2022

Level 3 Flood Risk Assessment

PROPOSED RESIDENTIAL DEVELOPMENT AT 50 ROMAN BANK, LONG SUTTON, PE12 9LB

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DEVELOPMENT SITE AND LOCATION

An Outline Planning Application has been made to South Holland District Council to construct two detached houses and replace the existing dwelling on a site at 50 Roman Bank, Long Sutton. The National Grid Reference of the site is 543827 322826, and the extent of the site is shown on Map 1 in the Appendices at the end of this document.

The site is located nearly 1km east of the centre of Long Sutton, 4.7 km from the tidal defences of the River Nene at Sutton Bridge, and at least 10km south of the tidal defences of the Wash.

The expected lifetime of the proposed development is a minimum of 100 years as it is a residential development on an existing residential site, replacing the current dwelling.

The proposed development is within Flood Zone 3 "High Probability" as detailed on the Environment Agency's flood zone maps without defences, (see Appendices Map 3) as defined in Table 1 of the NPPG:

TABLE 1 NPPG

Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)

Applying the flood risk vulnerability classification in Table 2 of the Guidance, the development site is classified as "more vulnerable".

Table 3 of the Guidance states that residential use is only permitted after the sequential and exception test is followed.

The Planning Application therefore requires a flood risk assessment to be carried out as required in the National Planning Practice Guidance (NPPG) to the National Planning Policy Framework.

The site is within a defended area as specified in the South Holland District Council's Strategic Flood Risk Assessment and is located in the South Holland Internal Drainage Board District. Map 4 in the appendices shows the location of the land in conjunction with the Adopted Watercourses. The adoption of a watercourse is acknowledgement by the Water Management Alliance (WMA) Board that the watercourse is of arterial importance to the Internal Drainage District and as such will normally receive maintenance from the Internal Drainage Board (IDB).

SEQUENTIAL TEST

As the proposed development is located in Flood Zone 3 the NPPF requires the sequential test to be applied to determine if there are any reasonably available and suitable alternative sites in a lower flood risk zone for this type of development.

The development is likely to have no more or less flood risk than others in this area, and all of this area is within Flood Zone 3.

8.3.9 of the SE Lincolnshire SFRA V6 explains that due to the extent of Flood Zone 3 in this area, the Flood Map will not provide enough refined information to carry out a meaningful Sequential Test. Therefore the hazard and depth maps should be used to refine the information on flood risk to the site.

HAZARD AND DEPTH MAPS (SEE APPENDICES)

The following information about the flood risk in the location of this development has been sourced from the SE Lincolnshire Strategic Flood Risk Assessment (SEL SFRA).

Map 5 indicates the risk to flooding to the development area is low risk, which means the area has a chance of flooding of between 0.1% and 1%. This takes into account any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.

Map 6 indicates the hazard to people is low for the present day 1% fluvial and 0.5% tidal event probability.

Map 7 indicates the hazard to people is medium for 2115 1% fluvial and 0.5% tidal event probability.

Map 8 indicates the peak depth is 0 for the present day 1% fluvial and 0.5% tidal event probability.

Map 9 indicates the peak depth is 0.25 – 0.5m for 2115 1% fluvial and 0.5% tidal event probability.

Map 10 – Breach Locations Plan - indicates there are no breach locations within approximately 10 miles of the site.

Map 11 indicates the residual flood extent is low or medium, but reliant on protection by flood defences for this standard for the present day, 1% fluvial and 0.5% tidal event probability.

Map 12 indicates the flood probability is high for the whole surrounding area of Long Sutton including areas currently outlined in the Local Plan for new housing, for 2115 1% fluvial and 0.5% tidal event probability.

Map 13 indicates a peak depth of 0.25 to 0.5m from tidal dominated flooding for 2115 which is less than the depth of one of the sites currently outlined in the Local Plan for new housing.

Map 14 indicates the peak velocity is low or medium, but reliant on protection by flood defences for this standard for the present day, 1% fluvial and 0.5% tidal event probability.

Map 15 indicates the peak velocity is 0 - 0.3 metres per second for 2115 1% fluvial and 0.5% tidal event probability. Which is the same for the other areas outlined in the Local Plan for new housing

FLOOD MAPS SUMMARY

The actual flood hazard for the present day and 2115 is as follows:

Depth of flooding..... 0 - 0.25m

Extent of flooding..... low or medium, reliant on flood defences

Velocity ..... 0 – 0.3m per second

The residual flood hazard for the present day and 2115 is as follows:

	50 Roman Bank		Planned New Housing	
	Present Day	2115	Present Day	2115
Depth	0	0.25m - 0.5m	0	1m - 2m

Extent of flooding	Low or Med*	High	Low or Med*	High
Velocity	Low or Med*	0 - 0.3m/sec	Low or Med*	0 - 0.3m/sec

*Dependant on flood defences

EXCEPTION TEST

The Sequential Test has demonstrated that it is not possible, consistent with wider sustainability objectives, for the development to be located in zones with a lower probability of flooding. Therefore the Exception Test must be applied and for this to be passed:

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

Both parts of this test must be satisfied in order for the development to be considered appropriate in terms of flood risk. There must be robust evidence in support of every part of the test.

The first section will be demonstrated by the Supporting Planning Statement and compliance with South Holland District Council's planning policies.

This flood risk assessment will demonstrate that the development will be safe for its lifetime and it will not increase flood risk elsewhere.

CLIMATE CHANGE

The site is located within the Anglian River Basin, for sites within Flood Zone 3a and for "More Vulnerable" land uses, the Central river flow allowances figures in Table 1 should be used.

TABLE 1

Table 1 Peak river flow allowances by river basin district (1981 to 2000 baseline)

River basin district	Allowance category	Total potential change anticipated for '2020's (2015 to 2039)	Total potential change anticipated for '2050's' (2040 to 2069)	Total potential change anticipated for '2080's'(2070 to 2115)
Anglian	Central	-2%	-7%	4%
	Higher Central	4%	0%	13%
	Upper End	18%	17%	36%

The effect of climate change on peak rainfall allowances is given in Table 2.

Table 2 Peak rainfall intensity allowance in small catchments (less than 5km2) or urban drainage catchments (based on a 1961 to 1990 baseline)

Applies across all of England	Total potential change anticipated for the '2020's' (2015 to 2039)	Total potential change anticipated for the '2050's' (2040 to 2069)	Total potential change anticipated for the '2080's' (2070 to 2115)
Upper end	10%	20%	40%

Central	5%	10%	20%

The annual sea rise due to climate change is given in NPPF and the recommended contingency allowances are stated in Table 3.

Table 3 Peak sea level allowance for each epoch in (mm) per year with cumulative sea level rise for each epoch in brackets (use 1981 to 2000 baseline)

Area of England (Use River Basin)	Allowance	2000 to 2035	2036 to 2065	2066 to 2095	2096 to 2125	Cumulative Rise 2000 to 2125 (m)
Anglian	Higher Central	5.8 (203mm)	8.7 (261mm)	11.6 (348mm)	13 (390mm)	1.20m
Anglian	Upper End	7 (245mm)	11.3 (339mm)	15.8 (474mm)	18.1 (543mm)	1.60m

Higher Central

Base year 2017 – 2035@ 5.8mm/year (18 years x 5.8mm) = 104.4mm

2036 – 2065 @ 8.7mm/year (30 years x 8.7) = 261mm

2066 – 2095 @ 11.6mm/year (30 years x 11.6) = 348mm

2096 – 2121 @ 13mm/year (25 years x 13) = 325mm

Overall total = **1038mm**

Peak tide levels Present Day (2017) at West lighthouse 0.5% (1 in 200) = 5.82mODN and for year 2120 = 6.86mODN.

Upper End

Base year 2006 – 2035@ 7mm/year (29 years x 7mm) = 203mm

2036 – 2065 @ 11.3mm/year (30 years x 11.3) = 339mm

2066 – 2095 @ 15.8mm/year (30 years x 15.8) = 474mm

2096 – 2121 @ 18.1mm/year (25 years x 18.1) = 453mm

Overall total = **1469mm**

Peak tide levels Present Day (2017 at West lighthouse 0.5% (1 in 200) = 5.82mODN and for year 2121 =

7.29mODN.

The current Hazard Mapping has a Base year 2006 – 2115.

It is therefore concluded, that until the Environment Agency undertake new modelling for the Coastal Hazard Mapping, that the present-day breach mapping can be used for determining finished floor levels for residential development.

