

WHITE LODGE

FLOOD RISK ASSESSMENT

Proposed Replacement Dwelling

3 Green Lane

Moulton Seas End

Spalding

Lincs



525 Broadgate, Weston Hills, Spalding, Lincs, PE12 6DB

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**Proposed Replacement Dwelling
3 Green Lane
Moulton Seas End
Spalding
Lincs**

May 2015

ENVIRONMENT AGENCY

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*"John Trevor Elsey
© May 2015*

PREAMBLE

Introduction

- P.01 This *Site-Specific Flood Risk Assessment (FRA)* has been prepared to accompany an application to South Holland District Council (LPA) seeking outline planning consent for the construction of a Replacement Dwelling at 3 Green Lane, Moulton Seas End, Spalding, Lincs.

Assessment Purpose

- P.02 To comply with *National Planning Policy Framework 2012 (NPPF)* and its associated *Planning Practice Guidance [2014]*, it is a matter for developers to investigate the potential flood-associated risks relating to individual developments and the purpose of this *FRA* is to address the issues identified in para.102 (*reproduced below*) of that document.

Policy Framework – Paragraph 102

If, following application of the Sequential Test, it is not possible, consistent with wider sustainable objectives, for the development to be located in zones with a lower probability of flooding, the Exception Test can be applied if appropriate.

For the Exception Test to be passed:

- It must be demonstrated that the development provides wider sustainable benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; and
- A site-specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

Both elements of the test will have to be passed for development to be allocated or permitted.

Development Proposal

- P.03 Proposals extend to the construction of a new dwelling to replace a long-established, uninhabited two-storey residential building and associated outhouses, all of which are in poor condition. The 990m² approx. redevelopment plot currently forms part of the overall 3 Green Lane property.
- P.04 For the purpose of this assessment, the proposal is given an assumed 100-year life (*ie to year 2115*).

Site Location

- P.05 National Grid Reference: 532380 326760 (*centre of existing buildings*). This location relates to all references made in this *FRA* to the site.

Land Drainage

- P.06 The site is located in the South Holland Internal Drainage Board (IDB) district.

Flood Zone

- P.07 The Environment Agency's flood plain map, which ignores the presence of defences, shows the site (*circled red on the following map extract*) to be located within a Flood Zone 3(a) (*High Probability*), assessed as having a 1 in 100 or greater annual probability of river flooding ($>1\%$), or a 1 in 200 or greater annual probability of flooding from the sea ($>0.5\%$) in any year. (*Source: Environment Agency Web Site*).



Extract from the Environment Agency Flood Plain Map

National Planning Policy Framework

- P.08 *Sequential and Exception Tests*
- This assessment, prepared to reflect at a minimum the requirements of *Planning Practice Guidance [2014]*, uses the Environment Agency's Flood Plain Map as a basis for the determination of appropriate land use as described in *Planning Practice Guidance [2014] Table 1: Flood Zones*.
 - Reference to *Planning Practice Guidance [2014] Tables' 2 and 3 (next page)*, classifies a "dwelling house" as a "More Vulnerable" development with regard to flood risk but as an appropriate development for the Flood Zone 3a, subject to the completion of an "Exception Test".

Table 2: Flood Risk Vulnerability Classification (*Table Extract*)

<u>More Vulnerable</u>	
▪	Hospitals
▪	Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
▪	Buildings used for dwelling houses, students halls of residence, drinking establishments, nightclubs and hotels.
▪	Non-residential uses for health services, nurseries and educational establishments.
▪	Landfill and sites used for waste management facilities for hazardous waste.
▪	Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

Table 3: Flood Risk Vulnerability and Flood Zone 'Compatibility'

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

Key:

- ✓ Development is appropriate.
- ✗ Development should not be permitted

Notes:

1. This assessment is prepared to address site-specific flood risk only.
2. The implementation of an "Exception Test" is a matter for the LPA.

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1 LOCATION

- 1.01 The site, at the eastern edge of Green Lane (*a County maintained paved road*), lies south-eastward from Moulton Seas End village within a traditional pocket of residential properties in an area identified on Ordnance Survey mapping as "Halesgate". It is bordered northward by residential properties while a small paddock and arable lands lie respectively to the south and east.
- 1.02 A general overview of the location, to particularly show Main River, local drainage infrastructure and the highway network, is provided by the Ordnance Survey Map extract included at page no.9. However, as that publication lacks detail, it is supplemented by larger-scale information at the page subsequent.

2 SITE DETAIL

- 2.01 The dwelling and outbuildings, to which the redevelopment proposal relates, are situated on localised, relatively high topography adjacent to an existing, disused greenhouse. Topographical elevations of the location and its surrounds are shown on the "Site Plan" included at page no.11 and, to enable appropriate association with flood and flood defence data referred to in this assessment, all are related to Ordnance Datum Newlyn.

3 EXISTING FLOOD ALLEVIATION MEASURES

Main River

Environment Agency - Tidal "River Welland"

- 3.01 Albeit the low-lying fenlands, of which the Moulton Seas End area forms part, are defended against flooding by earth embankments, the topographical elevation of the site (*which at its closest is some 4.70km south-eastward from Surfleet Reservoir*), is well below that of the Spring tide levels applicable to the River Welland and, as such, it is appropriately included within an area designated as floodplain. Nevertheless, the entire length of primary tidal embankment, which is the direct responsibility of the Environment Agency, is regularly maintained and inspected by that authority to enable potential structural problems to be identified and addressed at an early stage. Consequently, there is no reason to doubt the performance of the channel's right-hand (*south and east*) embankment when subject to extreme tidal conditions.

Land Drainage Infrastructure

Internal Drainage Board

- 3.02 Land drainage in the area between Spalding and Sutton Bridge, bounded by the tidal river and coastal frontage, is reliant upon IDB maintained arterial systems and of particular importance to the site and, more generally, Moulton Seas End, are the Board's channels identified on the included "Location Plan – General Overview". These convey flows generally westward and northward to the Lord's Drain Pumping Station and Sluice where they are evacuated to the tidal River Welland.
- 3.03 In considering the standard of maintenance adopted by the IDB for the upkeep of its channels and pumping plant, it is evident from observation that this is commensurate with the best standards applied to such infrastructure and, accordingly, the good performance of the drainage system under high flow conditions is not to be doubted.

Riparian Channels

- 3.04 The overall land drainage picture would be incomplete without the secondary, riparian maintained channels that extend from the IDB's main arterial system to cater for flows originating from the more remote parts of the district. With particular focus on the site, such a system borders the lower, northern edge of the overall 3 Green Lane property, from where it extends northward alongside the County road to its outfall into the IDB maintained channel.

Summary

- 3.05 The existing flood alleviation measures relevant to the site, as identified in the foregoing, are summarised as follows:
- Right-hand tidal embankment alongside the River Welland.
 - Land Drainage infrastructure.

