Holiday Cabins
Lowgate, Spalding
PE12 8LP

Larkfleet Group Ltd

Flood Risk Assessment

MA11542-FRA-R02

Millward
consulting engineers

REVISION

Reference	Revision	Author	Checker	Date
MA11542-FRA-R01	Preliminary issue	YL	JMcK	April 2022
MA11542-FRA-R02	Minor Amendments	YL	JMcK	May 2022

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1 INTRODUCTION

1.1 Millward have been appointed by Larkfleet Group Ltd to undertake a Flood Risk Assessment (FRA) for a proposed log cabin holiday/leisure use development situated approximately 9 miles east of Spalding, Lincolnshire.

1.2 This FRA is undertaken in accordance with the National Planning Policy Framework and associated Planning Practice Guidance (August 2021).

1.3 This FRA discusses and provides a qualitative and quantitative assessment of flood risk, reviewing the Environment Agency breach hazard information provided as part of their consultation response. The Strategic Flood Risk Assessment (SFRA) for the area has also been reviewed with appropriate mitigation measures applied to safely manage any risk to the development.

2 THE SITE

2.1 The site is located to the southwest side of the junction of Roman Bank and Lowgate which is situated approximately 0.5 miles north of the village of Fleet Hargate. The development site area is approximately 4.6 Hectares (46,000m^2). The site location is illustrated in **Figure 2-1** below.

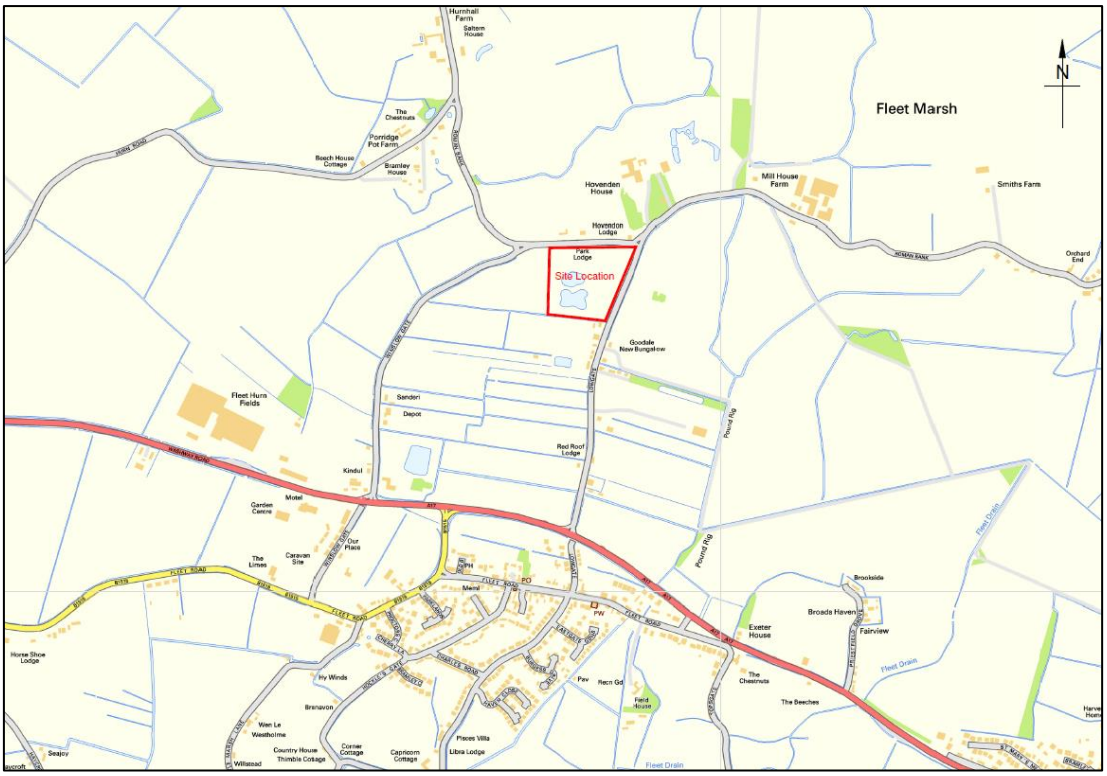


Figure 2-1: Site Location Plan

2.2 Vehicular access to the site will be via a new access point from Lowgate to the eastern boundary of the site which will pass over an existing Internal Drainage Board drain (South Holland IDB).

2.3 The site is currently used for agricultural use and is classed as greenfield for the purpose of analysis and assessment, subject to a natural drainage regime with no existing positive drainage connections.

3 CONSULTATIONS

3.1 Environment Agency (EA)

3.1.1 The Environment Agency Flood Map for Planning is available on their web site and has been interrogated firstly to define in terms of planning what flood zone the site is contained within.

3.1.2 The development site is contained predominantly within Flood Zone 3 (High Probability) which in accordance with Table 1 of the NPPF Technical Guidance document, is defined as having greater than a 1 in 100 chance (>1%) of flooding from rivers and 1 in 200 chance (>0.5%) from the sea in any one year (excluding the presence of flood defences).

3.1.3 The site benefits from the presence of both river and tidal flood defences.

3.1.4 Therefore, further Environment Agency consultation has taken place to obtain flood hazard mapping for the site location to aid an accurate assessment.

4 SEQUENTIAL AND EXCEPTION TESTS

4.1 Sequential Test

4.1.1 The site is currently Greenfield and is located wholly within Flood Zone 3 (High Probability).

4.1.2 In line with the NPPF Table 1 Flood Zone 3 (High Probability) land uses for this type of development (More Vulnerable) is only appropriate in this zone if the Exception Test is passed.

4.1.3 The expanse of Flood Zone 3 in this area is vast and there is very little land in lower flood zones in this locality. Any land in lower flood zones are essentially dry islands and do not provide connectivity to any greater expanse of land outside Flood Zone 3.

4.1.4 Therefore, this FRA concentrates on the residual risk to the development taking the flood defences into account and also the mitigation measures that can be applied to ensure the development is safe for use.

4.2 Exception Test

4.2.1 The development, in order to pass the Exception Test will need to show that the development is safe in terms of flood risk for the lifetime of the development.

4.2.2 As part of the assessment we have looked at safe access / egress for the cabins to areas outside the breach and overtopping scenarios provided by the Environment Agency and we recommend minimum finished floor levels for the log cabins as part of the mitigation measures to be applied to this site.

