

**FLOOD RISK ASSESSMENT & SW. / EFF. DISPOSAL
FOR A PROPOSED DEVELOPMENT SITE ADJACENT
259 BRIDGE ROAD, SUTTON BRIDGE,
PE12 9SL (MAP REFERENCE, TF42SE 546395, 321871)**

REVISED 20/12/2018 TO BE IN ACCORD WITH SOUTH EAST LINCOLNSHIRE

FLOOD RISK STANDING ADVICE (FGFL 1.0m. ABOVE ADJACENT GROUND LEVEL)

REVISED 09/11/2018 TO INCLUDE DESIGN SHEETS FOR SW & EFF DISPOSAL UNITS

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

Report prepared by:

B.W. Hornigold, C Env. MCIWEM. CMIM.

Engineering Support Practice Ltd.,

The Cottage, Brow of the Hill,

Leziate, Kings Lynn.

PE32 1EN

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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 two storey dwellings with sleeping accommodation of the first floor. The site is located to the east of 259 Bridge Road, Sutton Bridge, Lincs, PE12 9SL. Access to and from the site is off Bridge Road, Sutton Bridge no problems are envisaged with both access and egress of the site. (Appendix 5/6)

1.2 The site is located to the west of Sutton Bridge settlement with existing residential dwellings to the immediate west and opposite, agricultural land to the south and east . (Appendix 5/7)

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. 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. (Appendix 8)

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 south west of the development site. (Appendix 1/2)

1.5 Contact has been made with the South Holland District Council (SHDC) Planning Department and information has been gained with regard to the South East Lincolnshire Strategic Flood Risk Assessment document March 2017 commissioned by the SHDC. (Appendix 7)

1.6 Engineering Support Practice Ltd was appointed in September 2018 to undertake the Flood Risk Assessment for the site

2.0 Location.

2.1 The development site is located adjacent 259 Bridge Road, Sutton Bridge, Lincs, PE12 9SL it being placed to the west of Sutton Bridge settlement in close proximity to existing residential dwellings. The site is currently an amenity area utilised in connection with a commercial car servicing business. (Appendix 5/6/7)

2.2 The site location and the extent of the area and the general development area are shown on the enclosed plans. (Appendix 5/6) Map Ref., TF42SE 546395,321871.

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. A South Holland IDB., Main Drain is located to the south west of the site. (Appendix 2)

3.0 The Site, Sequential and Exception Tests.

3.1 The site is currently an amenity area to the east of 259 Bridge Road, Sutton Bridge utilised in connection with a commercial car servicing business. The site will be subject to a planning application for a proposed development of 2 No. semi-detached two storey dwellings with sleeping accommodation on the first floor. Access will be via the adjacent highway Bridge Road, Sutton Bridge.

3.2 The area of the development site is restricted to that as detailed on the enclosed plans and is bounded to the north by Bridge Road, the east and south by open agricultural ground, the west by existing residential development. The site area is of 0.0625ha. (Appendix 6)

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

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

3.5 Sequential Test.

3.5.1 The site is located within close proximity to the Sutton Bridge settlement boundary as designated min the by the South Holland District Council Local Development Plan. 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.

3.5.2 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)

3.5.3 The South Holland District Council Planning Officer Lucy Buttery was contacted and the area of search over which to confine the Sequential Test determined. The confines of the Sutton Bridge settlement was agreed, for ease of enquiry however the larger post code area PE12 was considered and provided one alternative option of land availability. This area is considered unsuitable because of its size and that it is located in the same Flood Zone 3a, no lesser a flood zone than the proposed site, therefore it is suggested that the location adjacent 259 Bridge Road is to be preferred, therefore passing the Sequential Test.(Appendix 7)

3.6 Exception test.

3.6.1 The development is that of constructing 2No. semi - detached two storey dwellings with sleeping accommodation on the first floor, it being located within close proximity to the Sutton Bridge settlement boundary and immediately adjacent existing residential dwellings being positioned in Flood Zone 3a. plus climate change, a defended flood plain. (Appendix 2)

3.6.2 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" (Appendix 8)

3.7 To pass the Exception Test, NPPF Clause 102, states, (Appendix 8)

3.7.1. "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."

3.7.2 "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. "

3.7.3 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. Additionally sustainable methods of heat source will be utilised and rain water harvested where possible.

3.8 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 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 close proximity to the Sutton Bridge west settlement boundary and is within the South Holland District Council administrative area and within the South Holland Internal Drainage Board District (SHIDB) (Appendix 5/7)

4.2 A SHIDB. "Main Drain" exists to the south west of the site and provides a general drainage service to the whole of the localised catchment. The development will not be within the Boards 9m. bye-law distance of the "Main Drain" water course. (Appendix 3/5)

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 noted on the IDB internet web site. (Appendix 3) 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 3)

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.(Appendix 1/2)

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 site area is not served by Anglian Water Public Sewers and therefore it is the intention that the development will discharge effluent to a bespoke treatment plant and discharged to drainage field designed to BRE 365 standards. 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 and designed to BRE 365 standards. (Appendix 4/5/6)

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 3)**
- 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 2118. The development site being some 1.40 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 and be readily absorbed into the south Holland Internal Drainage Board systems. (Appendix 2/5)**

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 0.75 and 1.25 "Danger to some".

2. Max Depth, 0.25m. – 0.50m. and 0.50m. – 1.0m.

3. Max Velocity, 0.0m/s – 0.3./s

Therefore the appropriate mitigation measures if entirely based on the THM data would be to raise the finished ground floor level (FGFL) to 0.5m. above adjacent ground levels. However to accord with the South East Lincolnshire Flood Risk Standing Advice the finished ground floor level will be set 1.0m above the adjacent ground level. with 0.6m. of flood resistance measures ie., removable flood gates to all entrances, above FGFL. and flood resilience measures to all service entrances and internal structure applied to a height of 0.6m. above FGFL. (Appendix 2)

d) Pluvial Flooding of the site is not expected owing to the topographical terrain falling generally away from the dwelling towards the agricultural lands east and south and thence SHIDB water course, this together with the proposal to raise the FFL. 1.0m. 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 1.0m. 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 9)

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 2/3)

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.

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. (Appendix 2/8)

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 2118 would be +1.22m.ODN. above that of today ie., +7.30m.AODN. 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. (Appendix 1/2)

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 1.40km. to the east of the development site any such major failure or overtopping of defences because of the distance would offer little or no effect on water levels on the adjacent proposed site. (Appendix 5)

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 FGFL. at 1.0m. above the adjacent ground level, together with providing demountable floodgates up to 600mm. above the FGFL., together with flood resilience measures to a height of 0.6m. above the FGFL. will provide mitigation against an extreme flood event.(Appendix 10)

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 1.0m. above the adjacent ground level with flood resistance measures applied to a height of 0.6m. above the finished ground floor level and flood resilience measures installed to a height of 0.6m. 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 3/8)

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. (Appendix 7)

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 Framework Directive.

10.1 The South Holland District Council SFRA. (Appendix 7) 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/)

10.2 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 4)

10.3 An bespoke effluent treatment plant and drainage field will be installed to accept the effluent discharge the system designed to meet the numbers of occupants and to BRE 365 standards.

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 2/7/8/9) 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.

11.4 Attention is drawn to the predictions for sea level rise by the year 2118, 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 + 1.22m. above the current day 1 in 200 year extreme tidal event, a level of +7.30m.AODN. 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(Appendix 2) 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 0.75 – 1.25 “Danger to some” and 1.25 and 2 “Danger to most”

2. Max Depth, 0.25m. – 0.50m. and 0.5m. – 1.0m.

3. Max Velocity, 0.0m/s – 0.3./s

11.5.1 Therefore the appropriate mitigation measures are recommended to be the raising of finished ground floor level (FGFL) to 1.0m., **in accordance with the South East Lincolnshire Flood Risk Standing Advice**, above adjacent ground levels with 0.6m. of demountable floodgates to all pedestrian entrances as flood resistance measures above FGFL. together with flood resilience measures, non-turn valves to all service entrances, together with internal structure protection applied to a height of 0.6m. above FGFL. SAFE REFUGE, should a breaching incident arise, is available on the first floor. (Appendix 2/5)

11.6 The area is not served by Anglian Water Public Sewers and therefore it is the intention that the development will discharge effluent to a bespoke effluent treatment plant and drainage field designed to BRE 365 standards.(Appendix 4)

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 9)

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 2)

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



Lucy Buttery
South Holland District Council
Planning & Development
Council Offices Priory Road
Spalding
Lincolnshire
PE11 2XE

Our ref: AN/2018/128270/01-L01
Your ref: H18-1048-18
Date: 28 November 2018

Dear Lucy

**Proposed pair of semi-detached houses
Land East: Bridge Auto's Bridge Road**

Thank you for referring the above application on 14 November 2018.

Environment Agency position

In the absence of an acceptable Flood Risk Assessment (FRA) we **object** to this application and recommend that planning permission is refused.

Reason

The submitted FRA (ref: November 2018, prepared by B W Hornigold, and saved on LPA website 13 November 2018) does not comply with the requirements for site-specific flood risk assessments, as set out in paragraphs 30 to 32 of the Flood Risk and Coastal Change section of the planning practice guidance. The FRA does not adequately address the development's flood risks.

The FRA correctly assesses flood depths of 0.5-1.0m on site, however, it does not state that finished floor levels will be set 1m above ground level in accordance with South East Lincolnshire Flood Risk Standing Advice.

Overcoming our objection

To overcome our objection, the applicant should submit a revised FRA which addresses the point highlighted above.

If this cannot be achieved, we are likely to maintain our objection. Please consult us on any revised FRA and we will respond within 21 days of receiving it

If you are minded to approve the application contrary to this advice, we request that you contact us to allow further discussion and/or representations from us in line with

Environment Agency
Nene House (Pythley Lodge Industrial Estate),
Pythley Lodge Road, Kettering, Northants. NN15 6JQ
Email: LNplanning@environment-agency.gov.uk

*Customer services line: 03708 506 506
Calls to 03 numbers cost the same as calls to standard
geographic numbers (i.e. numbers beginning with 01 or 02).*

Cont/d..

the Town and Country Planning (Consultation) (England) Direction 2009.

Should you require any additional information, or wish to discuss these matters further, please do not hesitate to contact me on the number below.

Yours sincerely

Mrs Sharon Nolan
Sustainable Places Planning Adviser

Direct dial 020302 53525

Direct e-mail sharon.nolan@environment-agency.gov.uk

Ben Hornigold

From: PSOWN [PSOWN@environment-agency.gov.uk]
Sent: 04 October 2018 15:11
To: ben.hornigold@btinternet.com
Cc: Lincs & Northants, Customer Enquiries
Subject: RE: Proposed development site Bridge Road, Sutton Bridge, Lincs. CNN/ 2018/ 99835
Attachments: CCN_2018_99835.pdf

Dear Ben

Enquiry regarding flood risk information for Bridge Road, Sutton Bridge

Thank you for your enquiry which was received on 10/09/18

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

I enclose Product 3 and 8. Please refer to [Open Government Licence](#) which explains the permitted use of this information.

I hope the attached meets your requirements. If you have any questions, however, please contact this office using the telephone/e-mail details below.

Kind regards

Sarah Curl

Partnerships and Strategic Overview Officer | Lincolnshire and Northamptonshire | Welland and Nene

Environment Agency | Nene House, Pytchley Road Industrial Estate, Pytchley Lodge Road, Kettering, NN15 6JQ

sarah.curl@environment-agency.gov.uk

External: 020 847 49385 | Team Dial: 020 302 53535

We're committed to providing excellent customer service and would appreciate your feedback.

Were you happy with the service you received today?



From: Lincs & Northants, Customer Enquiries

Sent: 18 September 2018 14:05

To: ben.hornigold@btinternet.com

Cc: PSOWN <PSOWN@environment-agency.gov.uk>

Subject: FW: Proposed development site Bridge Road, Sutton Bridge, Lincs. CNN/ 2018/ 99835

Dear Ben,

Product data for site at 259 Bridge Road, Sutton Bridge, Spalding, PE12 9SL

Thank you for your request for flood risk data of 10 September 2010.

We have passed your request to our Partnerships and Strategic Overview Team who will assess what information is available and most relevant to your site. They will confirm this and provide the data in their final reply. The data provided will usually be a product 3, 8 or a combination of the two, please see below for definitions:

- Product 3: Basic Flood Risk Assessment Map, including flood zones, defences and storage areas, statutory main river designations and some key modelled flood levels and flows
- Product 8: Flood Defence Breach Hazard Map including, maximum flood depth, maximum flood velocity, maximum flood hazard

Under Freedom of Information we have up to 20 working days to send the information to you. However we will aim to provide a response to you before this time but you can expect to receive the data by no later than 08 October 2018.

If you have any queries in the meantime, please do not hesitate to contact me.

Regards

Nigel Cooper

Customers and Engagement Officer

**Lincolnshire and Northamptonshire Area
Environment Agency**

✉ Ceres House, Searby Road, LINCOLN, LN2 4DW

☎ 02084749704

☎ 49704 (Internal)

☎ 07879435031

From: Ben Hornigold [[mailto: ben.hornigold@btinternet.com](mailto:ben.hornigold@btinternet.com)]

Sent: 10 September 2018 15:50

To: Enquiries_EastAnglia <Enquiries_EastAnglia@environment-agency.gov.uk>

Subject: Proposed development site Bridge Road, Sutton Bridge,Lincs.

Hi ,

Please see location plans of the above, could you please provide details of EA flood risk protection assets serving the area and products 4 / 8 .

Best regards, Ben.

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Ben Hornigold
ben.hornigold@btinternet.com

Our ref: CCN/2018/99835

Date: 4 October 2018

Dear Ben

Provision of Flood Risk Information for Bridge Road, Sutton Bridge.

Thank you for your request to use our flood risk information in the development of the Flood Risk Assessment (FRA) for the above site. The information is set out below and attached. It is important you read any contextual notes on the maps provided.

We aim to review our information on a regular basis, so if you are using this data more than twelve months from the date of this letter, please contact us again to check it is still valid.

Flood Map

The attached map includes the current Flood Map for your area. The Flood Map indicates the area at risk of flooding, **assuming no flood defences exist**, for a flood with a 0.5% chance of occurring in any year for flooding from the sea, or a 1% chance of occurring for fluvial (river) flooding. It also shows the extent of the Extreme Flood Outline which represents the extent of a flood with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater.

In some locations, such as around the fens and the large coastal floodplains, showing the area at risk of flooding assuming no defences may give a slightly misleading picture in that if there were no flood defences, water would spread out across these large floodplains. This flooding could cover large areas of land but to relatively shallow depths and could leave pockets of locally slightly higher land as isolated dry islands. It is important to understand the actual risk of the flooding to these dry islands, particularly in the event of defence failure.

The Flood Map also shows the location of formal raised flood defences and flood storage reservoirs. It represents areas at risk of flooding for present day only and does not take account of climate change.

The Flood Map only indicates the extent and likelihood of flooding from rivers or the sea. It should also be remembered flooding may occur from other sources such as surface water sewers, road drainage, etc.

Historic Flood Extent Map

A copy of the Historic Flood Extent Map showing the extent of previous recorded flooding in your area is attached. This only covers information we hold and it is possible other flooding may have occurred which other organisations, such as the Local Authority or Internal Drainage Boards, may have records.

Tidal Flood Risk Information

Tidal Defence Information

The tidal defences protecting this site consist of earth embankments. They are in fair condition and reduce the risk of flooding to a 0.67% (1 in 150) chance of occurring in any year. We inspect these defences routinely to ensure potential defects are identified.

Tidal Flood Levels

The attached table shows our current best estimate for extreme tide levels.

Levels for the Humber Estuary have an assessment date of 2014, with others having an assessment date of 2006, which should be used in any consideration of future increases due to climate change.

Modelled Hazard Mapping

For certain locations we have carried out modelling to map the maximum values of flood depth, velocity and hazard rating (danger to people) resulting from overtopping and / or breaching of defences at specific locations for a number of scenarios.

At present this information is available along the full coastal / tidal floodplain, except the tidal Witham Haven in Boston (upstream of Hobhole) where only breaching and not overtopping has been modelled and the tidal River Welland upstream of Fosdyke Bridge where neither breaching nor overtopping are available. Hazard mapping is also available for fluvial flood risk in Northampton, Lincoln, Wainfleet and some isolated rural locations.

The number of locations we have this information for is expected to increase in time.

Hazard Mapping – Breaching

The attached maps show the maximum values of flood depth, velocity and hazard rating (danger to people) resulting from breaching of the defences at specific locations for the scenarios below. For some locations the breach mapping also includes flooding from overtopping if this is expected in that scenario. The location of modelled tidal breaches is shown on a separate attached map.

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

Development Planning

If you would like local guidance on preparing a flood risk assessment for a planning application, please contact our Sustainable Places team at Inplanning@environment-agency.gov.uk. It will help if you mention this data request and attach your site location plan.

We provide free preliminary advice; additional/detailed advice, review of draft FRAs and meetings are chargeable at a rate set to cover our costs, currently £100 (plus VAT) per hour of staff time. Further details are available on our website at

<https://www.gov.uk/guidance/developers-get-environmental-advice-on-your-planning-proposals>.

General advice on flood risk assessment for planning applications can be found on GOV.UK at <https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>

Climate change will increase flood risk due to overtopping of defences. Please note the climate change data included has an allowance for 20% increase in flow. Updated guidance on how climate change could affect flood risk to new development - 'Flood risk assessments: climate change allowances' was published on GOV.UK in February 2016. The appropriate updated climate change allowance should be applied in a Flood Risk Assessment.

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

Supporting Information

Please see the Standard Notice or licence for details of permitted use. The Standard Notice can be found at the link below.

<http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

We respond to requests for recorded information we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR).

Further information on flood risk can be found on the GOV.UK website at:

<https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather>

Other Flood Risk Management Authorities

The information provided with this letter relates to flood risk from main river or the sea. Additional information may be available from your Lead Local Flood Authority (ie county council or unitary authority) or, where they exist, the Internal Drainage Board.

Further Contact

I hope we have correctly interpreted your request. If you are not satisfied with our response to your request for information, you can contact us within two calendar months to ask for our decision to be reviewed.

If you have any queries or would like to discuss the content of this letter further please contact Sarah Curl using the details below.

Yours sincerely,



FOR Alastair Windler

Partnerships and Strategic Overview Team Leader - Welland and Nene

Direct dial 020 302 53535

Direct e-mail PSOWN@environment-agency.gov.uk

Enc.

Flood Map

Historic Flood Extent Map

Estimated Tide Levels

Tidal Breach Locations Map

Hazard Mapping – Breaching (4 maps)

APPENDIX 2

BETA This is a new service – your [feedback \(/feedback\)](#) will help us to improve it.

Likelihood of flooding in this area

This location is in an area with a high probability of flooding

FLOOD ZONE 3

Land and property in flood zone 3 have a high probability of flooding

[More information about flood zones](#)

(<http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/flood-zone-and-flood-risk-tables/table-1-flood-zones>)

- 1** You must carry out a [flood risk assessment](#) (<https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>) for development in flood zone 3
- 2** For some types of development in flood zone 3 you must follow the [Environment Agency's](#) standing advice for carrying out a flood risk assessment (<https://www.gov.uk/guidance/flood-risk-assessment-standing-advice>)
- 3** You can also [read more about flood risk assessments for planning applications](#) (<https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>)



Learn more about the [potential sources of flood risk in this area](#) (<https://flood-warning-information.service.gov.uk/long-term-flood-risk/map?easting=546412&northing=321829>)

[Download this information \(PDF\)](#)

[Refine this search \(/confirm-location?easting=546412&northing=321829\)](#)

[Find out the flood probability for another location \(/\)](#)

You can use this information as part of a [flood risk assessment for a planning application](#) (<https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications#when-you-need-an-assessment>)

[Terms of use](#)

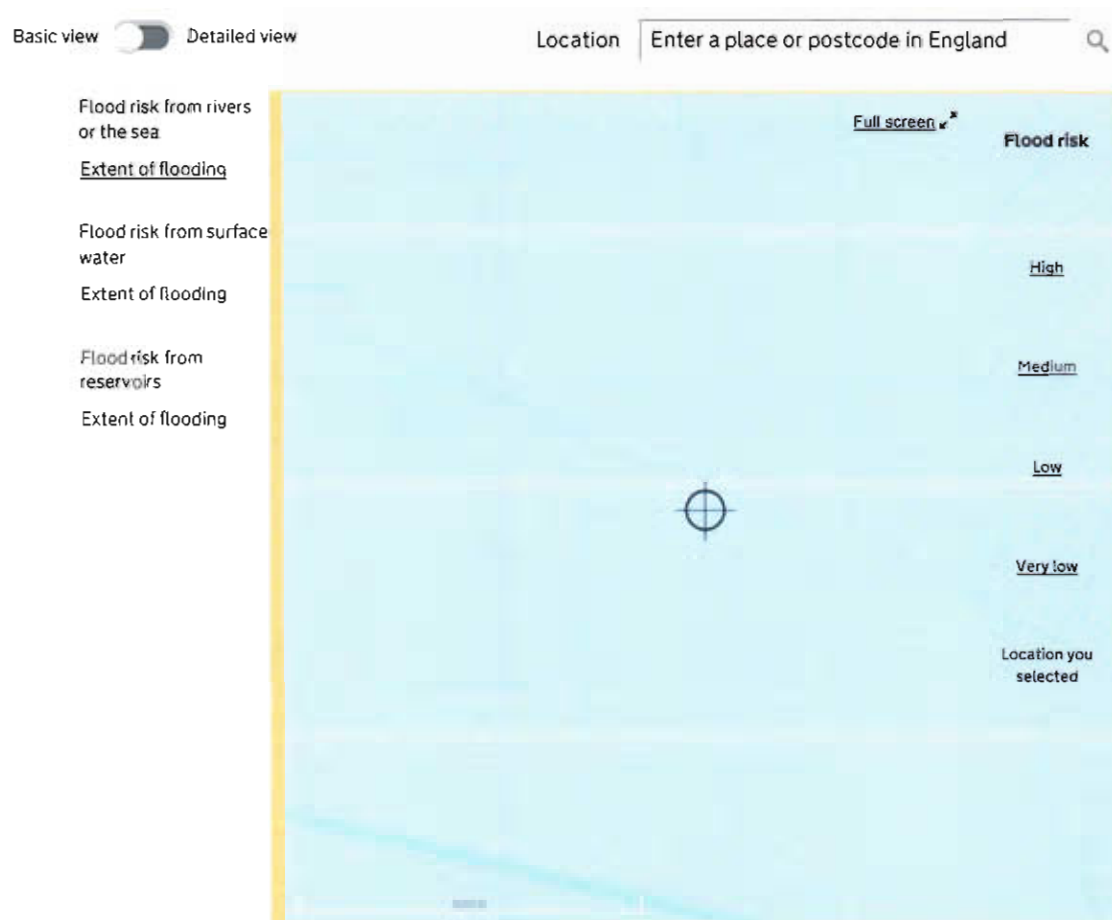
Learn more about this area's flood risk

Select the type of flood risk information you're interested in. The map will then update.

You can [learn more about the ways we describe flood risk](#). Alternatively select a legend item or feature from the map for an explanation of that flood risk.

'Detailed view' shows more technical information.

All information, particularly the likelihood of surface water flooding, is a general indicator of an area's flood risk. As such it is not suitable for identifying whether an individual property will flood. This service uses computer models to assess an area's long term flood risk from rivers, the sea, surface water and some groundwater. It does not include flood risk from sources such as blocked drains and burst pipes.



► [Accuracy of surface water flood risk information](#)

[View the flood risk information for another location](#)

[Go to the national flood information service](#)

► [Other ways of getting this information](#)

Learn more about this area's flood risk

Select the type of flood risk information you're interested in. The map will then update.

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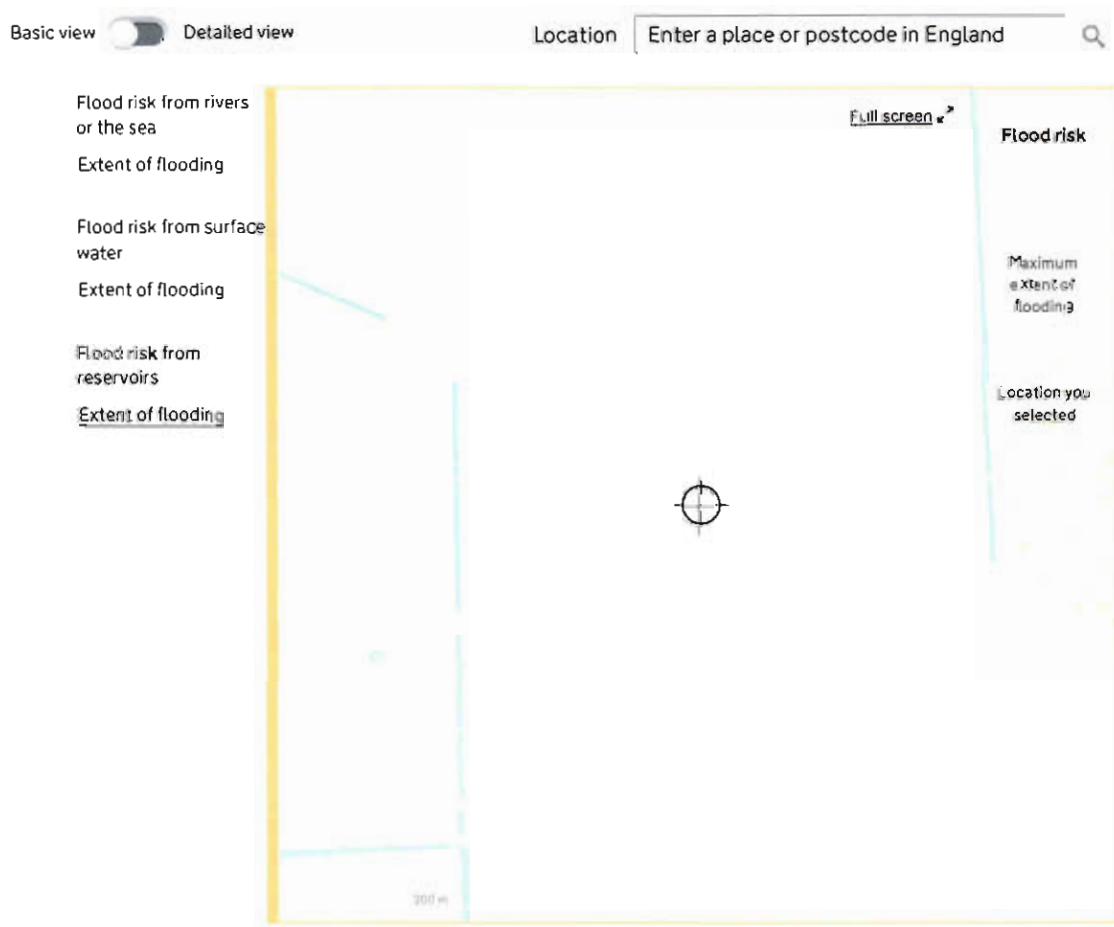
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► [Accuracy of surface water flood risk information](#)

[View the flood risk information for another location](#)

[Go to the national flood information service](#)

► [Other ways of getting this information](#)

Environment
A group

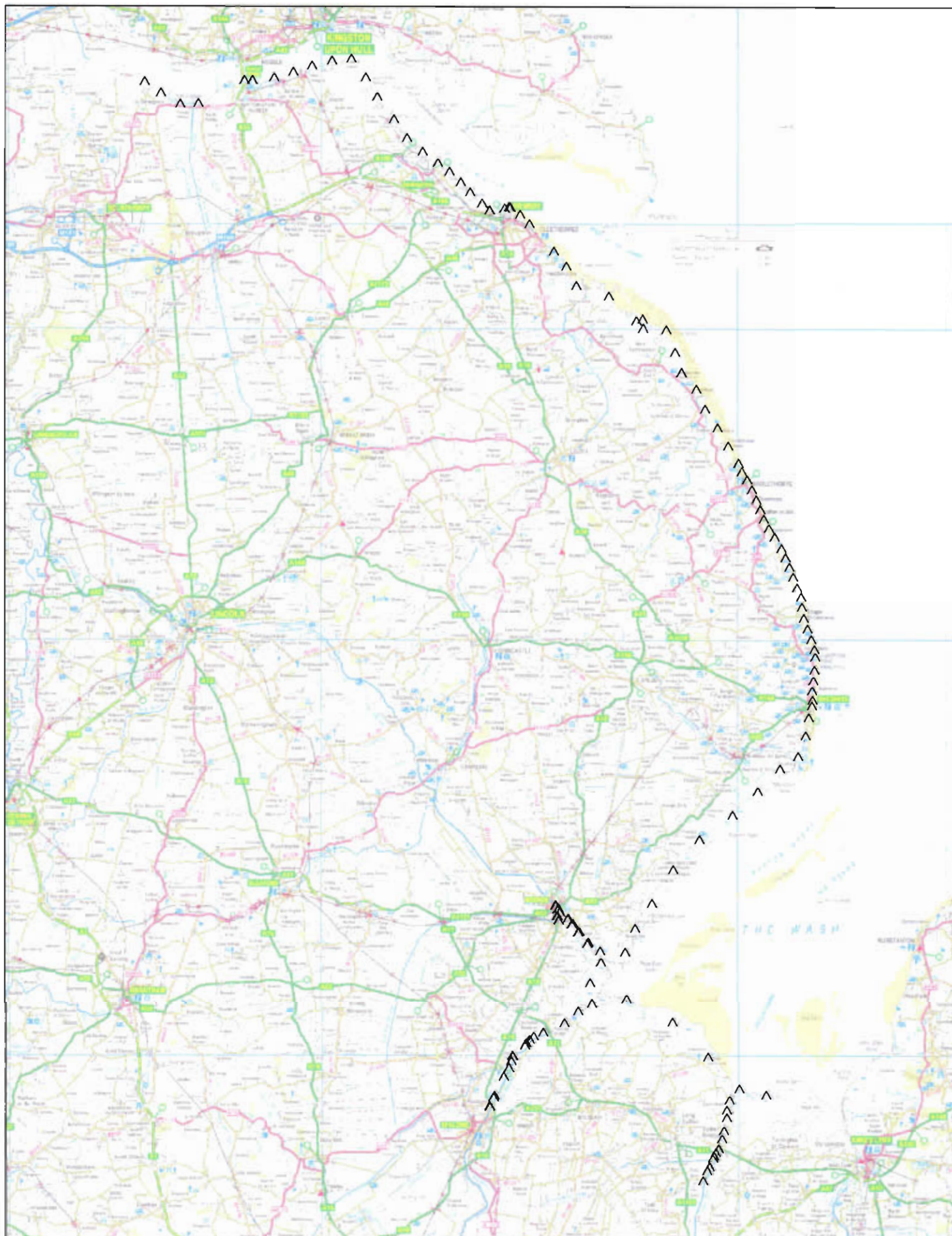


Tidal Water Levels for the South Humber, East Coast and The Wash

The table below shows still water levels for locations, from the above location map, around the South Humber Estuary, East Coast and The Wash. It is important to note the following:

- The base date for the data is 2014 for the South Humber and 2006 for the East Coast and The Wash.
- The data are still water levels. Depending on the use of the data it may be necessary to consider wave heights and / or joint probability analysis of water level and other variables.
- The water level quoted is the 'Best Estimate' water level. Depending on the use of the data it may be necessary to carry out sensitivity testing. Upper and Lower 95% confidence bandings are available upon request.
- Levels for other annual chance scenarios are available if required.

