk](mailto:Rachael@wlma.org.uk)>  
**Subject:** RE: Holbeach Food Enterprise Zone - Local Development Order

Elizabeth

Please see plan attached showing the Board's watercourses highlighted in the royal blue colour. As you can see from the plan there are no Board maintained watercourses surrounding the site. However I believe the Private/Riparian watercourses adjacent to the A151 are maintained by LCC and these all drain into the Board's watercourses eventually entering the Board's Holbeach New River watercourse which drains out through Holbeach River Sluice into the River Welland.

The Board would allow 1.4litres a second per hectare and there would be a Surface Water Development Contribution payable of £74,740 per impermeable hectare draining into the watercourse. The rate payable would be 20% of the overall total providing the flow rate is kept to 1.4litres.

The whole of catchment P has been modelled. The Board can provide you with model information, however there will be a charge for doing so. If you provide us with return periods you require, we will issue you with the fee payable for the information required.

Regards

Dom

**Dom Morris**  
Assistant Engineer, South Holland IDB  
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**From:** Elizabeth Edney [<mailto:eedney@peterbrett.com>]  
**Sent:** Monday, August 1, 2016 4:13 PM  
**To:** Dominic Morris <[Dominic@wlma.org.uk](mailto:Dominic@wlma.org.uk)>  
**Subject:** Holbeach Food Enterprise Zone - Local Development Order

Dominic

We have been instructed by our Client for the preparation of flood risk reports to support a Local Development Order at a site adjacent to the A17 in Holbeach (please see attached site location plan). I would be grateful if you could advise on the allowable discharge rates in l/s/ha that you would accept into the adjacent IDB watercourses and if you could provide an update on the modelling for the area.

Many thanks.

Kind Regards,

**Elizabeth Edney**

Flood Risk/Drainage Engineer

For and on behalf of Peter Brett Associates LLP - [Reading](#)



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e [eedney@peterbrett.com](mailto:eedney@peterbrett.com)  
w [peterbrett.com](http://peterbrett.com)

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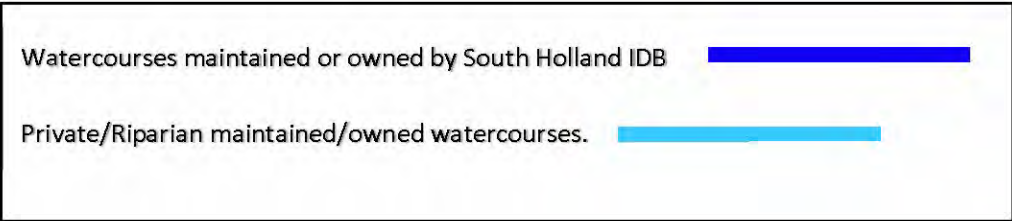
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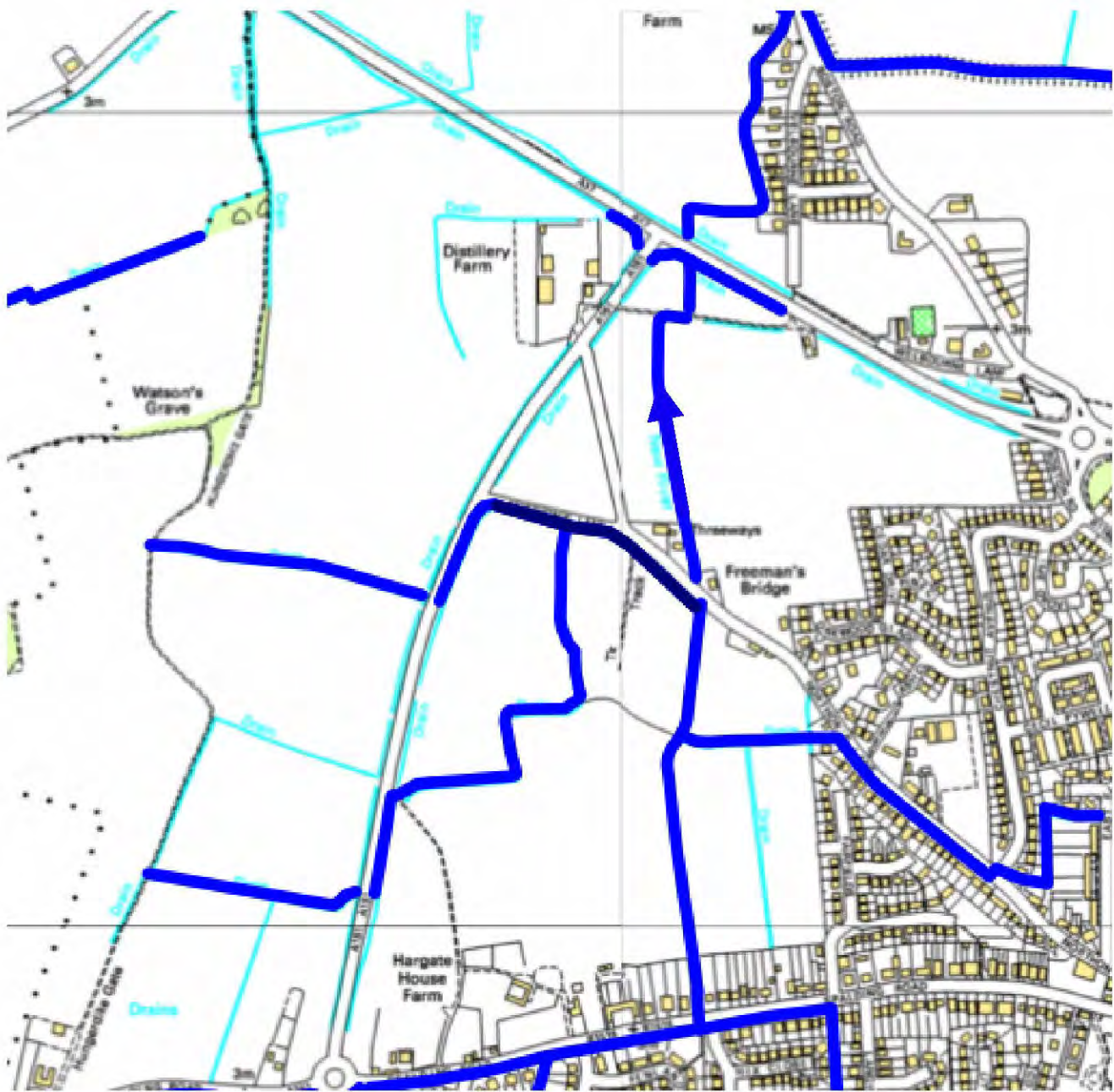
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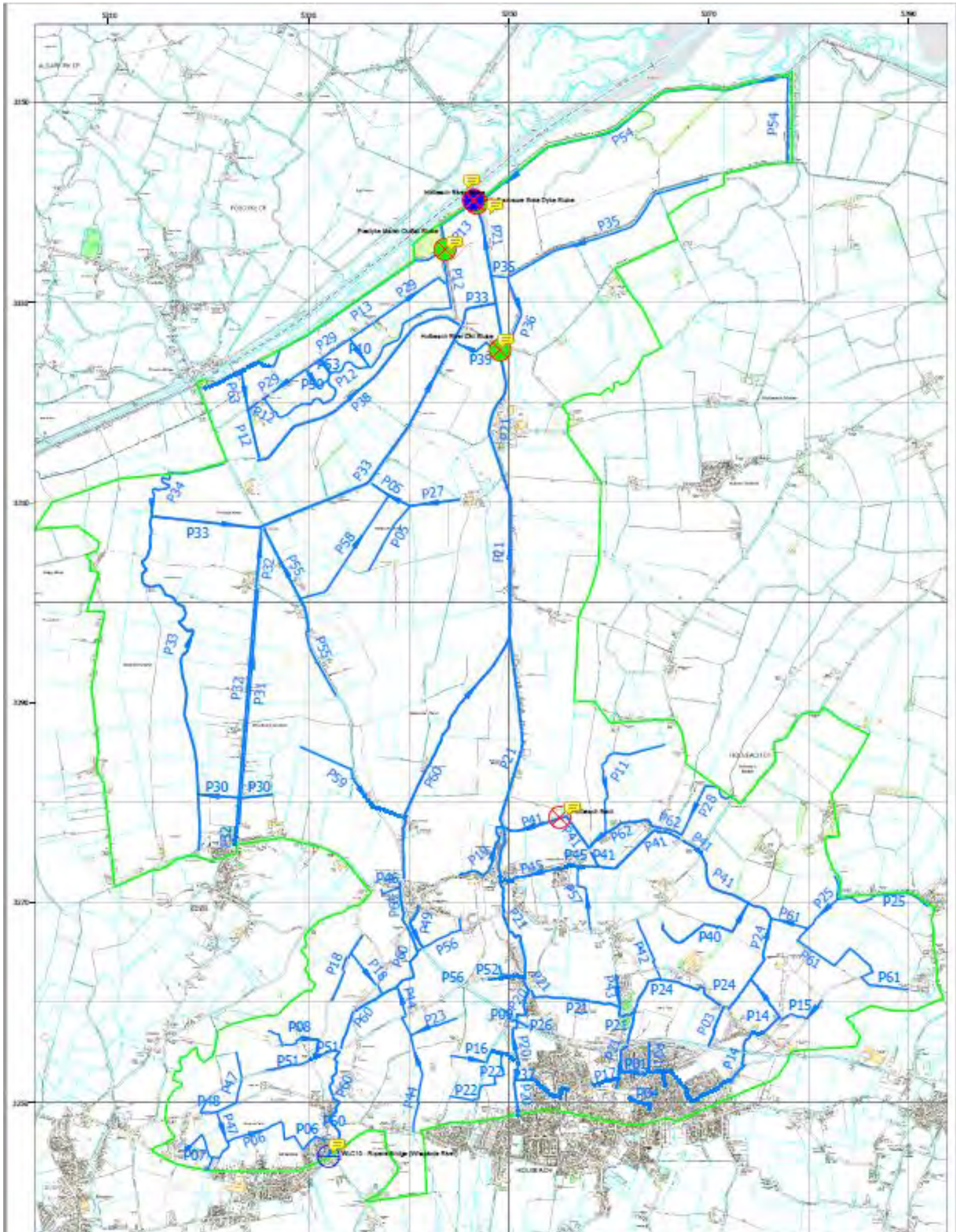
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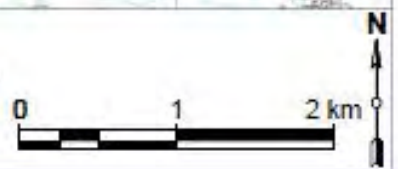
**South Holland IDB**  
**Catchment P - Holbeach River**

Updated date:  
 Feb 2011

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**Key:**

- - Catchment P Boundary
- - IDB Ordinary Watercourse
- ⊗ - Pumping Station
- Water level control
- - Tidal Sluice
- - Inland Sluice



## South Holland I.D.B. (March 2008)

DRAIN ID	DRAIN NAME	OWNED BY SHIDB	HIGH PRIORITY	TOTAL LENGTH (m)	* SOW LENGTH (m)	HIGH PRIORITY A LENGTH (m)	HIGH PRIORITY B LENGTH (m)
<i>P: HOLBEACH RIVER CATCHMENT</i>							
P01	BATTLEFIELDS	<input type="checkbox"/>	<input checked="" type="checkbox"/>	580	580	580	0
P02	BATTLEFIELDS OLD PIPELINE	<input type="checkbox"/>	<input type="checkbox"/>	625	625	0	0
P03	BATTLEFIELDS NORTHERN	<input type="checkbox"/>	<input type="checkbox"/>	440	0	0	0
P04	CEMETARY	<input type="checkbox"/>	<input checked="" type="checkbox"/>	390	240	0	0
P05	CHAPEL	<input type="checkbox"/>	<input type="checkbox"/>	1,250	0	0	0
P06	CROWN	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1,905	1,500	1,905	0
P07	CROWN BRANCH	<input type="checkbox"/>	<input checked="" type="checkbox"/>	580	0	440	0
P08	DAISY HALL	<input type="checkbox"/>	<input type="checkbox"/>	805	0	0	0
P09	DISTILLERY FARM	<input checked="" type="checkbox"/>	<input type="checkbox"/>	80	0	0	0
P10	DRAIN NO 15	<input checked="" type="checkbox"/>	<input type="checkbox"/>	350	0	0	0
P11	FLINT HOUSE	<input type="checkbox"/>	<input type="checkbox"/>	1,325	0	0	0
P12	FOSDYKE MARSH MAIN	<input checked="" type="checkbox"/>	<input type="checkbox"/>	4,150	0	0	0
P13	FOSDYKE MARSH SOKE DYKE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	3,550	0	0	0
P14	FOXES LOW	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2,515	2,000	2,515	0
P15	FOXES LOW BRANCH	<input type="checkbox"/>	<input type="checkbox"/>	570	0	0	0
P16	GANDER GROUND	<input type="checkbox"/>	<input type="checkbox"/>	615	0	0	0
P17	GAS HOUSE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	240	240	240	0
P18	GODDAMS LANE	<input type="checkbox"/>	<input type="checkbox"/>	1,285	0	0	0
P19	HOLBEACH CLOUGH	<input type="checkbox"/>	<input checked="" type="checkbox"/>	870	870	870	0
P20	HOLBEACH NEW RIVER	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1,380	1,380	1,380	0
P21	HOLBEACH RIVER	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10,350	3,000	10,350	0
P22	HUNGERDYKE - EAST	<input type="checkbox"/>	<input type="checkbox"/>	1,210	0	0	0
P23	HUNGERDIKE - WEST	<input type="checkbox"/>	<input type="checkbox"/>	495	0	0	0
P24	HURN SOUTH	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2,310	0	665	0
P25	HURN BANK DRAIN AND BRANCH	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,770	0	0	0
P26	LOW LANE	<input type="checkbox"/>	<input type="checkbox"/>	180	0	0	0
P27	MAJORS	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1,375	200	875	0
P28	MARSH LEVEL	<input type="checkbox"/>	<input type="checkbox"/>	1,015	0	0	0
P29	MIDDLE MARSH ROAD	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2,235	0	0	0
P30	MOULTON COMMON CONNECTION	<input type="checkbox"/>	<input type="checkbox"/>	735	0	0	0
P31	MOULTON COMMON - EAST	<input type="checkbox"/>	<input type="checkbox"/>	2,560	0	0	0
P32	MOULTON COMMON - WEST	<input type="checkbox"/>	<input checked="" type="checkbox"/>	3,175	500	3,175	0
P33	MOULTON RIVER	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	8,375	0	3,445	0
P34	MOULTON RIVER BRANCH	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1,295	0	0	0

