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Engineering for life

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FLOOD RISK ASSESSMENT

FOR A PROPOSED DEVELOPMENT SITE NORTHEAST OF "COPPER BEECH", LUTTON GOWTS, LUTTON, SPALDING, PE12 9LQ.

(MAP REFFERENCE, TF42SW 543650, 324177)

THE DEVELOPMENT IS THAT OF CONSTRUCTING 2 No. SEMI - DETACHED AND 4 No. DETACHED TWO - STOREY DWELLINGS WITH FIRST FLOOR SLEEPING ACCOMODATION.

Report prepared by:

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Engineering Support Practice Ltd.,

The Cottage, Brow of the Hill,

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1.0 Introduction.

1.1 The site will be the subject of a Planning Application by Peter Humphreys Associates Ltd.,, 30 Old Market , Wisbech, Cambs, PE13 1NB for 2 No. semi – detached and 4 No, detached two storey dwellings with sleeping accommodation of the first floor. The site is located to the northeast of "Copper Beech", Lutton Gowts, Lutton, PE12 9LQ5. Access to and from the site is Lutton Gowts highway no problems are envisaged with both access and egress of the site.
(Appendix 6/7)

1.2 The site is located on the centre and east of the village of Lutton Gowts within existing residential development. (Appendix 6)

1.3 As required the site now has to comply with the National Planning Policy Framework (NPPF), Section 10 "Meeting the Challenge of Climate Change, Flooding and Coastal Change" and Section 1, "Flood Risk", within the Technical Guidance to the NPPF document. (Appendix 9) A Flood Risk Assessment has been prepared to comply with the requirements of the NPPF, the South Holland District Council and the Environment Agency (EA) that the development is within such guide lines.

1.4 The Environment Agency has been contacted to gain their advice and information on particular points relating to the Flood Risk Assessment. The site is identified as being within Environment Agency Flood Zone 3a a passive flood zone protected to the 1 in 200 year service level. The site is within the South Holland Internal Drainage Board (SHIDB) District, a Boards Main Drain is identified as being to the north of the development site. (Appendix 2)

1.5 Contact has been made with the South Holland District Council (SHDC) Planning Department and information has been gained with regard to the Strategic Flood Risk Assessment document commissioned by the SHDC.
(Appendix 8) and contact has been made with the SHIDB and correspondence received with regard to the levels of service provided by the Boards watercourses. (Appendix 4/5)

1.6 Engineering Support Practice Ltd was appointed in February 2016 to undertake the Flood Risk Assessment for the site

2.0 Location.

2.1 The development site is located on the eastern side of Lutton Gowts adjacent the village highway it being placed centrally within existing residential development. The site is currently an amenity area top the northeast of "Copper Beech". (Appendix 6/7)

2.2 The site location and the extent of the area and the general development area are shown on the enclosed plans. (Appendix 6) Map Ref., TF42SW 543650,324177.

2.3 The site is located within the South Holland Internal Drainage Board District and is within the South Holland District Council Planning Area. It is shown to be within the indicative Environment Agency (EA) Flood Risk Zone 3a. (Appendix 3) A South Holland IDB., Main Drain is located to the north of the site. (Appendix 4)

3.0 The Site, Sequential and Exception Tests.

3.1 The site is currently an amenity to the northeast of "Copper Beech" formally used as a domestic garden area. (Appendix 6) The site will be subject to a planning application for a proposed development of 2 No. semi – detached and 4No. detached two storey dwellings , sleeping accommodation on the first floor. Access will be via the adjacent highway.

3.2 The area of the development site is restricted to that as detailed on the enclosed plans and is bounded on the north, east and south by open agricultural ground to the west by existing residential property and Lutton Gowts highway. The site area is of 0.0495hectares. (Appendix 6)

3.4 The proposed development site is as detailed on the enclosed plans (Appendix 6) photographs of the site are within the report. (Appendix 7)

3.5 The site is not within the bye-law distance of any South Holland Internal Drainage Board "Main Drain". (Appendix 4/5)

3.6 Sequential Test.

3.6.1 The site is currently within the developed area of the Village of Lutton Gowts as adopted by the South Holland District Council Local Development Plan. (Appendix 8) However it is also located within the Environment Agency Flood Zone 3a and therefore as required by the National Planning Policy Framework (NPPF) and Technical Guidance document and the South Holland District Council has to be subject to the Sequential Test. (Appendix 3/9) The Exception Test will also be applied.

3.6.2 The Sequential Test requires that development is directed to the least vulnerable ground it being in Flood Zones 1 and or Flood Zone 2. This proposal is within Flood Zone 3a and therefore the sequential test has to be applied. (Appendix 8/9)

3.6.3 The village of Lutton Gowts has been inspected and the proposed site lies immediately outside the current settlement boundary. It is understood that the South Holland DC. and the Boston Town councils are reviewing their Local Development Plan for South East Lincolnshire therefore it is suggested that the location would be suitable for continued development.

3.6.4 It should be noted that, Paragraph 49 of the NPPF 2012, indicates that housing applications should be considered in the context of the presumption in favour of sustainable development if a local planning authority cannot demonstrate a five year supply of housing land - the South Holland District Council has a three year supply as of the 31/12/2015. Consequently, if an application were to be forthcoming the onus would be on the applicant to demonstrate that residential development in this location would be sustainable. Therefore application of the Exception Test and it being passed demonstrates it so. (Appendix 9)

3.6.6 It is therefore proposed to apply the "Exception Test" as required in NPPF Technical Guidance

3.7 Exception Test.

3.7.1 The development is that of constructing 2No. semi – detached and 4No. detached two storey dwellings with sleeping accommodation on the first floor, it being located within the existing residentially developed area of Lutton Gowts, it being positioned in Flood Zone 3a. plus climate change, a defended flood plain. (Appendix 2)

3.7.2 The Flood Zone 3a high probability, definition within Table 1 : Flood Zones of the NPPF Technical Guidance document (Appendix 9) indicates that "More vulnerable uses should only be permitted in this zone if the Exception Test is passed" The proposed development is, within Table 2 : Flood Risk vulnerability classification of the NPPF Technical Guidance document, one of the "More Vulnerable" type "bullet point 3"

3.8 To pass the Exception Test, NPPF Clause 102, states, (Appendix 9)

3.8..1. "It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared."

3.8.2 "A site specific flood risk assessment must demonstrate that the development will be safe for its lifetime taking into account the vulnerability of its user without increasing flood risk elsewhere and where possible will reduce flood risk overall. "

3.8.3 The development is being placed within an existing community that enjoys a full range of social and community services including commercial shops, public education facilities, and public transport services to adjoining main conurbations together with employment opportunity and will therefore only provide sustainability to the area and its facilities.

3.9 This Flood Risk Assessment demonstrates that the development meets the requirement relating to the safety of the development for its lifetime and its users and does not increase flood risk elsewhere.

3.9.1 The development therefore complies with, NPPF Clause 102, and passes the Exception Test.

4.0 Existing flood alleviation measures

4.1 The site is located within the central area of the village of Lutton Gowts. It is within the South Holland District Council administrative area and within the South Holland Internal Drainage Board District (NLIDB) (Appendix 4 / 6)

4.2 A SHIDB. "Main Drain" exists to the north of the site and provides a general drainage service to the whole of the localised catchment. (Appendix 4)The development will be within the Boards 9m. bye-law distance of the "Main Drain" water course. (Appendix 5)

4.3 The existing standard of drainage within the South Holland IDB District is capable of dealing with the 1 in 100 year fluvial event and confirmation of this has been received from the IDB. within correspondence. (Appendix 5) Inspections of the appropriate watercourse indicate that a minimum of 0.9m free board is available within the Boards systems and is compatible with the Department of Environment Food and Rural Affairs target of services for agricultural land and residential areas.

4.4 The South Holland IDB. maintains their "Main Drains" on an annual basis and when required improvements works are carried out to these watercourses to ensure that a high level of services is maintained. The site is therefore considered to be at a low risk of flooding from the Boards watercourses. The area is considered to be at a low risk of flooding from the Internal Drainage Board systems. (Appendix 4/5)

4.5 Those tidal defences which are provided by the Environment Agency i.e., those provided along the frontage of the Tidal River are designed to cope with the 1 in 200 year tidal event as required under NPPF. The level of these defences is set at + 6.3 m.ODN. for hard defences and +7.0 m.ODN. for earth embankments and this therefore provides protection for the current requirements.

4.6 The current maintenance standard adopted by the Environment Agency for the tidal defences and those of the South Holland IDB. for its "Main Drains" is such that it could be considered to be of high standard and meet with those requirements that would ensure that the level of service is retained and maintained into the future such that it is able to cope with climate change.

4.7 The area is served by Anglian Water Public Sewers and therefore it is the intention that the development will discharge effluent to the Public Sewer. The foul water will be discharged to the existing Anglian Water systems and the appropriate permissions sought when required. The surface water discharges are intended to be dealt with applying the Sustainable Urban Drainage Systems (SUDS) principles installation of water butts and soak aways, being utilised as required, in the hierarchal listings for Sustainable Urban Drainage Systems (SuDs) adoption (Appendix 8/10)

5.0 Potential sources of flooding

5.1 There are five potential sources of flooding which are identified as a result of this assessment.

a) Local failures or blockages of the Boards "Main Drains".

b) The 1 in 100 year fluvial event being exceeded in the Internal Drainage Board Main Drain.

c) The 1 in 200 year tidal event being exceeded which would cause overtopping or major failure of the Tidal Nene Defences.

d) Pluvial Flooding of the site.

e) Ground Water Flooding of the site.

5.2 The probability of flooding from source:

a) is low owing to the high maintenance standards being achieved and managed by the South Holland IDB. The system which is used to service this particular area is one that has been maintained at a high standard over the past and thus this together with inspections applied to the Boards area enhances the protection provided. (Appendix 4/5)

b) Should the 1 in 100 year fluvial event be exceeded the flood water would take up the available freeboard within the Boards watercourse and should this be exceeded flood water will extend into the lower agricultural land and therefore the maximum height which can be obtained at the Proposed Site would be below that of the adjacent site levels, therefore NPPF is adhered to.

c) The Tidal Defences protecting the area were improved following the 1978 and 2013 Tidal Surge events and currently provide protection against the 1 in 200 year tidal event. However these defences are at such a height that they will not fully protect against climate change, overtopping at the year 2116. The development site being some 5.25 kilometres west from the main area of tidal defence of the River Nene would be at a low risk of flooding from any such over topping which would occur over a small period of time during the tide cycle curve.

c.1 Tidal Hazard mapping data has been acquired from the Environment Agency and is as follows:

Taking due regard of a breaching of defences in the year 2115 coincident with a 0.1% event (1 in 1000 year) provides factors for,
1. Max Hazard, Between 1.25 and 2 Danger to most.
2. Max Depth, 0.5m. – 1.0m.
3. Max Velocity, 0.0m/s – 0.3./s

Therefore the appropriate mitigation measures are recommended to be the raising of finished ground floor level (FGFL) to 0.5m. above adjacent ground levels with 0.5m. of flood resistance measures above FGFL. and flood resilience measures applied to a height of 1.0m. above FGFL. (Appendix 3)

d) Pluvial Flooding of the site is not expected owing to the topographical terrain falling generally away from the dwelling towards the SHIDB water course, this together with the proposal to raise the FFL. 500mm. above the adjacent ground level will greatly reduce the risk of flooding by such a method .

e) Ground Water Flooding is not expected as again any discharge emanating from the ground will migrate to the lowest areas of the site, no artesian effects are evident on the existing land use profile.

5.3 To ensure protection from any future extreme rainfall events it is recommended that the Finished Floor Level (FFL) is placed 500mm. above the general site ground level together with incorporating flood resilience measures into the dwelling design to a height of 600mm. above the finished ground floor level. (Appendix 11)

5.4 The existing tidal defences together with the fluvial defences are such that providing maintenance of them remains to the current standard any event in excess of the protection standard would provide minimal over spilling and therefore since the over topping by the Tidal River would be of a small duration, it and that of the on-line storage would be available to absorb such impacts, it is considered that this would not adversely affect the site. (Appendix 8)

5.5 With regard to the Internal Drainage Board system again considerable protection is provided within the maintenance standard adhered to by the Board throughout its water courses.

6.0 Extent of known flooding

6.1 It is understood that minor flooding of the surrounding land took place during the 1953 tidal flood event when the tidal river were overtopped in the adjacent reach of the Tidal River Nene. There is however no evidence of any further flooding since that time as flood defences were improved following 1953. Also no flooding took place during the 1978 and 2013 tidal events and defences were again raised to a higher standard. Which today are considered to be appropriate to provide a 1 in 200 year protection and duly protected the South Holland IDB area at the time of the 5th December 2013 extreme tidal event. (Appendix 2/3)

6.2 Despite the heavy rain fall periods in 1978, 1998, 2000 and 2008 the area did not suffer flooding but this is perhaps a reflection on the high level of service and maintenance provided by the IDB. (Appendix 5)

6.3 Therefore taking into account the fore mentioned situations it can be considered that the Environment Agency and the Internal Drainage Board systems currently meets and provides protection to this site to the 1 in 100 year fluvial event scenario and the tidal defences provide protection to the 1 in 200 tidal event, therefore the site is compliant with NPPF requirements and appropriately placed to withstand future events taking into account climate change.

7.0 Probabilities and trends of flooding

7.1 The probability of this development site flooding from the local Internal Drainage Boards system is low. It should also be noted that despite being placed within the Flood Zone 3a area on the Environment Agency flood risk map the site is protected by the Tidal Defences on the River Nene frontage and it is deemed that these defences provide the necessary 1 in 200 year tidal event protection and therefore this complies with NPPF. It should be noted that climate change and sea level rises will take place over the next 100 years however such over topping levels will not adversely affect the site because the over topping would be very small duration and contained within the existing protection systems in and around Sutton Bridge and surrounding catchment and those provided by the IDB.

7.2 Taking due regard of the suggested figures for sea level rise in NPPF Technical Guidance document indicating a rise in the rate of change of increasing tide levels such that it is indicated that the 1 in 200 year surge by the year 2116 would be +1.19m.ODN. above that of today. Should this be the case it is almost certain that appropriate measures to improve the level of service to the developed areas of catchment adjacent the River Nene Wisbech reach would be implemented and maintain the required standard of protection currently enjoyed.

7.3 The probability of the site flooding from the Tidal River Nene is technically remote because of the existing standard of defences which provide the 1 in 200 year tidal event level protection and are some 5.25km. to the west of the development site any such major failure or failure of defences because of the extensive distance would offer little or no effect on water levels on the adjacent proposed site.

7.4 If under extreme conditions the level of fluvial flood water rose in the IDB's system this would not be of a sudden nature and it is probable that sufficient time would be available to take precautionary actions to limit the extent of the potential flood event. The placing of the FFL. at 500mm,. above the adjacent ground level, together with providing flood resilience measures up to 600mm. above the FFL., will provide additional mitigation against an extreme flood event. (Appendix 11)

7.5 It should be noted that the water levels of the drainage channels throughout the area will tend to rise as a result of the impacts of climate change however the existing system of defences together with the protection provided by the adjacent flood plains will provide mitigation.

8.0 Impacts of flooding

8.1 It is considered that there are no significant impacts of flooding to be anticipated for the proposed site bearing in mind the protection provided by the Environment Agency and the South Holland IDB. drainage systems. The development site is at a level which is above the 1 in 100 year fluvial event and protected to the 1 in 200 year level of service by the existing tidal defences.

8.2 To ensure protection against failure of the tidal defences and extreme rainfall events it is recommended that the Finished Ground Floor Level (FGFL) of the proposed development will be set 500mm. above the adjacent ground level with flood resistance measures applied to a height of 0.5m. above the finished ground floor level and flood resilience measures installed to a height of 1.0m. above the FGFL.

8.3 No increased flooding risk is expected as a consequence of the proposed development.

9.0. Residual Risks – Extreme Event

9.1 Residual risk from extreme events to this site is low despite being in EA Flood Zone 3a. The protection afforded by the Tidal Flood Defences of the River Nene and maintained by the Environment Agency are of such a high standard that it could be considered highly unlikely for a catastrophic failure to take place and adversely affect the development site. During an extreme event the current system of monitoring together with communication systems would provide warning to the development area of any likely flooding that would occur do to back flows in the Internal Drainage Boards Drainage system owing to inundations by tidal waters.

9.2 The protection afforded by the South Holland IDB. is compliant with NPPF, it must be recognised however that this protection will be eroded owing to climate change but due consideration must be given to the fact that the IDB. continue to monitor the situation. (Appendix 8)

9.3 Taking into account the climate change assessment, that there will be an increase in flows of 20% up to 2050 and beyond, it is still felt that no increase flood risk will occur on the development site.

9.4 Although within the Environment Agency Flood Zone 3a classification the site is as said to be at a medium to low risk of flooding due to the current standards of drainage and flood defence maintenance levels. The site is not located within a Tidal Functional Flood Plain and is protected to a 1 in 200 year standard and therefore can be considered to be in a passive flood plain area it is also adjacent to the IDB. Main Drain which is maintained and held at to a high standard of service.

9.5 It is considered that there is no risk of flooding to adjoining properties as a consequence of this proposed development site. The surface water discharges being discharged into a Sustainable Urban Drainage System principled installation will reduce the pluvial flood risk to the site and surrounding residential properties.

9.6 In the extreme event of a serious blockage of the watercourse downstream within the Internal Drainage Board system or the over topping of the tidal defences protection would be afforded by the existing flood storage which is within the existing system of the Boards main drains. Should major events occur it is expected that flood warnings given by the Environment Agency and the Internal Drainage Boards would be forthcoming and it would be expected that any occupancy during the period would take appropriate action as recommended by the South Holland District Council (SHDC) Emergency Action Plan. A Flood Emergency Preparedness Plan should be prepared and agreed with the Emergency Planning Department of the SHDC. to ensure guidance during notified flood emergency events.

9.7 It is recommended that the residents sign up to the Environment Agency "Direct-line Flood Warning" to ensure timely notification of any adverse flood risks.

10.0 Sustainable Urban Drainage (SUDS) and Water Frame Work Directive.

10.1 The South Holland District Council SFRA. Level 1 (Appendix 8) requires that a sustainable method of dealing with surface water run-offs is adopted on site together with due consideration of the Water Framework Directives to ensure that the over- arching environmental issues are dealt with and that no dis-benefits are created by the proposed development. (Appendix 8/9/10)

10.2 The site being of a minor development size allows , subject to confirmation, the extensive installation of soak aways to deal with surface water run-offs in a traditional SuDs methodology. The usage of such soak aways usage will be confirmed, when appropriate, using BRE 365 infiltrations test regulations for design purpose and combined with additional SuDs compliant requirements such as water butts and permeable surface access drives and highway. (Appendix 10)

11.0 Conclusions and recommendations

11.1 As a result of the assessment the following conclusions and recommendations have been reached.

11.2 The proposed development site being in Environment Agency Tidal Zone 3a is not considered to be in a Functional Tidal Flood Plain, it is located in the Passive Flood Plain protected by existing tidal defences to a 0.5% standard. Therefore development is allowable in this zone providing the "Sequential and Exception Tests" are passed as required in the National Planning Policy Framework document. (Appendix 2/8/9) As a consequence of this document it is considered that these items have been successfully complied with.

11.3 The site is located within the South Holland Internal Drainage Board District and the standard of drainage provided at this site is suggested to be greater than a 1 in 100 year fluvial protection, thus complies with the 1 in 100 year NPPF compliant event and this accords with the DEFRA guide lines for urban development. The Board's watercourses have been designed to provide a freeboard (the distance between land level and the level of water in the watercourse) of 0.9m. above the water level of a 1 in 50 year flood event to the lowest land levels in the district. (Appendix 5)

11.4 Attention is drawn to the predictions for sea level rise by the year 2116, which is the period over which the assessment must extend, this indicates that a surge tide of the 1 in 200 year event type, by that date, could reach + 1.19 m. above the current day 1 in 200 year extreme tidal event. This is clearly beyond the capabilities of the current defences to provide protection to the developed area up to the 1 in 200 year standard . It is therefore assumed that appropriate measures will be taken to ensure that the correct standard is retained for the area. (Appendix 8/9)

11.5 Tidal Hazard mapping data has been acquired from the Environment Agency and is as follows:

Taking due regard of a breaching of defences in the year 2115 coincident with a 0.1% event (1 in 1000 year) provides factors for,
1. Max Hazard, Between 1.25 and 2 Danger to most.
2. Max Depth, 0.5m. – 1.0m.
3. Max Velocity, 0.0m/s – 0.3./s

Therefore the appropriate mitigation measures are recommended to be the raising of finished ground floor level (FGFL) to 0.5m. above adjacent ground levels with 0.5m. of flood resistance measures above FGFL. and flood resilience measures applied to a height of 1.0m. above FGFL. (Appendix 3)

11.6 The area is served by Anglian Water Public Sewers and therefore it is the intention that the development will discharge effluent to the Public Sewer. The foul water will be discharged to the existing Anglian Water systems and the appropriate permissions sought when required.

11.7 The site being of a minor development size allows , subject to confirmation, the extensive installation of soak aways to deal with surface water run-offs in a traditional SuDs methodology. The usage of such soak aways usage will be confirmed, when appropriate, using BRE 365 infiltrations test regulations for design purpose and combined with additional SuDs compliant requirements such as water butts and permeable surface access drives and highway. (Appendix 10)

11.8 To ensure full mitigation against extreme rainfall events and or extreme flood events the proposed finished floor levels (FFL) should be raised 500mm. above the adjacent ground level with flood resilience measures installed up to 1m. above the FFL. (Appendix 11)

11.9 Additionally it is also suggested that occupants must be made aware of Emergency Procedures that reflect the importance of the safety of the public and be supplied with a Flood Emergency Preparedness Plan agreed with the South Holland District Council (SHDC) Emergency Planning Department to assist and direct residents actions during a flood emergency event. It is felt that it would be appropriate for the owners to ensure that they are fully conversant with the Flood Warning Systems of the Environment Agency, the SHDC. "District Emergency Procedures" and to familiarize themselves with the location of the South Holland IDB. Office, this will enable access to information on any Heavy Rainfall Events and or Flood Events increasing the risk of flooding to the development area. The residents / owner should register with the Environment Agency (EA) to receive the "Direct Line Flood Warnings" service to provide notification of extreme fluvial and tidal events.

APPENDIX 1

Ben Hornigold

From: Smith, Rachel [Rachel.Smith@environment-agency.gov.uk]
Sent: 19 February 2016 15:49
To: ben.hornigold@btinternet.com
Subject: CCN-2016-3447 – Provision of Product 8 Hazard Mapping for Lutton Gowts, Lutton, Spalding, Lincolnshire, PE12 9LQ
Attachments: CCN_2016_3447.pdf

Dear Mr Hornigold,

Thank you for your request for Product 8, Hazard Mapping Information for the above location. I hope the attached information meets your requirements. If you have any questions, however, please contact this office using the telephone/e-mail details below.

Kind regards

Rachel

Rachel Smith MSc, BSc (Hons)
Flood and Coastal Risk Management Officer
Partnership and Strategic Overview (Lincs)
Lincolnshire and Northamptonshire Area
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Environment Agency

Mr Ben Hornigold
ben.hornigold@btinternet.com

Our ref: CCN-2016-3447

Date: 19 February 2016

Dear Mr Hornigold,

Flood Hazard Mapping – Lutton Gowts, Lutton, Spalding, Lincolnshire, PE12 9LQ

Thank you for your request for copies of our flood hazard mapping for the above location.