5 PROPOSED DEVELOPMENT

5.1 Summary of Proposals

5.1.1 Development proposals include the construction of 38 log cabins within the 4.6-hectare site with an access road and ponds as shown on drawing L188/SITE/01 Rev C contained within **Appendix A**.

5.1.2 There are large, landscaped areas such that the roadway and roof run-off from the log cabins will be able to drain into the open spaces and ponds to percolate towards the drainage ditches and ponds, mimicking the existing scenario.

5.1.3 An access road is proposed to provide vehicular access into the site from Lowgate via the eastern boundary. This crosses an IDB maintained drain which may require reinforcement / extension works to the culvert which currently facilitates the existing field access.

5.2 Drainage

5.2.1 Significant lake areas are proposed as part of the development to provide visual amenity for the development as well as areas for the informal runoff from the built development to drain towards.

5.2.2 SuDS features are proposed to manage the surface water runoff generated by the development in a sustainable way. This will ensure the development does not increase surface water flood risk off-site.

6 FLOOD RISK

6.1 Fluvial Flooding

6.1.1 The development area is shown within Flood Zone 3 (High Probability) from watercourses / the sea (not taking into account flood defences).

6.1.2 The River Welland is approximately 9.5km north west of the site at the nearest approach, the North Sea cost is approximately 12km to the northeast, and the mouth of the River Great Ouse is approximately 19km to the east.

6.1.3 These watercourses and the coast, in this particular area, have significant flood defence systems along their embankments which provide protection for the development site.

6.1.4 The residual risk to the site from this source is available to be analysed from the Environment Agency flood hazard mapping which is contained within **Appendix B**.

6.1.5 This site is not affected by breaching or overtopping for the present day (2006) scenarios for either the 1 in 200 (0.5% AEP) or 1 in 1000 (0.1% AEP) year event which means the present day flood risk to the site from this source is **LOW.**

6.1.6 The latest Environment Agency information online shows the extent of flooding from rivers and the sea encompassing the site but confirms a very low risk. Very low risk means that each year this area has a chance of flooding of less than 0.1%. This takes into account the effect of any flood defences in this area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

6.1.7 However, the expected rise in sea levels due to climate change over the lifetime of the development does present a residual risk to the development site.

6.1.8 The Environment Agency have provided the year 2115 scenario which does affect the site which is assuming the development would still be in use in 100 years' time although this is unlikely, it has been taken into account as a precautionary measure.

6.1.9 Residual risk of flooding from this source is assessed further in **Section 6.3.**

6.2 Flooding from Adjacent Land / Development

6.2.1 The main risk of flooding to the site from this source is from the land to the west of the site in the form of overland flow when the adjacent fields are saturated during higher rainfall events.

6.2.2 Due to the flat topography of the site and surrounding area, any overland flow from adjacent land site is likely to be shallow. There is also an extensive network of land drainage ditches which, by design, intercept overland flows.

6.2.3 The log cabins will not be positioned in any depressions or low points within the site. There are localised depressions and ponds proposed within the proposals which would take any surplus surface water run-off from adjacent land. Indeed, the finished floor level of the log cabins are to be elevated above existing ground levels ensuring and flood flow routes are directed away from the log cabins and access road.

6.2.4 Overall, the risk of flooding from this source is considered to be **LOW**.

6.3 Flooding From Climate Change (Fluvial and Tidal Breach Scenarios)

6.3.1 The NPPF Technical Guidance Document confirms in Table 5 that peak rainfall intensity is estimated to increase up to 30% depending over the lifespan of the development (30% applies to the 2085-2115 epoch which is very likely beyond the design life of this development but represents a worse case scenario) and peak river flows by 20%.

6.3.2 The site is also affected by tidal aspects and sea levels are expected to rise at a rate of 4mm per year (currently) and 15mm per year by 2115 as well as increases to peak wave heights.

6.3.3 The EA have been consulted and have provided information showing the maximum velocities of flood water, depth and hazard for the 1 in 200 and 1 in 1000 breach events in the year 2115.

6.3.4 The site is geographically located on the periphery of the anticipated breach extents and is situated

6.3.5 The results show that the site is affected at year 2115 for the 1 in 200 year event with velocities between 0 and 0.3m/s, maximum depths on the site between 0.25 and 0.5m, and hazard ratings in the locations of the proposed log cabins of 'Danger for Some' with Low hazard on the northern perimeter of the site.

6.3.6 The results show that the site is affected at year 2115 for the 1 in 1000 year event with velocities between 0 and 0.3m/s, maximum depths on the site between 0.5 and 1.0m, and hazard ratings in the locations of the proposed log cabins of 'Danger for Most' with 'Danger for some' on the northern perimeter of the site.

6.3.7 These breach models show anticipated flood risk to the site at year 2115 which is 100 years in the future. The lifetime of this development is highly likely to be less than this, somewhere between 20 and 50 years as a maximum. Therefore, the breach scenarios at 2115 which have been used ensure a robust assessment of the residual flood risk from this source. The year 2115, 1 in 200 year breach scenario is more than sufficient to assess the risk to the site based on the anticipated lifetime of the development.

6.3.8 Overall the risk of flooding from this source is considered to be **MEDIUM** and there are mitigation measures proposed to deal with this residual risk such as raising land in the location of the log cabins to raise the FFLs out above any anticipated flood depths, raising the access road above anticipated flood depths to provide safe means of egress if required.

6.4 Flooding from Infrastructure Failure

6.4.1 The site is not within an area deemed to be at risk of flooding from reservoirs (according to the data on the EA website).

6.4.2 As the site is outside the limits of any deemed flood extents from a reservoir failure, the risk of flooding to the site considered **LOW**.

6.5 Flooding From Groundwater

6.5.1 There are no confirmed records of groundwater flooding in the vicinity of the site in the SFRA.

6.5.2 Existing soil strata is defined as being predominantly clays which are generally impermeable (or very low permeability) and therefore raising of groundwater to the surface is highly unlikely in this location.

6.5.3 Overall the risk of flooding from this source is considered to be **LOW.** However, the raised finished floor levels of the proposed dwelling will provide sufficient protection should groundwater flooding risk become greater over the lifetime of the development.

6.6 Flooding From Sewers

6.6.1 There are no adopted foul or surface water sewers within the vicinity of the site to pose a risk to the development.

6.6.2 Therefore, the risk of flooding from this source is considered to be **LOW**.

6.7 Flooding from IDB ditches

6.7.1 There are several ditches in the vicinity of the site which convey field and highway run-off around the perimeter of the site and beyond. If these ditches were to overflow due to either blockage or exceedance of capacity, the flood water would be shallow due to the flat topography of the land in this area.