4 POTENTIAL FLOODING SOURCES AND DEFENCE DETAILS

- 4.01 Failure of either identified flood alleviation measure at a crucial time would potentially endanger, to a greater or lesser degree, the flood plain area, and it is therefore appropriate that they - or in the case of raised defence, the tidal river - be considered potential flood sources. Additionally, since flooding can also materialise from other sources, such possibility is considered where deemed of relevance to the site.

Main River

Environment Agency – Tidal “River Welland”

Year 2015

- 4.02 Flooding would occur over the low-lying hinterland of the River Welland immediately downstream from Spalding in the eventuality of an overtop or a breach in the raised defences during a high tide condition. However, following a tidal event in January 1978 that overtopped these structures at various locations along both the coastal and tidal river frontages, a major bank-raising scheme, implemented by a predecessor authority of the Environment Agency, was undertaken during the early 1980's. Consequent to that improvement, the Strategic Flood Risk Assessment (*SFRA*) prepared for the *LPA*, reveals the river's right-hand (south and east) defence embankment, upstream from Fosdyke Bridge to Spalding, to range in elevation between 7.19m ODN and 8.08m ODN with a typical 7.60m ODN at Weston Marsh. The structure therefore confers a 1.60m minimum freeboard against overtopping by the 5.98m ODN tide identified in the appended “Tidal Model Analysis” tabulation prepared by the Environment Agency. Moreover, it is noteworthy that there is no reason to suspect that the embankment's well-proportioned profile would succumb to breach under such peak tidal conditions.

Year 2115

- 4.03 It is to be accepted that predicted climate change will progressively increase sea levels and over the envisaged 100-year lifetime of the proposed project, on the basis of published, “*Recommended Contingency allowances for Sea Level Rises*” shown

below, the predicted 0.50% tide is expected to rise by around 1.14m between the years' 2006 and 2115. This is demonstrated by the following calculation:

$$[(19 \times 4) + (30 \times 8.5) + (30 \times 12) + (30 \times 15)] / 1000 = 1.14\text{m} \quad (2115)$$

Recommended Contingency Allowances for Sea level Rises

Region	Net sea level rise (mm per year) relative to 1990			
	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
East of England, east midlands, London, south-east England (south of Flamborough Head)	4.0	8.5	12.0	15.0

- 4.04 Assuming there to be no change in elevation of the defences during the 100-year period, the year 2115 calculated tide level of 7.12m ODN ($5.98 + 1.14$) would reduce the freeboard against overtopping to 0.46m and, hence, present an increased risk of embankment failure. Nevertheless, it would likely require a catastrophic event for ensuing floodwater to cross the intervening topography to affect the site.

Land Drainage Infrastructure

Internal Drainage Board

Year 2015

- 4.05 Although the land drainage infrastructure provides a good standard of drainage to the area it, nonetheless, must be considered a potential source of flooding.
- 4.06 While, owing to many inherent vagaries, there is no definitive standard for the design of such channels, empirically derived criteria adopted by IDB's over many years, has proven to work well. While specific data for the nearby Ugly Bridges Drain is not at hand, its normal maximum water level is known to be typically around 2.30m ODN, thereby conferring a freeboard of approximately 1.30m to the dwelling site.
- 4.07 Internal Drainage Board channel design typically incorporates a minimum 0.90m of freeboard to ruling low land areas and there is no reason to doubt that this was not the case with regard to the Ugly Bridges channel. However, adopting a more pessimistic view, it is to be acknowledged that such freeboard could be reduced during extreme conditions caused, for instance, by flows exceeding those of the empirically derived design criterion or in the event of channel obstruction.

Year 2115

- 4.08 Climate change and predicted, increased rainfall intensities, as stated in the *NPPF (Technical Guidance)*, indicate that peak river flows will be amplified by a precautionary 20% over the period 2025 to 2115 (*table over-page*) and, in the absence of compensatory improvements, this will undoubtedly impact upon water levels in the fluvial Main River channels'. While this particularly relates to the Environment Agency's fluvial systems that, in this case, are remote from the site and therefore not identified as potential sources of flooding for this *FRA*, it is to be recognised that the situation will equally impact upon the land drainage infrastructure. With this in mind, rough and ready evaluation of these systems, based on the likely cross sectional areas of water in the open channels with no increase in velocity, indicates a 0.10m to 0.15m approx. rise to be reasonable. Clearly, such an effect would not endanger the site.

Precautionary sensitivity ranges for:
Peak Rainfall Intensities and Peak River Flows

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak rainfall intensity	+5%	+10%	+20%	+30%
Peak river flow	+10%	+20%		

Riparian System

Years' 2015 to 2115

- 4.09 Whilst there is no record at hand of level data relating to the local riparian system catering for runoff from the site, it is not known to be problematic. The same situation as relates to the IDB system would apply.

Ground Water

- 4.10 It is to be acknowledged that high ground water levels can lead to serious water logging and potential flooding but given the permeable soils of the locality, together with the land drainage system that is for the specific purpose of avoiding such conditions, there should be no problem in this regard. This issue is therefore not to be considered further.

5 KNOWN FLOODING AND IDENTIFIED CHANGES

- 5.01 A tidal event in January 1978, and the subsequent bank raising work along the River Welland, is referred to in paragraph 4.02.
- 5.02 During early July 1968, rainfall, generally in excess of 75mm, was recorded in the Spalding area during a 24-hour period and this widespread storm resulted in significant drainage problems and localised flooding throughout the IDB district. This event initiated major drainage improvement schemes that included improvements along the Ugly Bridges channel.
- 5.03 During the preparation of this assessment, no evidence was discovered indicating the site to have a history of flooding during modern times.

6 LOCAL HYDRAULICS

- 6.01 Fenland hydraulics inevitably involves the land drainage system whose efficiency will deteriorate over time if not subject to routine maintenance to clear aquatic growth and accrued deposits from channels and pipelines. In this regard, the IDB undertakes routine maintenance of its system to ensure continued good function while giving appropriate consideration to associated, environmental issues.

7 FLOODING ASSESSMENT

Tidal Waters

- 7.01 While the coastal defences offer a good standard of protection to Moulton Seas End and its general locality, and a breach in the primary structure is unlikely, tidal waters doubtless present the most acute risk of serious flooding at the site. Accordingly, it is appropriate to consider the potential consequences of a failure in the defence and this is addressed by reference to the appended, 2D hazard mapping which is reproduced from an extract of more extensive data prepared by the Environment Agency. While these maps show no present-day tidal flooding at the site, they indicate a probable floodwater spread to the location for both the 0.5% and 0.1% events applying to the year 2115. When these potential floodwater depths are related to known topographical elevations, both scenarios reflect a similar floodwater level of 3.50m ODN.

Fluvial Waters

Land Drainage Infrastructure

- 7.02 The primary function of land drainage infrastructure is to cater for flows ensuing from precipitation and, in this regard, the extensive lengths of associated trapezoidal channel invariably incorporate storage capacity above their normal maximum water levels to accommodate runoff from the more extreme of events before an "out of brink" situation materialises. However, in the remote eventuality of such an occurrence arising from, for instance, overload, channel slippage or blockage of some kind within the reaches of channel downstream from the site, break point could be attained resulting in the slow spread of relatively shallow floodwater over adjacent low-lying areas. However, upon attaining such a condition, any further rise would be negligible and, consequently, it is fair to suggest that flooding from the land drainage system would not likely trouble the relatively high ground associated with the site. In any event, such occurrence would not equal that of the Environment Agency's, modelled scenarios.

