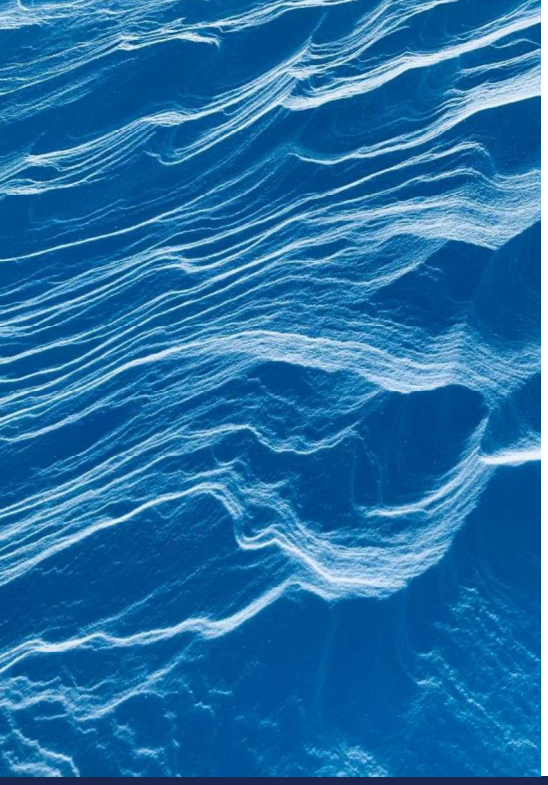
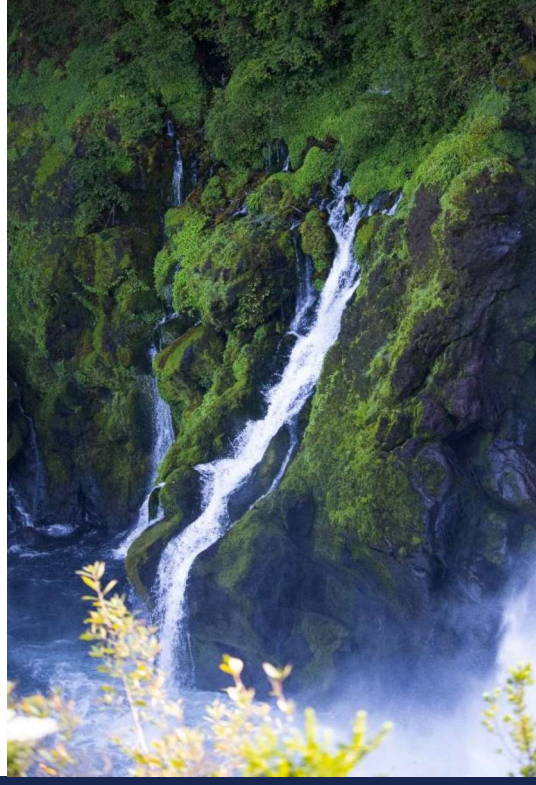




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Flood risk, water and environment

# Flood Risk Assessment
# AEG03031_PE11_Spalding_01

Site Address: 10 Green Lane
Spalding
South Holland
PE11 2YB

UK Experts in Flood Modelling, Flood Risk Assessments, and Surface Water Drainage Strategies

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Flood risk, water and environment

# Document Issue Record

**Project:** Flood Risk Assessment

**Prepared for:** Andrew Ferguson

**Reference:** AEG03031_PE11_Spalding_01

**Site Location:** 10 Green Lane, Spalding, South Holland, PE11 2YB

| Consultant | | Date |
|---|---|---|
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| Document Check | Oliver Manston | 26/09/2023 |
| Authorisation | Kirsty Tolson | 09/10/2023 |

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# Summary

| Development Description | Existing | Proposed |
|---|---|---|
| **Development Type** | Residential dwelling and garage | Garage conversion into two residential dwelling (studio flats). |
| **EA Vulnerability Classification** | More Vulnerable | More Vulnerable |
| **Ground Level** | Based on the LiDAR data, the ground elevation of the site varies between approximately 3.32m AOD and 3.95m AOD; and varies between 3.47m AOD and 3.90m AOD at the location of the proposed development/ existing garage | No Change |
| **Level of Sleeping Accommodation** | N/A[2] | Ground floor and first floor |
| **Surface Water Drainage** | N/A[1] | Surface Water Drainage Strategy recommended inclusive of appropriate SuDS features |
| **Site Size** | Approximately 460 m² | No change |
| **Risk to Development** | **Summary** | **Comment** |
| **EA Flood Zone** | Flood Zone 3 | Site is not affected in the modelled flood events (see section 4) |
| **Flood Source** | Fluvial/ Tidal | River Welland |
| **SFRA Available** | South East Lincolnshire Strategic Flood Risk Assessment (South East Lincolnshire Joint Strategic Planning Committee, 2017) | |
| **Management Measures** | **Summary** | **Comment** |
| **Ground floor level above extreme flood levels** | Yes | Site is not affected in all modelled fluvial events based on the modelling data from the Welland Glen (2016) model. Based on SFRA hazard mapping, the site also not affected in |

| | | |
|---|---|---|
| | | the modelled 1 in 100 (1.0%) fluvial/ 1 in 200 (0.5%) tidal and 1 in 1000 (0.1%) + CC (2115) and in the 'present' day scenarios. |
| **Safe Access/Egress Route** | Yes | Site only affected in the modelled 0.1%AEP pluvial event. |
| **Flood Resilient Design** | Not Recommended | Site at low risk from all sources. |
| **Site Drainage Plan** | N/A[1] | Surface Water Drainage Strategy recommended inclusive of appropriate SuDS features |
| **Flood Warning and Evacuation Plan** | Recommended | Recommended to sign up to the Lower Welland and other watercourses from Stamford to Spalding, including Market Deeping and Spalding Environment Agency (EA) flood alert and warning service. Recommend also to sign up to receive Met Office Severe Weather warnings. |
| **Offsite Impacts** | **Summary** | **Comment** |
| **Displacement of floodwater** | Negligible | The proposed development does not include any increase in built footprint and as such it should not increase flood risk elsewhere. |
| **Increase in surface run-off generation** | No change in impermeable area. | Surface Water Drainage Strategy recommended inclusive of appropriate SuDS features |
| **Impact on hydraulic performance of channels** | No | Does not impact channel. River Welland is located approximately 535m east of the site boundary. |

[1] not required for this assessment. [2] data not available.

