FLOOD RISK ASSESSMENT
FOR PROPOSED
RESIDENTIAL DEVELOPMENT AT
BRIDGE ROAD, LONG SUTTON, LINCS.

FINAL REPORT

GEOFF BEEL CONSULTANCY

APRIL 2020

GCB/SWANN EDWARDS

DISCLAIMER

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Swann Edwards drg. no. SE-1146 PP1110

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CCN-2016-25722

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1.0 INTRODUCTION

1.1 A full planning application is to be submitted by Swann Edwards Architecture Ltd on behalf of IMN Properties Ltd for proposed residential development at land off Bridge Road, Long Sutton, Lincs.

1.2 A Flood Risk Assessment is required to accompany the planning application and meet the requirements and general principles of the Planning Practice Guidance to the National Planning Policy Framework (NPPF) and for approval by the Environment Agency.

The site, as situated, is located within Flood Zone 3, of the Environment Agency's Flood Map for Planning. The latest Agency Flood Maps have been created as a tool to raise awareness of flood risk with the public and our partner organisations, such as Local Authorities, Emergency Services and Drainage Authorities. The Maps do not take into account any flood defences.

The site is also shown in Flood Zone 3 of the South East Lincs. Strategic Flood Risk Assessment Map (2018) and located in the South Holland IDB drainage district.

1.3 Geoff Beel Consultancy was appointed on 23rd April 2020 to undertake a Flood Risk Assessment.

1.4 A previous Flood Risk Assessment prepared by the author in April 2017 was approved by the Environment Agency who requested that finished floor levels be no lower than 500mm above existing ground levels with flood resilient/resistance measures and the dwellings to be two storey but the planning application was refused planning approval on 22nd September 2017.

1.5 The development has subsequently been approved upon appeal ref: APP/A2525/W/18/3196554 dated 5th September 2018 and the Planning Inspector has imposed the following condition:

7) The following mitigation measures shall be implemented in complying with the Flood Risk Assessment ref: GCB/Swann Edwards dated April 2017:

i) all dwellings shall rise to two storeys in height
ii) finished floor levels shall be set at least 500mm above existing ground level; and
iii) flood resilient construction shall be incorporated within the development up to 300mm above finished floor level.

2.0 LOCATION

2.1 The development site is located at land south of Bridge Road, Long Sutton. The National Grid Reference of the central point of the development is TF 44152240.

2.2 The position and extent of the site is shown on Fig 1 – Planning Drawing; Location Plan & Site Plan at the end of the document.

2.3 The site, located within the South Holland Internal Drainage Board district is shown within Flood Zone 3 as detailed on both the Environment Agency Flood Map for Planning and of the Council's Strategic Flood Risk Assessment Map (2018).

3.0 THE SITE AND SEQUENTIAL TEST

3.1 The site is currently waste ground off Bridge Road, Long Sutton.

3.2 The area of development is approximately 0.40 hectare.

3.3 The proposed site layout consists the construction of nine two-storey dwellings. Ground level is generally at 3.60m aOD whilst Bridge Road carriageway level is at 4.40m aOD.

3.4 The Sequential Test and Exception Test will require to be applied but the development may be permitted as the site is protected against both the 1 in 200 year return period tidal event and the 1 in 100 year return period fluvial event and has been approved on appeal.

Flood mitigation measures have been incorporated into the design and construction of the new dwellings by raising finished floor levels above the existing ground level to safeguard against the risk of flooding as a result of a breach to the tidal defences and to ensure the proposals pass Part 2 of the Exception Test with an adequate water exclusion strategy for the design flood and breach event.

4.0 EXISTING FLOOD ALLEVIATION MEASURES

4.1 The site is within a defended floodplain, as defined in Appendix 1 of the Environment Agency's 'Policy for the Protection of Floodplains' and is considered to be passive until such time as a flood greater than that for which the defences were designed occurs. The likelihood of flooding due to overtopping or failure of a flood defence embankment is considered to be small.

The South Holland Internal Drainage Board is protected by a combination of the River Welland tidal defences downstream of Spalding, the River Welland fluvial embankments as well as the River Nene tidal defences downstream of Foul Anchor.

4.2 The site and the surrounding land drains by gravity to the Board's main drain system and hence via the Sutton Bridge Sluice to discharge into the tidal River Nene upstream of Sutton Bridge.

4.3 The existing standard of drainage for the South Holland Internal Drainage Board is 1 in 50 years return period, compatible with the Department of the Environment, Food and Rural Affairs target level of service for rural drainage and flood defence works. Freeboard of 900mm is provided to the lowest land levels.

4.4 Current maintenance standards within the South Holland Internal Drainage Board and of the Environment Agency defences are generally very good.

During the operation and maintenance of its pumping stations, associated structures and channel systems, particularly those that could affect property, the Board 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. However, bank slips, blocked culverts etc may occur from time to time and these matters are usually dealt with promptly.