8 CROSS SECTION

- 8.01 A cross section, prepared from topographical survey to show the surface profile across the site at the existing house, is included at page no.12. This, extending along a northern transect from the site's southern boundary to the riparian channel, shows the year 2115 assessed, potential floodwater levels relating to the modelled 0.50% and 0.1% tidal events relative to the ground floor level of the existing dwelling.

9 FLOOD RATE EFFECTS AND ASSOCIATED CONSIDERATIONS

- 9.01 A raised defence is susceptible to breach that would normally materialise from weakness caused, for instance, by overtopping or structural disturbance of some kind. Nevertheless, no matter what the cause of failure, an initial minor flow of water, either through or over a raised defence, can cause material to be scoured from the structure resulting in a progressively enlarging hole to allow the passage of increasing volumes of water to the point of a rapid inundation of adjoining land. Although such a condition would have inherent potential to cause structural damage and the loss of life in proximity to the defence, this would not be applicable to the site and is therefore given no further consideration in this *FRA*.

Floodwater Hazard Rating

- 9.02 The Environment Agency's Tidal Hazard Mapping (*derived from the 2D modelling and the "Flood Risk Assessment Guidance for New Development – Technical Report FD2320/TR2 (October 2005)", Section 13*) for the year 2115, 0.5% and 0.1% events, indicate "low" hazard ratings for the site.

General Comments

- 9.03 Bearing in mind the standard of protection provided to the site and the locality by the primary defences, the risk of flooding from a tidal breach is of remote probability.
- 9.04 While recognising that reliance upon warning from others as a means of flood protection should be avoided, it would, nevertheless, be unthinkable for early warning of a potential tidal incident not to be announced by the relevant authorities using various media, particularly as tidal surge forecasting has vastly improved over recent years. Additionally, it is most reasonable to consider that news of a potential breach or overtopping event along the flood defences would quickly spread within the local community, well in advance of potential floodwater reaching the site. While it is reasonable to consider that safe refuge for occupants would be available in any replacement dwelling, the site could be evacuated, if deemed necessary, in advance of a flood condition. Moreover, the relatively shallow floodwater (*as modelled*) of the locality could be negotiated by high ground clearance vehicles to nearby villages'.
- 9.05 Environmentally, it is difficult to imagine any adverse effect transpiring from the proposals.

10 SITE HYDRAULICS

Surface Water

- 10.01 In keeping with the existing building and neighbouring property, a sustainable system (*soakaway*) would be implemented for the disposal of roof-water.

Foul Water

- 10.02 Given there is no mains sewer infrastructure, foul water would be discharged to an on-site system (*septic tank*) in compliance with requirements of the Environment Agency and the Local Authority.

11 EFFECT UPON THE FLOOD PLAIN

- 11.01 Development within the flood plain inevitably occupies volume that would otherwise be available to floodwater, thereby impacting, to a greater or lesser degree, upon potential floodwater depth or spread. However, given the footprint of the proposed replacement building would be at a higher elevation than that of the potential floodwater, there would be nil, flood plain impact.

12 IMPACT UPON THIRD PARTIES

- 12.01 A replacement dwelling would not add to the potential flood risk of other properties within the indicative flood plain area.

13 RESIDUAL RISK

- 13.01 Inevitably, there is a residual risk relating to any development in the flood plain area, particularly if conditions of greater magnitude than those envisaged within this *FRA* are experienced.

14 BRIEF SUMMARY

- 14.01 The site is not situated in a functional flood plain as defined by *NPPF (Planning Practice Guidance [2014] Table .1: Flood Zones)*.
- 14.02 The Environment Agency's flood plain map, which ignores the presence of defences, shows the site to be located within a Flood Zone 3(a) (*High Probability*), assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
- 14.03 Reference to *Planning Practice Guidance [2014] Tables' 2 and 3* classifies a "dwelling house" as a "*More Vulnerable*" development with regard to flood risk but as an appropriate development for the Flood Zone 3a, subject to the completion of an "*Exception Test*".
- 14.04 The site is protected from flooding by the embankments alongside the Main River systems in addition to the Internal Drainage Board's and riparian land drainage infrastructure.
- 14.05 Given intervening distances and topographical elevations, flooding at the site from a tidal event would be of remote probability.
- 14.06 In the event of an overtop situation in the land drainage system, the resulting floodwater would slowly spread to a shallow depth over adjacent low-lying areas and upon attaining this break point, further rise in level would be minimal. Consequently, it is fair to suggest that flooding from the land drainage system would not trouble the elevated site.
- 14.07 Given the location, in addition to the modelled, potentially shallow floodwater depth, personal hazard and structural damage can reasonably be discounted. Safe refuge for occupants would be available in any replacement dwelling and, if deemed necessary, the site could be evacuated in advance of a flood condition. Moreover, the relatively shallow floodwater (*as modelled*) of the locality could be negotiated by high ground clearance vehicles to nearby villages'.
- 14.08 The Environment Agency's Tidal Hazard Mapping for the year 2115, 0.5% and 0.1% events, indicate "low" hazard ratings for the site.
- 14.09 In keeping with that of the existing building and neighbouring property, roof-water runoff would be discharged to soakaway.
- 14.10 Given there is no mains sewer infrastructure, foul water would be discharged to an on-site system (*septic tank*) in compliance with requirements of the Environment Agency and the Local Authority.
- 14.11 The footprint of the proposed replacement building would be at a higher elevation than that of the potential floodwater and, consequently, there would be nil, flood plain impact.
- 14.12 A replacement dwelling would not add to the potential flood risk of other properties within the indicative flood plain area.

15 RECOMMENDATIONS

15.01 Given the potential – *albeit of low probability and of modelled shallow depth* - for flooding at the site, it would be prudent to:

1. Set the ground floor of any replacement dwelling at an elevation not lower than that of the existing structure. It would therefore have a clearance of approximately 0.220m above the modelled, potential floodwater level.
2. Implement a traditional brick and mortar construction.

15.02 Occupants of any replacement dwelling at this location should be encouraged to register the property with the Environment Agency's automated "Flood Warnings Direct*" service. This would enable early warning of a potential flood to be received via a variety of media.