STRATEGIC FLOOD RISK ASSESSMENT

FLUVIAL FLOOD RISK

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 have responsibility.

TIDAL FLOOD RISK

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. The Environment Agency inspect these defences routinely to ensure potential defects are identified.

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

TIDAL FLOOD LEVELS

The main source of flooding is tidal/sea.

The data sheets (see appendix 16) show the Environment Agency's current best estimate for extreme tide levels.

From East Coast & Wash – 2018 Coastal Flood Boundary (CFB) Dataset

The base date for the data is 2017 for the still water levels, the Peak tide levels Present Day (2017) at West Lighthouse for the 50% confidence bound 0.5% (1 in 200 year) = 5.82m ODN

TIDAL BREACH HAZARD MAPPING

The Environment Agency has published Breach Hazard Mapping which predicts the depths, velocities and hazard (risk to people) following a breach in the tidal defences at specific locations for a 1 in 200 and 1 in 1000 year event in the present day and in 2115.
The predicted maximum values of flood depth, velocity and hazard rating (danger to people) resulting from breaching of the defences for the site are as follows (see tidal hazard maps appendix 18:

	Max Hazard	Max Depth	Max Velocity
Present Day 0.5% (1 in 200) chance	< 0.75 (Low hazard)	0 – 0.25m	0 – 0.3m/s
Present Day 0.1% (1 in 1000) chance	Between 0.75 and 1.25 (Danger for some)	0 – 0.25m	0 – 0.3m/s
2115 0.5%	Between 1.25 and 2.0 (Danger for most)	0.5 – 1.0m	0 – 0.3m/s

(1 in 200) chance			
2115 0.1% **(1 in 1000) chance**	Between 1.25 and 2.0 (Danger for most)	0.5 – 1.0m	0 – 0.3m/s

At present this site is not covered by any overtopping hazard mapping.

EXISTING FLOOD ALLEVIATION MEASURES

The site is within a defended flood plain, as defined in Appendix 1 of the Environment Agency's "Policy and Practice for the Protection of Flood Plains", which is considered to be passive until such time that a flood greater than the defences can withstand occurs. The likelihood of flooding occurring due to overtopping or failures of the defences is considered to be very low.

The site is located approximately 4.6 km from the tidal section of the River Nene and 10.0km from the Wash defences at the nearest point. The tidal defence banks to all of these are maintained by the Environment Agency.

The major watercourses in the area are maintained by South Holland IDB, which has carried out improvement schemes so that IDB watercourses generally provide at least a 1 in 50 year standard against flooding of agricultural land and aim to provide a 1 in 100 year standard to urban areas.

EXISTING GROUND LEVELS AND PROPOSED LEVELS OF BUILDINGS

The level of the development site is approximately 3.20m OD. The level of Roman Bank is 3.50m OD west of the proposed development site.

POTENTIAL SOURCES OF FLOODING

The potential sources of flooding to the site are:

1. Failure or overtopping of tidal defences of the River Nene.

2. High water levels in IDB drainage channels.

3. Localised flooding in the area.

1. FAILURE OR OVERTOPPING OF TIDAL DEFENCES OF THE RIVER NENE

At present this site is not covered by any overtopping hazard mapping.

2. HIGH WATER LEVELS IN IDB DRAINS

Although the whole of this area is below high tide level and levels in the rivers, the retained water levels in the drainage channels ensure that the risk of flooding is extremely low. South Holland IDB maintains a system of sluices, pumping stations, and drainage channels which convey surface water into the River Nene and the Wash and control water levels throughout the South Holland IDB area.

The watercourse on the northern side of Bridge Road is maintained by South Holland IDB. This flows north eastwards through a network of drainage channels and discharges into Tidal River Nene through Luton Sluice, which is maintained by South Holland IDB.

The channels maintained by South Holland IDB in urban areas are classified as high priority watercourses and as such receive a higher maintenance priority.

There are possibilities of failure of outfall sluices, but these are mitigated by the high level of maintenance given to these structures by the IDB. If a failure did occur the IDB would immediately be warned of the problem by their telemetry system and take action to repair the fault or to bring in temporary pumps to reduce the risk of any flooding in the area. Similarly any failures of culverts or other blockages would be dealt with immediately.

IDB systems are designed to provide a freeboard of between 600mm and 1000mm to all land in a 1 in 10 year return period rainfall event. This normally provides a standard of service of between 1 in 50 years and 1 in 100 years against flooding. In an extreme event water levels will rise but this will be a slow process and it would be at least 24 hours before levels were high enough to begin to flood low land in the area, and after this the level of the flood water would need to rise at least another 500mm before the development site would be affected.

Therefore the risk of flooding from IDB drainage channels can be considered to be extremely low.

4. LOCALISED FLOODING IN THE AREA

There is a very low risk of flooding from surface water as confirmed by the Environment Agency surface water flood risk map (see appendix 19).

EXTENT OF KNOWN FLOODING

With regards to the history of flooding, the Environment Agency have confirmed they do not have any records of flooding in this area.

PROBABILITIES AND TRENDS OF FLOODING

The Environment Agency do not consider this site to be at risk of flooding from main rivers

RESIDUAL RISK – EXTREME EVENTS

The residual risk from extreme events is very low on this site. The major risk to the site is from a breach of the tidal defences. The risk of this happening in this case is low and the hazard from any flooding is also low.

FLOOD PROTECTION

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

Flood-resistance or proofing works: - these try to reduce the amount of water entering a building.

Flood-resilient works: - these reduce the amount of damage caused by water entering the building.

The ground floor of the buildings should be a minimum of 500mm above existing ground level at a level of 3.70m OD and all sleeping is located at first floor level which provides a safe haven for the residents.

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

CONCLUSIONS

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

The existing property is shown to be located within Flood Zone 3a 'High Probability' as detailed on the Environment Agency's Flood Zone Maps **without defences**, and as defined in Table 1 of NPPG**.**

The Flood Risk Vulnerability Classification in Table 2 of NPPG states that the proposed development is classified as "More Vulnerable", with Table 1 of NPPG stating that such development is appropriate in this flood zone subject to the Sequential and Exception Test.

The site-specific flood risk assessment demonstrates that the development is safe for its lifetime

The risk of flooding caused by overtopping or breaching of the east bank of the tidal River Nene is at Low risk of flooding. **Low risk** means that each year this area has a chance of flooding of between 0.1% and 1%.

The SFRA predicts that the depth of flooding if a breach occurred during a 1 in 200 year event in 2115 would be between 500mm and 1000mm. However, the more recent maps from the EA indicate the depth of flooding following a similar event would be between 300mm and 1.5 metre. Both the SFRA and the EA maps indicate that there is a low risk of flooding at the present time, a lower risk than the proposed development sites in the Local Plan.

The raising of the floor levels to 3.70m OD will ensure that the risk of flooding, if there is a serious failure of the IDB drainage system, is extremely low, and is only likely to occur in a greater than 1 in 100 year event.

There are no local site-specific risks that would adversely affect the flood risk categorisation of the site. Similarly, there are considered to be no increased risk of offsite flooding risks as a result of the development.

Flooding from other sources is unlikely to affect the site.

RECOMMENDATIONS

In any area at risk of flooding it is preferable that new dwellings should be of two story construction with all bedrooms at first floor level. This is to provide a refuge for residents if the building becomes flooded after a major breach of the tidal bank, and ensure there is no danger to residents when they are asleep.

The ground floor level of the proposed replacement buildings should be a minimum of 500mm above existing ground level at a level of 3.70m OD and should have all bedrooms at first floor level.

The development should take into consideration flood protection works by either of the following means:

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

Occupiers of the property should register with the Environment Agency's Floodline Warnings Direct Service.

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19th April 2022

This flood risk assessment has been prepared solely to support the planning application for a development at 50 Roman Bank, Long Sutton. The author has made every effort to provide an accurate assessment of the flood risk but accepts no liability should the information be found to be incorrect or incomplete.