Hazard Mapping – Breaching
Enclosed with this letter is a plan showing the location of the breaches we have modelled, together with four plans showing the maximum values of flood depth, velocity and hazard rating (danger to people) resulting from these breaches for the following scenarios:

- Year 2006 0.5% (1 in 200) chance event
- Year 2006 0.1% (1 in 1000) chance event
- Year 2115 0.5% (1 in 200) chance event
- Year 2115 0.1% (1 in 1000) chance event

Hazard Mapping – Overtopping
Your site is not affected by overtopping for the present day (2006) and future (2115) scenarios.

It is important that you read the contextual notes on the maps.

All information is provided subject to the enclosed notice, which you should read.

If you have any queries about the hazard mapping please contact us using the telephone/email details below. Please quote our CCN reference number in all correspondence where data is referenced.

Yours sincerely

Rachael

CUSTOMER SERVICE EXCELLENCE CSE

Awarded to Lincolnshire & Northamptonshire Area

FOR Ian Cappitt
Partnerships and Strategic Overview Team Leader Lincolnshire

Direct dial 020 84745311
Direct fax 01522 785018
Direct e-mail PSOLINCS@environment-agency.gov.uk

FLOODS DESTROY BE PREPARED

Enc.
FRA/FCA Advisory Text
Breach Location Plan
Breach Hazard Maps x 4
Standard Notice

Waterside House, Waterside North, Lincoln, LN2 5HA.
Customer services line: 08708 506 506
Email: enquiries@environment-agency.gov.uk
www.gov.uk/environment-agency

FLOODS DESTROY BE PREPARED

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Contact: enquiries@environment-agency.gov.uk 03708 506506

Use of Environment Agency Information for Flood Risk / Flood Consequence Assessments

Important
If you have requested this information to help inform a development proposal, then we recommend that you undertake a formal pre-application enquiry using the form available from our website:-

http://www.environment-agency.gov.uk/research/planning/33580.aspx

Depending on the enquiry, we may also provide advice on other issues related to our responsibilities including flooding, waste, land contamination, water quality, biodiversity, navigation, pollution, water resources, foul drainage or Environmental Impact Assessment.

In **England**, you should refer to the Environment Agency's Flood Risk Standing Advice, the technical guidance to the National Planning Policy Framework and the existing PPS25 Practice Guide for information about what flood risk assessment is needed for new development in the different Flood Zones. These documents can be accessed via:

http://www.environment-agency.gov.uk/research/planning/82587.aspx

http://www.communities.gov.uk/publications/planningandbuilding/nppftechnicalguidance

http://www.communities.gov.uk/publications/planningandbuilding/pps25guideupdate

You should also consult the Strategic Flood Risk Assessment produced by your local planning authority.

In **Wales,** you should refer to TAN15 for information about what flood consequence assessment is needed for new development in the different flood zones
http://new.wales.gov.uk/splash;jsessionid=8yIGTfGZthmB0t2vhp6hS1GcB1LXvZzB3YIczf20Xn7LK3zK0nMk!981825250?orig=/topics/planning/policy/tans/tan15/

You should also consult the Strategic Flood Consequence Assessment if one has been produced by your local planning authority.

In both **England and Wales** you should note that:

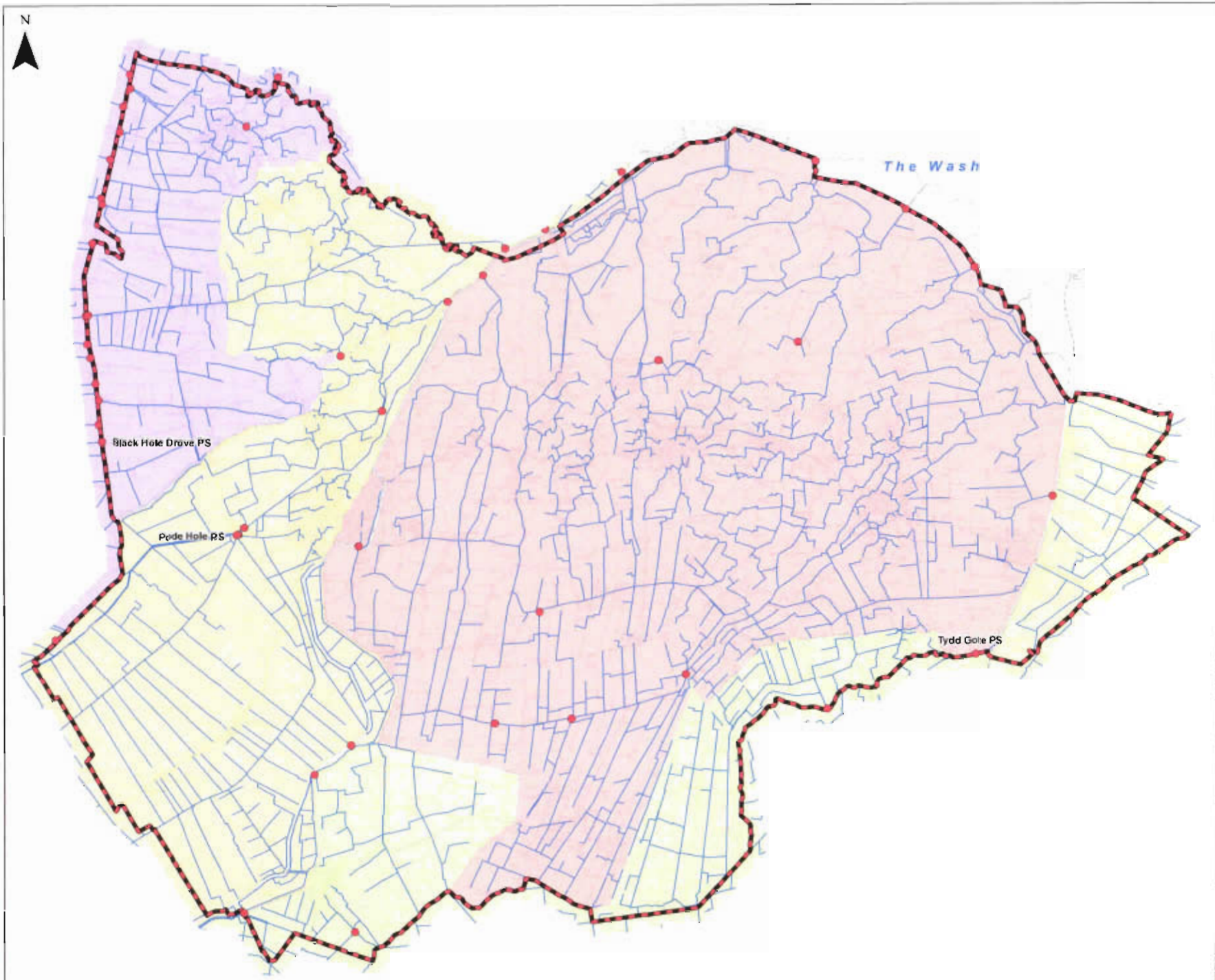
1. Information supplied by the Environment Agency may be used to assist in producing a Flood Risk / Consequence Assessment (FRA / FCA) where one is required, but does not constitute such an assessment on its own.

2. This information covers flood risk from main rivers and the sea, and you will need to consider other potential sources of flooding, such as groundwater or overland runoff. The information produced by the local planning authority referred to above may assist here.

3. Where a planning application requires a FRA / FCA and this is not submitted or deficient, the Environment Agency may well raise an objection.

4. For more significant proposals in higher flood risk areas, we would be pleased to discuss details with you ahead of making any planning application, and you should also discuss the matter with your local planning authority.

APPENDIX 2



NOTES

Map Legend

- Pumping Stations
- Drains
- South Holland IDB Catchment
- Kings Lynn IDB Catchment
- Black Sluice IDB Catchment
- North Level IDB Catchment
- Welland and Deepings IDB Catchment

0 0.5 1 2 3 4 5 Kilometers

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UPDATE OF STRATEGIC FLOOD RISK ASSESSMENT

Internal Drainage Board Catchments

DATE OF ISSUE: Jan 2010 REV NO:

SCALE: 1:120,000

FIGURE NO: 4



NOTES

1. Defence condition is as expressed in the Environment Agency's NFCDD database

Map Legend

Defence Condition
- No Data
- 1 - Very Good
- 2 - Good
- 3 - Fair

REV	DATE	REMARKS

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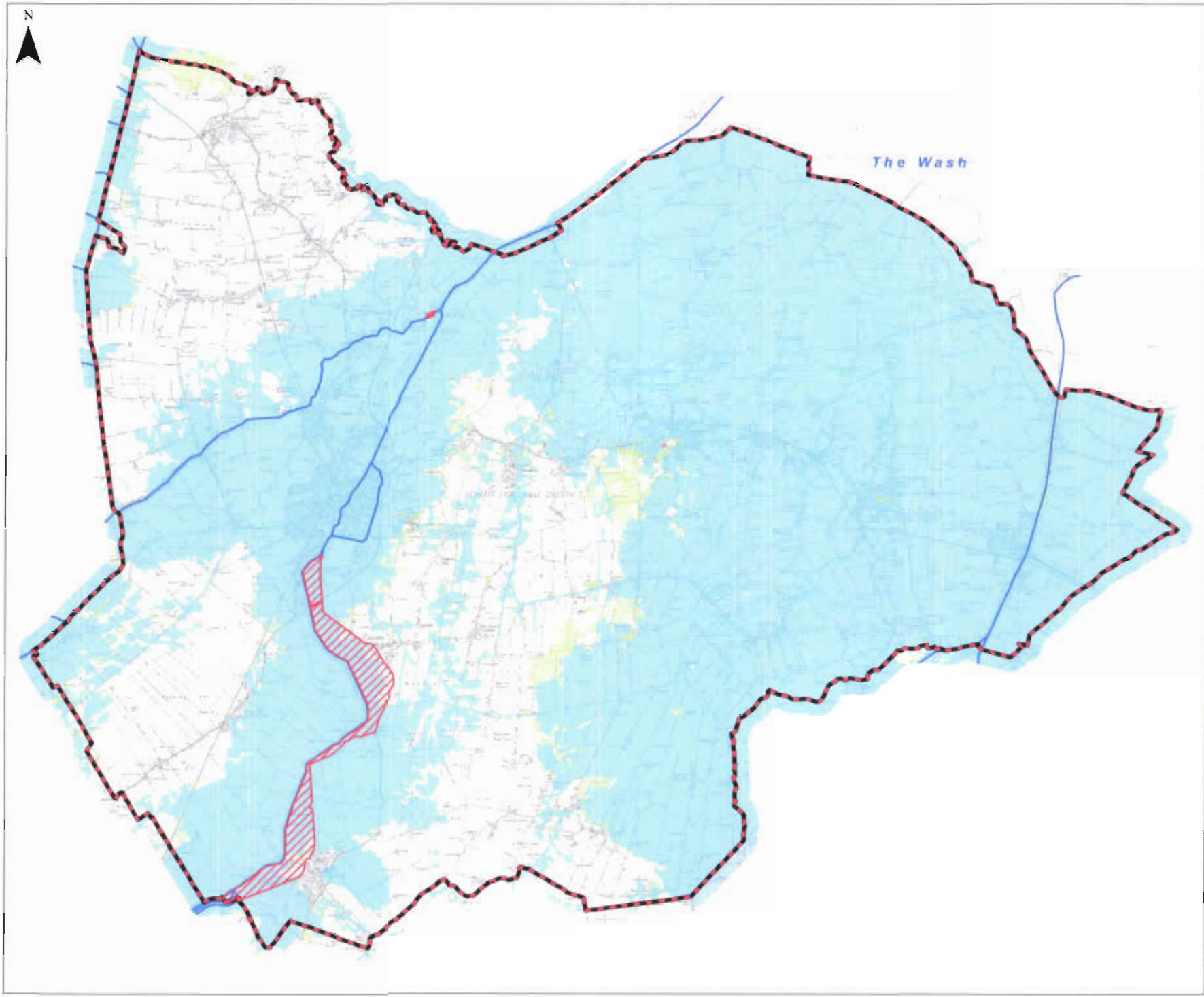
UPDATE OF STRATEGIC FLOOD RISK ASSESSMENT

Defence Condition

DATE OF ISSUE: Jan 2010 REV NO:

SCALE: 1:120,000

FIGURE NO: 6



NOTES

1. The Flood Zones are as designated by the Environment Agency. They ignore the presence of flood defences.
2. The Flood Defences can be defined as follows:

Zone 3 - Land that could be flooded from the sea by a flood of 0.5% annual probability (once in 200 years on average) or greater, or from the river by a flood at 1% annual probability (Once in 100 years on average) or greater.

Zone 2 - The additional extent likely to be affected by a flood, from the sea or from a river, having a 0.1% annual probability (once in 1,000 years on average).

Zone 1 - Land other than Functional Floodplain, outside Zone 2 and 3.

Functional Floodplain - Areas where water is expected to flow or be stored in times of flood.

Map Legend

- Main Rivers
- Zone 1
- Zone 2
- Zone 3
- Functional Floodplain
- South Holland District Boundary

REV	DATE	REMARKS

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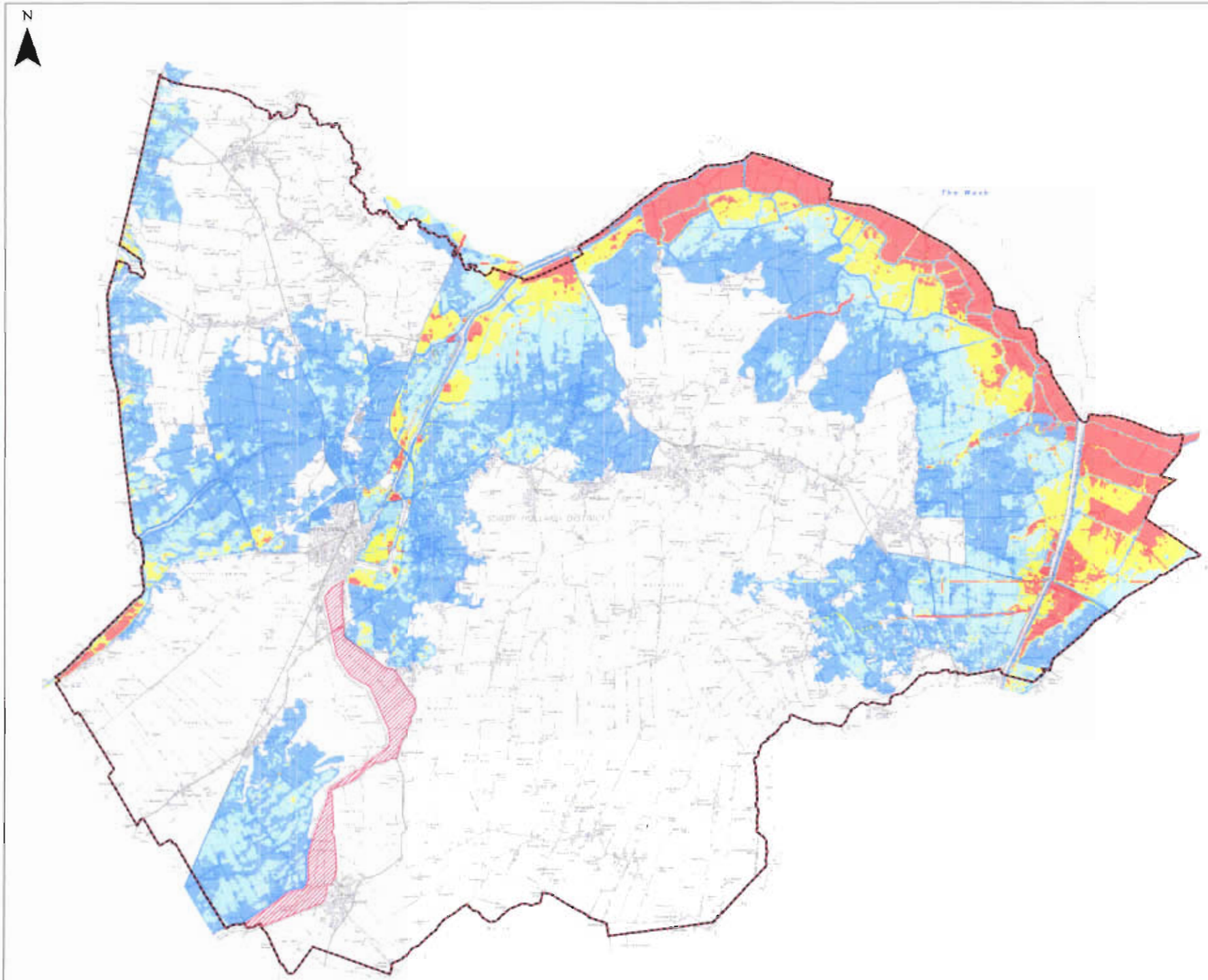
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UPDATE OF STRATEGIC FLOOD RISK ASSESSMENT

Flood Zones

DATE OF ISSUE: Jan 2010 REV NO:

SCALE: 1:120,000 FIGURE NO: 7



NOTES

1. The potential flooding consequences shown on this map relate to flooding from the sea, main rivers and Internal Drainage Board systems taking into account the presence of current flood risk management measures such as flood defences.

2. In addition to the potential flood extents shown on this map, there may be shallow flooding in low-lying rural areas.

3. The consequences designated as being an Actual Risk arise from direct overtopping of defences, where this would occur, together with assumed breach failure of some defences. Breach failure has been assumed to occur in places where the freeboard between peak sea or river water level and the defence crest level is less than the minimum desirable for structural security of the defence.

4. The consequences designated as being a Residual Risk arise from direct overtopping of defences, where this would occur, together with breach failure which is assumed could occur at any point along the defences.

5. The potential flooding consequences relate to flood probability bandings as follows:

Probability Band	Annual probability of Flooding	
	from a river (fluvial)	from the sea (tidal)
Low	<0.1%	<0.1%
Medium	1%-0.1%	0.5%-0.1%
High	>1%	>0.5%

6. Functional Floodplain encompasses areas where water is intended to flow or be stored in times of flood.

7. Land outside South Holland District is not considered.

8. This map shows the extents only of the flooding probability bands relevant to the map Title.

Map Legend

Peak Depth

- 0m - 0.5m
- 0.5m - 1m
- 1m - 1.5m
- >1.5m
- Functional Floodplain
- South Holland District Boundary

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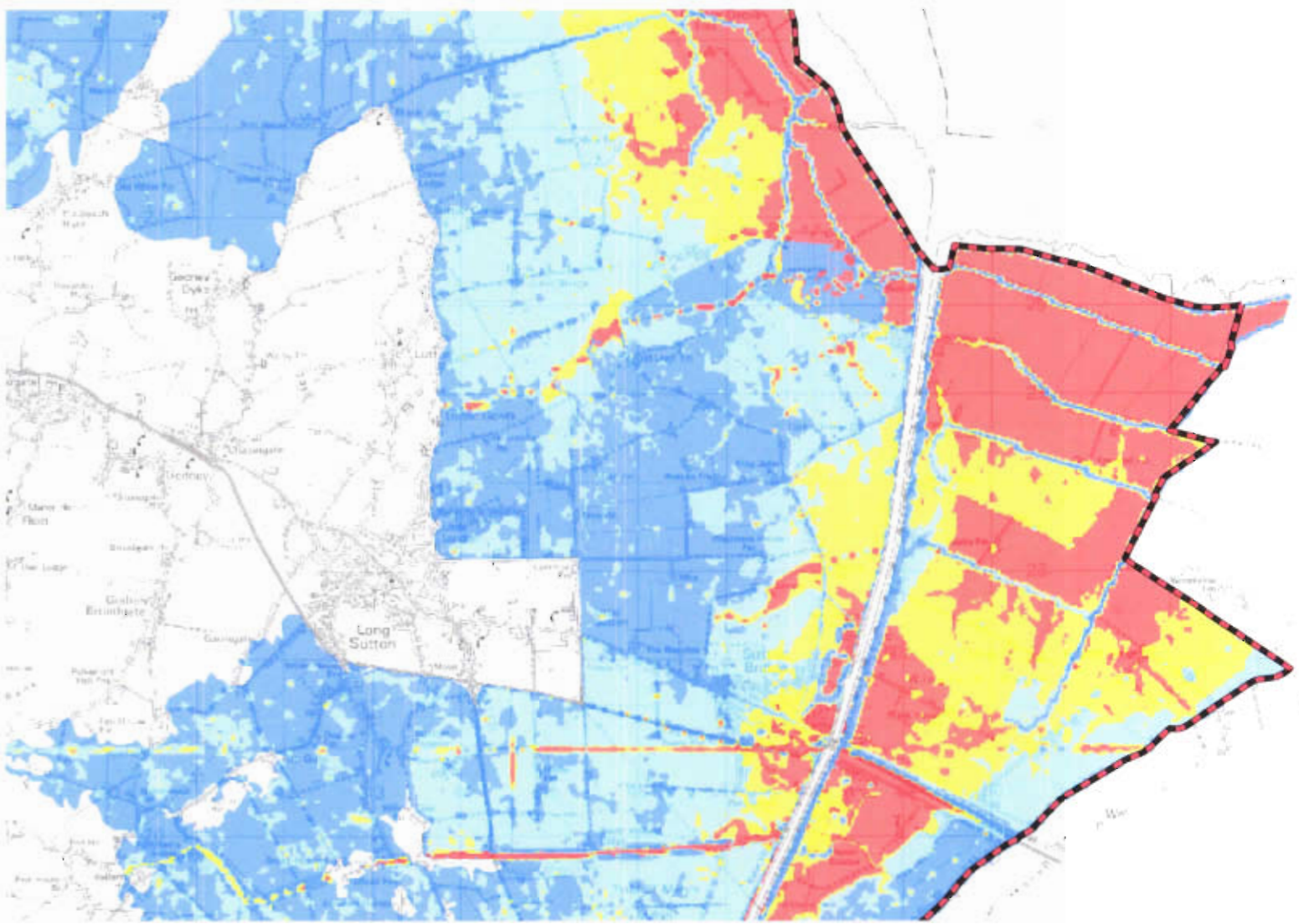
UPDATE OF STRATEGIC FLOOD RISK ASSESSMENT

Actual Peak Depth
District - Year 2115
1% Fluvial / 0.5% Tidal Event Probability

DATE OF ISSUE: January 2010 REV NO:

SCALE: 1 : 60,000 @ A1

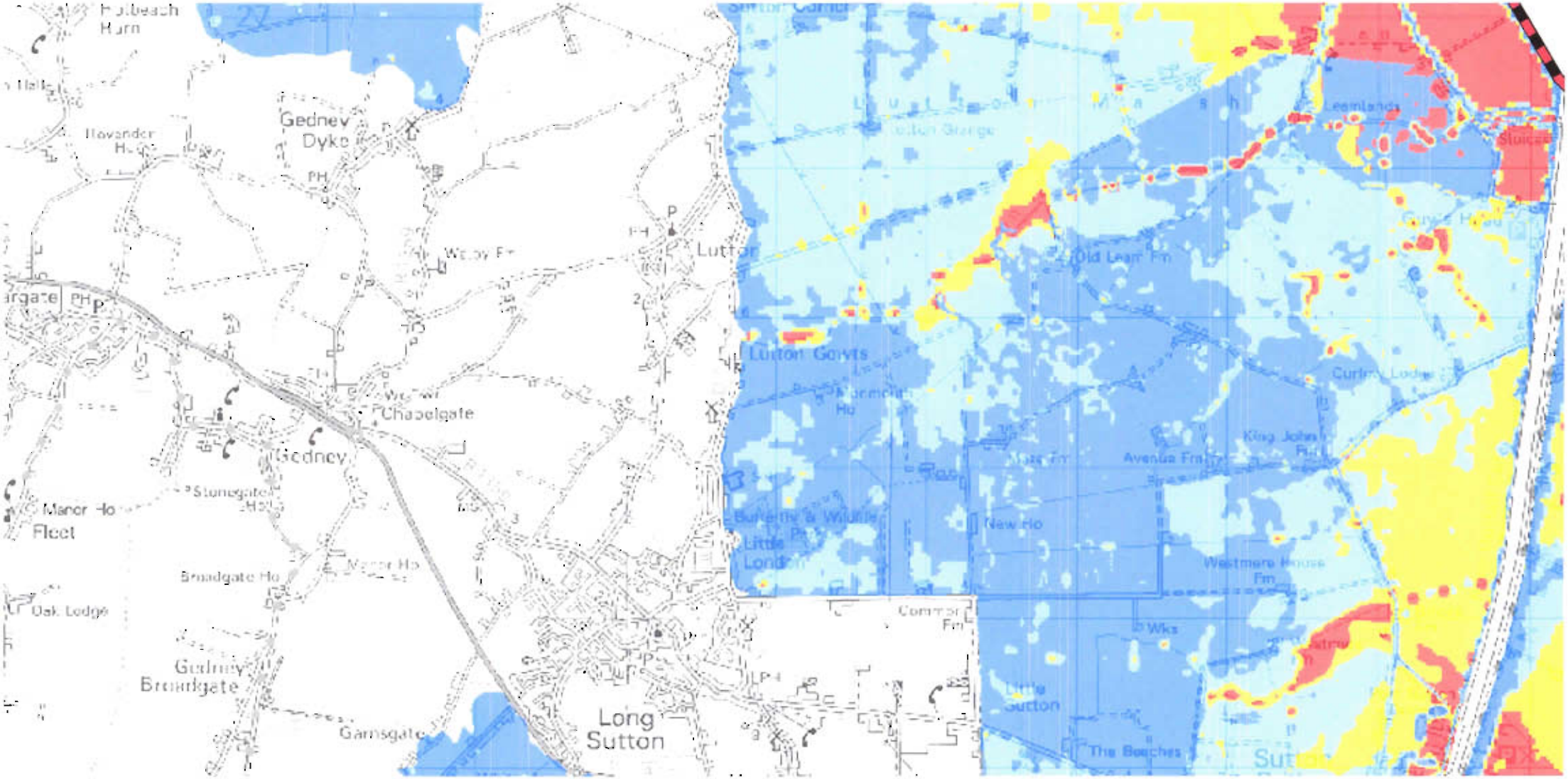
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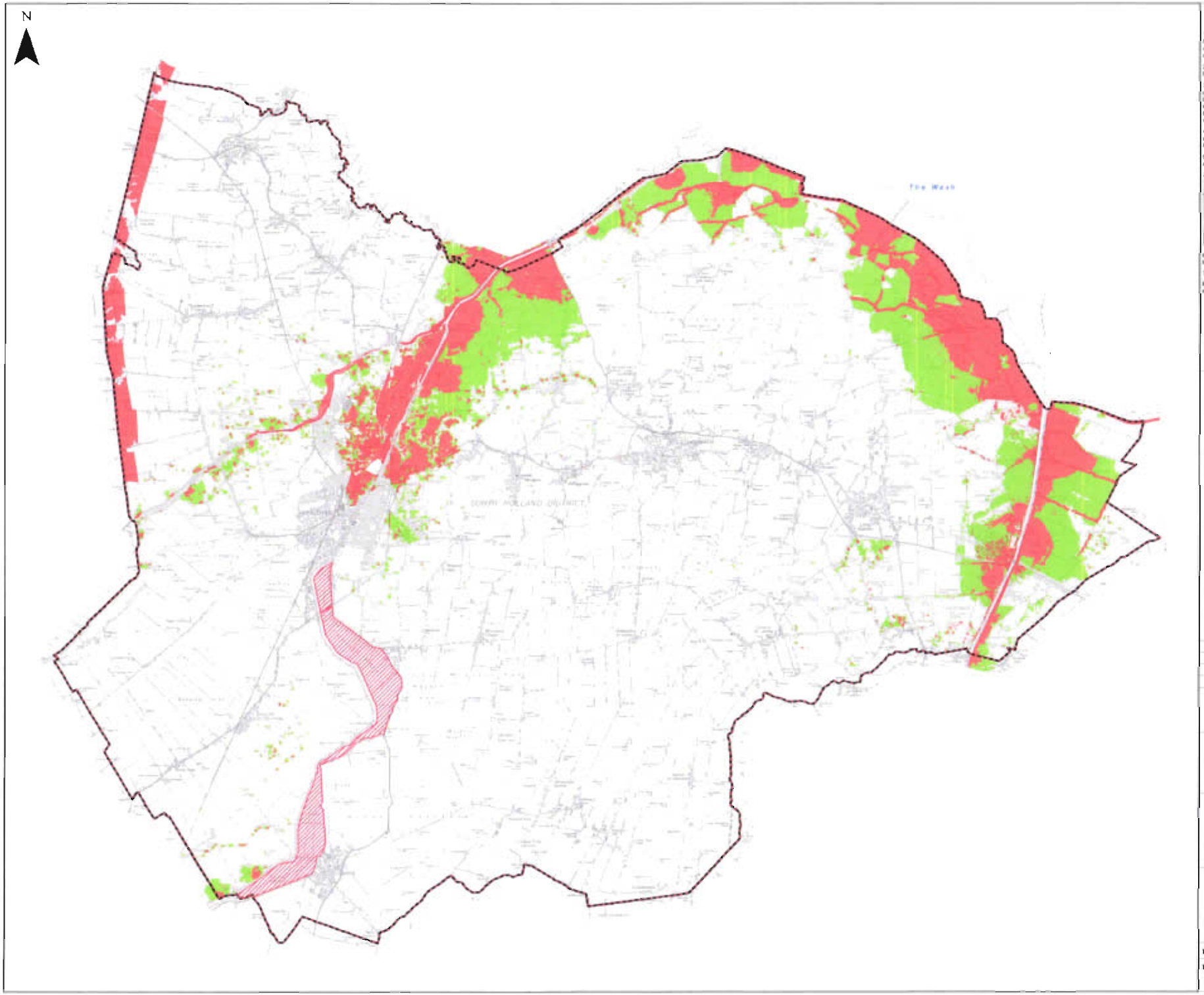


Map Legend

Peak Depth

- 0m - 0.5m
- 0.5m - 1m
- 1m - 1.5m
- >1.5m
- Functional Floodplain
- South Holland District Boundary


Holbeach Hurn
Gedney Dyke
Chapelgate
Gedney
Manor Ho
Fleet
Broadgate Ho
Oak Lodge
Gedney Broadgate
Garnsgate
Long Sutton
Lutton
Lutton Gotts
Old Leam Fm
Leamlands
Sluices
Curlew Lodge
King John's Fm
Avenue Fm
New Ho
Westmere House Fm
Little Sutton
The Beeches



NOTES

1. The potential flooding consequences shown on this map relate to flooding from the sea, main rivers and Internal Drainage Board systems taking into account the presence of current flood risk management measures such as flood defences.

2. In addition to the risk areas shown on this map, there may be shallow flooding in low-lying rural areas.

3. The consequences designated as being an Actual Risk arise from direct overtopping of defences, where this would occur, together with assumed breach failure of some defences. Breach failure has been assumed to occur at places where the foreboard between peak sea or river water level and the defence crest level is less than the minimum desirable for structural security of the defence.

4. The consequences designated as being a Residual Risk arise from direct overtopping of defences, where this would occur, together with breach failure which is assumed could occur at any point along the defences.

5. The potential flooding consequences relate to flood probability bandings as follows:

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	from a river (fluvial)	from the sea (tidal)
Low	<0.1%	<0.1%
Medium	1%-0.1%	0.5%-0.1%
High	>1%	>0.5%

6. Functional Floodplain encompasses areas where water is intended to flow or be stored in times of flood.

7. Land outside South Holland District is not considered.

8. This map shows the extents only of the flooding probability bands relevant to this map Title

Map Legend

Peak Velocity (metres per second)

- 0 - 0.1
- 0.1 - 0.25
- >0.25
- Functional Floodplain
- South Holland District Boundary

REV	DATE	REMARKS

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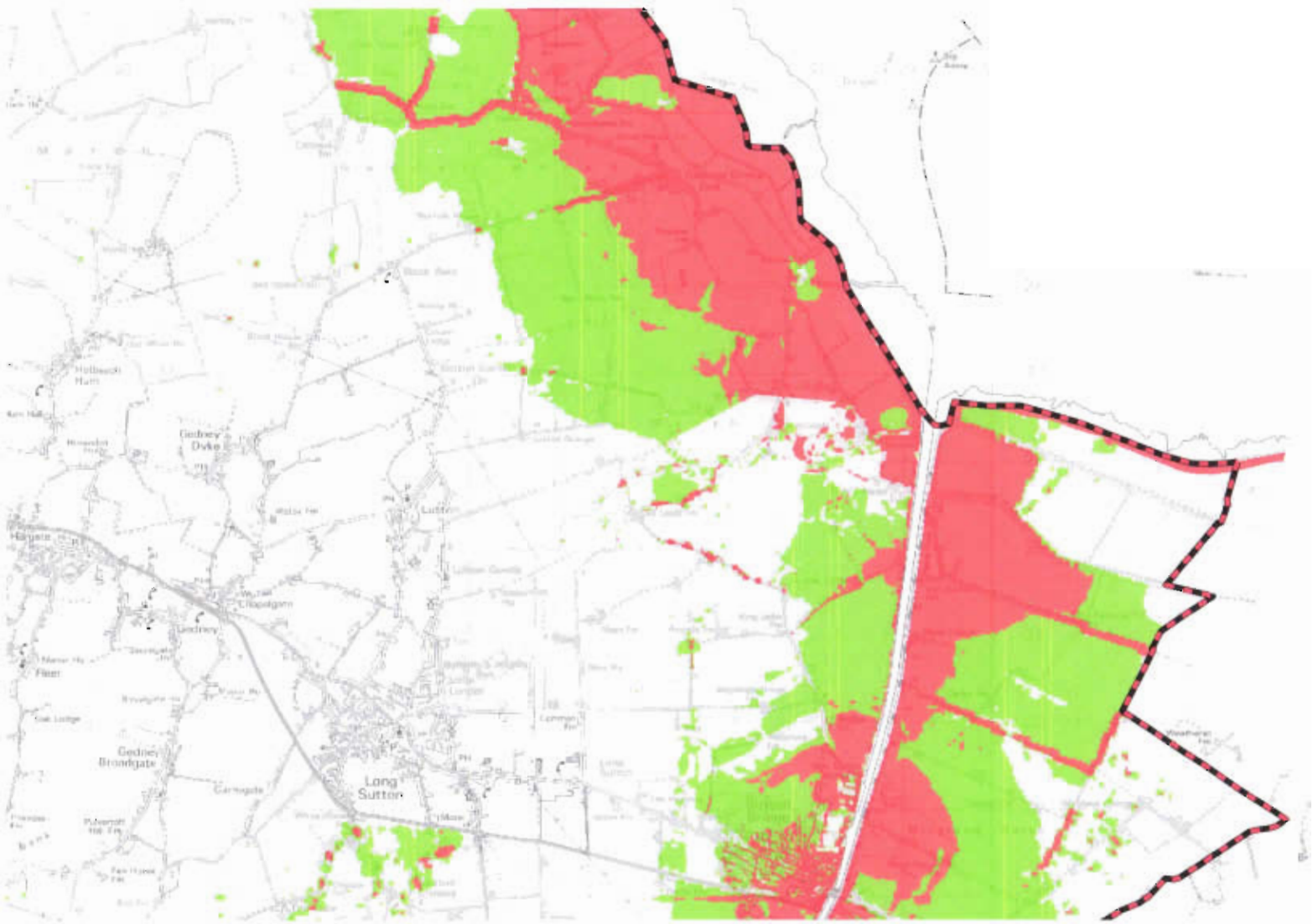
UPDATE OF STRATEGIC FLOOD RISK ASSESSMENT

Actual Peak Velocity
District - Year 2115
1% Fluvial / 0.5% Tidal Event Probability

DATE OF ISSUE: January 2010 REV NO:

SCALE: 1 : 60,000 @ A1

MAP NO:



7. Land outside South Holland District is not consider

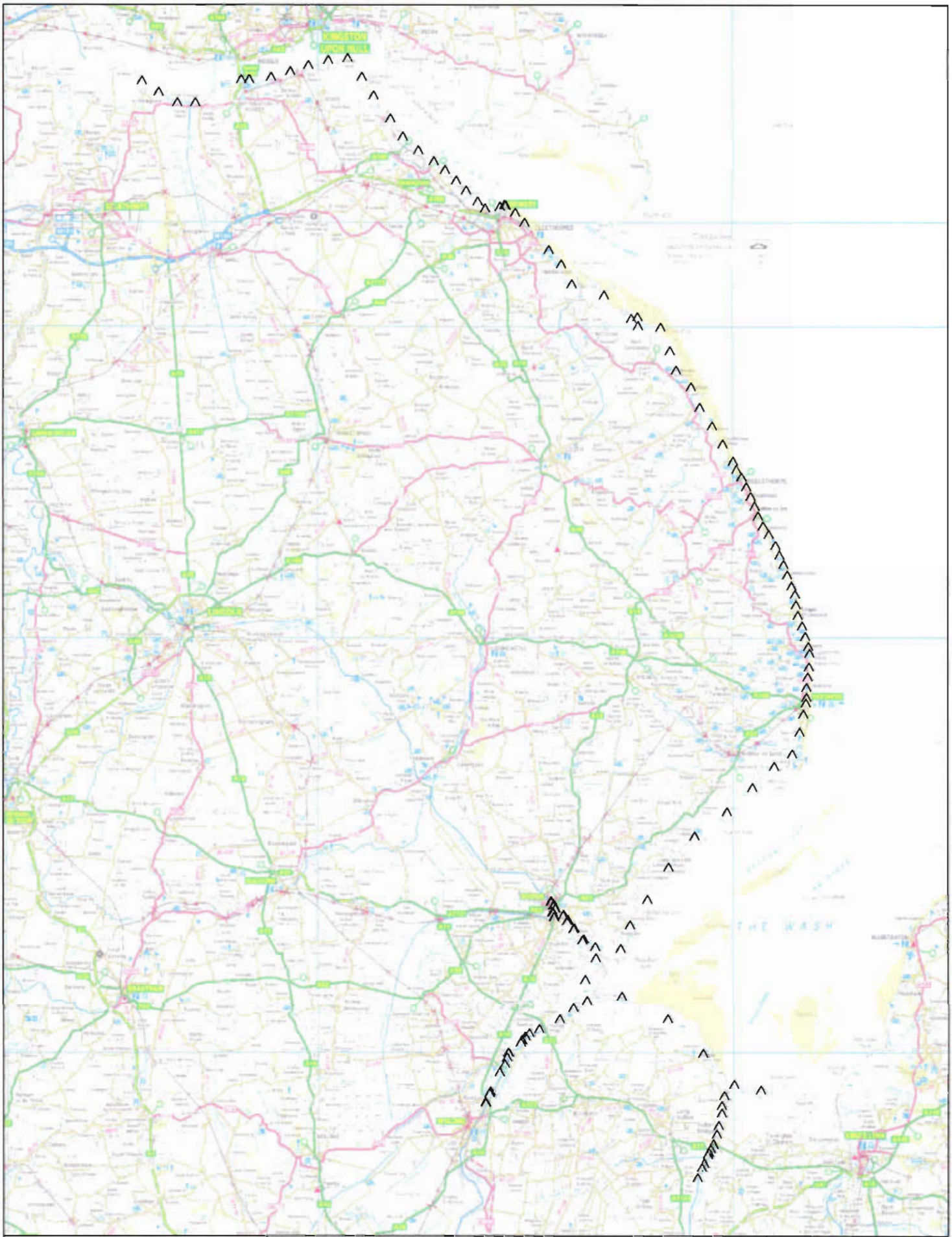
8. This map shows the extents only of the floodin relevent to the map Title

Map Legend

Peak Velocity (metres per second)

- 0 - 0.1
- 0.1 - 0.25
- >0.25
- Functional Floodplain
- South Holland District Boundary

APPENDIX 3



^ 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. 03708 506 506.
Weekday daytime calls cost 5p plus up to 6ppm from BT Weekend Unlimited. Mobile and other providers charges may vary.

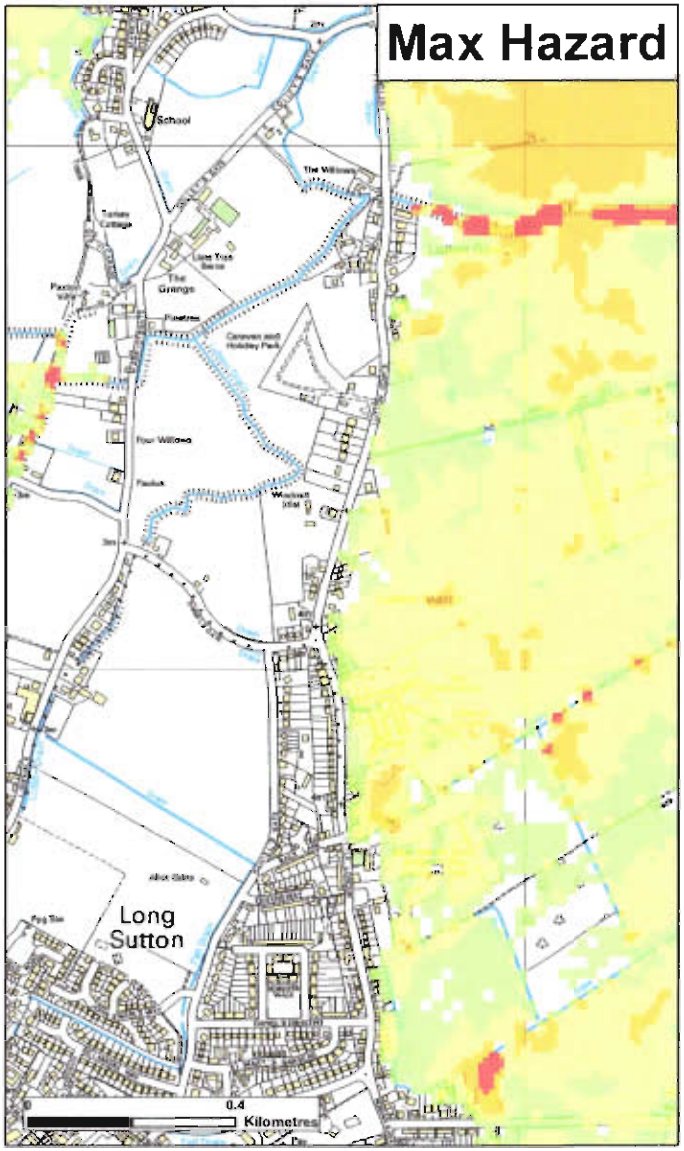
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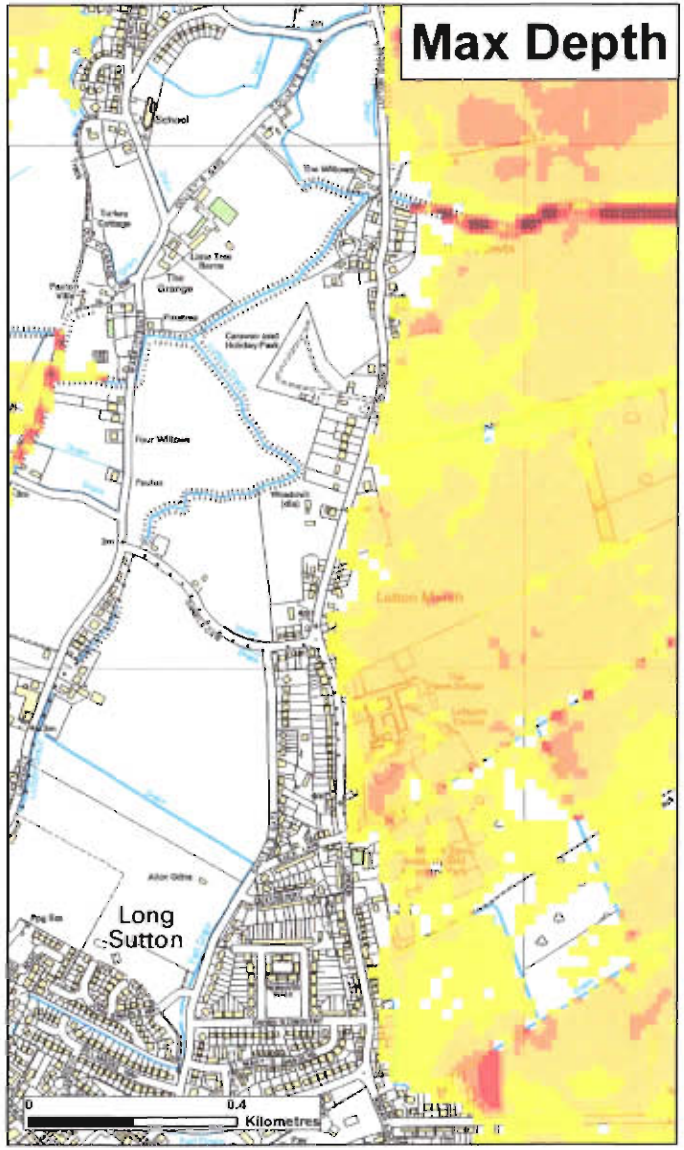
Produced by the Partnership and Strategic Overview Team, Lincoln

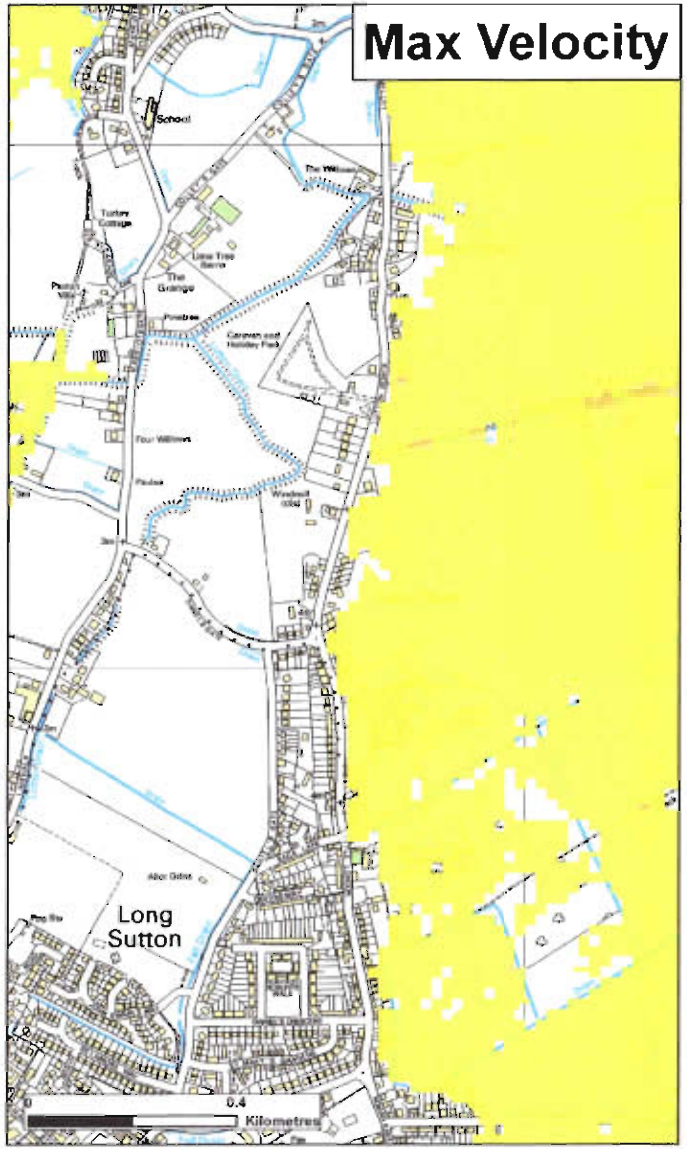
Northern Area Tidal Hazard Mapping

Location of Modelled Breaches

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

Max Hazard
(Flood Risk to People : FD2320)

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

Max Depth (m)

- 0 - 0.25
- 0.25 - 0.50
- 0.50 - 1.0
- 1.0 - 2.0
- 2.0 +

Max Velocity (m/s)

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

Date Printed	February 2016	Scenario year	2006	Scenario Annual Chance	0.5% (1 in 200)	CCN Number	CCN-2016-3447

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.