Ref	Location	Easting	Northing	Annual Chance (1 in x) of Tide Level					
				metres ODN					
				1	10	50	100	200	1000
HUMBER									
H030	Tetney	535420	403180	3.94	4.29	4.56	4.69	4.82	5.15
H050	Buck Beck	532700	406580	4.03	4.36	4.62	4.74	4.87	5.18
H060	Grimsby	527878	411346	4.10	4.43	4.70	4.82	4.95	5.27
H080	Haborough Marsh	520790	415740	4.26	4.61	4.88	5.01	5.14	5.47
H090	Immingham	519141	417449	4.26	4.61	4.88	5.01	5.14	5.47
H100	South Killingholme	518700	417120	4.41	4.77	5.05	5.18	5.32	5.66
H130	North Killingholme	516530	420000	4.51	4.87	5.15	5.28	5.42	5.77
H150	East Halton	514450	422870	4.59	4.96	5.25	5.39	5.53	5.89
H170	Goxhill	511970	425440	4.67	5.04	5.34	5.47	5.61	5.95
H200	New Holland	508020	424330	4.87	5.26	5.55	5.68	5.81	6.12
H210	Barrow Haven	506380	422620	4.92	5.31	5.60	5.73	5.86	6.17
H220	Ferriby	497550	421150	5.04	5.42	5.67	5.77	5.86	6.04
H230	Winterton	493420	422830	5.14	5.51	5.74	5.83	5.90	6.02
H250	Blacktoft	484247	424190	5.25	5.62	5.83	5.90	5.96	6.04
H270	Goole	474857	422960	5.46	5.85	6.07	6.15	6.21	6.29
East Coast									
~	Great Eau	545500	393800	3.80	4.19	4.46	4.57	4.69	4.96
~	Boygrift	553300	379800	3.84	4.24	4.53	4.65	4.77	5.05
~	Burgh Sluice	555190	358620	4.26	4.45	4.76	4.90	5.03	5.34
Wash									
~	Hobhole	536610	339940	4.82	5.30	5.64	5.78	5.93	6.27
~	Lawyers Sluice	540750	334550	4.84	5.32	5.66	5.80	5.95	6.29
~	West Lighthouse	549150	325750	4.88	5.37	5.71	5.86	6.01	6.35
~	Grand Sluice	532400	344500	4.88	5.33	5.65	5.78	5.93	~
~	Fosdyke Bridge	531700	332200	4.91	5.38	5.71	5.85	5.99	~
~	Marsh Road	526000	324000	5.04	5.44	5.73	5.85	5.98	~
~	Wisbech	546100	310000	4.83	5.25	5.53	5.66	5.78	~
~	Dog In Doublet	527300	299300	3.67	4.00	4.22	4.32	4.42	~



^ Modelled Breach Locations

0 3.5 7 14
Kilometres

This map indicates the location of where we have modelled the consequence of breaches in the defences along the coastline and tidal rivers. We have mapped the the maximum values of Hazard Rating (Danger to People), Depth and Velocity.

We have not assumed that all breaches occur at the same time, but have modelled each breach individually and overlaid the results to find the maximum values.

Our modelling only considers the consequences of a breach, it does not make any assumption about the likelihood of a breach occurring. Our defences generally provide a good standard of flood defence but a risk of breaching remains.

Please contact the Environment Agency for information on how these maps are used in the management of flood risk.

General Enquiries No. 03709 506 506

Weekday daytime rate to plus up to 8p from BT Weekend Unlimited. Mobile and other providers charges may vary.

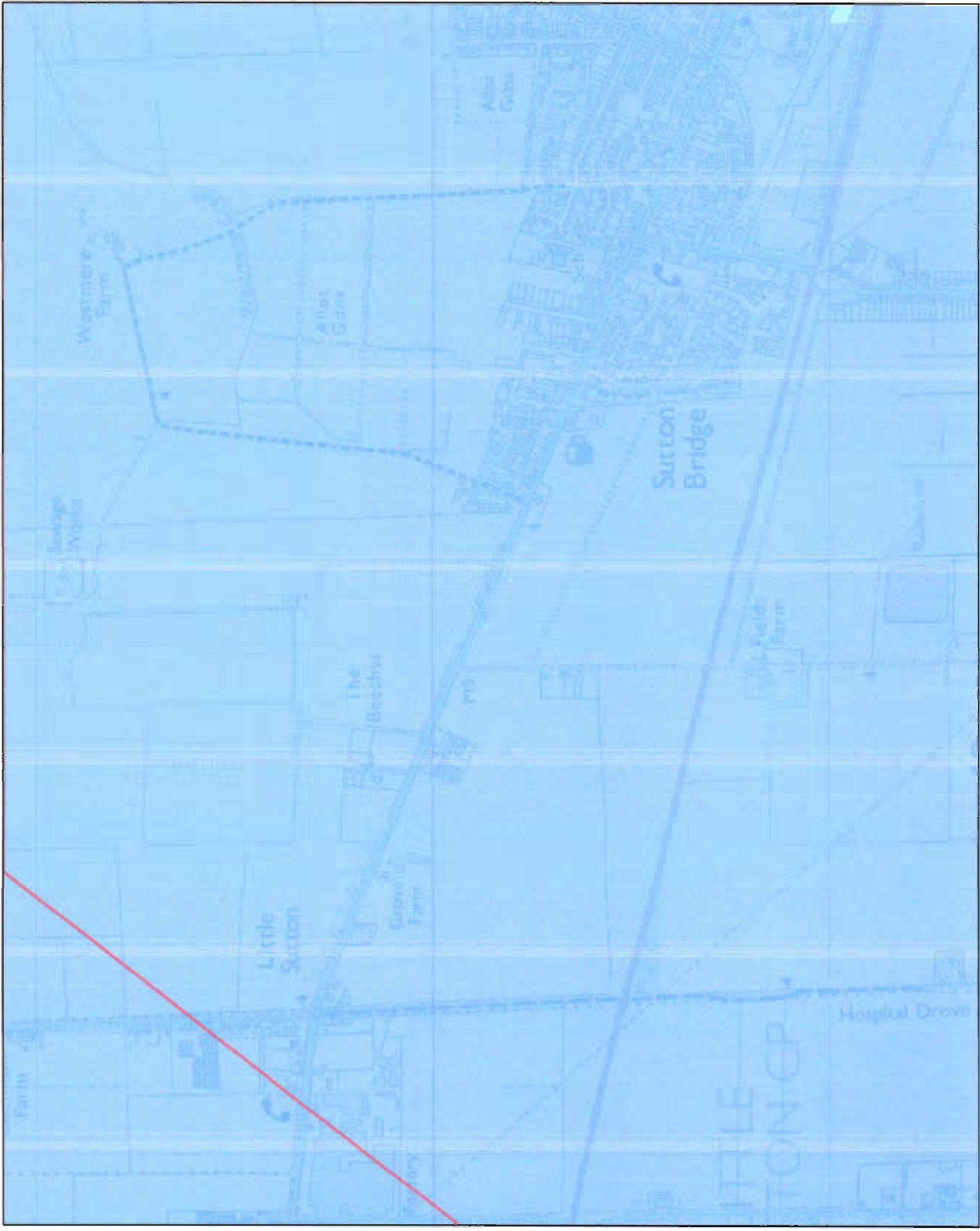


Produced by the Partnership and Strategic Overview Team, Lincoln
Contract Reference No. 2014/01/001

Northern Area Tidal Hazard Mapping

Location of Modelled Breaches

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Scale 1:10,000

N

Legend

- Main River
- Raised Defences
- Flood Storage Areas
- Area at Risk of Flooding from Rivers or The Sea
- Extreme Flood Outline

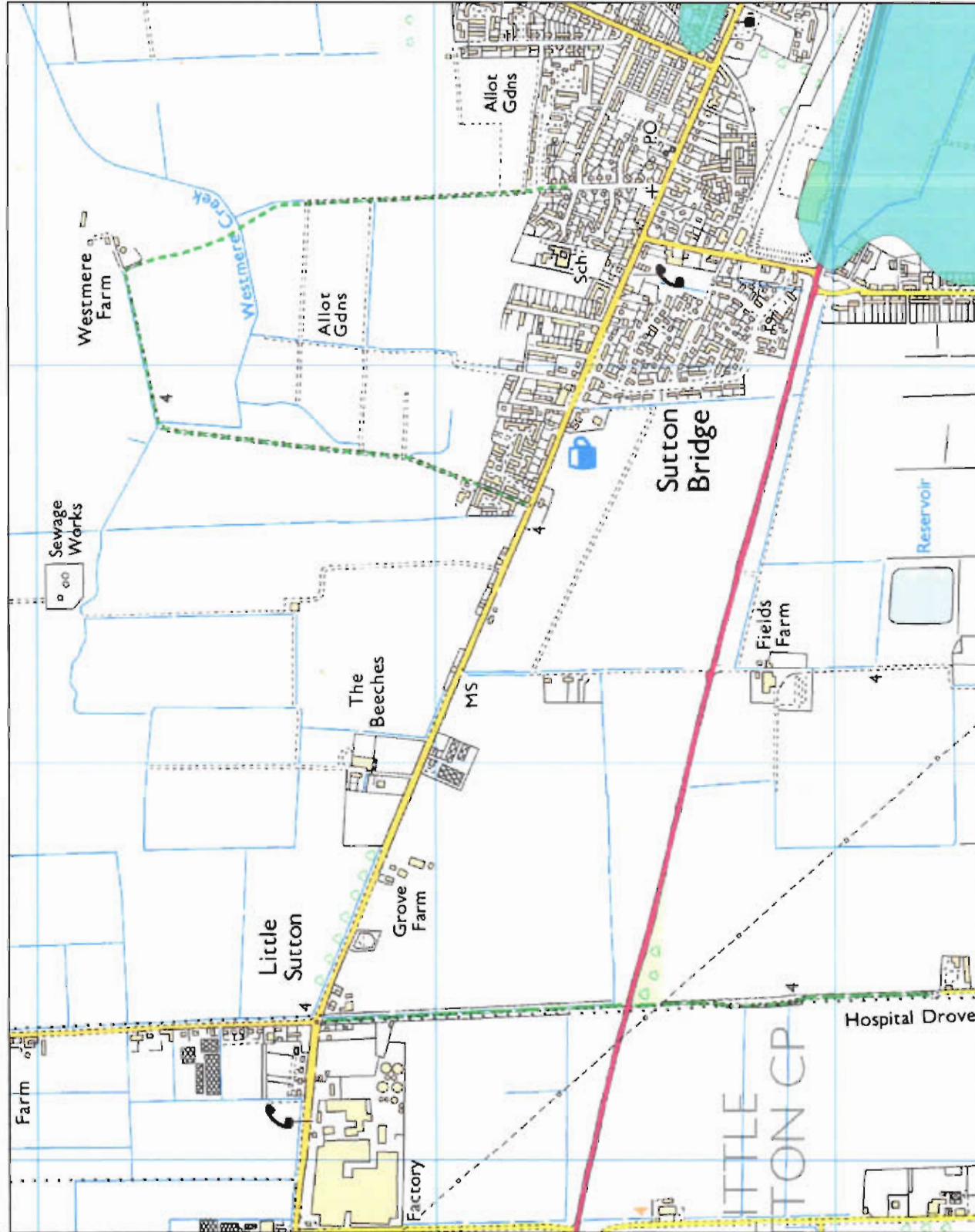
Dark blue shows the area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area could be flooded.

- from the sea by a flood that has a 0.5% (1 in 200) or greater chance of happening each year.
- or from a river by a flood that has a 1% (1 in 100) or greater chance of happening each year.

Light blue shows the extent of the Extreme Flood Outline, which represents the extent of a flood event with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater.

These two colours show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements. Sites outside the two extents, but behind raised defences, may be affected by flooding if the defences are overtopped or fail.

Created by the Partnerships and Strategic Overview Team, Kettering

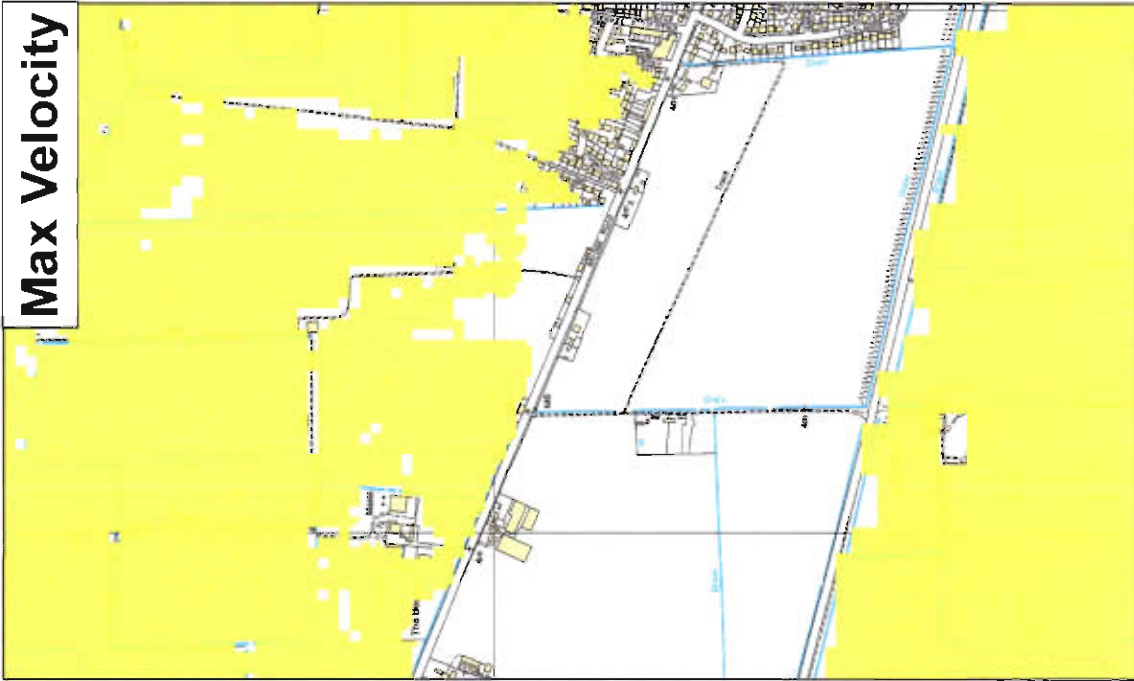
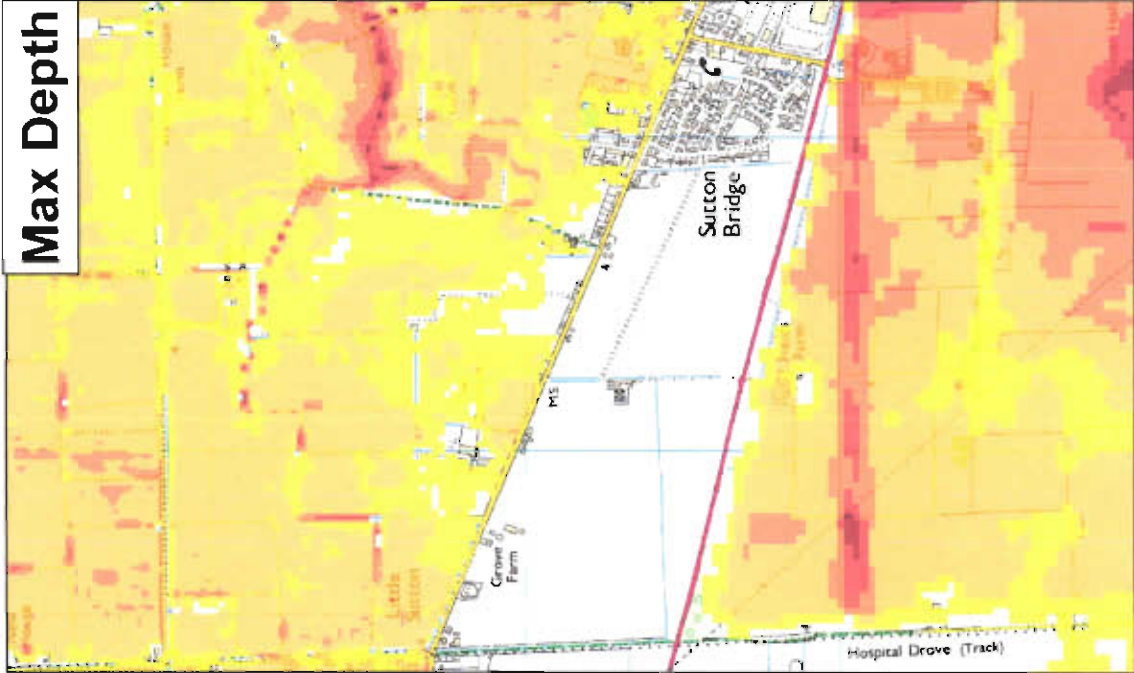
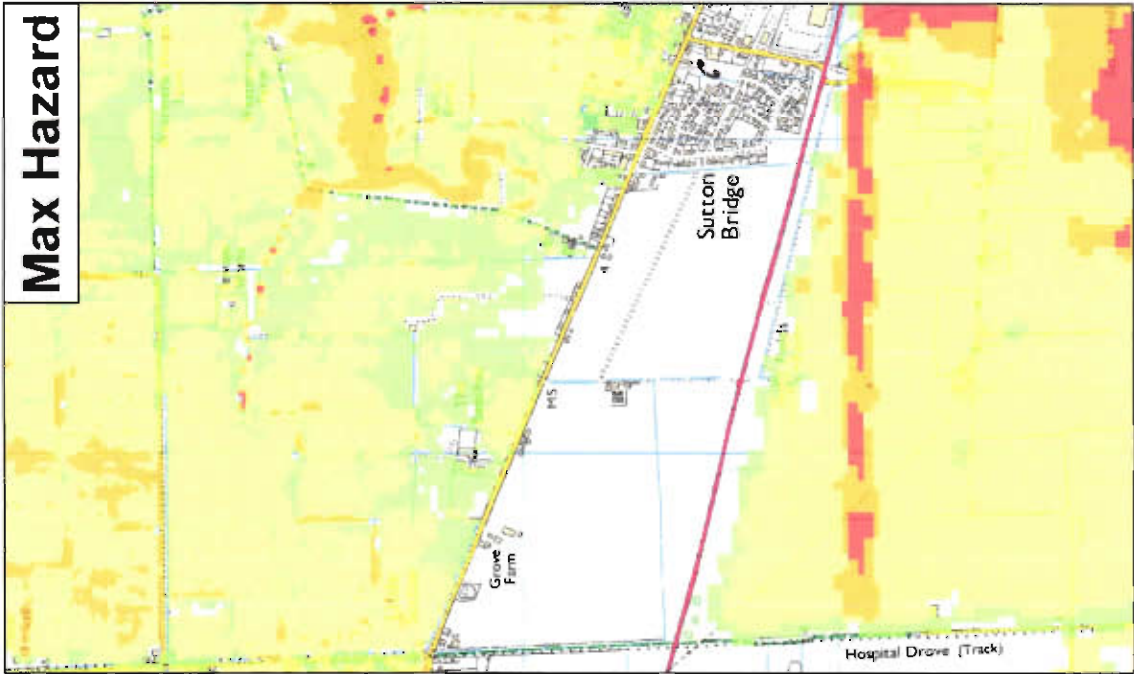


Scale 1:10,000

Legend

January 1978 on the Tidal River Nene

Created by the Partnership & Strategic Overview Team,
Kettering



★ Modelled Breach Locations - see also the accompanying plan "Location of Modelled Breaches"						
Date Printed	Oct 2018	Scenario year	2006	Scenario Annual Chance (1 in 200)	CCN Number	CCN-2018-99835
Max Hazard (Flood Risk to People: F02-202)		Max Depth (m)		Max Velocity (m/s)		
Less than 0.75 (Low Hazard)		0 - 0.25		0 - 0.3		
Between 0.75 and 1.25 (Danger for Some)		0.25 - 0.50		0.3 - 1.0		
Between 1.25 and 2.0 (Danger for Most)		0.50 - 1.0		1.0 - 1.5		
Greater than 2.0 (Danger for All)		1.0 - 1.5		1.6 - 2.5		
		1.6 +		2.5 +		

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

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: 03706 506 506. Weekday Daytime calls cost 5p plus up to 5p per minute from BT Weekend Unlimited. Mobile and other providers charges may vary.

Lincolnshire and Northamptonshire
Tidal Breaching Hazard
Mapping

Map Created on 17/03/2018

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Secretary of State for the Environment, Food and Rural Affairs. All rights reserved.
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Environment Agency copyright and may lead to prosecution or civil proceedings.

Max Hazard

Linda's Office

Grove Farm

Surratt Bridge

Hospital Drive (Track)

The map displays the Sutton Bridge area, showing the river and surrounding land. The map is color-coded to represent different levels of maximum depth, with a legend on the left indicating 'Max Depth'.

Key features labeled on the map include:

- Sutton Bridge**: The main bridge crossing the river.
- Hospital Drive (Track)**: A track running along the right side of the river.
- Little Sutton**: A small settlement on the left bank.
- Grove Farm**: A farm located near Little Sutton.
- The Rectory**: A building located near the riverbank.
- MS**: A marker or point on the riverbank.
- 4**: A numerical marker on the riverbank.
- MS**: Another marker or point on the riverbank.
- MS**: A third marker or point on the riverbank.
- MS**: A fourth marker or point on the riverbank.
- MS**: A fifth marker or point on the riverbank.
- MS**: A sixth marker or point on the riverbank.
- MS**: A seventh marker or point on the riverbank.
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- MS**: A ninety-fifth marker or point on the riverbank.
- MS**: A ninety-sixth marker or point on the riverbank.
- MS**: A ninety-seventh marker or point on the riverbank.
- MS**: A ninety-eighth marker or point on the riverbank.
- MS**: A ninety-ninth marker or point on the riverbank.
- MS**: A hundredth marker or point on the riverbank.

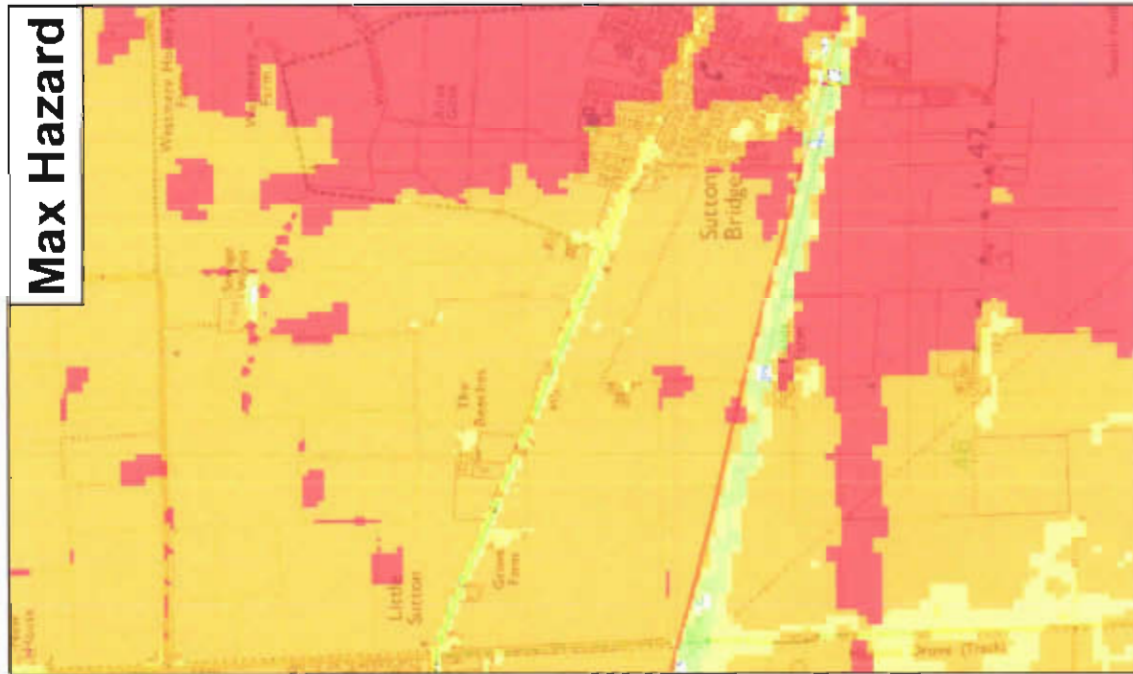
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Date Printed	Oct 2018	Scenario year	2006	Scenario Annual Chance	0.1% (1 in 1000)	CCN Number	CCN-2018-99835	
Max Hazard <i>(Risk Max to People - FLOOD)</i>			Max Depth (m)		Max Velocity (m/s)			
	Less than 0.75 (Low Hazard)		0 - 0.25		$\beta = 0.3$			
	Between 0.75 and 1.25 (Danger for Some)		0.25 - 0.50		0.3 - 1.0			
	Between 1.25 and 2.0 (Danger for Most)		0.50 - 1.0		1.0 - 1.5			
	Greater than 2.0 (Danger for All)		1.0 - 1.5		1.5 - 2.5			
			1.5 +		2.5 +			

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

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.

Max Hazard



Max Depth



Max Velocity



★ **Modelled Breach Locations** → See also the accompanying plan "Location of Modelled Breaches"

[illegible]

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 constitution 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.