APPENDICES

APPENDIX 1 - MAP 1 - LOCATION MAP

Ordnance Survey Plan Grid Ref: TF 43827 22826:

X (Eastings) 543827

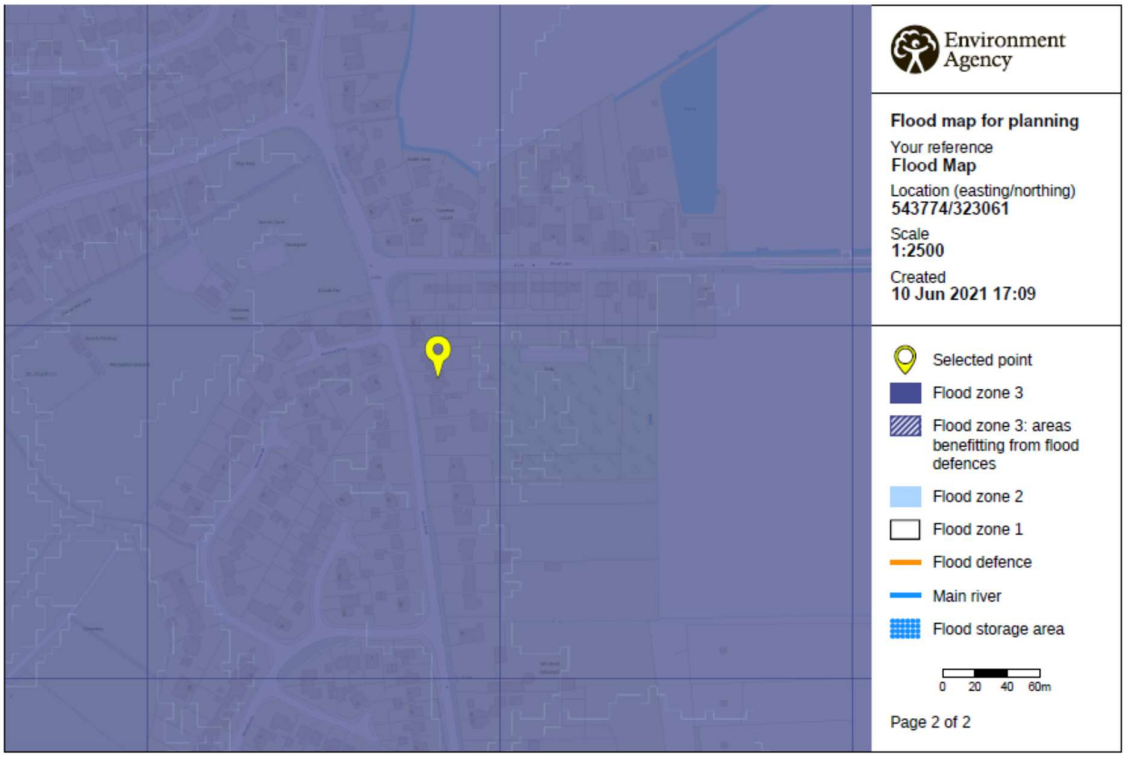
Y (Northings) 522826



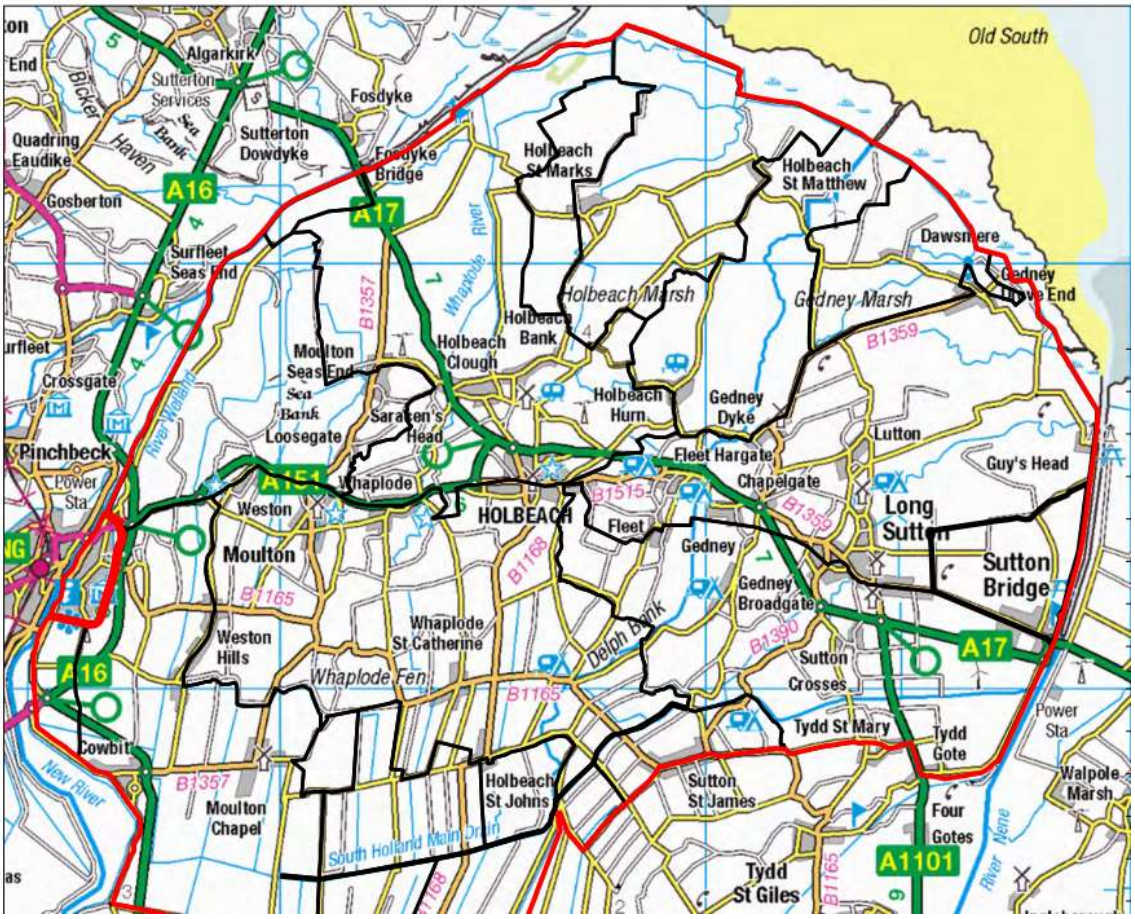
APPENDIX 2 - MAP 2 – BLOCK PLAN



APPENDIX 3 - MAP 3 - FLOOD ZONE MAP

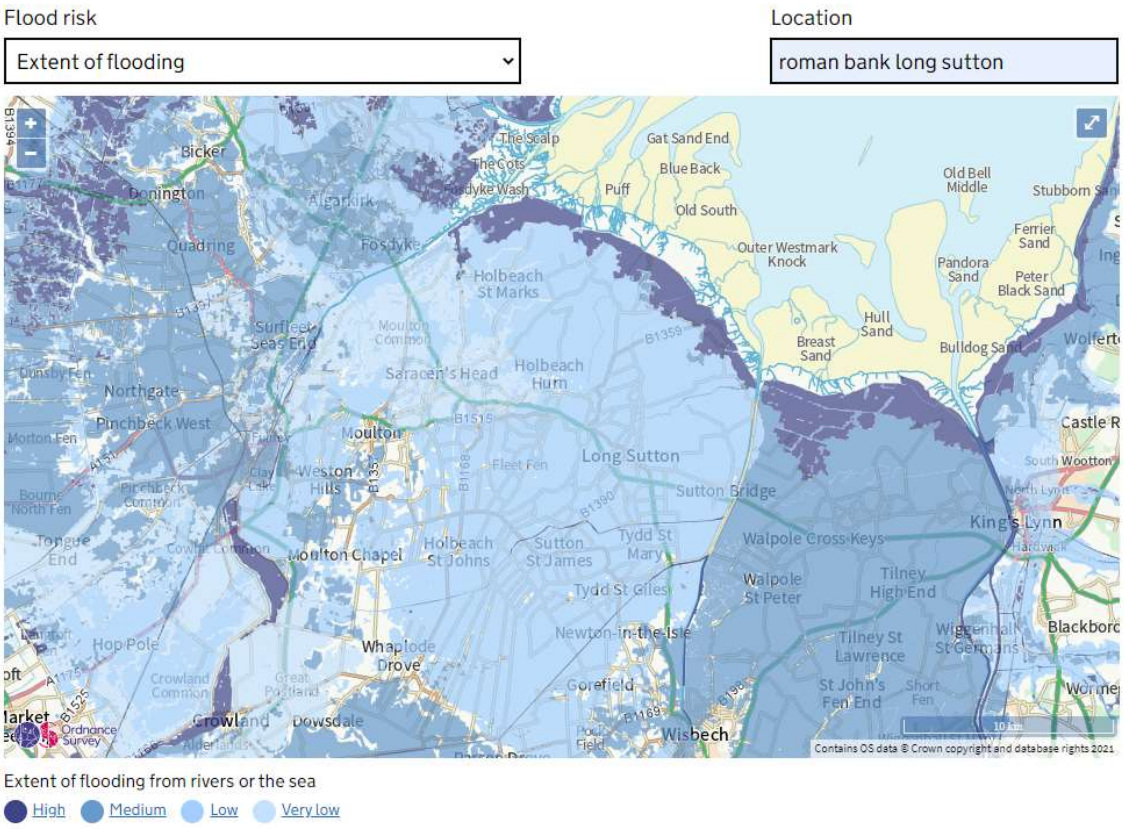


APPENDIX 4 - MAP 4 - SOUTH HOLLAND IDB MAP



APPENDIX 5 - MAP 5 - FLOOD RISK FROM RIVERS OR THE SEA– EXTENT OF FLOODING

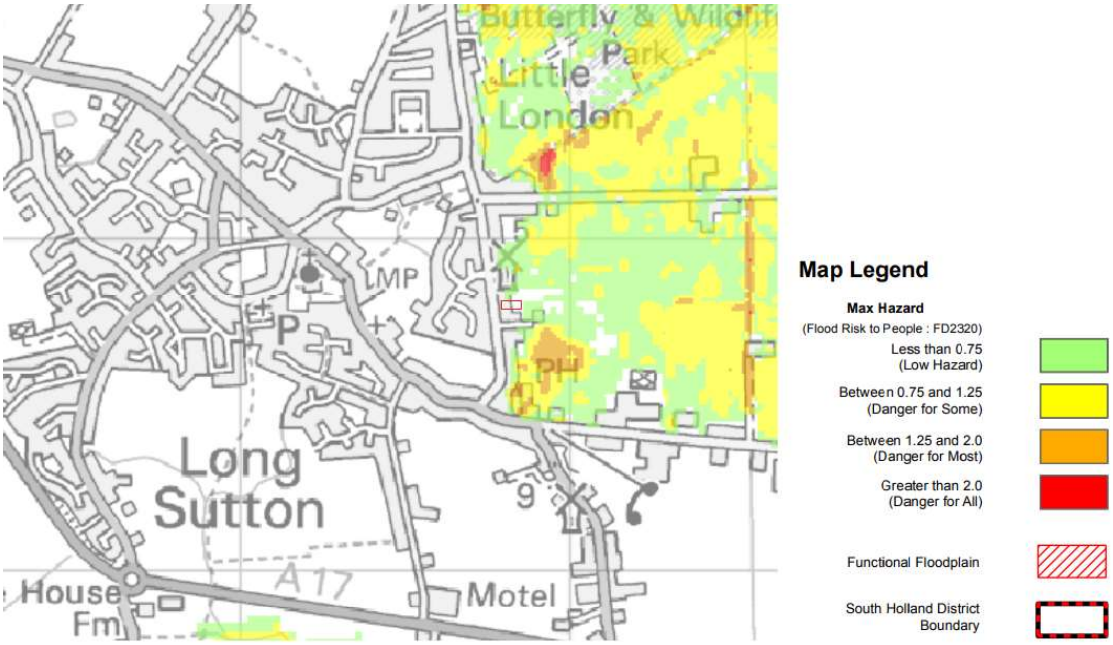
The following map indicates the risk to flooding to the development area is low risk, which means the area has a chance of flooding of between 0.1% and 1%. This takes into account any flood defences in the area. These defences reduce but do not completely stop the chance of flooding as they can be overtopped, or fail.



THE FOLLOWING PLANS ARE TAKEN FROM THE SOUTH EAST LINCOLNSHIRE STRATEGIC FLOOD RISK ASSESSMENT (MARCH 2017) APPENDIX A – FLUVIAL & TIDAL HAZARD MAPPING