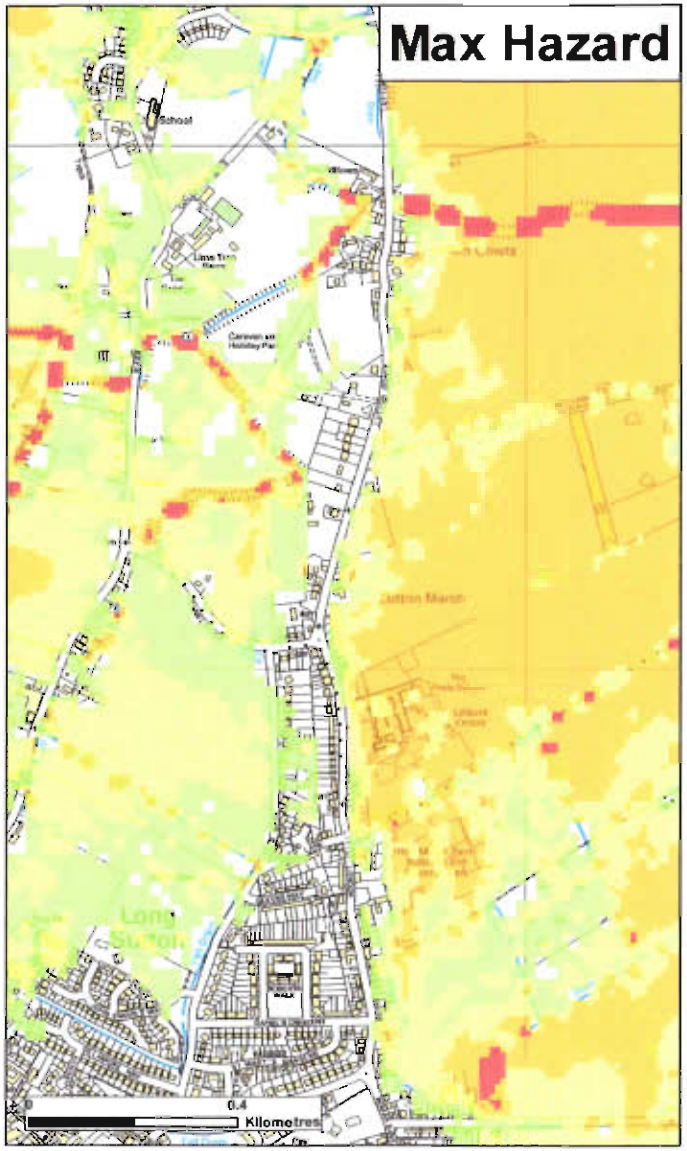
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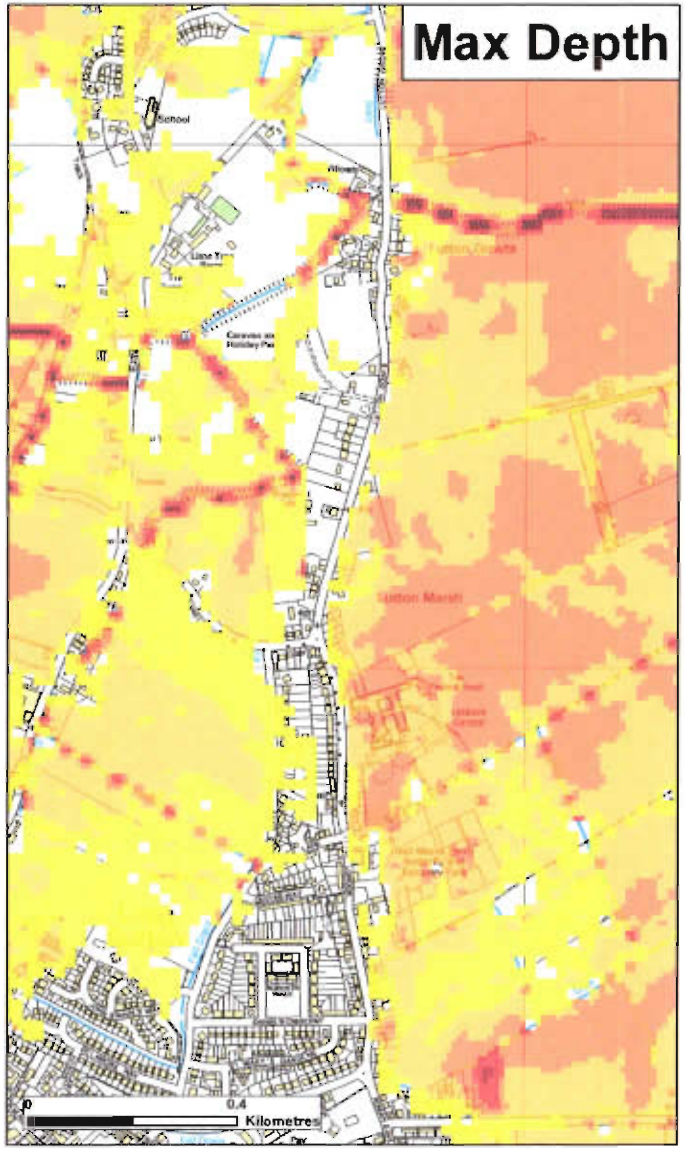
Environment Agency

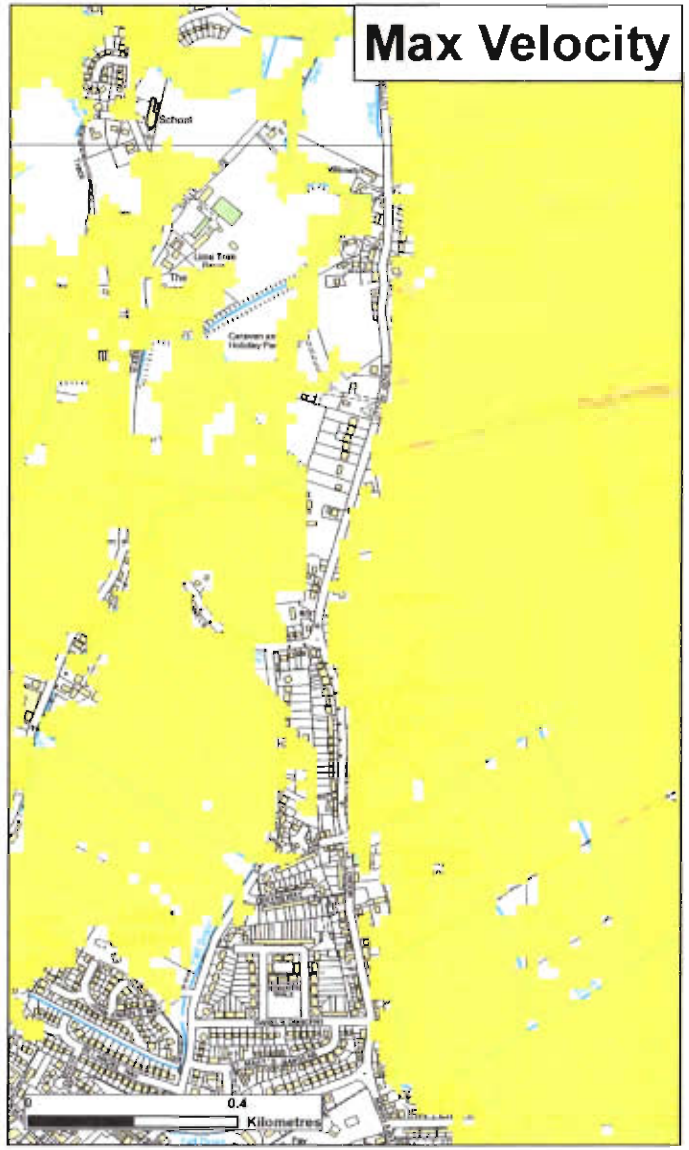
Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

Map Centred on TF 43050 24177

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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 - 2.0	1.5 - 2.5
	2.0 +	2.5 +

Date Printed	February 2016	Scenario year	2006	Scenario Annual Chance	0.1% (1 in 1000)	CCN Number	CCN-2016-3447

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

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

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

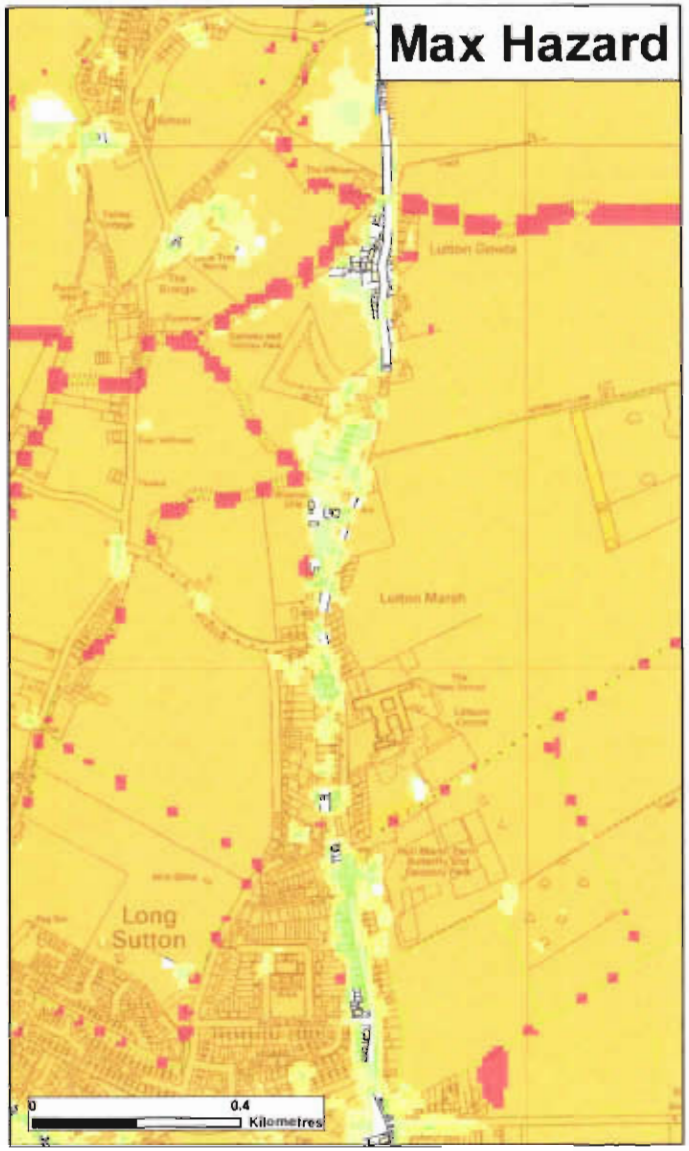
General Enquiries No: 03708 506 506. Weekday Daytime calls cost 5p plus up to 6p per minute from BT Weekend Unlimited. Mobile and other providers' charges may vary

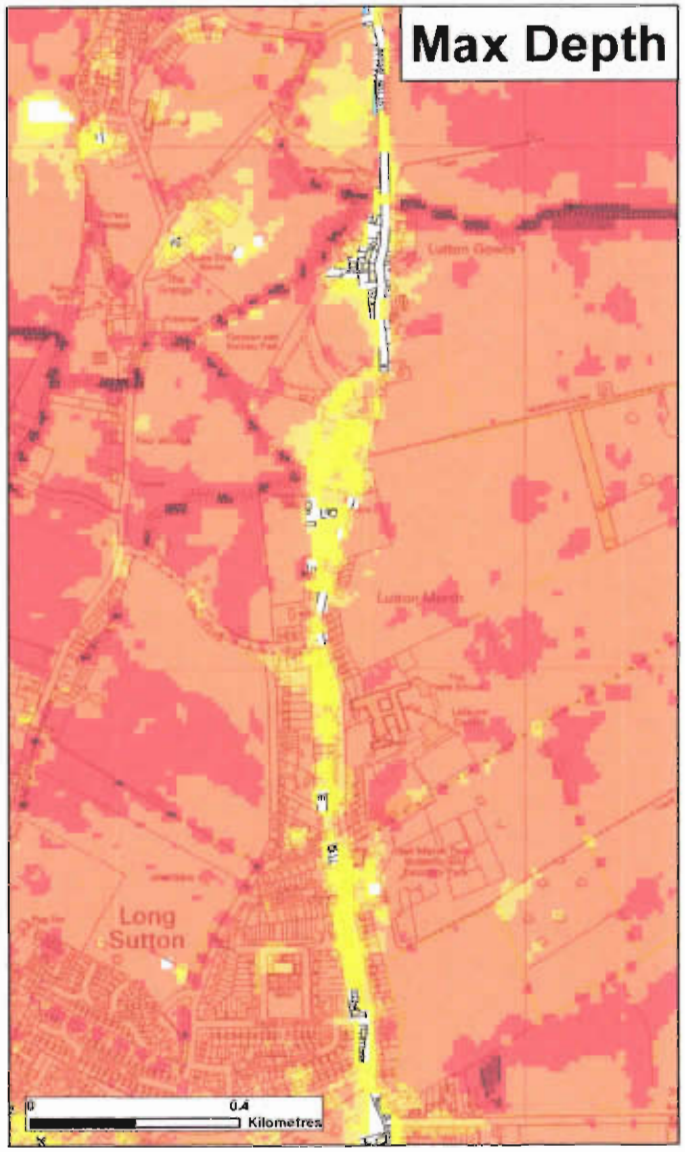
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Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

Map Centred on TF 43650 24177

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

Max Hazard
(Flood Risk to People : FD2320)

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

Max Depth (m)

- 0 - 0.25
- 0.25 - 0.50
- 0.50 - 1.0
- 1.0 - 2.0
- 2.0 +

Max Velocity (m/s)

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

Date Printed	February 2016	Scenario year	2115	Scenario Annual Chance	0.5% (1 in 200)	CCN Number	CCN-2016-3447

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

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

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

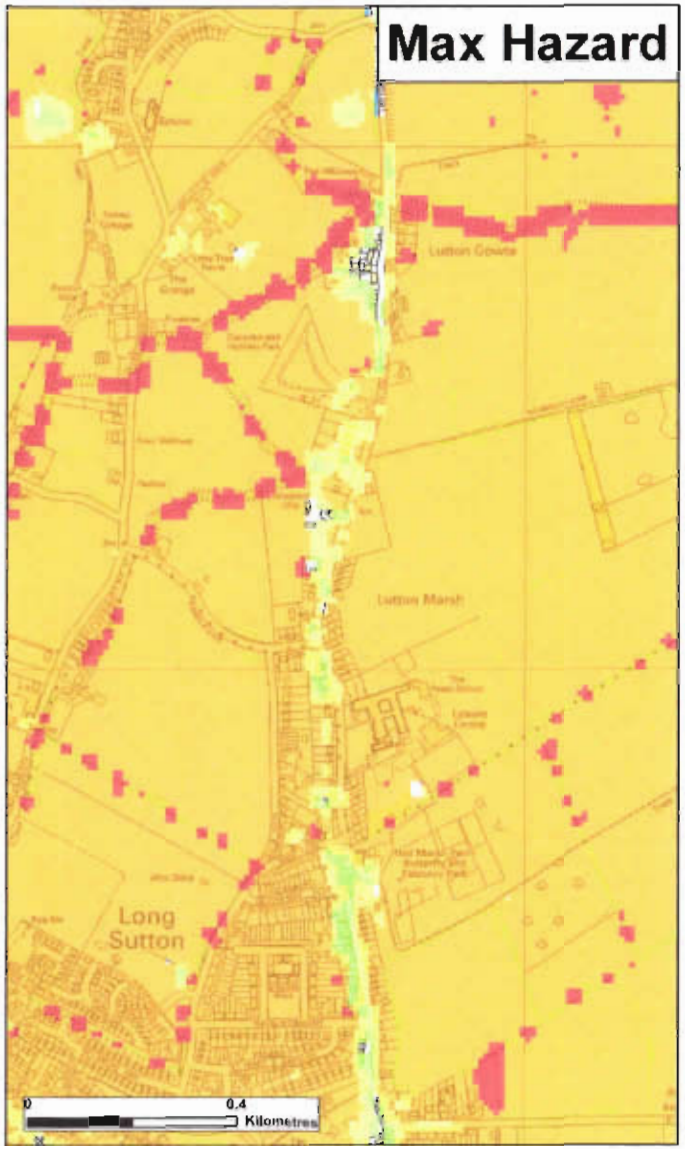
General Enquiries No: 03708 506 506. Weekday Daytime calls cost 5p plus up to 5p per minute from BT Weekend Unlimited. Mobile and other providers' charges may vary.

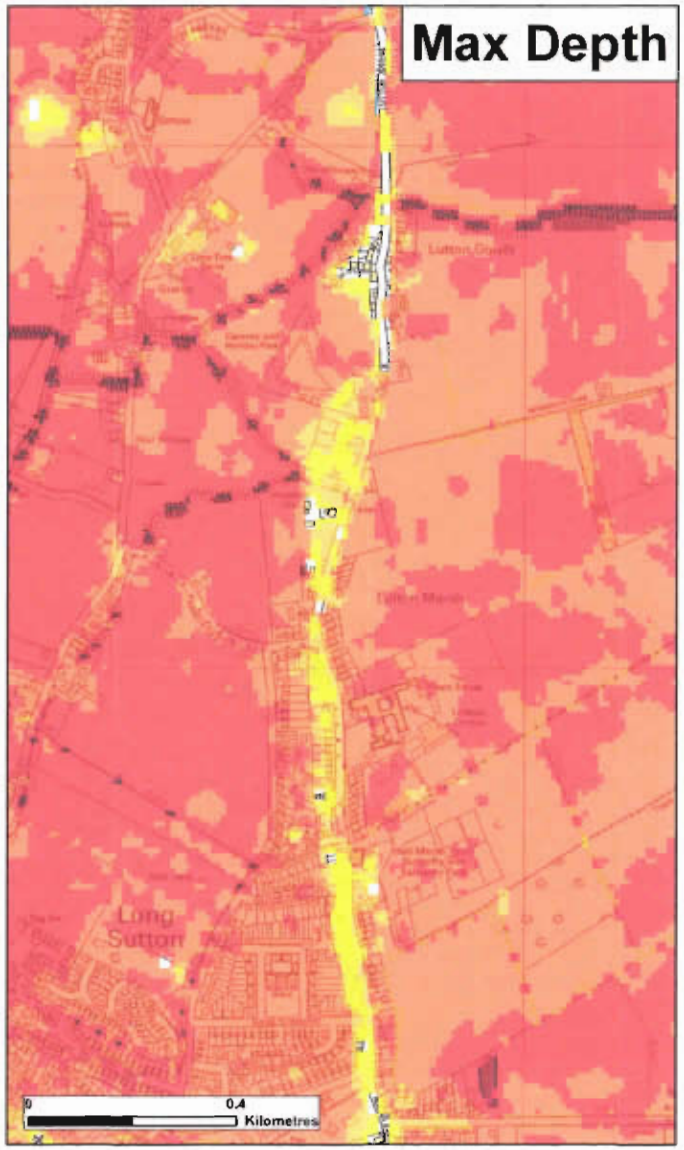
Environment Agency

Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

Map Centred on TF 43650 24177

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

Max Hazard
(Flood Risk to People : FD2320)

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

Max Depth (m)

- 0 - 0.25
- 0.25 - 0.50
- 0.50 - 1.0
- 1.0 - 2.0
- 2.0 +

Max Velocity (m/s)

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

Date Printed	February 2016	Scenario year	2115	Scenario Annual Chance	0.1% (1 in 1000)	CCN Number	CCN-2016-3447

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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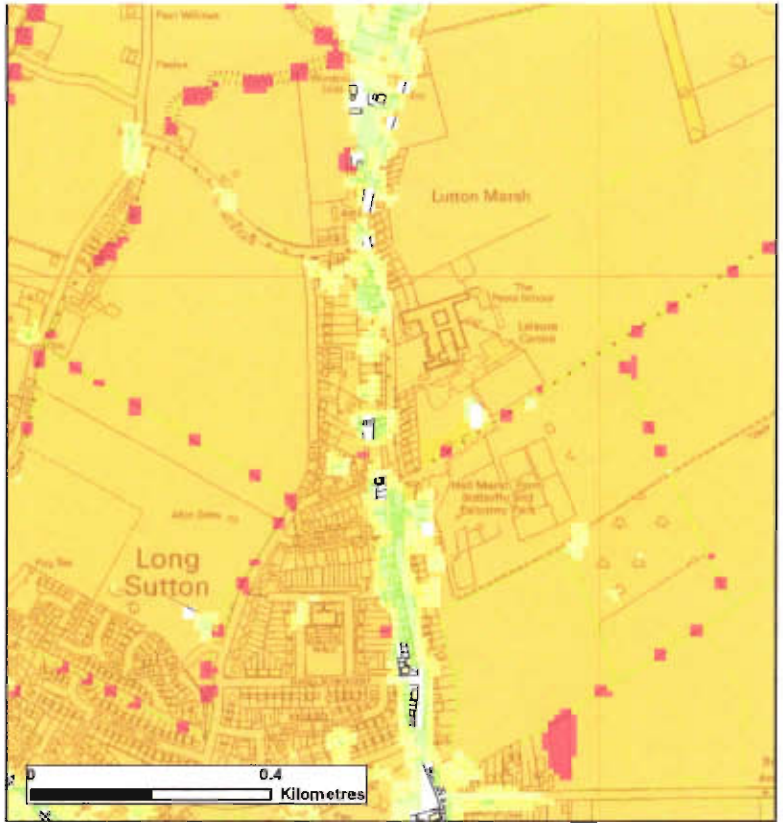
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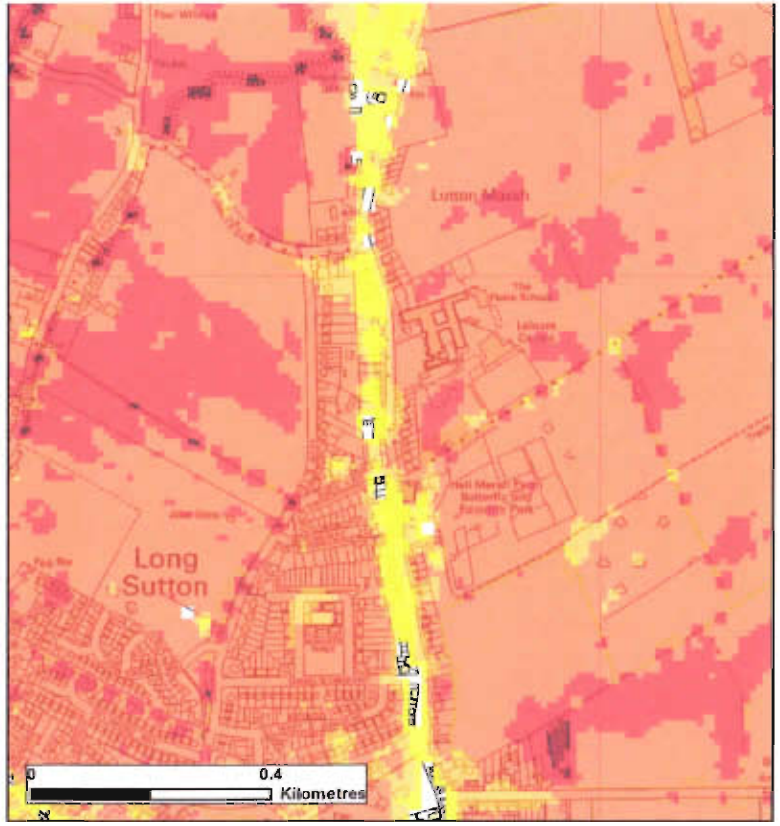
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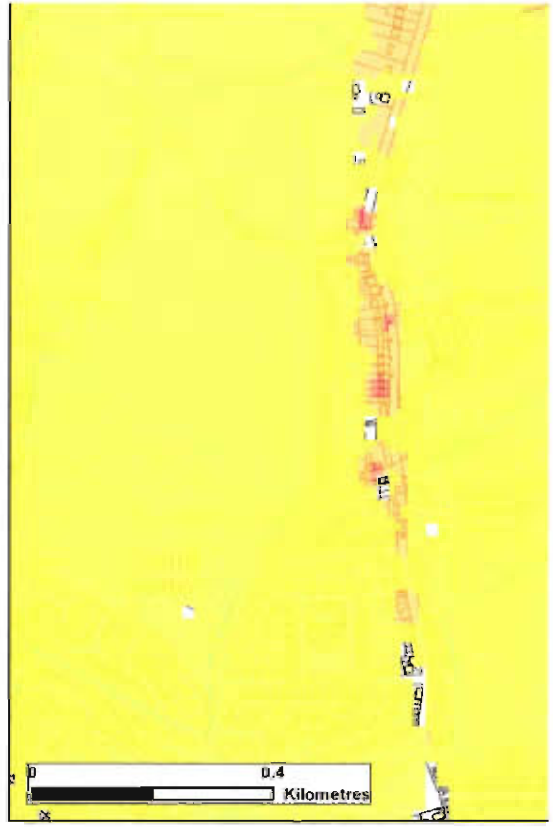
Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