5.0 POTENTIAL SOURCES OF FLOODING

5.1 Four potential sources of flooding have been identified as a result of this assessment:

a) local blockages to IDB main drain system.
b) storm return period of 1 in 50 years being exceeded
c) failure of the Sutton Bridge Outfall Sluice
d) overtopping and breaching the tidal River Nene defences

5.2 The probability of flooding from source a) is low due to the maintenance standards already achieved and managed by the IDB.

The probability of flooding from b) is also low due to the South Holland IDB main drain design standard incorporating a minimum 900mm freeboard to the lowest land level which provides adequate storage in events greater than 1 in 50 years.

Previous historic rainfall events of 1968 and 1978, estimated to be greater than 1 in 100 year events, caused no flooding to any residential properties at the time and the Boards policy is to provide a standard of drainage which satisfies NPPF requirements of a 1 in 100 year return period for fluvial protection inclusive of the effects of climate change and developments to the arterial system enables a flexible approach to be adopted and meet the criteria for "sustainable urban drainage".

5.3 Failure of the Sutton Bridge Outfall Sluice may occur due to long term mechanical breakdown or power supply being disrupted. However, in these circumstances, if conditions were such as 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 utilising temporary pumping equipment. The probability of such an occurrence is also considered to be low.

5.4 The flood embankments to the tidal River Nene provide a 1 in 200 year return period level of protection. Surface water drainage from the site will be to a sustainable drainage system and Building Regulations approval.

5.5 The South East Lincs. Strategic Flood Risk Assessment Residual Flood Depth Maps show the site to be flooded to between 0.00 – 0.50m whilst more recent Tidal Hazard Mapping prepared by the Environment Agency indicates that the development site could be flooded to a depth of between 0.25 – 0.50m. It is necessary to mitigate against such risks with finished floor level raised 500mm above ground level and flood resilient construction incorporated up to 300mm above finished floor level.

6.0 EXTENT OF FLOODING

6.1 During the preparation of this assessment, no evidence was discovered of the site being flooded or of any adjoining properties.

7.0 PROBABILITIES AND TRENDS OF FLOODING

7.1 The probability of this development flooding from localised drainage systems is very low.

7.2 The probability of the site flooding with water from any South Holland IDB main drain is less than 1% because of the standards of the existing flood defence systems, storage within existing drainage channels and the location of the site.

7.3 The probability of the site flooding with fluvial waters from any main river system is less than 1% because of the standards of the existing flood defences and the location of the site.

7.4 If under very extreme events, levels of floodwater from the South Holland IDB main drains or arterial systems rose to such an extent that the site was affected, the situation would not be sudden. It is very probable that sufficient time would be available to take precautionary actions to limit the extent and potential impact of flooding.

7.5 The water levels in the drainage channels will tend to rise as a result of the impacts of climate change. However the existing systems and defences together with the proposed floor level 500mm above ground level with flood resilient construction up to 300mm above finished floor level will be appropriate for the design life of the development (i.e. 100 years).

7.6 Safe refuge will be available at first floor level.

7.7 The developer will 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 provides a Flood Warnings Service which includes Flood Warnings Codes and uses direct warning methods where the risks and impacts of flooding are high. Indirect warnings are provided to all flood risk areas, even those at low risk of flooding. The main method is media broadcasts via local radio and also be television.

In addition to direct and indirect flood warnings, the Environment Agency operates a 24 hour a day Floodline Service providing advice and information on flooding contact tel: 0345 988 1188. The occupiers of the dwellings should register with the Floodline Direct Warnings Service to receive any future flood warnings.

8.0 IMPACTS OF FLOODING

8.1 No significant impacts of flooding are anticipated.

8.2 Floor level of the development will be 500mm above existing ground level which together with the proposed flood resilient construction will offer additional protection against impacts arising from any extreme short duration, localised events.

8.3 The general location of the site within the catchment is such that if flooding occurred from any of the South Holland IDB main drain systems, then probably 2 to 3 days warning time would be available.

8.4 No displacement of water from the site will affect any adjoining properties as a sustainable drainage system has been designed to meet Building Regulations approval.

8.5 Safe and dry access/egress is available to Bridge Road and hence in a westerly direction to Holbeach where land is in Flood Zone 1.

9.0 RESIDUAL RISK – EXTREME EVENTS

9.1 The residual risk from extreme events is very low on this site, because of its location, within the South Holland IDB area and its location 4.00kms from the River Nene tidal defences.

9.2 Although within Flood Zone 3 according to NPPF classification, the site actually has a very low risk of flooding due to the current standards of drainage and flood defence and land levels. The site is not located within a Functional Flood Plain of any 'main river' or 'main drain'. The Environment Agency Flood Map for Planning has been produced irrespective of existing flood defences and standards of protection.

9.3 South Holland District Council and Boston Borough Council in conjunction with the Environment Agency and the local IDB's within the Council area have carried out a Strategic Flood Risk Assessment of the whole District by appointed Consulting Engineers.