APPENDIX 6 - MAP 6 - RESIDUAL FLOOD HAZARD SOUTH HOLLAND DISTRICT PRESENT DAY 1% FLUVIAL / 0.5% TIDAL MAP

http://www.southeastlincslocalplan.org/wp-content/uploads/2017/03/Residual_Flood_Hazard_District_Present_Day_1_Fluvial_05_Tidal_20170224-1.pdf



APPENDIX 7 - MAP 7 - RESIDUAL FLOOD HAZARD SOUTH HOLLAND DISTRICT 2115 1% FLUVIAL / 0.5% TIDAL MAP

http://www.southeastlincslocalplan.org/wp-content/uploads/2017/03/Residual_Flood_Hazard_District_2115_1_Fluvial_05_Tidal_20170224-1.pdf

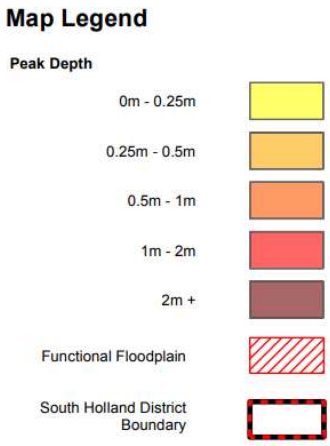


THE FOLLOWING PLANS ARE TAKEN FROM THE SOUTH EAST LINCOLNSHIRE STRATEGIC FLOOD RISK ASSESSMENT (MARCH 2017) APPENDIX B – FLUVIAL & TIDAL DEPTH MAPPING

APPENDIX 8 - MAP 8 - RESIDUAL FLOOD DEPTH SOUTH HOLLAND DISTRICT PRESENT DAY (1% FLUVIAL / 0.5% TIDAL) MAP

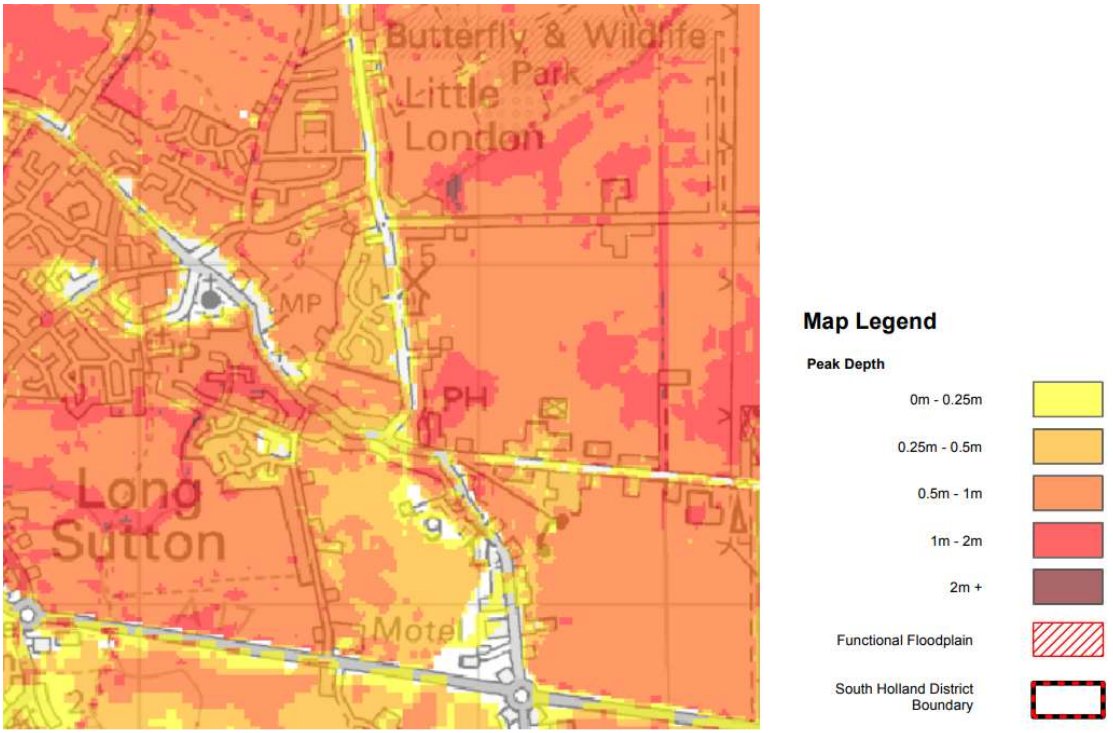
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APPENDIX 9 - MAP 9 - RESIDUAL FLOOD DEPTH – SOUTH HOLLAND DISTRICT 2115 (1% FLUVIAL / 0.5% TIDAL) MAP

