

**FLOOD RISK ASSESSMENT
FOR RESIDENTIAL DEVELOPMENT AT
LOWGATE, TYDD ST MARY**

FINAL REPORT

ECL0770/ROBERT DOUGHTY CONSULTANCY

DATE NOVEMBER 2022

ELLINGHAM CONSULTING LTD

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1.0 INTRODUCTION

This Flood Risk Assessment has been prepared in accordance with National Planning Policy Framework (NPPF) and supporting planning practice guidance (PPG) on Flood Risk and Coastal Change.

In areas at risk of flooding or for sites of 1 hectare or more, developers are required to undertake a site-specific Flood Risk Assessment to accompany an application for planning permission. This Flood Risk Assessment has been produced on behalf of Medley's Charity in respect of a development that consists of twenty-eight dwellings at Lowgate, Tydd St Mary.

An outline planning application for the proposed development is to be submitted by Robert Doughty Consultancy.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is located on land to the west of Lowgate, Tydd St Mary, Wisbech, PE13 5QP. The National Grid Reference of the site is 54358/31863.

The location of the site is shown in Figure 1.

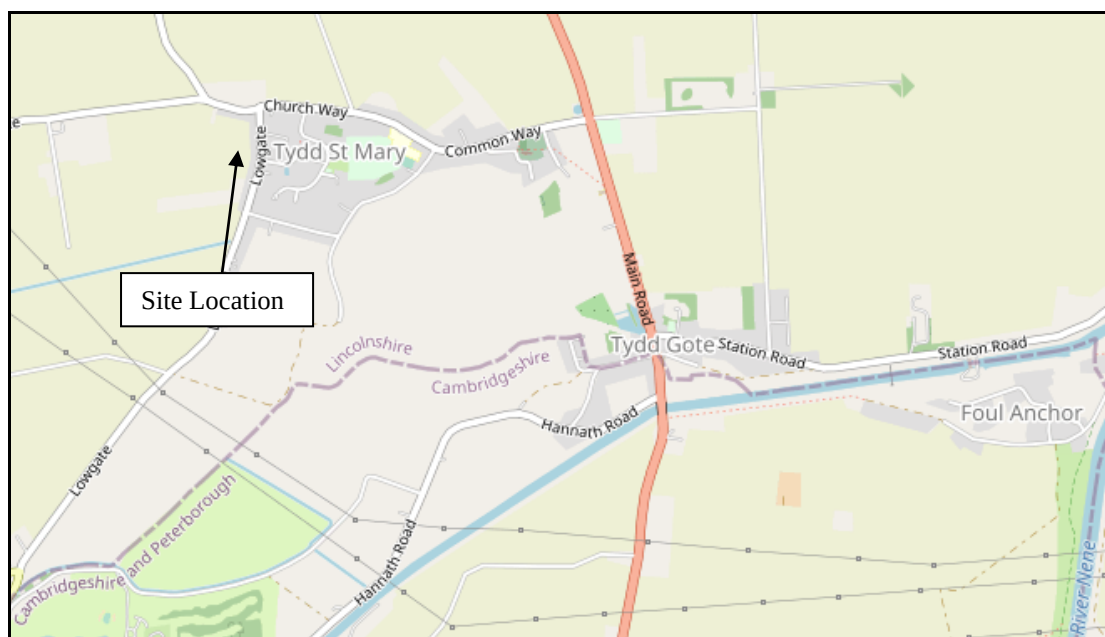


Figure 1 – Location Plan (© OpenStreetMap contributors)

2.2 Existing Site

The site is on the western side of Lowgate. The site is agricultural land. There is agricultural land to the south and west of the site and the properties on Lowgate and Church Way are to the east and north of the site respectively. The area of development is approximately 1.54 hectares.

A topographic survey of the site is provided in Attachment 1. Ground levels within the majority of the site are between +2.0m OD and +2.2m OD. Close to the northern boundary ground levels rise and on the northern boundary ground levels are typically +2.5m OD. The highest part of the site is in the north east corner with a level of +2.81m OD.

The site is in the North Level Internal Drainage Board (IDB) District. Surface water at the site would naturally drain through soakaway and hence to the IDB drainage system. There is a riparian drain on the southern boundary of the site and School Drain, an IDB Watercourse, forms the northern and western boundaries of the site.

The online British Geological Survey maps indicate that the site is likely to be underlain by Ampthill Clay Formation mudstone. The bedrock is shown to be overlain with superficial deposits of clay and silt.

2.3 Proposed Development

The proposed development consists of twenty-eight new dwellings. The dwellings will have two storeys except for one single storey dwelling that will be alongside the access into the site from Lowgate. The Site Plan is provided in Attachment 2.

2.4 Local Development Documents

The South East Lincolnshire Local Plan 2011 – 2036, adopted in March 2019, is the Local Plan for the district. Policy 4: Approach to Flood Risk states the requirements for flood risk reduction.

The South East Lincolnshire Level 1 and Level 2 Strategic Flood Risk Assessment (SFRA) was prepared in June 2017.

The Joint Lincolnshire Flood Risk and Drainage Management Strategy has been prepared by Lincolnshire County Council as the Lead Local Flood Authority. The purpose of the Strategy is to increase the safety of people across Lincolnshire by reducing the number of people at risk of flooding, increasing the resilience of local communities, and reducing the impact of flooding.

2.5 Flood Zones

An extract from the Environment Agency Flood Map for Planning is shown in Figure 2. The site is located in Flood Zone 3, an area with a high probability of flooding.