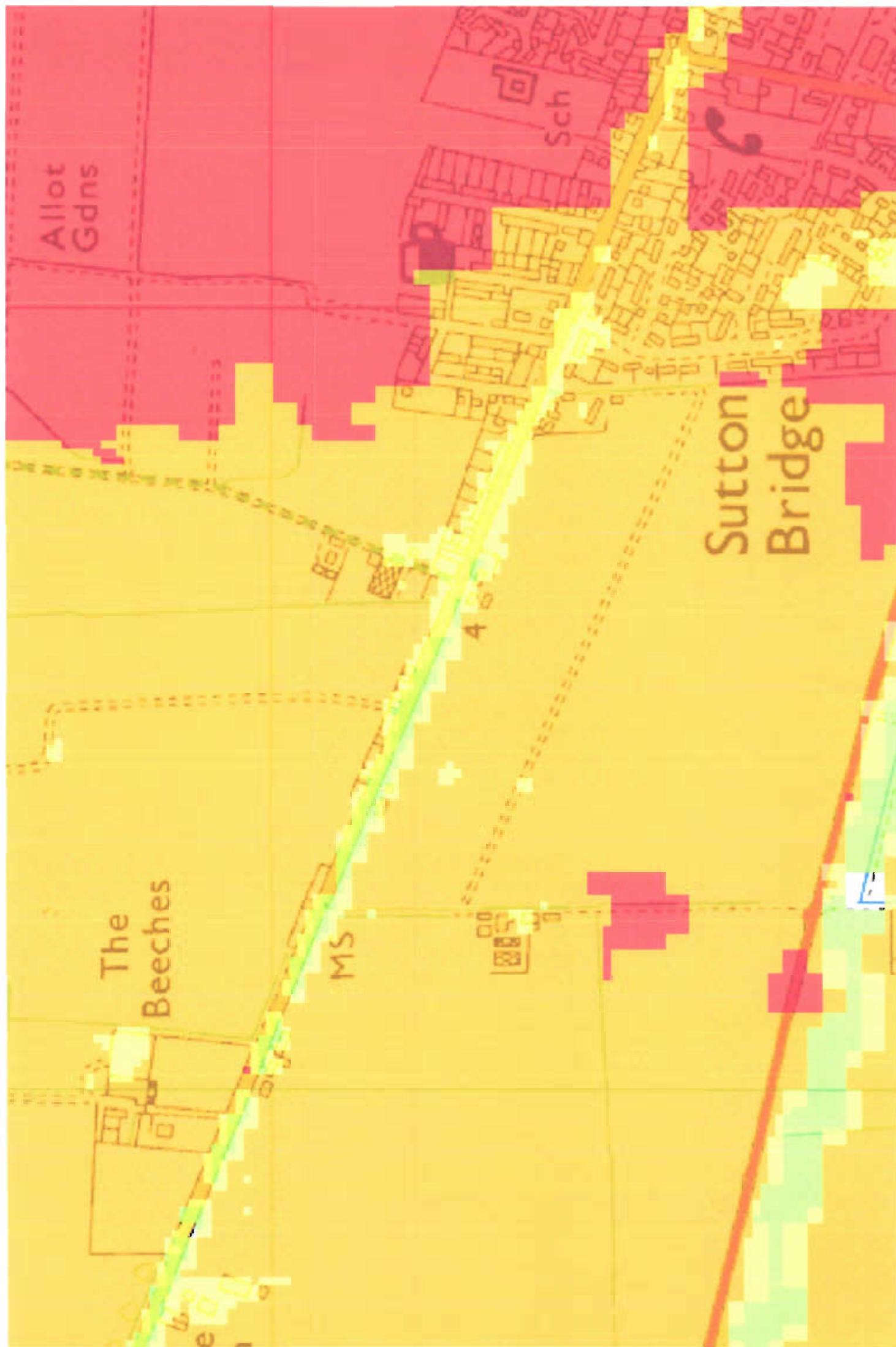
General Enquiries No. 0755 222 506. Working Daytime call and 24 hrs. up to 5p per minute from BT Weekend Charge d. Mobile and other providers' charges may vary



Lincolnshire and Northamptonshire Tidal Breaching Hazard Mapping

Map Centred on TF 46366 24854

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Allot
Gdns

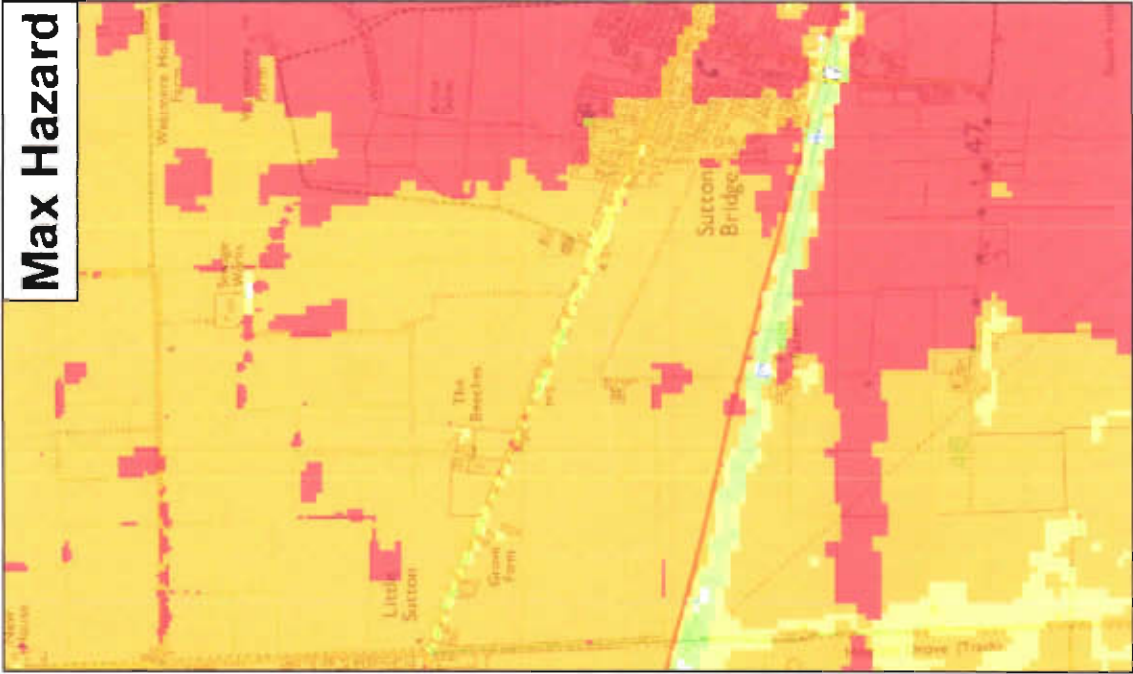
Sutton
Bridge

The
Beeches

MS

Grove
Farm





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

Date Printed	Oct 2018	Scenario year	2115	Scenario Annual Chance	0.1% (1 in 1000)	CCN Number	CCN-2018-99835
Max Hazard (Flood Risk to People - F02-229)							
Less than 0.25 (Low Hazard)							
Between 0.25 and 1.25 (Danger for Some)							
Between 1.25 and 2.9 (Danger for Most)							
Greater than 2.9 (Danger for All)							
Max Depth (m)				Max Velocity (m/s)			
0 - 0.25				0 - 0.3			
0.25 - 0.50				0.3 - 1.0			
0.50 - 1.0				1.0 - 1.5			
1.0 - 1.6				1.5 - 2.5			
1.6 +				2.5 +			

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

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.

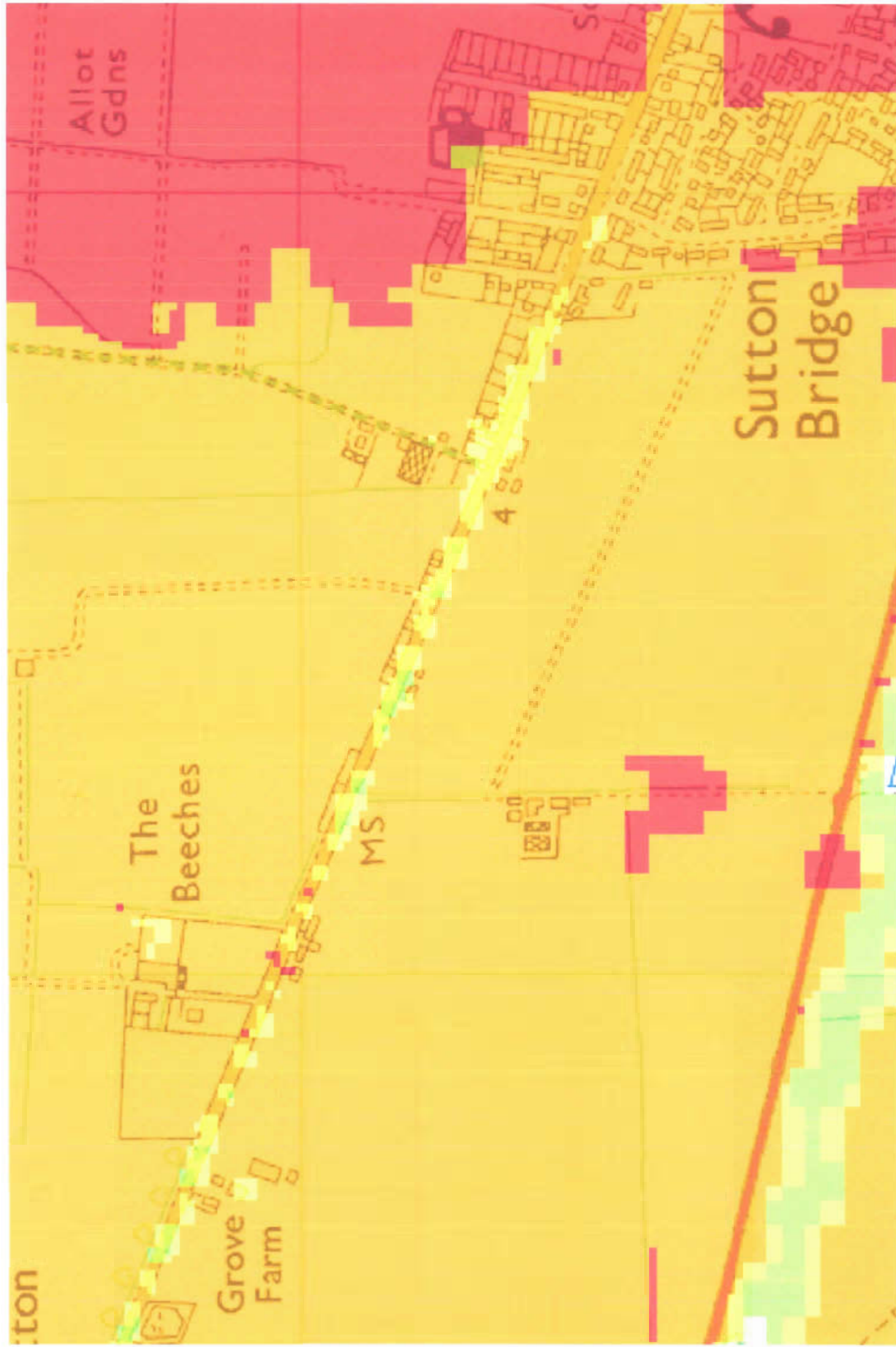
General Enquiries No: 03708 506 506. Weekday Daytime calls cost 1p plus up to 6p per minute from BT* Weekend Unlimited. Mobile and other providers' charges may vary.



Lincolnshire and Northamptonshire
Tidal Breaching Hazard
Mapping

Map Centred on TF 46386 34854

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Sutton
Bridge

The
Beeches

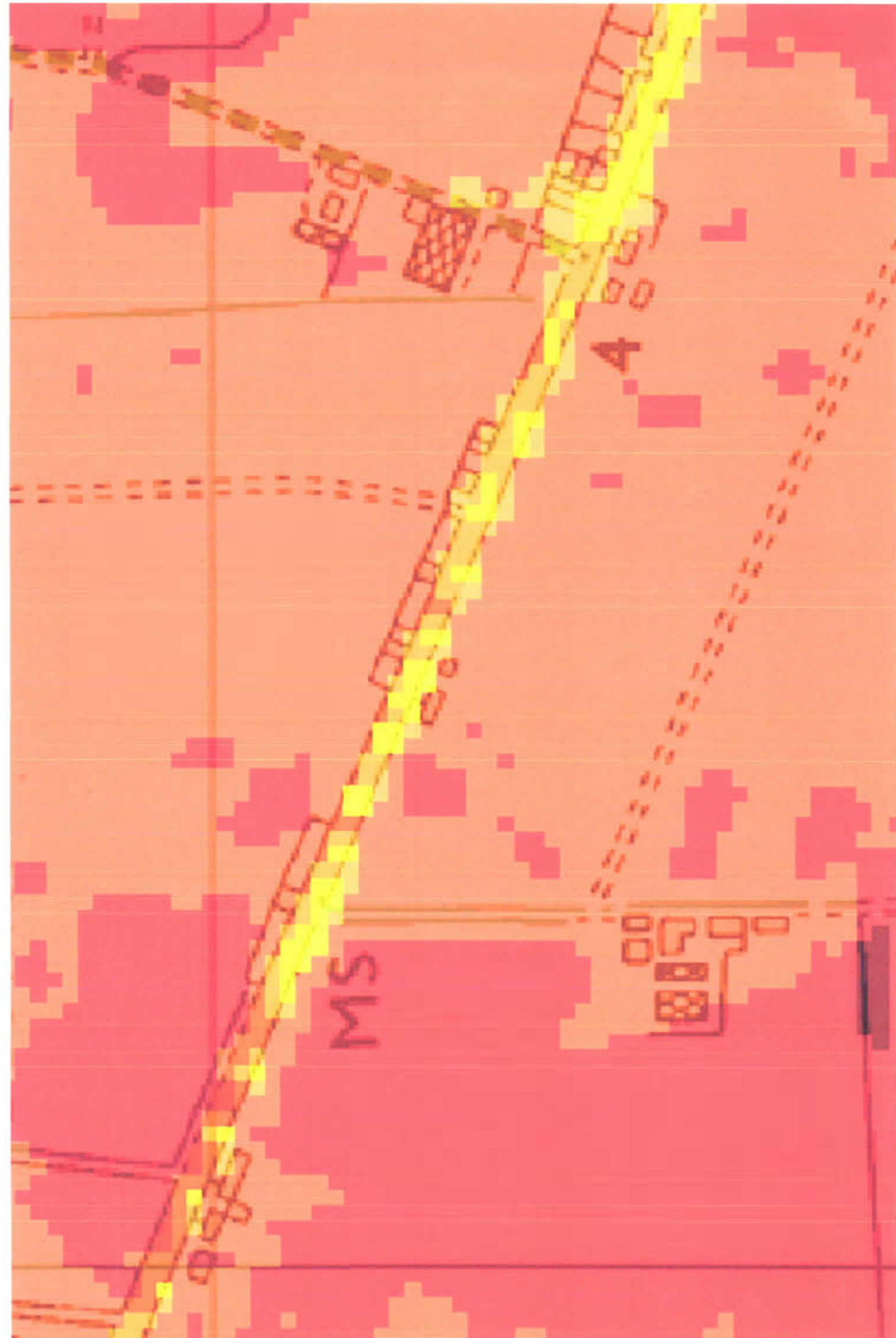
Grove
Farm

Allot
Gdns

MS

A 84

Sutton





APPENDIX 3



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Board's Area

The [Board's Area](#) includes some of the most fertile arable land in the world and is widely recognised as the bread basket of Britain. The area is home to around 60,000 people, a thriving local economy and an increasingly popular tourist destination that attracts visitors from around the country. The area is both locally and nationally important and worth the cost of defending and protecting, now and in future.

Although the entire area is at considerable theoretical risk of river flooding and inundation from the sea, the actual risk is substantially reduced by the work that we do in partnership with Local Authorities, the Environment Agency and Natural England.

The Board's [full watershed catchment area](#) draining to the [Drainage District](#) is the same as the Drainage District, which means that we can provide a better service than we might otherwise be able to: this is because we are not compelled to take surface water from outside the Drainage District that we have no control over. This gives us an advantage in being able to protect the people of South Holland and reduce the risk of flooding.

Board's Drainage System

The [Board's drainage and water level management infrastructure](#) consists of watercourses, pumping stations and a number of other water level control structures. Our infrastructure can be viewed and downloaded from the [maps](#) available on our website – just click on the catchment area that you want. Detailed listings and photographs are also available by clicking on the link shown on our [Board's Area](#) webpage.

Not all of the defences within our Drainage District are controlled by the Board – the Environment Agency have operational responsibility for the [Main Rivers](#) and [Coastal](#)

SOUTH HOLLAND
Internal Drainage Board

Defenders of Lincolnshire's Fens

- Bread Basket of Britain
- Prioritized Maintenance Programme
- The Right Balance
 - People
 - Property
 - Infrastructure
 - Agriculture
 - Commerce
 - Wildlife

Land within South Holland IDB District - 38,443 Hectares

Category	Area (Ha)
Agricultural Land	35,263
Coastal/Urban/Other	3,180

Defences. We have permissive powers to manage the other infrastructure in our Drainage District.

The Board actively maintains only the most critical ordinary watercourses that are not Main River, which equates to around 25% of the total length of ordinary watercourse in the Drainage District. It is therefore vitally important that these watercourses are regularly maintained to design levels, to properly convey flows to the Main Rivers via our pumps and other water level control structures.

It is equally as important to properly maintain the pumping stations and other structures that control the movement of water through the drainage channels. However, the efficiency of our systems and therefore the safety, security and well being of those living and working within our Drainage District is also dependent upon the Environment Agency maintaining the [Main Rivers](#) and [Coastal Defences](#), or permitting others to do so.

Vision, Mission and Values

Our [Vision](#) is to make the Drainage District and watershed catchment area a safer place to live, work, learn, grow and have fun, as a model of sustainable living in a high flood risk area. Our Mission, strategic aims and corporate values can all be viewed and downloaded from the group's [Vision, Mission and Values](#) webpage.

Policy

Our [Business Plan and Policy Statement](#) sets out the standards of protection we aspire to provide and how we will go about managing risk and water levels, and delivering services in our area. The Board's Business Plan/Policy Statement and most of its tactical and operational policies can be viewed and downloaded from our [Policy](#) webpage.

Organisation

We are able to draw on the local knowledge and experience of our [Board Members](#) who give their time freely to serve you, as custodians of our lowland environment. As a member of the WMA we also have access to the [group's administration, technical support staff and workforce](#), in addition to the Board's own directly employed staff. For more information please visit our [Organisation](#) webpage.

Governance

The Board provides leadership within a framework of prudent and effective controls, which enables risk to be properly assessed and managed. The Board has put in place a number of plans, policies, procedures and governance arrangements to ensure best value, probity, propriety and transparency in the decision making process. For more info please check-out our [Governance](#) webpage.

Drainage Rates and Special Levies

We have two primary sources of income: the direct rating of all agricultural land and buildings from drainage ratepayers and special levy payments from Local Authorities, which reflect the extent of other property in the Drainage District. The Board sets the rate and special levies each year based on an estimate of its net expenditure, which can be [viewed and downloaded](#) from our website. Our policy is to limit any increases to the Consumer Price Index, as indicated by the [Office for National Statistics](#) for October every year.

Operations

Necessary capital improvement works and regular maintenance of the drainage infrastructure are vitally important services that we provide to help keep South Holland Internal Drainage District safe. All of our operations are controlled and financed by the Board directly. We undertake planned maintenance and capital work annually, using a healthy mix of in-house resource and contractors. We're also able to undertake rechargeable work on behalf of [riparian owners](#) and other third parties. We respond to emergency situations and other events as and when they arise, in accordance with the Board's emergency procedures and scheme of delegation. For more information please visit our [Operations](#) webpage.

Work Programmes

Please check-out our [Work Programmes](#) webpage to identify the maintenance and capital work we plan to deliver.



Emergencies

We provide an emergency service, the extent of which appears to be largely unrecognised. We respond to emergencies during periods of high rainfall and during tidal surge events, utilising our workforce, board membership and state of the art telemetry system. We work closely with other operating authorities and Member Boards in the WMA. We have detailed how we shall respond in an emergency situation on our [Emergencies](#) webpage.

Development

One of the principle services that we provide is regulating, controlling and facilitating [development](#) to secure the efficient working of the drainage system now and in the future. This is done by reasonable application of the [Board's Byelaws](#) and the [Land Drainage Act 1991](#), and by working closely with Developers, Local Authorities, the Environment Agency and other Stakeholders.

Board Members

The Board has a total of 21 members who make the key decisions, 10 of which are elected by occupiers of agricultural land who pay Drainage Rates directly for the services they receive (the elected members), and 11 members are appointed by the constituent Councils to represent the extent of other interests in the Drainage District (the appointed members). The current list of [Board Members](#) and the entitlement of each constituent Council can be viewed and downloaded from our website.

Board Meetings

The Board meets at least 4 times a year in Holbeach. All Board meetings are public meetings and as such members of the public are welcome to attend the general business sessions. Scheduled meeting dates, notices and agenda are posted on the [Board Meetings](#) page on our website. The confirmed minutes of every Board meeting along with the Report extracts that helped to inform the decision making can also be viewed and downloaded from this webpage.

Financial Statements

The Board's Annual Accounts are audited by its independently appointed external auditor every year and when the auditor has provided their opinion, the financial statements and opinion can be viewed and downloaded from our [financial statements](#) webpage. The unaudited Annual Accounts are also published every year and are available for inspection prior to audit on our [Public Notices](#) webpage.

Elections

Elections for membership of the Board are held every 3 years, so if you're not happy with our performance you have the opportunity to do something about it, either by exercising your vote as a drainage ratepayer or standing for election yourself. For more information please visit our [Elections](#) webpage.

History

The Board and its predecessors have been very successful in reducing flood risk, with a pedigree of over 500 years in the business. So successful in fact, that many people living and working in the area know nothing of the Internal Drainage Board and the vital work that we do to help prevent flooding and facilitate land use. Our success is inevitably measured by what does not happen rather than what does happen, which means that if flooding does not occur frequently then the value of what we do is sometimes questioned. But it is precisely because we continually maintain, improve and watch over the drainage system that we are actually able to reduce the risk of flooding. For more information please visit our [history](#) webpage.

Feedback

To help us better serve you, please let us know how we're doing by completing a [Customer Feedback Form](#). It is recognised that we don't always get it right first time, so if you need to [complain](#) please give us a call. If this does not resolve your complaint, please complete our [Complaint Form](#) and send it to us by email to info@wlma.org.uk. Alternatively you can print it out, complete the form and return it to our central office, the address of which is shown on the [Home page](#).



Links

In addition to the [WMA web links](#) you may also find the sites on our [Links](#) page useful.

Contact us

You can contact us during office hours either at the central office in King's Lynn or at our district office in Holbeach. Contact details for the central office appear on the group's [Home page](#) or the [Contact us page](#). Out of hours contact details are shown on our own [Contact](#) webpage.

Public Notices

Generally, all notices that we're legally obliged to advertise are published on our [Public Notices](#) webpage. Project updates and other news can be accessed from our [Facebook page](#).



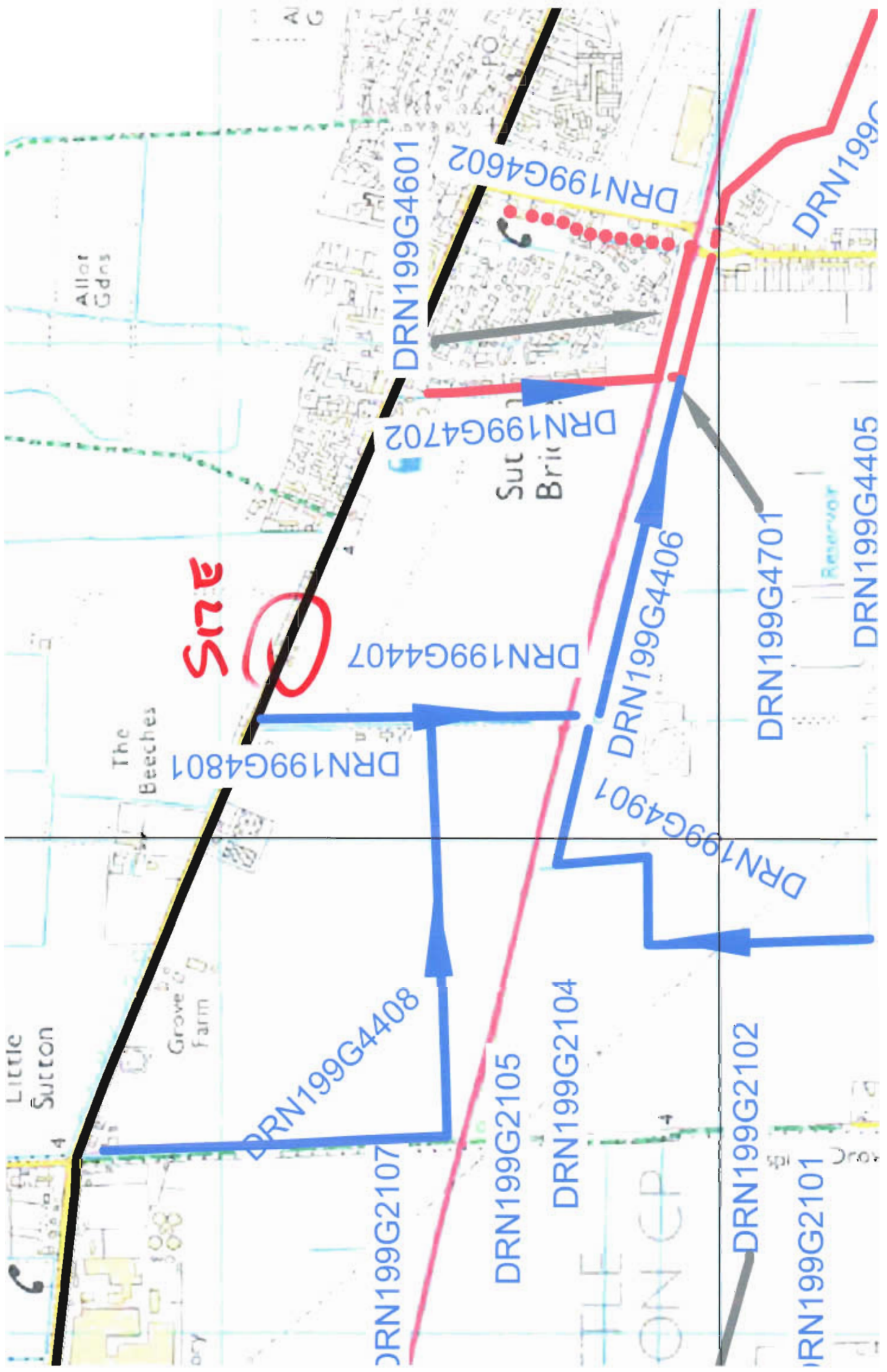
Contact details

During office hours
(between 9.30 am and 5.30 pm)
Tel: +44(0)1553 819600
Fax: +44(0)1553 819639
Email: info@wlma.org.uk

Central Office: Kettlewell House, Austin Fields
Industrial Estate, King's Lynn, Norfolk. [PE30 1PH](#)

Out of hours

Please contact the Duty Officer on +44(0)7881 581521 or send an email to dutyofficer@wlma.org.uk. Otherwise if you know who you need to contact in an emergency, please refer to the Member Board's 'Contact us' webpage on this site for their out of hours contact details.



APPENDIX 4

**A REPORT ON A GROUND INVESTIGATION AT
BRIDGE ROAD, SUTTON BRIDGE**

PREPARED FOR	ESP Limited
DATE OF ISSUE	2 October 2018
REPORT REFERENCE	MJB/18.003

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NR10 5QL

Tel: 01603 755452
Mob: 07887761849
Email: Info@microgeo.co.uk

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1. INTRODUCTION
2. BRE365 TEST METHOD
3. SITE WORK

APPENDICIES

APPENDIX A: REFERENCES

APPENDIX B: TRIAL PIT AND SOAKAGE TEST RECORDS

APPENDIX C: DRAWINGS

1. INTRODUCTION

This report is the summary of a ground investigation that was undertaken at 259 Bridge Road, Sutton Bridge. At the instruction of ESP Limited, an investigation was carried out to provide information regarding drainage characteristics, whilst giving an overall assessment of the shallow soil strata.

This report can be used to aid the drainage design of the proposed development.

2. BRE365 TEST METHOD

The test is performed by excavating a trial hole to a depth agreed by the client. The soils recovered from the trial hole are then sampled and logged by an engineer in general accordance with BS 5930:2015. Groundwater ingress and sidewall stability is monitored throughout whilst continuously assessing safety of practise.

Upon completion of the trial hole, 20 mm gravel is used to fill the relevant test section to keep the trial pit walls stable, avoiding any risk of collapse during the testing period. The trial hole is then backfilled with arisings to surface around a monitoring pipe and a greater diameter pipe used for filling with water. The test section is then filled with water and the water level monitored using dataloggers that measure head pressure. Testing is repeated three times before removing all pipes and reinstating to satisfactory standard.

3. SITE WORK

Micro Geotechnical Limited visited the site on 27 and 28 September 2018 to undertake two machine excavated trial pits with subsequent soakaway testing.

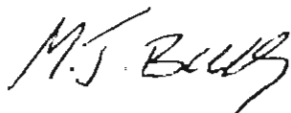
Soils recovered from each excavation were logged in general accordance with BS EN 1997-2:2007 Eurocode 7 and its UK National Annex supported by BS 5930:2015.

Locations of the trial pits were agreed by the client prior to the investigation and are shown on drawing 18.003/draw2. Each location was scanned by a cable avoidance tool (CAT) to locate any potential buried services. Any services detected were noted and positions relocated as necessary.

The trial pits, referenced TP01 and TP02 were machine excavated by a Volvo EC 25 using a 0.3 m wide toothed bucket and were taken to depths of 2.0 m and 1.5 m respectively. No groundwater was encountered during excavation.

TP01 and TP02 drained successfully within 24 hours and an infiltration rate is given for each test. The trial pit logs and infiltration rates are appended to this report.

Matthew Balls
Managing Director
Micro Geotechnical Limited



APPENDIX A: REFERENCES

BRITISH STANDARD INSTITUTION. 2015. BS 5930:2015 code of practice for ground investigations. British Standards Institution, London.

BUILDING RESEARCH ESTABLISHMENT. 2016. BRE Digest 365: Soakaway design. Building Research Establishment, London.

APPENDIX B: TRIAL PIT RECORDS AND INFILTRATION DATA

D = Disturbed sample

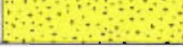
B = Bulk sample

All measurements displayed on the log are presented in metres unless otherwise stated. Soils are described in general accordance with BS 5930:2015.

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Site/Job number: 259 Bridge Road, Sutton Bridge/18.003
 Client: ESP Limited
 Trial Pit Number: TP01
 Date of Excavation: 27/09/2018
 Excavation Method: Machine excavated pit (Volvo EC25)
 Trial Pit Dimensions: L 1.8 m x w 0.3 m x D 2.0 m
 Logged By: MJB

Soil Depth (m)	Geotechnical Soil Description	Legend	Sample	Depth (m)
0.30	MADE GROUND (Shingle and membrane over dark brown slightly clayey slightly silty fine to coarse sand)		D1 0 - 0.3	0.00 0.20
1.90	Light brown slightly clayey slightly silty fine to coarse SAND with rare roots and rootlets		D2 0.3 - 1.9	0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80
2.00	Light brown and grey slightly silty fine to coarse SAND		D3 1.9 - 2.0	2.00

Description

1. CAT4+ scanner used to sweep location prior to excavation.
2. Trial pit excavated to 2.0 m successfully without sidewall collapse.
3. No groundwater encountered.
4. Pit backfilled with gravel to 1.0 m and then arisings to surface.
5. Soakage test performed between 1.0 m and 2.0 m.