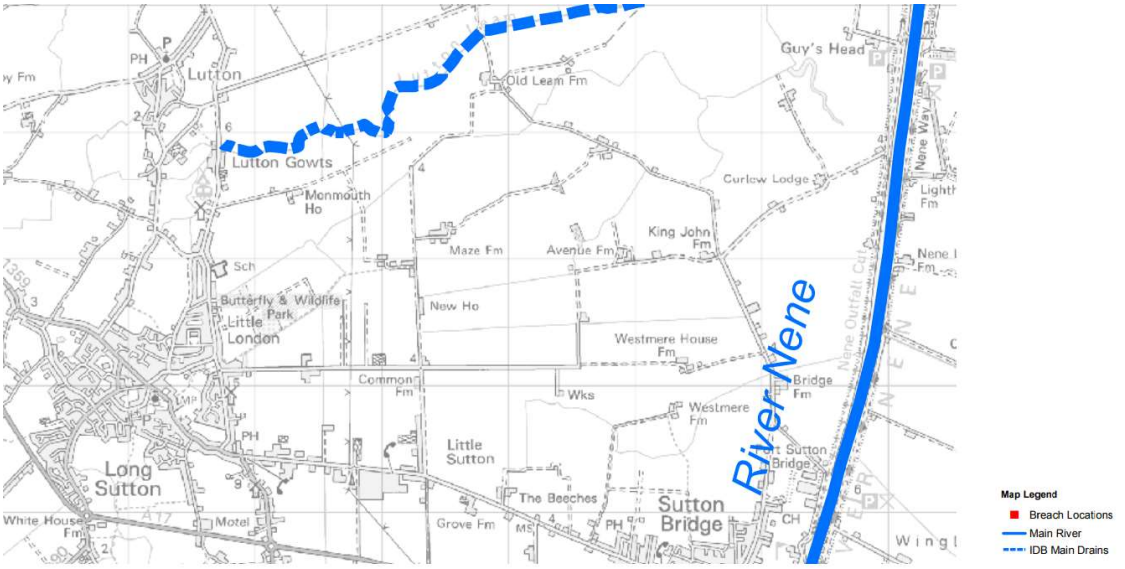
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THE FOLLOWING PLANS ARE TAKEN FROM THE SOUTH EAST LINCOLNSHIRE STRATEGIC FLOOD RISK ASSESSMENT (MARCH 2017) APPENDIX C – STANDING ADVICE & OTHER MAPS

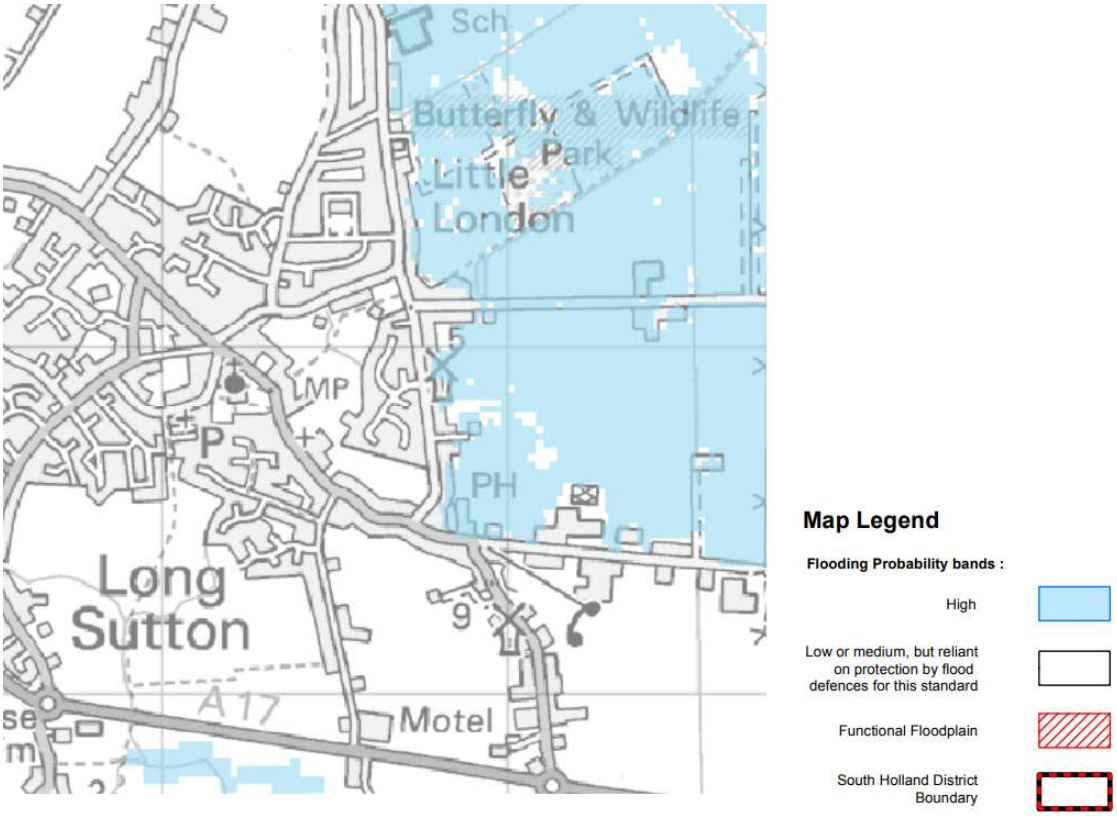
APPENDIX 10 - MAP 10 - BREACH LOCATIONS PLAN

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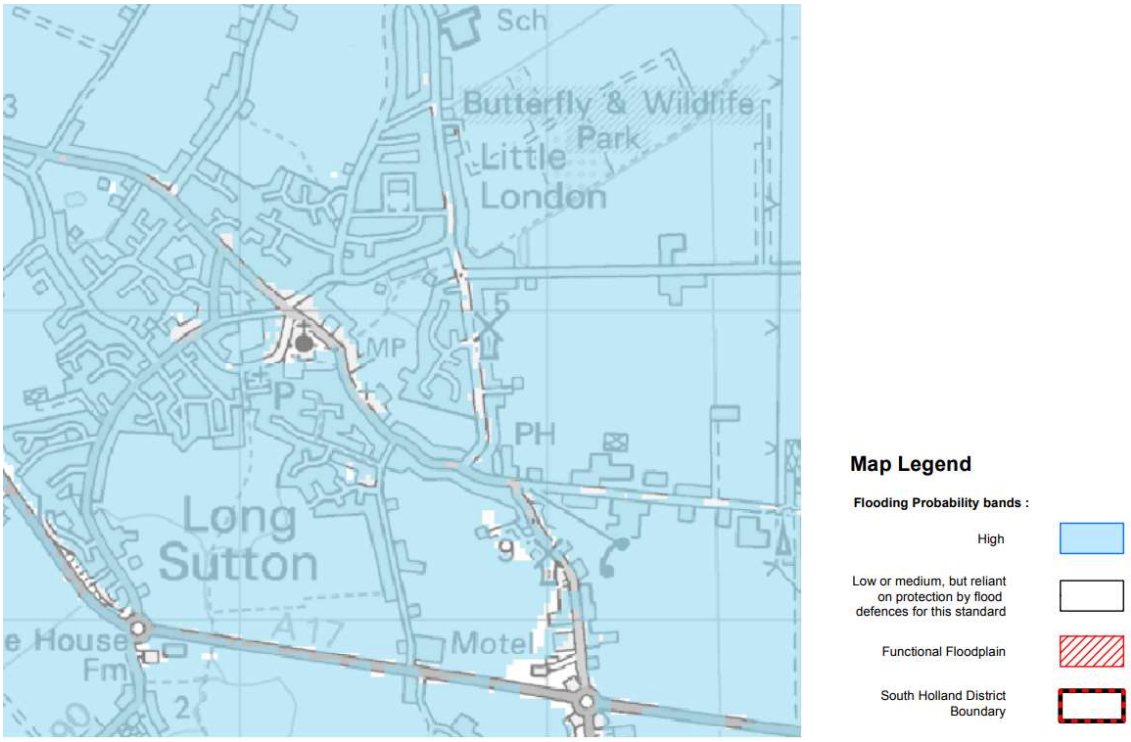
APPENDIX 11 - MAP 11 - RESIDUAL FLOOD EXTENT SOUTH HOLLAND DISTRICT PRESENT DAY (1% FLUVIAL / 0.5% TIDAL) MAP