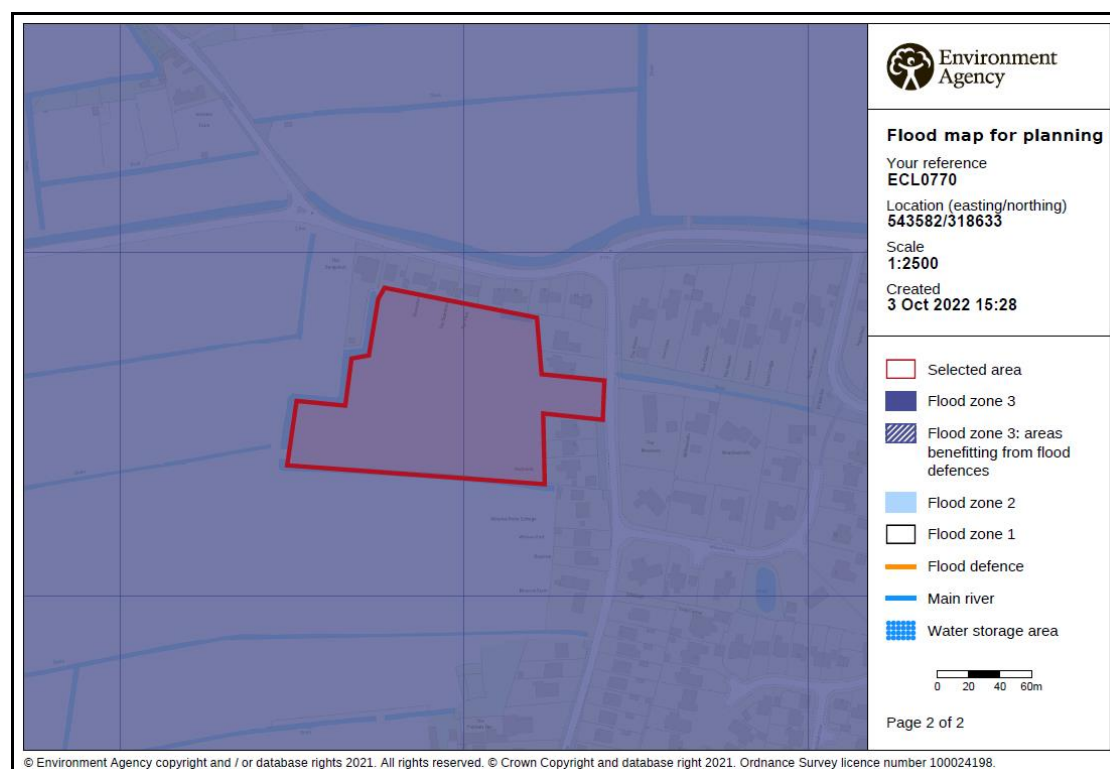


Figure 2 – Environment Agency Flood Map for Planning

The Environment Agency Long Term Flood Risk maps show that:

- the site has a low risk of flooding from rivers or the sea (annual probability between 0.1% and 1%);
- the site has a very low risk of surface water flooding (annual probability less than 0.1%); and
- the site is not within an area at risk of reservoir flooding.

Table 1 shows the level of risk at the site identified on the tidal hazard mapping and tidal depth mapping within the South East Lincolnshire SFRA.

SFRA Map	Present Day	2115
Residual Flood Hazard Map for the 1% fluvial and 0.5% tidal event	Part of the site is in the 'Danger for Some' area	Part of the site is in the 'Danger for Most' area
Residual Peak Depth Map for the 1% fluvial and 0.5% tidal event	The peak flood depth is between 0.0m and 0.5m.	The peak flood depth is between 0.0m and 1.0m.

Table 1 – Flood Risk within SFRA Maps

Flood risk information provided by the Environment Agency that is specific to the site is provided in Attachment 3.

3.0 FLOOD RISK VULNERABILITY

3.1 The Sequential and Exception Test

The NPPF requires the application of a Sequential Test to ensure that new development is in areas with the lowest probability of flooding.

The Exception Test is a method to demonstrate and help ensure that flood risk to people and property will be managed, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available.

3.2 Vulnerability Classification

Table 2 of the PPG Flood Risk and Coastal Change categorises different types of uses and development according to their vulnerability to flood risk. The proposed development is covered by the description of buildings used for dwellings and is classified as 'More Vulnerable'.

Table 3 of the PPG Flood Risk and Coastal Change sets out Flood Risk Vulnerability and flood zone 'compatibility'. The site is in Flood Zone 3 and the development is 'More Vulnerable' therefore it is necessary to complete the Exception Test.

PPG Flood Risk and Coastal Change defines that the lifetime of the development in terms of flood risk and coastal change is 100 years.

3.3 Application of the Sequential Test and Exception Test

It is for the Local Planning Authority, using the evidence provided and taking advice from the Environment Agency as appropriate, to consider whether an application passes the Sequential Test.

The site was identified within the South East Lincolnshire Local Plan 2011-2036 and therefore has been compared to alternative sites within the settlement. On the basis that the site is within the Local Plan (Tyd014) the site is considered to pass the Sequential Test.

The Exception Test requires consideration of the wider sustainability benefits of a development and that the development would be safe and residual risks managed.

The Local Plan has a target of a net increase of at least 11,681 dwellings in South Holland over the 25-year local plan period. The Plan considers this new housing is required to ensure the sustainability of the Local Plan area. The proposed development will contribute to this target.

Section 5 of this Flood Risk Assessment describes the flood mitigation measures and the management of the residual risks, demonstrating that this development will be safe and not increase flood risk elsewhere. The development is considered to pass the Exception Test.

4.0 SITE SPECIFIC FLOOD RISK

4.1 Local Flood Assets

The site is 3.2km west of the tidal River Nene. The site is protected by the River Nene tidal defences between Wisbech and Sutton Bridge. The River Nene is a main river and the responsibility of the Environment Agency.

There is a long-term strategy for the maintenance of the Environment Agency defences which is reviewed and updated periodically.

There is an extensive local drainage network managed by North Level IDB. The site and the surrounding land are within the Tydd Catchment and drain to the School Drain which discharges to the North Level Main Drain.

The site is approximately 1.6km north west of the North Level Main Drain, an embanked channel which flows to Tydd Pumping Station to discharge to the tidal River Nene.

During the operation and maintenance of its pumping stations, associated structures and channel systems, the IDB seeks to maintain a general standard capable of providing flood protection to its district. A routine maintenance programme is in place to ensure that the Boards assets are commensurate with the standard of protection that is sought.

Current maintenance standards of the North Level Internal Drainage Board and the Environment Agency are generally good.

4.2 Sources of Flooding

The potential sources of flooding that have been identified during this assessment are:

- local blockages to the North Level IDB drainage system;
- an event in the local drainage network greater that exceeds the standard of protection;
- failure of Tydd Pumping Station; and
- overtopping and/or breaching of the River Nene tidal defences.

4.3 Probability of Flooding

The probability of flooding associated with blockages in the North Level IDB drainage system is low due to the maintenance standards achieved and managed by the IDB.

Through the operation and maintenance of the pumping stations and the channel system the Board seek to maintain a general standard capable to providing flood protection to agricultural land and developed areas of 1 in 20 years and 1 in 100 years, respectively. The risk associated with flood events that exceed the standard

of protection provided is lowered due to the North Level IDB main drains incorporating freeboard. This freeboard provides storage during the exceedance events.

The maximum flood level in the North Level Main Drain is -1.35m OD and therefore the site is not at risk from this watercourse.

The site benefits from defences on the River Nene that provide protection during a 0.5% annual probability (1 in 200 chance each year) tidal event and a 1% annual probability (1 in 100 chance each year) fluvial event. The defences consist of earth embankments with a riverside berm. The River Nene tidal defences between Sutton Bridge and Wisbech were improved after the 1978 tidal surge event to a level of 7.00m AOD. The tidal surge of 5 December 2013 reached a level of +6.10m OD at Wisbech Town Bridge.

4.4 Historic Flooding

During the preparation of this assessment, no evidence was discovered of the site being flooded.