The South East Lincs. Strategic Flood Risk Assessment has produced definitive Flood Risk Maps similar to those published by the Environment Agency and at the same time has analysed flood return periods of all tidal and fluvial defences for years 2002 and 2115 to account for the effects of climate change.

Breach scenarios of embankments failing and/or being overtopped have also been carried out to establish Flood Risk Zones. The site is shown as being liable to flooding of between 0.25 – 0.50m on both the Council's Strategic Flood Risk Assessment Maps and the Environment Agency Tidal Hazard Mapping as a result of a failure of the River Nene tidal defences.

9.4 As a result of the Strategic Flood Risk Assessment; the South Holland Main Drain and associated IDB main drains have been determined as providing protection against a 1 in 100 year return period event both in year 2115.

10.0 CONCLUSIONS AND RECOMMENDATIONS

10.1 As a result of the assessment, the following conclusions have been reached:-

- The proposed development is not in a Functional Floodplain. It is located in the Passive Floodplain protected by the River Nene tidal defences and the South Holland IDB to a 1 in 200 year return period, (0.5%).

- Although the site is in Flood Zone 3, the actual risk of site flooding from any Environment Agency river system is very low (less than 0.5%). The site has been identified as liable to flooding of between 0.25 – 0.50m depth due to the failure of the River Nene tidal defences on the Council's South East Lincs. Strategic Flood Risk Assessment Maps and the Environment Agency Tidal Hazard Mapping.

- Although the site is located within an Internal Drainage District with a minimum standard of drainage of 1 in 50 years, this accords with Defra guidelines for rural development. Freeboard to design water level of 900mm to lowest land level is available for events greater than 1 in 50 years providing further storage within the drainage channels.

- Floor level of the two storey dwellings will be raised 500mm above lowest ground level with flood resilient construction up to 300mm above finished floor level and safe refuge available at first floor level.

- On site rainwater from the development will be discharged via a sustainable drainage system designed to meet Building Regulations and Internal Drainage Board requirements.



Site Plan

Scale: 1:250

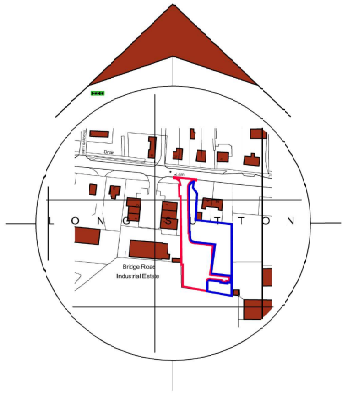
Landscaping Description	
T - Trees to include Prunus ('Flowering Cherry) 'Accolade' Field Maple (Acer campestre) Mountain Ash (Sorbus aucuparia) Whitebeam (Sorbus aria majestica) Size 10-12cm planted.	GC - Ground Cover Plants Cotoneaster Horizontalis, Hedera Helix, Lavendula Spica 6 plants per sq m. 15cm planting size
SP - Shrub Planting to include Lonicera Pileatea, Spiraea Good Flame, Sceaseo Creyii, Rosa Rugosa, Prunus Laurocerasus, Syringa Vulgaris C3 pot size, planting size 40-60cm, planted at 750mm ctrs.	Hedging - Laurel
Landscaping Notes - All planting, seeding or turfing as shown on the above landscaping plan are to be carried out in the first planting and seeding seasons following the occupation of the dwelling of the completion of the development, whichever is sooner; and any trees or plants which within a period of 5 years from the completion die are to be removed and replaced with others of a similar size and species, unless the Local Planning Authority gives written consent to any variation.	

Method statement for protection of trees on site during construction

- Prior to the commencement of any construction work on site, protective fencing shall be erected around each tree or tree group. Protective fencing in accordance with above table and BS 5837 unless otherwise agreed in writing with the local Planning Authority. Please see protected areas marked on proposed site plan.
- No trenches or pipe runs for services and drains shall be sited within 4m of the trunk of any trees retained on the site, unless otherwise agreed in writing with the local Planning Authority.
- New hard surfaces or paths in accordance with minimum recommended distances for protective fencing.
- No burning shall take place at a position where the flames could extend to within 5m of foliage, branches or the trunk of any tree to be retained.

Method statement for nature conservation

- The existing remaining tree on site is to be protected as above for the duration of the construction to safeguard the habitats of any nesting birds that may be present.