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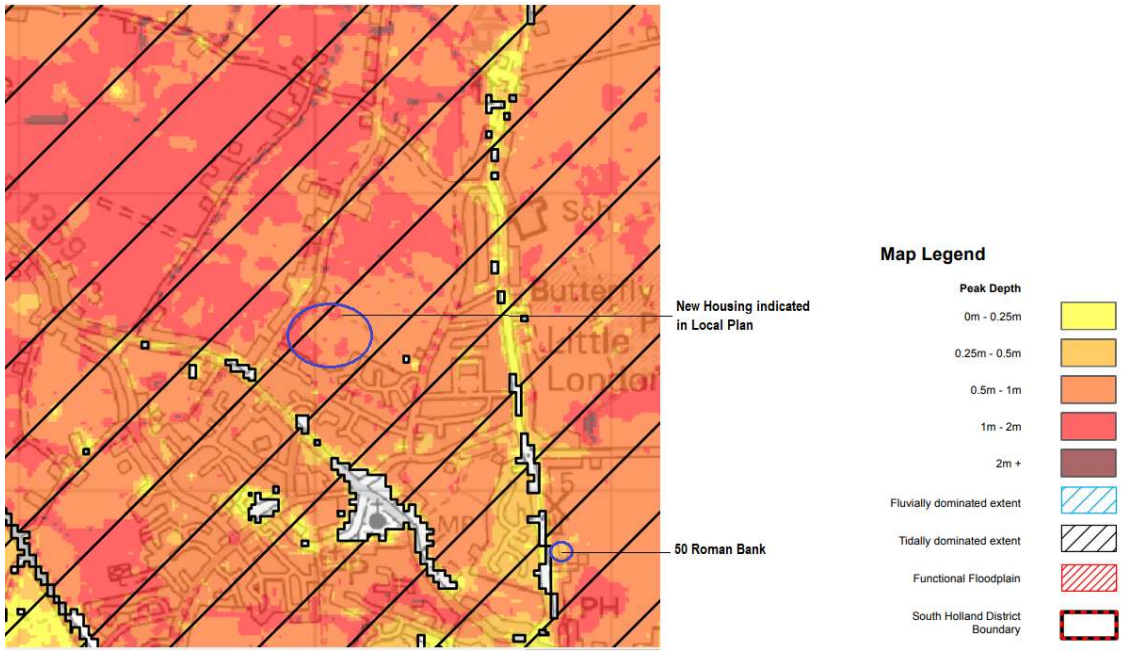
APPENDIX 12 - MAP 12 - RESIDUAL FLOOD EXTENT SOUTH HOLLAND DISTRICT 2115 (1% FLUVIAL / 0.5% TIDAL) MAP

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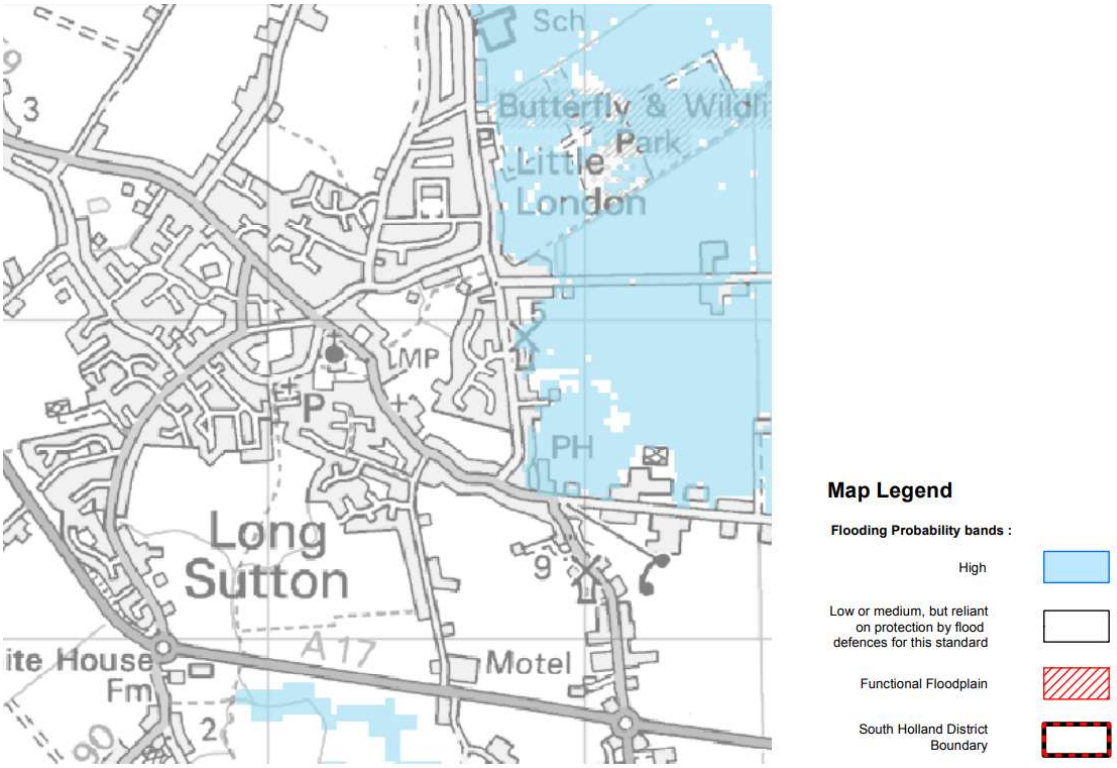
APPENDIX 13 - MAP 13- RESIDUAL PEAK DEPTH EXTENT OF FLUVIAL & TIDAL DOMINATION 2115 SOUTH HOLLAND DISTRICT

http://www.southeastlincslocalplan.org/wp-content/uploads/2017/03/Tidal_Fluvial_Dominated_Extent_District_2115_1_Fluvial_05_Tidal_20170302-1.pdf



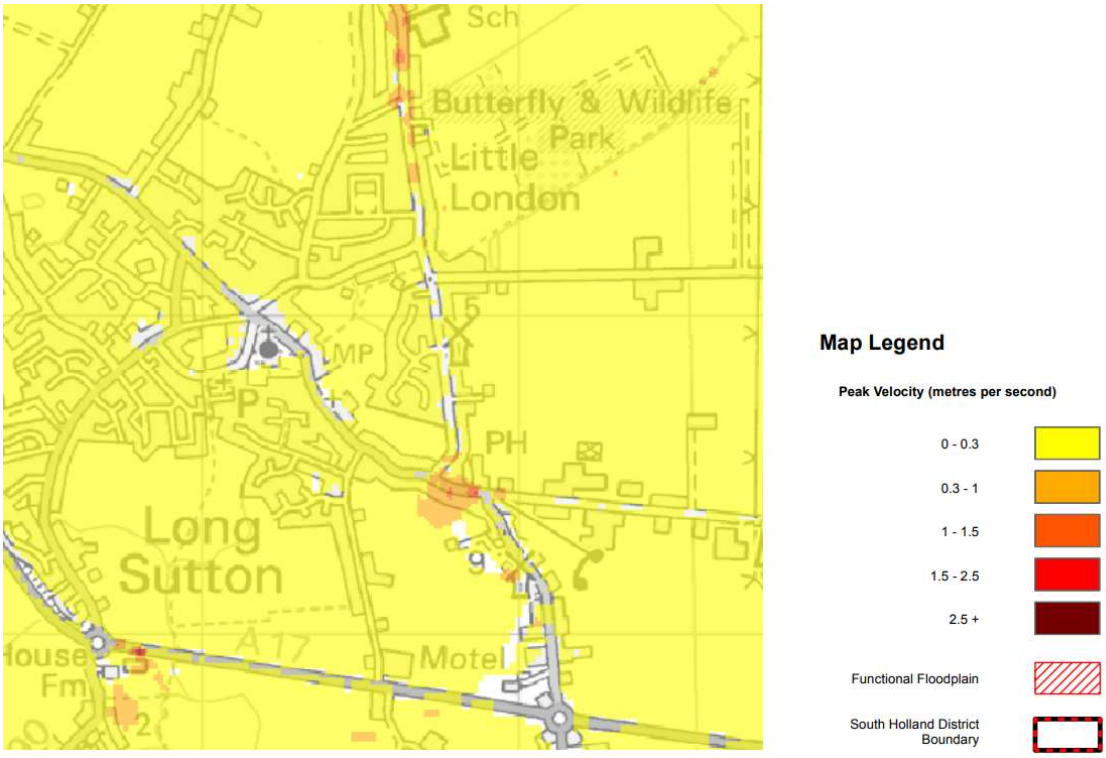
APPENDIX 14 - MAP 14 - RESIDUAL FLOOD VELOCITY SOUTH HOLLAND DISTRICT PRESENT DAY (1% FLUVIAL / 0.5% TIDAL) MAP