\* SOW = Strategic Ordinary Watercourse



## South Holland I.D.B. (March 2008)

DRAIN ID	DRAIN NAME	OWNED BY SHIDB	HIGH PRIORITY	TOTAL LENGTH (m)	* SOW LENGTH (m)	HIGH PRIORITY A LENGTH (m)	HIGH PRIORITY B LENGTH (m)
<i>P: HOLBEACH RIVER CATCHMENT</i>							
P35	NEW SEA BANK	<input type="checkbox"/>	<input type="checkbox"/>	2,550	0	0	0
P36	NEW SEA BANK OLD OUTFALL ROUTE	<input type="checkbox"/>	<input type="checkbox"/>	820	0	0	0
P37	NORTHONS LANE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	700	0	160	0
P38	OLD SEA BANK SOKE DYKE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2,630	500	2,630	0
P39	OLD SLUICE	<input type="checkbox"/>	<input type="checkbox"/>	590	0	0	0
P40	OUNDLE VICARAGE	<input type="checkbox"/>	<input type="checkbox"/>	1,250	0	0	0
P41	PEARTREE	<input type="checkbox"/>	<input checked="" type="checkbox"/>	3,530	0	3,530	0
P42	PENNY HILL	<input type="checkbox"/>	<input type="checkbox"/>	640	0	0	0
P43	PENNY HILL ROAD	<input type="checkbox"/>	<input checked="" type="checkbox"/>	325	325	325	0
P44	RODIKE MILL	<input type="checkbox"/>	<input type="checkbox"/>	1,550	0	0	0
P45	ROMAN BANK	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1,020	1,020	1,020	0
P46	SARACENS HEAD	<input type="checkbox"/>	<input type="checkbox"/>	200	0	0	0
P47	SAVAGES LOW	<input type="checkbox"/>	<input type="checkbox"/>	1,100	0	0	0
P48	SAVAGES LOW BRANCH	<input type="checkbox"/>	<input type="checkbox"/>	345	0	0	0
P49	SCARLET GATE	<input type="checkbox"/>	<input type="checkbox"/>	460	0	0	0
P50	SECOND DROVE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	380	0	0	0
P51	SPALDING GATE	<input type="checkbox"/>	<input type="checkbox"/>	755	0	0	0
P52	STOCKWELL GATE	<input type="checkbox"/>	<input type="checkbox"/>	525	0	0	0
P53	THIRD DROVE	<input checked="" type="checkbox"/>	<input type="checkbox"/>	360	0	0	0
P54	WARDS SOKE DYKE	<input type="checkbox"/>	<input type="checkbox"/>	4,340	0	0	0
P55	WASHWAY ROAD A17	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1,860	1,000	1,160	0
P56	WASHWAY ROAD - SARACENS HEAD	<input type="checkbox"/>	<input type="checkbox"/>	595	0	0	0
P57	WASHWAY MILL	<input type="checkbox"/>	<input type="checkbox"/>	730	0	0	0
P58	WHAPLODE LODGE	<input type="checkbox"/>	<input type="checkbox"/>	1,410	0	0	0
P59	WHAPLODE & MOULTON MARSH	<input type="checkbox"/>	<input type="checkbox"/>	1,345	0	0	0
P60	WHAPLODE RIVER	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	6,150	2,000	6,150	0
P61	WOODHOUSE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2,185	0	295	0
P62	OLD PEARTREE	<input type="checkbox"/>	<input type="checkbox"/>	1,100	0	0	0
P63	FOSDYKE MARSH SOKE DYKE CONNECTION	<input type="checkbox"/>	<input type="checkbox"/>	380	0	0	0
P64	FIELD MEADOWS PIPELINE	<input type="checkbox"/>	<input type="checkbox"/>	195	0	0	0
<b>Total Length for Holbeach River Catchment (km)</b>				<b>100.61</b>	<b>15.98</b>	<b>41.71</b>	<b>0.00</b>

\* SOW = Strategic Ordinary Watercourse

## Richard Fisher

---

**From:** Dominic Morris <Dominic@wlma.org.uk>  
**Sent:** 12 January 2017 16:47  
**To:** Richard Fisher  
**Subject:** RE: Holbeach Food Enterprise Zone - Local Development Order  
**Attachments:** Holbeach New River SHDC.pdf

Richard

Please see plan attached showing the Board's watercourses and water levels for return periods. With regards to flood maps it shows on our maps that given a 1:100year + climate change rainfall event there would be between 600mm -300mm freeboard in the proposed development area.

Regards

Dom

**Dom Morris**

Assistant Engineer, South Holland IDB

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t: +44 (0)1553 819600 | f: +44 (0)1553 819639 | e: [info@wlma.org.uk](mailto:info@wlma.org.uk) | [www.wlma.org.uk](http://www.wlma.org.uk)

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---

**From:** Richard Fisher [mailto:[RFisher@peterbrett.com](mailto:RFisher@peterbrett.com)]  
**Sent:** 12 January 2017 14:41  
**To:** Dominic Morris <Dominic@wlma.org.uk>  
**Subject:** RE: Holbeach Food Enterprise Zone - Local Development Order

Thanks Dominic,

The site is outlined in red below – levels would be fine for this stage (I don't know if you have flood outlines also?)





Kind regards,

**Richard Fisher**

Associate

For and on behalf of Peter Brett Associates LLP - [Reading](#)



t 01189520612  
e [rfisher@peterbrett.com](mailto:rfisher@peterbrett.com)  
w [peterbrett.com](http://peterbrett.com)



---

**From:** Dominic Morris [<mailto:Domonic@wlma.org.uk>]  
**Sent:** 12 January 2017 14:39  
**To:** Richard Fisher <[RFisher@peterbrett.com](mailto:RFisher@peterbrett.com)>  
**Subject:** RE: Holbeach Food Enterprise Zone - Local Development Order

Richard

I can supply you with water levels for different return period events, closest to the site, if you send a plan over to me showing the exact site location, for free. However, if you want the model information there would be a large cost involved.

Regards

Dom

**Dom Morris**

Assistant Engineer, South Holland IDB

dd: +44 (0)1406 421702 | m: +44 (0)7920 792389 | e: [dominic@wlma.org.uk](mailto:dominic@wlma.org.uk)

Water Management Alliance

Kettlewell House, Austin Fields Industrial Estate, King's Lynn, Norfolk, PE30 1PH, UK

t: +44 (0)1553 819600 | f: +44 (0)1553 819639 | e: [info@wlma.org.uk](mailto:info@wlma.org.uk) | [www.wlma.org.uk](http://www.wlma.org.uk)

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[Norfolk Rivers Drainage Board](#) and [South Holland Drainage Board](#)

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---

**From:** Richard Fisher [<mailto:RFisher@peterbrett.com>]  
**Sent:** 12 January 2017 12:45  
**To:** Dominic Morris <[Dominic@wlma.org.uk](mailto:Dominic@wlma.org.uk)>  
**Cc:** Rachael Yeowell <[Rachael@wlma.org.uk](mailto:Rachael@wlma.org.uk)>  
**Subject:** RE: Holbeach Food Enterprise Zone - Local Development Order

Hi Dominic,

Thanks for the information below. Checking back through the file, I can't see if we requested the flood level data or not for this site?

It would be useful to get an idea of flood levels – can you confirm what events have been modelled? I notice you mentioned there is a cost for this data. Our work is being undertaken for the South Holland District Council – does that have an impact on any cost?

Kind regards,

**Richard Fisher**

Associate

For and on behalf of Peter Brett Associates LLP - [Reading](#)



t 01189520612  
e [rfisher@peterbrett.com](mailto:rfisher@peterbrett.com)  
w [peterbrett.com](http://peterbrett.com)



---

**From:** Dominic Morris [<mailto:Dominic@wlma.org.uk>]  
**Sent:** 04 August 2016 13:43  
**To:** Elizabeth Edney <[eedney@peterbrett.com](mailto:eedney@peterbrett.com)>  
**Cc:** Rachael Yeowell <[Rachael@wlma.org.uk](mailto:Rachael@wlma.org.uk)>  
**Subject:** RE: Holbeach Food Enterprise Zone - Local Development Order

Elizabeth

Please see plan attached showing the Board's watercourses highlighted in the royal blue colour. As you can see from the plan there are no Board maintained watercourses surrounding the site. However I believe the Private/Riparian watercourses adjacent to the A151 are maintained by LCC and these all drain into the Board's

watercourses eventually entering the Board's Holbeach New River watercourse which drains out through Holbeach River Sluice into the River Welland.

The Board would allow 1.4litres a second per hectare and there would be a Surface Water Development Contribution payable of £74,740 per impermeable hectare draining into the watercourse. The rate payable would be 20% of the overall total providing the flow rate is kept to 1.4litres.

The whole of catchment P has been modelled. The Board can provide you with model information, however there will be a charge for doing so. If you provide us with return periods you require, we will issue you with the fee payable for the information required.

Regards

Dom

**Dom Morris**

Assistant Engineer, South Holland IDB

dd: +44 (0)1406 421702 | m: +44 (0)7920 792389 | e: [dominic@wlma.org.uk](mailto:dominic@wlma.org.uk)

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t: +44 (0)1553 819600 | f: +44 (0)1553 819639 | e: [info@wlma.org.uk](mailto:info@wlma.org.uk) | [www.wlma.org.uk](http://www.wlma.org.uk)

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---

**From:** Elizabeth Edney [<mailto:eedney@peterbrett.com>]  
**Sent:** Monday, August 1, 2016 4:13 PM  
**To:** Dominic Morris <[DominiC@wlma.org.uk](mailto:DominiC@wlma.org.uk)>  
**Subject:** Holbeach Food Enterprise Zone - Local Development Order

Dominic

We have been instructed by our Client for the preparation of flood risk reports to support a Local Development Order at a site adjacent to the A17 in Holbeach (please see attached site location plan). I would be grateful if you could advise on the allowable discharge rates in l/s/ha that you would accept into the adjacent IDB watercourses and if you could provide an update on the modelling for the area.

Many thanks.

Kind Regards,

**Elizabeth Edney**

Flood Risk/Drainage Engineer

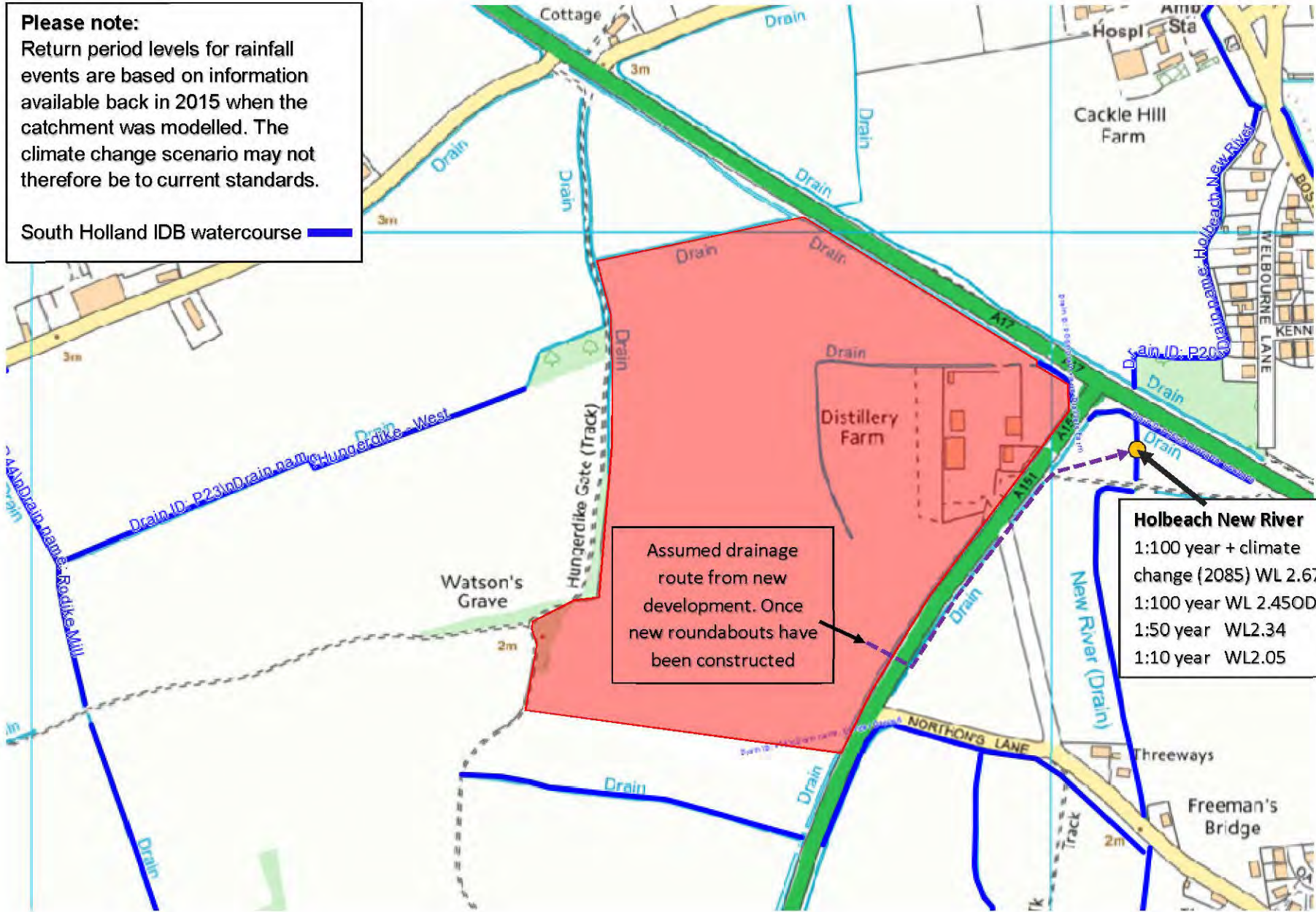
For and on behalf of Peter Brett Associates LLP - [Reading](#)



t 01189520314  
e [eedney@peterbrett.com](mailto:eedney@peterbrett.com)  
w [peterbrett.com](http://peterbrett.com)

**Please note:**  
 Return period levels for rainfall events are based on information available back in 2015 when the catchment was modelled. The climate change scenario may not therefore be to current standards.

South Holland IDB watercourse



Assumed drainage route from new development. Once new roundabouts have been constructed

<b>Holbeach New River</b>
1:100 year + climate change (2085) WL 2.67ODN
1:100 year WL 2.45ODN
1:50 year WL 2.34
1:10 year WL 2.05



**From:** [Leekam, Hugh](#)  
**To:** [Ellie Roberts](#)  
**Cc:** [info@wlma.org.uk](mailto:info@wlma.org.uk); [Fisher, Richard](#)  
**Subject:** RE: Holbeach, University of Leicester, Centre of Excellence, Surface Water Drainage Planning Amendments  
**Date:** 22 May 2023 11:29:00  
**Attachments:** [image001.png](#)  
[IDB\\_email\\_12thJan17.pdf](#)  
[Holbeach New River SHDC.pdf](#)

---

Good morning Ellie,

Following-on from my email below, in relation to IDB agreed discharge rates at the Holbeach site.

Would you also be able to advise on whether the attached associated flood levels (Holbeach New River SHDC pdf.) within the IDB Holbeach New River flood model (2015), are still valid and have not been superseded at the site?

Flood Event (Annual Probability)	Flood level (Holbeach New River) m AOD
1 in 10 (10%)	2.05
1 in 50 (2%)	2.34
1 in 100 (1%)	2.45
1 in 100 plus climate change (to 2085)	2.67

Within our previous flood risk mitigation strategy (2017), these modelled flood levels (2015) were used to assess for the appropriate freeboard level at the site. We would like to confirm as to whether we can continue to use these modelled flood levels within our updated flood risk assessment (2023), to be able advise our client on a suitable freeboard level for the next stages of development across the Holbeach site?

This information is becoming much more urgent for our client, we are hoping for a response soon.

Please let me know if you have any questions or require more information to help you advise on discharge rates and updated flood levels at the site.

Many thanks,

**Hugh Leekam**  
**Assistant Flood Risk Engineer**

The Stills, 1<sup>st</sup> Floor, 80 Turnmill Street, London EC1M 5QU  
**Direct:** +44 20 3824 6623  
**Mobile:**  
[Hugh.Leekam@stantec.com](mailto:Hugh.Leekam@stantec.com)

---

**From:** Leekam, Hugh  
**Sent:** Wednesday, May 17, 2023 9:55 AM  
**To:** 'Ellie Roberts' <Ellie.Roberts@wlma.org.uk>  
**Cc:** 'info@wlma.org.uk' <info@wlma.org.uk>; Fisher, Richard <richard.fisher@stantec.com>  
**Subject:** RE: Holbeach, University of Leicester, Centre of Excellence, Surface Water Drainage

**From:** Ellie Roberts <Ellie.Roberts@wlma.org.uk>  
**Sent:** 02 June 2023 12:02  
**To:** Leekam, Hugh  
**Subject:** RE: Holbeach, University of Leicester, Centre of Excellence, Surface Water Drainage Planning Amendments

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Hi Hugh,

Our catchment engineer has advised me that the levels below are our most recent data, however the catchment is being re-modelled and we expect to have new data later this year.

It is unfortunate that the whole site did not come forward with a drainage strategy for which we could have given one consented discharge rate to match the 1.4l/s as quoted by Dominic. The attached email however should not be taken as consent and it may be the case that on a new application a different rate may be acceptable based on intermediate development and its effects on the catchment. Is the new site intended to drain through the existing outfall or would there be a separate discharge point?

We would expect that the proposed discharge rate is limited to a maximum of Qbar equivalent, and would encourage an application for the whole site which we could review as one consent. If approved, the parcels as they come forward could evidence to us that they are contributing pro-rata to the overall system to ensure it works as consented.

I hope this is useful, happy to discuss further.