4.5 Climate Change

Climate change is likely to impact the site through increased rainfall intensity and duration affecting the local drainage network and increased flood levels in the River Nene.

The River Nene tidal defences have been designed to include an allowance for climate change.

In summary the existing systems and defences are appropriate for the design life of the development (i.e., 100 years).

4.6 Residual Risk

The Tidal Hazard Mapping shows that there is a residual risk to the site should there be a breach of the tidal defences. The Tidal Hazard Maps are included within the South East Lincolnshire SFRA and were provided by the Environment Agency. An extract from the tidal hazard map indicating the flood depth during the 0.5% (1 in 200 chance each year) event in 2116 is shown in Figure 3.

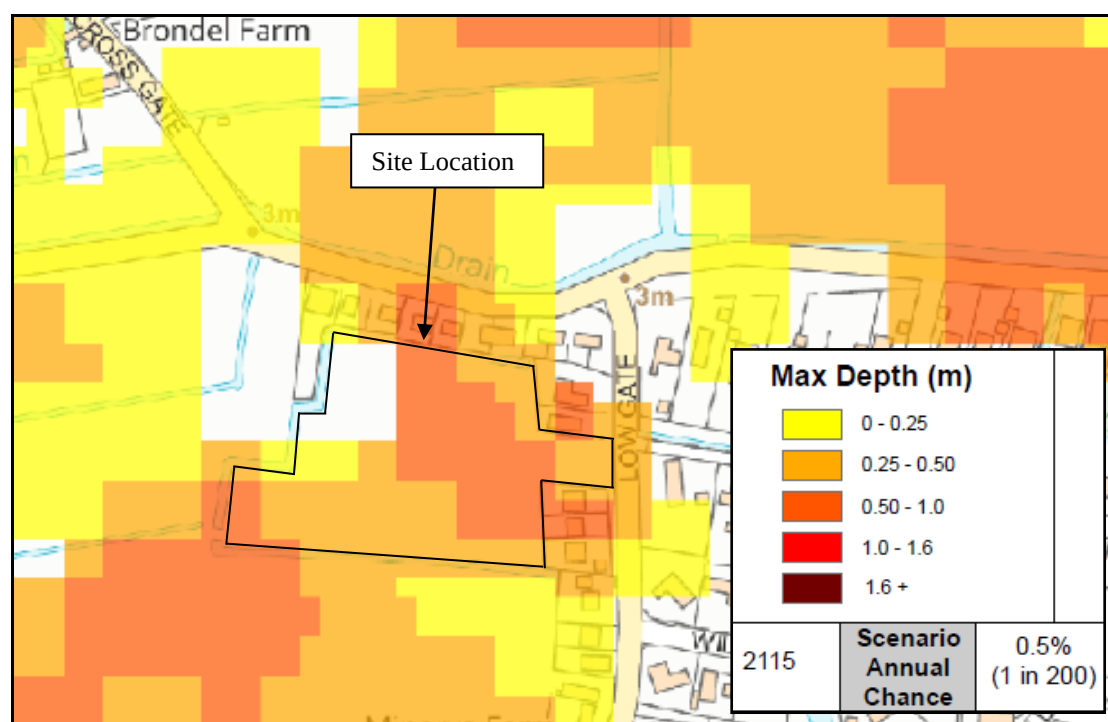


Figure 3 –2116 Residual Peak Depth Map (0.5% annual probability)

Figure 3 shows that the north west corner of the site is not at risk during a breach and in the remainder of the site flood depths range between 0.0m and 1.0m. The flood depths in Figure 3 are not consistent with the topographic survey. For example, apart from the area close to the northern boundary the ground levels within the site are between +2.0m OD and +2.2m. The residual peak depth map shows that within this part of the site there are areas where the flood depth is 0.0m-0.25m, 0.25m-0.5m and 0.5m-1.0m.

Based upon the majority of the site being between +2.0m OD and +2.2m OD and that during the 0.5% annual probability (1 in 200 chance each year) event in 2116 the maximum flood depth is 1.0m, the breach flood level is not greater than +3.2m OD.

The proposed development includes a single storey dwelling and therefore the finished floor level within this dwelling needs to consider the 0.1% annual probability (1 in 1000 chance each year) event in 2115. The tidal hazard map for this scenario shows that the maximum flood depth within the site is 1m. The single storey dwelling is proposed in an area where the ground level is between +2.1m OD and +2.2m OD. Based upon the ground levels and the depth of flooding during the 0.1% annual probability (1 in 1000 chance each year) event in 2116, the breach flood level for this more extreme event is not greater than +3.2m OD.

5.0 FLOOD RISK MITIGATION

5.1 Summary of Risks

The probability of this development flooding from localised drainage systems is low. Failure of Tydd Pumping Station could lead to an increased level of risk at the site.

The probability of the site flooding from any Environment Agency system is less than 1% annual probability (1 in 100 chance each year) because of the standards of the existing flood defences. Over time there will be a gradual increase in risk to the site due to climate change. During the design life of the development it is not anticipated that the site would flood.

There is a residual risk to the site associated with a breach in the tidal defences. The peak flood depth is between 0.5m and 1.0m. During the 0.5% annual probability (1 in 200 chance each year) event and 0.1% annual probability (1 in 1000 chance each year) event in 2116 the breach flood level would not exceed +3.2m OD.

The proposed development increases the impermeable area and therefore there is an increased volume of surface water that has the potential to increase flood risk.

5.2 Mitigation Measures

The site has a low 'actual risk' of flooding. Based upon the information available during the preparation of this flood risk assessment, it is recommended that the floor level of the dwellings is not lower than +3.2m OD. Furthermore, it is recommended that there is 0.3m of flood resilient construction above finished floor level.

The developer should ensure that the eventual occupiers of the dwellings are sufficiently aware of the risk of flooding, and the standard of the existing defences. The Environment Agency operates a flood warning system for properties at risk of flooding to enable householders to protect life or take actions to manage the effect of flooding on property. Floodline Warnings Service is a national system run by the Environment Agency for broadcasting flooding warnings. The occupier of the dwellings should register to receive flood warnings.

Should there be a failure of Tydd Pumping Station and conditions were such to put properties and land at risk of flooding, the Internal Drainage Board would take emergency action to maintain the drainage level of service by using temporary pumping equipment.

A Drainage and Maintenance Strategy has been prepared to support the application so that the risk of the development increasing flood risk elsewhere is mitigated.