Photo:



Location: 259 Bridge Road, Sutton Bridge Project Number: 18.003
Client: ESP Limited Date: 2 Oct 2018

Time	Depth to
0	1.00
1	1.04
2	1.07
3	1.10
4	1.13
5	1.17
10	1.20
15	1.26
20	1.32
25	1.36
30	1.41
35	1.44
40	1.48
45	1.51
50	1.54
55	1.57
60	1.60
65	1.62
70	1.66
75	1.68
80	1.70
85	1.72
90	1.75
95	1.76
100	1.80

Infiltration Test (1)

Depth of Test Hole (m)	Width of Test Hole (m)	Length of Test Hole (m)	Effective storage Depth (m)	Time at 75% (Min)	Time at 25% (Min)
<u>2</u>	<u>0.3</u>	<u>1.8</u>	<u>1.00</u>	<u>15</u>	<u>95</u>
Hole has granular fill? ☒			Porosity of Granular Fill <u>30%</u>		
Test 1 - Soil Infiltration Rate:					<u>6.39E-06</u>

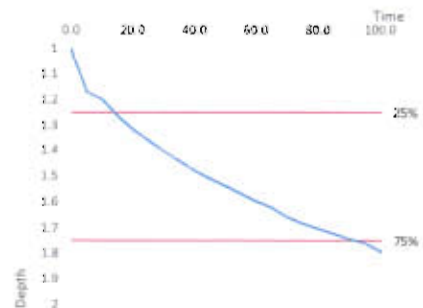
Test Pit ID: TP01

$V_{0.75-25}$	<u>0.081 m3</u>
a_{150}	<u>2.64 m2</u>
$t_{0.75-25}$	<u>80.0 min</u>

Strata: Slightly clayey slightly silty SAND over slightly silty SAND

Remarks: 1. Soakage test performed between 1.0 m and 2.0 m. 2. No groundwater encountered. 3. Level logger serial number 11528070. 4. Test 1 and 2 undertaken on 27/09/18 and test 3 undertaken on 28/09/18.

Groundwater Encountered? No



Location:

259 Bridge Road, Sutton Bridge

Project Number:

18.003

Client:

ESP Limited

Date:

2 Oct 2018

Time	Depth to
0	1.00
1	1.02
2	1.04
3	1.05
4	1.07
5	1.08
10	1.14
15	1.19
20	1.24
25	1.28
30	1.32
35	1.35
40	1.38
45	1.42
50	1.45
55	1.47
60	1.50
65	1.53
70	1.55
75	1.57
80	1.60
85	1.62
90	1.64
95	1.66
100	1.68
105	1.70
110	1.72
115	1.74
120	1.76
125	1.77
130	1.79
133.5	1.80

Infiltration Test (2)

Depth of Test Hole (m)	Width of Test Hole (m)	Length of Test Hole (m)	Effective storage Depth (m)	Time at 75% (Min)	Time at 25% (Min)
2	0.3	1.8	1.00	25	120
Hole has granular fill? ☒			Test 1 - Soil Infiltration Rate:		
Porosity of Granular Fill			5.38E-06		
30%					

Test Pit ID:

TP01

Strata:

Slightly clayey *slightly silty* SAND over slightly silty SAND

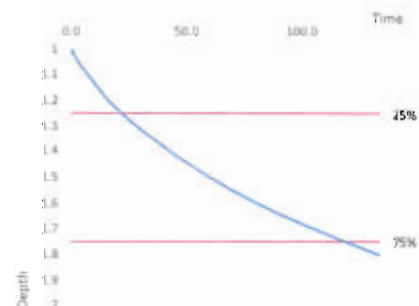
Remarks:

1. Soakage test performed between 1.0 m and 2.0 m. 2. No groundwater encountered. 3. Level logger serial number 11626070. 4. Test 1 and 2 undertaken on 27/09/18 and test 3 undertaken on 28/09/18.

Groundwater Encountered?

No

V_{p75-25}	0.081 m ³
a_{150}	2.64 m ²
t_{p75-25}	95.0 min



Location: 259 Bridge Road, Sutton Bridge Project Number: 18.003
Client: ESP Limited Date: 2 Oct 2018

Time	Depth to
0	1.00
1	1.01
2	1.02
3	1.04
4	1.05
5	1.06
10	1.12
15	1.17
20	1.21
25	1.25
30	1.28
35	1.32
40	1.35
45	1.37
50	1.40
55	1.44
60	1.46
65	1.48
70	1.50
75	1.53
80	1.55
85	1.57
90	1.59
95	1.62
100	1.64
105	1.65
110	1.67
115	1.69
125	1.72
135	1.75
145	1.79
151.833	1.81

Infiltration Test (3)

Depth of Test Hole (m)	Width of Test Hole (m)	Length of Test Hole (m)	Effective storage Depth (m)	Time at 75% (Min)	Time at 25% (Min)
2	0.3	1.8	1.00	30	145
Hole has granular fill? ☒			Porosity of Granular Fill		
			30%		
Test 1 - Soil Infiltration Rate:					4.45E-06

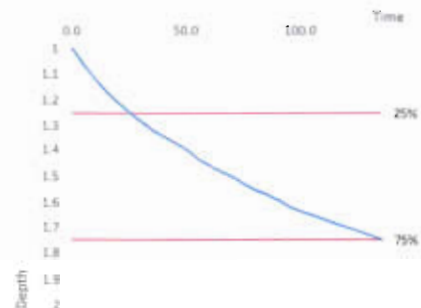
Test Pit ID: TP01

V_{75-25}	0.081 m3
A_{50}	2.64 m2
t_{75-25}	115.0 min

Strata: Slightly clayey slightly silty SAND over slightly silty SAND

Remarks: 1. Soakage test performed between 1.0 m and 2.0 m. 2. No groundwater encountered. 3. Level logger serial number 11928070. 4. Test 1 and 2 undertaken on 27/09/18 and test 3 undertaken on 28/09/18.

Groundwater Encountered? No

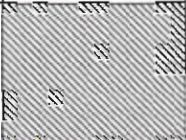


Test 1 - Soil Infiltration Rate:	6.39E-06
Test 2 - Soil Infiltration Rate:	5.38E-06
Test 3 - Soil Infiltration Rate:	4.45E-06

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Site/Job Number: 259 Bridge Road, Sutton Bridge/18.003
 Client: ESP Limited
 Trial Pit Number: TP02
 Date of Excavation: 27/09/2018
 Excavation Method: Machine excavated pit (Volvo EC25)
 Trial Pit Dimensions: L 1.8 m x w 0.3 m x D 2.0 m
 Logged By: MJB

Soil Depth (m)	Geotechnical Soil Description	Legend	Sample	Depth (m)
0.30	MADE GROUND (Shingle and geotextile over dark brown slightly silty gravelly fine to coarse sand. Gravel is subangular to subrounded fine to coarse flint)		D1 0 - 0.3	0.00
1.40	Light brown slightly clayey slightly silty fine to coarse SAND		D2 0.3 - 1.4	0.20
1.50	Soft to firm light mottled brown slightly silty sandy CLAY		D3 1.4 - 1.5	0.40
				0.60
				0.80
				1.00
				1.20
				1.40
				1.60
				1.80
				2.00

Description

1. CAT4+ scanner used to sweep location prior to excavation.
2. Trial pit excavated to 1.5 m successfully without sidewall collapse.
3. No groundwater encountered.
4. Pit backfilled with gravel to 0.5 m and then arisings to surface.
5. Soakage test performed between 0.5 m and 1.5 m.

Photo:



Location:

259 Bridge Road, Sutton Bridge

Project Number:

18.003

Client:

ESP Limited

Date:

2 Oct 2018

Time	Depth to
0	0.50
1	0.51
2	0.53
3	0.54
4	0.55
5	0.56
10	0.62
15	0.67
20	0.71
25	0.75
30	0.79
35	0.83
40	0.86
45	0.89
50	0.92
55	0.95
60	0.97
65	1.00
70	1.02
75	1.04
80	1.06
85	1.08
95	1.12
105	1.16
115	1.19
125	1.21
135	1.24
145	1.27
155	1.29
160	1.30

Infiltration Test (1)

Depth of Test Hole (m)	Width of Test Hole (m)	Length of Test Hole (m)	Effective storage Depth (m)	Time at 75% (Min)	Time at 25% (Min)
1.5	0.3	1.8	0.50	25	145
Hole has granular fill? ☐			Porosity of Granular Fill		
			30%		
Test 1 - Soil Infiltration Rate:					4.26E-06

Test Pit ID:

TP02

Strata:

Slightly clayey slightly silty SAND over slightly silty sandy CLAY

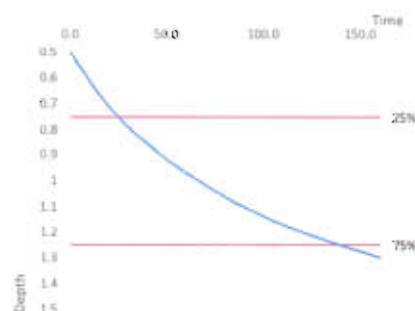
Remarks:

1. Soakage test performed between 0.5 m and 1.5 m. 2. No groundwater encountered. 3. Level logger serial number 21828030. 4. Test 1 undertaken on 27/08/18 and tests 2 and 3 undertaken on 28/08/18.

Groundwater Encountered?

No

V_{25-75}	0.081 m ³
q_{150}	2.64 m ²
t_{25-75}	120.0 min



Location:

259 Bridge Road, Sutton Bridge

Project Number:

18.003

Client:

ESP Limited

Date:

2 Oct 2018

Time	Depth to
0	0.50
1	0.51
2	0.51
3	0.52
4	0.53
5	0.54
10	0.59
15	0.63
20	0.67
25	0.71
30	0.75
35	0.78
40	0.82
45	0.85
50	0.88
55	0.91
60	0.94
65	0.96
70	0.99
75	1.01
80	1.03
85	1.05
95	1.09
105	1.13
115	1.16
125	1.20
135	1.23
145	1.25
155	1.28
164.333	1.30

Infiltration Test (2)

Depth of Test Hole (m)	Width of Test Hole (m)	Length of Test Hole (m)	Effective storage Depth (m)	Time at 75% (Min)	Time at 25% (Min)
1.5	0.3	1.8	0.50	35	145
Hole has granular fill? ☒			Porosity of Granular Fill		
			30%		
Test 1 - Soil Infiltration Rate:					4.65E-06

Test Pit ID:

TP02

Strata:

Slightly clayey/slightly silty SAND over slightly silty sandy CLAY

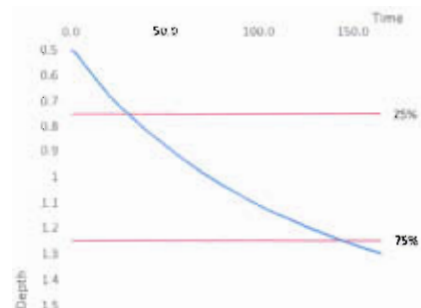
Remarks:

1. Soakage test performed between 0.5 m and 1.5 m. 2. No groundwater encountered. 3. Level logger serial number 11928030. 4. Test 1 undertaken on 27/09/18 and tests 2 and 3 undertaken on 28/09/18.

Groundwater Encountered?

No

V_{e75-25}	0.081 m3
a_{150}	2.64 m2
t_{e75-25}	110.0 min



Location:
259 Bridge Road, Sutton Bridge

Project Number:
18.003

Client:
ESP Limited

Date:
2 Oct 2018

Time	Depth to
0	0.50
1	0.51
2	0.51
3	0.52
4	0.53
5	0.54
10	0.58
15	0.61
20	0.65
25	0.68
30	0.71
35	0.75
40	0.78
45	0.81
50	0.84
55	0.86
60	0.89
65	0.92
70	0.94
75	0.96
80	0.99
85	1.01
95	1.05
105	1.09
115	1.12
125	1.15
135	1.18
145	1.21
155	1.24
165	1.26
175	1.28
184.833	1.30

Infiltration Test (3)

Depth of Test Hole (m)	Width of Test Hole (m)	Length of Test Hole (m)	Effective storage Depth (m)	Time at 75% (Min)	Time at 25% (Min)
1.5	0.3	1.8	0.50	40	165
Hole has granular fill? ☒			Porosity of Granular Fill		
			30%		
Test 1 - Soil Infiltration Rate:					4.09E-06

Test Pit ID:

TP02

Strata:

Slightly clayey slightly silty SAND over slightly silty sandy CLAY

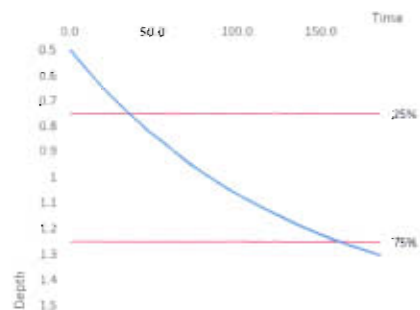
Remarks:

1. Soakage test performed between 0.3 m and 1.5 m. 2. No groundwater encountered. 3. Level logger serial number 12928010. 4. Test 1 undertaken on 27/09/18 and tests 2 and 3 undertaken on 28/09/18.

Groundwater Encountered?

No

$V_{e(75-25)}$	0.081 m ³
$a_{(75-25)}$	2.64 m ²
$t_{(75-25)}$	125.0 min

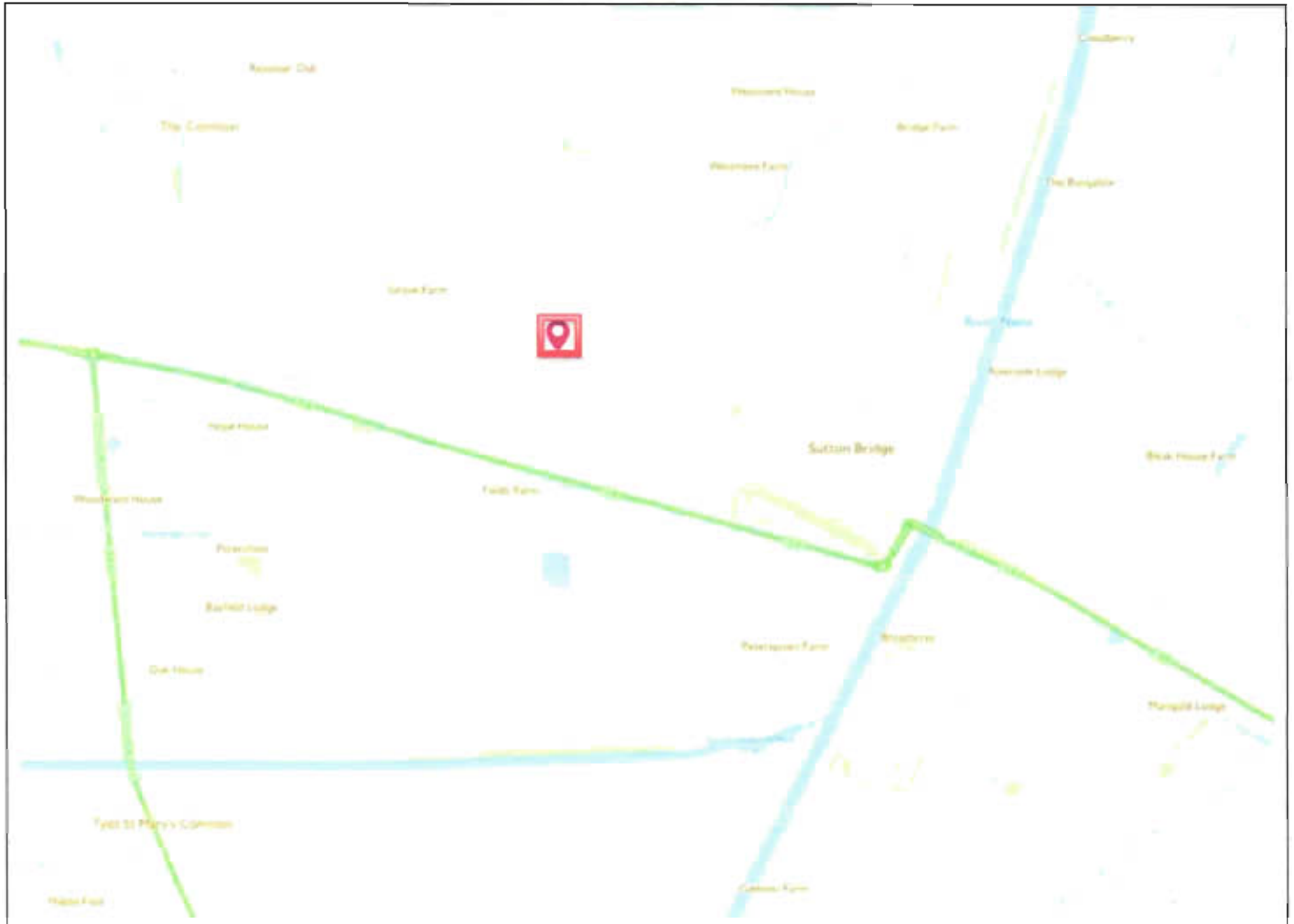


Test 1 - Soil Infiltration Rate:	4.26E-06
Test 2 - Soil Infiltration Rate:	4.65E-06
Test 3 - Soil Infiltration Rate:	4.09E-06

APPENDIX C: DRAWINGS

Site location plan	18.003/draw1
Trial pit location plan	18.003/draw2

Site location plan

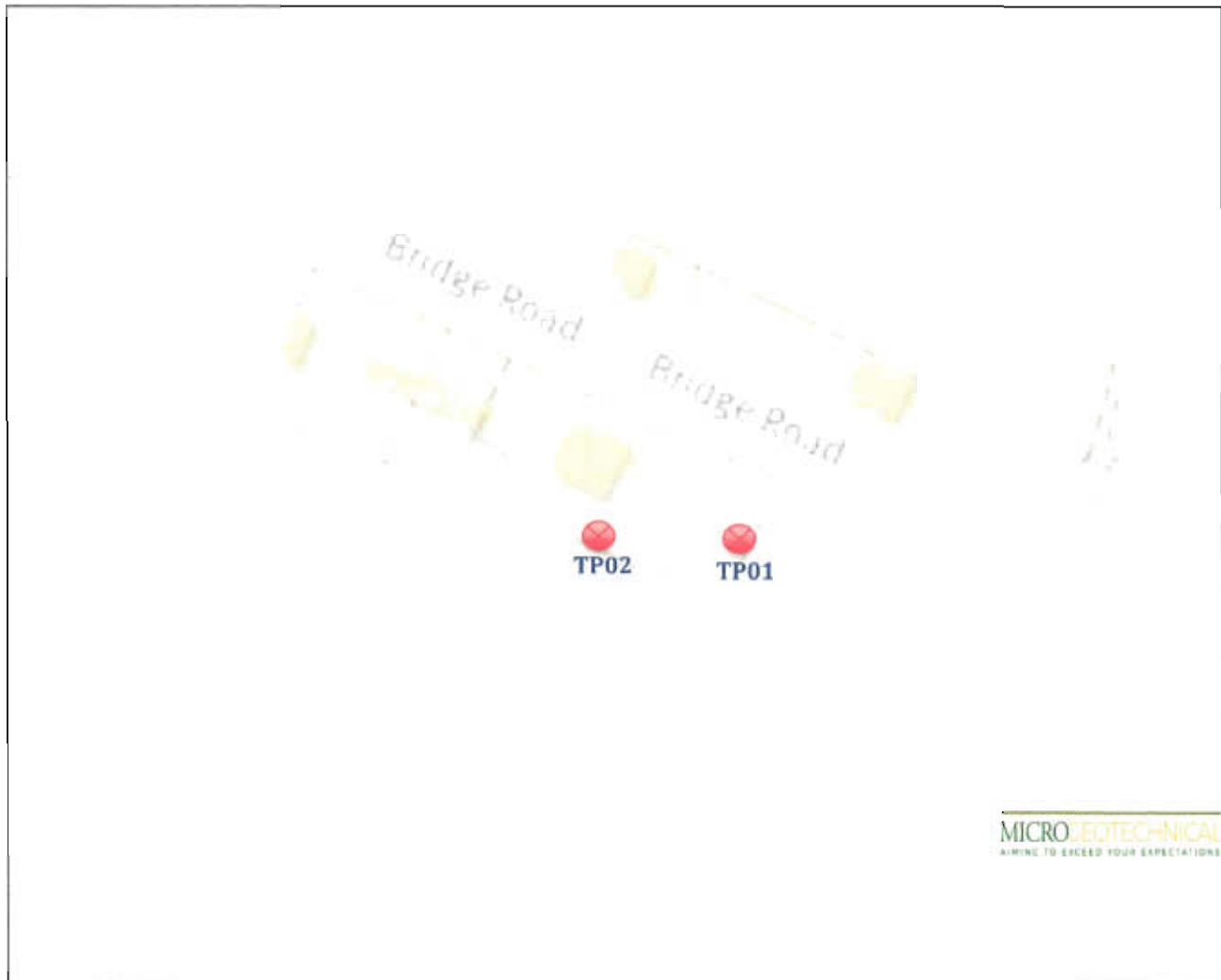


Job number: 18.003
Job name: 259 Bridge Road, Sutton Bridge
Client: ESP Limited
Drawing ref: 18.003/draw1



Approximate site location

Hole location plan



Job number: 18.003
Job name: 259 Bridge Road, Sutton Bridge
Client: ESP Limited
Drawing ref: 18.003/draw2

 Approximate trial pit location

Ben Hornigold

From: Matthew Balls [info@microgeo.co.uk]
Sent: 02 October 2018 22:02
To: Ben Hornigold
Subject: 18.003 259 Bridge Road, Sutton Bridge
Attachments: 18.003 Bridge Road, Sutton Bridge FACT.pdf; DSCF0169.JPG; DSCF0170.JPG

For the attention of Ben Hornigold,

Please find attached the report for the ground investigation at the above site, complete with photos of reinstatement. A second email will follow with photos that summarise the work carried out as requested.

This secure attachment allows the client to distribute the report as necessary.

If you have any problems interpreting this report or have any questions, please do not hesitate to call us on 01603 755452 or simply reply to this email.

Kind Regards,

Matthew Balls
Geotechnical Technician



2018. 9. 28. 15:59

NO PARKING

NO PARKING

NO PARKING

2018 9 28 16:55

WAVIN Stormwater Management

AquaCell Soakaway designed in accordance with CIRIA 156

Project & Site Details

Project Number	S16847	Produced by	Harry Wrobel
Client	Ben Hornigold	Checked by	
Site Name	259 Bridge Road, Sutton Bridge		
Location	PE12 9SL	Date	08/11/2018

Drainage Details

Area	48 m ²	Climate Change	40 %
Catchment Type	Roof	Effective Area	61 m ²
Area Reduction Factor	0.9	Additional Inflow	0.00 l/s

Discharge Parameters

Infiltration Rate	4.45E-06	Soil Type	
Factor of Safety	2	Source	
Effective Infiltration Rate	2.23E-06		
Additional Outflow*	0.00 l/s	Depth to Groundwater (m)	

*flat rate from pump only

Rainfall Data

R value					0.4		Storm Return Period			1 in 100 years	
M5-60					19		Country			England and Wales	
Time	Z1 Value	y mm	Z2 Value	p mm	Value i	a	b	Storage Height	Time To Half -Empty		
5min	0.38	7.22	1.84	13.28	0.16	-92.29	0.012	0.094	5.04		
10min	0.52	9.88	1.89	18.67	0.11	-64.65	0.012	0.131	6.81		
15min	0.63	11.97	1.91	22.86	0.09	-52.64	0.012	0.160	8.10		
30min	0.80	15.20	1.99	30.25	0.06	-34.59	0.012	0.210	10.16		
1hr	1.00	19.00	1.99	37.81	0.04	-21.36	0.012	0.259	12.00		
2hr	1.19	22.61	2.03	45.90	0.02	-12.69	0.012	0.305	13.64		
4hr	1.44	27.36	2.01	54.99	0.01	-7.33	0.012	0.348	15.04		
6hr	1.59	30.21	1.97	59.51	0.01	-5.09	0.012	0.359	15.37		
10hr	1.81	34.39	1.97	67.75	0.01	-3.26	0.012	0.374	15.82		
24hr	2.35	44.65	1.89	84.39	0.00	-1.36	0.012	0.344	14.91		
48hr	2.69	51.11	1.81	92.51	0.00	-0.43	0.012	0.191	9.40		

Soakaway Parameters

Length	2.0 m	Width	4.5 m
Depth	0.4 m	Void	95 %

Results

Critical storm duration (hrs)	10hr	
Required Storage Height (m)	0.374	PASS
Half Time Empty (hrs)	15.82	PASS

AquaCell Modular Units

No. Units Long	2	No. Units Wide	9
No. Units Deep	1		
Total Number of Units	18	Unit Type	



CONNECT TO BETTER

Septic Tanks and Package Sewage Treatment Plants

$$V_p \text{ (s/mm)} = \frac{\text{Time to drop from 75\% to 25\% divided by 50\% pit height}}{}$$

$$\begin{aligned} \text{Time to drop from 75\% to 25\%} &= 6900 \text{ Seconds} \\ 50\% \text{ of pit height:} &= 500 \text{ mm} \end{aligned}$$

$$V_p = \frac{6900}{500} = 13.8 \text{ secs/mm}$$

The answer gives the average time in seconds (V_p) required for the water to drop 1mm
Drainage field disposal should only be used when percolation tests indicate average values of V_p of between 12 and 100

A_t - Floor area (m^2)

p - number of persons served by the tank

V_p - is the percolation value (secs/mm)

Number of persons (p): 3
Percolation Value (V_p): 13.8

$A_t = p \times V_p \times 0.25$ for Septic Tanks
 $A_t = p \times V_p \times 0.20$ for Sewage Treatment Plants

$$A_t = 8.28 \text{ m}^2$$

Info

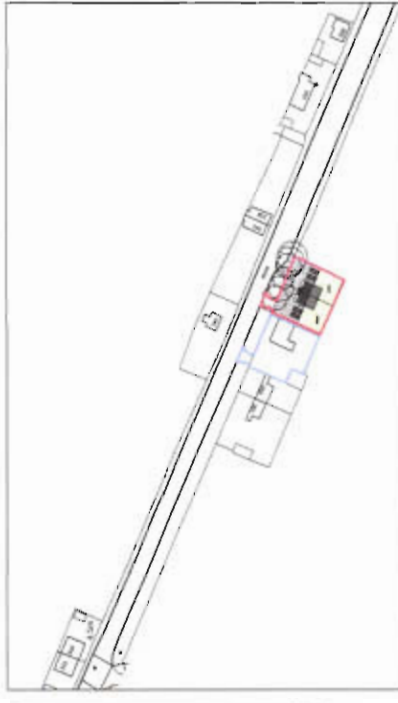
110/100mm Pipe

Pipes should be laid at a minimum depth of 500mm

Drainage trenches should be from 300mm to 900mm wide, with areas of undisturbed ground 2m wide being maintained between parallel trenches.