Kind Regards,

Ellie



**Eleanor Roberts, BSc (Hons), MCIWEM**  
Senior Sustainable Development Officer  
Water Management Alliance  
m: 07827 356752 | e: [ellie.roberts@wlma.org.uk](mailto:ellie.roberts@wlma.org.uk)

Registered office: Pierpoint House, Horsley's Fields, King's Lynn, Norfolk, PE30 5DD  
t: 01553 819600 | e: [info@wlma.org.uk](mailto:info@wlma.org.uk) | [www.wlma.org.uk](http://www.wlma.org.uk)

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Your feedback is valuable to us, as we continually review and work to improve our services. So, if you have any suggestions, recommendations, questions, compliments or complaints, please complete one of our online forms: [Feedback Form](#) | [Complaint Form](#)

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## **Appendix D SHDC SFRA Maps**

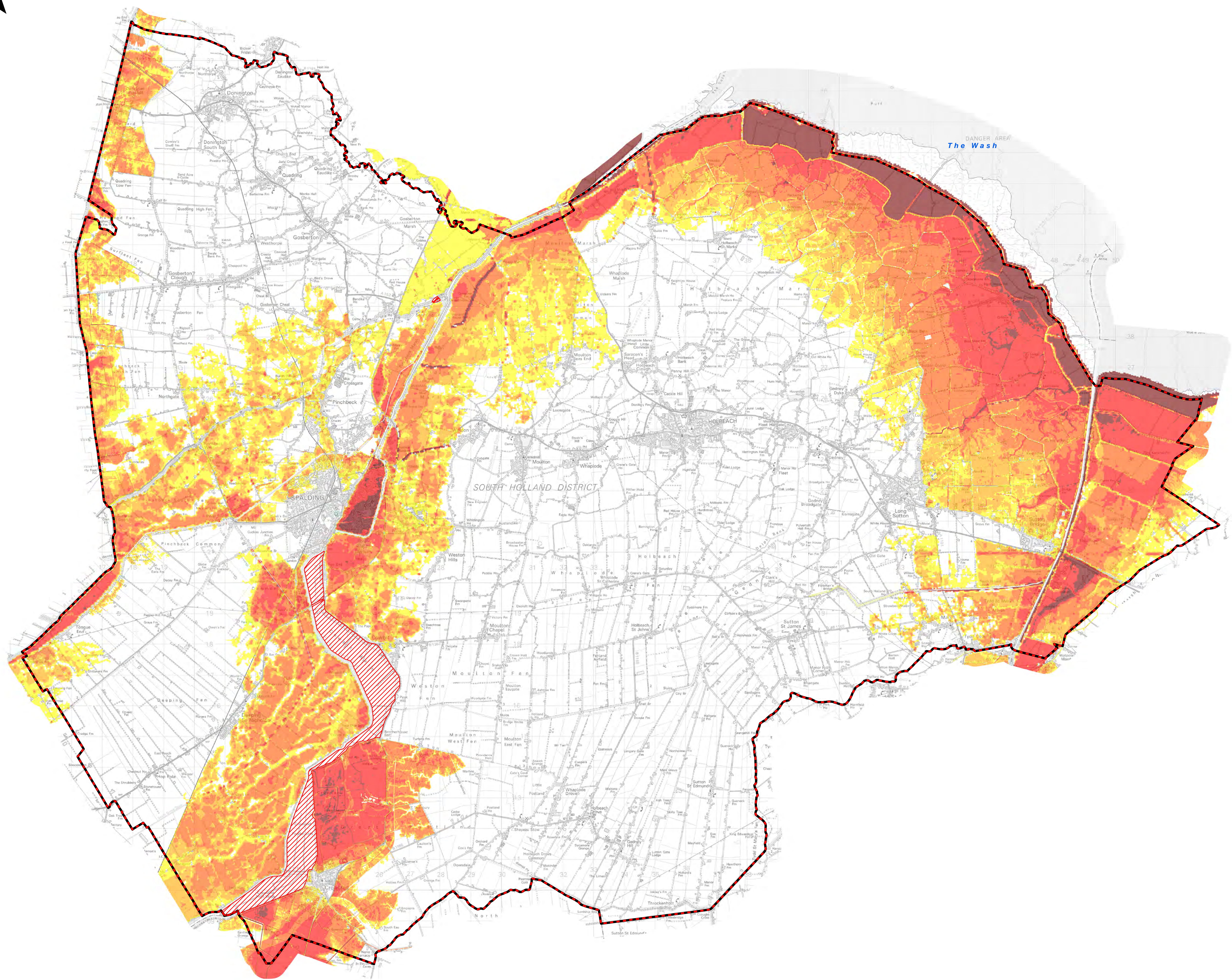
SFRA Map 1 – Residual Peak Depth District – Present Day 1% Fluvial / 0.5% Tidal Event Probability

SFRA Map 2 – Residual Peak Depth District – Year 2115 1% Fluvial / 0.5% Tidal Event Probability

SFRA Map 3 – Residual Risk Extent District – Present Day 1% Fluvial / 0.5% Tidal Event Probability

SFRA Map 4 – Residual Risk Extent District – Year 2115 1% Fluvial / 0.5% Tidal Event Probability





**NOTES**

1. The potential flooding consequences shown on this map primarily relate to flooding from the sea and main rivers taking into account the presence of current flood risk management measures such as flood defences.
2. This update only included new flood risk information from River Welland (Fluvial), River Glen (Fluvial) and Tidal hazard mapping (River Welland, River Nene and the Wash sea defences). No new information from the Internal Drainage Boards and associated systems was used for this update.
3. In addition to the potential flood extents shown on this map, there may be shallow flooding in low-lying rural areas
4. The consequences designated as being a Residual Risk arise from direct overtopping of defences, where this would occur, together with breach failure which is assumed could occur at any point along the defences.
5. Functional Floodplain encompasses areas where water is intended to flow or be stored in times of flood.
6. Land outside South Holland District is not considered.
7. This map shows the extents only of the flooding probability bands relevant to the map Title

**Map Legend**

<b>Peak Depth</b>	
0m - 0.25m	
0.25m - 0.5m	
0.5m - 1m	
1m - 2m	
2m +	
Functional Floodplain	
South Holland District Boundary	

2	Feb 17	Modelling and Mapping Update
1	Dec 16	Modelling and Mapping Update
<b>REV</b>	<b>DATE</b>	<b>REMARKS</b>

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FAX +44 (0)1733 262243

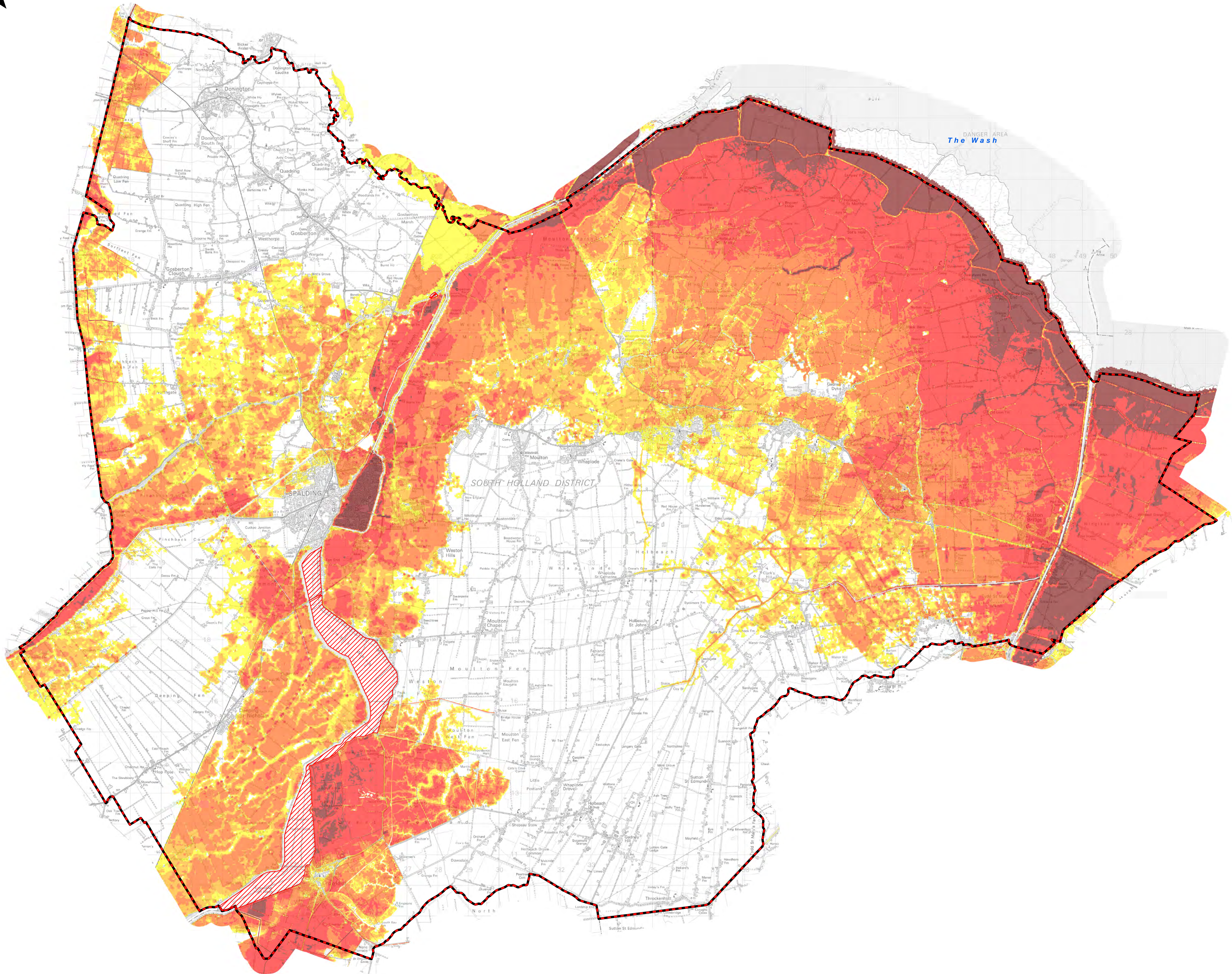
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PE11 2XE

**UPDATE OF STRATEGIC FLOOD RISK ASSESSMENT**  
**Residual Peak Depth District - Present Day**  
**1% Fluvial / 0.5% Tidal Event Probability**

DATE OF ISSUE: Feb 2017 REV NO: 2

SCALE: 1 : 60,000 @ A1 MAP NO:





**NOTES**

1. The potential flooding consequences shown on this map primarily relate to flooding from the sea and main rivers taking into account the presence of current flood risk management measures such as flood defences.
2. This update only included new flood risk information from River Welland (Fluvial), River Glen (Fluvial) and Tidal hazard mapping (River Welland, River Nene and the Wash sea defences). No new information from the Internal Drainage Boards and associated systems was used for this update.
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4. The consequences designated as being a Residual Risk arise from direct overtopping of defences, where this would occur, together with breach failure which is assumed could occur at any point along the defences.
5. Functional Floodplain encompasses areas where water is intended to flow or be stored in times of flood.
6. Land outside South Holland District is not considered.
7. This map shows the extents only of the flooding probability bands relevant to the map Title

**Map Legend**

Peak Depth	
0m - 0.25m	
0.25m - 0.5m	
0.5m - 1m	
1m - 2m	
2m +	
Functional Floodplain	
South Holland District Boundary	

REV	DATE	REMARKS
2	Feb 17	Modelling and Mapping Update
1	Dec 16	Modelling and Mapping Update

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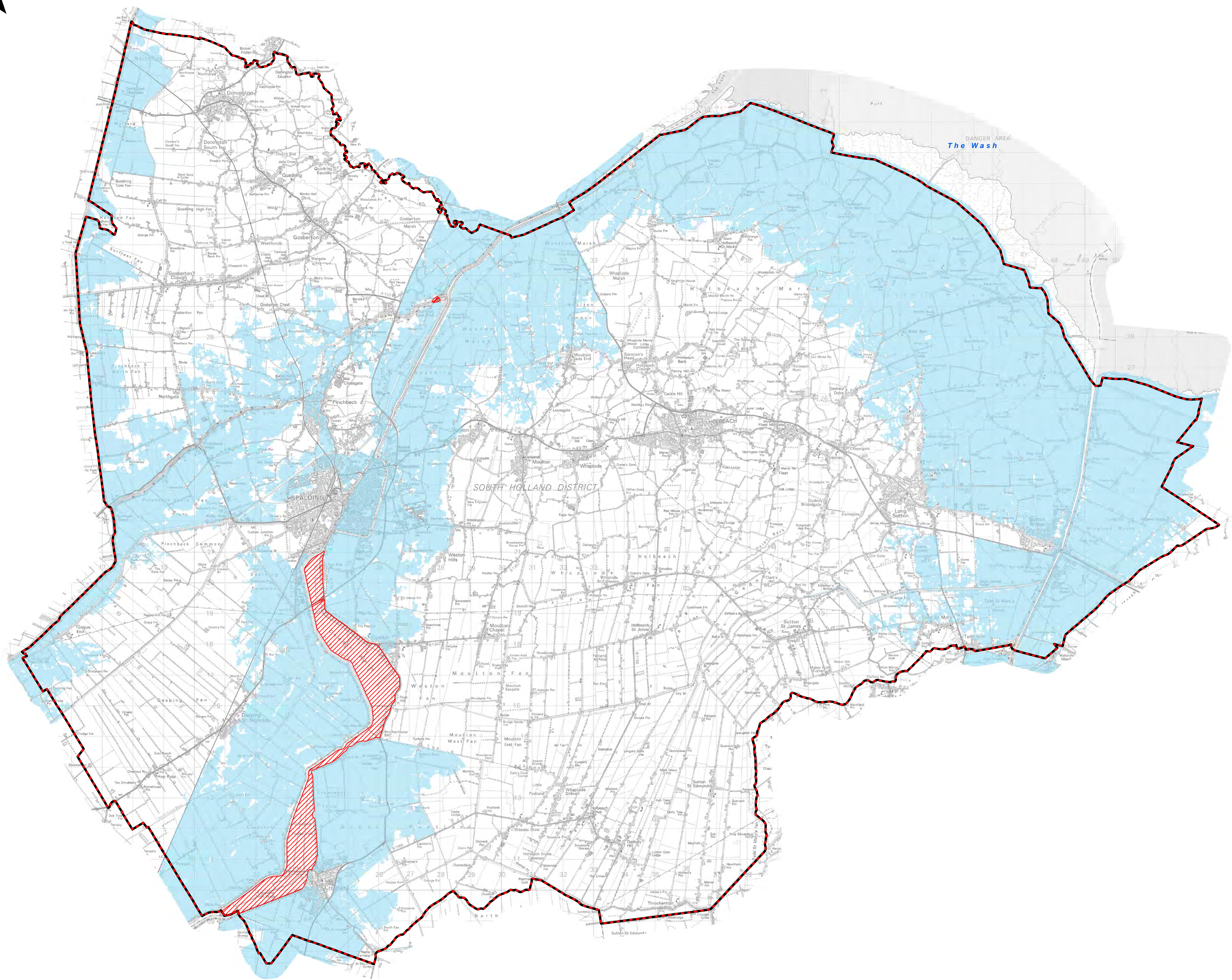
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**UPDATE OF STRATEGIC FLOOD RISK ASSESSMENT**  
**Residual Peak Depth District - Year 2115**  
**1% Fluvial / 0.5% Tidal Event Probability**

DATE OF ISSUE: Feb 2017 REV NO: 2

SCALE: 1 : 60,000 @ A1 MAP NO:





**NOTES**

1. The potential flooding consequences shown on this map primarily relate to flooding from the sea and main rivers taking into account the presence of current flood risk management measures such as flood defences.
2. This update only included new flood risk information from River Welland (Fluvial), River Glen (Fluvial) and Tidal hazard mapping (River Welland, River Nene and the Wash sea defences). No new information from the Internal Drainage Boards and associated systems was used for this update.
3. In addition to the potential flood extents shown on this map, there may be shallow flooding in low-lying rural areas.
4. The consequences designated as being a Residual Risk arise from direct overtopping of defences, where this would occur, together with breach failure which is assumed could occur at any point along the defences.
5. The potential flooding consequences relate to flood probability bandings as follows:

Probability Band	Annual probability of Flooding	
	from a river (fluvial)	from the sea (tidal)
Low	<0.1%	<0.1%
Medium	1%-0.1%	0.5%-0.1%
High	>1%	>0.5%

6. Functional Floodplain encompasses areas where water is intended to flow or be stored in times of flood.
7. Land outside South Holland District is not considered.
8. This map shows the extents only of the flooding probability bands relevant to the map Title