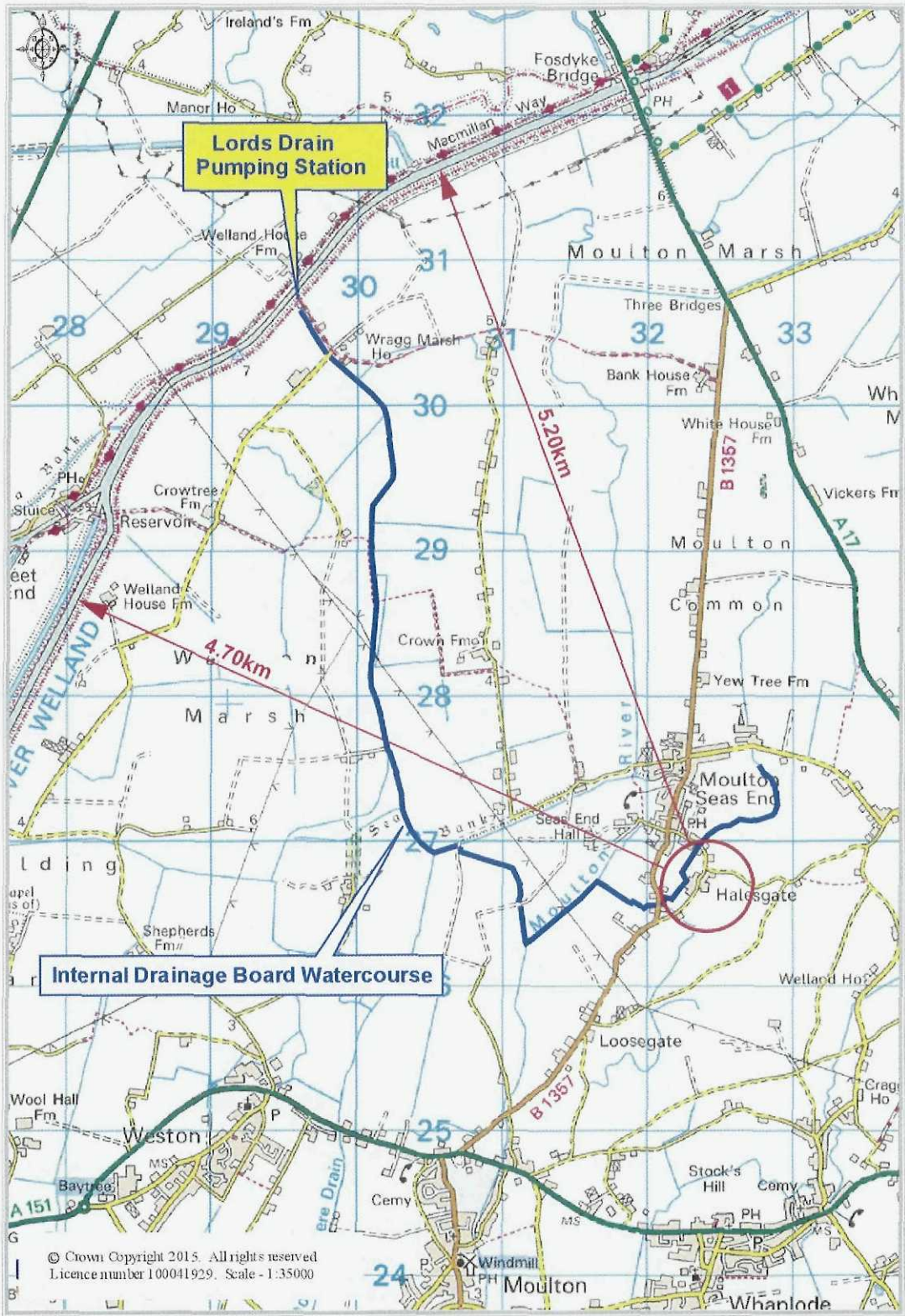
* *Registration is available free of charge by telephoning 0845 9881188.*

16 CONCLUSIONS

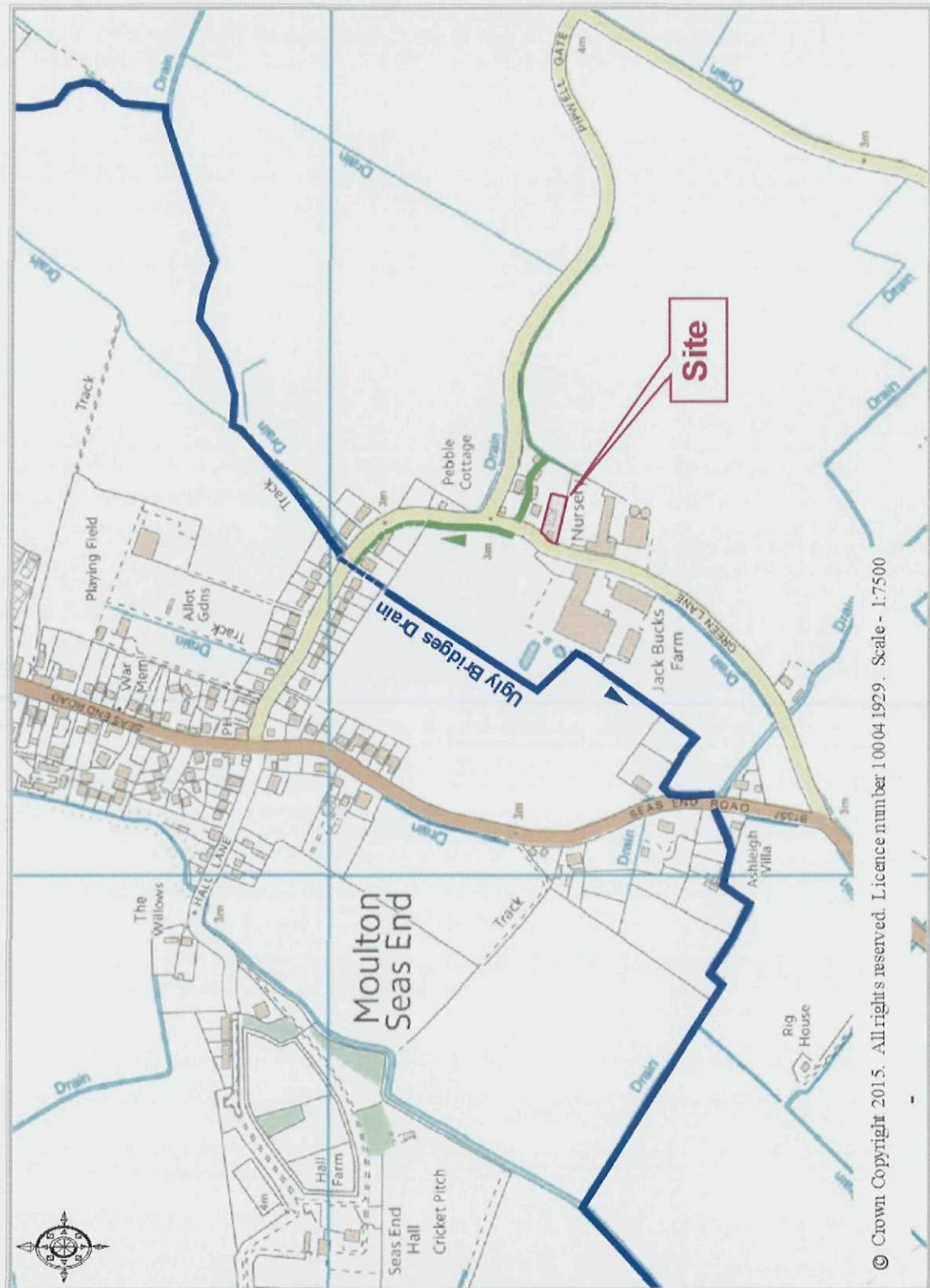
16.01 Realistically, in the context of *NPPF* and flood risk, a replacement dwelling at the site would, it is considered, be "*safe*" for its envisaged 100-year life. However, the fenland location is to be recognised and, although of remote probability, the unexpected can occur and inflict consequences greater than those identified by this Flood Risk Assessment.