6.7.2 The latest Environment Agency information relating to flood risk from surface water confirms that there is only low risk depth (less than 300mm depth) and velocity (less than 0.25m/s) from this source.

6.7.3 These ditches are monitored and maintained by the IDB with regular clearance and unblocking whenever necessary.

6.7.4 Flood water from this source is unlikely to pose a significant risk to the development and the risk of flooding from this source is considered to be **LOW**.

7 MITIGATION MEASURES

7.1 Mitigation Measures

7.1.1 The assessment of flood risk in Section 6 of this assessment confirms a **LOW** risk of flooding from all sources of flooding other than from fluvial / tidal which is **MEDIUM**

7.1.2 An essential mitigation measure required to protect the proposed log cabins from residual risk of flooding is a minimum finished floor level for all cabins.

7.1.3 The majority of the plot locations have an anticipated maximum depth of flood water during the 1 in 200-year 2115 breach event of 0-0.25m, with a small number of plots shown to have 0.25-0.5m, based upon existing ground levels.

7.1.4 Along the western boundary there is an area of anticipated flood depth of 0.5-1m which would affect the plots situated there, however when the topographical survey (included in **Appendix A**) is consulted, a significant land drainage ditch is shown in this location. It is therefore anticipated that these flood depths are associated with the low levels within the ditch and due to the coarseness of the mapping this flood water is shown to impact the surrounding areas when, in a real-world scenario, it would not.

7.1.5 The existing ground level in the areas where cabins are proposed is either at or below the 3.5m contour.

7.1.6 Therefore, in order to provide a safe finished floor level for the development, the level of 3.5m AOD has been taken as the highest anticipated level across the site and then the maximum water depth for the majority of the site of 0.25m is added with an additional freeboard of 150mm to account for any variations/inconsistencies in the modelling outputs.

7.1.7 As such, a finished floor level for all plots of 3.9m AOD ensures all properties remain safe from flooding, even during extreme future events. A proposed finished floor levels plan is included in **Appendix A.**

7.1.8 Highways should be profiled to encourage water off the roads and towards the drainage ditches along the site boundaries ensuring highways can tie back in with existing ground.

7.1.9 The ground floor slabs for plots should be ground supported and preferably concrete slabs with150mm thickness.

7.1.10 Any electrical circuits should be in the ceiling cavity and down towards any light switches and sockets located within the ground floor area. This would protect against any potential flooding damage (highly unlikely but prudent to do this as part of the construction).

7.1.11 External levels should be profiled to conduct any surface water runoff away from the cabins towards the landscaped areas.

8 CONCLUSIONS

8.1 This Flood Risk Assessment serves to review, assess and quantify (where applicable) the sources of any potential flooding, as well as the pathways of this flooding and potential receptors within the vicinity of the site.

8.2 The assessment of flood risk undertaken for this development confirms that the risk of flooding is **LOW** from most sources of flooding except for breach events which is considered to be **MEDIUM**.

8.3 The essential and recommended mitigation measures will provide further protection to the development and reduce any residual risk as far as reasonably practicable. It is recommended that compliance with the recommendations of this FRA are conditioned as part of any planning permission.

8.4 This assessment concludes that the site is suitable for development for residential use without unacceptable risk of flooding from all sources to the site itself and elsewhere as long as the essential mitigation measures are applied to this development.

Appendix A – Drawings

Site Layout Plan: L188/SITE/01

Topographical Survey

Proposed FFLs: MA11542-003



REVISION	DATE	DESCRIPTION	DRAWN
C	06.05.22	Various cabins moved	JRB
B	27.04.22	Various amends to accomodate drain easement	JRB
A	21.04.22	Cabin blocks updated, layout amends to allow for unregistered land	JRB

ORIGINAL SIZE 100MM - THIS PRINT MAY BE REDUCED

NOTE; ALL DIMENSIONS, MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH NHBC STANDARDS AND BUILDING REGULATIONS.
DO NOT SCALE FROM THIS DRAWING. ALL DIMENSIONS TO BE VERIFIED WITH THE TECHNICAL OFFICE.

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BOURNE
LINCOLNSHIRE
PE10 0FF

TEL: 01778 391570

PROJECT

LOWGATE, FLEET

DRAWING TITLE

SKETCH SITE LAYOUT

SCALE	DATE	DRAWN	APPROVED
1:500 @A1	31.03.22	JRB	-

DRAWING NO.