0.25

APPENDIX 5



Location Plan 1:1250



Proposed Site Plan 1:500



Debrisflow Jury Associates
800.446.8211 FAX 714.961.2888 97912 90111 91793

Department and of Health, infectious Diseases

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Journal of Internal Medicine 247: 391–397

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1000-0000

PLUG

Price: \$19.95

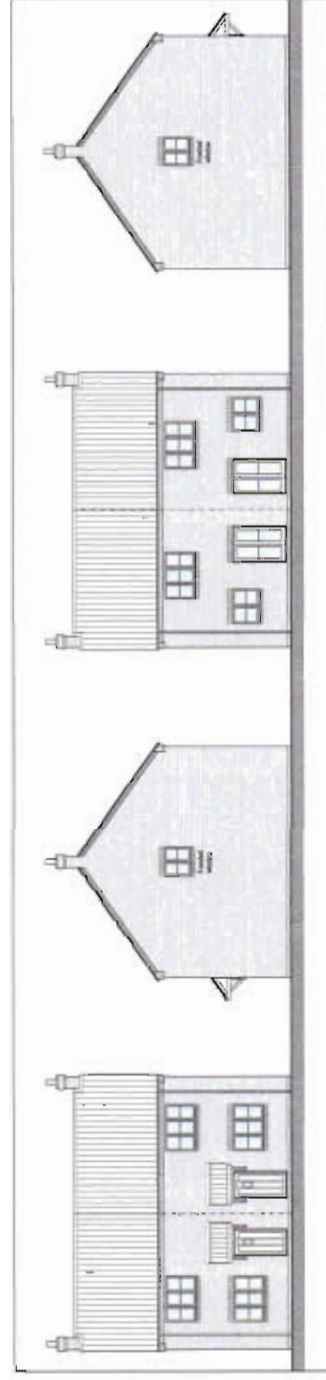
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Journal of Internal Medicine 247: 115-121

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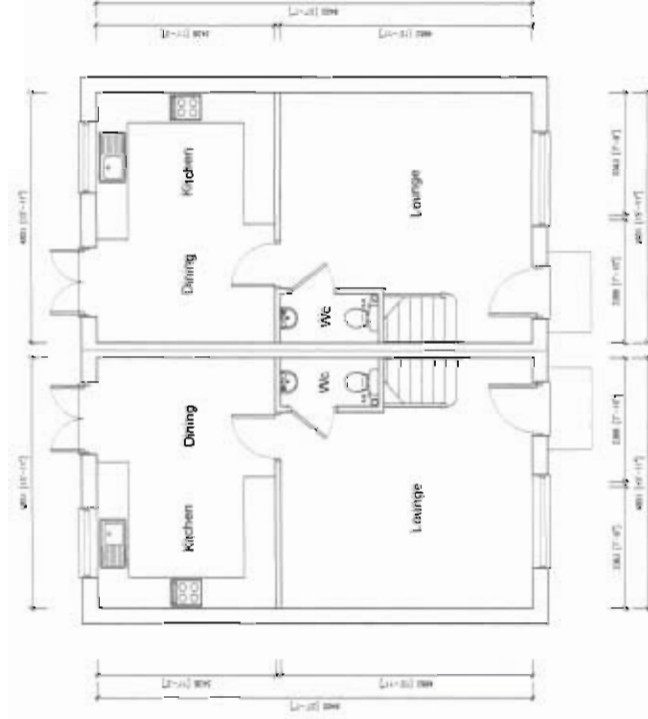
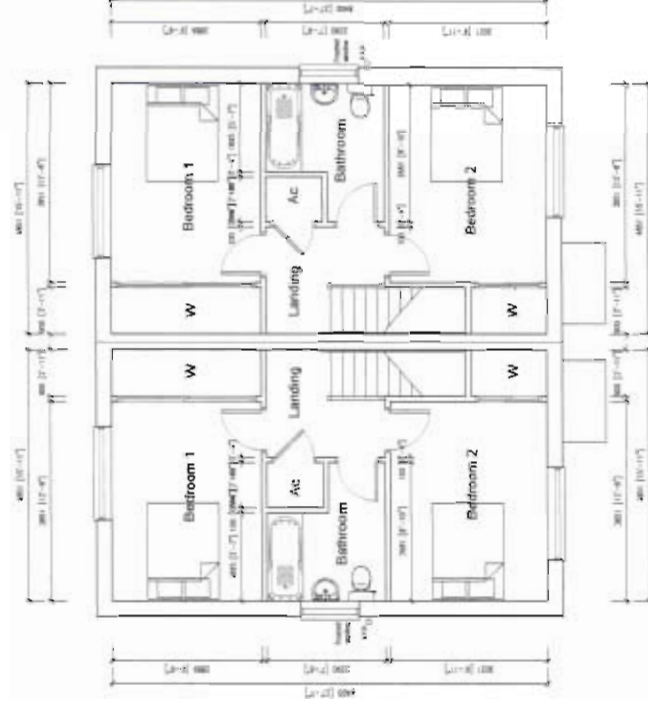


Proposed Front Elevation 1:100

Proposed Side Elevation 1:100

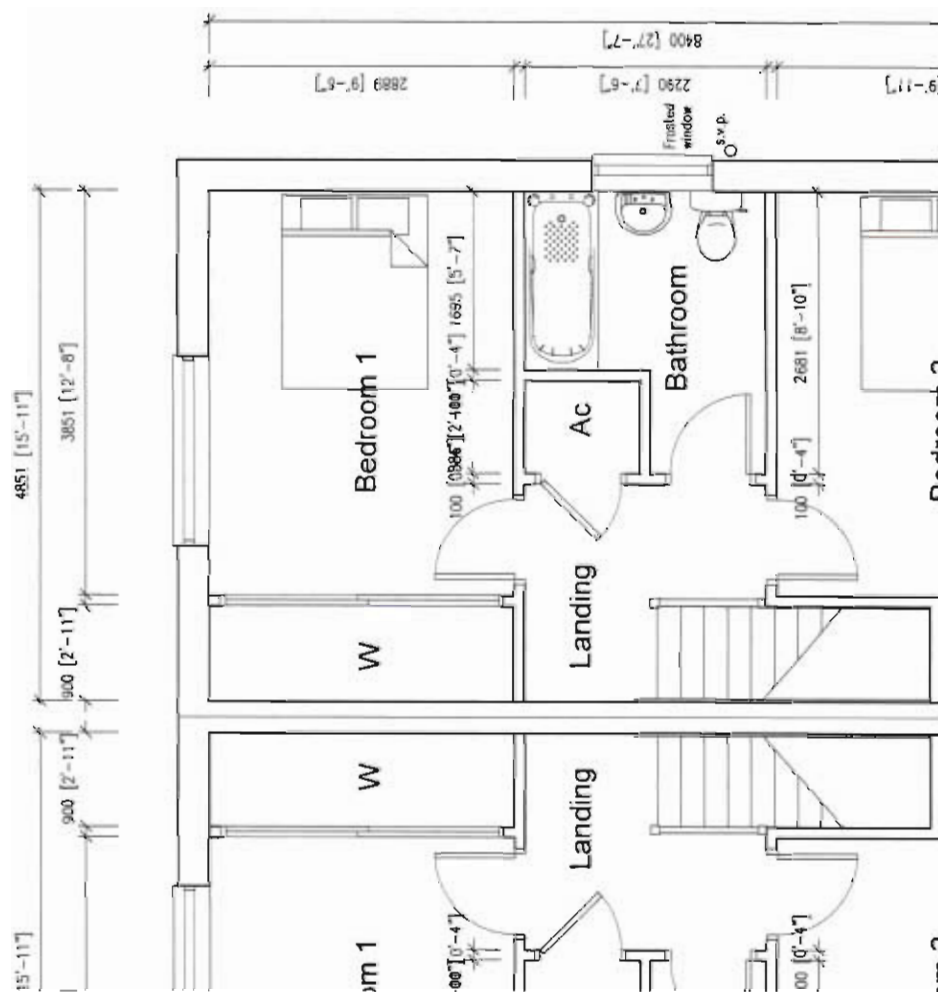
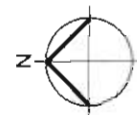
Proposed Rear Elevation 1:100

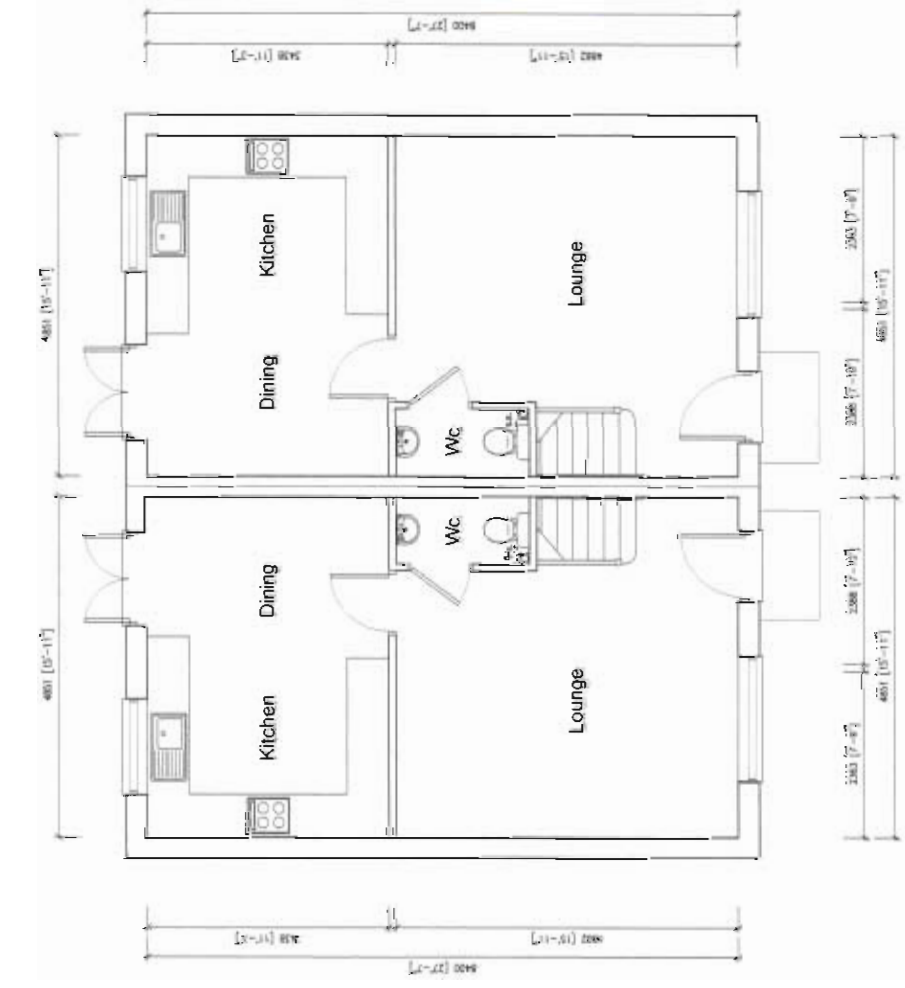
Proposed Side Elevation 1:100



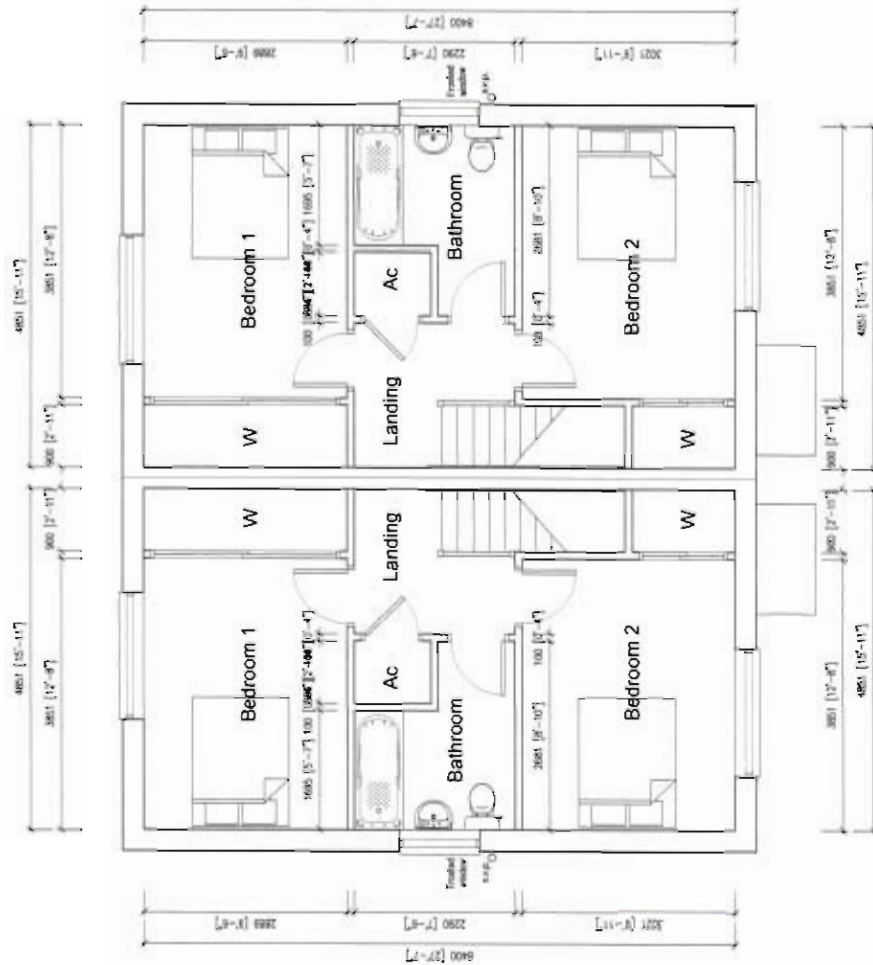
Proposed Ground Floor Elevation 1:50

Proposed First Floor Elevation 1:50



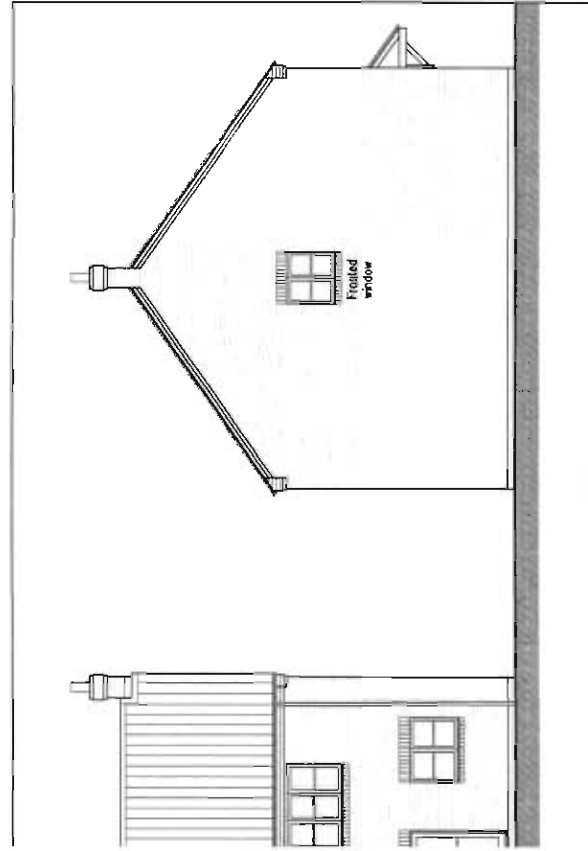


Proposed Ground Floor Elevation 1:50

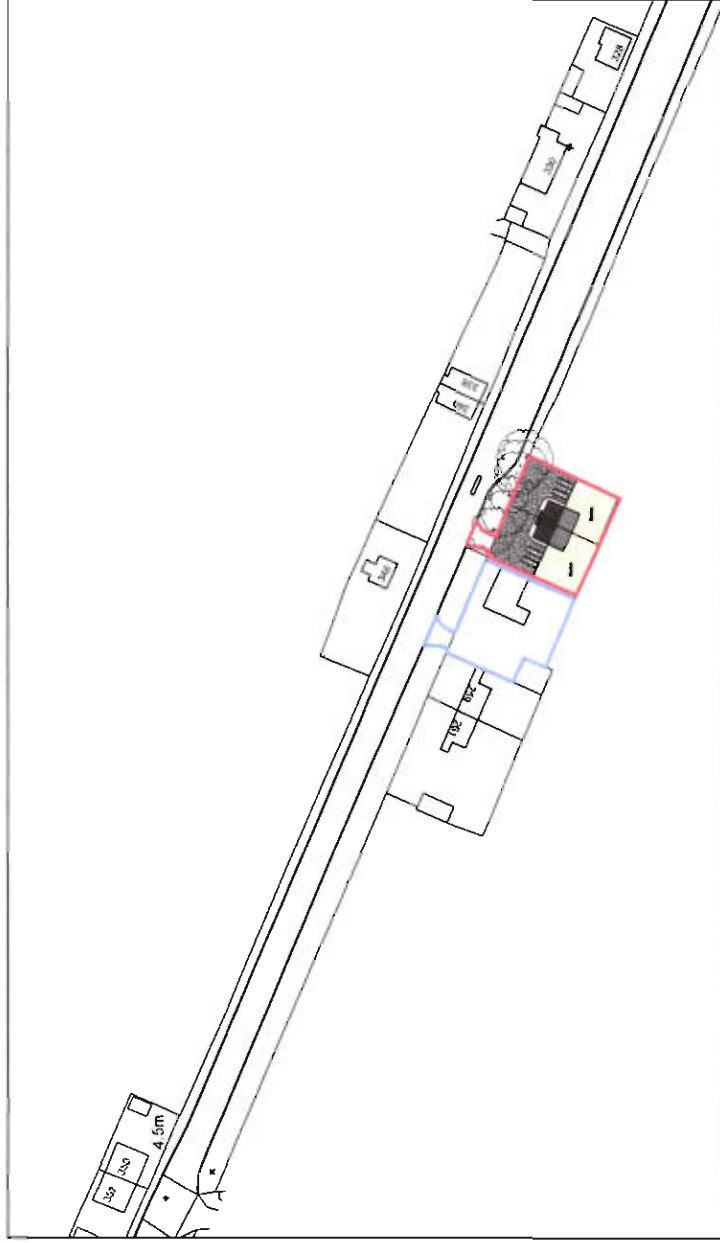


Proposed First Floor Elevation 1:50

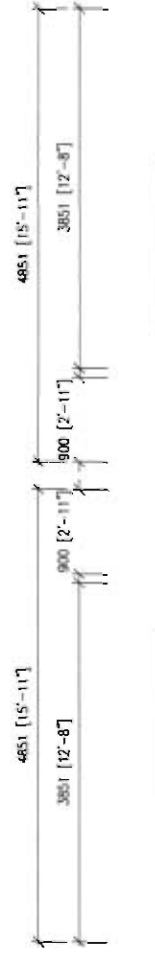
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Proposed Side Elevation 1:100



Location Plan 1:1250



Google Maps



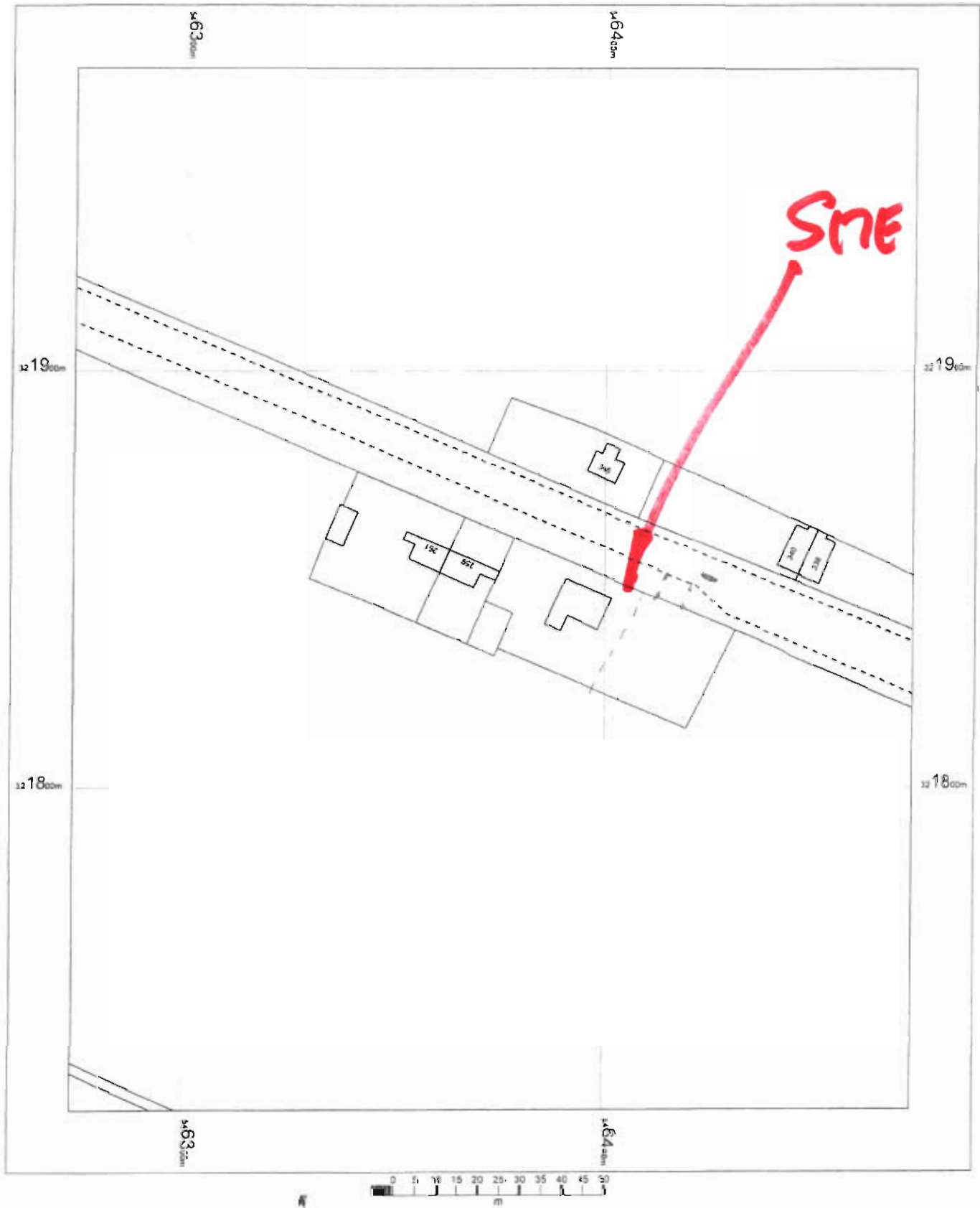
Imagery ©2018 DigitalGlobe, Getmapping plc, Infoterra Ltd & Bluesky, Map data ©2018 Google 200 m

SNE

Google Maps



Map data ©2018 Google 10 m



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£1600 Howland

OS MasterMap 1250/2500/10000 scale
02 March 2016, ID: M4P-00507247
Bookmark: The Crescent, Spalding
1:1250 scale print at A4, Centre: 56373 E, 321847 N
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APPENDIX 6

1



SOUTH

EAST
BOUNDARY

N
↑



aus

NNE

3



SITE

AN

↑ NW



SNE

Size

↑ W



9415

MS 1



NE

FIELD EAST OF
EAST BOUNDARY

7

East

Field South of
South Boundary

APPENDIX 7

South East Lincolnshire Strategic Flood Risk Assessment March 2017



South East Lincolnshire
Joint Strategic Planning Committee

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1.1. Introduction

- 1.1.1 The South East Lincolnshire Joint Planning Unit (SELJPU) area lies to the west and south-west of the Wash estuary. The low-lying nature of the area makes it vulnerable to flooding from both rivers and the sea. The main watercourses, such as the River Witham, River Welland, River Nene and connected drainage channels have tidal influences. The area is protected from flooding by an extensive network of raised engineered defences, which provide varying standards of defence. Climate change, particularly associated with the predicted effects on sea level rise, brings an increased likelihood of flooding that could be a danger to life affecting whole settlements. Such an extreme consequence would come about as a result of the highest tides (predicted to be common in 100 years time) coupled with storm surge conditions causing major breaches in coastal/tidal defences. Even a minor flood event has the potential to inundate valuable farmland with saline water and impact productivity for many years.
- 1.1.2 The Environment Agency's Flood Map shows that almost the whole of the Borough of Boston and a large part of the South Holland District are at a high probability of flooding. Approx 85% of Boston lies within the floodplain (84% in Flood Zone 3 'high probability', 1% in Flood Zone 2 'medium probability') resulting in 26,503 residential and 1,212 commercial properties being at risk. Approximately 74% of South Holland lies within the floodplain (68% in Flood Zone 3, 6% in Flood Zone 2) resulting in 29,922 residential and 1,296 commercial properties being at risk.

1.2. National Planning Requirements

- 1.2.1 Government guidance, contained in the [National Planning Policy Framework](#) (NPPF) and the [National Planning Practice Guidance](#) (NPPG) advises that a Strategic Flood Risk Assessment (SFRA) should be 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 land use changes and development in the area will have on flood risk.

1.3. South East Lincolnshire SFRA

- 1.3.1 This report contains the SFRA carried out by the South East Lincolnshire Joint Planning Unit (SELJPU). It is accompanied by mapping which shows the variation in flood risk for land within the SELJPU area.
- 1.3.2 The assessment has been undertaken to ensure there is consistent evidence base against which the SELJPU can inform its Local Plan and Development Management decisions.
- 1.3.3 The previous Boston Borough Council SFRA was completed in October 2010. South Holland District Council's SFRA was completed in January 2010.
- 1.3.4 This report supersedes these existing documents and provides the latest and best available information on flood risk.
- 1.3.5 The report contains information to cover the two levels of assessment recommended by the National Planning Practice Guidance (NPPG), i.e. Level 1 and Level 2 assessments.
- 1.3.6 The Level 1 assessment is present in the form of the Environment Agency's Flood Map, Flood Map for Surface Water and Reservoir Flood Map. These maps identify the potential extent of flooding from tidal, fluvial, surface water and reservoirs (further detail on these maps is contained in the relevant sections below).
- 1.3.7 The Level 2 assessment is present in the form of hazard mapping, which classifies flood risk as Low Hazard and Danger to Some/Most/All based upon the modelling of factors including

the potential depths of flooding, the velocity of flood flows and the presence of water borne debris.

- 1.3.8 The hazard mapping covers the whole of the Boston Borough Council area (please note that the component maps for the hazard in Boston, i.e. depth and velocity, are only available for those areas where tidal risk is dominant). In the South Holland area, the hazard map covers Spalding, Pinchbeck, Surfleet, Crowland and Sutton Bridge.
- 1.3.9 Development in areas beyond the Level 2 SFRA boundaries (and the fluvially dominant areas of Boston) and within a Flood Zone will need to undertake their own assessment, relative to the scale and nature of the proposed development, to inform appropriate mitigation consistent with the appended Standing Advice.
- 1.3.10 This document has been prepared in consultation with the Environment Agency, and Lincolnshire County Council in its role as Lead Local Flood Authority. It brings together information from these organisations, as well as the Internal Drainage Boards.
- 1.3.11 The Local Authorities and the Environment Agency have agreed a framework of flood risk mitigation requirements for development proposals according to different levels of risk (standing advice - see section 10 below). This sets a level of safety over the lifetime of the development where development in areas at risk is deemed appropriate and necessary to meet local need. The Local Authorities will use the relevant parts of the standing advice to ensure a consistent approach to flood mitigation is applied and to ensure development in high hazard areas is made safe as required by the NPPF. The standing advice also gives a clear indication of where mitigation will need to be incorporated into development proposals, which will enable developers to design in these elements and include in any viability appraisal from the outset.

1.4. Guidance on using this SFRA

- 1.4.1 The information within this SFRA is being used to refine information on river and sea flooding shown on the Environment Agency's [Flood Map for Planning](#). The information is being used by the SELJPU to:
 - Determine the variations in risk from all sources of flooding;
 - Inform the Sustainability Appraisal of the Local Plan so that flood risk can be fully taken into account when considering allocation options and in the preparation of plan policies;
 - Apply the Sequential Test, and where necessary, the Exception Test when determining land use allocations;
 - Assist with site-specific flood risk assessments;
 - Determine the acceptability of flood risk in relation to emergency planning capability; and
 - Consider opportunities to reduce flood risk to existing communities and development through better management of surface water, provision for conveyance and of storage of flood water.
- 1.4.2 The SFRA is divided into sections, which contain a variety of information such as flood maps, guidance and advice. Please note that this SFRA does not seek to duplicate advice and guidance already contained in other planning documents. Therefore, it should be read in conjunction with government guidance on flood risk, currently contained in the [NPPF](#) and the [NPPG](#).

2. Flood Map for Planning (Rivers and Sea)

- 2.1.1 The Environment Agency's [Flood Map for Planning](#) shows areas across England that could be affected by flooding from rivers or the sea in the current day. It also shows flood

defences and the areas that benefit from them. The Flood Map is available online from the Environment Agency's web site, and it has been designed to raise awareness among the public, local authorities and other organisations of the likelihood of flooding. It aims to encourage people living and working in areas prone to flooding to find out more and take appropriate action.

- 2.1.2 The Flood Map shows the extent of Flood Zones, areas also known as flood plains, which could be affected by flooding from rivers and the sea.
- 2.1.3 These Flood Zones are defined in the Government's NPPG. They ignore the presence of existing flood defences, since defences can be 'overtopped' if a flood occurs which is higher than the defences are designed to withstand. Defences can even fail in extreme events.
- 2.1.4 Flood Zone 1 shows areas with the lowest probability of flooding from rivers and the sea, where the chance of flooding in any one year is less than 0.1% (i.e. 1 in 1000).
- 2.1.5 Flood Zone 2 shows the area between Zone 1 and Zone 3. This represents an area with the chance of flooding in any one year between 0.1% and 1% fluvial or 0.5% tidal (i.e. between a 1 in 1000 and either a 1 in 100 fluvial or a 1 in 200 tidal chance). The outer edge of this zone is referred to as the 'Extreme Flood Outline' (EFO).
- 2.1.6 Flood Zone 3 shows areas with the highest probability of flooding. The chance of flooding in any one year is greater than or equal to 1% (i.e. a 1 in 100 chance) for river flooding and greater or equal to 0.5% (i.e. a 1 in 200 chance) for coastal and tidal flooding.
- 2.1.7 The Environment Agency Flood Map should be used by Local Planning Authorities to inform planning decisions, and the Flood Zones are the starting point for applying the Sequential Test. For further information, please refer to Chapter 8 of this SFRA.
- 2.1.8 Flood Zones are also used to identify when a developer needs to carry out a Flood Risk Assessment.
- 2.1.9 A Flood Risk Assessment or Flood Risk Statement may also be required for development at risk of flooding from local sources of flooding. This is discussed in further detail in Section 5 on Local Sources of Flooding.

3. Fluvial and Tidal Hazard Mapping

- 3.1.1 This SFRA contains hazard mapping for the parts of the South East Lincolnshire study area, which incorporates both Fluvial and Tidal flood events for Boston, Spalding, Sutton Bridge, Pinchbeck, Crowland and Surfleet (see Appendix A).
- 3.1.2 The hazard mapping includes modelled flooding consequences resulting from both overtopping and breaching of flood defences.
- 3.1.3 The failure (or breaching) of flood defences is likely to cause rapid inundation of areas behind flood defences as flow in the river channel or from the sea discharges through the breach. A breach can happen with little or no warning, although they are much more likely to occur when there are extreme tides or river levels and the stresses on flood defences are highest. Flood water flowing through a breach will normally discharge at a high velocity, rapidly filling up the areas behind the defences, resulting in significant damage to buildings and a high risk of loss of life.
- 3.1.4 The crest (height) of the defences used in all modelling scenarios was based on present defence heights. Each breach was simulated individually. The width of the breach was dependent on the type and location of the defence.
- 3.1.5 The probability of a breach event is extremely difficult to determine, although overtopping will promote breaching. The modelling therefore only assesses the consequence of breaches; the assessment of the probability of a breach occurring is not required. Also, national planning guidance requires those proposing development in flood risk areas to ensure development and its future users are safe from the harmful effects of flooding therefore

appropriate mitigation against potential impacts will be required (i.e. the consequences of defence failure).