**Map Legend**

- Flooding Probability bands :
- High
  - Low or medium, but reliant on protection by flood defences for this standard
  - Functional Floodplain
  - South Holland District Boundary

2	Feb 17	Modelling and Mapping Update
1	Dec 16	Modelling and Mapping Update

REV	DATE	REMARKS
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*Enhancing Society Together*

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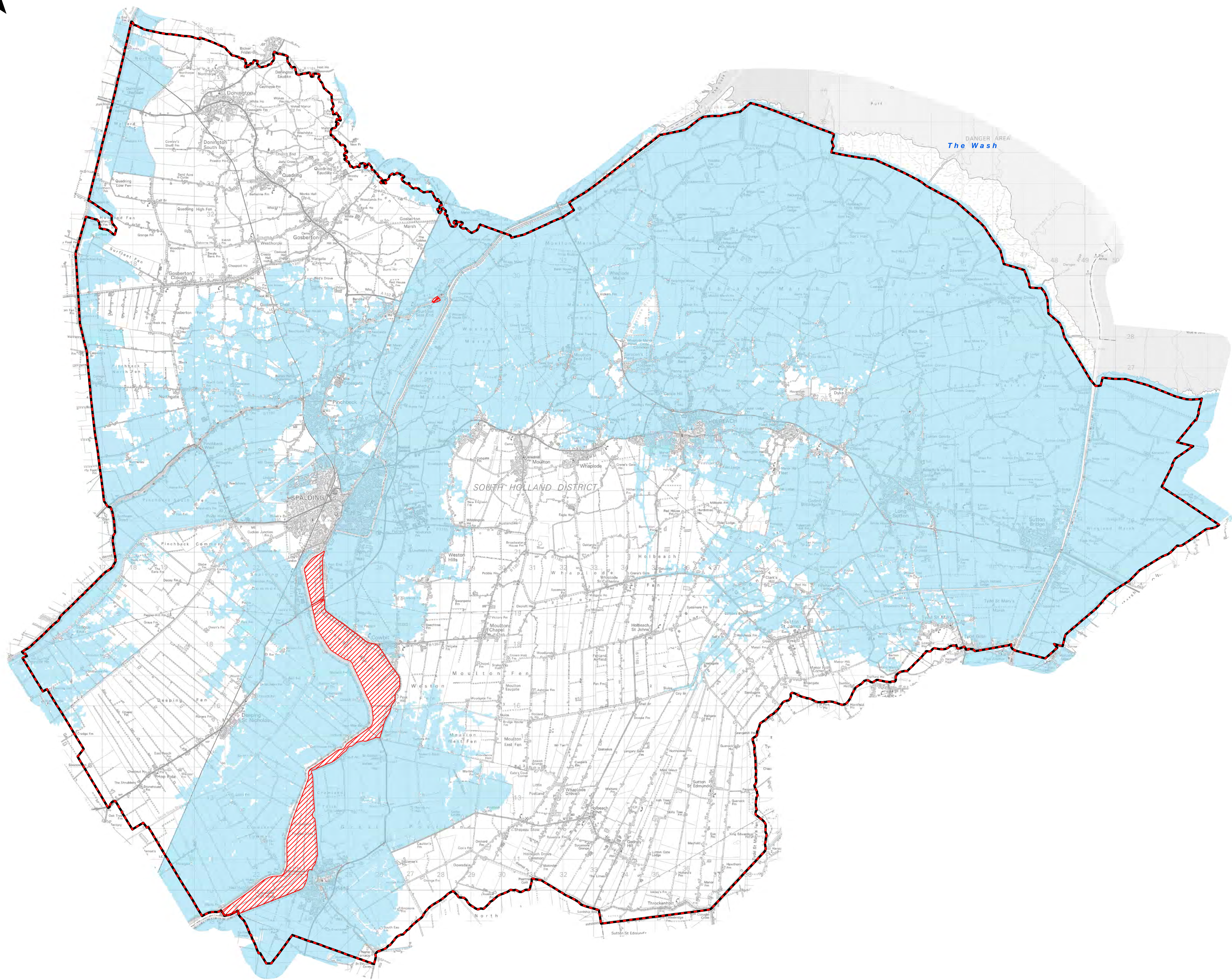
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**UPDATE OF STRATEGIC FLOOD RISK ASSESSMENT**  
**Residual Risk Extent**  
**District - Present day**  
**1% Fluvial / 0.5% Tidal Event Probability**

DATE OF ISSUE: **Feb 2017** REV NO: **2**

SCALE: **1 : 60,000 @ A1** MAP NO:





**NOTES**

1. The potential flooding consequences shown on this map primarily relate to flooding from the sea and main rivers taking into account the presence of current flood risk management measures such as flood defences.
2. This update only included new flood risk information from River Welland (Fluvial), River Glen (Fluvial) and Tidal hazard mapping (River Welland, River Nene and the Wash sea defences). No new information from the Internal Drainage Boards and associated systems was used for this update.
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4. The consequences designated as being a Residual Risk arise from direct overtopping of defences, where this would occur, together with breach failure which is assumed could occur at any point along the defences.
5. The potential flooding consequences relate to flood probability bandings as follows:

Probability Band	Annual probability of Flooding	
	from a river (fluvial)	from the sea (tidal)
Low	<0.1%	<0.1%
Medium	1%-0.1%	0.5%-0.1%
High	>1%	>0.5%

6. Functional Floodplain encompasses areas where water is intended to flow or be stored in times of flood.
7. Land outside South Holland District is not considered.
8. This map shows the extents only of the flooding probability bands relevant to the map Title

**Map Legend**

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- High
  - Low or medium, but reliant on protection by flood defences for this standard
  - Functional Floodplain
  - South Holland District Boundary

2	Feb 17	Modelling and Mapping Update
1	Dec 16	Modelling and Mapping Update

REV	DATE	REMARKS
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**UPDATE OF STRATEGIC  
 FLOOD RISK ASSESSMENT**  
**Residual Risk Extent**  
**District - Year 2115**  
**1% Fluvial / 0.5% Tidal Event Probability**

DATE OF ISSUE: Feb 2017 REV NO: 2

SCALE: 1 : 60,000 @ A1 MAP NO:



## Appendix E Environment Agency Information and OpenData Flood Maps

EA email of 29<sup>th</sup> March 2023

The EA Northern Area Tidal Hazard Mapping Study' and Flood Mapping & Hydraulic Wash Model (EA reference - CCN/ 2023/ 303845, April 2023) including modelled breach hazard mapping and tidal flood data.

- Modelled Breach Locations
- Tidal Breach Hazard Mapping – 2115 1 in 200 (0.5%) annual probability event
- Tidal Breach Hazard Mapping – 2115 1 in 1000 (0.1%) annual probability event

Stantec Opendata Flood Maps

- Site Location Plan
- Site Location (Aerial Photography)
- Area Topography (LiDAR)
- EA Flood Zone Map
- EA Surface Water Flood Risk
- Reservoir Flood Map
- EA Ground Water Source Protection Zones Map
- EA Historic Flood Map



**From:** PSOWN <PSOWN@environment-agency.gov.uk>  
**Sent:** 11 April 2023 15:31  
**To:** Leekam, Hugh  
**Cc:** Lincs & Northants, Customer Enquiries  
**Subject:** RE: 230409/ER07 Holbeach, Spalding, Lincolnshire - 'Food Enterprise Zone' development site - Flood and Breach Data Request CCN/ 2023/ 306111  
**Attachments:** [CCN-2023-306111.pdf](#)  
**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Dear Hugh,

**Product data for site at Holbeach, Spalding, Lincolnshire (NGR: TF3476625678). CCN/ 2023/ 306111**

Thank you for your request for flood risk data of 29<sup>th</sup> March 2023.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

I enclose the requested flood data. Please refer to [Open Government Licence](#) which explains the permitted use of this information.

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Kind regards,  
Annabelle

**Annabelle Webster**

Flood Risk Officer, Partnerships and Strategic Overview (Welland & Nene)  
Lincolnshire & Northamptonshire

**Environment Agency** | Nene House, Pytchley Lodge Road, Kettering, NN15 6JQ

Email: [annabelle.webster@environment-agency.gov.uk](mailto:annabelle.webster@environment-agency.gov.uk) | Team Email:

[PSOWN@environment-agency.gov.uk](mailto:PSOWN@environment-agency.gov.uk)

Direct Dial: +447557185692 | Team Dial: 020 302 53535

---

**From:** Lincs & Northants, Customer Enquiries <[LNenquiries@environment-agency.gov.uk](mailto:LNenquiries@environment-agency.gov.uk)>  
**Sent:** 11 April 2023 10:37  
**To:** LN Planning <[LNplanning@environment-agency.gov.uk](mailto:LNplanning@environment-agency.gov.uk)>; PSOWN <[PSOWN@environment-agency.gov.uk](mailto:PSOWN@environment-agency.gov.uk)>  
**Subject:** FW: 230409/ER07 Holbeach, Spalding, Lincolnshire - 'Food Enterprise Zone' development site - Flood and Breach Data Request CCN/ 2023/ 306111

Good morning,

We have received this Flood Product request with the deadline of 28<sup>th</sup> April 2023.

SP – Have copied you in as the customer has asked who is the Planning Liaison officer is.

Kind regards,

Nigel

Nigel Cooper  
**Customers and Engagement Team**  
Lincolnshire and Northamptonshire Area  
Environment Agency  
✉ [LNenquiries@environment-agency.gov.uk](mailto:LNenquiries@environment-agency.gov.uk)  
☎ 02084749704  
☎ 29704 (Internal)  
☎ 07879435031

---

**From:** Lincs & Northants, Customer Enquiries

**Sent:** 11 April 2023 10:33

**To:** [Hugh.Leekam@stantec.com](mailto:Hugh.Leekam@stantec.com)

**Subject:** FW: 230409/ER07 Holbeach, Spalding, Lincolnshire - 'Food Enterprise Zone' development site - Flood and Breach Data Request CCN/ 2023/ 306111

Dear Hugh,

**Product data for site at Holbeach, Spalding, Lincolnshire (NGR: TF3476625678). CCN/ 2023/ 306111**

Thank you for your request for flood risk data of 29<sup>th</sup> March 2023.

We have passed your request to our Partnerships and Strategic Overview Team who will assess what information is available and most relevant to your site. They will confirm this and provide the data in their final reply.

Under Freedom of Information we have up to 20 working days to send the information to you. However we will aim to provide a response to you before this time but you can expect to receive the data by no later than 28<sup>th</sup> April 2023.

If you have any queries in the meantime, please do not hesitate to contact me.

Kind regards,

Nigel

Nigel Cooper  
**Customers and Engagement Team**  
Lincolnshire and Northamptonshire Area  
Environment Agency  
✉ [LNenquiries@environment-agency.gov.uk](mailto:LNenquiries@environment-agency.gov.uk)  
☎ 02084749704  
☎ 29704 (Internal)  
☎ 07879435031

---

**From:** Leekam, Hugh <[Hugh.Leekam@stantec.com](mailto:Hugh.Leekam@stantec.com)>  
**Sent:** 29 March 2023 16:20  
**To:** Enquiries, Unit <[enquiries@environment-agency.gov.uk](mailto:enquiries@environment-agency.gov.uk)>  
**Subject:** 230409/ER07 Holbeach, Spalding, Lincolnshire - 'Food Enterprise Zone' development site - Flood and Breach Data Request

To whom it may concern,

Hopefully you can be of assistance. Stantec has been commissioned to undertake a flood risk assessment and drainage strategy for the site shown in the attached location plan. The site will comprise of a 'Food Enterprise Zone' development site (Science Park) on the western flank of the town of Holbeach in Lincolnshire, Spalding, PE12 7PY (site centre OS grid reference 534,730m E, 325,750m N).

This data request and site development details are confidential.

We have also requested information from the South Holland Internal Drainage Board, but would be very grateful for Product 4 information as available, including the following:

- Modelled flood level information where available including node locations and information regarding the nature of the modelling work, who owns it and what the licensing cost would be.
- Any records of flooding in the vicinity of the site.
- Any information regarding groundwater flood risk.
- Any details of breach flooding from the Whaplode River, Holbeach River and New River (Drain), and any other relevant flood data of any nearby watercourses or potential flood sources.
- Any surface water management criteria that may apply at this location (over and above NPPF).
- Any information about any flood alleviation measures already in place, their state of maintenance and their performance.
- Any plans for future flood alleviation measures.
- Information regarding critical drainage areas, if relevant.

- Anything else you feel is relevant that a FRA would need to consider.

We would also greatly appreciate if you can confirm who the Planning Liaison Officer will be for the site attached. We look forward to your reply at your earliest convenience. Meanwhile, if you have any queries, please do not hesitate to get in touch using the contact details below.

Many Thanks,

**Hugh Leekam**  
**Assistant Flood Risk Engineer**

The Stills, 1<sup>st</sup> Floor, 80 Turnmill Street, London EC1M 5QU

Direct: +44 20 3824 6623

Mobile:

[Hugh.Leekam@stantec.com](mailto:Hugh.Leekam@stantec.com)

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Hugh Leekam  
[Hugh.Leekam@stantec.com](mailto:Hugh.Leekam@stantec.com)

**Our ref:** CCN-2023-306111

**Date:** 11/04/2023

Dear Hugh

### **Provision of Flood Risk Information for Holbeach, Spalding.**

Thank you for your request for our flood risk information for the above site. The information is set out below and attached. It is important you read any contextual notes on the maps provided.

If you are preparing a Flood Risk Assessment (FRA) for this site, please note this information may not be sufficient by itself to produce an adequate FRA to demonstrate the development is safe over its lifetime. Additional information may be required to carry out an appropriate assessment of all risk, such as consequence of a breach in defences.

We aim to review our information on a regular basis, so if you are using this data more than twelve months from the date of this letter, please contact us again to check it is still valid.

Please read the letter in full as the information covered has been updated in **March 2023**.

#### **1. Flood Map**

The attached map includes the current Flood Map for your area. The Flood Map indicates the area at risk of flooding, **assuming no flood defences exist**, for a flood 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 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, showing the area at risk of flooding assuming no defences may give a slightly misleading picture in that if there were no flood defences, water would spread out across these large floodplains. This flooding could cover large areas of land but to relatively shallow depths and could leave pockets of locally slightly higher land as isolated dry islands. It is important to understand the actual risk of the flooding to these dry islands, particularly in the event of defence failure.

The Flood Map also shows the location of formal raised flood defences and flood storage reservoirs. It represents areas at risk of flooding for present day only and does not take account of climate change.

The Flood Map only indicates the extent and likelihood of flooding from rivers or the sea. It should also be remembered flooding may occur from other sources such as surface water sewers, road drainage, etc.

## **2. Historic Flood Event Outlines**

With regards to the history of flooding I can advise we do not have any records of flooding in this area. It is possible recent flooding may have occurred which we are currently investigating, therefore this information may be subject to change. It is possible other flooding may have occurred which other risk management authorities, such as the Lead Local Flood Authority (ie top tier council) or Internal Drainage Board (where they exist) have responsibility.

## **3. Schemes in the area**

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

## **4. Fluvial Flood Risk Information**

This site is not considered to be at risk of flooding from main rivers.

The site may be at risk from local ordinary watercourses for which other risk management authorities, such as the Lead Local Flood Authority (ie top tier council) or Internal Drainage Board (where they exist) have responsibility.

## **5. Tidal Flood Risk Information**

This site is considered to be at risk from tidal flooding.

### **5.1 Tidal Defence Information**

The existing tidal defences protecting this site consist of earth embankments.

They are in fair condition and reduce the risk of flooding (at the defence) to a 0.67% (1 in 150) chance of occurring in any year. We inspect these defences routinely to ensure potential defects are identified.

Refer to paragraph 3 for details of any ongoing capital projects to reduce the flood risk to this site.

### **5.2 Tidal Flood Levels**

The attached data sheets show our current best estimate for extreme tide levels.

Please read the information notes on the data sheets.

### **5.3 Tidal Hazard Mapping**

For certain locations we have carried out modelling to map the maximum values of flood depth, velocity and hazard rating (danger to people) resulting from overtopping and / or breaching of defences at specific locations for a number of scenarios.

At present this information is available along the full coastal / tidal floodplain, except the tidal Witham Haven in Boston (upstream of Hobhole) where only breaching and not overtopping



has been modelled and the tidal River Welland upstream of Fosdyke Bridge where neither breaching nor overtopping are available.

The number of locations we have this information for is expected to increase in time.