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APPENDIX 15 - MAP 15 - RESIDUAL FLOOD VELOCITY SOUTH HOLLAND DISTRICT 2115 (1% FLUVIAL / 0.5% TIDAL) MAP

http://www.southeastlincslocalplan.org/wp-content/uploads/2017/03/Residual_Flood_Velocity_District_2115_1_Fluvial_05_Tidal_20170228-1.pdf



East Coast and Wash: Immingham to the West Lighthouse

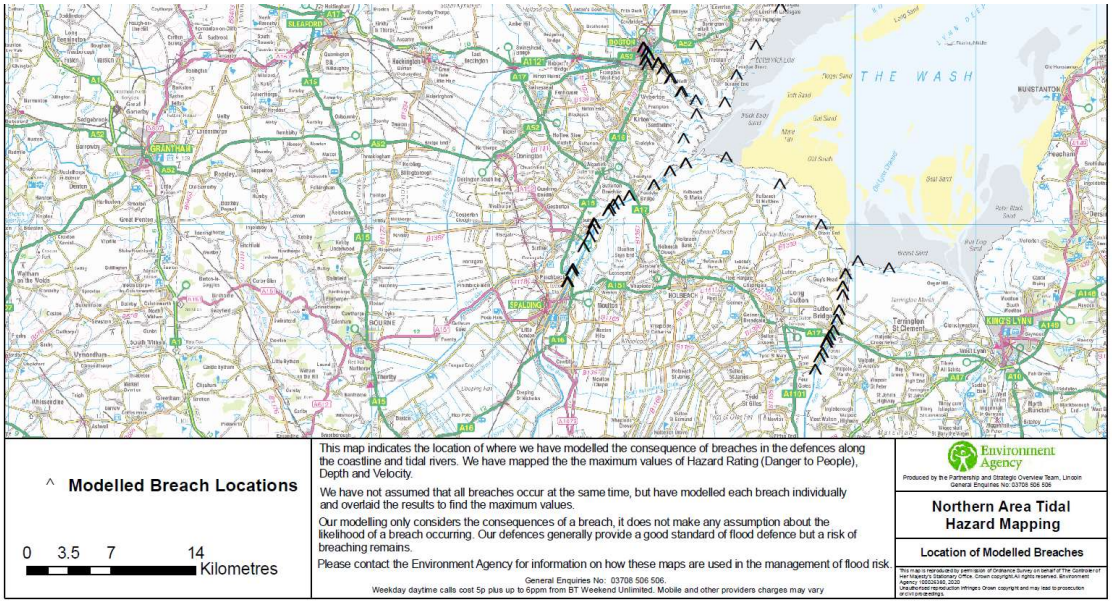
2018 Coastal Flood Boundary Extreme Sea Levels

Environment Agency

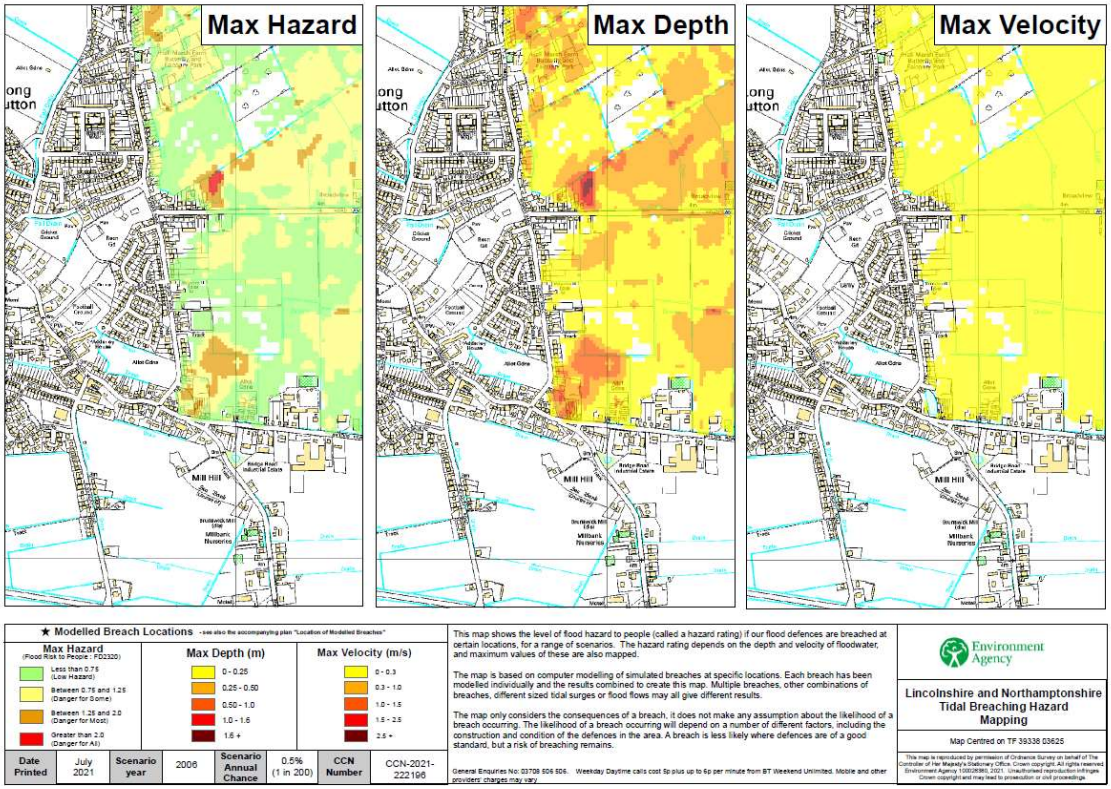
CFB Ref	Location	Easting	Northing	Annual Chance (1 in x) of Tide Level in metres ODN																			
				1			10			50			100			200			300			1000		
				Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound			Confidence Bound		
				2.5%	50%	97.5%	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	-	-	-	-	-	-	-

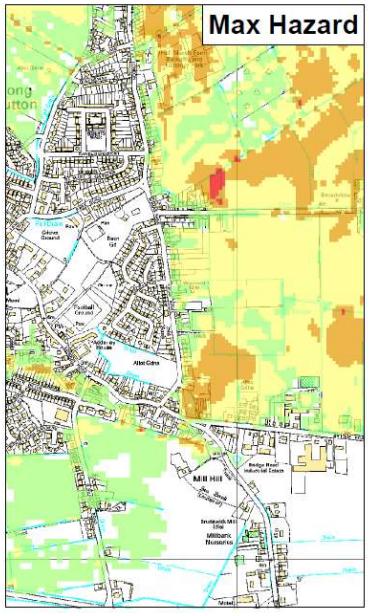
See next page for notes

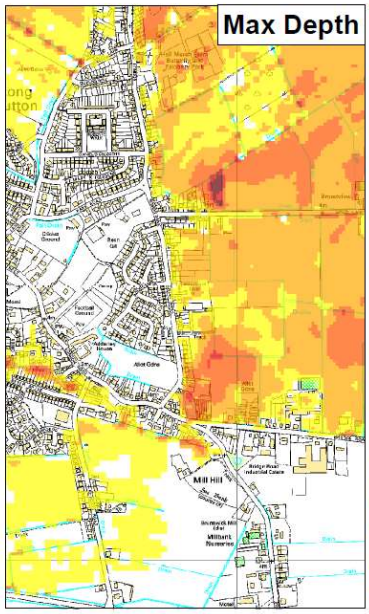
APPENDIX 17 - MODELLED BREACH LOCATIONS

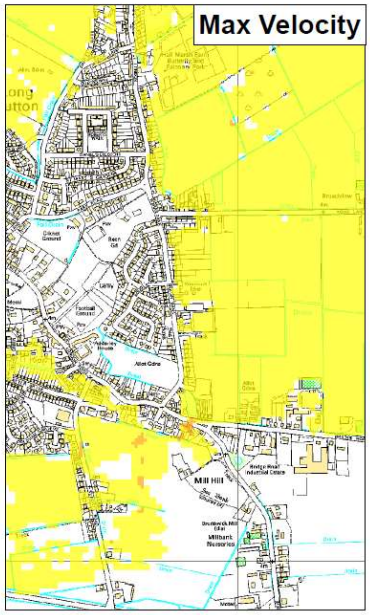


APPENDIX 18 – TIDAL HAZARD MAPPING BREACHES









★ 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	July 2021	Scenario year	2006	Scenario Annual Chance	0.1% (1 in 1000)	CCN Number	CCN-2021-222196

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.