16.02 Finally, it is considered that this Site-Specific Flood Risk Assessment fully addresses the developer's responsibilities as detailed in the Preamble, paragraph P.02.

White Lodge



Location Plan – General Overview

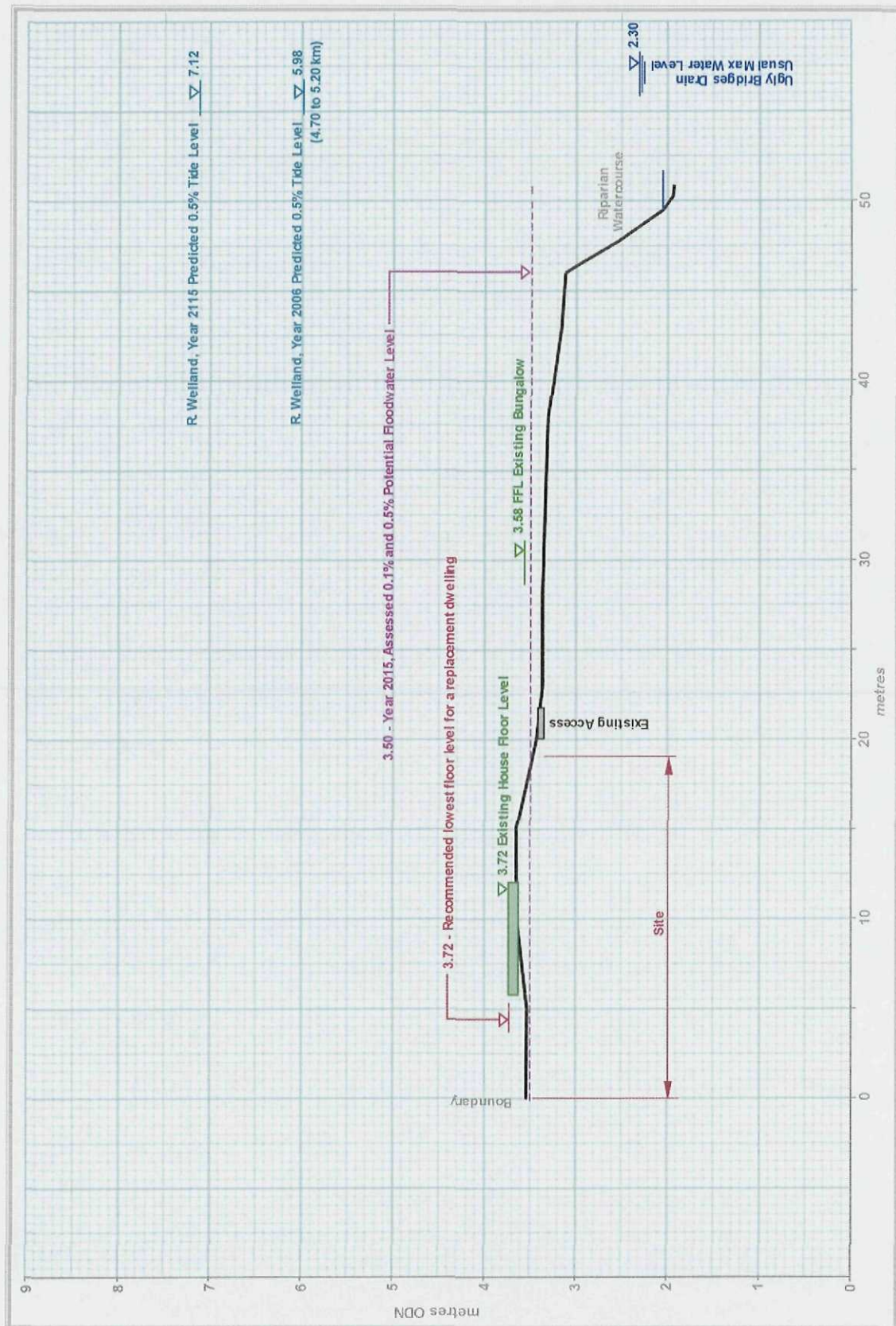


Location Plan



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Site Plan



Site Cross Section S-S

Appendix

Environment Agency Information

Tidal Model Analysis 2006

Modelled Breach Locations

Flood Hazard Maps

Breach Hazard Mapping – Scenario Year 2006, Potential 0.10% chance event

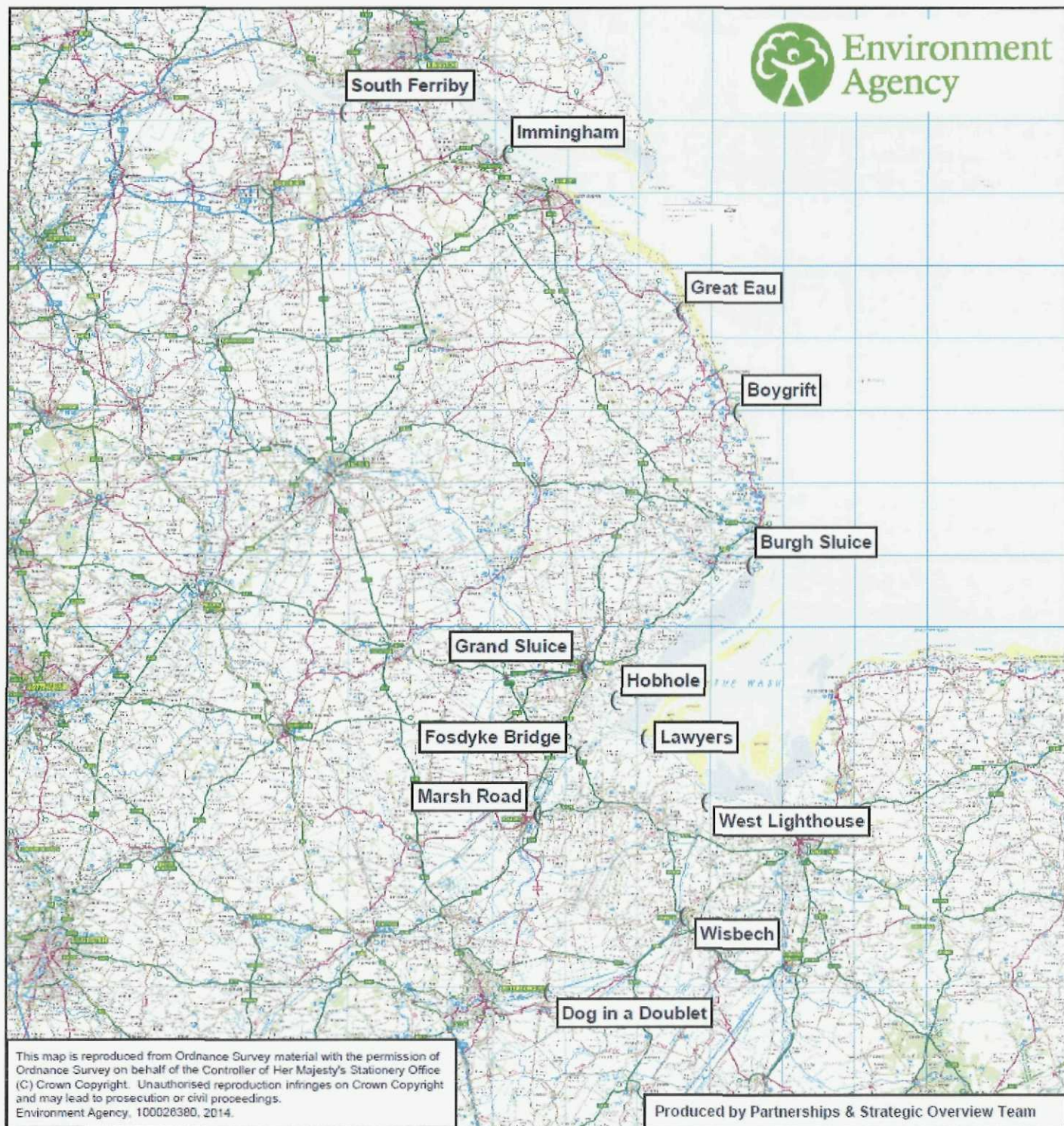
Breach Hazard Mapping – Scenario Year 2006, Potential 0.50% chance event