Map Centred on TF 43660 24177

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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 - 2.0	1.5 - 2.5
	2.0 +	2.5 +

Date Printed	February 2016	Scenario year	2115	Scenario Annual Chance	0.5% (1 in 200)	CCN Number	CCN-2016-3447

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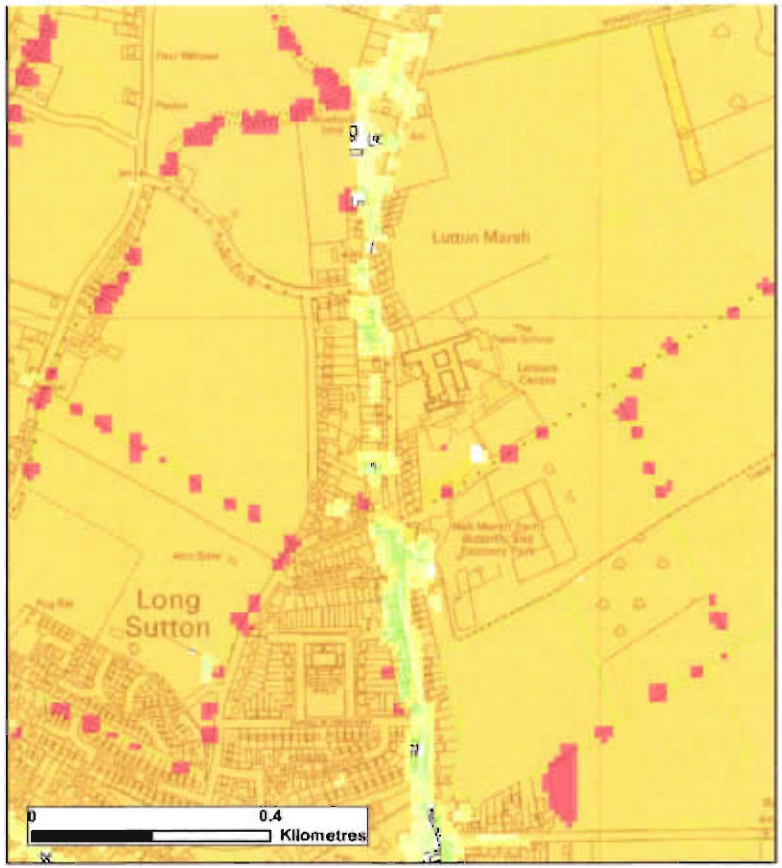
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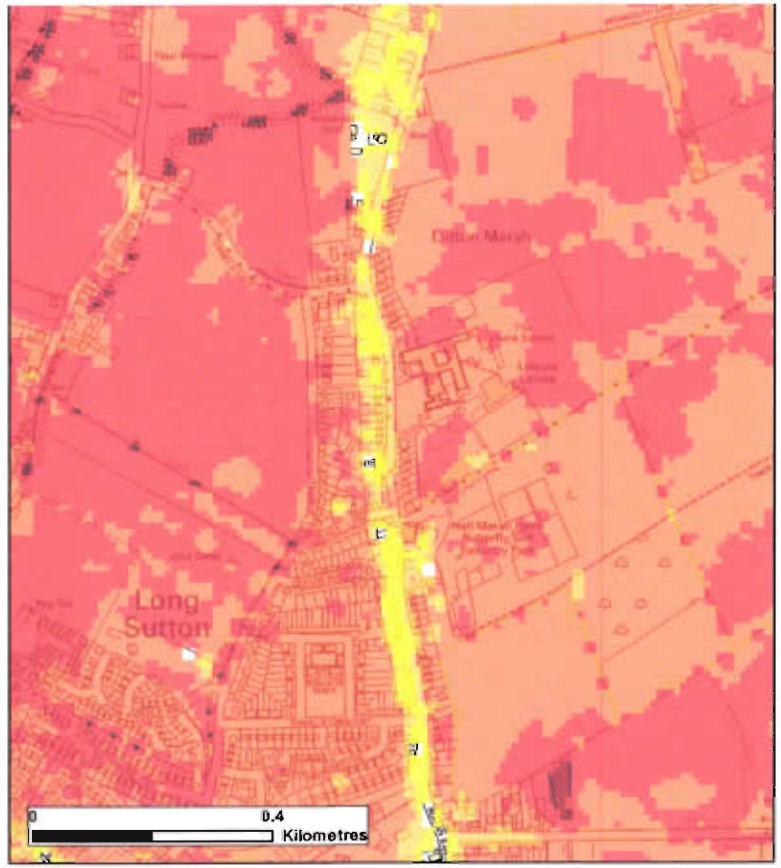
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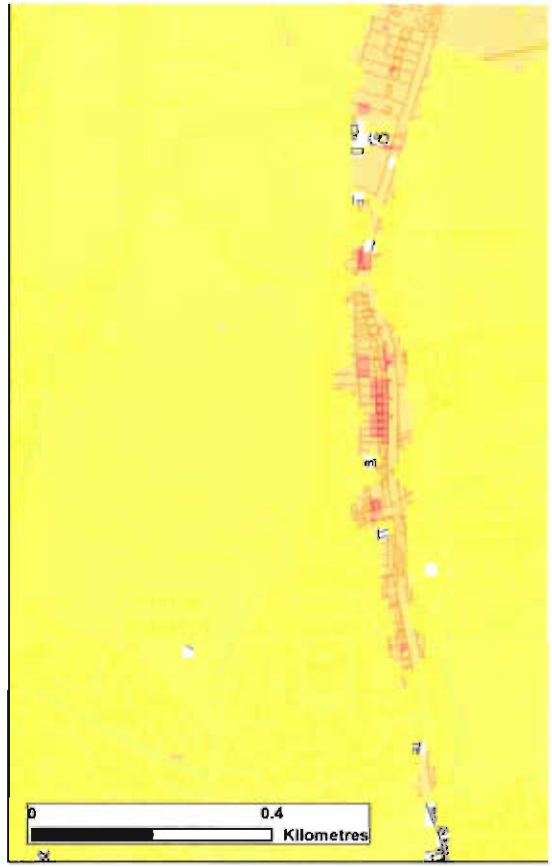
Lincolnshire and
Tidal Breac
Map

Map Centred o

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★ Modelled Breach Locations

- see also the accompanying plan "Location of Modelled Breaches"

Max Hazard
(Flood Risk to People : FD2320)

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

Max Depth (m)

- 0 - 0.25
- 0.25 - 0.50
- 0.50 - 1.0
- 1.0 - 2.0
- 2.0 +

Max Velocity (m/s)

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

Date Printed	February 2016	Scenario year	2115	Scenario Annual Chance	0.1% (1 in 1000)	CCN Number	CCN-2016-3447

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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Lincolnshire and Tidal Breac Map

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APPENDIX 4



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Sheet Number	Sheet Title
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B - CMT193P	Wisemans (N)
B - CMT193P	Wisemans (S)
C - CMT194P	Peartree Hilt
D - CMT195P	Donningtons
E - CMT196P	Fleet Fen (N)
E - CMT196P	Fleet Fen (S)
F - CMT197P	Little Holland (N)
F - CMT197P	Little Holland (S)
F - CMT197P	Little Holland (W)
G - CMT198P	Sutton St James
H - CMT199G	Free Discharge (E)
H - CMT199G	Free Discharge (W)
H - CMT199G	Free Discharge (C)
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K - CMT201G	Lutton Leam (E)
K - CMT201G	Lutton Leam (W)
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South Holland Drainage Board

LEGEND

- Boards Boundary
- Hydrological Catchment

KEY MAP

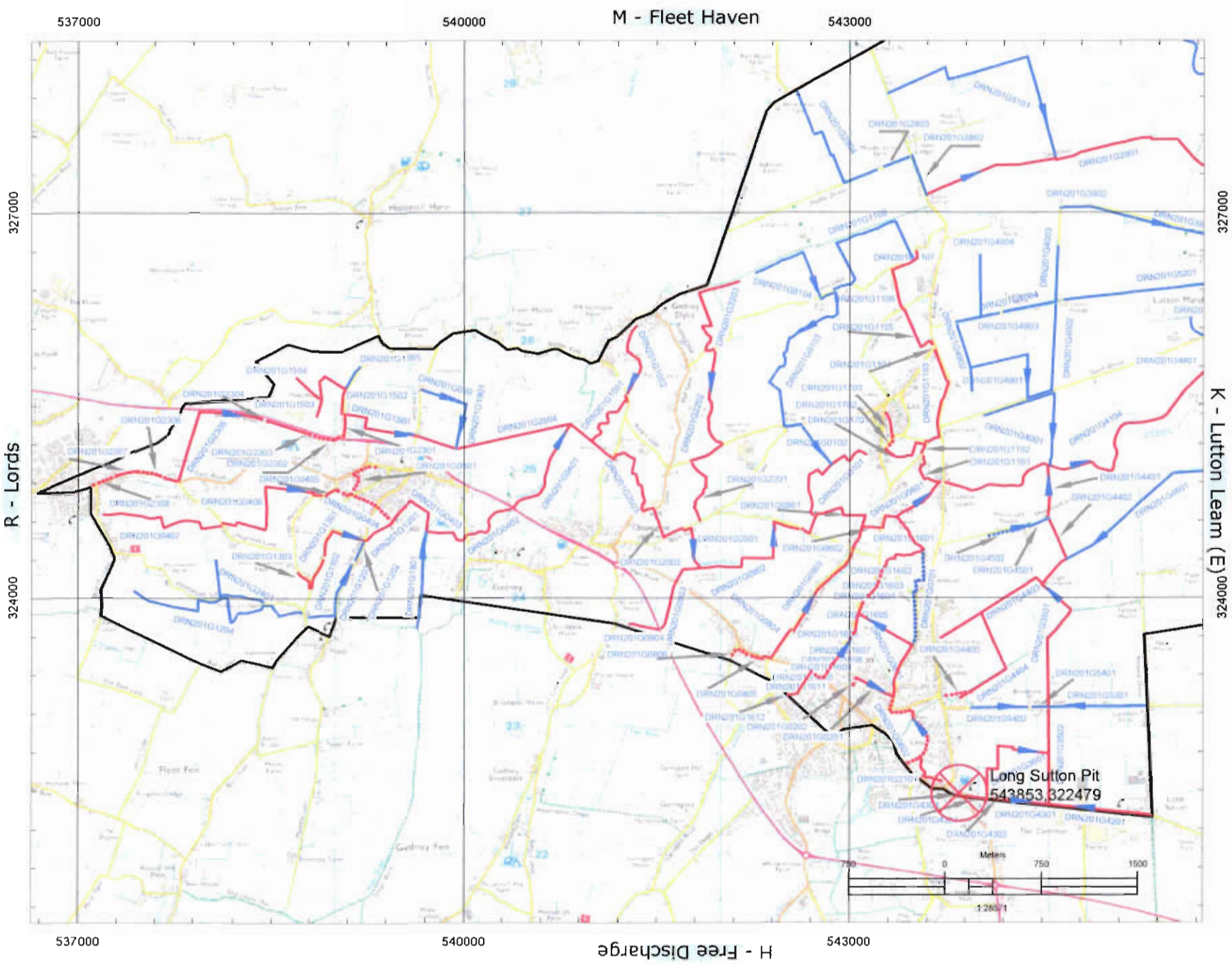


SCALE	SHEET NUMBER
Best Fit	Index
PLOT DATE	
23/07/2015	

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FILE NAME

SHIDB_webmap2013.dwg



Lutton Leam (W)

South Holland Drainage Board

LEGEND

- Catchment Boundary
- High Priority Watercourse
- IDB Ordinary Watercourse
- High Priority Pipeline
- Ordinary Pipeline
- Water Control Structure
- Pumping Station
- Inland Sluice
- Tidal Sluice

KEY MAP

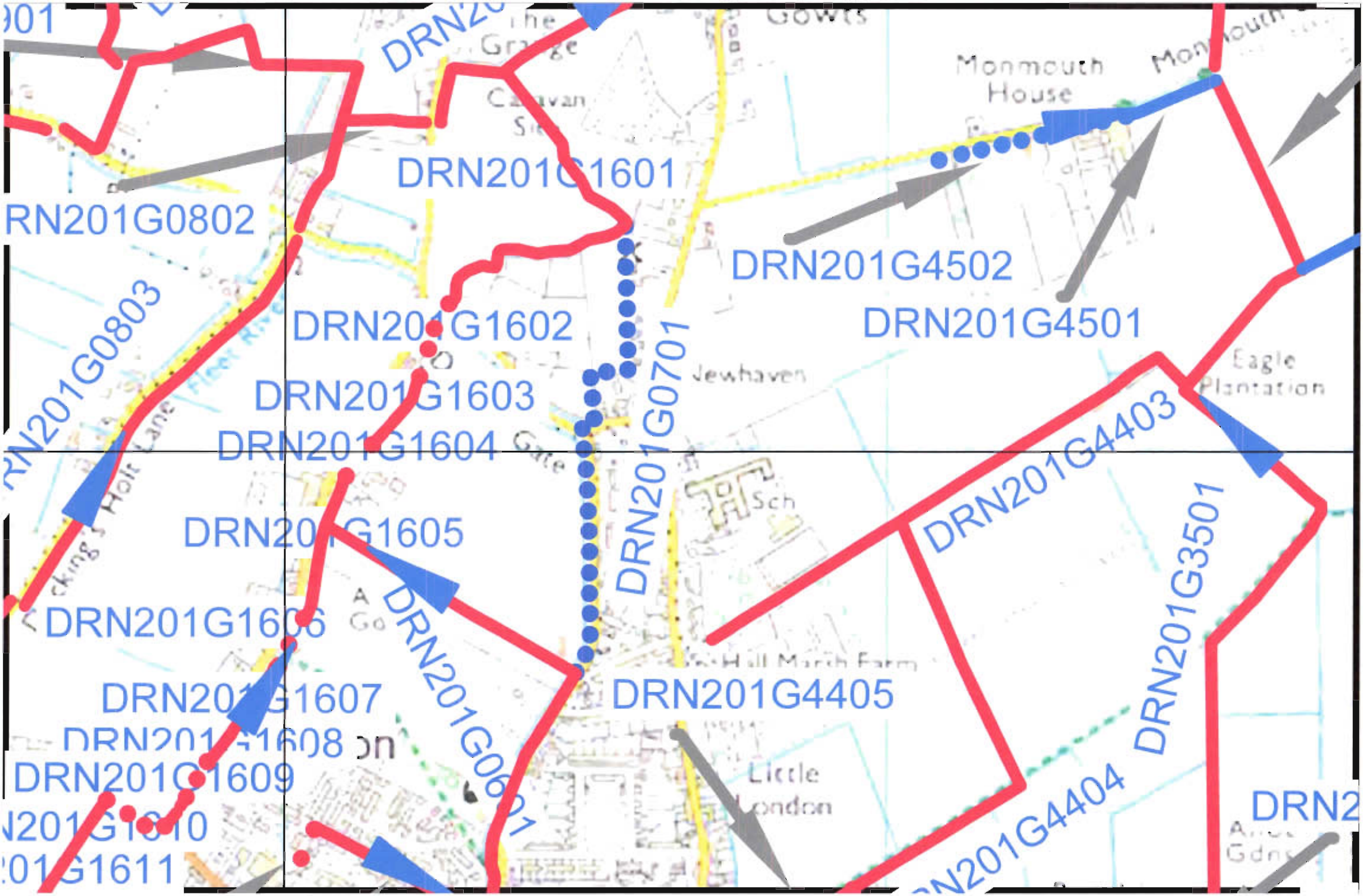


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DRN201G0701
DRN201G0601
DRN201G4502
DRN201G4501
DRN201G4403
DRN201G3501
DRN201G4405
DRN201G4404
Monmouth House
Jewhaven
Eagle Plantation
Little London

APPENDIX 5

Ben Hornigold

From: Dominic Morris [Dominic@wlma.org.uk]
Sent: 16 February 2016 10:38
To: ben.hornigold@btinternet.com
Subject: Lutton Gowts Lutton PE12 9LQ
Attachments: Catchment K Lutton Leam.pdf

Ben

Please find plan attached showing the location of the proposed development sites in SHIDB catchment K, which the levels of the watercourses are governed by Lutton Leam Tidal Sluice. As you can see from the plan there are no IDB watercourses adjacent to the site. So any surface water disposal if entering the Board's drainage system would have to flow through a Private/Riparian watercourse. The anticipated flood level is based on old data, as we haven't finished the new survey model for this catchment. The Board are not aware of any flooding occurrences in this area, but that nots to say that there haven't been, just never reported.

The Board will expect an in depth surface water disposal design at planning stages, for their consideration for this proposed development.

Many thanks

Dom

Dom Morris
Assistant Engineer, South Holland IDB
dd: +44 (0)1406 421702 | **m:** +44 (0)7920 792389 | **e:** dominic@wlma.org.uk

Water Management Alliance
Kettlewell House, Austin Fields Industrial Estate, King's Lynn, Norfolk, PE30 1PH, UK
t: +44 (0)1553 819600 | **f:** +44 (0)1553 819639 | **e:** info@wlma.org.uk | www.wlma.org.uk

Consisting of:
Broads Drainage Board, East Suffolk Drainage Board, King's Lynn Drainage Board
Norfolk Rivers Drainage Board and South Holland Drainage Board

Defenders of the Lowland Environment

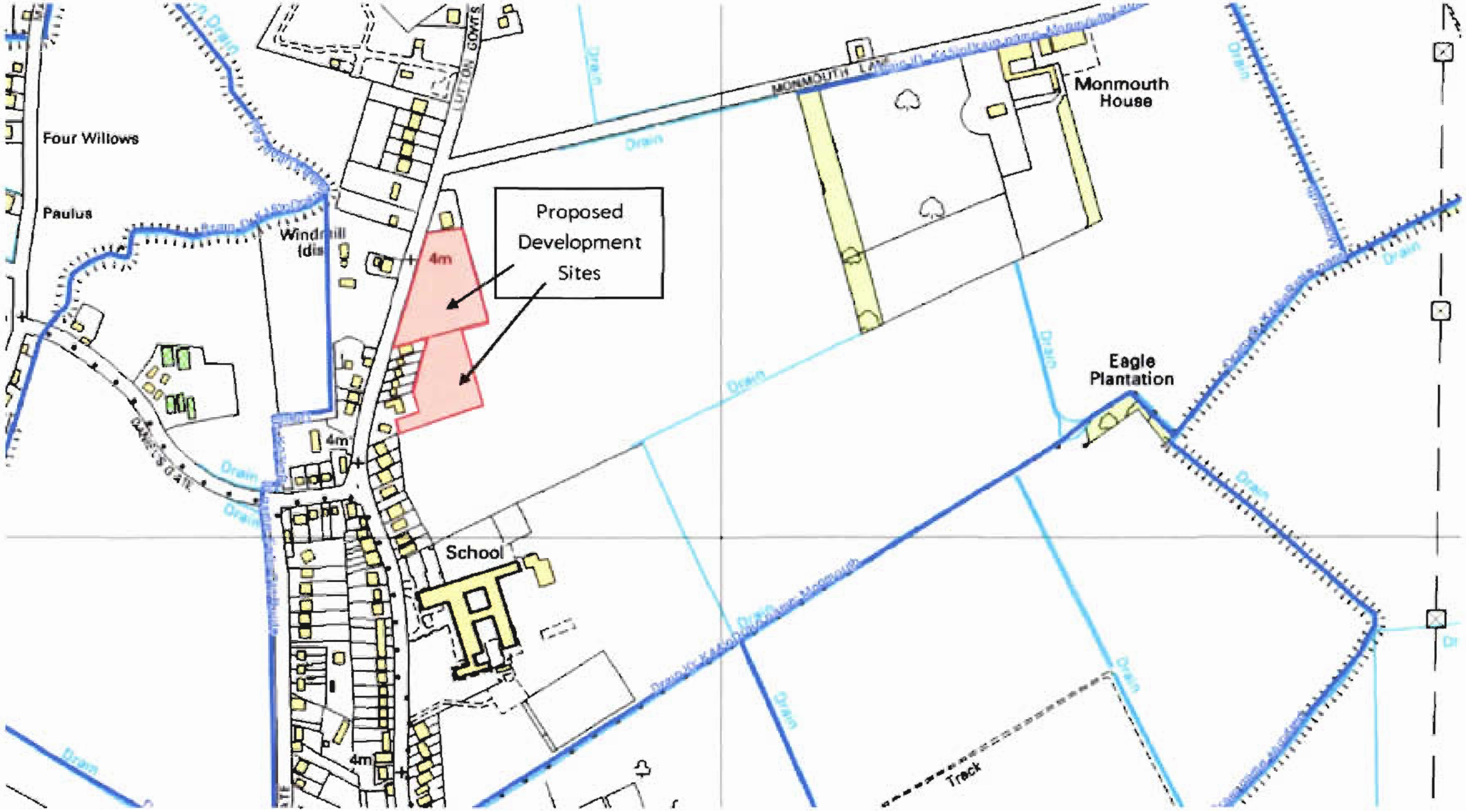
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SOUTH HOLLAND IDB CATCHMENT K