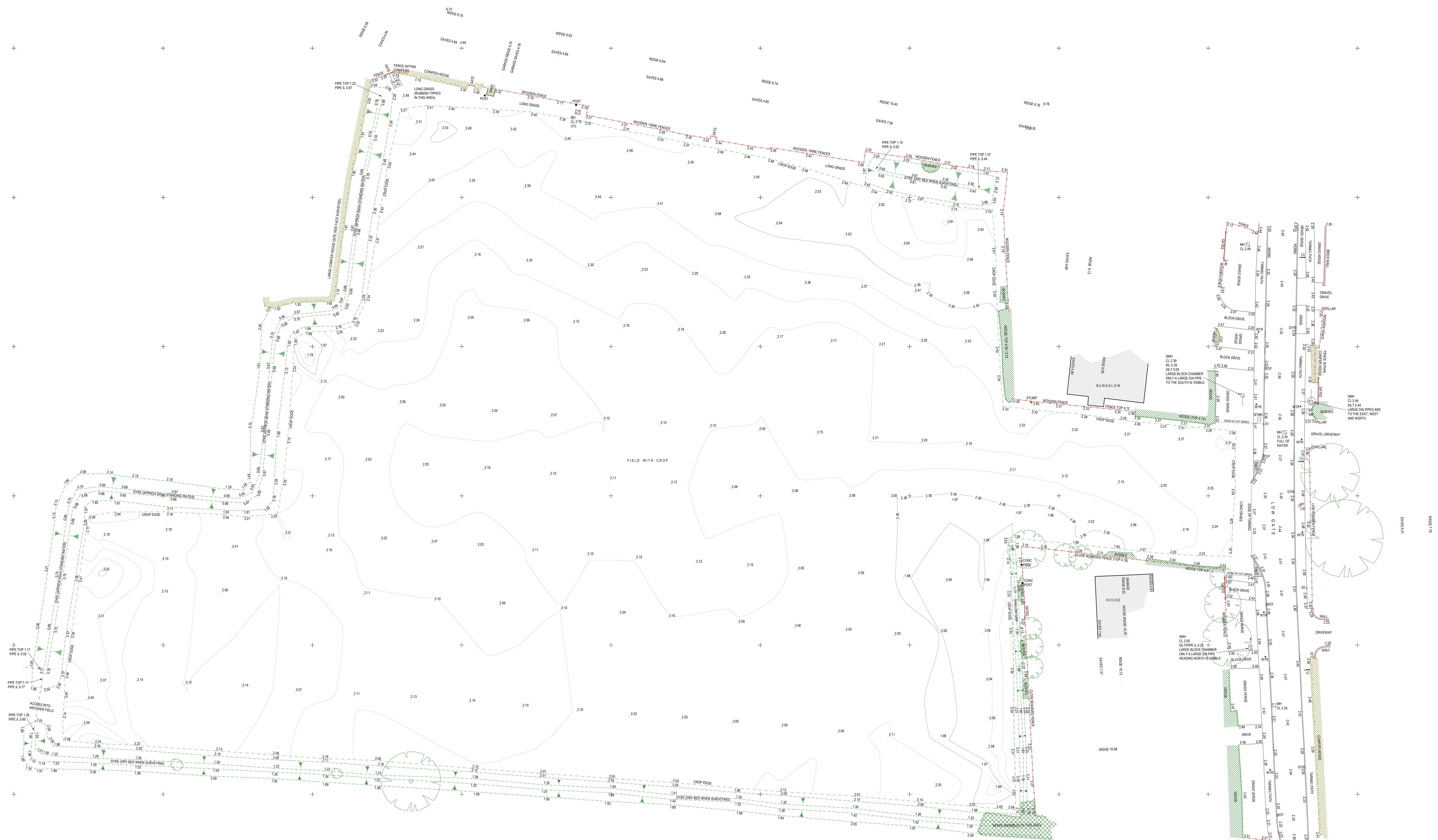
6.0 CONCLUSIONS

As a result of the assessment, the following conclusions have been reached.

- The proposed development comprises twenty-eight new dwellings on land to the west of Lowgate, Tydd St Mary.
- The site is located within an Internal Drainage Board catchment and through the operation and maintenance of the pumping stations and the channel system the Board seek to maintain a general standard capable to providing flood protection to agricultural land and developed areas of 1 in 20 and 1 in 100 years, respectively.
- The proposed development is in Flood Zone 3. The site benefits from defences on the tidal River Nene that provide protection during the 0.5% annual probability (1 in 200 chance each year) tidal event including climate change.
- The site is at risk during a breach of the tidal flood defences with the peak flood depth between 0.5m and 1.0m.
- It is recommended that the finished floor level of the dwellings is not lower than +3.2m OD and there is 0.3m of flood resilient construction above finished floor level.
- The development passes the Sequential Test and Exception Test and is therefore suitable for the proposed location.

ATTACHMENT 1

TOPOGRAPHIC SURVEY (Dwg CHS 22-114-01)

[illegible]

2. THE POSITION OF THIS SURVEY IS BASED ON GPS ORS ON THE GROUND.
3. ALL LEVELS RELATE TO HDNS TAKEN USING TRIMBLE VISION 500.
4. THREE SPREADS ARE DRAWN TO SCALE AND SHOW THE GENERAL VARIATION OF THE SURVEY.
5. ALL LEVELS SHOW AROUND LEVEL INFORMATION INCLUDING VOGES, GRADES & SERVICES HAVE BEEN IDENTIFIED FROM THE SURVEY. THE SURVEY HAS BEEN CONDUCTED USING TOTAL STATION SURVEYING. ONLY ALL CRITICAL DIMENSIONS SHOULD BE USED TO LOCATE THE SURVEY. THE SURVEY HAS BEEN CONDUCTED USING TOTAL STATION SURVEYING.
6. SURVEY EFFORT HAS BEEN MADE TO LOCATE AND SURVEY ALL VISIBLE FEATURES. IT SHOULD BE NOTED THAT SOME ITEMS MAY HAVE BEEN OBSERVED AT THE TIME OF THE SURVEY AND THEREFORE NOT SHOWN ON THIS DRAWING.
7. A PHYSICAL BOUNDARY FEATURES SHOWN ON THIS DRAWING ARE NOT TO BE USED TO REFLECT THE SURVEY. THE SURVEY BOUNDARIES. THIS INFORMATION SHOULD BE CONFIRMED WITH THE SURVEYOR.
8. THE CONTRACTOR MUST CHECK AND VERIFY ALL SITE LEVELS AND DIMENSIONS. THE CONTRACTOR IS RESPONSIBLE FOR THE COMMENCEMENT OF ANY SITE WORKS. ANY DISCREPANCIES MAY BE IDENTIFIED AT THE TIME OF THE SURVEY.
9. ALL SURVEY STATION CONTROL POINTS MUST BE CHECKED BY THE CONTRACTOR PRIOR TO STARTING ANY SITE WORKS.