L188/SITE/01

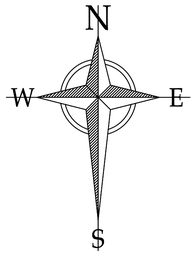
REVISION

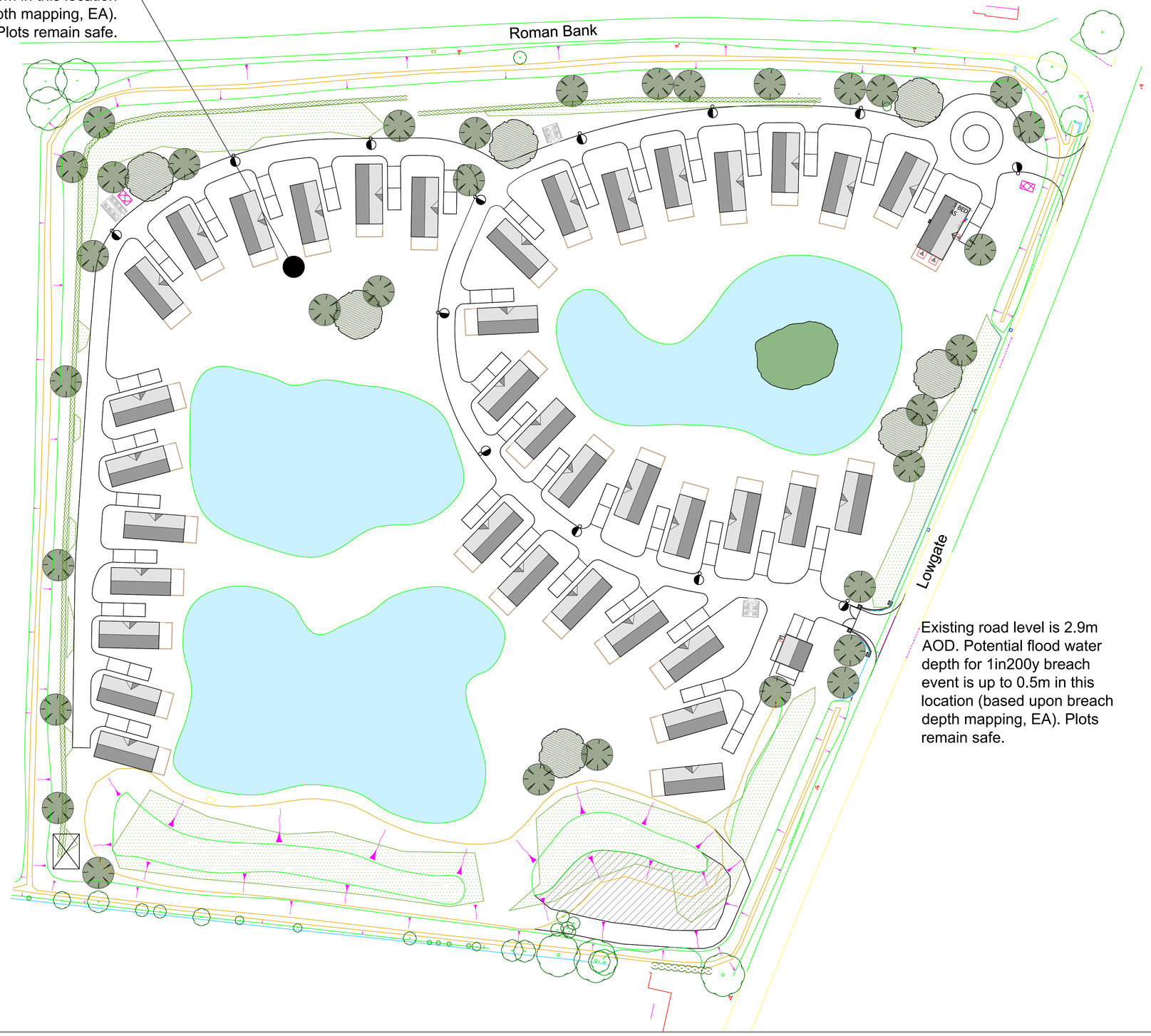
C



325950N
325900N
325850N
Roman Bank
Overhead Cable
Water Level=2.19
Headwall

Existing ground level is approximately 3.5m AOD. Potential flood water depth for 1in200y breach event is up to 0.25m in this location (based upon breach depth mapping, EA). Plots remain safe.





Existing road level is 2.9m AOD. Potential flood water depth for 1in200y breach event is up to 0.5m in this location (based upon breach depth mapping, EA). Plots remain safe.



ASSOCIATED DRAWINGS

No.	TITLE

NOTES

REV	DATE	BY	DETAILS	CHK'D
B	05/2022	YL	REVISED LAYOUT	JMcK
A	04/2022	GR	INITIAL LAYOUT	JMcK

AMENDMENTS

CLIENT

LARKFLEET HOMES

PROJECT

LOWGATE
FLEET
SPALDING

TITLE

PROPOSED
FINISHED FLOOR
LEVELS

DRAWING No:	DRAWING STATUS
MA11542-003	PRELIMINARY

SCALE	DRAWN	ENGINEER
1:500 @A1	GR	YL
DATE	CHECKED	APPROVED BY
11.04.22	JMcK	JMcK

1 Malin Hill, Nottingham, NG1 1JQ.
t: 0115 941 4560
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e: info@millward.co.uk

Millward consulting engineers
Different through Design

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A1

Appendix B – Consultations

Environment Agency Correspondence

Yusuf Lawson
yusuf@millward.co.uk

Our ref: CCN-2022-258809

Date: 11/05/2022

Dear Yusuf Lawson,

Provision of Flood Risk Information for Lowgate, 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.

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

5.1 Tidal Defence Information

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

They are in good 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.

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. 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. 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 Joshua Clark using the email address below and quoting our CCN reference number above.