SOUTH HOLLAND IDB CATCHMENT K



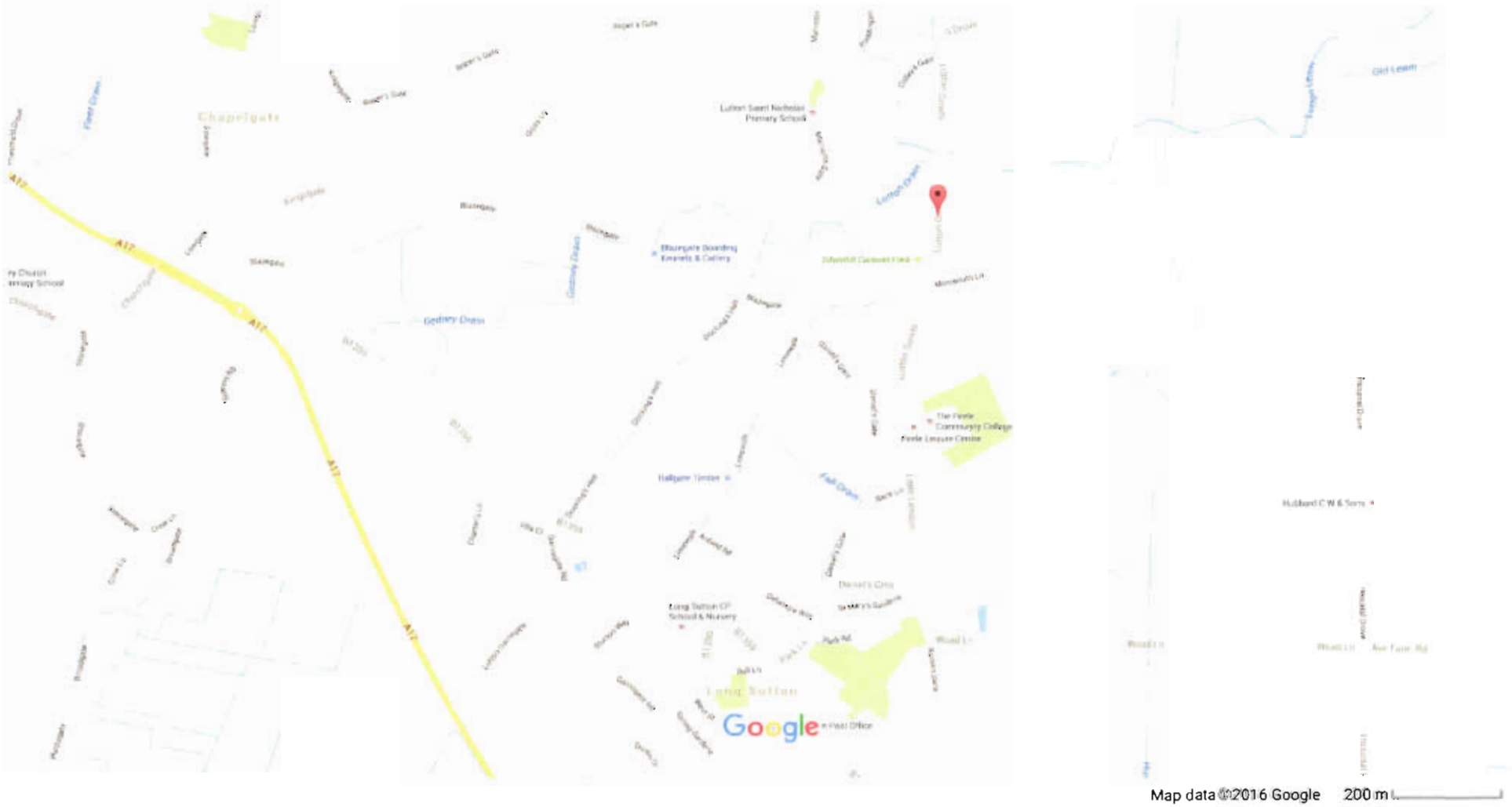
South Holland IDB maintained watercourses

Private/Riparian owned/maintained watercourses

Location of anticipated flood level of 0.9m ODN

APPENDIX 6

Google Maps Lutton Gowts



Lutton Gowts

Spalding, Lincolnshire PE12



Google earth

feet 2000

meters 900



Google earth

feet 400

meters 100



ILLUSTRATIVE SITE PLAN 1:200



LOCATION PLAN 1:1250

Peter Humphrey Associates
ARCHITECTURAL DESIGN AND BUILDING

RESIDENTIAL DEVELOPMENT
LAND NORTH EAST OF COPPER BEECH
LUTTON GOWTS
LUTTON

MR & MRS BARRINGTON-KENNEY

PLANNING

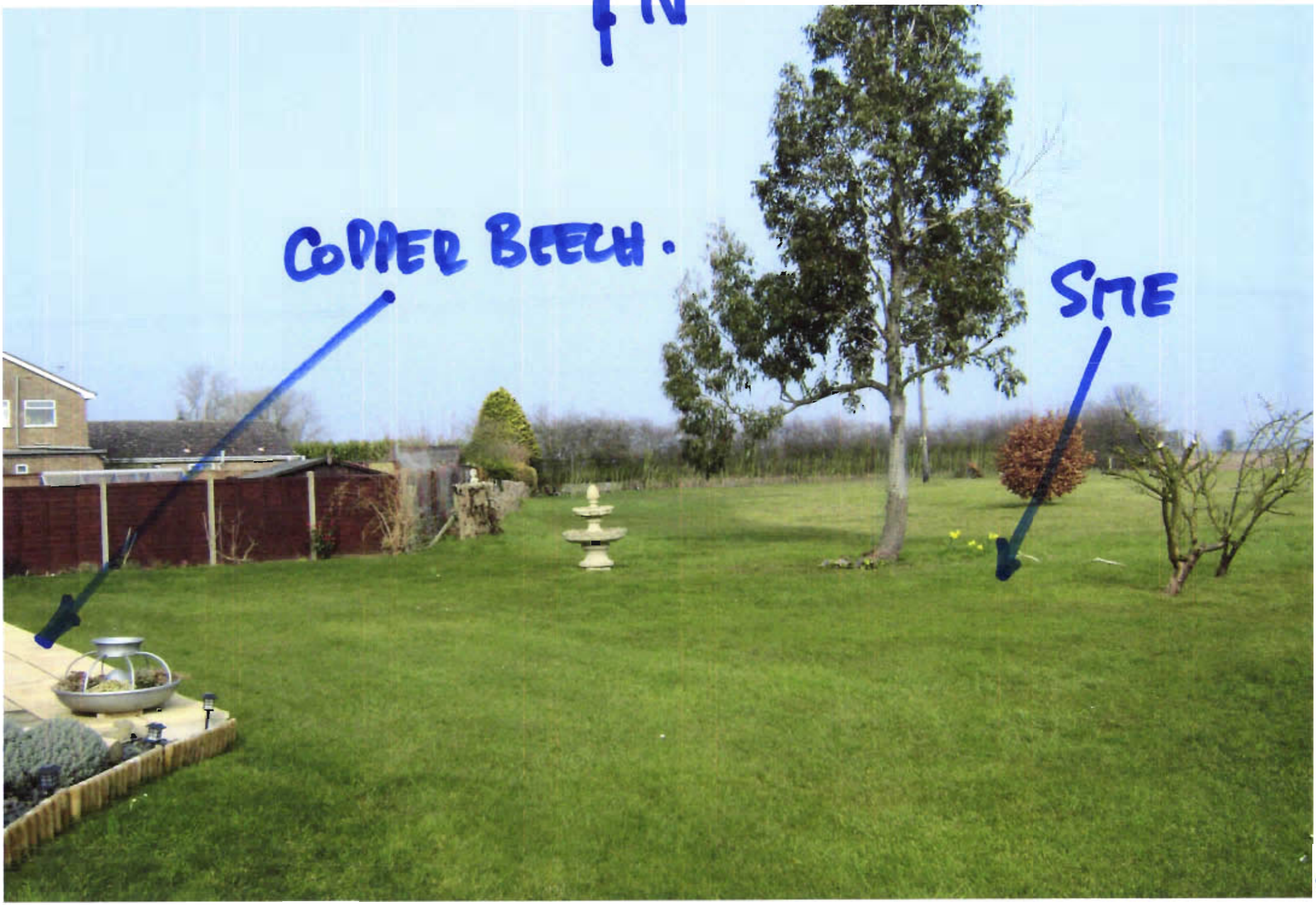
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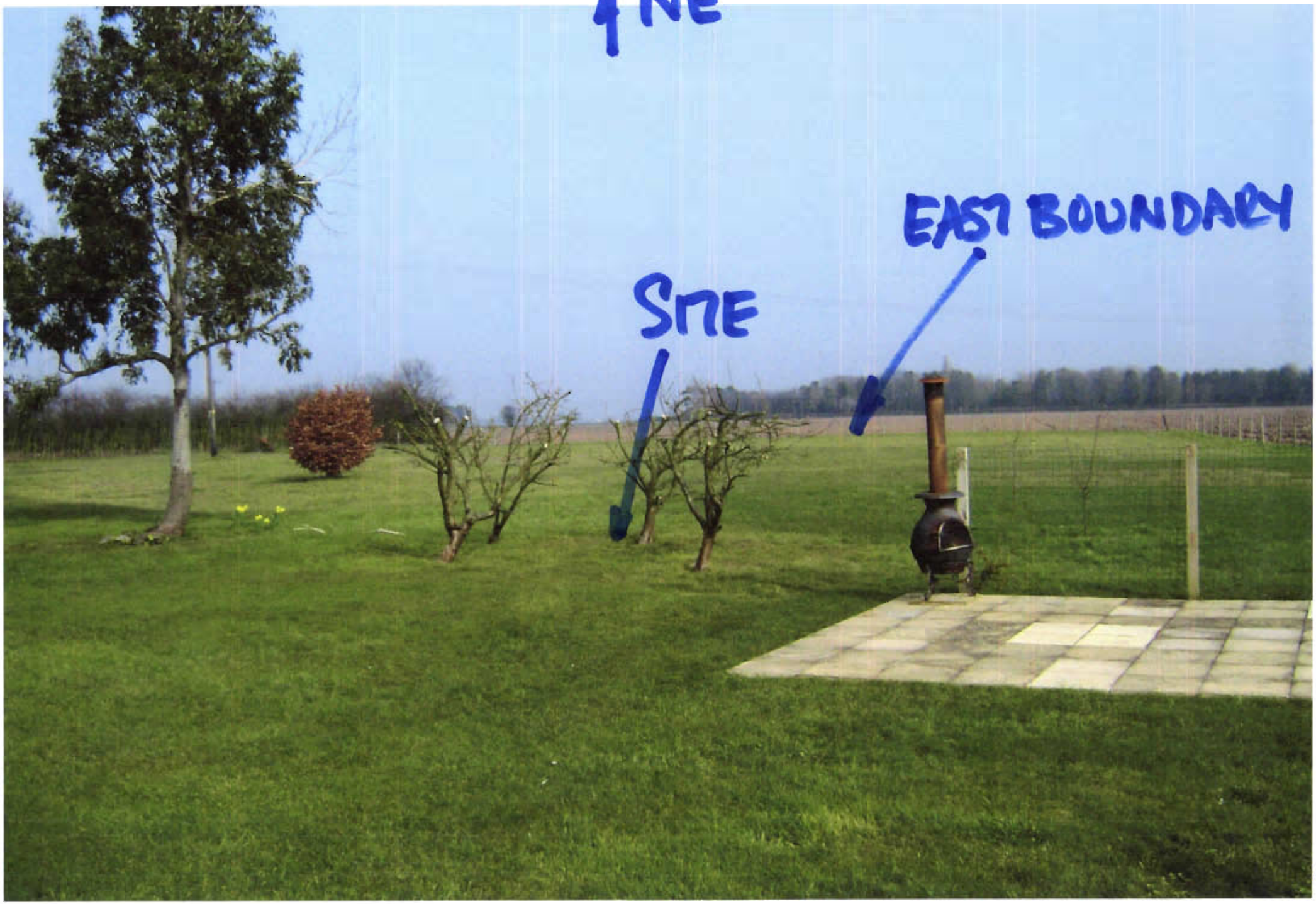
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Peter Humphrey Associates
Architectural

APPENDIX 7


N
COPPER BEECH.
SITE


4 NE
EAST BOUNDARY
SITE


1E
SOUTH BOUND.
SITE
3

APPENDIX 8

SOUTH HOLLAND DISTRICT COUNCIL
UPDATE OF STRATEGIC FLOOD RISK ASSESSMENT
FINAL REPORT

January 2010

ROYAL HASKONING

HASKONING UK LTD.
COASTAL & RIVERS

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Document title	Strategic Flood Risk Assessment
Status	Final
Date	January 2010
Project name	Update of Strategic Flood Risk Assessment
Project number	9S6131
Author(s)	David Worth
Client	South Holland District Council
Reference	9S6131/R/Deliverables/PBor

SUMMARY

SCOPE

This report concerns a Strategic Flood Risk Assessment covering the whole of South Holland District, Lincolnshire. It is accompanied by mapping which shows the variation in flood risk for land within the District.

PURPOSE AND FRAMEWORK

The Strategic Flood Risk Assessment (SFRA) has been prepared for South Holland District Council as an aid towards them implementing the intentions of Planning Policy Statement 25: Development and Flood Risk (PPS25)[1]. PPS 25 was issued by the Department for Communities and Local Government in December 2006.

A key element within PPS 25 is the concept of Flood Zones whereby land is categorised as being in one of a range of zones, Zone 1 to Zone 3b, according to the annual probability of flooding to the land. PPS 25 advises on the appropriate planning response for different types of development in relation to the flooding probability as categorised by the various Flood Zones.

As well as defining the extent of the Flood Zones, the SFRA provides sufficient further information so the Council have an overall view of present and potential future flood risk for strategic planning purposes. It covers both Level 1 and Level 2 aspects of a SFRA as set out in the PPS 25 Practice Guide[2]. The maps and this report enable decisions made in regard of flood risk to be consistent and robust.

This SFRA updates and supersedes a former similar strategic flood risk assessment published in December 2002.

The SFRA considers flood risk from all sources, including *inter alia* potential flooding from groundwater and from sewers, not solely the principal flooding threats – from the sea, from the rivers and from the Drainage Board systems.

The present-day situation is evaluated, as is the potential situation in about 50 and 100 years time (years 2055 and 2115). Consideration of the future scenarios is in line with the PPS 25 emphasis on contingency planning for climate change, notably a prospective rise in sea level and an increase in river flood flows.

The flood risk has been assessed taking into account the presence, character and operation of the existing flood defences. The consequences arising in the event of local failure of the defences has also been evaluated.

---

1. Planning Policy Statement 25: Development and Flood Risk. Department for Communities and Local Government – (December 2006).

2. Planning Policy Statement 25: Development and Flood Risk – Practice Guide. Department for Communities and Local Government – (June 2008).

FINDINGS FROM THE ASSESSMENT

The findings from the SFRA are appropriate to the nature of the District. They recognise the importance of flood risk across the agricultural areas forming the majority of the District, as these have high value and underpin the social and economic well-being of South Holland. In addition, particular attention is paid to the anticipated areas of development growth around both Spalding, the District Centre, and Sutton Bridge. The SFRA gives greater detail for these two localities.

Four key findings are:

- From a strategic point of view, the flooding threats to the District are from the sea, from the rivers and from any shortfalls in capacity in the internal drainage network.
- All the District is reliant on flood protection given by the various defence systems and related flood risk management measures.
- At present these systems largely sustain a satisfactory level of flood risk within the District.
- If the currently projected effects of climate change materialise (with higher sea levels and increased river flows), yet the defence systems are not upgraded from their present form, there will be significant flood risk within the District by the Year 2115, with impact in the main urban areas as well as in agricultural areas. The flood risk to people would become unacceptable. A lesser, but notable, increase in flood risk would also be apparent by the Year 2055.

As regards specific outputs, the mapping accompanying this report shows, in summary:

For the District as a whole:

- The extent of land within Flood Zone 3a (high probability of flooding).
- The potential maximum flood depth and maximum flood flow velocity within the Flood Zone 3a areas.
- The extent of land within Flood Zone 3b (functional floodplain, including washlands).
- The location of raised flood defences
- A potential rapid inundation zone behind raised defences, where flooding could rapidly occur to a significant depth in the event of failure in the local defence.
- The location of key infrastructure and of key access routes.

Additionally, for the Spalding and Sutton Bridge areas:

- The extent of land within Flood Zone 1 (low probability of flooding). The extent of land within Flood Zone 2 (medium probability of flooding) can readily be interpreted from the mapping but is not given directly.
- The distribution of flood hazard, in four bands (Low to Extreme) indicative of the flood risk to people.
- Contours showing the potential flood extent at various timesteps from the onset of flooding at the defence line.

Findings in this report include:

- Comment in support of the flood risk mapping, including comment on each of the development sites proposed in the Council's Local Plan.
- Comments on the flood risk to key infrastructure and access routes.
- Ideas on improvements to present flood defences, both to reduce the current flood risk as well as to counter the prospective effects of climate change.
- Ideas that could form the basis of planning policies aiming to accommodate the prospective effects of climate change without detriment to the District.

TECHNICAL CRITERIA

This report, with its Appendices, includes description of the technical criteria and processes used in the flood risk assessment. These are based on the best available information and use robust methods of analysis, including 2-dimensional computer modelling of flood spreading, all in keeping with procedures agreed with the Environment Agency.

ROYAL HASKONING

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1 SOUTH HOLLAND DISTRICT

1.1 Location

South Holland District is in South Lincolnshire, bordering The Wash. The District Centre is at Spalding. A location plan, also showing adjacent local authorities, is given as *Figure 1*.

As regards regional planning, the District falls within the ambit of the East Midlands Region of England.

1.2 Geography

1.2.1 Land Levels

The District has a land area of about 742km^2 (287 square miles). It is wholly fenland in character, with relatively flat, low-lying land throughout. Ground levels vary from below Ordnance Datum to about 4mOD, see *Figure 2*. The higher ground is towards The Wash, much being the product of successive reclamations over past centuries.

1.2.2 Rivers

The District is transected by three rivers, the Nene, Welland and Glen, each of which ultimately discharge to The Wash; see *Figure 3*. The rivers drain a substantial upland area west of the Fens, the Nene catchment extending as far inland as Warwickshire. They cross South Holland District within containing raised embankments. The River Nene is tidal for the full length of interest to this SFRA. The River Welland is tidal downstream from Spalding, the tidal limit being at Marsh Road sluice on the Coronation Channel. This channel carries the river flow around Spalding. A separate arm of the river extends through the town and outfalls into the tidal River Welland at Fulney Lock. The River Glen discharges to the Welland via tidal gates at Surfleet Reservoir.

The South Forty Foot Drain, on the western boundary of the District (See *Figure 3*) is a man-made embanked watercourse receiving and conveying drainage run-off from adjacent low-lying land. Drainage is towards the River Witham at Boston.

1.2.3 Urban Centres

The principal urban centre is Spalding, population 25,000.

Outside of Spalding, other main District centres are at Donington, Crowland, Holbeach, Long Sutton and Sutton Bridge. All these centres are on the higher ground within the District. There are ports at Fosdyke Bridge and Sutton Bridge. Both ports are linked via the A17 trunk road to other parts of eastern England and to the Midlands.

The overall population of the District is approximately 82,000.

1.2.4 Geology and Soils

The western part of the District, broadly west of Holbeach, is underlain by Oxford clay, with Ampthill clay/Kimmeridge clay underlying the eastern part. This solid geology is at a considerable depth below the surface. Above it the geology is classified as alluvium, with areas of peat near the South Forty Foot Drain and in the very south of the District. The surface soils are fenland in character, predominantly deep silty clay or clay.

7 ASSESSMENT OF FLOODING FROM INTERNAL DRAINAGE SYSTEMS

7.1 Scope

This aspect of the SFRA considers the potential for flooding from the IDB drainage systems. The layout of these systems is illustrated in *Figure 4* and shown in more detail in *Map 2*.

7.2 Flood Defences

The IDB systems provide flood defence by a combination of storage in the drainage channels and discharge, through pumping stations or gravity outfalls. In a flood event, each system is actively managed to achieve sufficient balance between the storm inflow, the drain storage and the possible outflow so that target standards of flood protection are maintained. Two drains, Vernatt's Drain and the Counter Drain, have containing raised embankments.

Information on the drainage channels, pumping stations and outfalls has been carried forward from the data collected for the December 2002 SFRA[4]. This information has been updated through consultation with individual IDBs and through research via IDB websites.

7.3 Flood Conditions

In the present-day 1% annual probability event, the IDBs consider that most of their drains may reach bank-full conditions but in urban areas there should be no flooding to property. In agricultural areas there would probably be shallow flooding of the lower-lying parts but with only isolated instances of flooding to properties or roads.

The IDBs' views are supported by experience and so have been accepted as valid by this SFRA. For practical reasons, the Brief for the assessment did not include for detailed technical analysis of the internal drainage systems. A qualitative assessment has been made instead, considering to what extent the capacity of the IDB systems may be exceeded in the respective circumstances.

Individual assessment has been made, however, of Vernatt's Drain (through Spalding) and of the Counter Drain, the drains having raised embankments. Design flood levels for each of these watercourses were provided by The Welland and Deepings IDB. The levels are highest during periods of tide-lock at the outfall but do not reach bank full. The water levels, together with bank levels, are listed in *Appendix A*.

7.4 Flooding Consequence

Since the drainage systems operate satisfactorily to the 1% annual probability standard at the present-day, the flood risk assessments have looked at:

- The consequences in the Spalding and Sutton Bridge areas during a 0.1% annual probability event at the present-day.
- The consequences at the future time points of 2055 and 2115.

By the nature of the drainage systems, the consequences will largely be due to two factors. One is the additional volume of run-off entering the drains, this volume being directly related to increase in rainfall total. The other is the effect of sea level rise at the tidal gravity outfalls, giving a shorter period during which water can be discharged. The

would then tend to flow in an arterial drain southwards to the lower-lying area south of Deeping St. Nicholas rather than be contained within Spalding.

In summary, flooding due to blockage in the waterway systems is taken as having low potential at strategic level. On the other hand, pumping systems within the District are of strategic importance though pump failure is not likely to have a great consequence for the present developed areas.

9 RESULTS

9.1 Probability Bands

A key output from the assessment is the classification of land within South Holland District into flooding probability bands. As noted in *Section 4.7*, these bands are assessed taking into account the presence of flood defences and of other infrastructure which acts as a flood defence. The probability bands match those used in PPS25[1]. They are summarised in *Table 5*.

Table 5 – Flooding Probability Bands

Category	Annual flooding probability	
	From the sea	From rivers and the internal drainage system
Low Probability	≤ 0.1%	≤ 0.1%
Medium Probability	0.5% to 0.1%	1% to 0.1%
High Probability	> 0.5%	> 1%

The flooding probability bands have been determined for both the Actual Risk and Residual Risk, see *Section 4.9*.

The results for the 0.5% annual probability tidal and the 1% annual probability fluvial assessments were treated as equivalent and so have been combined to give the net outcome, taking the worst position for each location.

The results for the 0.1% annual probability tidal and fluvial assessments have been combined similarly to give the net outcome.

9.2 Overview of Results

The SFRA gives the following information.

For all eras (2007, 2055, 2115):

- Maximum flood extent.
- Extent of the rapid inundation zone.