Point	Easting	Northing	Elevation
s1	543684.262	318637.019	2.377
s2	543691.490	318609.565	2.581
s3	543690.003	318669.723	2.436

SURVEY DATE	30 / 05 / 2022	INITIALS	SRW / CT
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Rev	Amendments	On	Ca
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[illegible]

Client:

ROBERT DOUGHTY CONSULTANCY

Project Title:

LAND TO THE WEST OF LOW GATE,
TYDD ST MARY, SOUTH LINCOLNSHIRE

Drawing Title:

TOPOGRAPHICAL SURVEY

Scale @ A4:	Date:
1 : 250	30 / 05 / 2022

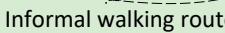
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Drawn By:	Checked By:
SRW	CT



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ATTACHMENT 2

**SITE PLAN
(DWG 1512-1_SK_SP01 A)**



Drawing No.	Rev
1512-1_SK_SP01	A

ATTACHMENT 3

ENVIRONMENT AGENCY FLOOD RISK INFORMATION

Tim Ellingham
tim@ellinghamconsulting.co.uk

Our ref: CCN-2022-282520

Date: 24/10/2022

Dear Tim,

Provision of Flood Risk Information for Lowgate, Tydd St Mary

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 (i.e. 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 (i.e. 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 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 2006 0.5% (1 in 200) chance
- Year 2006 0.1% (1 in 1000) chance
- Year 2115 0.5% (1 in 200) chance
- Year 2115 0.1% (1 in 1000) chance

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 (i.e. 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 Alexander Tan using the email address below and quoting our CCN reference number above.

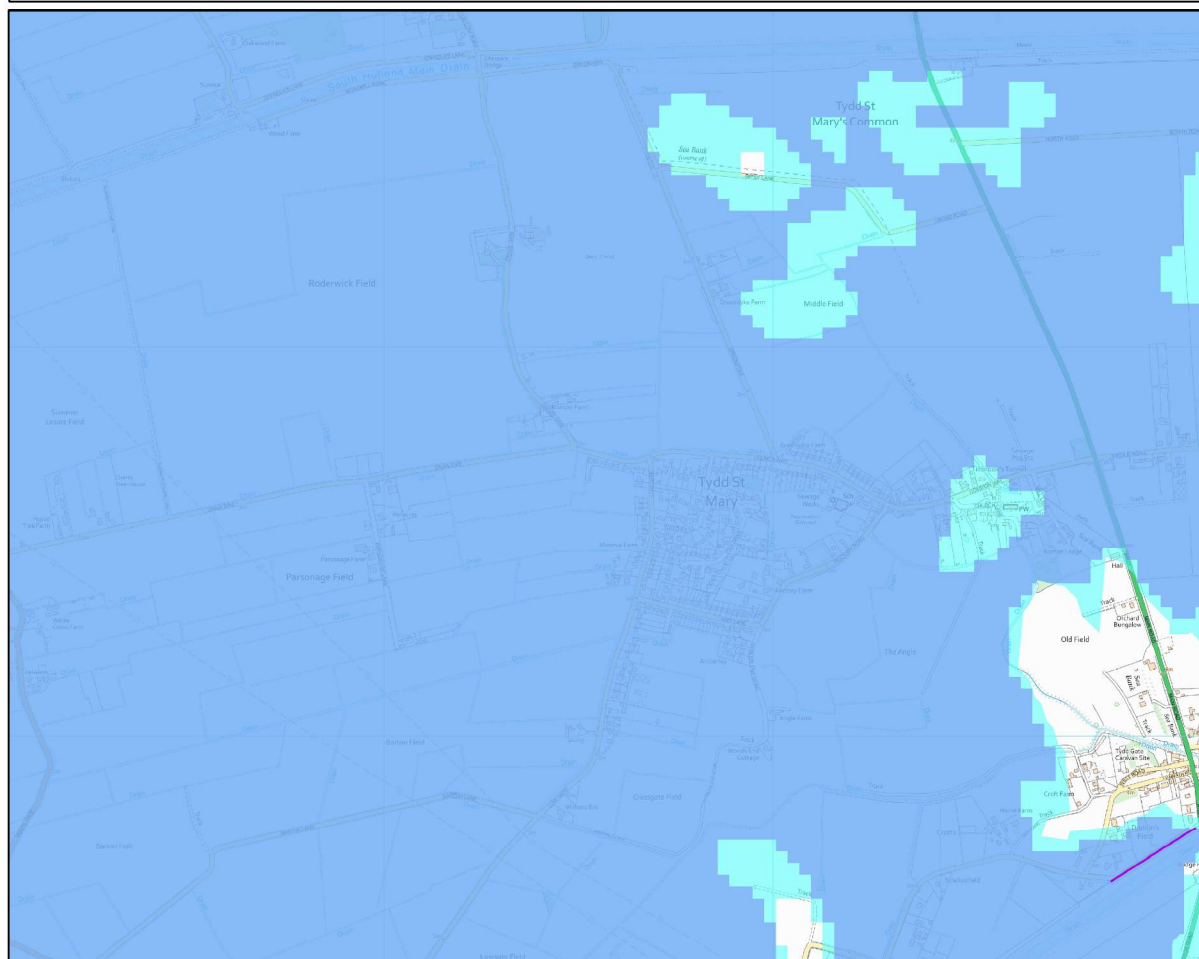
Yours sincerely,



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 43581 18636 - created October 2022 [Ref: CCN-2022-282520]



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

Created by the Partnerships and Strategic Overview Team, Lincoln

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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

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

East Coast and Wash: Immingham to the West Lighthouse

2018 Coastal Flood Boundary Extreme Sea Levels



NOTES:

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

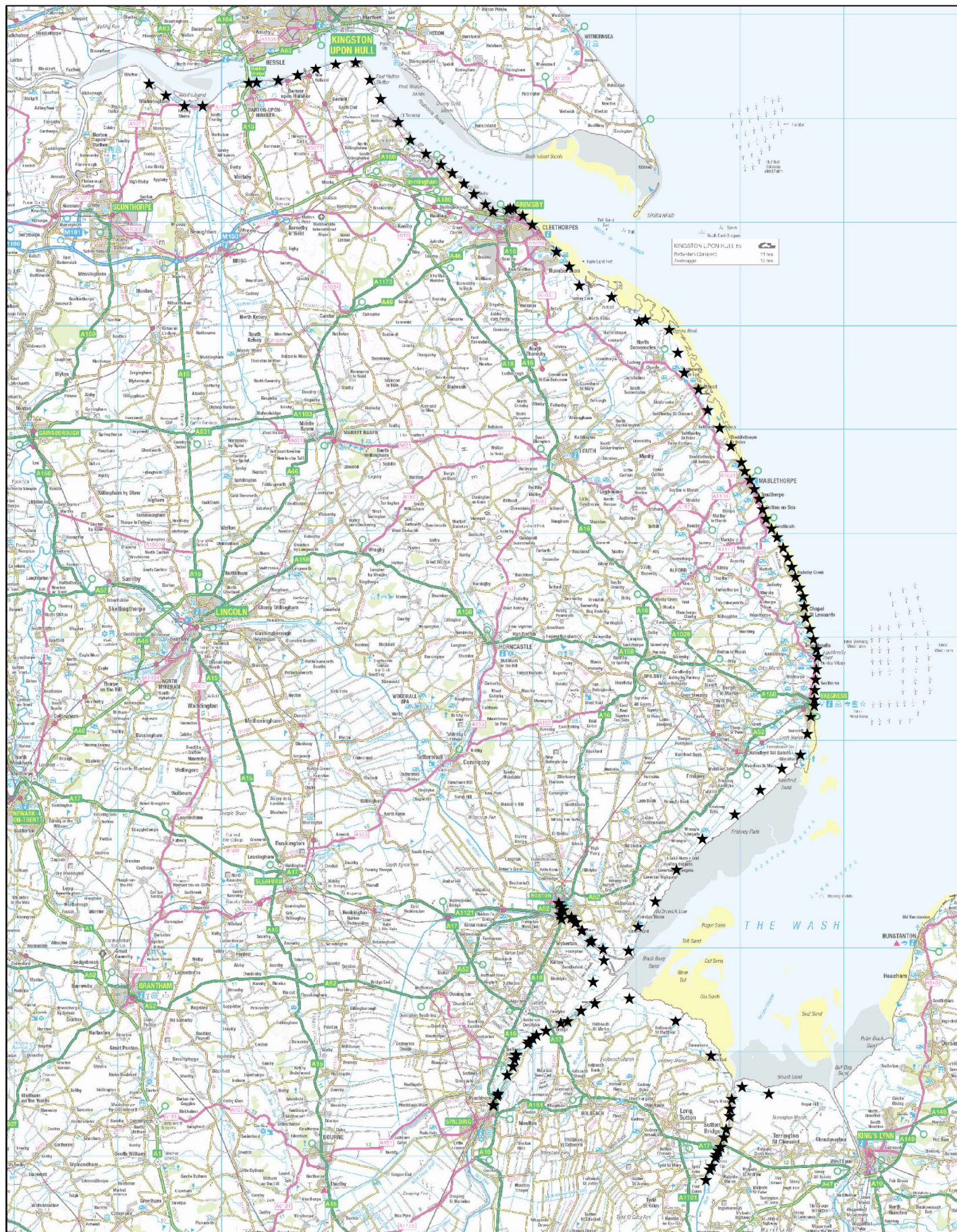
- The base date for the data is 2017.
- The levels are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- Levels for other annual chance probabilities are available if required.
-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

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

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

The following notes apply to Grand Sluice

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



★ Modelled Breach Locations

0 3.5 7 14 Kilometers

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 66p from BT Weekend Unlimited. Mobile and other providers charges may vary.

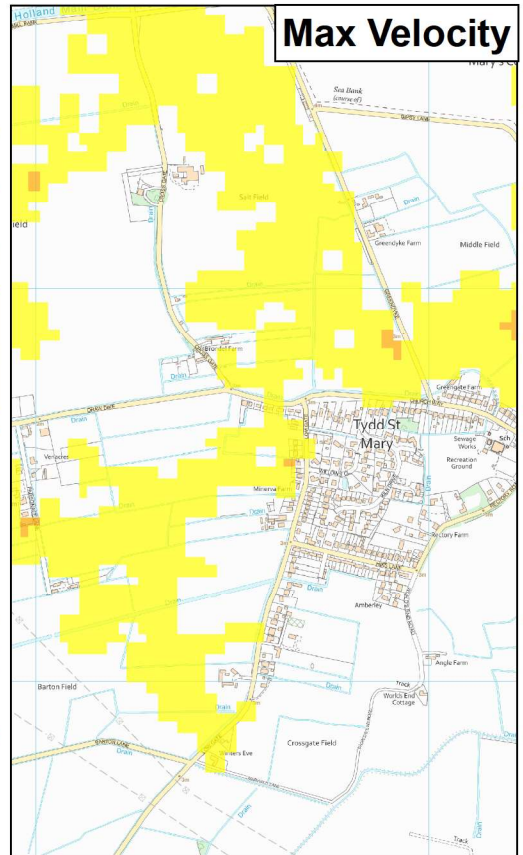
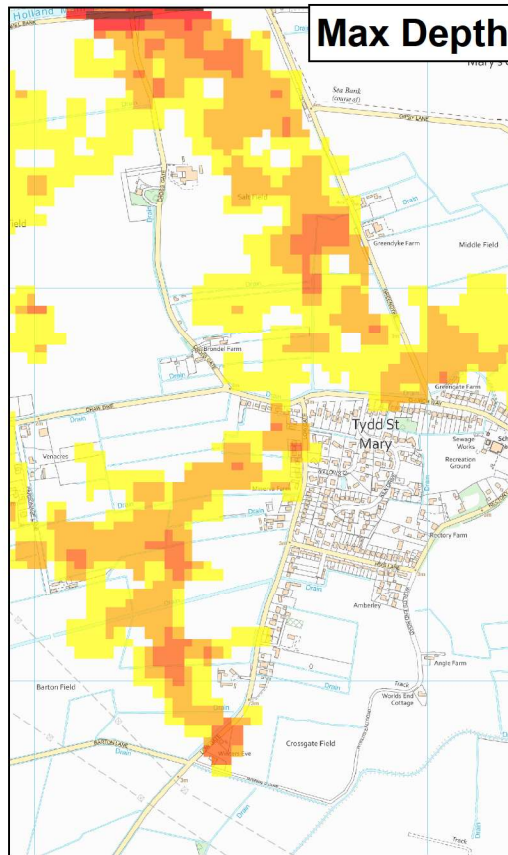


Produced by the Partnership and Strategic Overview Team, Lincoln
General Enquiries No: 03708 506 506