The attached maps show the maximum values of flood depth, velocity and hazard rating (danger to people) resulting from breaching of the defences at specific locations for the scenarios below. For some locations the breach mapping also includes flooding from overtopping if this is expected in that scenario. The location of modelled tidal breaches is shown on a separate attached map.

### 5.3.1 Tidal Hazard Mapping – Breaches

- Year 2115 0.5% (1 in 200) chance
- Year 2115 0.1% (1 in 1000) chance

Your site is not affected by breaching of the tidal defences for the present day (2006) scenarios.

### 5.3.2 Tidal Hazard Mapping - Overtopping

Your site is not affected by overtopping of the defences for the present day (2006) and climate change (2115) scenarios, though may be at risk from breaching.

## 6. Development Planning

If you would like local guidance on preparing a flood risk assessment for a planning application, please contact our Sustainable Places team at [LNplanning@environment-agency.gov.uk](mailto:LNplanning@environment-agency.gov.uk). It will help if you mention this data request and attach your site location plan.

We provide free preliminary advice; additional/detailed advice, review of draft FRAs and meetings are chargeable at a rate set to cover our costs, currently £100 (plus VAT) per hour of staff time. Further details are available on our website at <https://www.gov.uk/guidance/developers-get-environmental-advice-on-your-planning-proposals>.

General advice on flood risk assessment for planning applications can be found on GOV.UK at <https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>

Climate change will increase flood risk due to overtopping of defences. Please note, unless specified otherwise, the climate change data included has an allowance for 20% increase in flow. Updated guidance on how climate change could affect flood risk to new development - 'Flood risk assessments: climate change allowances' was published on GOV.UK in **July 2021**. The appropriate updated climate change allowance should be applied in a Flood Risk Assessment.

You should also consult the Strategic Flood Risk Assessment produced by your local planning authority.

## **7. Data Licence and Other Supporting Information**

We respond to requests for recorded information we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR).

This information is provided in accordance with the Open Government Licence which can be found here: <http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Further information on flood risk can be found on the GOV.UK website at: <https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather>

## **8. Other Flood Risk Management Authorities**

The information provided with this letter relates to flood risk from main river or the sea. The Flood Map for Surface Water can be viewed at <https://www.gov.uk/check-long-term-flood-risk>

Additional information may be available from other risk management authorities, such as the Lead Local Flood Authority (ie top tier council) or Internal Drainage Board (where they exist).

I hope we have correctly interpreted your request. If you have any queries or would like to discuss the content of this letter further please contact Annabelle Webster using the email address below and quoting our CCN reference number above.

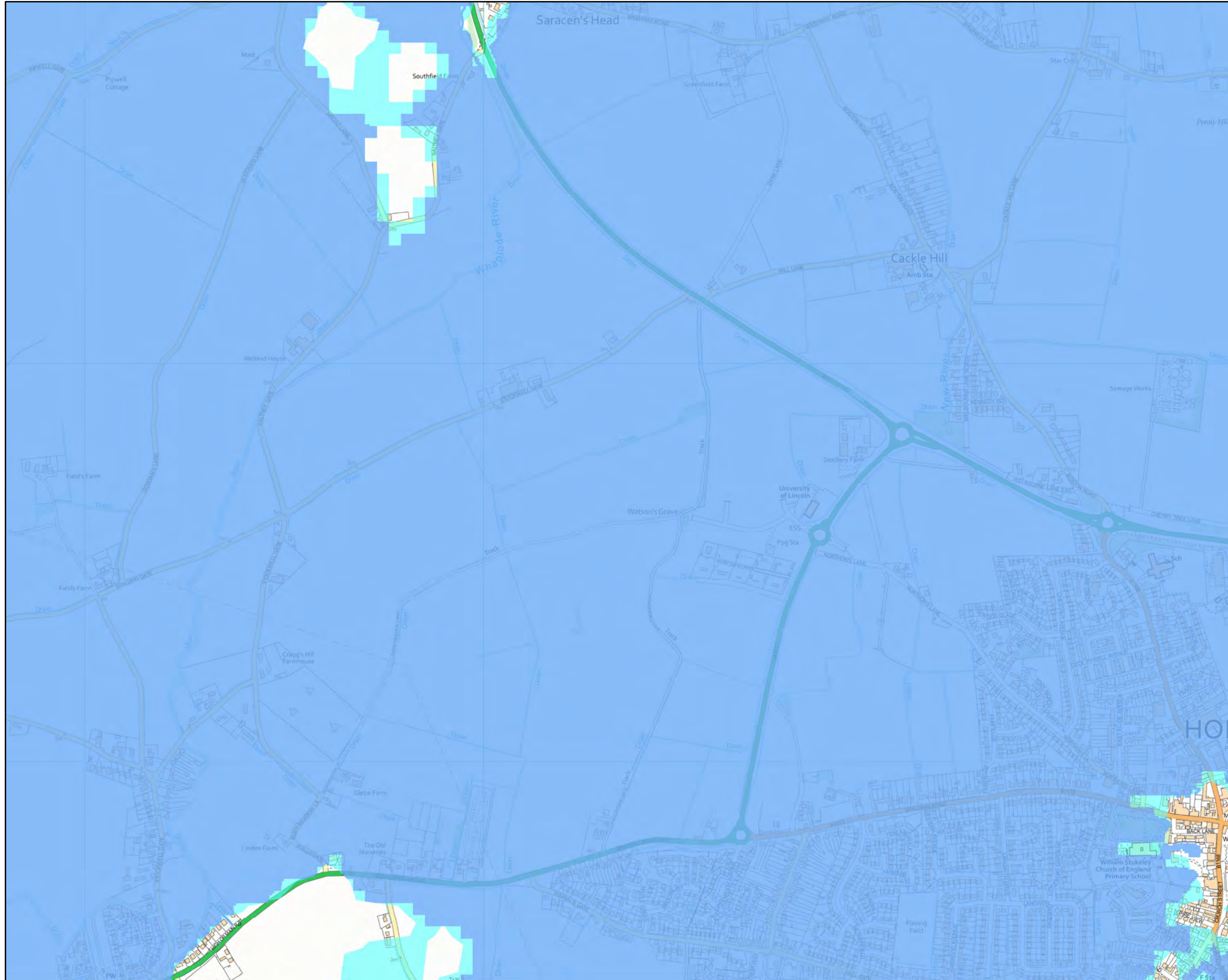
Yours sincerely,


Annabelle Webster  
020 302 53535

**for Alastair Windler**  
**Welland and Nene Partnerships and Strategic Overview Team Leader**  
e-mail [PSOWN@environment-agency.gov.uk](mailto:PSOWN@environment-agency.gov.uk)






Enc.  
Flood Map  
Tidal Level Data Sheets - Map and Tables  
Tidal Breach Points – Locations Map  
Hazard Mapping – Breaching

# Flood Map centred on TF 34766 25678 - created April 2023 [Ref: CCN-2023-306111]



Scale 1:10,000 

### Legend

-  Main Rivers
-  Raised Defences
-  Flood Storage Areas
-  Areas at Risk of Flooding from Rivers or the Sea
-  Extreme Flood Outline

Dark blue shows the area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area could be flooded:

- from the sea by a flood that has a 0.5% (1 in 200) or greater chance of happening each year.
- or from a river by a flood that has a 1% (1 in 100) or greater chance of happening each year.

Light blue 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.

These two colours show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements. Sites outside the two extents, but behind raised defences, may be affected by flooding if the defences are overtopped or fail.

Created by the Partnerships and Strategic Overview Team, Kettering



# East Coast and Wash - 2018 Coastal Flood Boundary [CFB] Dataset

## Key Node Points



Scale 1:550,000



▲ East Coast and Wash  
See separate data sheet for predicted flood levels





# 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%	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	Boygriff	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



## 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>

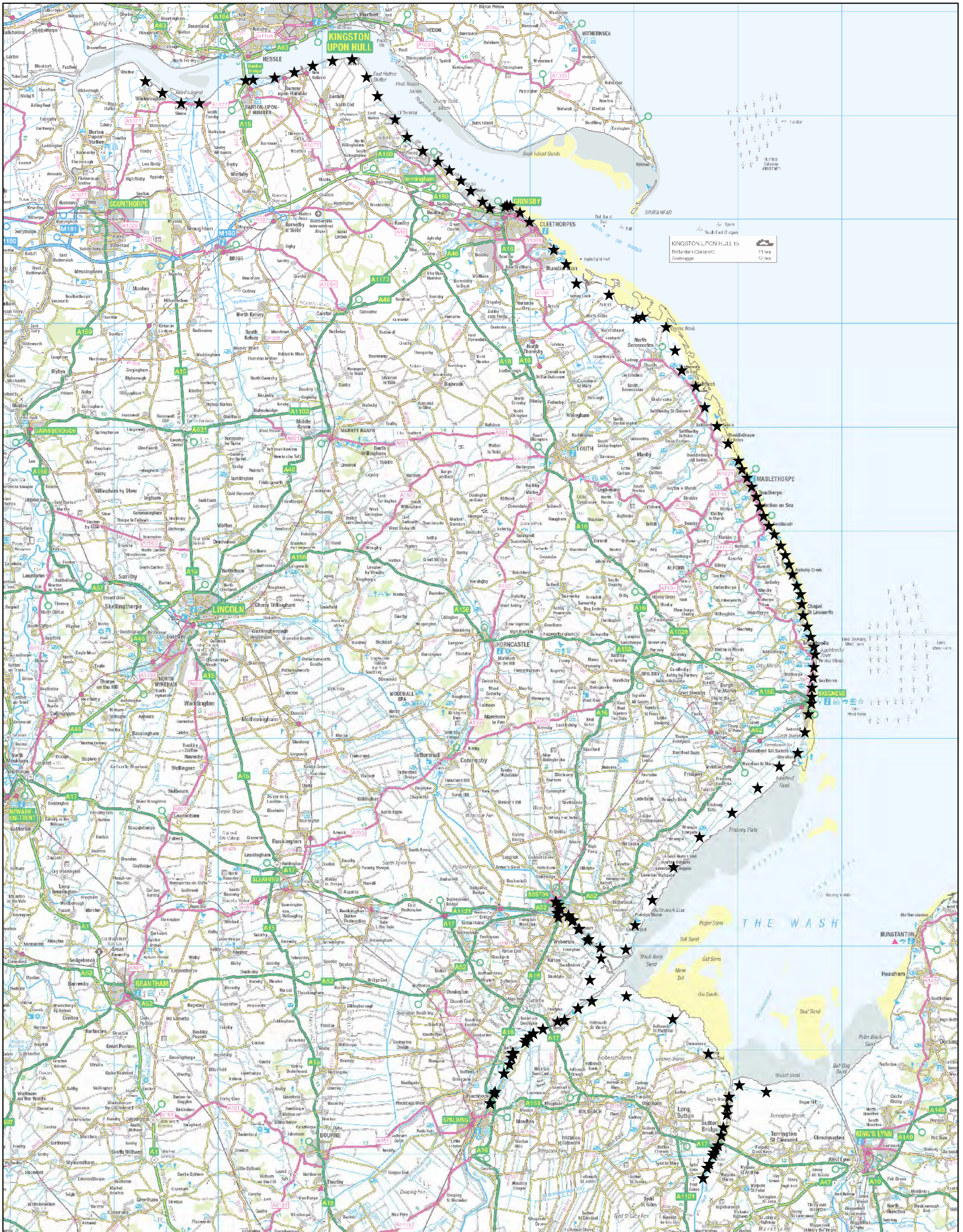
The following notes apply to all Marsh Road, Wisbech, Dog-in-a-Doublet

- 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>





★ **Modelled Breach Locations**



This map indicates the location of where we have modelled the consequence of breaches in the defences along the coastline and tidal rivers. We have mapped the maximum values of Hazard Rating (Danger to People), Depth and Velocity.

We have not assumed that all breaches occur at the same time, but have modelled each breach individually and overlaid the results to find the maximum values.

Our modelling only considers the consequences of a breach, it does not make any assumption about the likelihood of a breach occurring. Our defences generally provide a good standard of flood defence but a risk of breaching remains.

Please contact the Environment Agency for information on how these maps are used in the management of flood risk.

General Enquiries No: 03708 506 506.

Weekday calls cost 5p plus up to 6ppm from BT Weekend Unlimited. Mobile and other providers charges may vary.



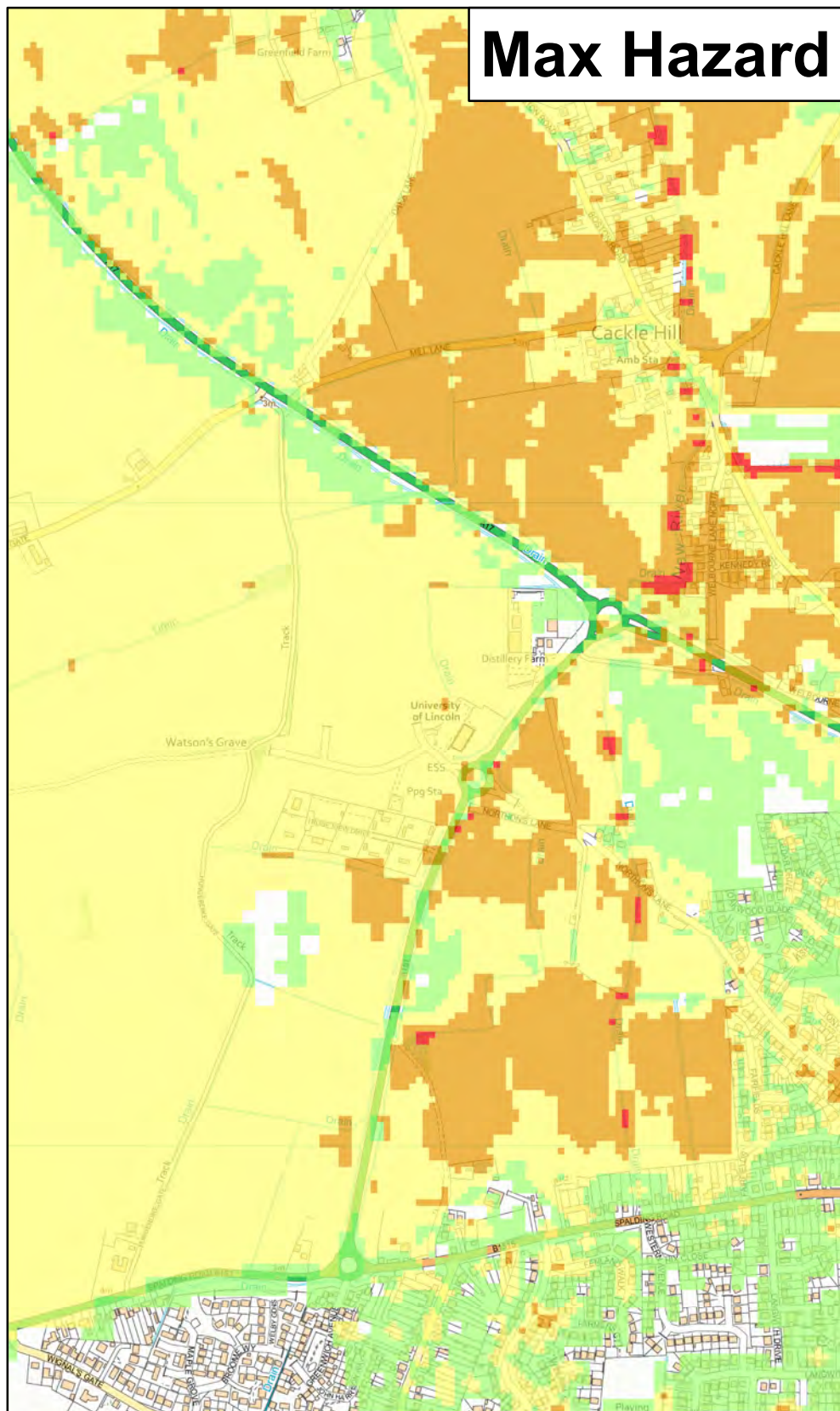
Produced by the Partnership and Strategic Overview Team, Lincoln  
General Enquiries No: 03708 506 506