Additionally, for eras 2007 and 2115:

- Maximum flood depth, in bands 0 to > 1m.
- Maximum flood flow velocity, in bands 0 to > 1 m/s.

plus, for the Spalding and Sutton Bridge areas only:

weather systems respectively causing extreme storm run-off in the District or extreme sea levels are quite different so the two extremes will not occur simultaneously.

8 ASSESSMENT OF FLOODING FROM OTHER SOURCES

8.1 Flooding from Sewers

Through consultation with Anglian Water, as well as drawing on the Council's own local experience, it is found that flooding from sewers is limited to minor isolated cases. It is not of strategic significance as regards flood risk.

8.2 Highway Drainage

Consultation with Lincolnshire County Council has revealed that flooding due to shortcomings in the highway drainage provision is also limited to minor isolated cases. The District Council's own experience supports this view. Highway drainage is therefore taken as not being of strategic significant as regards flood risk.

8.3 Flooding from Groundwater

There are no reports of groundwater flooding occurring in the District. This issue is therefore taken as having no strategic significance in relation to flood risk.

8.4 Reservoir Failure

There are three flood storage reservoirs within the district, namely Surfleet Reservoir, Crowland Washlands and Cowbit Washlands. The latter two are designated as large raised reservoirs under the Reservoir's Act 1975. The flood embankments associated with these reservoirs are the same as the flood defences of the River Welland and River Glen and have already been assessed for risk of overtopping and breach. No further assessment is therefore required.

8.5 Flooding due to Blockage or to Failure of Pumps

Bridge and sluice openings on waterways in the District are commensurate in size with the respective waterway. As such, the potential for blockage is low. This low risk is also sustained by the effective maintenance operations of the Environment Agency and the Internal Drainage Boards.

Significant areas within the District are reliant on pumping to sustain their flood defence standard. This is particularly the case west of Spalding and Gosberton, for example the area draining to Pode Hole pumping stations and the Black Sluice IDB catchment alongside the South Forty Foot Drain (see *Figure 4*). Whilst the IDBs have back-up facilities to employ in the event that mains electrical power is lost, or a pump fails, major failure of the pumping systems during a period of high rainfall would lead to flooding in the respective pumped catchment. The consequences, however, are not likely to be catastrophic. Since the land is relatively flat there would not be a great concentration of flood water at any one point. Instead there would be shallow flooding over a wide area. This would possibly affect farm buildings and minor roads but probably not directly affect many houses as these tend to have a threshold raised above the general ground level.

Although parts of the Spalding urban area drain to Pode Hole pumping station they should not be particularly vulnerable to flooding if the pumps fail. This is because water

On the east side of the River Nene, the area south of the A17 road is vulnerable in a 0.1% AP tidal event, see *Map 11*, due to the potential for breaching of the defences though not due to direct overtopping. If a breach occurred, peak flood depths in this area may exceed one metre. The area is secure against a 0.5% AP tidal event; hence it can be classified as having Medium probability .

11 ACTUAL RISK IN THE FUTURE

11.1 Climate Change Contingency Allowances

The consideration of scenarios for the future (years 2055 and 2115) include for an increase in river flow and in sea level as set out in *Section 4.4*. The increases are a contingency allowance for what may arise; they are not a prediction of what will actually happen by that time.

The SFRA findings for possible future flood risk should be taken in this light. They indicate, as an aid to planning decisions, where places would be vulnerable to flooding if the respective increase in river flow or sea level should materialise. In using this information one could, for example, allow development in the potentially vulnerable areas but plan for relocation or abandonment if the climate change effects eventually occur. As another example, one could reserve areas for future enhancement of flood risk management measures (such as defences and flood water dissipation zones), again with the intent that these areas would be utilised in this way only if eventually needed.

As an observation, a recent report[18] from the UK Climate Impact Panel (UKCIP) says that extreme high sea levels on the east coast are presently increasing at about 1.3mm/year, a rate that has persisted for many decades. The UKCIP report[18] also says there has been an increase in contribution to winter rainfall from heavy precipitation events. This volatility is noted[19] by the Centre for Ecology and Hydrology (CEH) but they conclude that variations lie within a general trend of stability in run-off flows since the early 1960s.

11.2 Future Flood Defences

The assessment of possible future conditions made in this SFRA has assumed that all flood defences, and indeed all features within the District, remain as they are seen today. As such, the assessment does not allow for any deterioration in defence levels over time nor for any improvement that may be made. In the latter regard, Environment Agency policies as expressed in the Catchment Flood Management Plans and in the Shoreline Management Plan are to sustain the defence standards for the District, along with those in other fenland areas. Under these policies they would aim to enhance the defences over time as may become necessary to keep pace with climate change effects. If the policies are put into effect then the present-day flood risks identified by the SFRA would remain in the future, but the potential increase in flood risk (such as is discussed in this Section) would not arise.

11.3 Flooding Probability Areas Year 2055

The High probability areas are shown on *Map 12*. The remainder of the District can be classified as having Medium or Low probability of flooding.

Around The Wash and along the River Nene the High probability extents arise in the most part from potential breaching of the defences. Direct tidal overtopping would only

occur at Sutton Bridge, near the Port and on the west side of the river near the A17 bridge.

The High probability areas elsewhere also mostly arise from potential breaching. The part shown to the east of Spalding arises because of insufficient freeboard at one location along the Coronation Channel. There are many potential breaching locations along the River Glen, see *Appendix A*, giving the High probability area extending through Pinchbeck and Surfleet. The risk to Pinchbeck is also due to overtopping that would occur on the right bank of the River Glen over a length north of the village.

11.4 Flooding Probability Areas Year 2115

11.4.1 District Overall

The High probability areas are shown on *Map 13*. The remainder of the District outside the Spalding and Sutton Bridge areas (for which separate comments are made below) can be classified as having Medium to Low probability of flooding. As in the present-day, low lying agricultural land would be vulnerable to shallow flooding in events beyond the normal capacity of the internal drainage systems.

Behind the Wash and River Nene frontages the flood extents arise from potential breaching of the defences, though direct overtopping would also occur in cell W5 (seen on *Figure 8*). In view of the very high peak tide levels, the Wash secondary defences would be overwhelmed though they would still help reduce the inland flooding compared to what may happen if they did not exist. Transient flood depths just inland of the defences, an area including Sutton Bridge and Gedney Drove End, could exceed one metre.

The High probability areas along the tidal part of the River Welland are also due to potential breaching. In addition, tidal overtopping of the defences would occur in Spalding near Fulney Lock. The flood water would spread southwards across Roman Bank as well as across West Marsh Road to properties on the west side of the river. The flood depths in the Roman Bank and Clay Lake areas arising from breaching and overtopping could exceed 1.5 metres.

The origin of other High probability areas, such as along the River Welland upstream of Spalding and along the River Glen is the same as described in *Section 10.2.1*.

11.4.2 Spalding Area

The areas vulnerable to flooding in a 0.1% AP event are shown on *Map 14*.

The extents along the tidal River Welland arise partly because of potential breaching that could occur anywhere along the defences. In addition there would be overtopping in Spalding near Fulney Lock, in a similar manner to that described above in *Section 11.4.1* but with greater consequences.

Reference to *Map 14* shows that about half of Spalding, including the town centre area, would remain at Low probability of flooding. Comparison with *Map 13*, showing the High probability area, indicates that parts of Spalding north of the town centre and near Vernatts' Drain can be classified as having Medium probability for this future scenario.

11.4.3 Sutton Bridge Area

The whole area would be vulnerable to tidal flooding in both the 0.5% AP and 0.1% AP events, see *Maps 13 and 15*. There would be widespread overtopping of the defences as well as the potential for breach failure. The overtopping alone would be sufficient to cause severe flooding, particularly in a 0.1% AP event. Transient flood depths through Sutton Bridge may exceed one metre.

12 RESIDUAL RISK

12.1 General

The mapped findings from the assessment of Residual Risk are provided digitally. They show the consequences assuming any part of the raised defences may fail, regardless of apparent standard, together with the consequences of overtopping that would occur. As may be expected, they show a wider potential flood risk area than arises when considering Actual Risk.

The findings confirm how South Holland District is reliant on man-made measures, such as embankments and the internal drainage systems, for protection against flooding. This reliance extends not just to the existence of the measures but on their continued maintenance and operation.

12.2 Rapid Inundation Zone

Part of the Residual Risk assessment within the SFRA included evaluation of a rapid inundation zone behind raised defence, using the criteria given in *Section 4.10*. The rapid inundation zones for the present-day and for the year 2115 scenario are shown on *Map 16*.

The rapid inundation zone identified in this SFRA is more specific than the broad-brush zone of the same name used in The Environment Agency's CFMPs and referred to here in *Section 2.7.4*. As such, it is a better indicator of vulnerability behind raised defences and should be preferred to the Environment Agency's zone as the basis for planning policy.

13 IMPLICATIONS FROM THE STRATEGIC ASSESSMENT

13.1 Impact on Proposed Developments

The impact on proposed developments is summarised in *Tables 7 and 8*. The development sites are shown on *Map 4*.

It can be presumed that all sites are reliant on flood defences and other management measures for their flood protection. In view of this, little further comment on Residual Risk is made in the Tables.

Possible measures to improve the flooding probability status of these sites are discussed in *Section 14*. Implementation of these, or other, measures to lessen the probability or impact of flooding to proposed development sites would reduce the respective flooding probability from that indicated in *Tables 7 and 8*.

Table 7 – Flooding probability at proposed development sites at the present-day

Site reference and proposed use	Flooding Probability
Spalding:	
A Urban	Low
B Housing	Low
C Housing	Low
D Employment	Low
E Employment	Low
F Employment	Low, but the site is in the rapid inundation zone.
G Employment	Low
Donington:	
H Employment	Low
Holbeach:	
I Urban	Low
J Housing	Low
Long Sutton:	
K Housing	Low
L Employment	Low
Sutton Bridge:	
M Housing	Low
N Employment	High, due to potential breach along the Wash frontage to the north. The vulnerability arises because the freeboard at two points is less than the minimum desirable. The site is also in the rapid inundation zone.
O Employment	Medium
P Employment	Medium
Crowland:	
Q Employment	Low

Any Residual Risk arises only if the capacity of the local IDB system is exceeded

These sites are also in the rapid inundation zone.

Any Residual Risk arises only if the capacity of the local IDB System is exceeded.

Table 8 – Possible flooding probability at proposed development sites in the future with contingency allowance for climate change

Site reference and proposed use		Flooding Probability	
		2055	2115
Spalding:			
A	Urban	Low	Low
B	Housing	Medium or Low	High
C	Housing	Medium or Low	High
D	Employment	Medium or Low	High
E	Employment	Medium or Low	High
F	Employment	Medium or Low	High
G	Employment	Medium or Low	High
Donington:			
H	Employment	Low	Low
Holbeach			
I	Urban	Medium or Low	Medium or Low
J	Housing	Medium or Low	Medium or Low
Long Sutton:			
K	Housing	Medium or Low	Medium or Low
L	Employment	Medium or Low	High
Sutton Bridge:			
M	Housing	Medium or Low	High
N	Employment	High	High
O	Employment	High	High
P	Employment	High	High
Crowland:			
Q	Employment	Low	Low

The status regarding the rapid inundation zone remains the same as is stated in *Table 7*.

13.2 Impact of Proposed Developments on Other Areas

None of the proposed developments, see *Map 4*, would have any impact on water levels in the Main Rivers. Care should be taken that development on site C, in Spalding, and on sites N and O, near Sutton Bridge, does not occupy space that may later inhibit enhancement of local embankment defences. No other development would have an impact on the raised defences.

In other respects the impact as regards flood risk would be solely on the internal drainage systems. In trying to bring the development proposals to fruition it will be necessary to liaise with the respective IDB to decide appropriate management measures to cater for the additional site run-off that may be generated. The measures would aim to accommodate the new development whilst also ensuring that there is no

detriment to the levels of service presently provided to existing development and the agricultural land. The IDBs may require provision of on-site flood storage if the local drainage channels cannot accept, or be adapted to accept, additional inflow.

The development sites in Spalding, sites A to G, are in Welland and Deepings IDB catchments. The IDB have intimated that the present drainage capacity is not a bar to future development. Indeed, discussions are already taking place about measures to accommodate site A, the Holland Park development.

In summary, therefore, the proposed developments should have no adverse impact on others provided suitable arrangements are made as outlined here.

13.3 Surface Water Drainage

At present there are no strategic surface water drainage problems in the District. Nearly all drainage is managed by the IDBs, whose levels of service are satisfactory for both urban and agricultural areas.

In the future, if rainfall amounts and sea levels increase, the IDB levels of service will decline unless the drainage systems are enhanced. Such enhancement may take the form of increased drain capacity to provide more flood storage and may involve the installation of greater outfall pumping capacity.

All the IDBs are known to be mindful of possible future conditions and their consequences. The IDBs have a good record of effective flood management, keeping pace with changing circumstances as they arise. One may expect this active approach to continue. In this case, although the operation and management of surface water drainage is vital to flood protection within the District, problems of a strategic nature should not develop.

13.4 Consequences for Key Infrastructure, Access and Evacuation

13.4.1 Present-day

The key infrastructure identified for this SFRA is shown on *Map 4* and described in *Section 3.3*. It is taken to include the major access and evacuation routes.

As at the present-day, the railway line and three roads are adjacent to, or cross a high risk area; see *Map 5*. There is no impact on the other features.

The Peterborough to Sleaford railway line runs adjacent to a High probability area in two places and crosses a High probability area near the South Forty Food Drain. In all these locations the railway is at an elevation above the potential flood water level. Similarly, the A16 and A151 roads run adjacent to High probability areas but would not themselves be flooded. The A52 road crosses a High probability area west of Donington, but as with the railway, is elevated above the potential flood water level.

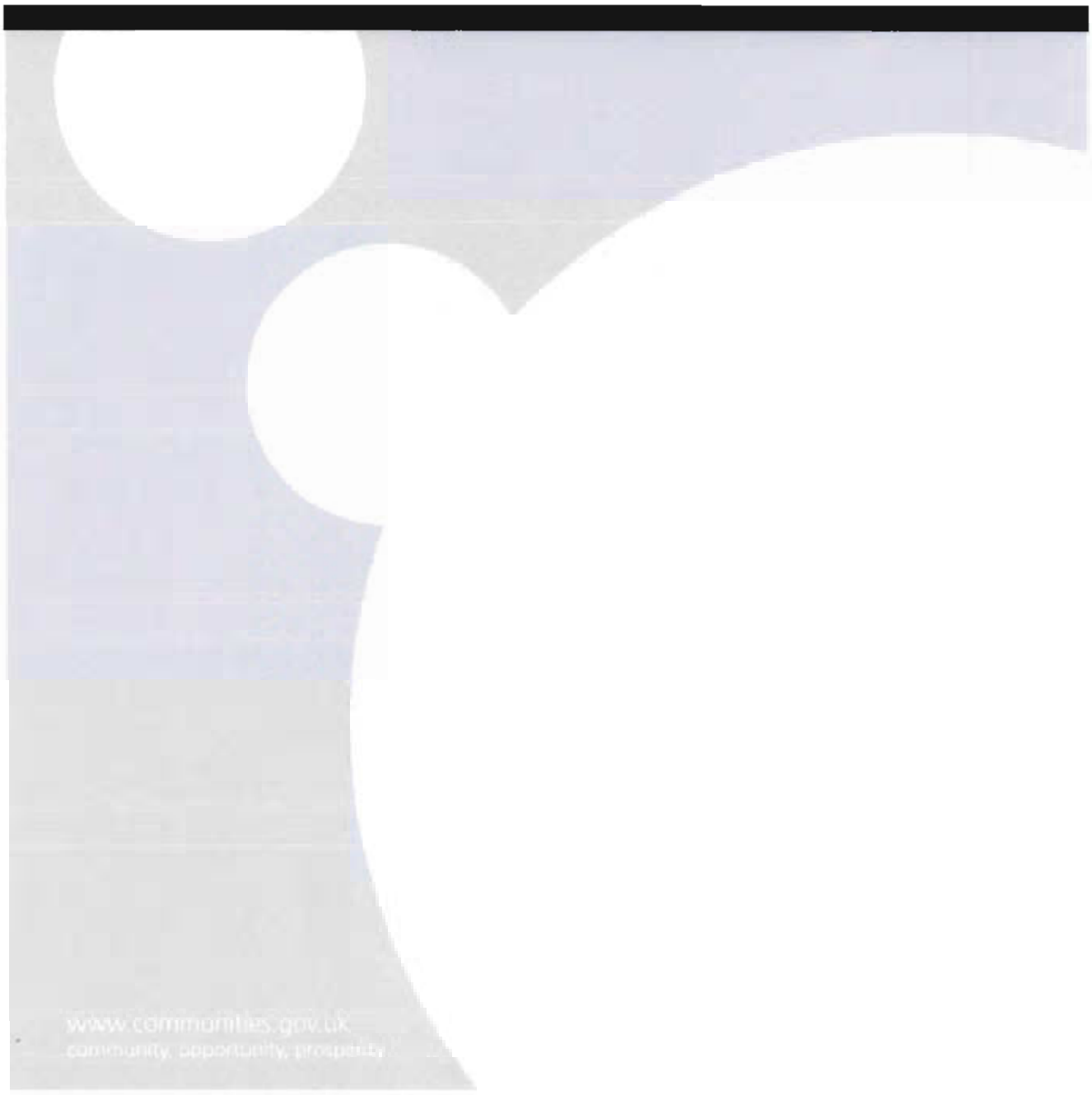
In Spalding the new hospital being constructed in Pinchbeck Road is in a Low probability area, see *Map 10*, as are all the other key infrastructure in the town.

Overall, therefore, the situation regarding flood risk to key infrastructure, including access routes, is satisfactory.

APPENDIX 9

Communities and Local Government

National Planning Policy Framework



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Achieving sustainable development

International and national bodies have set out broad principles of sustainable development. Resolution 42/187 of the United Nations General Assembly defined sustainable development as meeting the needs of the present without compromising the ability of future generations to meet their own needs. The UK Sustainable Development Strategy *Securing the Future* set out five 'guiding principles' of sustainable development: living within the planet's environmental limits; ensuring a strong, healthy and just society; achieving a sustainable economy; promoting good governance; and using sound science responsibly.

6. The purpose of the planning system is to contribute to the achievement of sustainable development. The policies in paragraphs 18 to 219, taken as a whole, constitute the Government's view of what sustainable development in England means in practice for the planning system.

7. There are three dimensions to sustainable development: economic, social and environmental. These dimensions give rise to the need for the planning system to perform a number of roles:

   - **an economic role** – contributing to building a strong, responsive and competitive economy, by ensuring that sufficient land of the right type is available in the right places and at the right time to support growth and innovation; and by identifying and coordinating development requirements, including the provision of infrastructure;
   - **a social role** – supporting strong, vibrant and healthy communities, by providing the supply of housing required to meet the needs of present and future generations; and by creating a high quality built environment, with accessible local services that reflect the community's needs and support its health, social and cultural well-being; and
   - **an environmental role** – contributing to protecting and enhancing our natural, built and historic environment; and, as part of this, helping to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate and adapt to climate change including moving to a low carbon economy.

8. These roles should not be undertaken in isolation, because they are mutually dependent. Economic growth can secure higher social and environmental standards, and well-designed buildings and places can improve the lives of people and communities. Therefore, to achieve sustainable development, economic, social and environmental gains should be sought jointly and simultaneously through the planning system. The planning system should play an active role in guiding development to sustainable solutions.

9. Pursuing sustainable development involves seeking positive improvements in the quality of the built, natural and historic environment, as well as in people's quality of life, including (but not limited to):

- making it easier for jobs to be created in cities, towns and villages;
- moving from a net loss of bio-diversity to achieving net gains for nature;[6]
- replacing poor design with better design;
- improving the conditions in which people live, work, travel and take leisure; and
- widening the choice of high quality homes.

10. Plans and decisions need to take local circumstances into account, so that they respond to the different opportunites for achieving sustainable development in different areas.

The presumption in favour of sustainable development

11. Planning law requires that applications for planning permission must be determined in accordance with the development plan unless material considerations indicate otherwise.[7]

12. This National Planning Policy Framework does not change the statutory status of the development plan as the starting point for decision making. Proposed development that accords with an up-to-date Local Plan should be approved, and proposed development that conflicts should be refused unless other material considerations indicate otherwise. It is highly desirable that local planning authorities should have an up-to-date plan in place.

13. The National Planning Policy Framework constitutes guidance[8] for local planning authorities and decision-takers both in drawing up plans and as a material consideration in determining applications.

6 Natural Environment White Paper, *The Natural Choice: Securing the Value of Nature*, 2011.
7 Section 38(6) of the Planning and Compulsory Purchase Act 2004 and section 70(2) of the Town and Country Planning Act 1990.
8 A list of the documents revoked and replaced by this Framework is at Annex 3. Section 19(2)(a) of the Planning and Compulsory Purchase Act 2004 states, in relation to plan-making, that the local planning authority must have regard to national policies and advice contained in guidance issued by the Secretary of State.

14. At the heart of the National Planning Policy Framework is a **presumption in favour of sustainable development**, which should be seen as a golden thread running through both plan-making and decision-taking.

    For **plan-making** this means that:

    - local planning authorities should positively seek opportunities to meet the development needs of their area;
    - Local Plans should meet objectively assessed needs, with sufficient flexibility to adapt to rapid change, unless:
        - any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole; or
        - specific policies in this Framework indicate development should be restricted.[9]

    For **decision-taking** this means:[10]

    - approving development proposals that accord with the development plan without delay; and
    - where the development plan is absent, silent or relevant policies are out-of-date, granting permission unless:
        - any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole; or
        - specific policies in this Framework indicate development should be restricted.[9]

15. Policies in Local Plans should follow the approach of the presumption in favour of sustainable development so that it is clear that development which is sustainable can be approved without delay. All plans should be based upon and reflect the presumption in favour of sustainable development, with clear policies that will guide how the presumption should be applied locally.

16. The application of the presumption will have implications for how communities engage in neighbourhood planning. Critically, it will mean that neighbourhoods should:

    - develop plans that support the strategic development needs set out in Local Plans, including policies for housing and economic development;

9 For example, those policies relating to sites protected under the Birds and Habitats Directives (see paragraph 119) and/or designated as Sites of Special Scientific Interest, land designated as Green Belt, Local Green Space, an Area of Outstanding Natural Beauty, Heritage Coast or within a National Park (or the Broads Authority); designated heritage assets; and locations at risk of flooding or coastal erosion.

10 Unless material considerations indicate otherwise.

- for market and affordable housing, illustrate the expected rate of housing delivery through a housing trajectory for the plan period and set out a housing implementation strategy for the full range of housing describing how they will maintain delivery of a five-year supply of housing land to meet their housing target; and
- set out their own approach to housing density to reflect local circumstances.

48. Local planning authorities may make an allowance for windfall sites in the five-year supply if they have compelling evidence that such sites have consistently become available in the local area and will continue to provide a reliable source of supply. Any allowance should be realistic having regard to the Strategic Housing Land Availability Assessment, historic windfall delivery rates and expected future trends, and should not include residential gardens.

49. Housing applications should be considered in the context of the presumption in favour of sustainable development. Relevant policies for the supply of housing should not be considered up-to-date if the local planning authority cannot demonstrate a five-year supply of deliverable housing sites.