- 3.1.6 Overtopping of flood defences occurs when water levels exceed the height of the defence. The worst case occurs when the fluvial or tidal levels are above the defence level as this can lead to rapid inundation and prolonged flooding. Less severe overtopping can occur when flood levels are below defence levels, but wave action causes wave overtopping. Flood defences are commonly designed with a degree of freeboard to provide protection against overtopping from some waves.
- 3.1.7 Two scenarios were modelled: the 1 in 200 (0.5%) and 1 in 1000 (0.1%). This was undertaken for the 'present' day (2006 baseline) and 2115 (the year to which the final Defra sea level allowances related and allows for a lifetime of development).
- 3.1.8 The definition of flood hazard used in this hazard mapping follows the definition used by Defra and the Environment Agency which is translated in 'Flood Risk Assessment Guidance for New Development Phase 2, R&D Technical Report FD2320/TR2'. The classification is split into four categories, defined by the depth and velocity of flood waters and the related ability of people to evacuate the area once a flood occurs. Please refer to the table below for further information on flood hazard.

Table 13.1 Danger to people for different combinations of depth and velocity

Velocity (m/s)	Depth of flooding (m)											
	0.05	0.10	0.20	0.30	0.40	0.50	0.60	0.80	1.00	1.50	2.00	2.50
0.00												
0.10												
0.25												
0.50												
1.00												
1.50												
2.00												
2.50												
3.00												
3.50												
4.00												
4.50												
5.00												

Key:

- Danger for some
- Danger for most
- Danger for all

(Source Table 13.1 of FD2320/TR2)

- 3.1.9 In addition to the areas of danger, there is also an area classified as low hazard (shown in green) on the hazard mapping. This area represents the outer extent of where flood water would reach during the breach or overtopping scenario, but should not pose a hazard to people. This represents the white boxes shown above in Table 13.1, where depths could be between 0.05m and 0.3m.

4. Fluvial and Tidal Depth Mapping

- 4.1.1 The hazard mapping shows the consequences should a breach or overtopping of existing defences occur. The results show the likely flood depths, velocities and overall hazard to a proposed site.
- 4.1.2 In particular, where hazard mapping indicates a proposed site will be inundated, the minimum finished floor levels of any development should be informed by the flood depth

maps arising from the applicable scenario (see Section 11 - Climate Change Allowances for Planning).

- 4.1.3 The Environment Agency and the Local Planning Authorities have agreed standing advice that applies to planning applications within the area covered by the Level 2 SFRA. This standing advice outlines how the flood depth maps (where available - see paragraph 1.3.8 above) should be used to inform adequate flood risk mitigation measures, along with further information on the correct scenarios to consider for each development type.
- 4.1.4 Please see Chapter 9 of this SFRA for further guidance on the Exception Test and flood risk mitigation requirements.
- 4.1.5 The Depth Maps can be found in Appendix B.

5. Local Sources of Flooding

5.1. General

- 5.1.1 The Environment Agency is responsible for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea.
- 5.1.2 Lead Local Flood Authorities are responsible for managing the risk of flooding from local sources: surface water, groundwater and ordinary watercourses. Local sources of flooding are considered in more detail in this Section.
- 5.1.3 Internal Drainage Boards are responsible for managing the risk of flooding within their Drainage Districts.

5.2. Surface Water Flooding

- 5.2.1 The NPPF requires that the risk from all sources of flooding is considered and that priority is given to the use of sustainable drainage systems. The NPPG advises that SFRAs should identify areas at risk from surface water flooding and drainage issues taking account of the surface water flood risk map published by the Environment Agency and any other available evidence, such as local flood risk management strategies. It should also identify the types of measures which may be appropriate to manage them, taking account of location, site opportunities, constraints and geology. Lead Local Flood Authorities provide expert advice to planning authorities on the management of surface water for planning.
- 5.2.2 The Environment Agency's [Flood Maps for Surface Water](#) give an indication of the broad areas likely to be at risk of surface water flooding. However, THEY ARE NOT SUITABLE FOR IDENTIFYING WHETHER AN INDIVIDUAL PROPERTY WILL FLOOD.
- 5.2.3 This is because the modelling only gives an indication of broad areas at risk, and because the Environment Agency does not hold information on floor levels, construction characteristics or designs of properties. It would need this and other detailed information to be able to say whether flooding of certain depth would enter into an individual property and cause damage.
- 5.2.4 These maps may be suitable for identifying where properties are in areas at risk of flooding for locations where surface water flooding is strongly influenced by topography.
- 5.2.5 In 2010 the Flood and Water Management Act defined 'surface runoff'.
- 5.2.6 Generally, the type of flooding shown by the Flood Map for Surface Water fits with the definition in the Act and shows:
 - The flooding that takes place from the 'surface runoff' generated by rainwater (including snow and other precipitation) which:
 - (a) is on the surface of the ground (whether or not it is moving), and
 - (b) has not yet entered a watercourse, drainage system or public sewer.

- 5.2.7 The Flood Map for Surface Water will pick out natural drainage channels, rivers, low areas in floodplains, and flow paths between buildings, but it will only indicate flooding caused by local rainfall.
- 5.2.8 It does not show flooding that occurs from overflowing watercourses, drainage systems or public sewers caused by catchment-wide rainfall events or river flow.
- 5.2.9 The Flood Map for Surface Water shows areas where surface water would be expected to flow or pond. There are four categories of risk:
- High - the chance of flooding in any year is greater than 3.3% (1 in 30);
 - Medium - the chance of flooding in any year is 3.3% (1 in 30) or less but greater than 1% (1 in 100);
 - Low - the chance of flooding each year is 1% (1 in 100) or less but greater than 0.1% (1 in 1000);
 - Very low - the chance of flooding each year is 0.1% (1 in 1000) or less.
- However, users must note that this is the chance of this rainfall, and not of the resulting flood extent occurring. Consequently, it only provides a general indication of areas which may be more likely to suffer from surface water flooding in these rainfall probabilities.
- 5.2.10 The Flood Map for Surface Water shows predictions of flooded areas but does not show whether individual properties will be affected by surface water flooding or have been affected in the past. The Flood Map for Surface Water should not be used to predict if individual properties will flood.
- 5.2.11 Developers are strongly advised to use local knowledge in conjunction with records held by Local Authorities and other partners (for example, of drainage systems and historic surface water flooding records) to assess and understand the suitability of the Flood Map for Surface Water as an indicator for surface water flooding in a proposed development area.
- 5.2.12 The Flood Map for Surface Water is available on the Environment Agency's [website](#)
- 5.2.13 A Flood Risk Assessment or Flood Risk Statement will be required in support of a planning application if a site lies within an area shown to be at risk of flooding on the Flood Map for Surface Water.

5.3. Groundwater Flooding

- 5.3.1 "Groundwater" means all water which is below the surface of the ground and in direct contact with the ground or subsoil. Periods of abnormally high rainfall can result in groundwater flooding of basements and the emergence of groundwater at the ground level, causing damage to property and infrastructure.
- 5.3.2 The British Geological Survey (BGS) have prepared a map showing the degree of susceptibility to groundwater flooding. The BGS should be contacted for more detailed site specific information on susceptibility to groundwater flooding whilst preparing a Flood Risk Assessment or Flood Risk Statement.
- 5.3.3 The Lead Local Flood Authority will need to be consulted on any proposed development in an area at risk of groundwater flooding.

5.4. Flooding from Other Local Sources

- 5.4.1 Flooding may also occur as a result of out of bank flows from ordinary watercourses. The flood risk from ordinary watercourses with a catchment greater than 3km² in Lincolnshire is identified on the Environment Agency's Flood Map for Planning. The flood extents shown on the flood map for planning are indicative only and may not represent the full extent of flooding. A site specific Flood Risk Assessment will therefore be required to assess the flood risk for any potential development site located in Flood Zones 2 or 3 of an ordinary watercourse.

- 5.4.2 In addition to the above requirement, the Lead Local Flood Authority will also require a site specific Flood Risk Assessment to be carried out if the site lies within 10m of an ordinary watercourse.

6. Functional Floodplain

- 6.1.1 The NPPG advises that Flood Zone 3b, Functional Floodplain, should be identified by Local Planning Authorities in Strategic Flood Risk Assessments.
- 6.1.2 Functional Floodplain should not be defined solely on rigid probability parameters. However, it is generally defined as land which would naturally flood with a 5% (1 in 20) chance in any one year or greater, or is designed to flood (such as a flood attenuation scheme).
- 6.1.3 Functional Floodplain is a very important planning tool in making space for flood waters when flooding occurs. The SELJPU's approach is to direct development away from these areas informed by the Environment Agency's flood risk management plans and shoreline management plans and local flood risk management strategies produced by Lincolnshire County Council (the Lead Local Flood Authority).
- 6.1.4 Within South Holland District, the functional floodplain comprises of the designated flood storage areas of the Crowland and Cowbit Washes and the Surfleet Reservoir (please also refer to section 7 below regarding reservoir flooding).
- 6.1.5 There is currently no Functional Floodplain in the Boston Borough.
- 6.1.6 The NPPG advises at [Table 3](#) that only [Water Compatible](#) development is appropriate in the Functional Floodplain.
- 6.1.7 Essential Infrastructure that has to be there and has passed the Exception Test may also be permitted providing it is 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.

7. Reservoir Flooding

- 7.1.1 The NPPG requires those proposing developments to assess the risk from all forms of flooding. The failure of a reservoir is one form of flooding that has the potential to cause catastrophic damage due to the sudden release of large volumes of water. The local planning authority has to evaluate the potential damage to buildings or loss of life in the event of dam failure, compared to other risks, when considering development downstream of a reservoir.
- 7.1.2 There are two flood storage reservoirs within the district of South Holland, namely Surfleet Reservoir, and the Crowland and Cowbit Washes. The latter is designated as a large raised reservoirs under the Reservoirs Act 1975.
- 7.1.3 The Reservoirs Act 1975 applies to all large raised reservoirs in England. Large raised reservoirs are those reservoirs capable of holding 25,000m³ or more of water above natural ground level.
- 7.1.4 The following sections provide some advice on what to consider in the two most common scenarios: development of a new reservoir and development downstream of or adjacent to an existing raised reservoir.

7.2. Development of a new reservoir

- 7.2.1 Anyone proposing the development of a new reservoir that will have an above ground capacity of 25,000m³ or more must consider the potential flood risk downstream of the new reservoir, in the event of dam failure leading to an uncontrolled release of water.

- 7.2.2 Developers will also need to provide the Environment Agency's Reservoir Safety Team with a notice of their intention under Section 21 of the Reservoirs Act, not less than 28 days before work on-site is due to start.
- 7.2.3 Applicants will also need to appoint a qualified civil engineer ('construction engineer') under Section 6 of the Reservoirs Act to design and supervise the construction work. Details of suitably qualified engineers can be found [here](#). It is recommended that developers complete a dam breach analysis and reservoir flood map, although this is not a requirement of the Reservoirs Act.

7.3. Development downstream of or adjacent to an existing reservoir

- 7.3.1 Reservoir flood maps for large raised reservoir can be found [here](#).
- 7.3.2 An assessment of the risk of inundation from the reservoir must be submitted in support of any planning application (this will normally include the need for breach analysis). This should include not only the risks posed to the development but also if the development within the reservoir's flood extent could change its risk designation to high-risk.
- 7.3.3 Given the potential legal and cost implications of development downstream of a 'not high-risk' reservoir, it is also recommended that applicants notify the reservoir owner of the planning application.

7.4. Surfleet Reservoir

- 7.4.1 The Surfleet Reservoir lies immediately upstream of the Surfleet outfall on the River Glen and is classified as Flood Zone 3b Functional Floodplain. This zone comprises land where water has to flow or be stored at times of flood. The reservoir contains approximately 50 properties, which were originally built as holiday chalets and intended for temporary occupancy only. Over the years these chalets changed hands, have been renovated and replaced, often with new owners being unaware of the risks involved. Many are now occupied all year round as permanent dwellings. Historic data records several flooding incidences, most recent events occurring in 1980, 2002, 2009 and January 2013.
- 7.4.2 National planning policy requires local planning authorities to adopt proactive strategies to mitigation and adapt to climate change, taking full account of flood risk. Where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term they should seek opportunities to facilitate the relocation of development, including housing, to more sustainable locations. Due to the increased likelihood of flood events occurring in this area and the need to protect property and life, it is a recommendation of this SFRA that further development in this location is not supported and opportunities to relocate existing properties outside of the functional floodplain are explored.

8. Sequential Test

- 8.1.1 The NPPF requires Local Plans to apply a sequential, risk-based approach to the location of development to avoid where possible flood risk to people and property. The Strategic Flood Risk Assessment provides the basis for applying this test. The general approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. The aim is to keep development out of medium and high flood risk areas (Flood Zones 2 and 3) and areas affected by other sources of flooding where possible.
- 8.1.2 The refined information in this SFRA (i.e. the hazard mapping) incorporates the consideration of climate change and should be used when carrying out a sequential assessment. Some areas that are shown not to be at risk in the undefended scenario (i.e.

the Flood Zones) may be at risk in the defended climate change scenario (i.e. the 2115 hazard mapping).

- 8.1.3 Where no reasonably available sites in Flood Zone 1 exist then Local Planning Authorities should consider the availability of sites in Flood Zone 2. Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3a be considered.
- 8.1.4 However, as mentioned in the Introduction above, the majority of the Boston Borough area and large parts of the South Holland district lie within Flood Zone 3. For this reason, and for the reason outlined in 8.1.2 above, it is therefore necessary to use the refined flood risk information (Hazard and Depth maps) to assist with the application of the Sequential Test.

8.2. Local Plan Sequential Test

- 8.2.1 The South East Lincolnshire Joint Planning Unit has used the mapping outputs contained in this Strategic Flood Risk Assessment to apply the Sequential Test.
- 8.2.2 The sites contained in the Strategic Housing Land Availability Assessment (SHLAA) for each settlement were assessed in terms of their suitability, availability and achievability to accommodate housing. Sites concluded to be developable and deliverable were then ordered in terms of which Flood Zone they were in.
- 8.2.3 As many of the settlements, and therefore potential housing sites, are entirely or largely within Flood Zone 3, it was necessary to then consider which flood hazard category they were in. The Breach Hazard Map for the 2115 scenario was used for this assessment (as the NPPG requires residential development lifetime to be considered for a minimum 100 years).
- 8.2.4 Where there were sites within a settlement in the same hazard category, it was necessary to use the information on flood depth (again in the 2115 breach scenario) to choose the most sequentially preferable. The Flood Zone, hazard and depth categories are recorded in the SHLAA.

8.3. Sequential Test for Planning Applications

- 8.3.1 The NPPF requires those proposing development in a location which is vulnerable to flood risk to present evidence to demonstrate that there are no other locations at a lower risk of flooding that could be suitable to accommodate the proposal. In line with this requirement, the Local Planning Authority will expect planning applications to be supported by evidence to demonstrate that the Sequential Test can be passed. Guidance on the application of the [Sequential Test](#) is available in the NPPF.
- 8.3.2 The NPPF advocates that the Sequential Test should be applied to all forms of development in medium and high risk areas (Flood Zones 2 or 3), other than sites which have been allocated in the Local Plan or for applications for minor development or change of use (except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site).
- 8.3.3 Minor Development is defined as:
- Minor non-residential extensions: Industrial/Commercial/Leisure etc. extensions with a footprint less than 250m² (where subsequent 250m² extensions are proposed a Sequential Test will be required).
 - 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.

- 8.3.4 Subdivision of Dwellings: Although the subdivision of a house into flats is specifically excluded from the definition of minor development, where no significant external alterations are required, it would be viewed as a Change of Use application. Change of Use applications are excluded from the Sequential Test as clarified above. So, the conversion of a barn into a dwelling or the subdivision of a dwelling into two or more dwellings does not require a Sequential Test as long as it does not involve significant external alterations/extensions. Development Management officers will provide specific advice on whether or not a development falls within this category.
- 8.3.5 Replacement dwellings: Where an individual proposes to redevelop their property in an existing flood risk area the consideration of alternative sites is not likely to be a realistic option. In such instances, the Sequential Test should include a statement as to why there is no alternative available to them to develop. This simple statement will satisfy the Sequential Test provided that they:
- 1) Do not increase the number of bedrooms; and
 - 2) Do not increase the number of dwellings in an area of flood risk (i.e. through the replacement of a single dwelling with an apartment block); and
 - 3) Do not significantly increase the floor area of the building (i.e. beyond 40% of the original).
- 8.3.6 In order to carry out a Sequential Test it is necessary to define the geographical area in which a search for alternative sites at a lower risk of flooding will be undertaken. The search area for the test should be the whole of the Council area unless the functional requirements of the development justify a reduced search area. For example, if there is a need for a doctor's surgery to serve a particular catchment area then it may be appropriate to reduce the search area to that catchment. Equally, in some circumstances it may be appropriate to expand the search area beyond the district boundary. For example the location of an oil refinery serving the whole country should be determined on a countrywide basis. The Sequential Test evidence should define the search area and include a summary of the functional requirements of the development in justification of the area chosen. Housing developments will generally need to consider reasonably available alternative sites across the whole of the Council area unless they are intended to meet a specifically identified need e.g. the need for affordable housing in a particular settlement.
- 8.3.7 It is also necessary to identify the sources of reasonably available sites. This can be done through existing evidence basis such as the Local Plan, the SHLAA, the Employment Land Review and the Town Centre and Retail Capacity Study.
- 8.3.8 Reasonably available sites should NOT be discounted on the following grounds:-
- They are not owned by the developer.
 - They are larger than the proposed site (a series of smaller sites accommodating an equivalent quantum may also be considered);
 - They do not offer sustainability benefits equivalent to the proposed site;
 - They have an extant planning permission but development has not begun.
- 8.3.9 For the reasons outline in 8.1.2 and 8.1.4 above, the Flood Map will not provide information that is refined enough to carry out a meaningful Sequential Test due to the extent of Flood Zone 3 in this area. Therefore the hazard map and depth maps should be used (in that order) to refine the information on flood risk to the site and potential alternative sites.
- 8.3.10 Evidence should be presented to clearly show the name and location of the reasonably available site options being compared to the application site, together with the hazard and depth classification of the sites.
- 8.3.11 The evidence should include reasons as to why you may or may not conclude that the site is a reasonable alternative to the application site.
- 8.3.12 On receipt of this evidence it is for the Local Planning Authority, taking advice from the Environment Agency as appropriate, to consider whether or not the Sequential Test is passed.

- 8.3.13 In order to avoid unnecessary expense, it is strongly recommended that applicants discuss the likelihood of their proposal passing the Sequential Test with the Planning Authority's Development Management Team before formulating and submitting their application.

9. Exception Test

- 9.1.1 The Exception Test provides a method of managing flood risk for developments of certain flood risk vulnerability while still allowing necessary development to occur.
- 9.1.2 The Exception Test should be applied only after the Sequential Test has been undertaken and in the circumstances set out in Table 3 of the NPPG, i.e. when 'more vulnerable' development and 'essential infrastructure' cannot be located in Flood Zones 1 and 2 and when 'highly vulnerable' development cannot be located in Flood Zone 1.
- 9.1.3 Essentially, the two parts to the Test require proposed development to show that a) it will provide wider sustainability benefits to the community that outweigh flood risk, and b) that it will be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce flood risk overall.
- 9.1.4 For Part a), consideration of the wider sustainability issues draws on the criteria for assessing the effects of the South East Lincolnshire Local Plan Documents (defined in the Sustainability Appraisal Scoping Report). This document provides the most localised criteria for considering wider sustainability issues within South East Lincolnshire and a useful template for considering each Strategic Site within 'Part a' of the Exception Test.
- 9.1.5 With particular reference to Part b), there are a range of factors to be considered when determining whether or not a development is 'safe'. However, the minimum mitigation measures required for each flood hazard zone can be found in the standing advice matrix at Appendix C.
- 9.1.6 All planning applications for development on windfall sites will need to meet the requirements of the Exception Test where applicable, and this should be demonstrated in a Site Specific Flood Risk Assessment.

10. Mitigation/Standing Advice

- 10.1.1 The Environment Agency and the Local Planning Authorities have produced local flood risk standing advice in the form of a matrix. This document has been prepared to assist in the interpretation of the Strategic Flood Risk Assessment for individual developments, whilst also providing pre-application advice. This matrix forms part of the Strategic Flood Risk Assessment and is contained in Appendix C.
- 10.1.2 Please note that single storey proposals will be expected to incorporate mitigation for the extreme 1 in 1000 (0.1%) scenario.
- 10.1.3 The Environment Agency has also produced basic guidance, aimed at developers and applicants on how to [complete](#) a Flood Risk Assessment.
- 10.1.4 Developers are also advised to refer to the DCLG document ['Improving the flood performance of new buildings: flood resilient construction'](#). This document aims to provide guidance to developers and designers 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. These approaches are appropriate for areas where the probability of flooding is low (e.g. Flood Zone 1) or areas where flood risk management or mitigation measures have been put in place.

11. Climate Change Allowances for Planning

- 11.1.1 The NPPF explains the key role of planning in ensuring new development is resilient to the impacts of climate change. Local Planning Authorities must adopt strategies to mitigate and adapt to climate change, taking full account of flood risk and coastal change. Local Plans need to take account of climate change over the longer term and for residential development this is considered to be a minimum of 100 years, unless there is specific justification for considering a short period.
- 11.1.2 The lifetime of a non-residential development depends on the characteristics of that development. Developers will be expected to justify why they have adopted a given lifetime for the development in their site-specific flood risk assessment. Generally commercial development is considered against 75 years, unless otherwise agreed with the planning authority. The adopted lifetime should be agreed with the relevant Development Management Case Officer.
- 11.1.3 The impact of climate change needs to be taken into account in a realistic way and developers, the Local Planning Authorities and the Environment Agency will need to agree what allowances are acceptable for particular proposals.
- 11.1.4 The Environment Agency has published guidance to assist with assessing the impacts of climate change in site-specific flood risk assessment. The guidance includes recommended contingency allowances for net sea level rise and peak rainfall intensity, peak river flow, offshore wind speed and wave height. Developers are requested to use this [guidance](#) when undertaking a site-specific flood risk assessment.
- 11.1.5 Please note when using this guidance, you will need to refer to the peak river flow allowances for the [Anglian River Basin District](#).

12. Site Specific Flood Risk Assessment

- 12.1.1 The NPPF requires that a site-specific Flood Risk Assessment (FRA) should accompany all planning applications for development proposals of 1 ha or greater in Flood Zone 1 and all proposals for new development located in Flood Zones 2 and 3.
- 12.1.2 The FRA should identify and assess the risks of all forms of flooding to and from the development and should demonstrate how these risks will be managed, taking climate change into account.
- 12.1.3 For major developments in all Flood Zones, the FRA should identify opportunities to reduce the probability and consequences of flooding.
- 12.1.4 A FRA will also be required where the proposals (including change of use to a more vulnerable flood risk vulnerability classification) may be affected by other sources of flooding or where the Environment Agency, Internal Drainage Board or other bodies have indicated there may be drainage problems.
- 12.1.5 Any Site Specific FRA will be expected to incorporate the relevant minimum mitigation measures found in the standing advice matrix.

13. Emergency Planning and Evacuation

13.1. Are flood warning and evacuation plans needed?

- 13.1.1 The National Planning Practice Guidance advises one of the considerations to ensure that any new development is safe, including where there is a residual risk of flooding, is whether adequate flood warnings would be available to people using the development. A flood warning and evacuation plan is a requirement for sites at risk of flooding used for holiday or

short-let caravans and camping and are important at any site that has transient occupants (e.g. hostels and hotels).

13.2. What are the important considerations for flood warning and evacuation plans?

- 13.2.1 The National Planning Practice Guidance advises flood warning and evacuation plans will need to take account of the likely impacts of climate change, e.g. increased water depths and the impact on how people can be evacuated. In consultation with the authority's emergency planning staff, the local planning authority will need to ensure that evacuation plans are suitable through appropriate planning conditions or planning agreements.
- 13.2.2 In advising the local planning authority, the emergency services are unlikely to regard developments that increase the scale of any rescue that might be required as being safe. Even with defences in place, if the probability of inundation is high, safe access and egress should be maintained for the lifetime of the development. The practicality of safe evacuation from an area will depend on:
- the type of flood risk present, and the extent to which advance warning can be given in a flood event;
 - the number of people that would require evacuation from the area potentially at risk;
 - the adequacy of both evacuation routes and identified places that people could be evacuated to (and taking into account the length of time that the evacuation may need to last), and;
 - sufficiently detailed and up to date evacuation plans being in place for the locality that address these and related issues.
- 13.2.3 Lincolnshire County Council has prepared an evacuation plan for East Coast Flooding which includes signed [evacuation routes](#).

13.3. Who should be consulted on emergency planning issues and in relation to reservoirs?

- 13.3.1 There are two flood storage reservoirs within the district of South Holland, namely Surfleet Reservoir, and the Crowland and Cowbit Washes. The latter is designated as large raised reservoirs under the Reservoirs Act 1975.
- 13.3.2 The National Planning Practice Guidance advises local planning authorities to consult with their emergency planning officers as early as possible during the preparation of Local Plans, and also regarding any planning applications which have implications for emergency planning. Where issues affecting emergency services are identified it may be relevant to contact the local resilience forum – multi-agency partnerships made up of representatives from local public services which prepare for local incidents and catastrophic emergencies. Or in some cases, it may be appropriate for the local planning authority to consult the emergency services on specific emergency planning issues related to new developments.
- 13.3.3 Local planning authorities are also advised to consult with the owners/operators of raised reservoirs, to establish constraints upon safe development.

14. Sustainable Drainage

- 14.1.1 Surface water flood risk on site should be managed using sustainable drainage systems such as swales, filter drains, bio retention basins, permeable paving, rain gardens, green roofs, etc. Sustainable drainage systems (SuDS) should be designed to control surface water runoff as close to where it falls as possible and mimic the natural catchment process. The design should aim to reduce runoff by integrating stormwater controls throughout the site in small discrete units rather than using large flow attenuation and flow control structures.

14.1.2 SuDS provide opportunities to:

- reduce surface water run-off;
- encourage natural groundwater recharge;
- reduce pollution;
- enhance amenity and biodiversity.

14.1.3 The National Planning Practice Guidance requires sustainable drainage systems to be provided for all proposed [major development](#), unless demonstrated to be inappropriate, and states that priority must be given to the use of [sustainable drainage systems](#) in areas at risk of flooding. All developments, regardless of scale and constraints, should seek to incorporate sustainable drainage.

14.1.4 Good SuDS design involves:

- managing surface runoff at its source where it is reasonably practicable to do so;
- managing surface runoff on the surface where it is reasonably practicable to do so;
- using public space where it serves more than one property and is reasonably practicable to do so;
- being cost-effective to operate and maintain over the life of the development;
- taking account of the likely impacts of climate change and changes in impermeable area over the design life of the development where it is reasonably practicable to do so.

14.1.5 Generally, the aim should be to discharge surface water runoff as high up the following hierarchy of drainage options as reasonably practicable:

- into the ground (infiltration);
- to a surface water body;
- to a surface water sewer, highway drain, or another drainage system;
- to a combined sewer.

14.1.6 SuDS design is an integrated process and must be considered early in the design process at the master planning stage. The runoff from properties and highways should be integrated and appropriate treatment stages applied. Flows should be managed in sequential sub-catchments (a management train) as close to the source as possible.

14.1.7 The minimum standards for SuDS are set out in the [non-statutory Technical Guidance for Sustainable Drainage Systems](#).

14.1.8 Surface water management schemes should be designed to provide multiple benefits, contributing to the enhanced amenity of developed areas, providing wildlife habitats and opportunities for biodiversity enhancement, as well as providing flood risk management function.

14.1.9 Clear arrangements must be in place for the on-going maintenance and/or adoption of the proposed drainage system for the lifetime of the development. These arrangements must be approved at the planning or reserved matters stage for all major development.

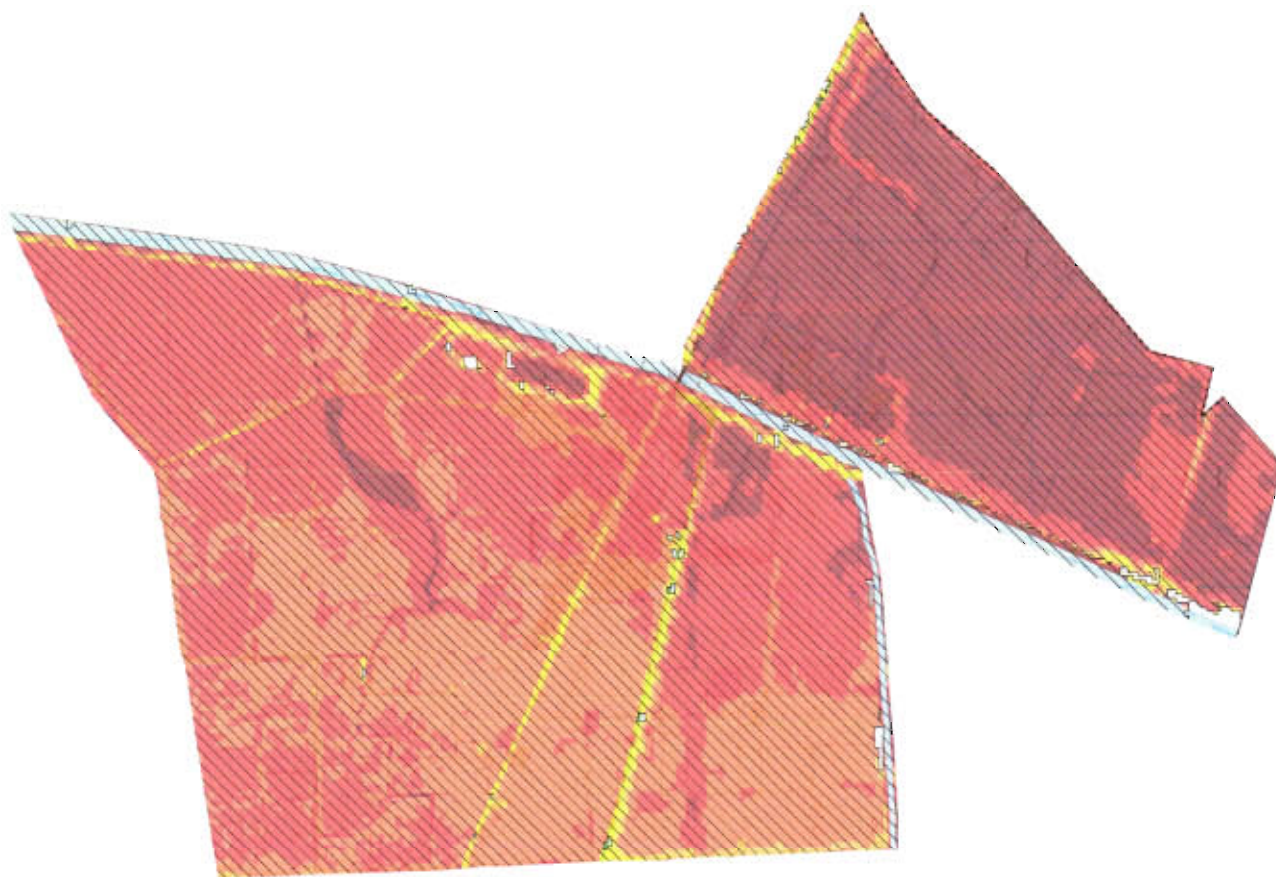
15. Appendices

- Appendix A: Fluvial and Tidal Hazard Mapping
- Appendix B: Fluvial and Tidal Depth Mapping
- Appendix C: Standing Advice

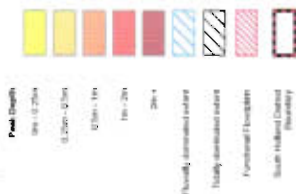


NOTES

- [illegible]



Map Legend



2	Feb 17	Modelling and Mapping Update
1	Dec 16	Modelling and Mapping Update
REV	DATE	REMARKS

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UPDATE OF STRATEGIC
FLOOD RISK ASSESSMENT
Residual Peak Depth
Extent of Fluvial and Tidal Domination
Sutton - Year 2115
1% Fluvial / 0.5% Tidal Event Probability

DATE OF ISSUE	Feb 2017	REV NO: 2
SCALE	MAP NO.	