Location Plan

Scale: 1:2500

0 25 50 75 100
metres

Site Plan Key

- Indicates proposed dwellings
- Indicates existing buildings from OS plan
- Indicates proposed site access (Site Access)
- Indicates proposed trees
- Indicates proposed laurel hedging
- Indicates proposed shrub planting (SP)
- Indicates proposed ground cover planting (GC)
- Existing hedge — Indicates existing planting
- Proposed hedge — Indicates proposed planting to be similar to existing
- Indicates existing features to be demolished
- Indicates proposed estate road with footpaths to be permeable tarmac
- Indicates proposed car park spaces to be block paving
- Indicates proposed private drive and service strip to be gravel
- Indicates proposed areas to be grass
- Indicates proposed patios
- Indicates proposed refuse collection point as per Refuse Collection strategy (Refuse collection point for plots 1-3)
- Indicates proposed refuse storage sheds as per Refuse Collection strategy

General Notes

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Revisions

C	Oct 2020	Amended Submission

Status: FOR APPROVAL

SWANN EDWARDS ARCHITECTURE

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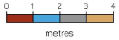
Job Title: Proposed Residential Development, Bridge Road, Long Sutton for: I M N Properties Ltd	Date: July 2019	Drawn by: JL
		Checked by: GE
Drawing Title: Planning Drawing, Location Plan and Site Plan	Job No.: SE-1145	Sheet Size: A1
	Dwg No.: PP1110	Revision: C

Plot 7



Front Elevation

Scale: 1:100





Side Elevation

Scale: 1:100



ELEVATION KEY

Facing brickwork to be: Ibstock Brick Lombard Village

Roof tiling to be Sandtoft Calderdale slate, colour Grey

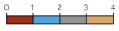
Treatment of Openings:

Windows to be uPVC colour Ivory.
Cills to be stone.



Rear Elevation

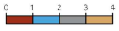
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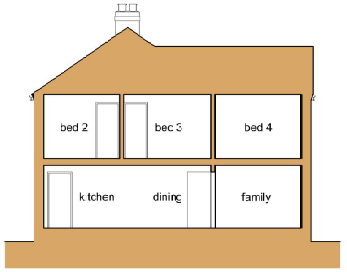




Side Elevation

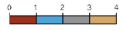
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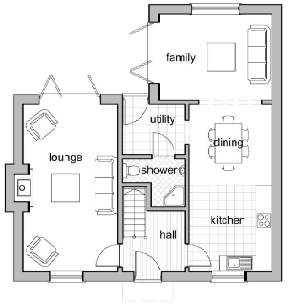




Cross Section

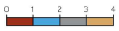
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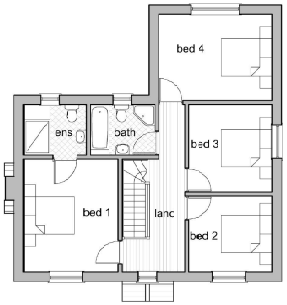




Ground Floor Plan

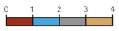
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First Floor Plan

Scale: 1:100



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Revisions

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Status

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Job Title
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for I M N Properties Ltd

Date: August 2020

Drawn by: JL

Checked by: GE

Drawing Title
Planning Drawing
Floor Plans and Elevations
Plot 7

Job No.: SE-1145

Sheet Size: A1

Dwg No.: PP1111

Revision: B

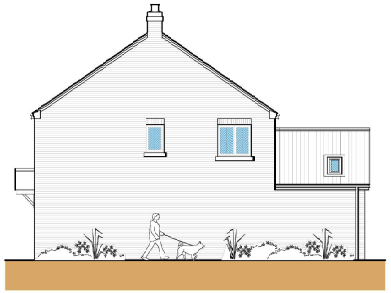
Swann Edwards Architecture Limited ©

Plot 8



Front Elevation

Scale: 1:100



Side Elevation

Scale: 1:100

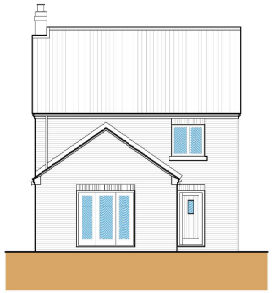
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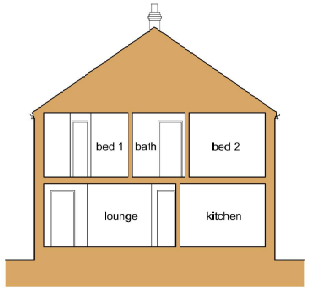
Rear Elevation

Scale: 1:100



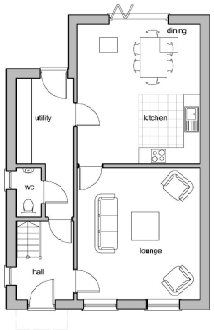
Side Elevation

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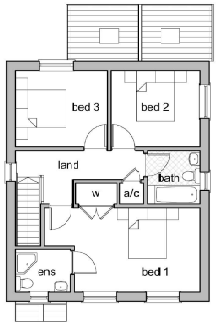
Cross Section