Breach Hazard Mapping – Scenario Year 2115, potential 0.10% chance event

Breach Hazard Mapping – Scenario Year 2115, potential 0.50% chance event

Acknowledgement re Environment Agency Mapping

"Contains Environment Agency information © Environment Agency and database right"



Still Water Tidal Levels mODN - Tidal Model Analysis 2006

Location	Easting	Northing	100% (1 in 1)	10% (1 in 10)	4% (1 in 25)	2% (1 in 50)	1% (1 in 100)	0.5% (1 in 200)	0.1% (1 in 1000)
South Ferriby	498772	421418	4.90	5.29	5.45	~	~	5.55	5.63
Immingham	521381	415464	4.08	4.49	4.65	4.76	4.88	5.05	5.34
Great Eau	545500	393800	3.80	4.19	4.34	4.46	4.57	4.69	4.96
Boygriff	553300	379800	3.84	4.24	4.41	4.53	4.65	4.77	5.05
Burgh Sluice	555190	358620	4.26	4.45	4.63	4.76	4.90	5.03	5.34
Hobhole	536610	339940	4.82	5.30	5.49	5.64	5.78	5.93	6.27
Lawyers	540750	334550	4.84	5.32	5.51	5.66	5.80	5.95	6.29
West Lighthouse	549150	325750	4.88	5.37	5.57	5.71	5.86	6.01	6.35
Grand Sluice	532400	344500	4.88	5.33	5.51	5.65	5.78	5.93	~
Fosdyke Bridge	531700	332200	4.91	5.38	5.56	5.71	5.85	5.99	~
Marsh Road	526000	324000	5.04	5.44	5.60	5.73	5.85	5.98	~
Wisbech	546100	310000	4.83	5.25	5.41	5.53	5.66	5.78	~
Dog in a Doublet	527300	299300	3.67	4.00	4.13	4.22	4.32	4.42	~



^ Modelled Breach Locations

0 3.5 7 14
Kilometres

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 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. 03706 506 506

Weekday daytime calls cost 6p plus up to 60p from BT Weekends Unlimited. Mobile and other providers charges may vary.

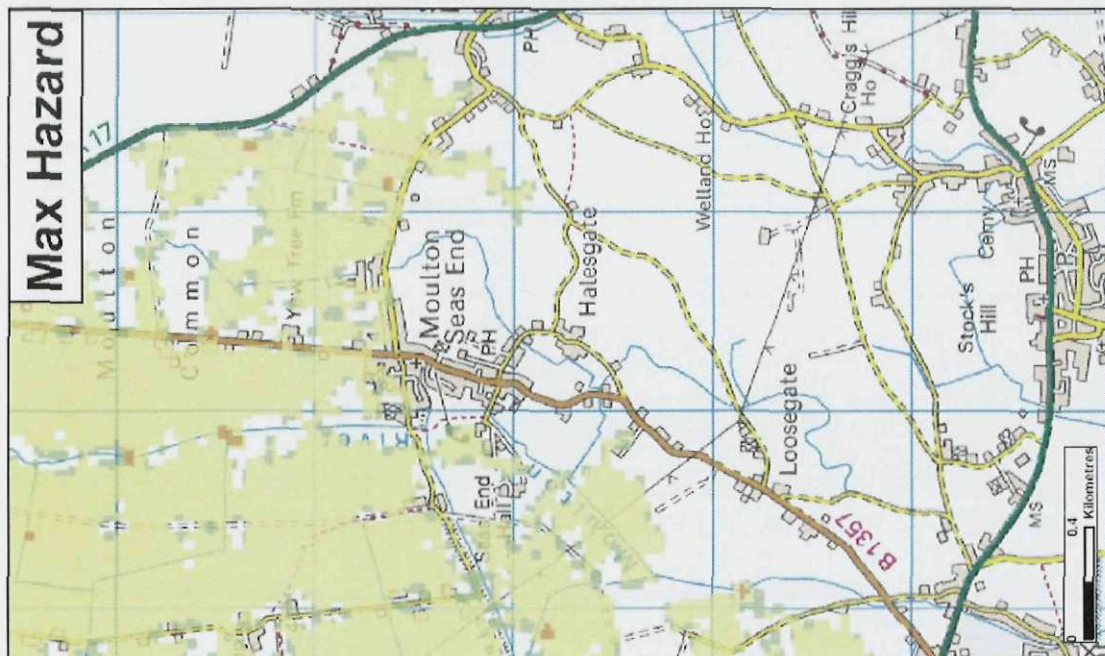


Produced by the Partnership and Strategic Overview Team, UK on
General Enquiries No. 03706 506 506

Northern Area Tidal Hazard Mapping

Location of Modelled Breaches

This map is produced by the Partnership and Strategic Overview Team, UK on behalf of the Environment Agency. It is a strategic overview map and does not show individual defences. It is not a detailed map and should not be used for detailed planning or design purposes. It is a strategic overview map and should not be used for detailed planning or design purposes.