: 15,000 @ A1



South East Lincolnshire
Local Plan 2011-2036

Publication Version
March 2017

Inset Map No 9

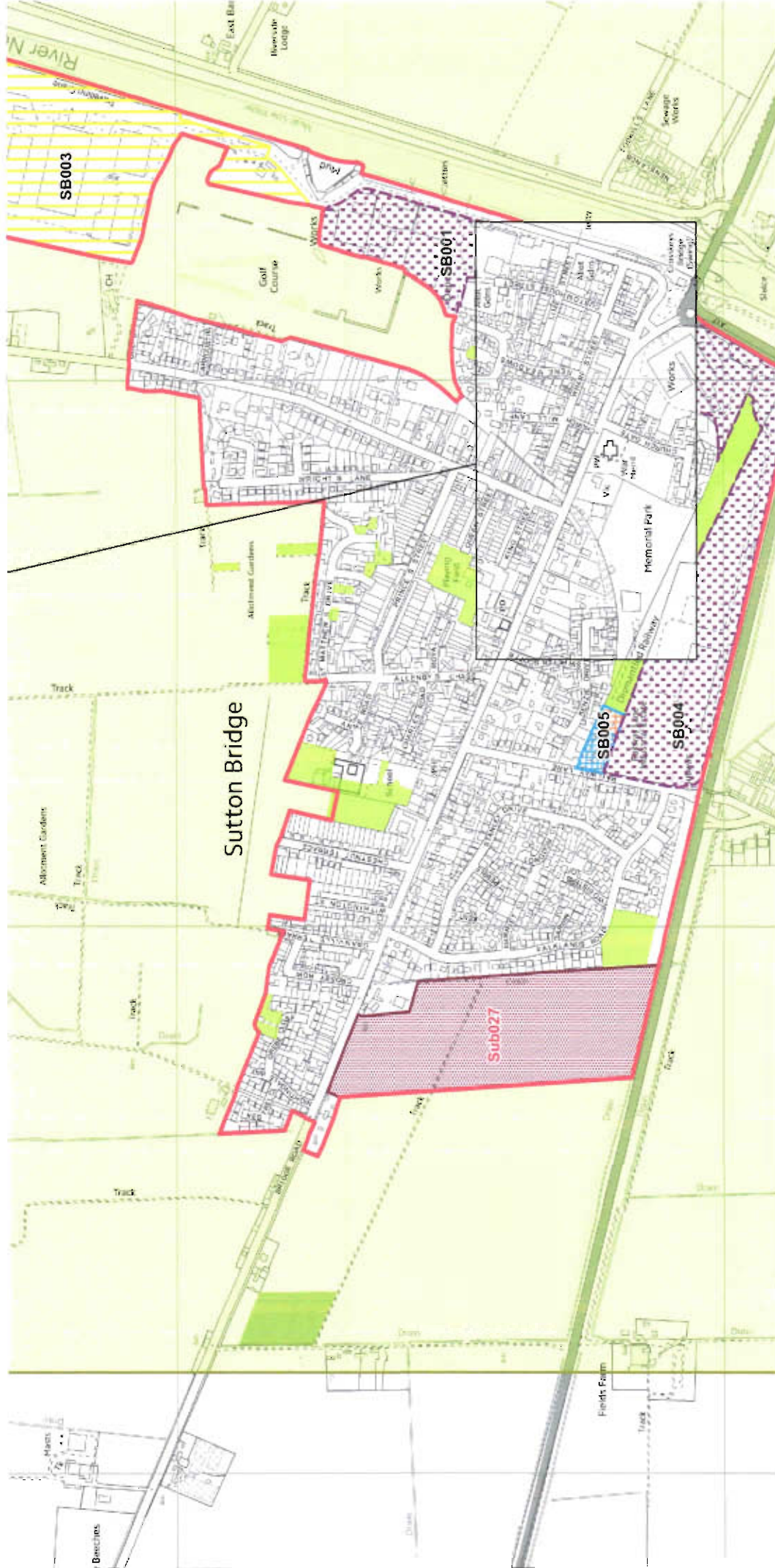
Sutton Bridge

Main Service Centre

Scale 1:10,000 @A2



Inset Map Boundary	Policy 2, 9, 16, 19, 20
Countryside	Policy 2, 16, 19, 20
Settlement Boundary	Policy 21, 22, 23
Town Centre Boundary	Policy 11, 12, 13
Housing Allocation	Policy 8
Existing Main Employment Area	Policy 8
Proposed Main Employment Area	Policy 8
Established Employment Site	Policy 8
Local Employment Site	Policy 8
Proposed Local Employment Site	Policy 8
Existing Restricted Use Site	Policy 8
Proposed Restricted Use Site	Policy 8
Primary Shopping Area	Policy 21, 22, 23
Local Wildlife Site	Policy 24
Recreational Open Space	Policy 28
Green Infrastructure	Policy 28



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13 High Street, Long Sutton, PE12 9DB

01408 477002 local call rate



www.rightmove.co.uk/property/52012650

Plot for sale

Bridge Road. Sutton Bridge.

Guide Price
£295,000



Property Description

Key features

- A Brownfield Site
- Suitable for Residential Development
- Just under two thirds of an acre / 0.27 Ha. (Subject to survey)

Full description

Potential building land. A Brownfield site, suitable for residential development. Just under two thirds of an acre/0.27 ha. (Subject to measured survey)

Outline Planning Permission granted by South Holland District Council on 25/08/05 under reference H18/0879/05. The planning permission has expired. We use cookies to optimise your experience on our website. If you continue we'll assume that you are happy to receive our cookies. However, if you would like to, you can change your cookie settings at any time. [Continue](#)

the Local Planning Authority is also likely to give favourable consideration to a higher density scheme. The vendor will require a vehicular right of way from the new estate road into the retained property edged blue on the location map and for all services to be taken into the retained property.

General Information - The site occupies a good location in this large and expanding village. Sutton Bridge is regarded as a town by South Holland District Council. The site is on a bus route, with bus stops nearby for a regular service to the nearby larger towns of Long Sutton (3 miles), Spalding (16 miles) and Kings Lynn (10 miles). The site is also close to the modern Health Centre, Post Office, Junior School, Pharmacy, Garage and General Store. Sutton Bridge has a range of shops / restaurants etc and a testing 9-hole golf course. There are also plans to construct a marina on the nearby tidal River Nene.

Services - All main services are available in Bridge Road, together with a surface water drain. Prospective buyers must satisfy themselves as to the adequacy of these services and the costs of connection.

Plot 1 (See Indicative Plan Enclosed) - This was to be retained by the vendor. Now that it is included in the disposal there will probably no longer be a requirement for a separate access.

Tenure And Possession - The site is freehold and vacant possession will be granted on completion of the sale. The buyer will be responsible for the demolition and removal of the buildings and hard-standing on the site.

Wayleaves, Easements And Rights Of Way - The property is sold subject to and with the benefit of all rights of way whether public or private, light, support, drainage, water and electricity and all other rights and obligations, easements, quasi easements, quasi rights, licences, privileges and restrictive covenants and all existing and proposed wayleaves for electricity, drainage, water and other pipe whether referred to in these particulars or not.

Useful Contact Details - Electricity: Western Power Distribution. Email: wpdnewsuppliesmids@westernpower.co.uk

Gas: National Grid Gas Distribution, Block 2, Brick Kiln Street, Hinckley, Leics. LE100NA. Tel: 01926656923.

Water and Drainage: Anglian Water. Email: planninglison@anglianwater.co.uk

South Holland Internal Drainage Board: Kettlewell House, Austin Fields Industrial Estate, Kings Lynn, Norfolk, PE30 1PH.

Local Planning Authority: South Holland District Council, Council Offices, Priory Road, Spalding, PE11 2XE. Tel: 01775 761161.

Highways Authority: Lincolnshire County Council, Municipal Buildings, West Street, Boston, PE21 8QR. Tel: 01205 314571.

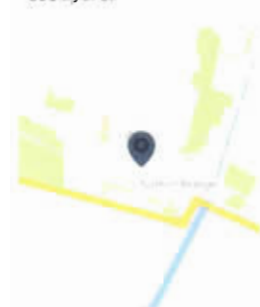
More Information from this agent

To view this media, please visit the on-line version of this page at www.rightmove.co.uk/property-for-sale/property-52012650.html

Listing History

Added on Rightmove:

06 July 2015



Nearest station

Kings Lynn (9.2 mi)

Distances are straight line measurements from centre of postcode

Nearest schools

Use the school checker

To view this property or request more details, contact:



Geoffrey Collings & Co, Long Sutton
13 High Street, Long Sutton, PE12 9DB
01406 477002 local call rate

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Map & Street View



Flood map for planning

BETA This is a new service – your [feedback \(/feedback\)](#) will help us to improve it.

Likelihood of flooding in this area

This location is in an area with a high probability of flooding

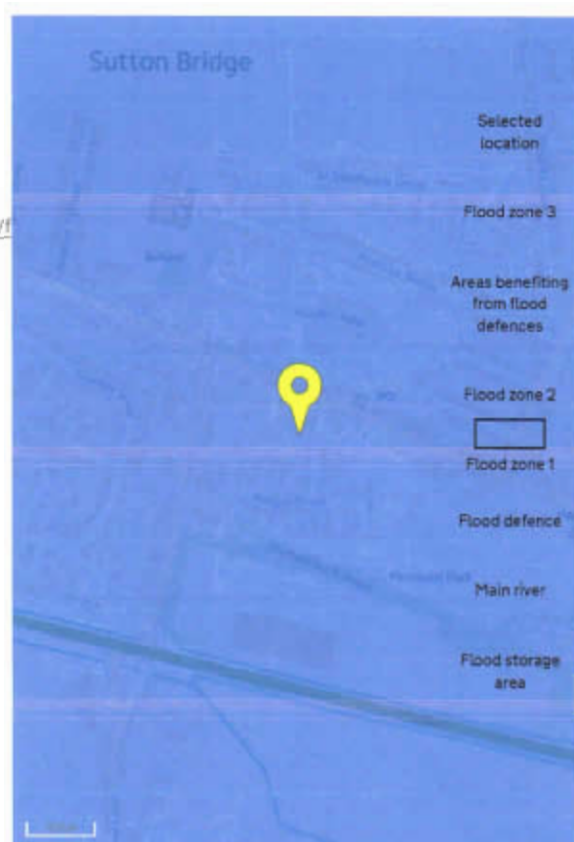
FLOOD ZONE 3

Land and property in flood zone 3 have a high probability of flooding

[More information about flood zones](#)

(<http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/flood-zone-and-flood-risk-tables/table-1-flood-zones>)

- 1** You must carry out a [flood risk assessment](#) (<https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>) for development in flood zone 3
- 2** For some types of development in flood zone 3 you must follow the [Environment Agency's standing advice for carrying out a flood risk assessment](#) (<https://www.gov.uk/guidance/flood-risk-assessment-standing-advice>)
- 3** You can also read more about [flood risk assessments for planning applications](#) (<https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>)



[Learn more about the potential sources of flood risk in this area](#) (<https://flood-warning-information.service.gov.uk/long-term-flood-risk/map?easting=547462&northing=321353>)

[Download this information \(PDF\)](#)

[Refine this search \(/confirm-location?easting=547462&northing=321353\)](#)

[Find out the flood probability for another location \(/\)](#)

You can use this information as part of a [flood risk assessment for a planning application](#) (<https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications#when-you-need-an-assessment>)

[Terms of use](#)

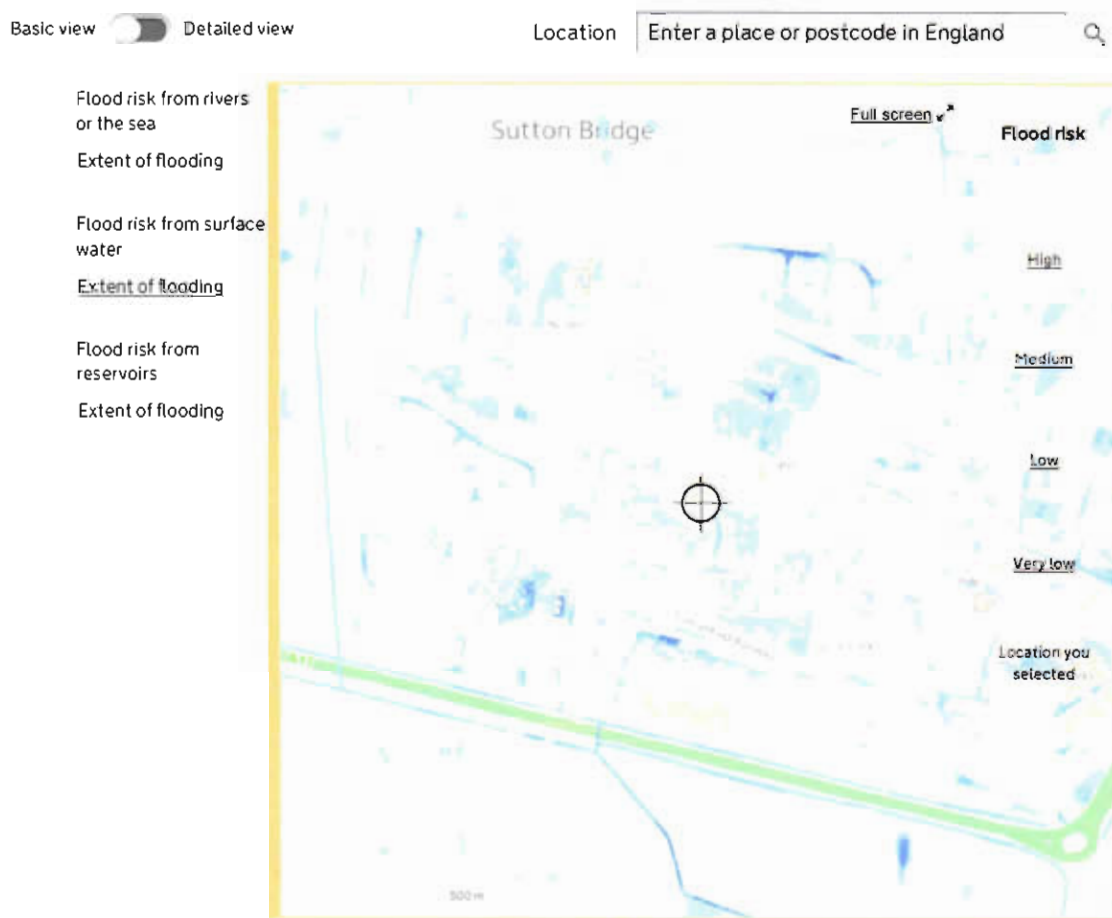
Learn more about this area's flood risk

Select the type of flood risk information you're interested in. The map will then update.

You can [learn more about the ways we describe flood risk](#). Alternatively select a legend item or feature from the map for an explanation of that flood risk.

'Detailed view' shows more technical information.

All information, particularly the likelihood of surface water flooding, is a general indicator of an area's flood risk. As such it is not suitable for identifying whether an individual property will flood. This service uses computer models to assess an area's long term flood risk from rivers, the sea, surface water and some groundwater. It does not include flood risk from sources such as blocked drains and burst pipes.



[▶ Accuracy of surface water flood risk information](#)

[View the flood risk information for another location](#)

[Go to the national flood information service](#)

[▶ Other ways of getting this information](#)

APPENDIX 8



Technical Guidance to the National Planning Policy Framework

March 2012
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 map¹ 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 systems².

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 use³. • Installations requiring hazardous substances consent⁴. (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 waste⁶. • Sites used for holiday or short-let caravans and camping, <i>subject to a specific warning and evacuation plan</i>.⁷
Less vulnerable • Police, ambulance and fire stations which are <i>not</i> 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	✓	x	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	x	x	x

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

Notes to table 3:

This table does not show:

- the application of the Sequential Test which guides development to Flood Zone 1 first, then Zone 2, and then Zone 3;
- flood risk assessment requirements; or
- the policy aims for each flood zone.

Flood risk assessment

- 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

- 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 assessment⁹. 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 developments¹⁰ 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 9

Ben Hornigold

From: Ben Hornigold [ben.hornigold@btinternet.com]
Sent: 08 October 2018 15:50
To: 'Technical Design (Chippenham)/WavinUK'
Cc: 'Andrew Nichols'
Subject: FW: Proposed development at 259 Bridge Road, Sutton Bridge, PE12 9SL.
Attachments: PL01.pdf; 18.003 Bridge Road, Sutton Bridge FACT.PDF

URGENT REQUEST.

Afternoon,

Please find attached soils infiltration test results for the above site. I would be pleased if you could provide me with the "AquaCell Soakaway" calculations and recommended design details for the above project utilising a design soak away principle as indicated within the provided borehole results for each dwelling. If you could provide the design to suit the 1 in 100 year event plus 40% climate change allowance this will be compliant with the Drainage Authorities required specification. Additionally could you provide an Osma drain system of sufficient capacity to cater for a treated effluent discharge separately for each property?

It would be greatly appreciated if you provide the design data asap., be obliged if you could acknowledge receipt please?

Best regards, Ben Hornigold.



Sustainable drainage

Drainage systems can contribute to sustainable development and improve the places and spaces where we live, work and play by balancing the different opportunities and challenges that influence urban design and the development of communities.

Approaches to manage surface water that take account of water quantity (flooding), water quality (pollution) biodiversity (wildlife and plants) and amenity are collectively referred to as Sustainable Drainage Systems (SuDS).

SuDS mimic nature and typically manage rainfall close to where it falls. SuDS can be designed to transport (convey) surface water, slow runoff down (attenuate) before it enters watercourses, they provide areas to store water in natural contours and can be used to allow water to soak (infiltrate) into the ground or evaporated from surface water and lost or transpired from vegetation (known as evapotranspiration).

SuDS are drainage systems that are considered to be environmentally beneficial, causing minimal or no long-term detrimental damage. They are often regarded as a sequence of management practices, control structures and strategies designed to efficiently and sustainably drain surface water, while minimising pollution and managing the impact on water quality of local water bodies.



SuDS are more sustainable than traditional drainage methods because they:

- Manage runoff volumes and flow rates from hard surfaces, reducing the impact of urbanisation on flooding
- Provide opportunities for using runoff where it falls
- Protect or enhance water quality (reducing pollution from runoff)
- Protect natural flow regimes in watercourses
- Are sympathetic to the environment and the needs of the local community
- Provide an attractive habitat for wildlife in urban watercourses
- Provide opportunities for evapotranspiration from vegetation and surface water
- Encourage natural groundwater/aquifer recharge (where appropriate)
- Create better places to live, work and play.

Delivering SuDS

Using SuDS

- Background
- Sustainable drainage
- Urban drainage
- SuDS principles
- Benefits of SuDS
- SuDS components
- SuDS performance & monitoring
- Delivery
- The costs & benefits of SuDS
- Adoption & maintenance of SuDS
- Legislation & regulation
- Design guidance

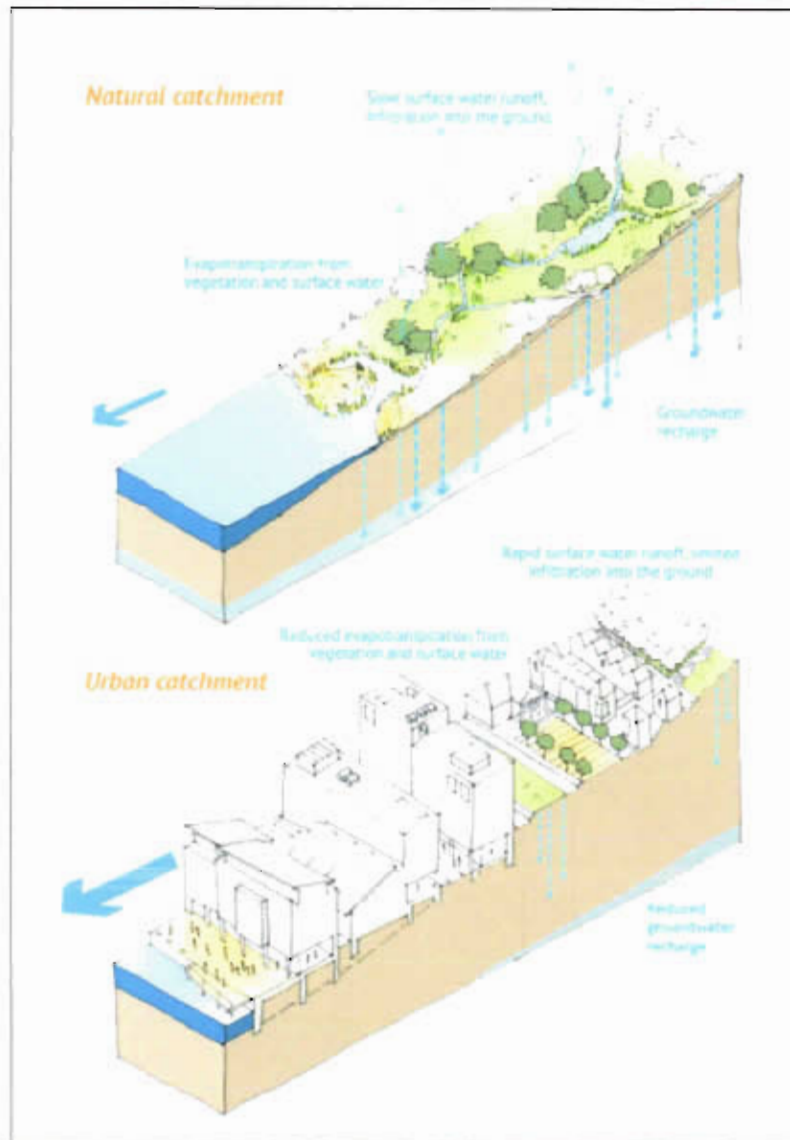
Retrofitting SuDS

- Why retrofit?
- Opportunities
- Retrofitting in the urban environment
- A framework for retrofitting

Drainage exceedance

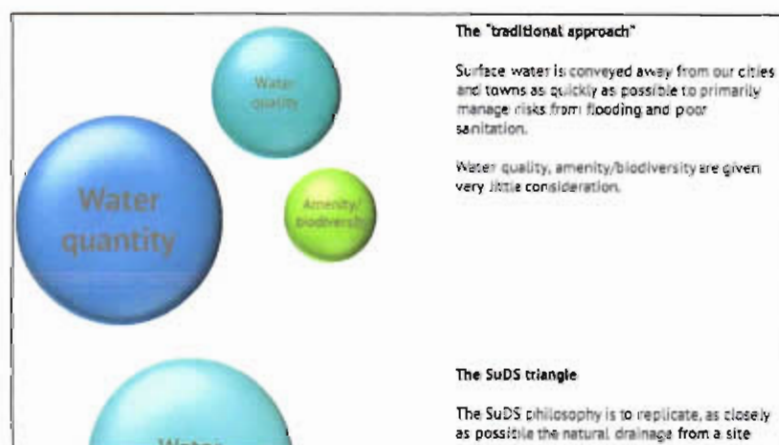
- Background
- Stakeholders
- Managing exceedance
- Encouraging uptake

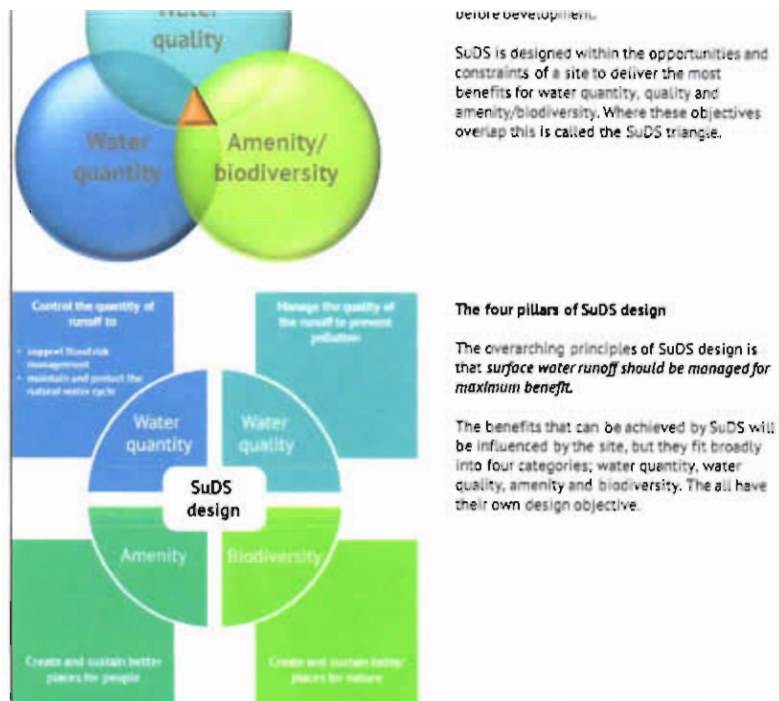
Figure 1 demonstrates the impacts of urbanisation on a catchment by reducing its permeability and increasing surface water runoff. This reduces opportunities for water to be managed naturally with the potential for pollution and localised flooding when the piped systems cannot cope with rainfall.



SuDS may also allow new development in areas where existing sewerage systems are close to full capacity, thereby enabling development within existing urban areas.

Sustainable drainage is moving away from the traditional thinking of designing only to manage flood risk, where runoff is regarded as a nuisance to a philosophy of where surface water is a valuable resource and should be managed for maximum benefit.





Sustainable drainage is a concept that includes long term environmental and social factors in decisions about drainage. It takes account of the quantity and quality of runoff, and the amenity and aesthetic value of surface water in the urban environment. Many existing urban drainage systems can cause problems of flooding, pollution or damage to the environment and are not proving to be sustainable in the context of wider challenges from climate change and urbanisation.

Read more on:

- [Urban drainage](#)
- [SuDS principles](#)
- [Benefits of SuDS](#)

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Introduction to the new EU Water Framework Directive

The increasing demand by citizens and environmental organisations for cleaner rivers and lakes, groundwater and coastal beaches has been evident for considerable time. It has recently been reconfirmed by a representative opinion poll [Eurobarometer](#) in all 25 EU countries:

When asked to list the five main environmental issues that Europeans are worried about, averaged results for the EU25 show that nearly half of the respondents are worried about "water pollution" (47%), with figures for individual countries going up as far as 71%.

This demand by citizens is one of the main reasons why the Commission has made water protection one of the priorities of its work. The new European Water Policy will get polluted waters clean again, and ensure clean waters are kept clean. In achieving these objectives, the roles of citizens and citizens' groups will be crucial. This is why a new European Water Policy has to get citizens more involved.

European Water Policy has undergone a thorough restructuring process, and a new Water Framework Directive adopted in 2000 will be the operational tool, setting the objectives for water protection for the future.

The following will provide an overview on development, present state and future of European Water Policy.

An early beginning

Early European water legislation began, in a "first wave", with standards for those of our rivers and lakes used for drinking water abstraction in 1975, and culminated in 1980 in setting binding quality targets for our drinking water. It also included quality objective legislation on fish waters, shellfish waters, bathing waters and groundwaters. Its main emission control element was the Dangerous Substances Directive.

Addressing pollution from urban waste water and from agriculture

In 1988 the Frankfurt ministerial seminar on water reviewed the existing legislation and identified a number of improvements that could be made and gaps that could be filled. This resulted in the second phase of water legislation, the first results of this were, in 1991, the adoption of

- the Urban Waste Water Treatment Directive, providing for secondary (biological) waste water treatment, and even more stringent treatment where necessary.
- the Nitrates Directive, addressing water pollution by nitrates from agriculture.