Scale: 1:100



Ground Floor Plan

Scale: 1:100



First Floor Plan

Scale: 1:100

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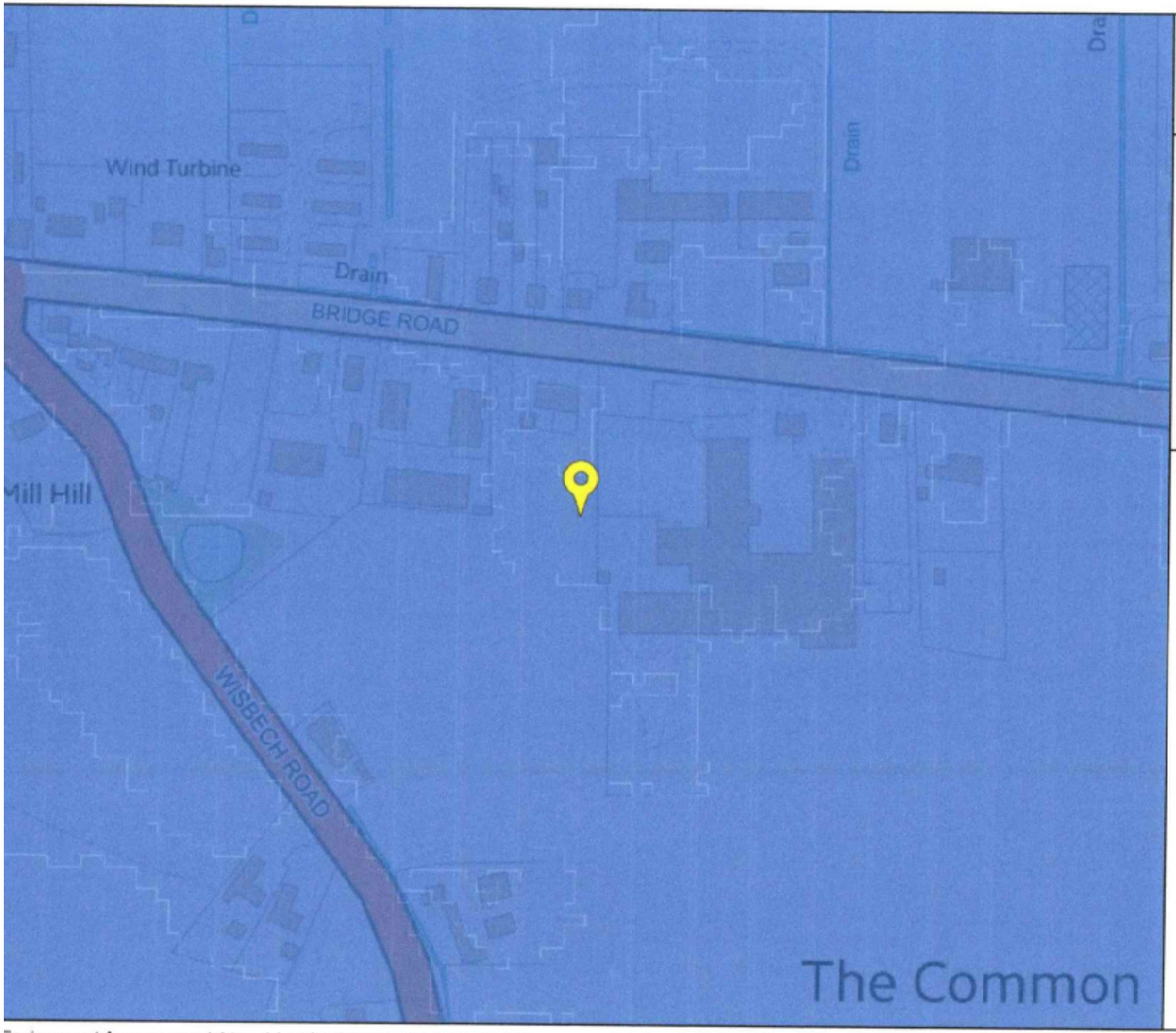
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Environment Agency