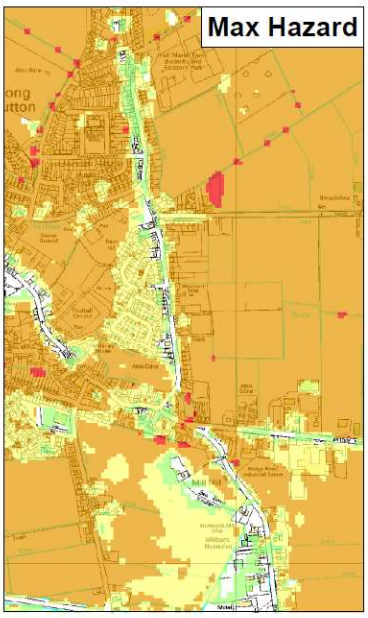
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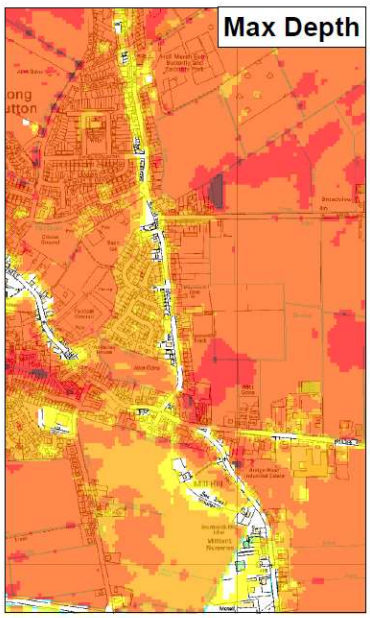
Environment Agency

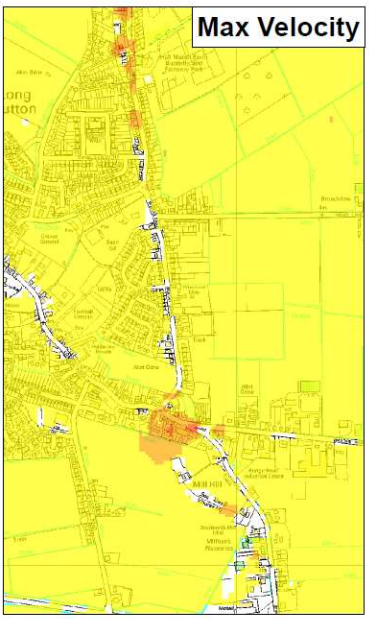
Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

Map Centred on TF 39338 03625

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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	July 2021	Scenario year	2115	Scenario Annual Chance	0.5% (1 in 200)	CCN Number	CCN-2021-222196

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.

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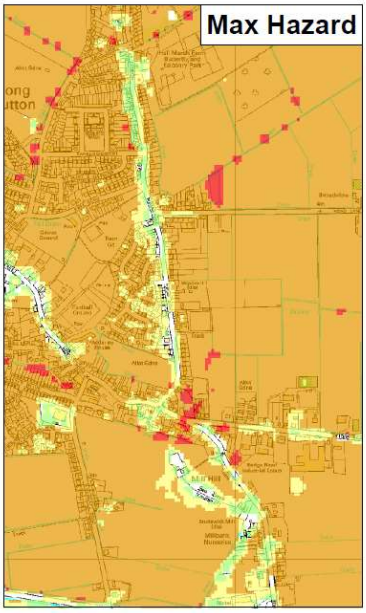
General Enquiries No: 03708 506 506. Weekday Daytime calls cost 5p plus up to 6p per minute from BT Weekend Unlimited. Mobile and other providers' charges may vary.

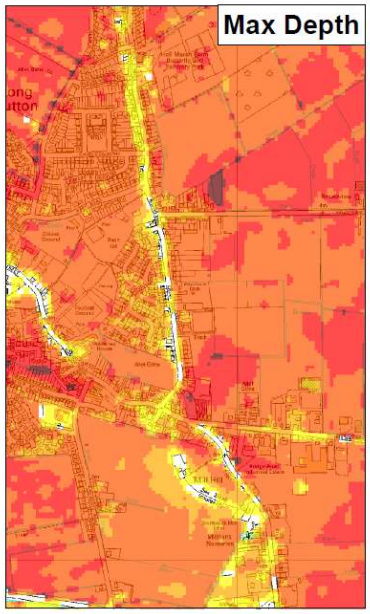
Environment Agency

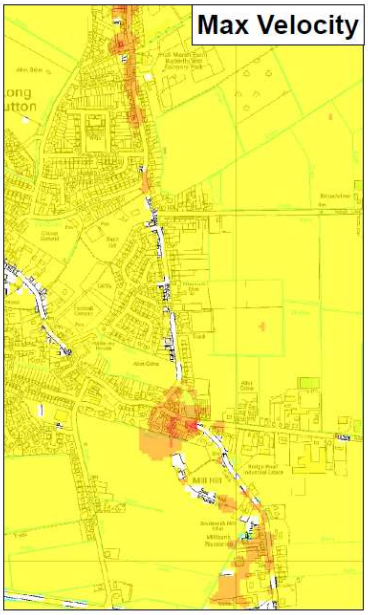
Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

Map Centred on TF 39338 03625

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

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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	July 2021	Scenario year	2115	Scenario Annual Chance	0.1% (1 in 1000)	CCN Number	CCN-2021-222196

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Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

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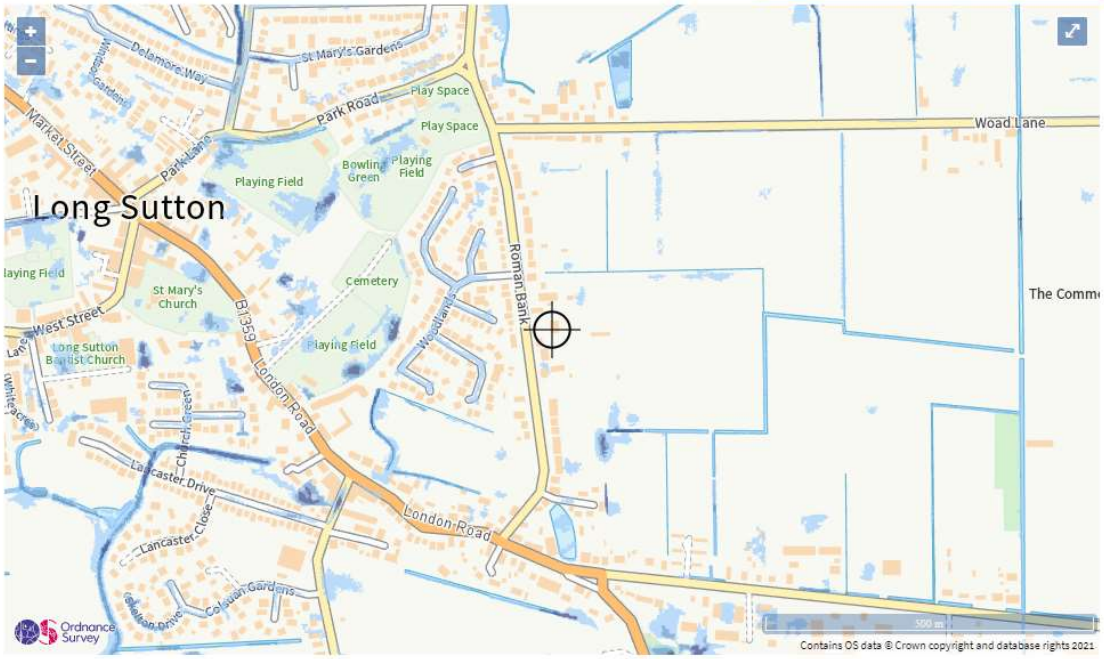
APPENDIX 19 – ENVIRONMENT AGENCY SURFACE WATER FLOOD RISK PLAN

Flood risk

Extent of flooding

Location

PE12 9LB



Extent of flooding from surface water

High Medium Low Very low Location you selected