Other legislative results of these developments were Commission proposals for action on

- a new Drinking Water Directive, reviewing the quality standards and, where necessary, tightening them (adopted November 1998),
- a Directive for Integrated Pollution and Prevention Control (IPPC), adopted in 1996, addressing pollution from large industrial installations.

Getting Europe's waters cleaner, getting the citizen involved: the new European water policy

Pressure for a fundamental rethink of Community water policy came to a head in mid-1995: The Commission, which had already been considering the need for a more global approach to water policy, accepted requests from the European Parliament's environment committee and from the Council of environment ministers.

Whilst EU actions of the past such as the Drinking Water Directive and the Urban Waste Water Directive can duly be considered milestones, European Water Policy has to address the increasing awareness of citizens and other involved parties for their water. At the same time water policy and water management are to address problems in a coherent way. This is why the new European Water Policy was developed in an open consultation process involving all interested parties.

A Commission Communication was formally addressed to the Council and the European Parliament, but at the same time invited comment from all interested parties, such as local and regional authorities, water users and non-governmental organisations (NGOs). A score of organisations and individuals responded in writing, most of the comments welcoming the broad outline given by the Commission.

As the culmination of this open process a two day Water Conference was hosted in May 1996. This Conference was attended by some 250 delegates including representatives of Member States, regional and local authorities, enforcement agencies, water providers, industry, agriculture and, not least, consumers and environmentalists.

The outcome of this consultation process was a widespread consensus that, while considerable progress had been made in tackling individual issues, the current water policy was fragmented, in terms both of objectives and of means. All parties agreed on the need for a single piece of framework legislation to resolve these problems. In response to this, the Commission presented a Proposal for a Water Framework

Directive with the following key aims:

- expanding the scope of water protection to all waters, surface waters and groundwater
- achieving "good status" for all waters by a set deadline
- water management based on river basins
- "combined approach" of emission limit values and quality standards
- getting the prices right
- getting the citizen involved more closely
- streamlining legislation

The outline below shows how these elements are made operational within the Directive.

A single system of water management: River basin management

The best model for a single system of water management is management by river basin - the natural geographical and hydrological unit - instead of according to administrative or political boundaries. Initiatives taken forward by the States concerned for the Maas, Schelde or Rhine river basins have served as positive examples of this approach, with their cooperation and joint objective-setting across Member State borders, or in the case of the Rhine even beyond the EU territory. While several Member States already take a river basin approach, this is at present not the case everywhere. For each river basin district - some of which will traverse national frontiers - a "river basin management plan" will need to be established and updated every six years, and this will provide the context for the co-ordination requirements identified above.

Co-ordination of objectives - good status for all waters by a set deadline

There are a number of objectives in respect of which the quality of water is protected. The key ones at European level are general protection of the aquatic ecology, specific protection of unique and valuable habitats, protection of drinking water resources, and protection of bathing water. All these objectives must be integrated for each river basin. It is clear that the last three - special habitats, drinking water areas and bathing water - apply only to specific bodies of water (those supporting special wetlands; those identified for drinking water abstraction; those generally used as bathing areas). In contrast, ecological protection should apply to all waters: the central requirement of the Treaty is that the environment be protected to a high level in its entirety.

Surface water

Ecological protection

For this reason, a general requirement for ecological protection, and a general minimum chemical standard, was introduced to cover all surface waters. These are the two elements "good ecological status" and "good chemical status". Good ecological status is defined in Annex V of the Water Framework Proposal, in terms of the quality of the biological community, the hydrological characteristics and the chemical characteristics. As no absolute standards for biological quality can be set which apply across the Community, because of ecological variability, the controls are specified as allowing only a slight departure from the biological community which would be expected in conditions of minimal anthropogenic impact. A set of procedures for identifying that point for a given body of water, and establishing particular chemical or hydromorphological standards to achieve it, is provided, together with a system for ensuring that each Member State interprets the procedure in a consistent way (to ensure comparability). The system is somewhat complicated, but this is inevitable given the extent of ecological variability, and the large number of parameters, which must be dealt with.

Chemical protection

Good chemical status is defined in terms of compliance with all the quality standards established for chemical substances at European level. The Directive also provides a mechanism for renewing these standards and establishing new ones by means of a prioritisation mechanism for hazardous chemicals. This will ensure at least a minimum chemical quality, particularly in relation to very toxic substances, everywhere in the Community.

Other uses

As mentioned above, the other uses or objectives for which water is protected apply in specific areas, not everywhere. Therefore, the obvious way to incorporate them is to designate specific protection zones within the river basin which must meet these different objectives. The overall plan of objectives for the river basin will then require ecological and chemical protection everywhere as a minimum, but where more stringent requirements are needed for particular uses, zones will be established and higher objectives set within them.

There is one other category of uses which does not fit into this picture. It is the set of uses which adversely affect the status of water but which are considered essential on their own terms - they are overriding policy objectives. The key examples are flood protection and essential drinking water supply, and the problem is dealt with by providing derogations from the requirement to achieve good status for these cases, so long as all appropriate mitigation measures are taken. Less clear-cut cases are navigation and power generation, where the activity is open to alternative approaches (transport can be switched to land; other means of power generation can be used). Derogations are provided for these cases also, but subject to three tests: that the alternatives are technically impossible, that they are prohibitively expensive, or that they produce a worse overall environmental result.

Groundwater

Chemical status

The case of groundwater is somewhat different. The presumption in relation to groundwater should broadly be that it should not be polluted at all. For this reason, setting chemical quality standards may not be the best approach, as it gives the impression of an allowed level of pollution to which Member States can fill up. A very few such standards have been established at European level for particular issues

(nitrates, pesticides and biocides), and these must always be adhered to. But for general protection, we have taken another approach. It is essentially a precautionary one. It comprises a prohibition on direct discharges to groundwater, and (to cover indirect discharges) a requirement to monitor groundwater bodies so as to detect changes in chemical composition, and to reverse any anthropogenically induced upward pollution trend. Taken together, these should ensure the protection of groundwater from all contamination, according to the principle of minimum anthropogenic impact.

Quantitative status

Quantity is also a major issue for groundwater. Briefly, the issue can be put as follows. There is only a certain amount of recharge into a groundwater each year, and of this recharge, some is needed to support connected ecosystems (whether they be surface water bodies, or terrestrial systems such as wetlands). For good management, only that portion of the overall recharge not needed by the ecology can be abstracted - this is the sustainable resource, and the Directive limits abstraction to that quantity.

One of the innovations of the Directive is that it provides a framework for integrated management of groundwater and surface water for the first time at European level.

Co-ordination of measures

There are a number of measures taken at Community level to tackle particular pollution problems. Key examples are the Urban Waste Water Treatment Directive and the Nitrates Directive, which together tackle the problem of eutrophication (as well as health effects such as microbial pollution in bathing water areas and nitrates in drinking water); and the Integrated Pollution Prevention and Control Directive, which deals with chemical pollution. The aim is to co-ordinate the application of these so as to meet the objectives established above. This is done as follows.

First of all, the objectives are established for the river basin as outlined in the previous section. Then an analysis of human impact is conducted so as to determine how far from the objective each body of water is. At this point, the effect on the problems of each body of water of full implementation of all existing legislation is considered. If the existing legislation solves the problem, well and good, and the objective of the framework Directive is attained. However, if it does not, the Member State must identify exactly why, and design whatever additional measures are needed to satisfy all the objectives established. These might include stricter controls on polluting emissions from industry and agriculture, or urban waste water sources, say. This should ensure full co-ordination.

The combined approach

But there is a further aspect. Historically, there has been a dichotomy in approach to pollution control at European level, with some controls concentrating on what is achievable at source, through the application of technology; and some dealing with the needs of the receiving environment in the form of quality objectives. Each approach has potential flaws. Source controls alone can allow a cumulative pollution load which is severely detrimental to the environment, where there is a concentration of pollution sources. And quality standards can underestimate the effect of a particular substance on the ecosystem, due to the limitations in scientific knowledge regarding dose-response relationships and the mechanics of transport within the environment.

For this reason, a consensus has developed that both are needed in practice - a combined approach. The Water Framework Directive formalises this. It does so as follows. On the source side, it requires that as part of the basic measures to be taken in the river basin, all existing technology-driven source-based controls must be implemented as a first step. But over and above this, it also sets out a framework for developing further such controls. The framework comprises the development of a list of priority substances for action at EU level, prioritised on the basis of risk; and then the design of the most cost-effective set of measures to achieve load reduction of those substances, taking into account both product and process sources.

On the effects side, it co-ordinates all the environmental objectives in existing legislation, and provides a new overall objective of good status for all waters, and requires that where the measures taken on the source side are not sufficient to achieve these objectives, additional ones are required.

The river basin management plan

All the elements of this analysis must be set out in a plan for the river basin. The plan is a detailed account of how the objectives set for the river basin (ecological status, quantitative status, chemical status and protected area objectives) are to be reached within the timescale required. The plan will include all the results of the above analysis: the river basin's characteristics, a review of the impact of human activity on the status of waters in the basin, estimation of the effect of existing legislation and the remaining "gap" to meeting these objectives; and a set of measures designed to fill the gap. One additional component is that an economic analysis of water use within the river basin must be carried out. This is to enable there to be a rational discussion on the cost-effectiveness of the various possible measures. It is essential that all interested parties are fully involved in this discussion, and indeed in the preparation of the river basin management plan as a whole. Which brings me to the final major element of the proposal, the public participation requirements.

Public participation

In getting our waters clean, the role of citizens and citizens' groups will be crucial.

There are two main reasons for an extension of public participation. The first is that the decisions on the most appropriate measures to achieve the objectives in the river basin management plan will involve balancing the interests of various groups. The economic analysis requirement is intended to provide a rational basis for this, but it is essential that the process is open to the scrutiny of those who will be affected.

The second reason concerns enforceability. The greater the transparency in the establishment of objectives, the imposition of measures, and the reporting of standards, the greater the care Member States will take to implement the legislation in good faith, and the greater the power of the citizens to influence the direction of environmental protection, whether through consultation or, if disagreement persists, through the complaints procedures and the courts. Caring for Europe's waters will require more

involvement of citizens, interested parties, non-governmental organisations (NGOs). To that end the Water Framework Directive will require information and consultation when river basin management plans are established: the river basin management plan must be issued in draft, and the background documentation on which the decisions are based must be made accessible. Furthermore a biannual conference in order to provide for a regular exchange of views and experiences in implementation will be organised. Too often in the past implementation has been left unexamined until it is too late - until Member States are already woefully behind schedule and out of compliance. The Framework Directive, by establishing very early on a network for the exchange of information and experience between water professionals throughout the Community will ensure this does not happen.

Streamlining legislation: seven old directives to be repealed

One advantage of the framework directive approach, in its own way a significant one, is that it will rationalise the Community's water legislation by replacing seven of the "first wave" directives: those on surface water and its two related directives on measurement methods and sampling frequencies and exchanges of information on fresh water quality; the fish water, shellfish water, and groundwater directives; and the directive on dangerous substances discharges. The operative provisions of these directives will be taken over in the framework directive, allowing them to be repealed.

Getting the prices right

The need to conserve adequate supplies of a resource for which demand is continuously increasing is also one of the drivers behind what is arguably one of the Directive's most important innovations - the introduction of pricing. Adequate water pricing acts as an incentive for the sustainable use of water resources and thus helps to achieve the environmental objectives under the Directive.

Member States will be required to ensure that the price charged to water consumers - such as for the abstraction and distribution of fresh water and the collection and treatment of waste water - reflects the true costs. Whereas this principle has a long tradition in some countries, this is currently not the case in others. However, derogations will be possible, e.g. in less-favoured areas or to provide basic services at an affordable price.

Conclusion

Much progress has been made in water protection in Europe, in individual Member States, but also in tackling significant problems at European level. But Europe's waters are still in need of increased efforts to get them clean or to keep them clean. After 30 years of European water legislation, this demand is expressed, not only by the scientific community and other experts, but to an ever increasing extent by citizens and environmental organisations. We should take up the challenge of water protection, one of the great challenges for the European Union in the new millennium. Let us seize the initiative generated by the political process on the Water Framework Directive for the benefit of all Europe's citizens and waters:

- Getting Europe's waters cleaner
- Getting the citizens involved.

APPENDIX 10



1. Home (<https://www.gov.uk/>)
2. Housing, local and community (<https://www.gov.uk/housing-local-and-community>)
3. Planning and building (<https://www.gov.uk/housing-local-and-community/planning-and-building>)
4. Energy efficiency in buildings (<https://www.gov.uk/housing-local-and-community/energy-efficiency-in-buildings>)

Guidance

Flood resilient construction of new buildings

Guidance to developers and designers on how to improve the resilience of new properties in low or residual flood areas.

Published 1 June 2007

From:

Ministry of Housing, Communities & Local Government (<https://www.gov.uk/government/organisations/ministry-of-housing-communities-and-local-government>)

Documents

Improving the flood performance of new buildings: flood resilient construction

(https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7730/flood_performance.pdf)

Ref: ISBN 9781859462874 PDF, 1.65MB, 100 pages

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Details

This document aims to provide guidance to developers and designers 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. These approaches are appropriate for areas where the probability of flooding is low (eg flood zone 1) or areas where flood risk management or mitigation measures have been put in place. The guidance will also be useful to planners and loss adjusters.

This is a priced publication available from: RIBA Bookshops Mail Order, 15 Bonhill Street, London, EC2P 2EA. Order through the orders telephone line: 020 7256 7222, fax: 020 7374 2737, email or visit RIBA bookshops (<http://www.ribabookshops.com>) to buy online.

Published 1 June 2007

Related content

Energy efficiency in buildings (<https://www.gov.uk/housing-local-and-community/energy-efficiency-in-buildings>)

Planning and building (<https://www.gov.uk/housing-local-and-community/planning-and-building>)

River maintenance, flooding and coastal erosion (<https://www.gov.uk/environment/river-maintenance-flooding-coastal-erosion>)

Improving the flood performance of new buildings

Flood resilient construction

Foreword

We are pleased to announce the publication of **Improving the flood performance of new buildings – Flood resilient construction**. This is the outcome of a joint research project between Communities and Local Government and the Environment Agency and has strong links to the Government's strategy for managing flood risk "Making space for water" that is co-ordinated by the Department for the Environment, Food and Rural Affairs. It is a true demonstration of joined-up Government on an important subject.

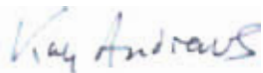
Flooding from rivers and coastal water or as a result of intense rainfall is a natural process that plays an important role in the shaping of the natural environment. However, flooding threatens life and causes substantial damage to property. Climate change over the next few decades is likely to mean milder wetter winters and hotter drier summers in the UK whilst sea levels will continue to rise. These factors will lead to increased and new risks of flooding within the lifetime of planned development.

Although planning policy avoids inappropriate new development in flood risk areas and directs development away from areas at highest risk, in order to maintain service or sustain communities, some development will be necessary in places that may flood. Planning deals with where to build. This guide explains how to build and describes how buildings should be constructed in order to minimise flood damage, as part of a package including flood awareness, warning and emergency planning.

This guide is the latest output in a series of information on flooding that has been published over the last 10 years, starting before the floods of autumn 2000. However, this project is different from earlier works in the UK and internationally in that it actually tested materials and assemblies in a hydraulics laboratory and subjected them to flooding for several days.

It is not always possible to provide defences to keep floodwater away from buildings and infrastructure, because they may not be the best option for people, wildlife or economically, and may increase flooding elsewhere. Increased demand for housing and limited available space means that in future it may be inevitable that properties will be built on sites that have some risk of flooding even after measures have been taken to reduce the risk. It is therefore important that these buildings are designed to be resistant or resilient to flooding.

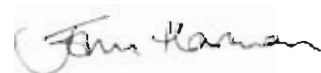
Most homes are intended to last over 60 years; many will still be here in a hundred years. In that time it is expected that there will be real changes in the climate that will affect the water environment and increase flood risk. Resilient construction is therefore an important area for investment and one which we hope designers, developers, planners and building control bodies will treat with the seriousness it deserves. Furthermore, this form of construction is one of the adaptation strategies discussed in the Stern Review.



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Executive Summary

Aim of the Guidance

This document aims to provide guidance to developers and designers 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. These approaches are appropriate for areas where the probability of flooding is low (c.g. flood zone 1 as defined by PPS 25) or areas where flood risk management or mitigation measures have been put in place. The guidance will also be useful to planners, building control officers and loss adjusters.

Specifically this guidance document provides:

- practical and easy-to-use guidance on the design and specification of new buildings (primarily housing) in low or residual flood risk areas in order to reduce the impacts of flooding
- recommendations for the construction of flood resistant and resilient buildings.

Background and government policy

Government policies in the UK do not advocate the building of dwellings in areas with a significant risk of flooding. However, where development is, *exceptionally*, necessary in such areas, national flood risk management policy requires that such developments are safe, do not increase flood risk elsewhere and, where possible, reduce flood risk overall.

It is critical that new buildings in these areas are designed appropriately to cope with floodwaters and minimise the time for re-occupation after a flooding event. Time to re-occupy properties is a principal consequence of flooding which can have a profound impact on the health and livelihoods of those affected.

In England, PPS 25 *Development and flood risk* (December 2006) and the associated Practice Guide takes a hierarchical approach to locating developments in the most appropriate location. This sequential approach (and the associated exception test) allows for resistance and resilience measures to be considered as part of this hierarchical approach.

The project supporting the development of the present guidance has also proposed changes to the Building Regulations for England and Wales (Approved Document C) to incorporate flood resistance and resilience. Once these changes are brought into effect, the links between planning and building control systems will be stronger.

This guidance offers a way in which planners and building control officers can assess the suitability of proposed resilience measures. However, this is not a checklist but a framework as there is no standard solution appropriate for all cases.

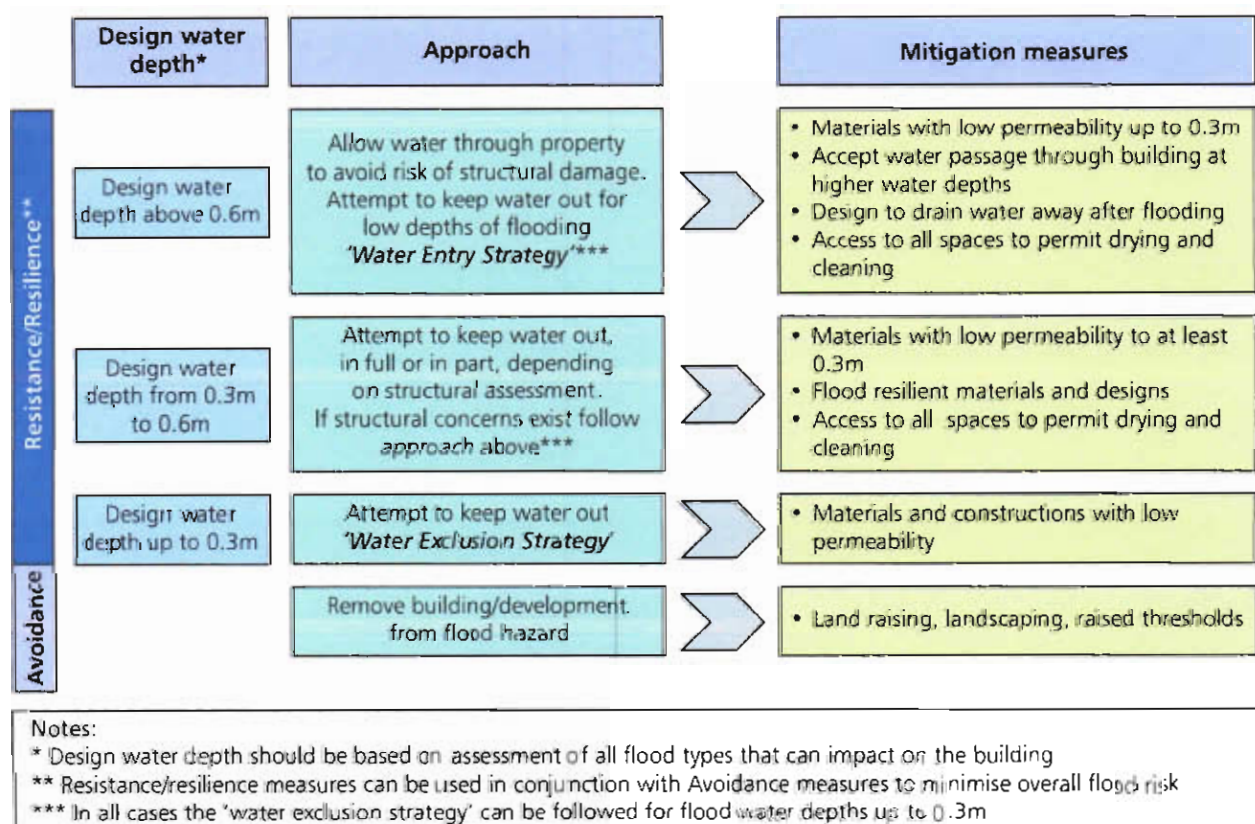
Hierarchy of building and site design

In line with the sequential approach to planning, the following are the range of construction measures that can be used to reduce the flooding risk at a site.

Flood avoidance	Constructing a building and its surrounds (at site level) in such a way to avoid it being flooded (e.g. by raising it above flood level, re-siting outside flood risk area etc)
Flood resistance	Constructing a building in such a way to prevent floodwater entering the building and damaging its fabric.
Flood resilience	Constructing a building in such a way that although flood water may enter the building its impact is reduced (i.e. no permanent damage is caused, structural integrity is maintained and drying and cleaning are facilitated).
Flood repairable	Constructing a building in such a way that although flood water enters a building, elements that are damaged by flood water can be easily repaired or replaced. This is also a form of flood resilience.

Design approaches and flood resilient design and construction

This document, based on evidence from laboratory tests, technical evidence and industry experience, helps a designer to determine the best option or design strategy for flood management at a building site level from knowledge of basic flood parameters (e.g. depth, frequency and duration) which would normally be determined in a flood risk assessment at the planning stage. Depending on these parameters (in particular flood depth) and after utilising options for flood avoidance at site level, designers may adopt a **water exclusion strategy** or a **water entry strategy** as illustrated in the figure below:



- In a **water exclusion strategy**, emphasis is placed on *minimising* water entry whilst maintaining structural integrity, and on using materials and construction techniques to facilitate drying and cleaning. This strategy is favoured when low flood water depths are involved (up to a possible maximum of 0.6m). According to the definitions adopted in this Guidance, this strategy can be considered as a resistance measure but it is part of the aim to achieve overall building resilience
- In a **water entry strategy**, emphasis is placed on allowing water into the building, facilitating draining and consequent drying. Standard masonry buildings are at significant risk of structural damage if there is a water level difference between outside and inside of about 0.6m or more. This strategy is therefore favoured when high flood water depths are involved (greater than 0.6m).

Advice is provided on the suitability of common building materials, floor and wall constructions and other features and fittings for improving the flood resilience of buildings. The flood resilience characteristics considered are water penetration, drying ability and retention of pre-flood dimensions and integrity.

In all of the above options, build quality and workmanship are crucial to achieving the desired effect.

Purpose of this Document:

This document provides guidance on how flood resistance and resilience measures can be used to reduce flood damage, as part of an integrated portfolio of approaches.

It should be used when the principle of new development has been agreed and demonstrated to the satisfaction of the Planning Authority through application of the Sequential and Exception Tests in PPS25.

About the document

Part 1 introduces the concepts of flooding and resilience, within the UK planning and building regulation systems.

This part of the Guidance is particularly relevant to those with a limited knowledge of flooding and of the regulatory system.

Part 2 deals with the design approaches to managing flood risk.

This part of the Guidance will help designers, planners and building surveyors select appropriate design strategies. This may also be of interest to property insurers.

Part 3 gives guidance on flood resilient design and construction.

This part of the Guidance will be of particular relevance to building surveyors, designers and builders as well as property insurers.

Part 4 contains supporting information.

PART 1			PART 2		PART 3	PART 4	
Chapter 1 Introduction	Chapter 2 Flooding considerations	Chapter 3 Planning policy and Building Standards	Chapter 4 Design Strategies	Chapter 5 Avoidance and resistance design options	Chapter 6 Guidance on flood resilient design and construction	Chapter 7 The evidence base	Chapter 8 References and sources of information
Why there is need to design for flood resilience How guide fits in with Government policy and existing guidance Scope of the guide What is not covered Intended users How to use the guide	Types and causes of flooding Definition of flood risk Ways to minimise flood risk Entry points of flood water into a building Types of damage caused by flood water	Overview of the planning system in England, Wales, Scotland and Northern Ireland General overview of Building Regulations in England, Wales, Scotland and Northern Ireland Interface between planning processes and Building Control	Description of strategies to manage flood risk Strategies for resilient building construction: 'Water exclusion strategy' 'Water entry strategy' Decision support flowchart for Avoidance, Resistance and Resilience design options	Description of avoidance and resistance measures such as: - site layouts (e.g. location of constructions on high ground) - landscaping - building options (e.g. raising floor levels) - drainage and incorporation of SUDS	Recommendations for specification of resilient building materials Advice and illustrative sketches on resilient design of: - foundations - ground floors - walls - doors and windows - fittings - services	Sources used to produce the guide: - published literature - review of existing practice - experimental information - laboratory test procedures and sample results	Key references and sources of information for resilient construction and planning

Glossary

Flood avoidance (at site level)	Constructing a building and its surrounds in such a way to avoid it being flooded (e.g. by raising it above flood level, re-siting outside flood risk area etc.)
Flood resistance	Constructing a building in such a way to prevent floodwater entering the building and damaging its fabric.
Flood resilience	Constructing a building in such a way that although flood water <u>may</u> enter the building its impact is minimised (i.e. no permanent damage is caused, structural integrity is maintained and drying and cleaning are facilitated).
Flood repairable	Constructing the building in such a way that although flood water enters a building, elements that are damaged by flood water can be easily repaired or replaced. This is a form of flood resilience (see definition above).
The concepts of dry proofing and wet proofing (used widely in the USA) have been superseded in the UK by the above definitions	

AD	Approved Document of the Building Regulations
ADC	Approved Document C of the Building Regulations
Damp proof course (d.p.c.)	Layer or coating of material placed in a wall to resist the passage of moisture from the ground.
Damp proof membrane (d.p.m.)	Layer or sheet of material placed beneath or within a floor to prevent passage of moisture. To be fully effective it should be lapped to the d.p.c. in the surrounding walls.
Differential head (dH)	Difference between water level outside and inside the building.
Exception test	The mechanism in PPS 25 which makes provision for the negative implications of developing in a flood risk area to be balanced against potential positive contributions to sustainable development that new development can bring. The exception test should be used only after the sequential approach has been applied and should not be used as a means of supporting inappropriate development.
Floodplain	Area of land that borders a watercourse, an estuary or the sea, over which water flows in time of flood, or would flow but for the presence of flood defences where they exist.

Flood risk	A combination of the probability and consequences of a flood event
Flood Risk Area	Any area liable to flood from any form of flooding
Flood Risk Assessment	A study to assess the risk to an area or site from flooding, now and in the future, and to assess the impact that any changes or development on the site or area will have on flood risk to the site and elsewhere. It may also identify, particularly at more local levels, how to manage those changes to ensure that flood risk is not increased. PPS25 differentiates between regional, sub-regional/strategic and site-specific flood risk assessments.
Freeboard	The difference between the flood defence level and the design flood level
Frogged brick	Brick with one or more indentations on the bed face, resulting from the pressing process.
Local flood defence	Infrastructure (e.g. earth bund) located close to the building which is intended to resist the passage of flood water and reduce the flood level adjacent to the building.
Perpends	Vertical cross joint in stone or brickwork.
Predicted flood level	Flood level estimated for a given frequency of occurrence.
PPS 25	Planning Policy Statement 25: Development and Flood Risk sets out the Government's policies on land use planning for development and flood risk
Residual flooding	This is the type of flooding that occurs when the existing flood management measures are exceeded or fail (e.g. breaching of defences or sewer surcharging).
Residual risk	The risk that remains after all risk avoidance, reduction and mitigation measures have been implemented, or where such measures fail.
Sacrificial materials	Materials used in house fittings that are likely to be damaged in case of flooding but can be easily replaced.
Sequential approach	The decision-making tool in PPS25 to ensure that sites at little or no risk of flooding are developed in preference to areas at higher risk
Sequential test	The application of the sequential approach by Local Planning Authorities in determining land uses that are compatible with the level of flood risk at each allocated development site within a Local Authority area.

SUDS	Sustainable Drainage Systems. A sequence of management practices and control structures used to attenuate run-off from development sites and to treat runoff to remove pollutants, thus reducing the negative impact on receiving water bodies
Tanking	Variety of methods used to prevent the infiltration of sub-surface water into a building, namely basements and walls and floors close to the water table.
TAN 15 Wales	Technical Advice Note 15: Development and Flood Risk (Wales) outlines the Welsh Assembly Government's policies for development in flood risk areas.
Water absorption	Ability of a material to incorporate water within its pore structure; it is usually defined as a percentage of weight.
Water penetration	Ability of a material/composite to allow passage of water through its body.
Water entry strategy	A design strategy based on allowing water to come inside a property rather than preventing its ingress.
Water exclusion strategy	A design strategy based on the use of impermeable materials/composite construction that will minimise the ingress of water into a property.

APPENDIX 11

DISCLAIMER.

Whilst Engineering Support Practice Ltd., considers that the information and opinions given in this report are based on assumptions and information, some of which is provided by others, that are subject to uncertainties.

Due to such uncertainties and because events may not occur as expected , there is a possibility that the results of assessments and observations presented in this report will be different from situations that occur in the future. As a consequence, ESP Ltd., will not assume any liability for any loss or damage out of the provision of this report

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