Flood map for planning

Your reference
Long Sutton

Location (easting/northing)
544165/322341

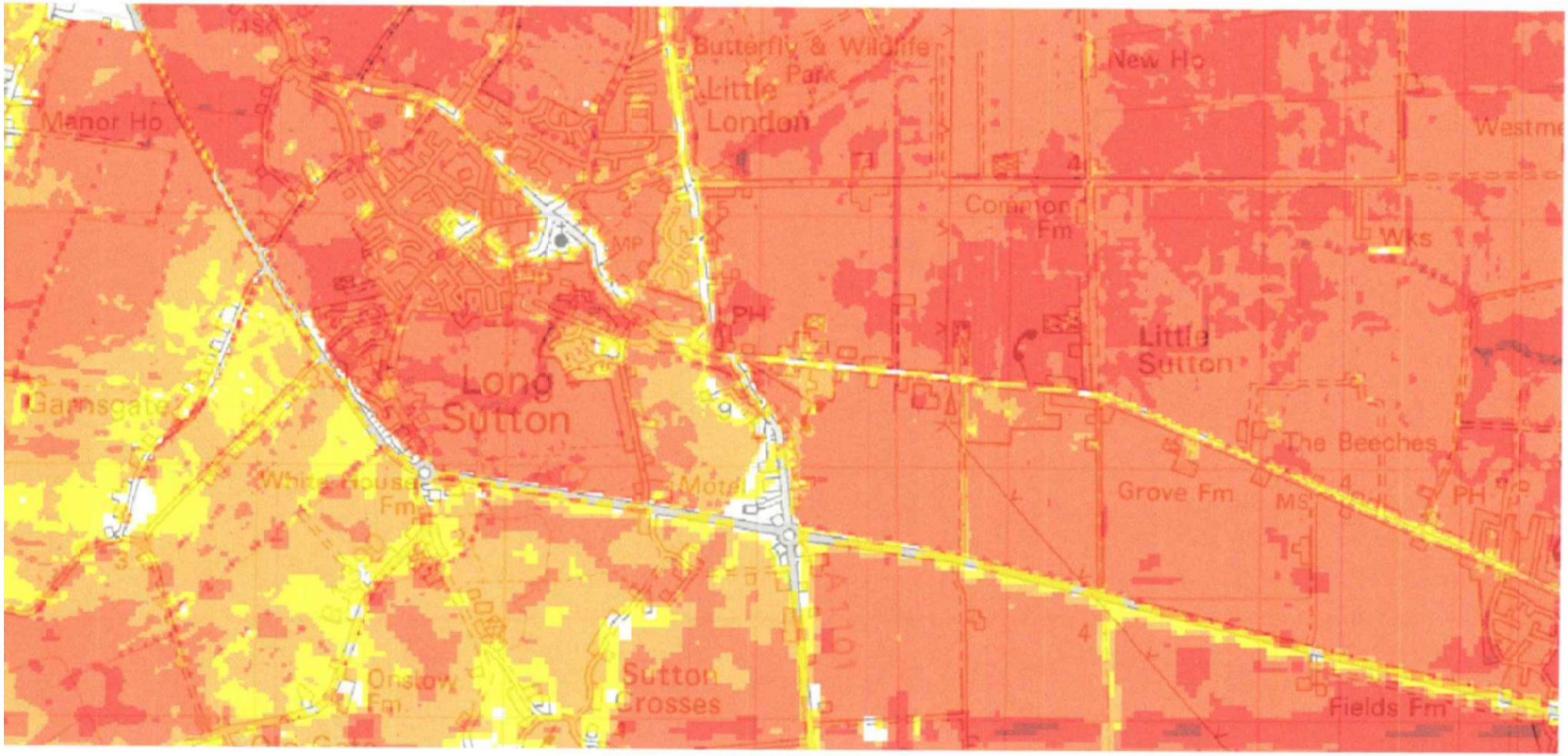
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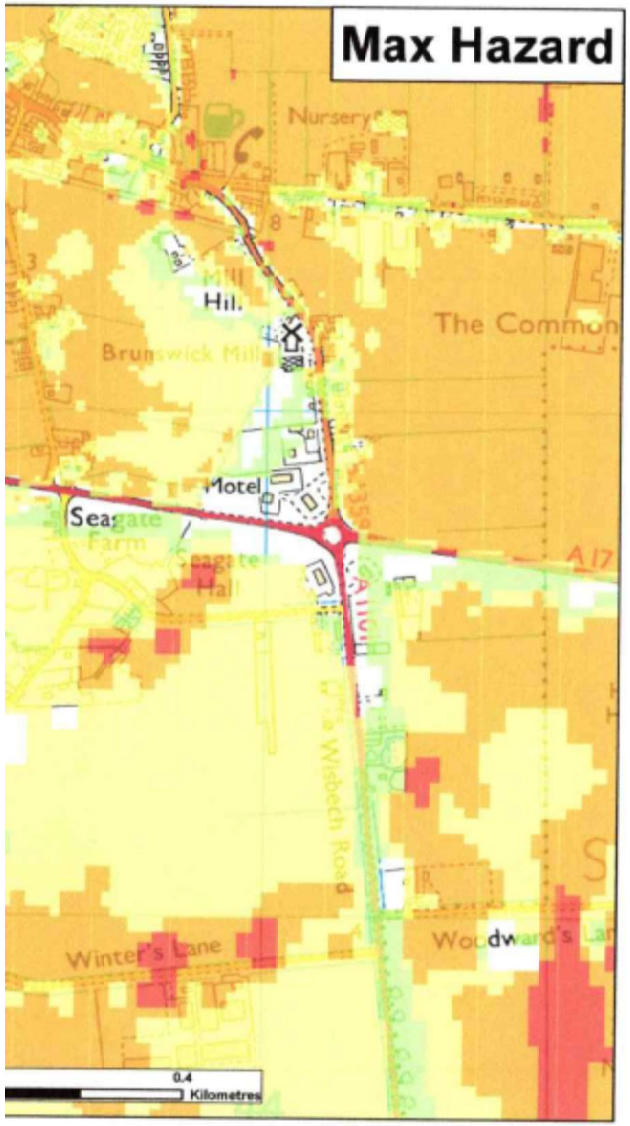
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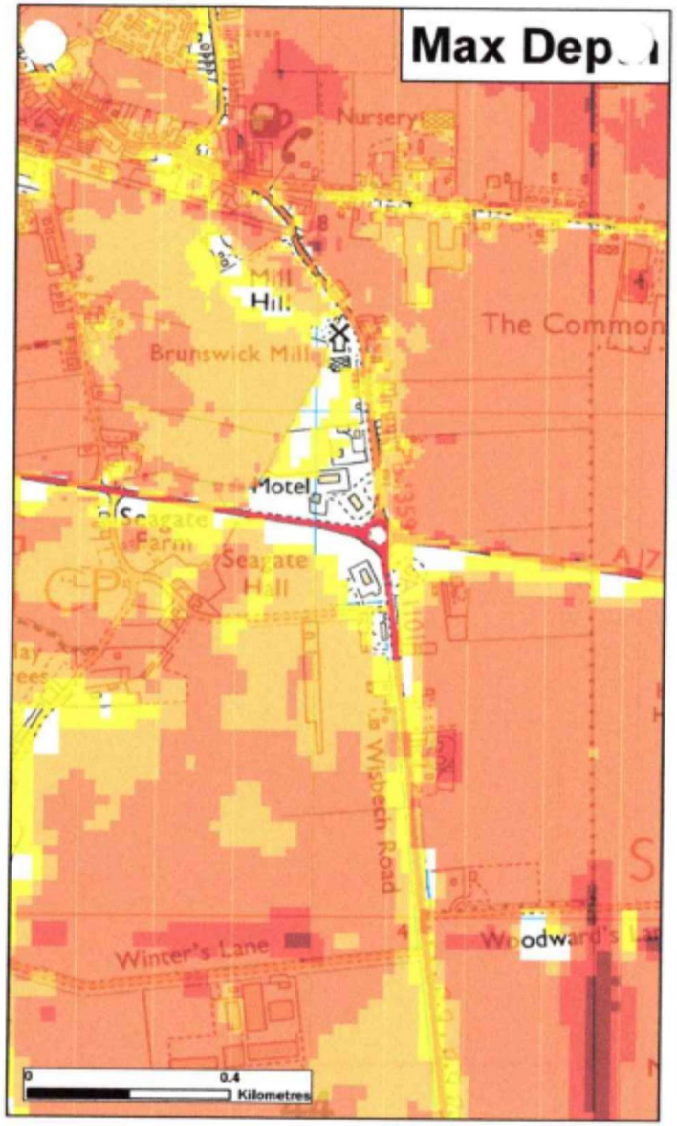
- Selected point
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Flood storage area