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

Date Printed	Scenario year	2006	Scenario Annual Chance	Max Velocity (m/s)	Max Depth (m)	Max Hazard
						(Hazard Risk to People - FID2023)
				0 - 0.3	0 - 0.25	Less than 0.75 (Low Hazard)
				0.3 - 1.0	0.25 - 0.50	Between 0.75 and 1.25 (Danger for Some)
				1.0 - 1.5	0.50 - 1.0	Between 1.25 and 2.0 (Danger for Most)
				1.5 - 2.5	1.0 - 2.0	Greater than 2.0 (Danger for All)
				2.5 +	2.0 +	

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.

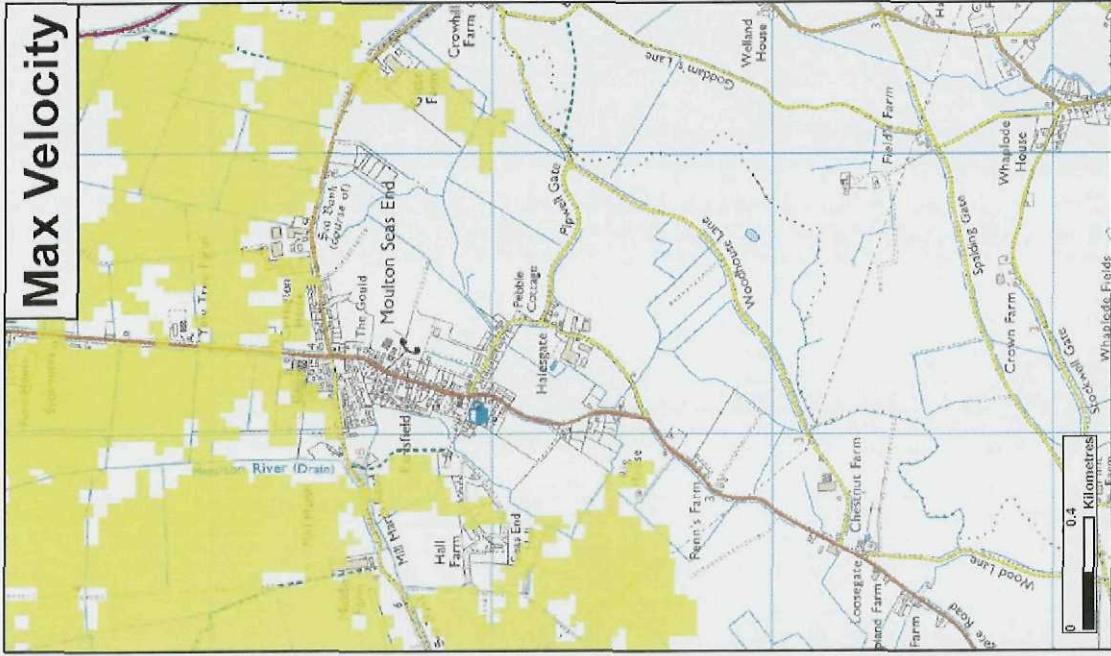
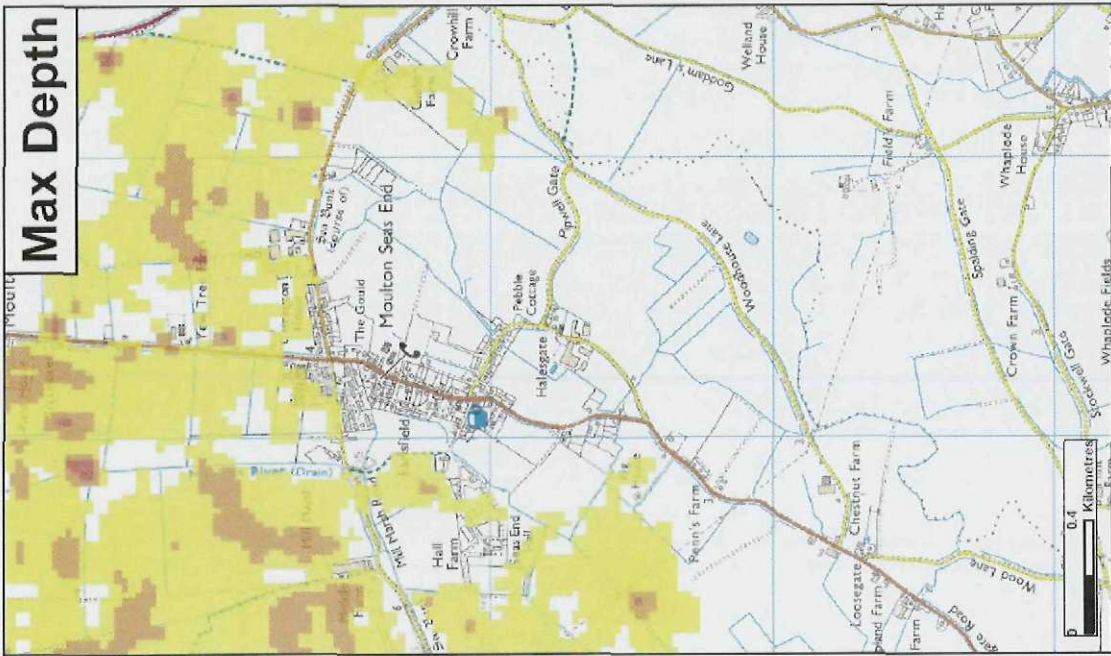
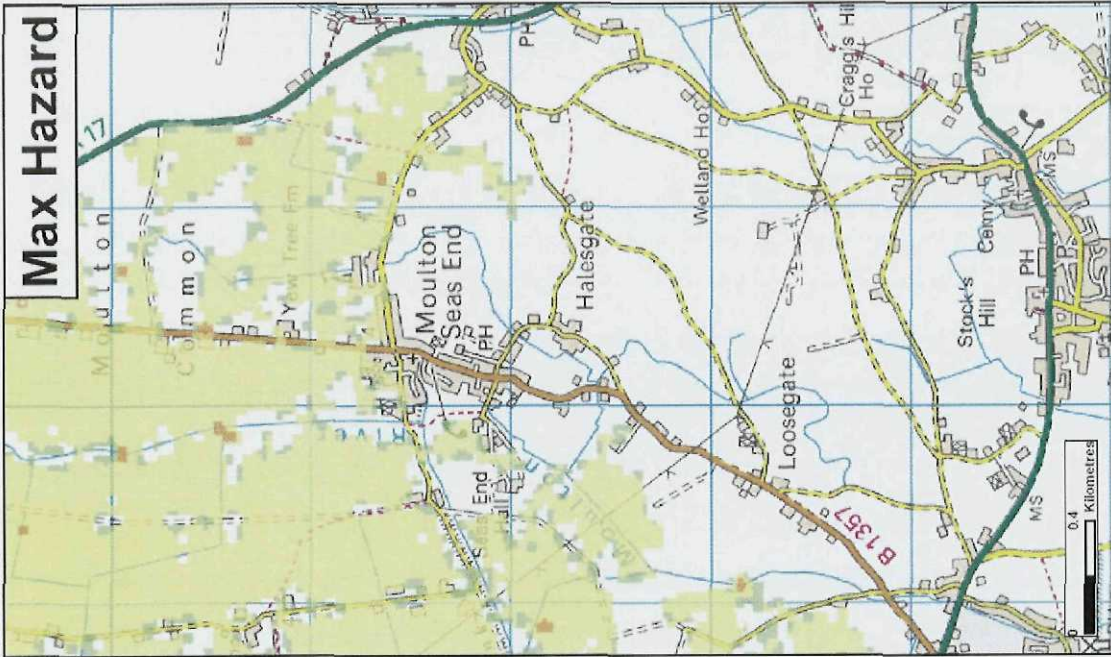
General Equities, No. 05700 426 426 (Stocks: Dow Jones Industrial Average and other securities) www.mutualshare.com



Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

Mao Centred on TF 32384 26758

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★ Modelled Breach Locations - see also the accompanying plan 'Location of Modelled Breaches'				
Max Hazard (Flood Risk to People - F02220)	Max Depth (m)	Max Velocity (m/s)	Scenario year	Scenario Annual Chance
Less than 0.75 (Low Hazard)	0 - 0.25	0 - 0.3	2000	0.5% (1 in 200)
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 - 2.0	1.5 - 2.5		
	2.0 +	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.

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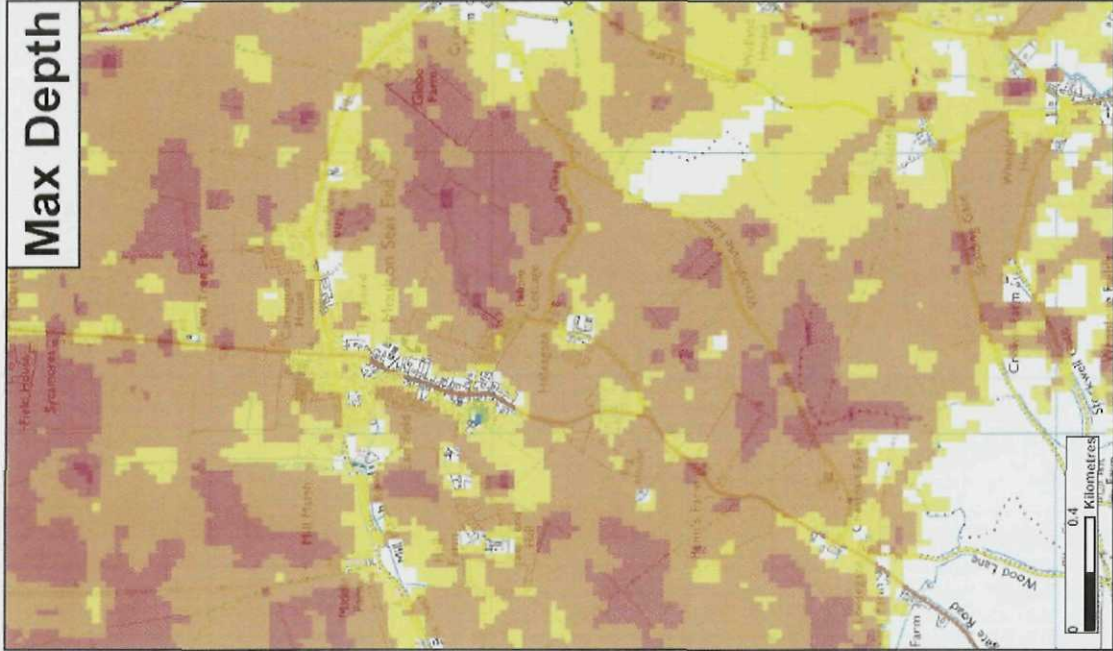
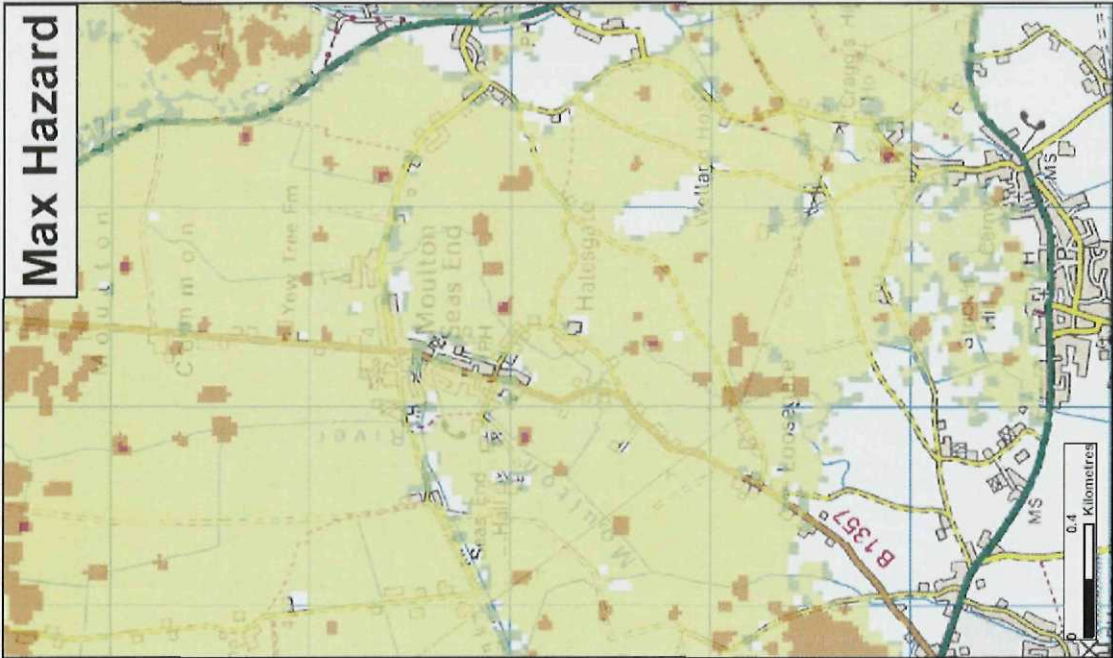
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General Enquiries No. 03709 505 505. Weekday Daytime calls cost 5p plus up to 5p per minute from BT. Weekend Unlimited. Mobile and other providers' charges may vary.

Lincolnshire and Northamptonshire
Tidal Breaching Hazard
Mapping

Map Centred on TF 32384 26798

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★ Modelled Breach Locations See also the accompanying plan 'Location of Modelled Breaches'				
Date Printed	Scenario year	Scenario Annual Chance	Max Velocity (m/s)	
			Max Depth (m)	Max Hazard (Flood Risk to People: FE23202)
April 2015	2115	0.1% (1 in 1000)	0-0.25	Less than 0.75 (Low Hazard)
			0.25-0.50	Between 0.75 and 1.25 (Danger for Some)
			0.50-1.0	Between 1.25 and 2.0 (Danger for Most)
			1.0-2.0	Greater than 2.0 (Danger for All)
			2.0+	

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.

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General Enquiries No. 03702 505 906. Weekday Daytime calls cost 5p plus up to 9p 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 32394 26793

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