Northern Area Tidal Hazard Mapping

Location of Modelled Breaches

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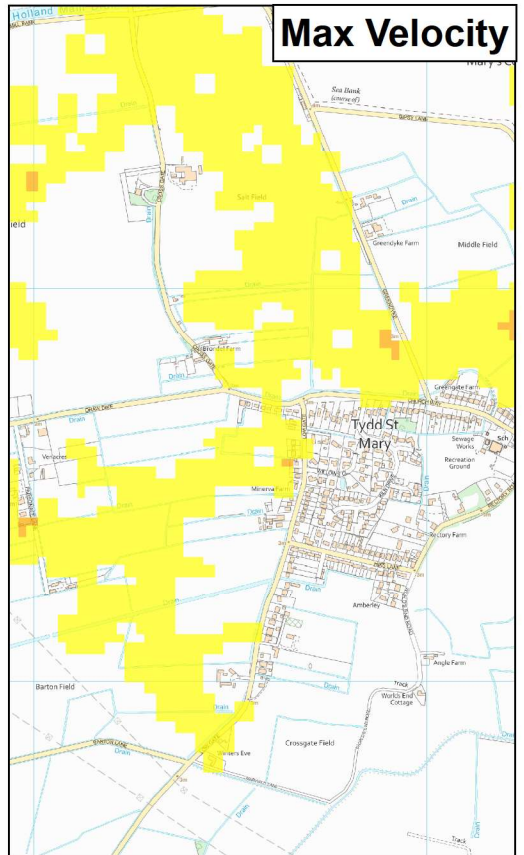
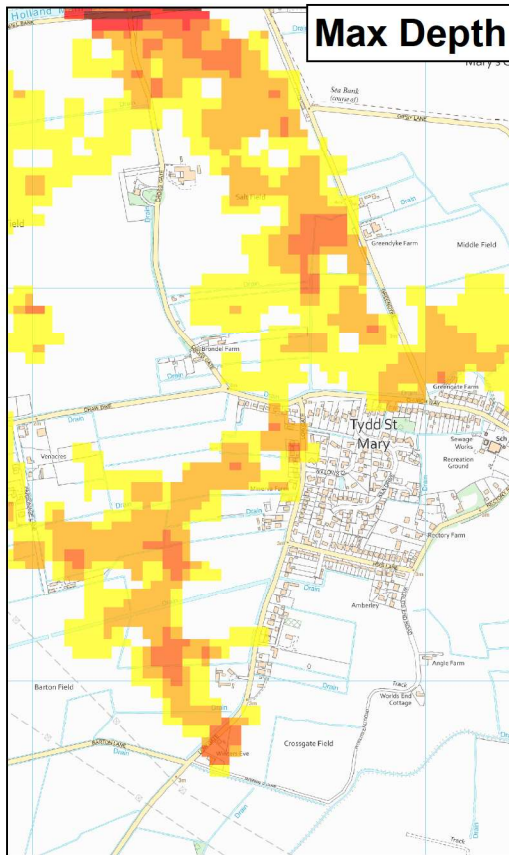


★ Modelled Breach Locations - see also the accompanying plan "Location of Modelled Breaches"									
Max Hazard (Flood Risk to People : FD2320)			Max Depth (m)			Max Velocity (m/s)			 Environment Agency Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping Map Centred on TF 43581 18636 This map is reproduced by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationary Office. Crown copyright. All rights reserved. Environment Agency 100024198, 2022. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings.
Less than 0.75 (Low Hazard)	Between 0.75 and 1.25 (Danger for Some)	Between 1.25 and 2.0 (Danger for Most)	0 - 0.25	0.25 - 0.50	0.50 - 1.0	0 - 0.3	0.3 - 1.0	1.0 - 1.5	
Greater than 2.0 (Danger for All)			1.0 - 1.6	1.6 +		1.5 - 2.5	2.5 +		
Date Printed	October 2022	Scenario year	2006	Scenario Annual Chance	0.5% (1 in 200)	CCN Number	CCN-2022-282520	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	

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.

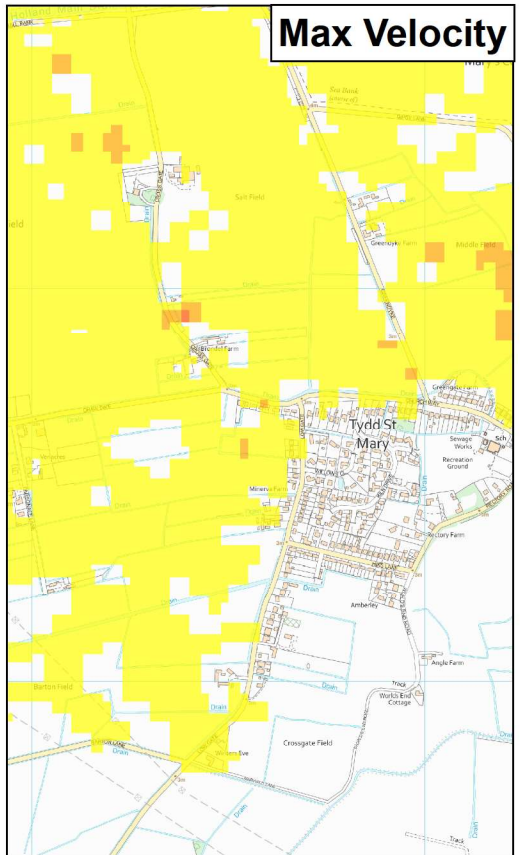
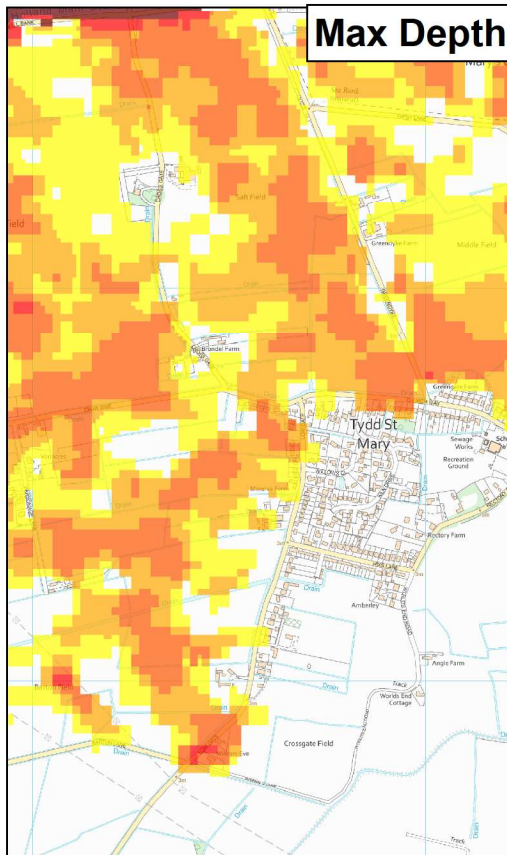
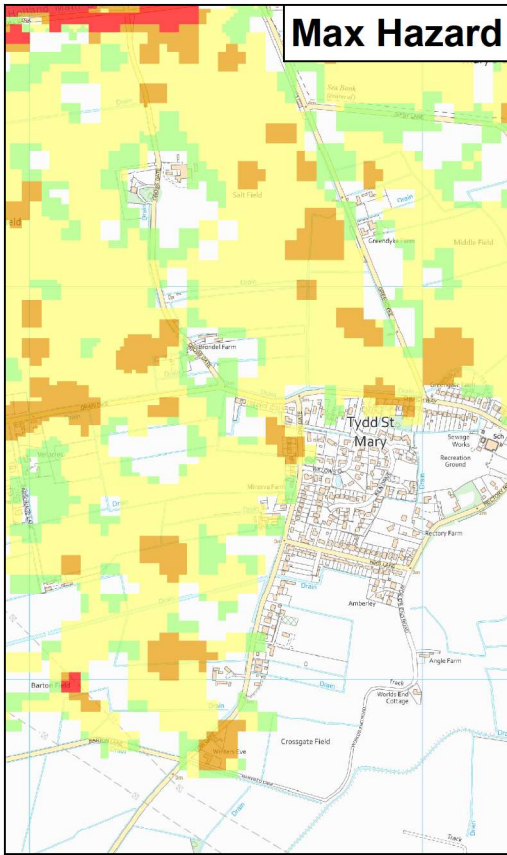