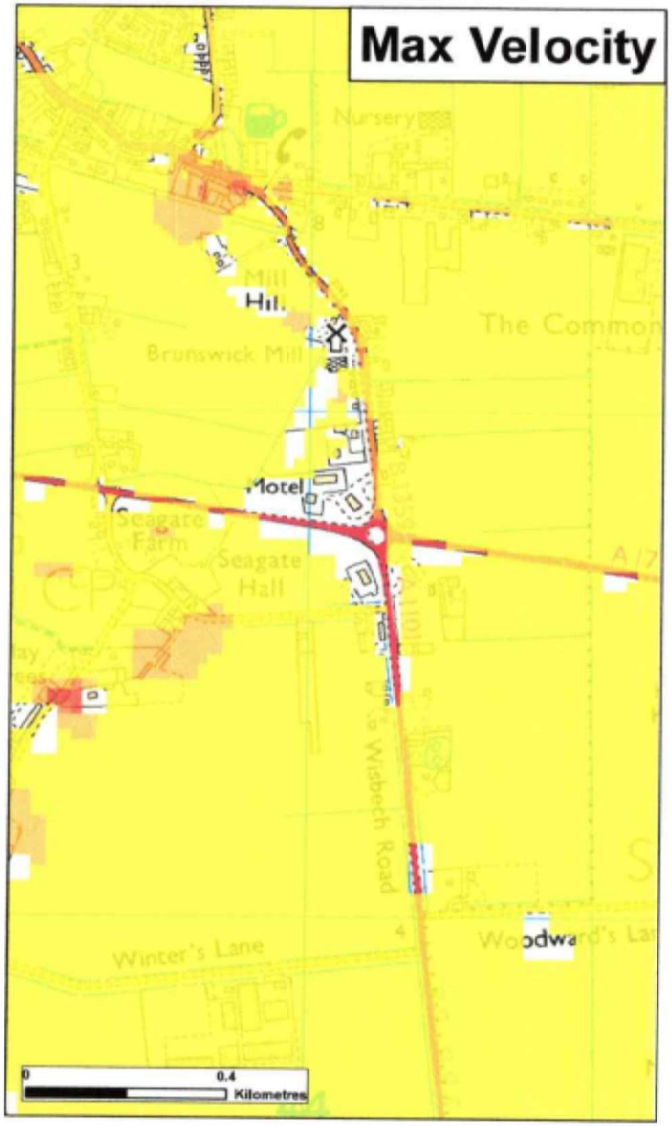
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Butterfly & Wildlife Park
Little London
New Ho
Manor Ho
Common Fm
Wks
PH
Little Sutton
Long Sutton
Garnsgate
The Beeches
Grove Fm
MS
PH
Motel
Onslow Fm
Sutton Crosses
Fields Fm