**Northern Area Tidal Hazard Mapping**

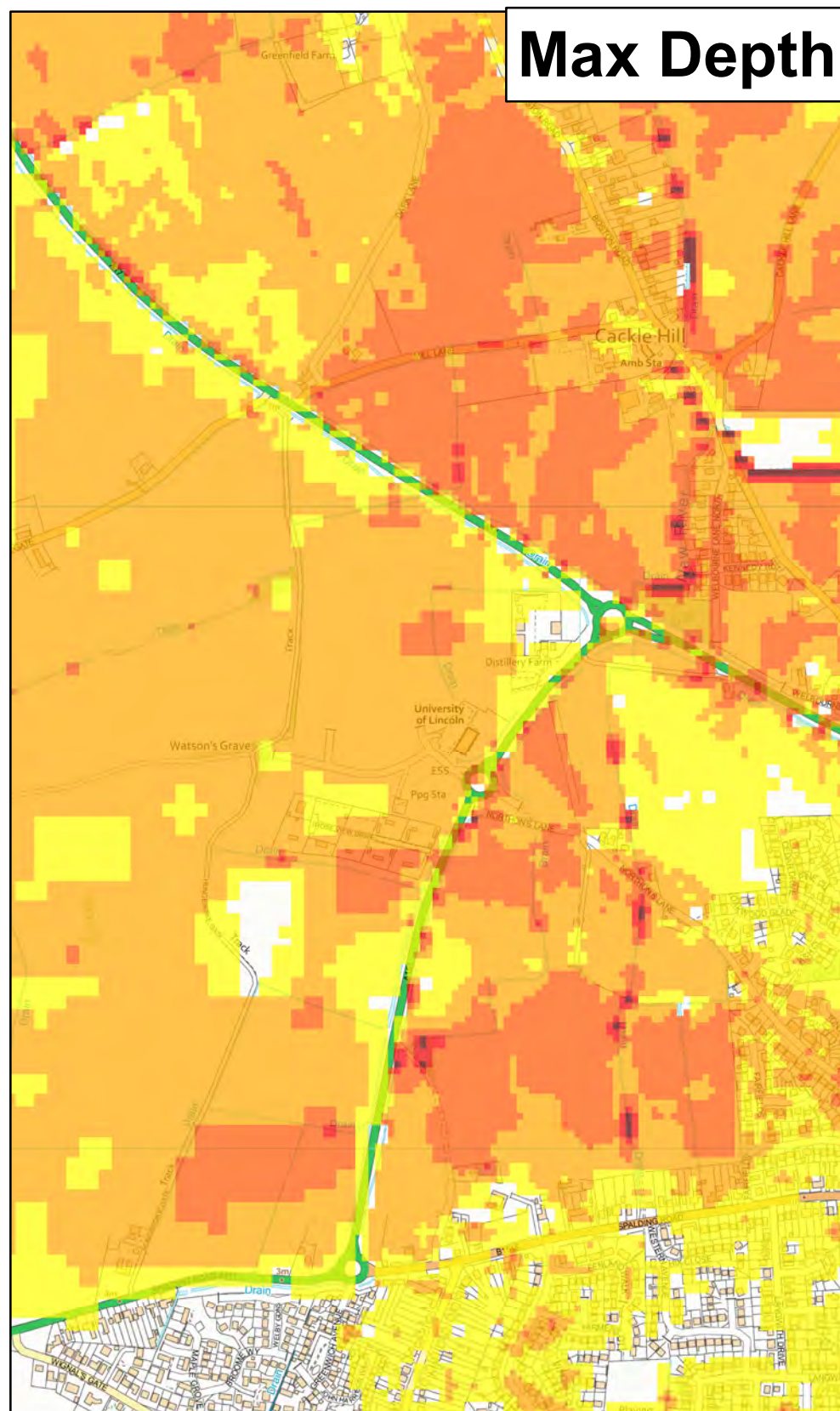
**Location of Modelled Breaches**

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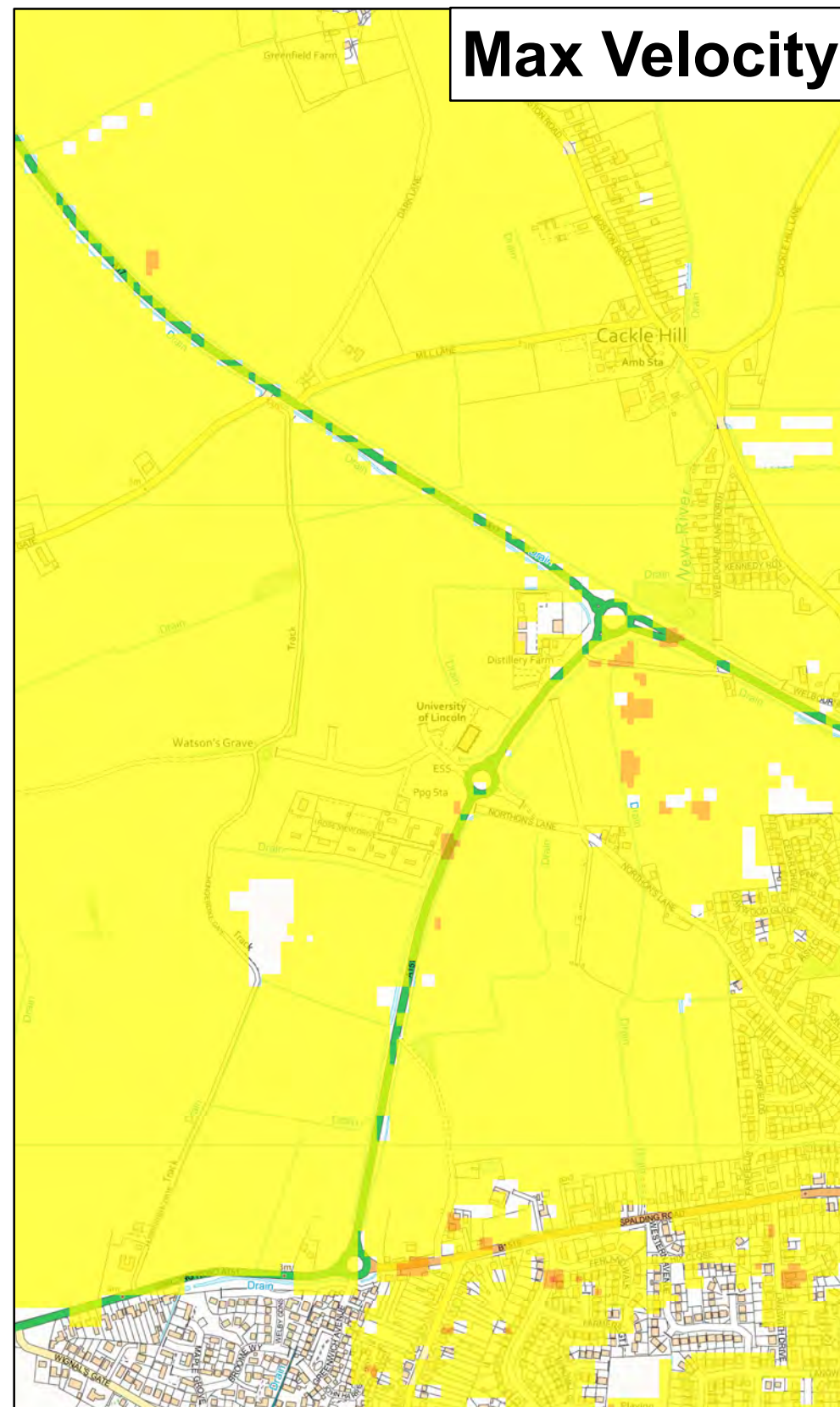




**Max Hazard**



**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 +

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.



**Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping**

Map Centred on TF 34766 25678

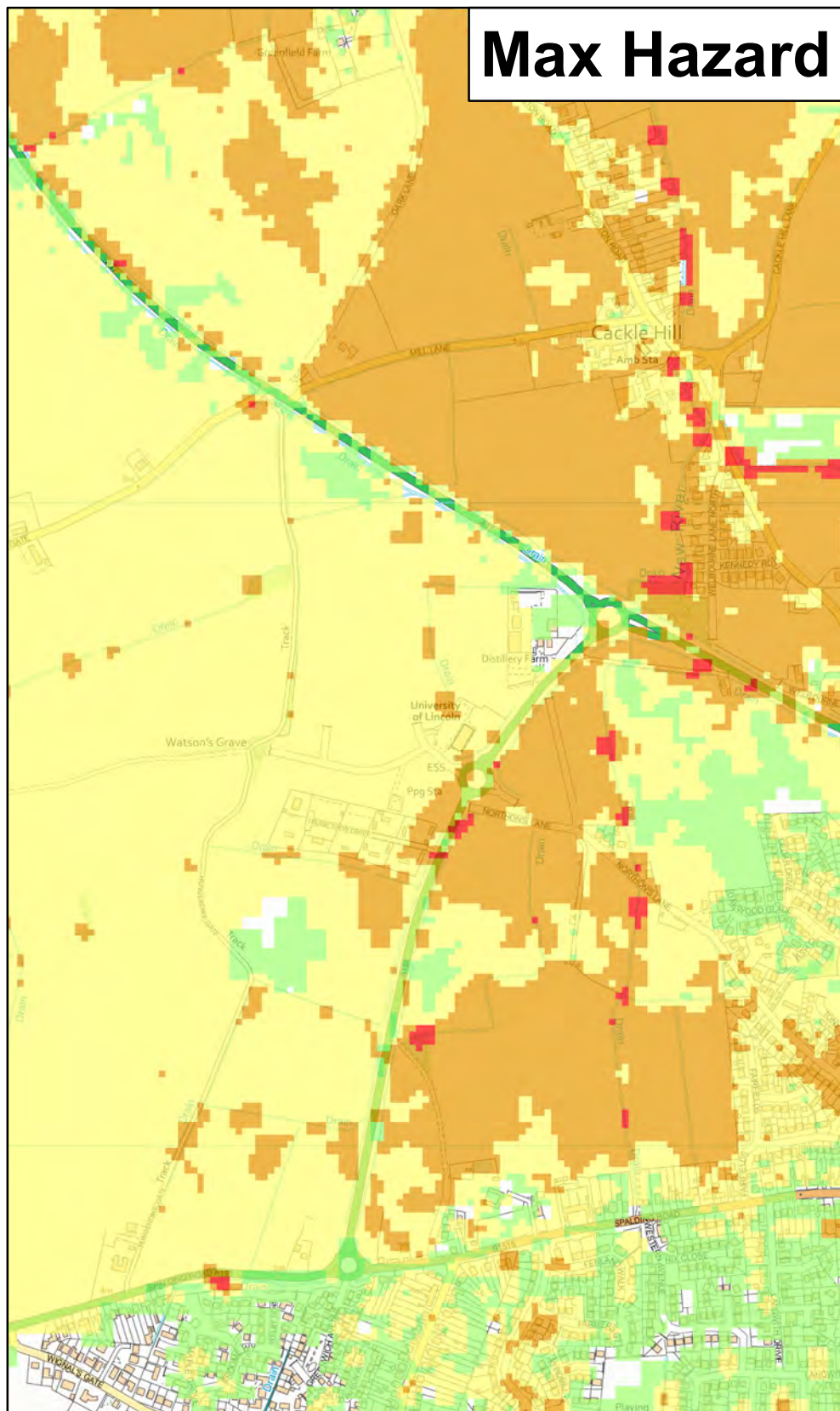
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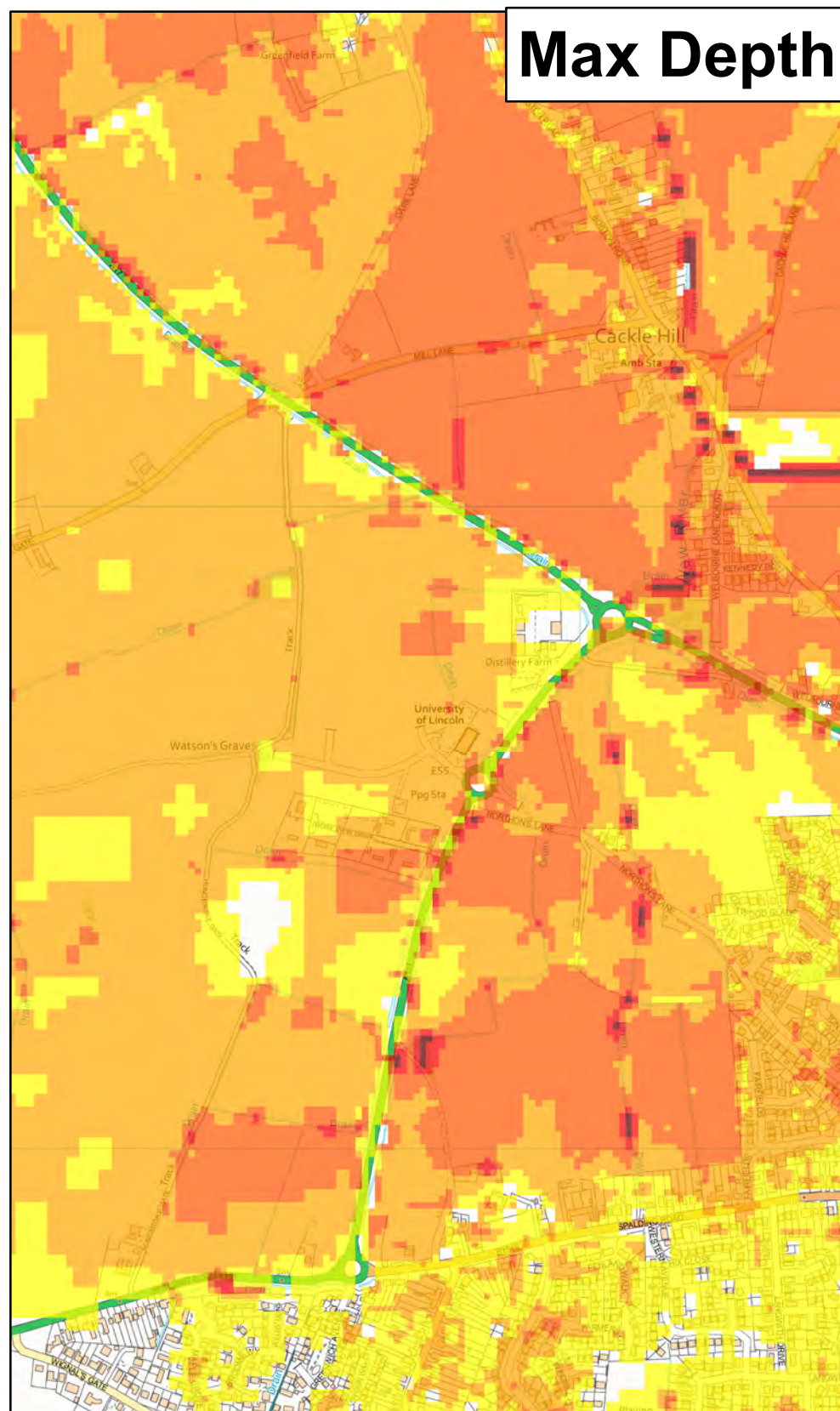
<b>Date Printed</b>	April 2023	<b>Scenario year</b>	2115	<b>Scenario Annual Chance</b>	0.5% (1 in 200)	<b>CCN Number</b>	CCN-2023-306111
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General Enquiries No: 03708 506 506. Weekday Daytime calls cost 5p plus up to 6p per minute from BT Weekend Unlimited. Mobile and other providers' charges may vary