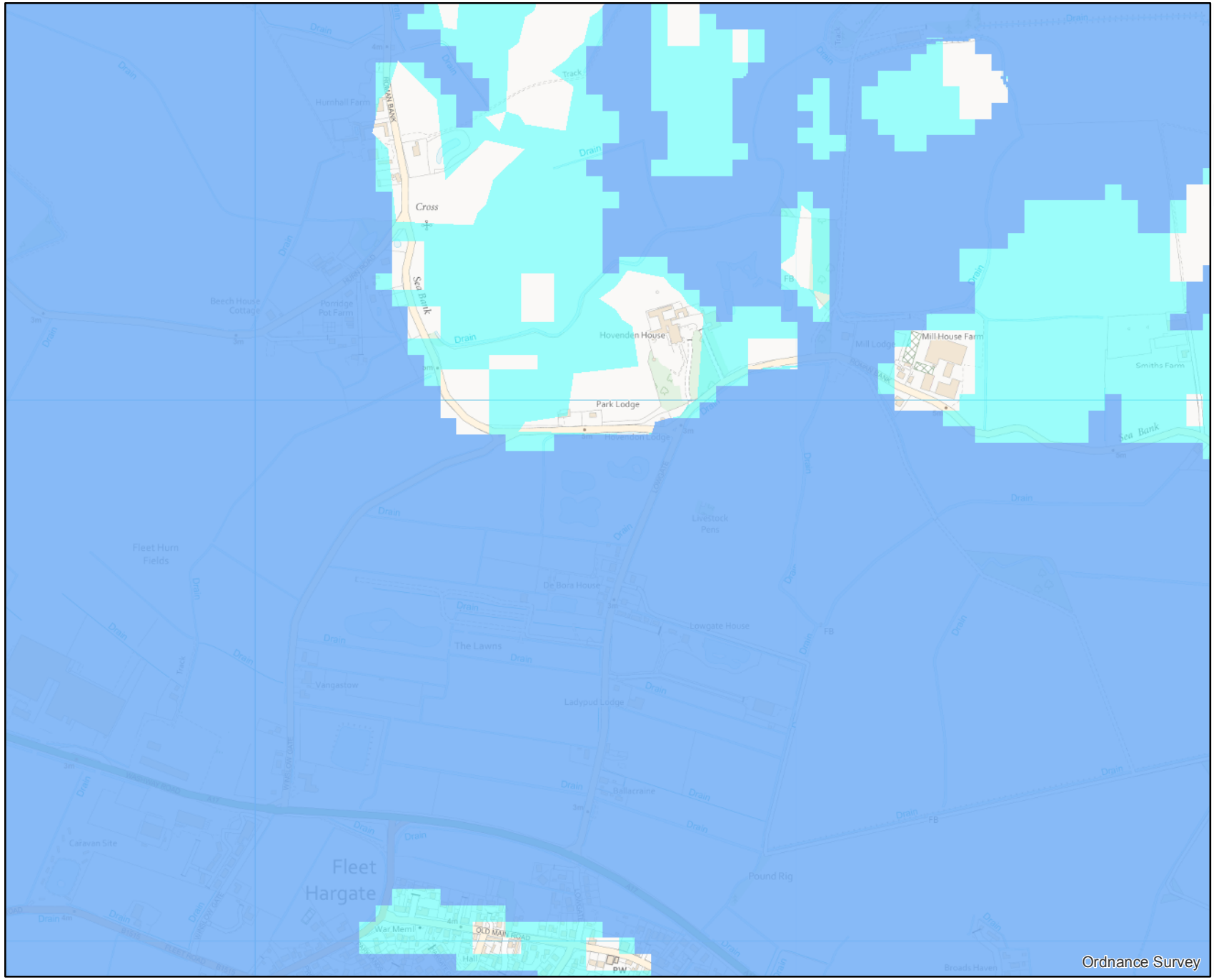
Yours sincerely,



for Alastair Windler
Welland and Nene Partnerships and Strategic Overview Team Leader
e-mail 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 39636 25855 - created May 2022 [Ref: CCN-2022-258809]



Environment Agency

Scale 1:10,000

N
W E
S

Legend

- Main River
- 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.

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

GRIMSBY

CLEETHORPES

SCUNTHORPE

LINCOLN

BOSTON

SKEGNESS

MABLETHORPE

SPALDING

KINGSTON UPON HULL to
Rotterdam (Europort) 11 hrs
Zeebrugge 12 hrs

★ **Modelled Breach Locations**

0 3.5 7 14 Kilometers

This map idicates 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.

Environment Agency

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



Scale 1:550,000

▲ East Coast and Wash

See seperate data sheet for predicted flood levels

Created by the Partnerships and Strategic Overview Team, Lincoln

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East Coast and Wash: Immingham to the West Lighthouse

2018 Coastal Flood Boundary Extreme Sea Levels

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

See next page for notes

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Calls to 03 numbers cost the same as calls to standard geographic numbers
(i.e. numbers beginning with 01 or 02)

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

East Coast and Wash: Immingham to the West Lighthouse

2018 Coastal Flood Boundary Extreme Sea Levels

NOTES:

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

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

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

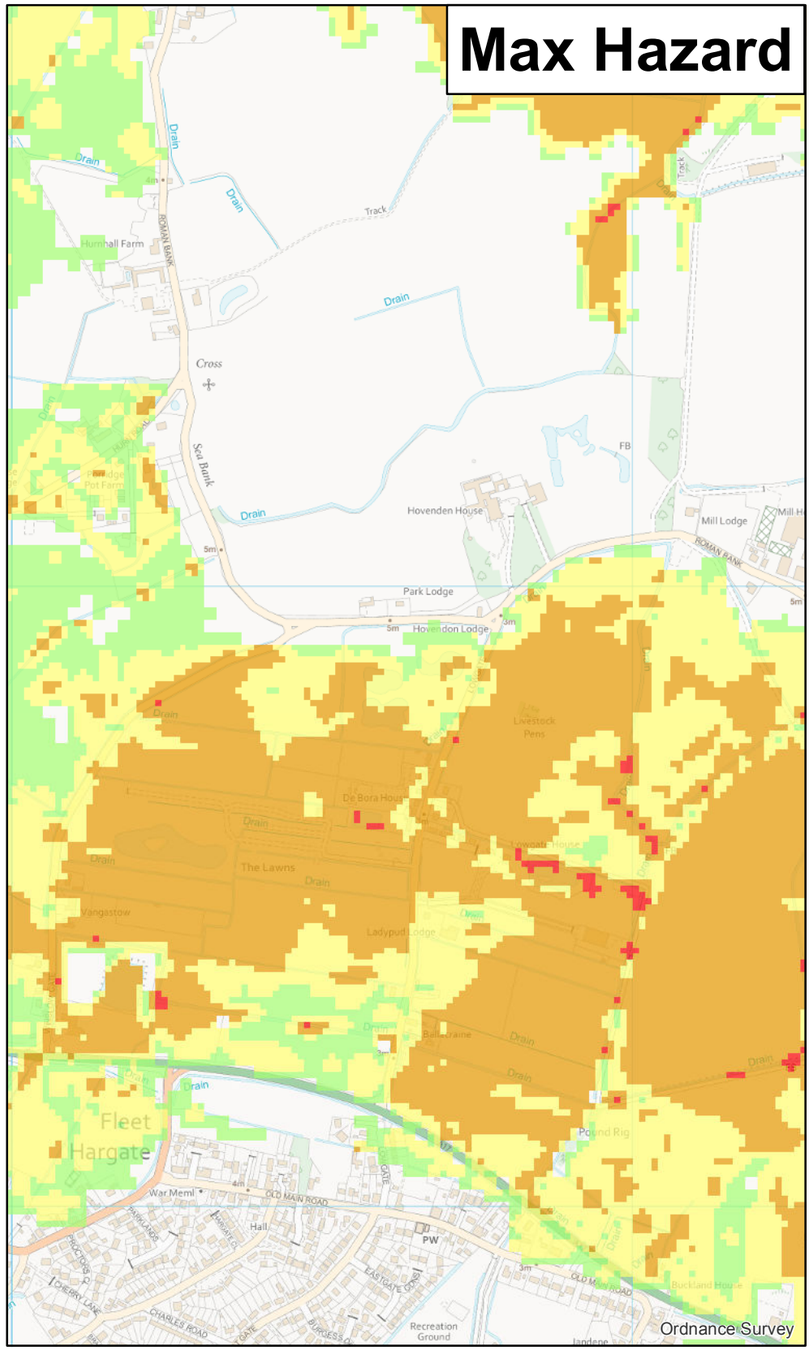
- The base date for the data is 2006
- The levels are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- Levels for other annual chance probabilities are available if required.
- These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