★ **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 +

te ted	October 2016	Scenario year	2115	Scenario Annual Chance	0.5% (1 in 200)	CCN Number	CCN-2016-25722

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

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

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

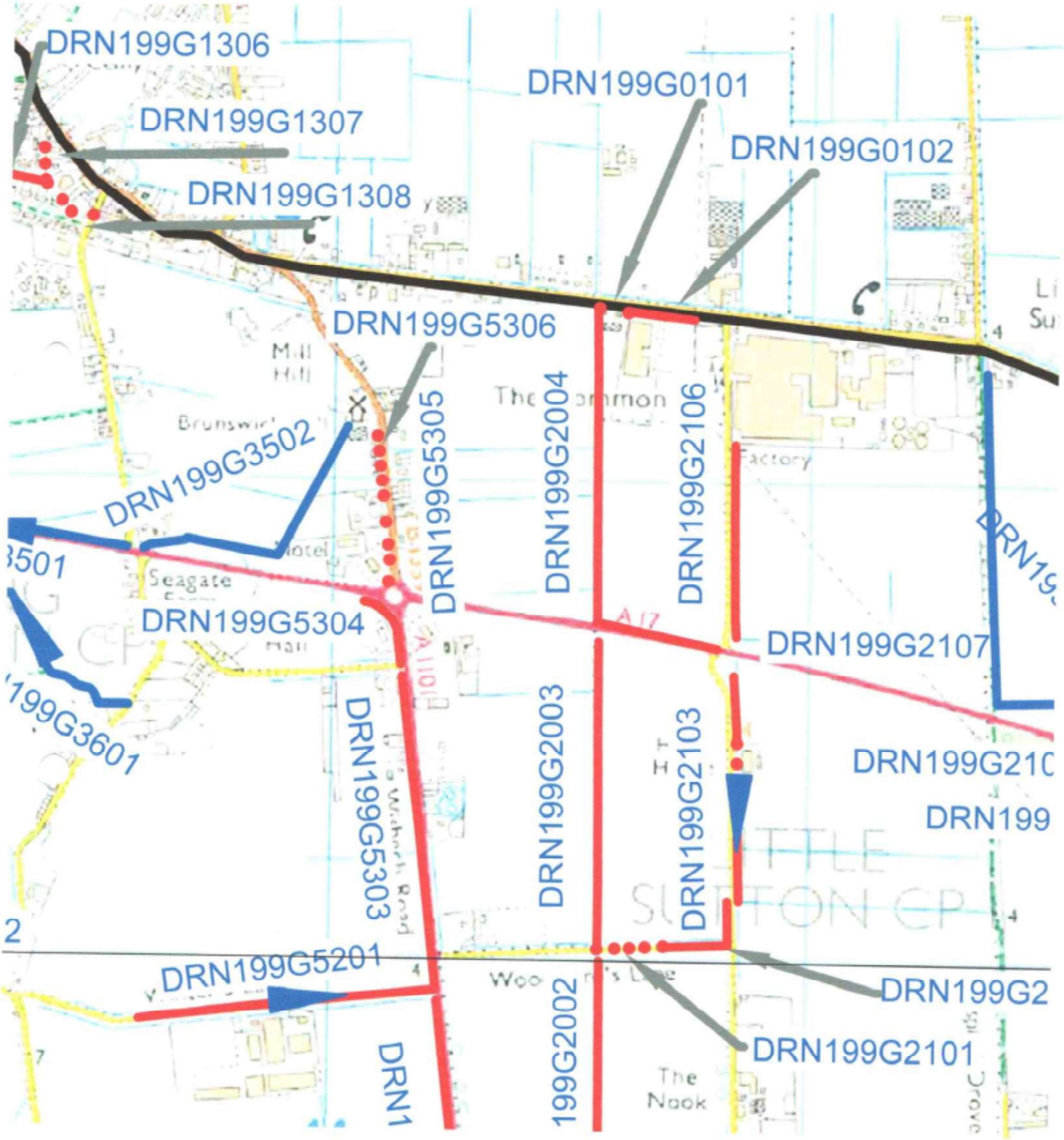
General Enquiries No: 01708 506 506. Weekday Daytime calls cost 5p plus up to 6p per minute from BT Weekend Unlimited. Mobile and other providers' charges may vary

Environment Agency

Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

Map Centred on TF 44052 21700

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DRN199G2103
DRN199G5201
DRN199G2101
DRN199G2002
Mill Hill
Seagate
A17
The Nook