★ Modelled Breach Locations - see also the accompanying plan "Location of Modelled Breaches"									
Max Hazard (Flood Risk to People : FD2320)			Max Depth (m)			Max Velocity (m/s)			 Environment Agency Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping Map Centred on TF 43581 18636 This map is reproduced by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationary Office. Crown copyright. All rights reserved. Environment Agency 100024198, 2022. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings.
Less than 0.75 (Low Hazard)	0.25 - 0.50	0.3 - 1.0	0.75 - 1.25 (Danger for Some)	0.50 - 1.0	1.0 - 1.5	0.75 - 1.25 (Danger for Some)	1.0 - 1.5	1.5 - 2.5	
Between 1.25 and 2.0 (Danger for Most)	1.0 - 1.6	1.5 - 2.5	Greater than 2.0 (Danger for All)	1.6 +	2.5 +	Greater than 2.0 (Danger for All)	1.6 +	2.5 +	
Date Printed	October 2022	Scenario year	2006	Scenario Annual Chance	0.1% (1 in 1000)	CCN Number	CCN-2022-282520	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	

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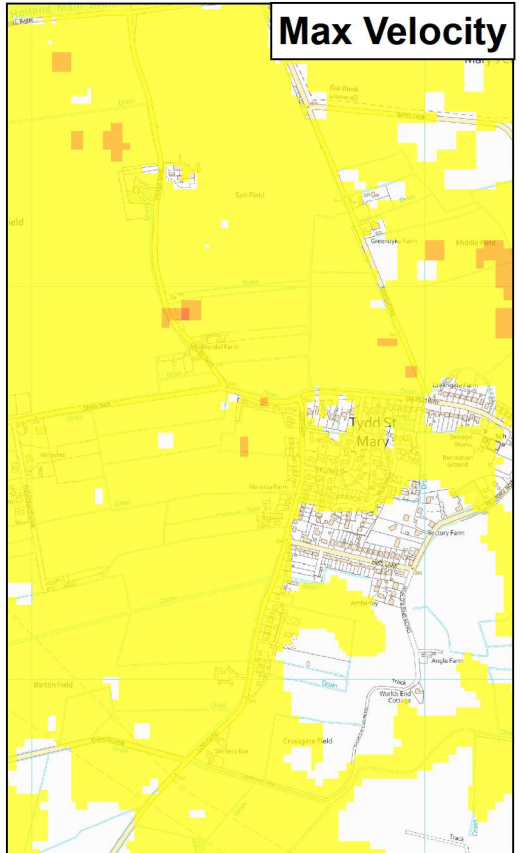
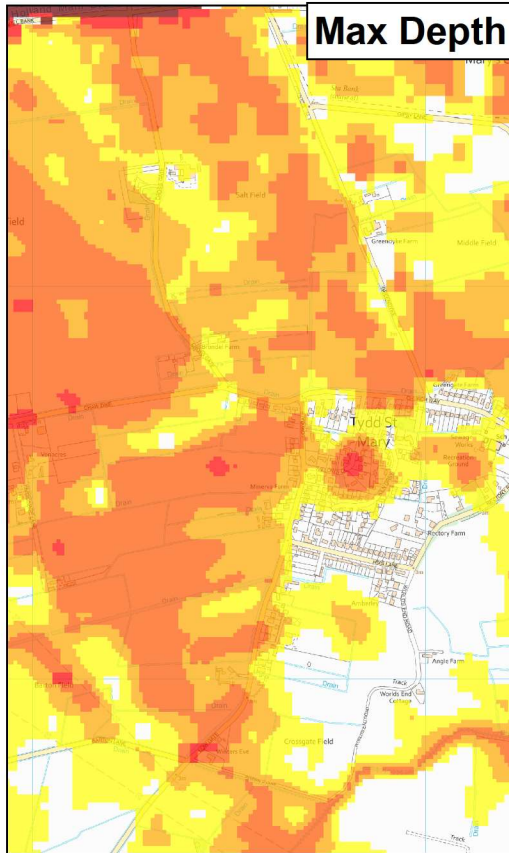
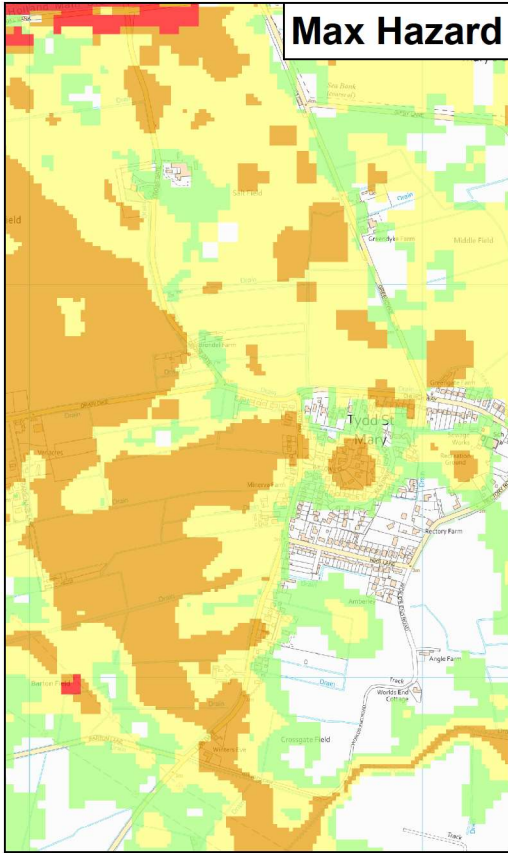
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	Greater than 2.0 (Danger for All)			1.0 - 1.6			1.5 - 2.5		
				1.6 +			2.5 +		
Date Printed	October 2022	Scenario year	2115	Scenario Annual Chance	0.5% (1 in 200)	CCN Number	CCN-2022-282520		
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Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

Map Centred on TF 43581 18636

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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	October 2022	Scenario year	2115	Scenario Annual Chance	0.1% (1 in 1000)
				CCN Number	CCN-2022-282520

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Environment Agency

Lincolnshire and Northamptonshire

Tidal Breaching Hazard Mapping

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