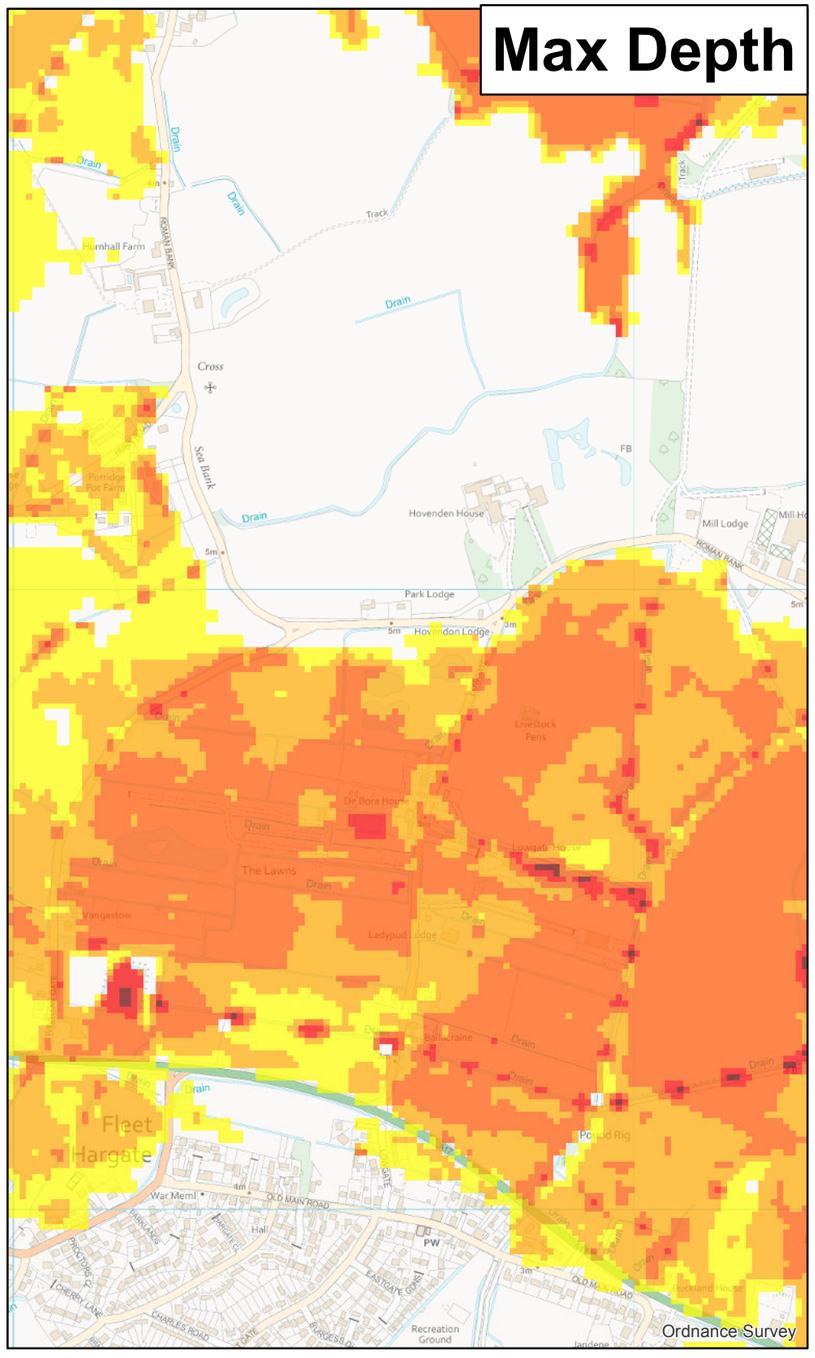
The following notes apply to Grand Sluice

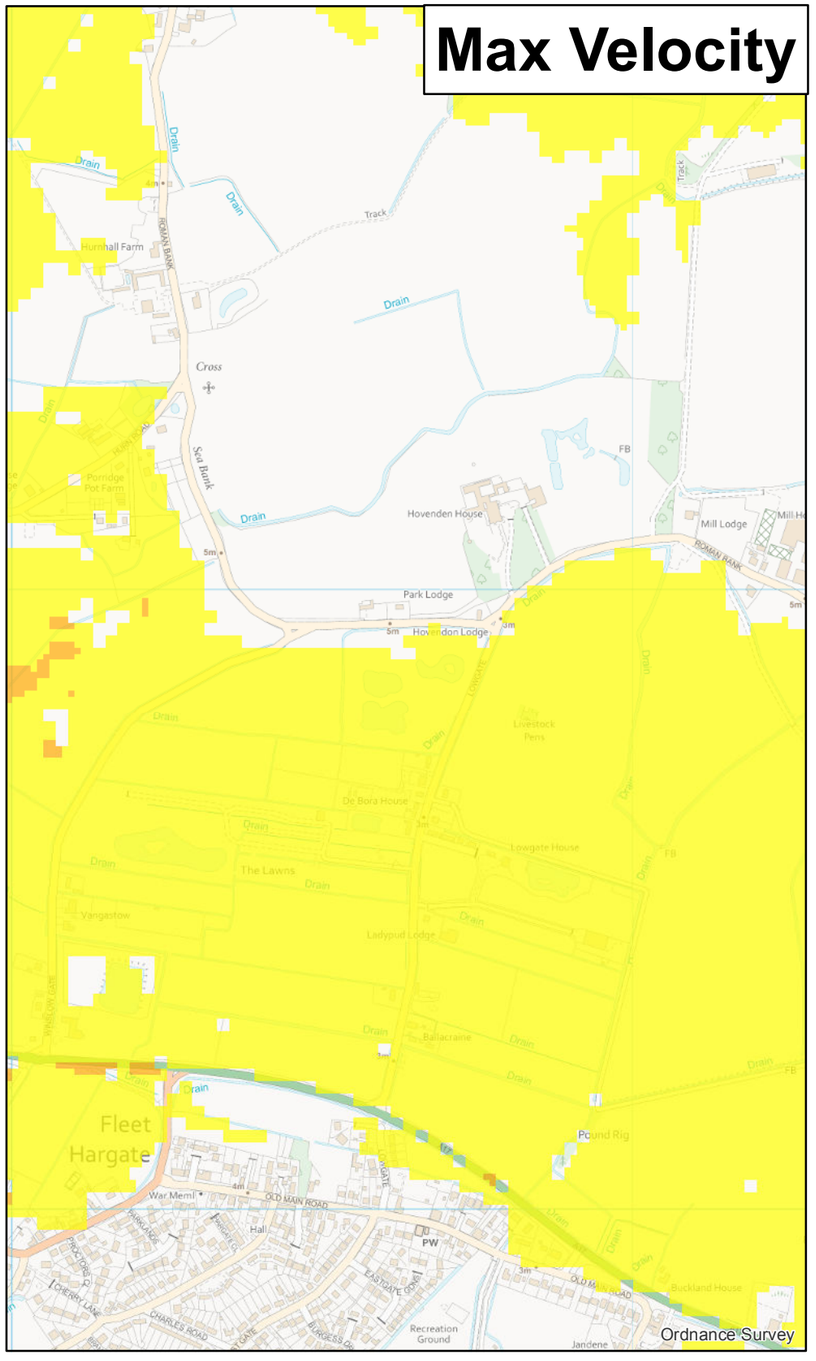
- The data is based on CFB 2018 data for Boston Barrier site, capped at 5.3mAOD to reflect use of the barrier.
- The base date for the data is 2017
- The levels are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
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★ Modelled Breach Locations - see also the accompanying plan "Location of Modelled Breaches"