50. To deliver a wide choice of high quality homes, widen opportunities for home ownership and create sustainable, inclusive and mixed communities, local planning authorities should:

- plan for a mix of housing based on current and future demographic trends, market trends and the needs of different groups in the community (such as, but not limited to, families with children, older people, people with disabilities, service families and people wishing to build their own homes);
- identify the size, type, tenure and range of housing that is required in particular locations, reflecting local demand; and
- where they have identified that affordable housing is needed, set policies for meeting this need on site, unless off-site provision or a financial contribution of broadly equivalent value can be robustly justified (for example to improve or make more effective use of the existing housing stock) and the agreed approach contributes to the objective of creating mixed and balanced communities. Such policies should be sufficiently flexible to take account of changing market conditions over time.

51. Local planning authorities should identify and bring back into residential use empty housing and buildings in line with local housing and empty homes strategies and, where appropriate, acquire properties under compulsory purchase powers. They should normally approve planning applications for change to residential use and any associated development from commercial buildings (currently in the B use classes) where there is an identified need for additional housing in that area, provided that there are not strong economic reasons why such development would be inappropriate.

52. The supply of new homes can sometimes be best achieved through planning for larger scale development, such as new settlements or extensions to existing villages and towns that follow the principles of Garden Cities.



Technical Guidance to the National Planning Policy Framework

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Department for Communities and Local Government

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Introduction

1. This document provides additional guidance to local planning authorities to ensure the effective implementation of the planning policy set out in the National Planning Policy Framework on development in areas at risk of flooding and in relation to mineral extraction. This guidance retains key elements of Planning Policy Statement 25 and of the existing minerals policy statements and minerals planning guidance notes which are considered necessary and helpful in relation to these policy areas. The retention of this guidance is an interim measure pending a wider review of guidance to support planning policy.

Flood risk

2. As set out in the National Planning Policy Framework, inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere. For these purposes:

   - "areas at risk of flooding" means land within Flood Zones 2 and 3; or land within Flood Zone 1 which has critical drainage problems and which has been notified to the local planning authority by the Environment Agency;

   - "flood risk" means risk from all sources of flooding - including from rivers and the sea, directly from rainfall on the ground surface and rising groundwater, overwhelmed sewers and drainage systems, and from reservoirs, canals and lakes and other artificial sources.

The Sequential and Exception Tests

3. As set out in the National Planning Policy Framework, the aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. The flood zones (see table 1) are the starting point for this sequential approach. Zones 2 and 3 are shown on the flood map[1] with Flood Zone 1 being all the land falling outside Zones 2 and 3. These flood zones refer to the probability of sea and river flooding only, ignoring the presence of existing defences.

4. Strategic Flood Risk Assessments (see paragraphs 7-8) refine information on the probability of flooding, taking other sources of flooding and the impacts of climate change (see paragraphs 11-15) into account. They provide the basis for applying the Sequential Test, on the basis of the flood zones in table 1. Where table 1

[1] To access the flood map, see the Environment Agency's website at: http://www.environment-agency.gov.uk/homeandleisure/floods/default.aspx

indicates the need to apply the Exception Test (as set out in the National Planning Policy Framework), the scope of a Strategic Flood Risk Assessment will be widened to consider the impact of the flood risk management infrastructure on the frequency, impact, speed of onset, depth and velocity of flooding within the flood zones considering a range of flood risk management maintenance scenarios. Where a Strategic Flood Risk Assessment is not available, the Sequential Test will be based on the Environment Agency flood zones.

5. The overall aim should be to steer new development to Flood Zone 1. Where there are no reasonably available sites in Flood Zone 1, local planning authorities allocating land in local plans or determining planning applications for development at any particular location should take into account the flood risk vulnerability of land uses (see table 2) and consider reasonably available sites in Flood Zone 2, applying the Exception Test if required (see table 3). Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 be considered, taking into account the flood risk vulnerability of land uses and applying the Exception Test if required.

Table 1: Flood zones

(Note: These flood zones refer to the probability of river and sea flooding, ignoring the presence of defences)

Zone 1 - low probability

Definition
This zone comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).

Appropriate uses
All uses of land are appropriate in this zone.

Flood risk assessment requirements
For development proposals on sites comprising one hectare or above the vulnerability to flooding from other sources as well as from river and sea flooding, and the potential to increase flood risk elsewhere through the addition of hard surfaces and the effect of the new development on surface water run-off, should be incorporated in a flood risk assessment. This need only be brief unless the factors above or other local considerations require particular attention.

Policy aims
In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of the development, and the appropriate application of sustainable drainage systems[2].

[2] Sustainable drainage systems cover the whole range of sustainable approaches to surface drainage management. They are designed to control surface water run off close to where it falls and mimic natural drainage as closely as possible.

Zone 2 - medium probability

Definition
This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year.

Appropriate uses
Essential infrastructure and the water-compatible, less vulnerable and more vulnerable uses, as set out in table 2, are appropriate in this zone. The highly vulnerable uses are *only* appropriate in this zone if the Exception Test is passed.

Flood risk assessment requirements
All development proposals in this zone should be accompanied by a flood risk assessment

Policy aims
In this zone, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout and form of the development, and the appropriate application of sustainable drainage systems.

Zone 3a - high probability

Definition
This zone comprises land 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.

Appropriate uses
The water-compatible and less vulnerable uses of land (table 2) are appropriate in this zone. The highly vulnerable uses should not be permitted in this zone.

The more vulnerable uses and essential infrastructure should only be permitted in this zone if the Exception Test is passed. Essential infrastructure permitted in this zone should be designed and constructed to remain operational and safe for users in times of flood.

Flood risk assessment requirements
All development proposals in this zone should be accompanied by a flood risk assessment.

Policy aims
In this zone, developers and local authorities should seek opportunities to:

- reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage systems;

- relocate existing development to land in zones with a lower probability of flooding; and
- create space for flooding to occur by restoring functional floodplain and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage.

Zone 3b - the functional floodplain

Definition
This zone comprises land where water *has* to flow or be stored in times of flood.

Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. But land which would flood with an annual probability of 1 in 20 (5%) or greater in any year, or is designed to flood in an extreme (0.1%) flood, should provide a starting point for consideration and discussions to identify the functional floodplain.

Appropriate uses
Only the water-compatible uses and the essential infrastructure listed in table 2 that has to be there should be permitted in this zone. It should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows; and
- not increase flood risk elsewhere.

Essential infrastructure in this zone should pass the Exception Test.

Flood risk assessment requirements
All development proposals in this zone should be accompanied by a flood risk assessment.

Policy aims
In this zone, developers and local authorities should seek opportunities to:

- reduce the overall level of flood risk in the area through the layout and form of the development and the appropriate application of sustainable drainage systems;
- relocate existing development to land with a lower probability of flooding.

Table 2: Flood risk vulnerability classification

Essential infrastructure • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood. • Wind turbines.
Highly vulnerable • Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use[3]. • Installations requiring hazardous substances consent[4]. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as "essential infrastructure")[5].
More vulnerable • Hospitals. • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student 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[6]. • Sites used for holiday or short-let caravans and camping, *subject to a specific warning and evacuation plan.*[7]
Less vulnerable • Police, ambulance and fire stations which are *not* required to be operational during flooding. • Buildings used for shops, financial, professional and other services,

[3] For any proposal involving a change of use of land to a caravan, camping or chalet site, or to a mobile home site or park home site, the Sequential and Exception Tests should be applied.
[4] See Circular 04/00: *Planning controls for hazardous substances* (paragraph 18) at: www.communities.gov.uk/publications/planningandbuilding/circularplanningcontrols
[5] In considering any development proposal for such an installation, local planning authorities should have regard to planning policy on pollution in the National Planning Policy Framework.
[6] For definition, see *Planning for Sustainable Waste Management: Companion Guide to Planning Policy Statement 10* at www.communities.gov.uk/publications/planningandbuilding/planningsustainable
[7] See footnote 3.

restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non–residential institutions not included in "more vulnerable", and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do *not* need to remain operational during times of flood. • Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).
Water-compatible development • Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel working. • Docks, marinas and wharves. • Navigation facilities. • Ministry of Defence defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, *subject to a specific warning and evacuation plan.*

Notes to table 2:

a. This classification is based partly on Department for Environment, Food and Rural Affairs and Environment Agency research on *Flood Risks to People* (*FD2321/TR2*)[8] and also on the need of some uses to keep functioning during flooding.

b. Buildings that combine a mixture of uses should be placed into the higher of the relevant classes of flood risk sensitivity. Developments that allow uses to be distributed over the site may fall within several classes of flood risk sensitivity.

c. The impact of a flood on the particular uses identified within this flood risk vulnerability classification will vary within each vulnerability class. Therefore, the flood risk management infrastructure and other risk mitigation measures needed to ensure the development is safe may differ between uses within a particular vulnerability classification.

[8] See website for further details.
www.defra.gov.uk/science/Project_Data/DocumentLibrary/FD2320_3364_TRP.pdf

Table 3: Flood risk vulnerability and flood zone 'compatibility'

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate.
× Development should not be permitted.

Notes to table 3:
This table does not show:
a. the application of the Sequential Test which guides development to Flood Zone 1 first, then Zone 2, and then Zone 3;
b. flood risk assessment requirements; or
c. the policy aims for each flood zone.

Flood risk assessment

6. Properly prepared assessments of flood risk will inform the decision-making process at all stages of development planning. A Strategic Flood Risk Assessment is a study carried out by one or more local planning authorities to assess the risk to an area from flooding from all sources, now and in the future, taking account of the impacts of climate change, and to assess the impact that changes or development in the area will have on flood risk. It may also identify, particularly at more local levels, how to manage those changes to ensure that flood risk is not increased. A site-specific flood risk assessment is carried out by, or on behalf of, a developer to assess the risk to a development site and demonstrate how flood risk from all sources of flooding to the development itself and flood risk to others will be managed now, and taking climate change into account. There should be iteration between the different levels of flood risk assessment.

Strategic Flood Risk Assessment

7. As set out in the National Planning Policy Framework, Local Plans should be supported by Strategic Flood Risk Assessment. The Strategic Flood Risk Assessment should be prepared in consultation with the Environment Agency,

local planning authorities' own functions of emergency response and drainage authority under the Land Drainage Act 1991, and where appropriate, internal drainage boards. Initially the Strategic Flood Risk Assessment will be used to refine information on the areas that may flood, taking into account other sources of flooding and the impacts of climate change, in addition to the information on the flood map. Local planning authorities should use the Strategic Flood Risk Assessment to inform their knowledge of flooding, refine the information on the flood map and determine the variations in flood risk from all sources of flooding across and from their area. These should form the basis for preparing appropriate policies for flood risk management for these areas. The Strategic Flood Risk Assessment should be used to inform the sustainability appraisal (incorporating the Strategic Environmental Assessment Directive) of local development documents, and will provide the basis from which to apply the Sequential Test and Exception Test in the development allocation and development control process.

8. Where local planning authorities have been unable to allocate all proposed development and infrastructure in accordance with the Sequential Test, taking account of the flood vulnerability category of the intended use, it will be necessary to increase the scope of the Strategic Flood Risk Assessment to provide the information necessary for application of the Exception Test. This should, additionally, consider the beneficial effects of flood risk management infrastructure in generally reducing the extent and severity of flooding when compared to the flood zones on the flood map. The increased scope of the Strategic Flood Risk Assessment will enable the production of mapping showing flood outlines for different probabilities, impact, speed of onset, depth and velocity variance of flooding taking account of the presence and likely performance of flood risk management infrastructure.

Site-specific flood risk assessment

9. As set out in the National Planning Policy Framework, local planning authorities should only consider development in flood risk areas appropriate where informed by a site-specific flood risk assessment[9]. This should identify and assess the risks of all forms of flooding to and from the development and demonstrate how these flood risks will be managed so that the development remains safe throughout its lifetime, taking climate change into account. Those proposing developments should take advice from the emergency services when producing an evacuation plan for the development as part of the flood risk assessment.

[9] The Environment Agency provides 'standing advice' on flood risk – see the Agency's website at: http://www.environment-agency.gov.uk/research/planning/82584.aspx . Applicants for planning permission will find this advice helpful when preparing a site-specific flood risk assessment for, and before designing, a lower risk development (and for ensuring extensions or alterations are designed and constructed to conform to any flood protection already incorporated in the property and include flood resilience measures in the design). The Agency also provides standing advice to enable local planning authorities to clearly identify the type of planning applications on which they should consult the Agency, and to make decisions on low risk applications where flood risk is an issue, without directly consulting the Agency for an individual response.

10. Minor developments[10] are unlikely to raise significant flood risk issues unless they would:

    - have an adverse effect on a watercourse, floodplain or its flood defences;
    - would impede access to flood defence and management facilities; or
    - where the cumulative impact of such developments would have a significant effect on local flood storage capacity or flood flows.

Taking climate change into account

11. Global sea level will continue to rise, depending on greenhouse gas emissions and the sensitivity of the climate system. The relative sea level rise in England also depends on the local vertical movement of the land, which is generally falling in the south-east and rising in the north and west. In preparing a Strategic Flood Risk Assessment or a site-specific flood risk assessment, the allowances for the rates of relative sea level rise shown in table 4 should be used as a starting point for considering flooding from the sea, along with the sensitivity ranges for wave height and wind speed in table 5.

Table 4: Recommended contingency allowances for net sea level rises

	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
South-west England	3.5	8.0	11.5	14.5
North-west England, north-east England (north of Flamborough Head)	2.5	7.0	10.0	13.0

Notes to table 4:

a. For deriving sea levels up to 2025, the 4mm per year, 3mm per year and 2.5mm per year rates (covering the three geographical groups respectively), should be applied back to the 1990 base sea level year. From 2026 to 2055, the increase in sea level in this period is derived by adding the number of years on from 2025 (to 2055), multiplied by the respective rate shown in the table. Subsequent time periods 2056 to 2085 and 2086 to 2115 are treated similarly.

[10] Minor development means:
- Minor non-residential extensions: industrial/commercial/leisure etc. extensions with a footprint less than 250sqm.
- Alterations: development that does not increase the size of buildings e.g. alterations to external appearance.
- Householder development: e.g. sheds, garages, games rooms etc. within the curtilage of the existing dwelling in addition to physical extensions to the existing dwelling itself. This definition excludes any proposed development that would create a separate dwelling within the curtilage of the existing dwelling e.g. subdivision of houses into flats.

APPENDIX 10

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CIRIA guidance

CIRIA has produced a number of guidance documents covering a range of opportunities and challenges related to general water management, all the way through to specific SuDS components. The more notable publications are CIRIA C753 The SuDS Manual and CIRIA C713 Retrofitting for surface water management. The majority of publications are below, some are free to download.

SuDS
Surface water management
General water management
Green infrastructure
SuDS components

Sustainable drainage

The SuDS Manual (C753) (FREE)
2015. This comprehensive guidance provides best practice guidance on the planning, design, construction, operation and maintenance of SuDS.
Download here (content is freely available once you have registered/signed in to CIRIA)

BeST (Benefits of SuDS Tool) (FREE)
2015. Tool and guidance to assist with the assessment of SuDS benefits.
Visit here

Going with the flow - SuDS infographic
2015. The 'Going with the flow' infographic details some of the key objectives and outcomes from a sustainable drainage approach.
Download here

Demonstrating the multiple benefits of SuDS - A busines case - Literature review (FREE)
2013. This is the background literature review for CIRIA Research Project RP993.
Download here

Planning for SuDS – making it happen (C687) (FREE)
2010. The guidance provides an easy to use reference for those not overly familiar with SuDS, the planning and development process or a mixture of both.
Download here (content is freely available once you have registered/signed in to CIRIA)

Site handbook for the construction of SUDS (C698) (FREE)
2007. This handbook provides guidance on the construction of SuDS to facilitate their effective delivery.
Download here (content is freely available once you have registered/signed in to CIRIA)

Sustainable Drainage Systems - Hydraulic, structural and water quality advice
2004. This technical report summarises current knowledge on the best approaches to design and construction of sustainable drainage systems.
Click here for more information

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Surface water management

Managing urban flooding from heavy rainfall - encouraging the uptake of designing for exceedance - Recommendations and summary (C738a) (FREE)
2014. This report summarises key findings from CIRIA project RP991 to support the delivery of drainage exceedance and refers to examples of good practice obtained from case studies, literature review and consultation with industry.
Download here (content is freely available once you have registered/signed in to CIRIA)

Managing urban flooding from heavy rainfall - encouraging the uptake of designing for exceedance - Lessons and success factors (C738b) (FREE)
2014. This report summarises key learning points and success factors obtained from case studies, literature review and consultation with industry.
Download here (content is freely available once you have registered/signed in to CIRIA)

Managing urban flooding from heavy rainfall - encouraging the uptake of designing for exceedance - Case studies (C738c) (FREE)
2014. This report collates 12 case studies demonstrating the delivery of drainage exceedance. Individual case studies can be found here
Download here (content is freely available once you have registered/signed in to CIRIA)

Managing urban flooding from heavy rainfall - encouraging the uptake of designing for exceedance - Literature review (FREE)
2014. This is the background literature review fo the project.
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Retrofitting to manage surface water (C713) (FREE)
2012. This guidance sets out a process to achieve the retrofitting of surface water management measures. It integrates the principles of urban design with surface water management.
Download here (content is freely available once you have registered/signed in to CIRIA)

Designing for exceedance in urban drainage: Good practice (C635) (FREE)
2006. This guidance provides best practice advice for the design and management of drainage systems to accommodate extreme rainfall events and manage drainage exceedance.
Download here (content is freely available once you have registered/signed in to CIRIA)

Drainage of development sites - a guide (X108) (FREE)
2004. The guide assists those involved with foul and surface water drainage of development sites.
Download here (content is freely available once you have registered/signed in to CIRIA)

Model agreements for sustainable drainage systems (C625)
2004. This guide provides advice on the use and development of model operation and maintenance agreements for sustainable drainage systems.
Click here for more information

Control of pollution from highway drainage discharge (R142)
1994. This report reviews the potential pollutants present in highway drainage discharges, and assesses the impact on receiving waters.
Click here for more information

General water management

Communication and engagement in local flood risk management (C751) (FREE)
This guide is useful to identify, engage and work with people likely to be affected by flooding, or integral to its future management.
Download here

Communication and engagement techniques in local flood risk management, companion guide (C752) (FREE)
This is a companion guide to *Communication and engagement in local flood risk management* (C751) and provides more details on the techniques and their use.

Download here

Creating water sensitive places – scoping the potential for Water Sensitive Urban Design in the UK (C724) (FREE)
2013. This scoping study provides detail about Water Sensitive Urban Design and its potential role in the UK. It is complemented by C723.
Click here for more information

Water Sensitive Urban Design in the UK - ideas for built environment practitioners (C723) (FREE)
2013. This ideas booklet explains Water Sensitive Urban Design and its potential role in the UK.
Click here for more information

Guidance on water cycle management for new developments (WaND) (C690)
2010.This guidance provides advice on achieving improved sustainable water cycle management in new developments.
Click here for more information

Sustainable water management in schools (W012) (FREE)
2006. Provides best practice on incorporating sustainable water management into school design and sets out the business case for doing so.
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Green infrastructure

The benefits of large species trees in urban landscapes: a costing, design and management guide (C712)
2012. This guide highlights the importance of large species trees, including the retention and enhancement of existing trees for new and existing developments.
Click here for more information

Delivering biodiversity benefits through green infrastructure (C711)
2011. This guide provides advice about maximising the benefits of green infrastructure for the construction industry.
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SuDS components

Structural designs of modular geocellular drainage tanks (C680)
2008. This guidance discusses the different types of geocellular drainage units and differences in their structural performance.
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Building Greener (C644)
2007. This guidance provides advice on the design, construction and operation of green roofs and green walls.
Click here for more information

Source control using constructed pervious surfaces. Hydraulic, structural and water quality performance issues (C582)
2002. This guidance discusses issues that should be considered when designing and constructing pervious surfaces.
Click here for more information

Review of the design and management of constructed wetlands (R180)
1997. This report details the benefits and limitations of constructed wetlands to treat wastewater, and urban and highway runoff.
Click here for more information

Infiltration drainage – manual of good practice (R156)
1996. This guidance provides advice on the planning, funding, design, construction or maintenance of infiltration systems.
Click here for more information

Design of flood storage reservoirs (B14)
1993. This guidance is intended primarily to assist with the detailed design of flood storage reservoirs for flood control.
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Water Framework Directive



What is the Water Framework Directive?

The Water Framework Directive is a piece of European Union legislation designed to preserve, restore and improve the water environment. It establishes a framework for managing the water environment in a holistic manner taking into account environmental, social and economic factors.

The Directive was established in October 2000 by the European Commission, the executive body of the European Union that proposes legislation, implements EU policies and enforces EU law. Each of the Member States of the European Union is required to implement the legislation and achieve the environmental objectives the Directive sets.

Article 4 of the Directive outlines the environmental objectives to be met. They are:

- All surface water bodies to achieve good ecological and chemical status by 2015. This covers inland waters, transitional waters (estuaries) and coastal waters.
- All groundwater bodies to achieve good groundwater quantitative and chemical status by 2015.
- Heavily-modified water bodies and artificial water bodies to achieve good ecological potential and good surface water chemical status by 2015.
- No water bodies to experience deterioration in status from one class to another.
- Protected Areas to achieve the requirements made under their designation in relation to the water environment.



Who is involved?

As well as the twenty five EU Member States implementing the Directive, EU candidate countries such as Romania and Bulgaria and EFTA members such as Norway and Iceland are also implementing it, although not to the same timescale.

How is it being implemented?

Each member state has to transpose the directive into their own national legislation. Although there is considerable flexibility in the transposition, to ensure commonality across Europe, a 'Common Implementation Strategy' provides guidance for Member States. Member States are required to designate a Competent Authority to oversee the transposition.

As part of the Common Implementation Strategy, fifteen Pilot River Basins have been set up to test the guidance documents produced by the Common Implementation Strategy working groups.

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APPENDIX 11

Planning Practice Guidance

(http://planningguidance.communities.gov.uk)

Guidance

Flood Risk and Coastal Change

Print

Flood resilience and flood resistance

Paragraph: 059 Reference ID: 7-059-20140306

What is flood resilience and flood resistance?

Flood resistance, or dry-proofing, stops water entering a building. Flood resilience, or wet-proofing, accepts that water will enter the building, but through careful design will minimise damage and allow the re-occupancy of the building quickly. Flood resistance and resilience measures should not be used to justify development in inappropriate locations:

- **Flood resilient**: Flood-resilient buildings are designed and constructed to reduce the impact of flood water entering the building so that no permanent damage is caused, structural integrity is maintained and drying and cleaning is easier. The Department for Communities and Local Government has published Improving the Flood Performance of New Buildings: flood resilient construction (2007) (https://www.gov.uk/government/publications/flood-resilient-construction-of-new-buildings). This provides guidance on how to improve the resilience of new properties in low or residual flood risk areas by the use of suitable materials and construction details.
- **Flood resistance**: Flood-resistant construction can prevent entry of water or minimise the amount that may enter a building where there is short duration flooding outside with water depths of 0.6 metres or less. This form of construction should be used with caution and accompanied by resilience measures, as effective flood exclusion may depend on occupiers ensuring some elements, such as barriers to doorways, are put in place and maintained in a good state. Buildings may also be damaged by water pressure or debris being transported by flood water. This may breach flood-excluding elements of the building and permit rapid inundation. Temporary and demountable defences are not appropriate for new developments.

Further advice on what needs to be considered in the use of appropriate flood resilience and resistance measures is here (http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/what-does-flood-resilient-and-flood-

resistant-mean/what-needs-to-be-considered-in-the-use-of-appropriate-flood-resilience-and-resistance-measures/#paragraph_056).

Revision date: 06 03 2014

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Planning Practice Guidance - flood-resilience-and-flood-resistance

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APPENDIX 12

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