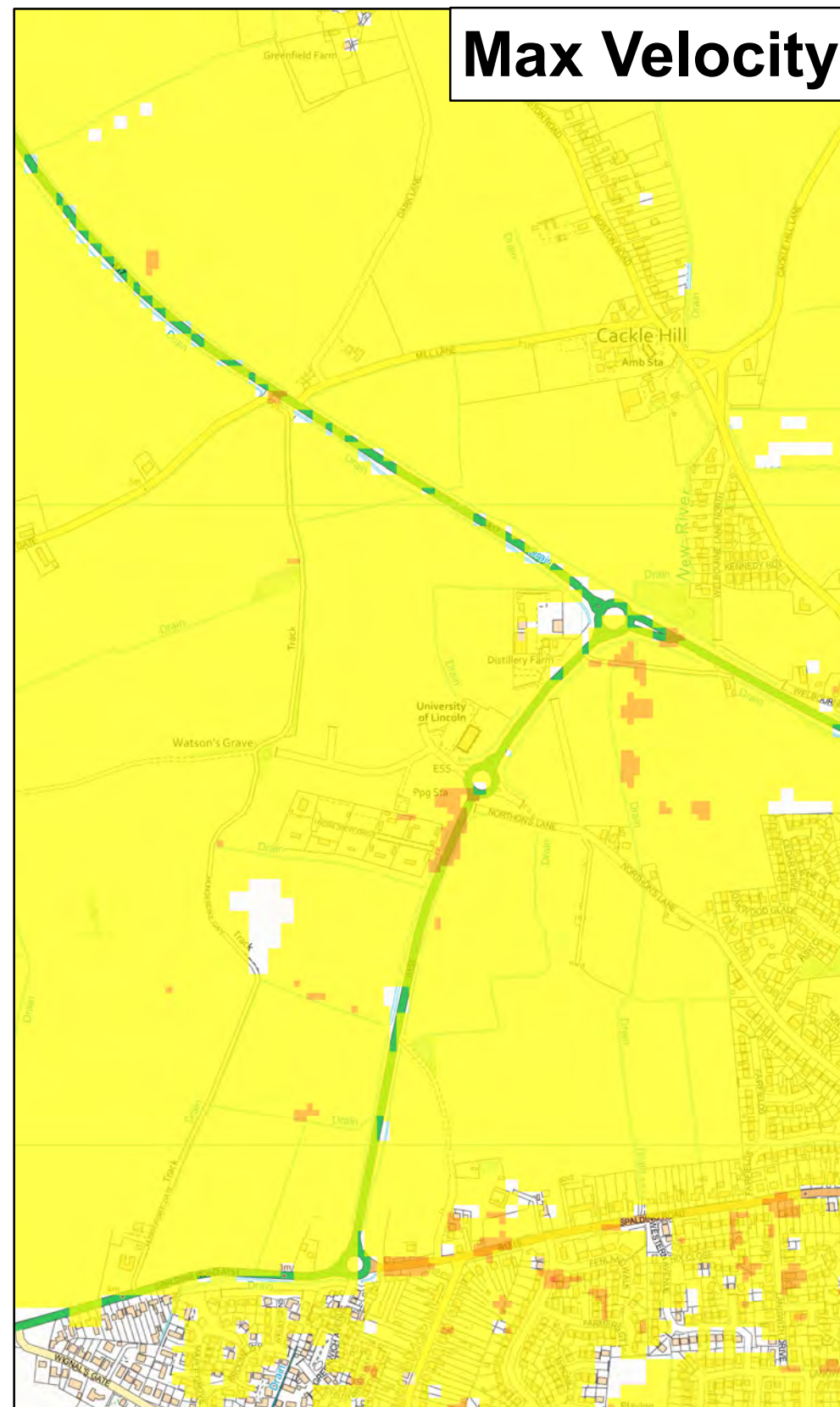




**Max Hazard**



**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 +

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.



**Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping**

Map Centred on TF 34766 25678

1:10,000

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<b>Date Printed</b>	April 2023	<b>Scenario year</b>	2115	<b>Scenario Annual Chance</b>	0.1% (1 in 1000)	<b>CCN Number</b>	CCN-2023-306111
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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

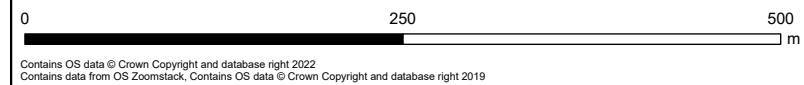




Client



**HOLBEACH FOOD ENTERPRISE ZONE (FEZ) LINCOLNSHIRE**  
Site Location



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Drawn: HL	Checked: RF
Figure: 001	Rev: A

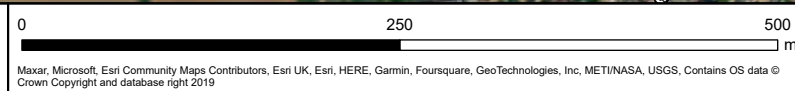




Site Boundary

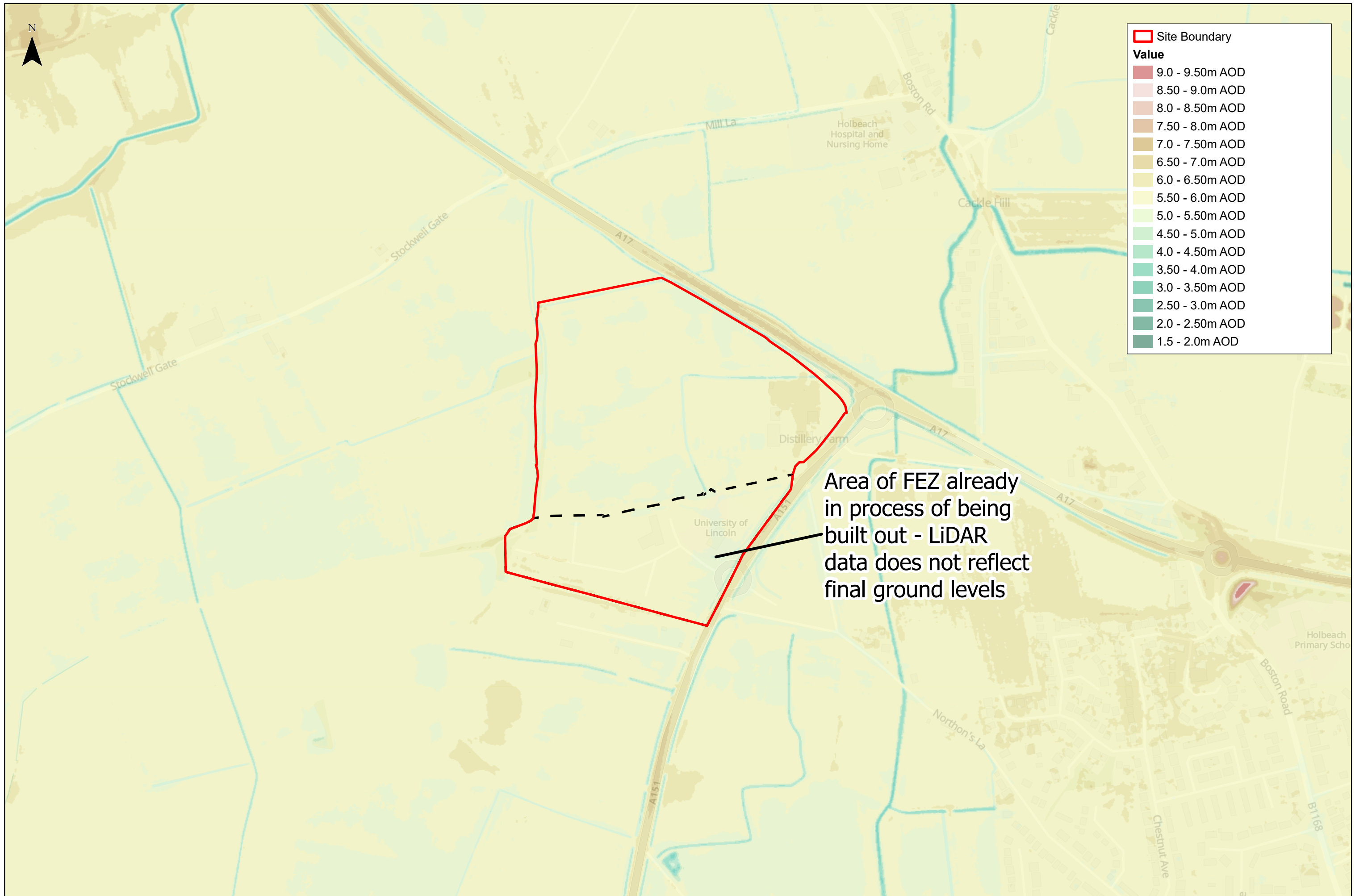


**HOLBEACH FOOD ENTERPRISE ZONE (FEZ) LINCOLNSHIRE**  
 Site Location - Aerial



1:5,000 @ A3	Date: 15/06/2023
Drawn: HL	Checked: RF
Figure: 002	Rev: A



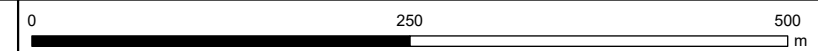


Site Boundary	
Value	
[Red]	9.0 - 9.50m AOD
[Light Red]	8.50 - 9.0m AOD
[Light Orange]	8.0 - 8.50m AOD
[Orange]	7.50 - 8.0m AOD
[Yellow-Orange]	7.0 - 7.50m AOD
[Yellow]	6.50 - 7.0m AOD
[Light Green]	6.0 - 6.50m AOD
[Green]	5.50 - 6.0m AOD
[Light Blue-Green]	5.0 - 5.50m AOD
[Blue-Green]	4.50 - 5.0m AOD
[Teal]	4.0 - 4.50m AOD
[Dark Teal]	3.50 - 4.0m AOD
[Dark Green]	3.0 - 3.50m AOD
[Medium Green]	2.50 - 3.0m AOD
[Light Green]	2.0 - 2.50m AOD
[Dark Green]	1.5 - 2.0m AOD

Area of FEZ already in process of being built out - LiDAR data does not reflect final ground levels

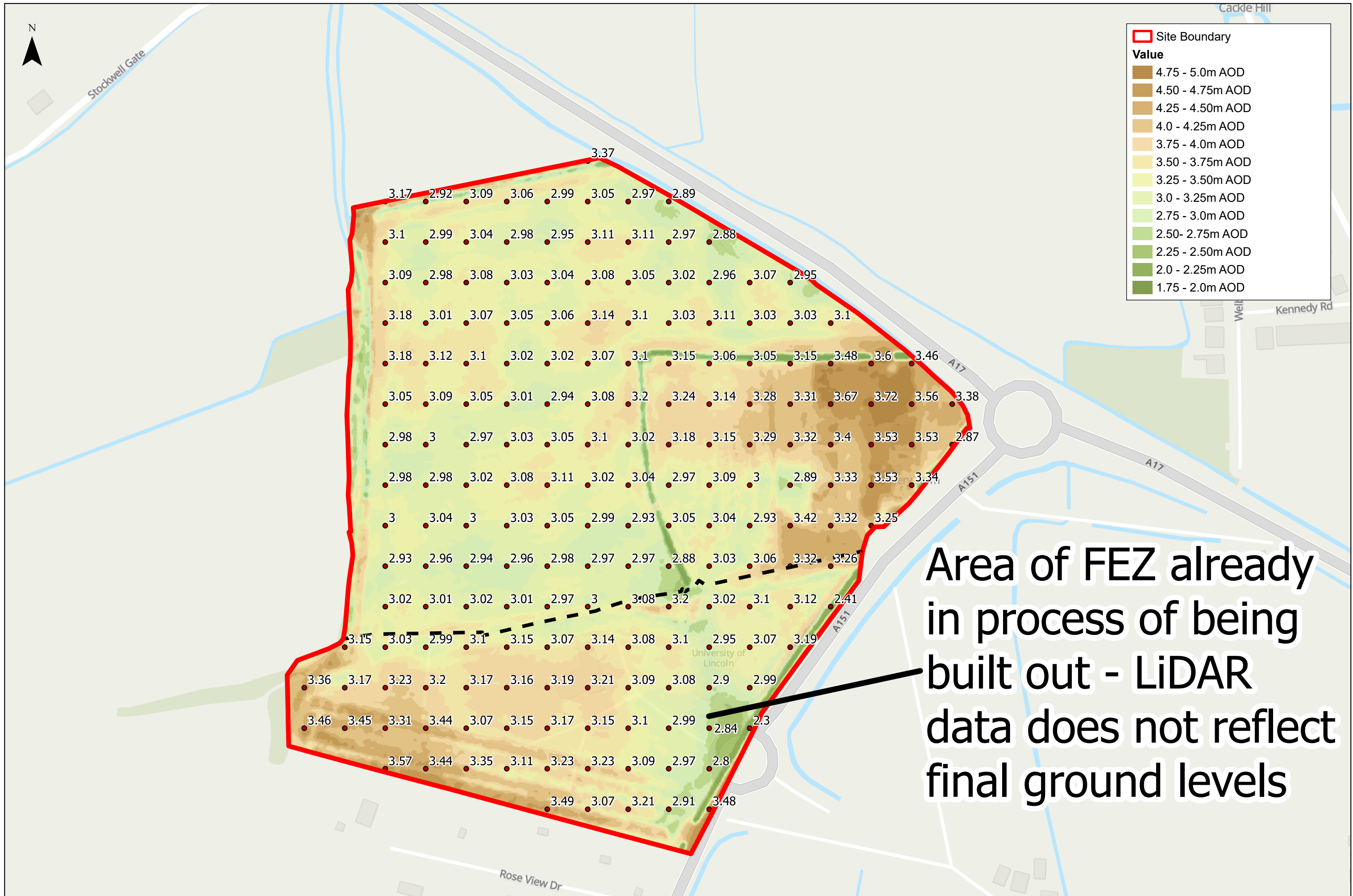


**HOLBEACH FOOD ENTERPRISE ZONE (FEZ) LINCOLNSHIRE**  
Topography

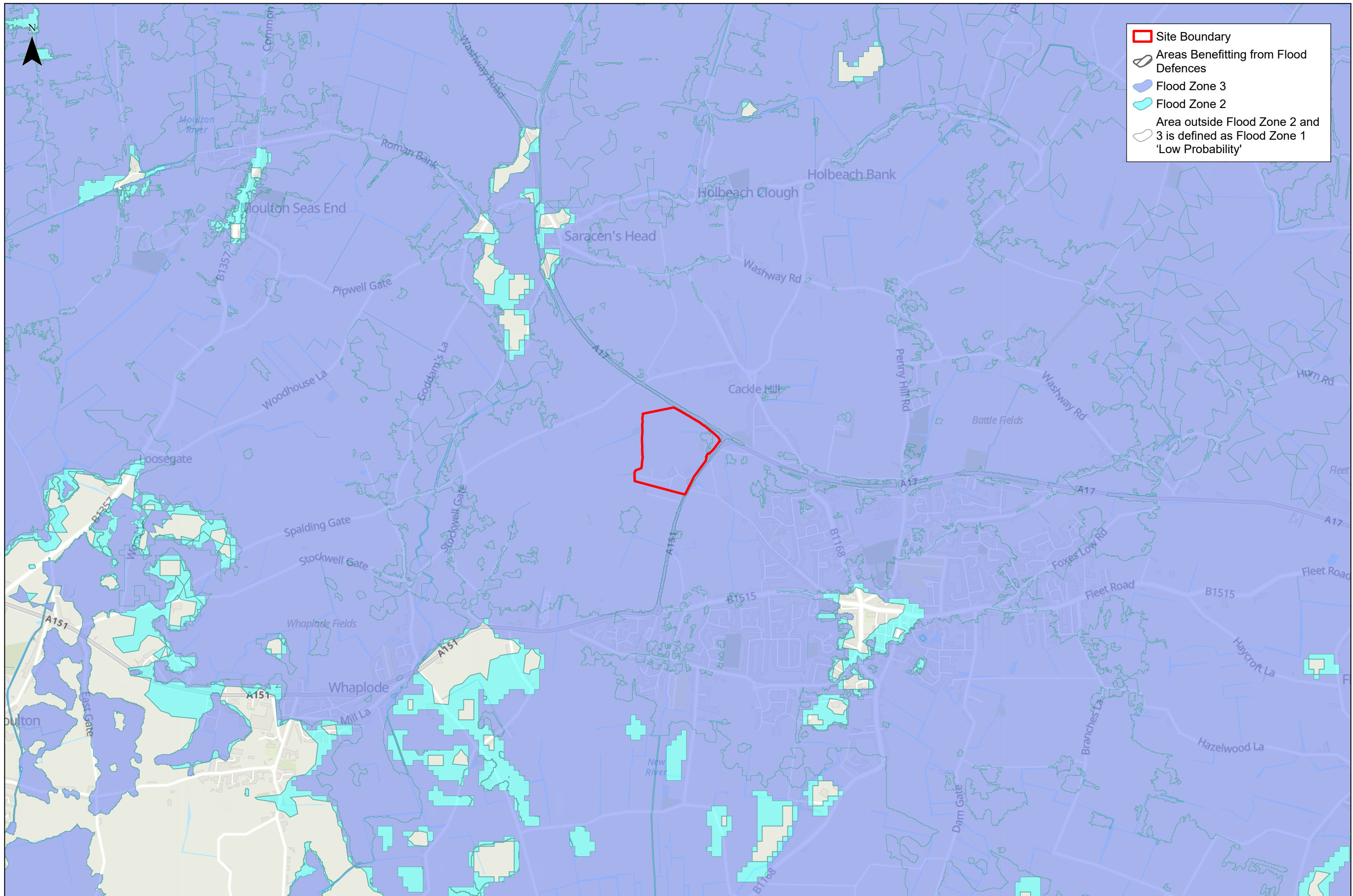


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Figure: 003	Rev: A



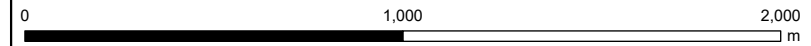




- Site Boundary
- Areas Benefitting from Flood Defences
- Flood Zone 3
- Flood Zone 2
- Area outside Flood Zone 2 and 3 is defined as Flood Zone 1 'Low Probability'



**HOLBEACH FOOD ENTERPRISE ZONE (FEZ) LINCOLNSHIRE**  
EA Flood Zone



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Flood Zones refer to the probability of river and/or sea flooding, ignoring the presence of defences.