Max Hazard
(Flood Risk to People : FD2320)

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

Max Depth (m)

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

Max Velocity (m/s)

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

Date Printed	May 2022	Scenario year	2115	Scenario Annual Chance	0.5% (1 in 200)	CCN Number	CCN-2022-258809

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

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

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

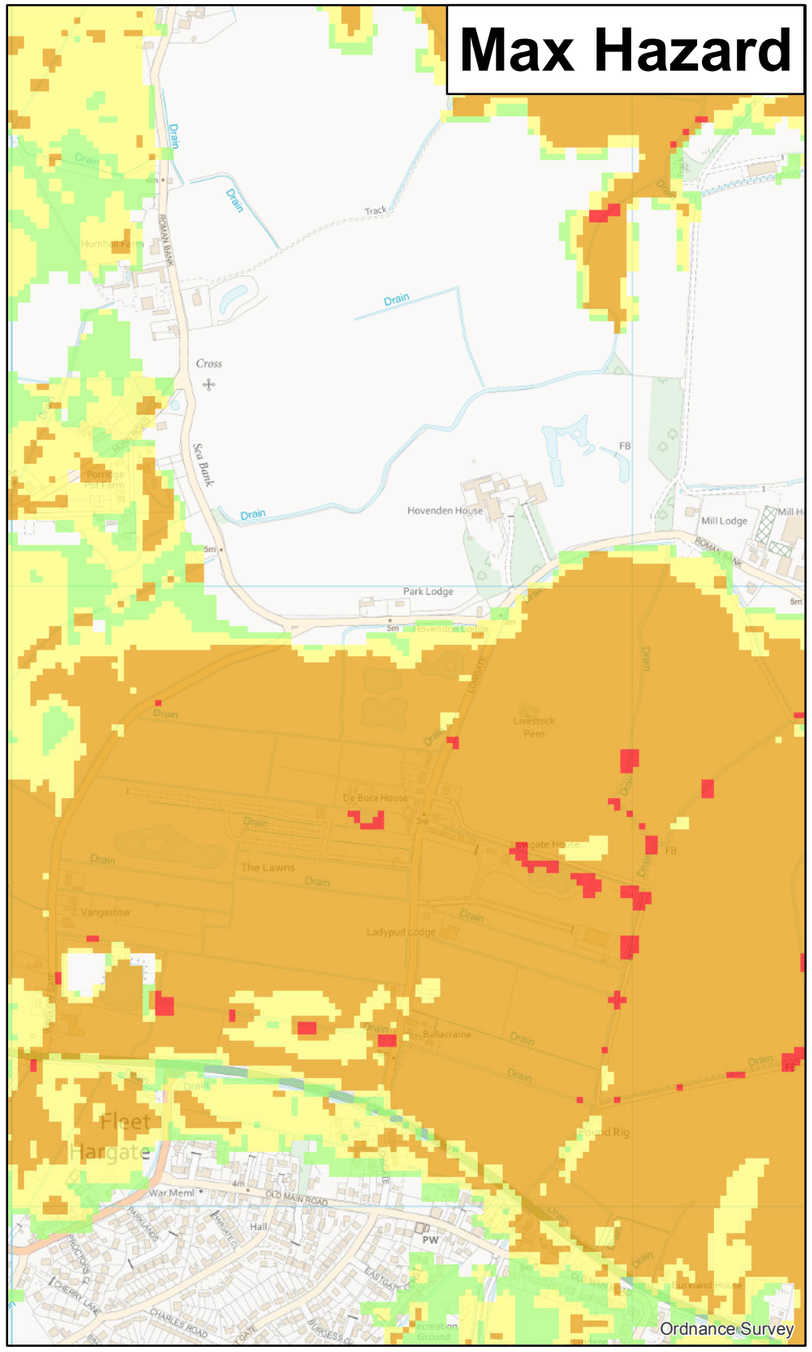
General Enquiries No: 03708 506 506. Weekday Daytime calls cost 5p plus up to 6p per minute from BT Weekend Unlimited. Mobile and other providers' charges may vary