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Figure: 004	Rev: A



**Site Boundary**

**Risk of Flooding from Surface Water**

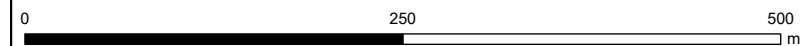
- High (3.3%) - 1 in 30 Annual Probability
- Medium (1%) - 1 in 100 Annual Probability
- Low (0.1%) - 1 in 1000 Annual Probability
- Very Low (<0.1%) - Less than 1 in 1000 Annual Probability



Client



**HOLBEACH FOOD ENTERPRISE ZONE (FEZ) LINCOLNSHIRE**  
EA Surface Water Flood Risk



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Map based on EA updated 'Flood Map for Surface Water' (uFMSW) released in 2013 as the latest iteration of a national scale surface water modelling exercise.

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Drawn: HL Checked: RF

Figure: 005 Rev: A





**Site Boundary**

**Risk of Flooding from Surface Water - Depth**

- Below 150mm
- 150 - 300mm
- 300 - 600mm
- 600 - 900mm
- 900 - 1200mm
- Over 1200mm

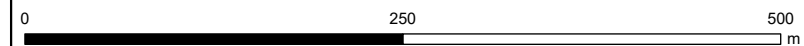


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**HOLBEACH FOOD ENTERPRISE ZONE (FEZ) LINCOLNSHIRE**

EA Surface Water Flood Risk - Depth  
3.3 Percent Chance



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Drawn: HL Checked: RF

Figure: 005a Rev: A



**Site Boundary**

**Risk of Flooding from Surface Water - Depth**

- Below 150mm
- 150 - 300mm
- 300 - 600mm
- 600 - 900mm
- 900 - 1200mm
- Over 1200mm

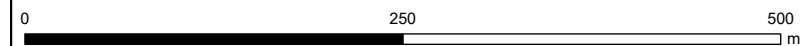


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**HOLBEACH FOOD ENTERPRISE ZONE (FEZ) LINCOLNSHIRE**

EA Surface Water Flood Risk - Depth  
1.0 Percent Chance



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Drawn: HL Checked: RF

Figure: 005b Rev: A





**Site Boundary**

**Risk of Flooding from Surface Water - Depth**

- Below 150mm
- 150 - 300mm
- 300 - 600mm
- 600 - 900mm
- 900 - 1200mm
- Over 1200mm

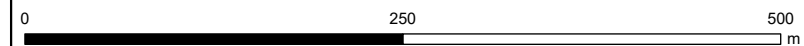


Client



**HOLBEACH FOOD ENTERPRISE ZONE (FEZ) LINCOLNSHIRE**

EA Surface Water Flood Risk - Depth  
0.1 Percent Chance

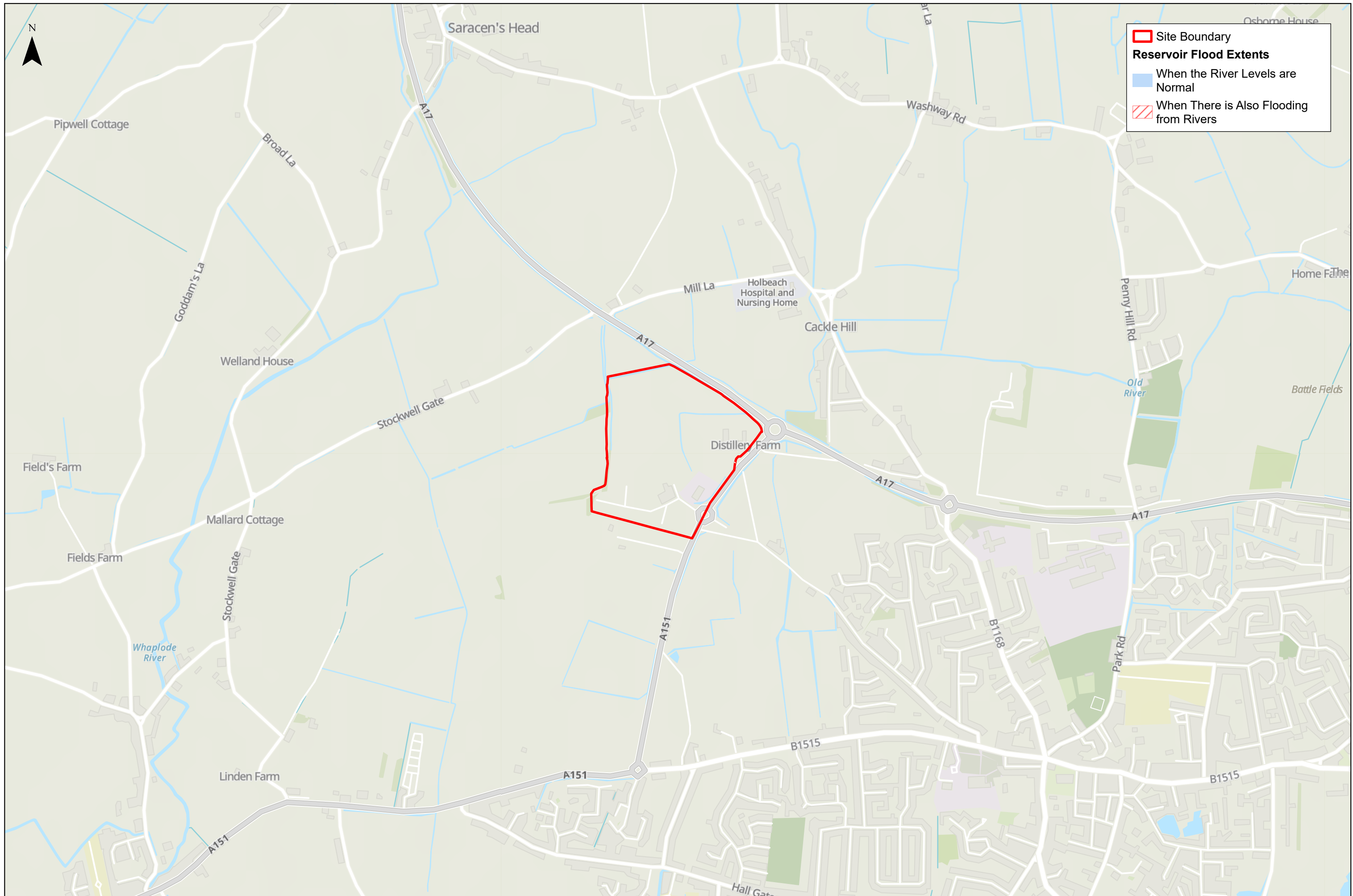


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Map based on EA updated 'Flood Map for Surface Water' (rFMSW) released in 2013 as the latest iteration of a national scale surface water modelling exercise.

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Figure: 005c Rev: A



**Site Boundary**

**Reservoir Flood Extents**

- When the River Levels are Normal
- When There is Also Flooding from Rivers



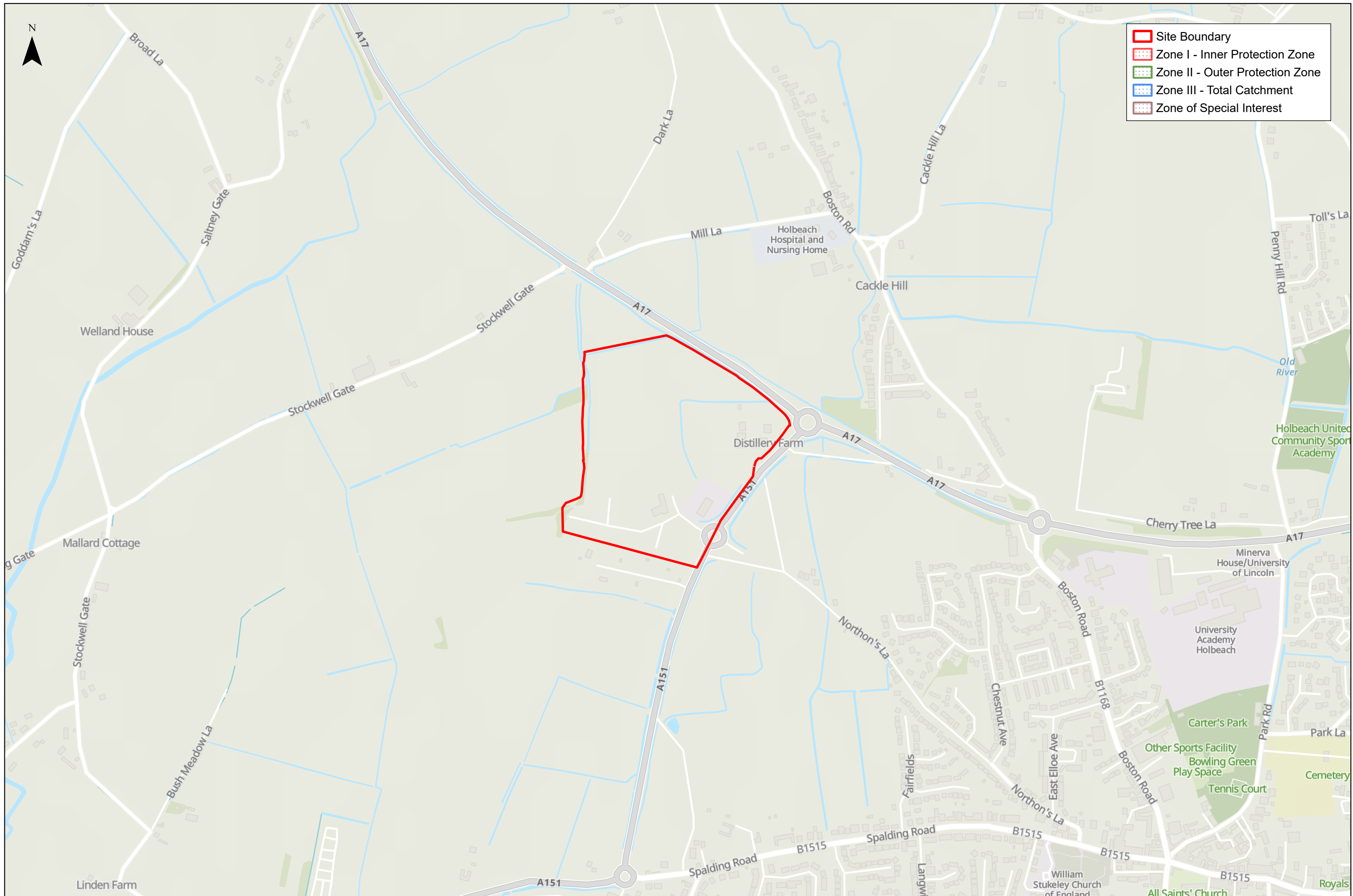
**HOLBEACH FOOD ENTERPRISE ZONE (FEZ) LINCOLNSHIRE**  
 Risk of Flooding from Reservoirs - Maximum Flood Extent

0 500 1,000 m

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Figure: 006	Rev: A	



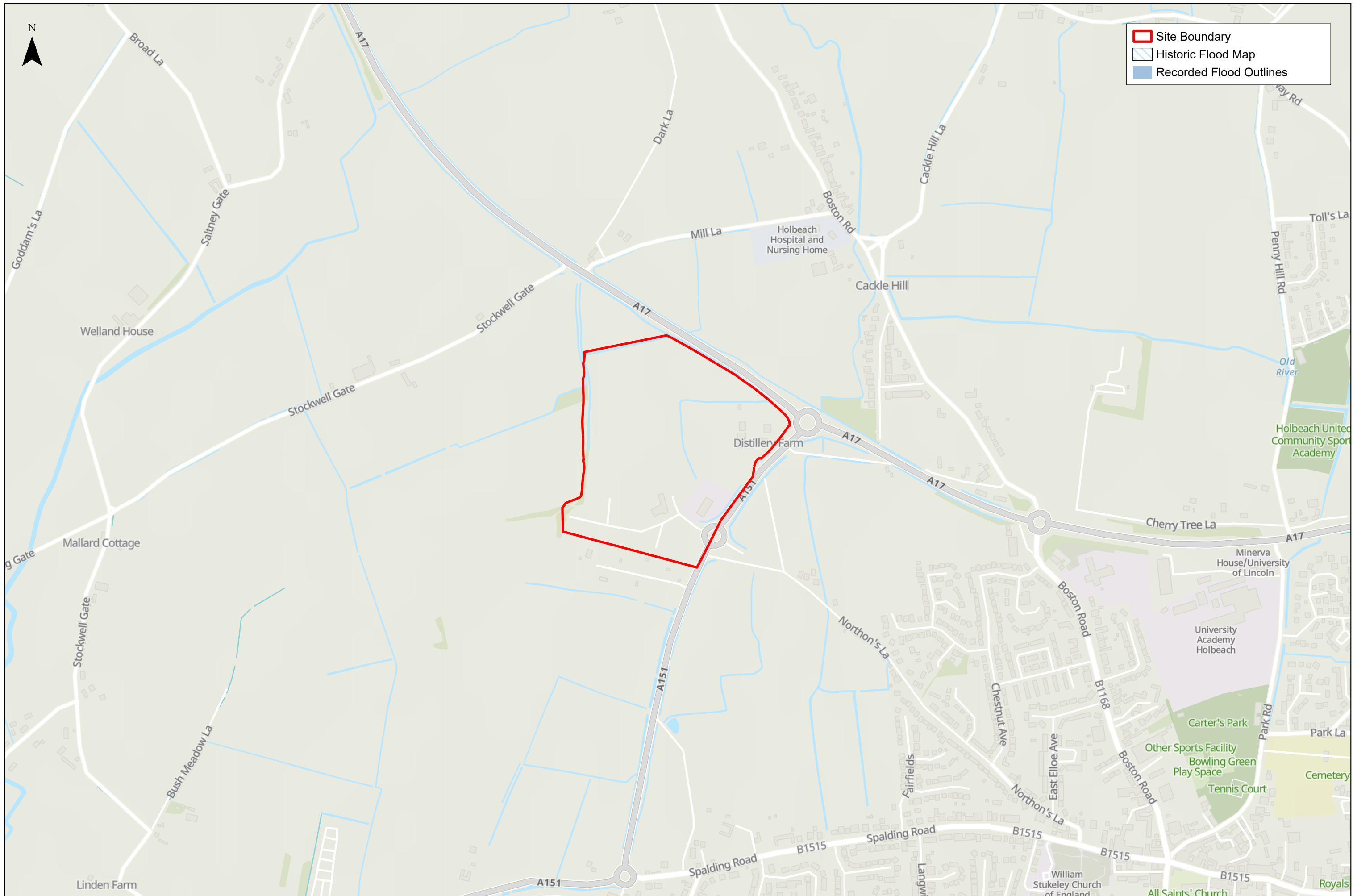


**HOLBEACH FOOD ENTERPRISE ZONE (FEZ) LINCOLNSHIRE**  
 EA Ground Water Source Protection Zones

0 375 750  
 m

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Figure: 007	Rev: A	



	Site Boundary
	Historic Flood Map
	Recorded Flood Outlines



**HOLBEACH FOOD ENTERPRISE ZONE (FEZ) LINCOLNSHIRE**  
EA Recorded Historic Flood Extents

0 375 750  
m

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Historic Flood Map shows the maximum extent of all individual Recorded Flood Outlines from river, the sea and groundwater springs and shows areas of land that have previously been subject to flooding in England.  
Recorded Flood Outlines shows all EA records of historic flooding from rivers, the sea, groundwater and surface water

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Drawn: HL	Checked: RF
Figure: 008	Rev: A