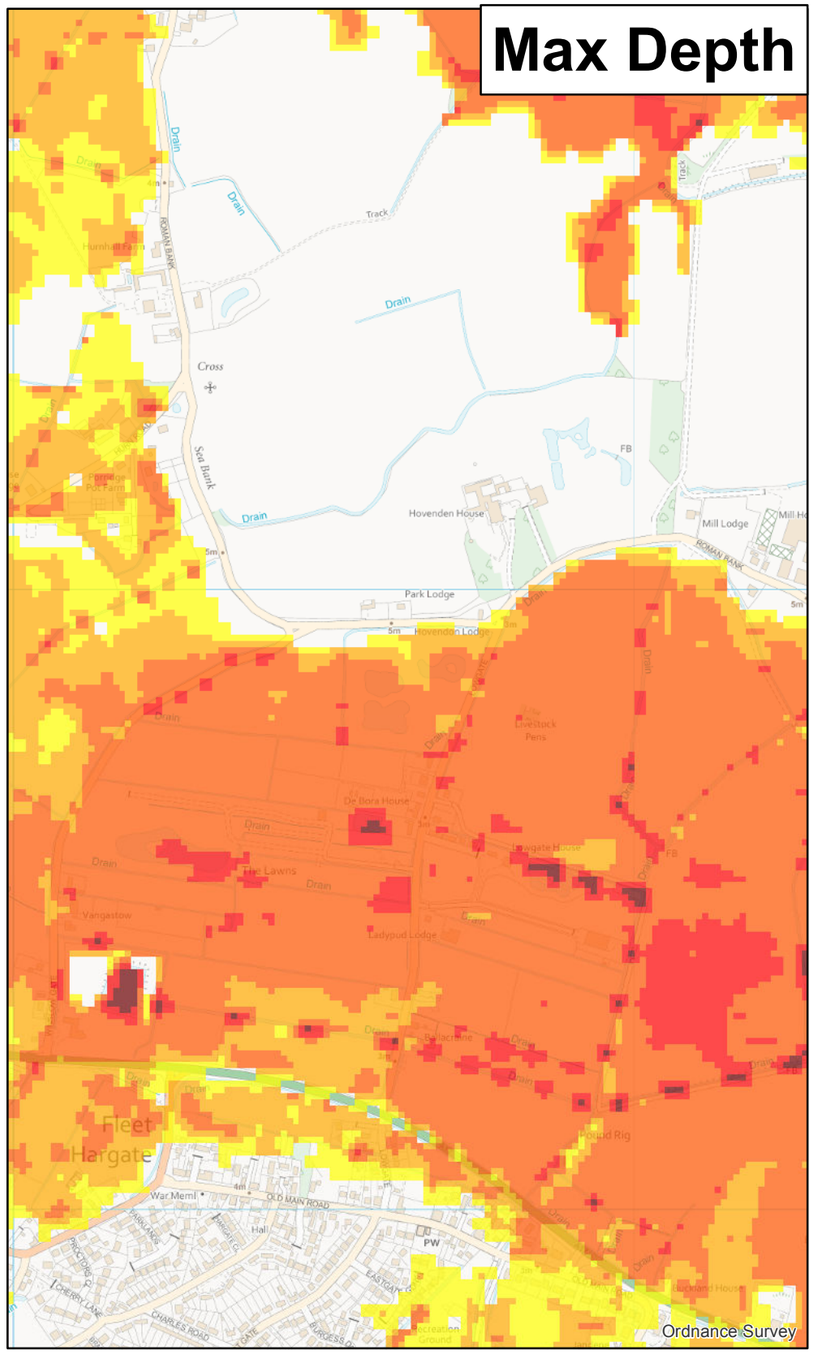
Environment Agency

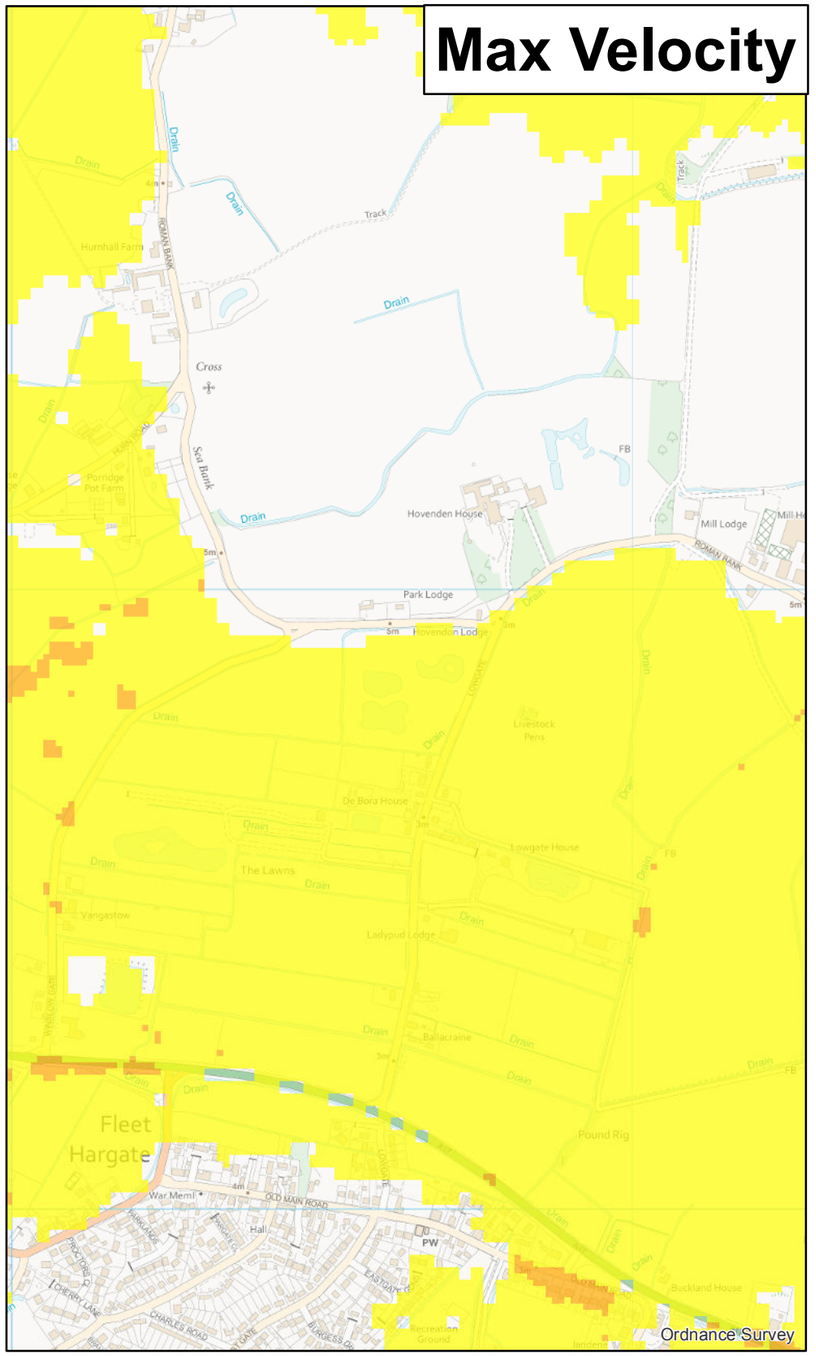
Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

Map Centred on TF 39636 25855

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

Max Hazard (Flood Risk to People : FD2320)	Max Depth (m)	Max Velocity (m/s)
Less than 0.75 (Low Hazard)	0 - 0.25	0 - 0.3
Between 0.75 and 1.25 (Danger for Some)	0.25 - 0.50	0.3 - 1.0
Between 1.25 and 2.0 (Danger for Most)	0.50 - 1.0	1.0 - 1.5
Greater than 2.0 (Danger for All)	1.0 - 1.6	1.5 - 2.5
	1.6 +	2.5 +

Date Printed	May 2022	Scenario year	2115	Scenario Annual Chance	0.1% (1 in 1000)	CCN Number	CCN-2022-258809

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