# 1. Introduction

1.1. Aegaea were commissioned by Andrew Ferguson to undertake a Flood Risk Assessment (FRA) to facilitate a planning application for the proposed development. This FRA has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance.

1.2. This FRA is intended to support a full planning application and as such the level of detail included is commensurate and subject to the nature of the proposals.

## Site Overview

1.3. The site of the proposed development is 10 Green Lane, Spalding, South Holland, PE11 2YB (Figure1).

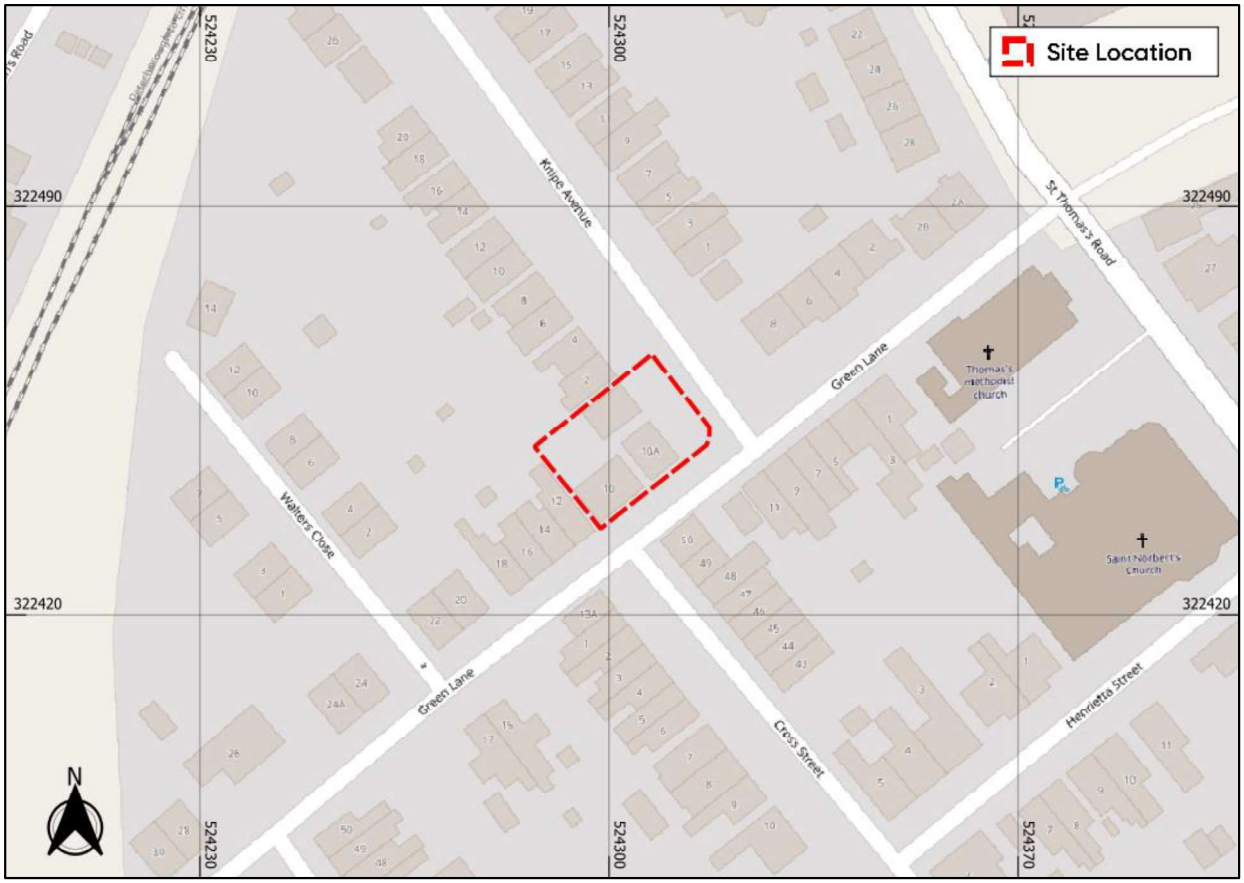



Figure 1: Site Location (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors)

1.4. The existing site comprises a residential dwelling and a garage. It is understood that the proposed development is for garage conversion into two residential dwellings (studio flats). It is also understood that the car parking area and pedestrian access to both front doors of the new flats on the side of the building will be retained.

1.5. In the absence of a topographical survey, Environment Agency Light Detection and Ranging (LiDAR) data Digital Terrain Model (1m resolution) has been used to review the topography of the site (Figure 2). Analysis of the 1m LiDAR data shows that the ground elevation of the site varies between approximately 3.32m AOD Above Ordinance Datum and 3.95m AOD. The ground elevation at the location of the proposed development/ existing garage varies between 3.47m AOD and 3.90m AOD.

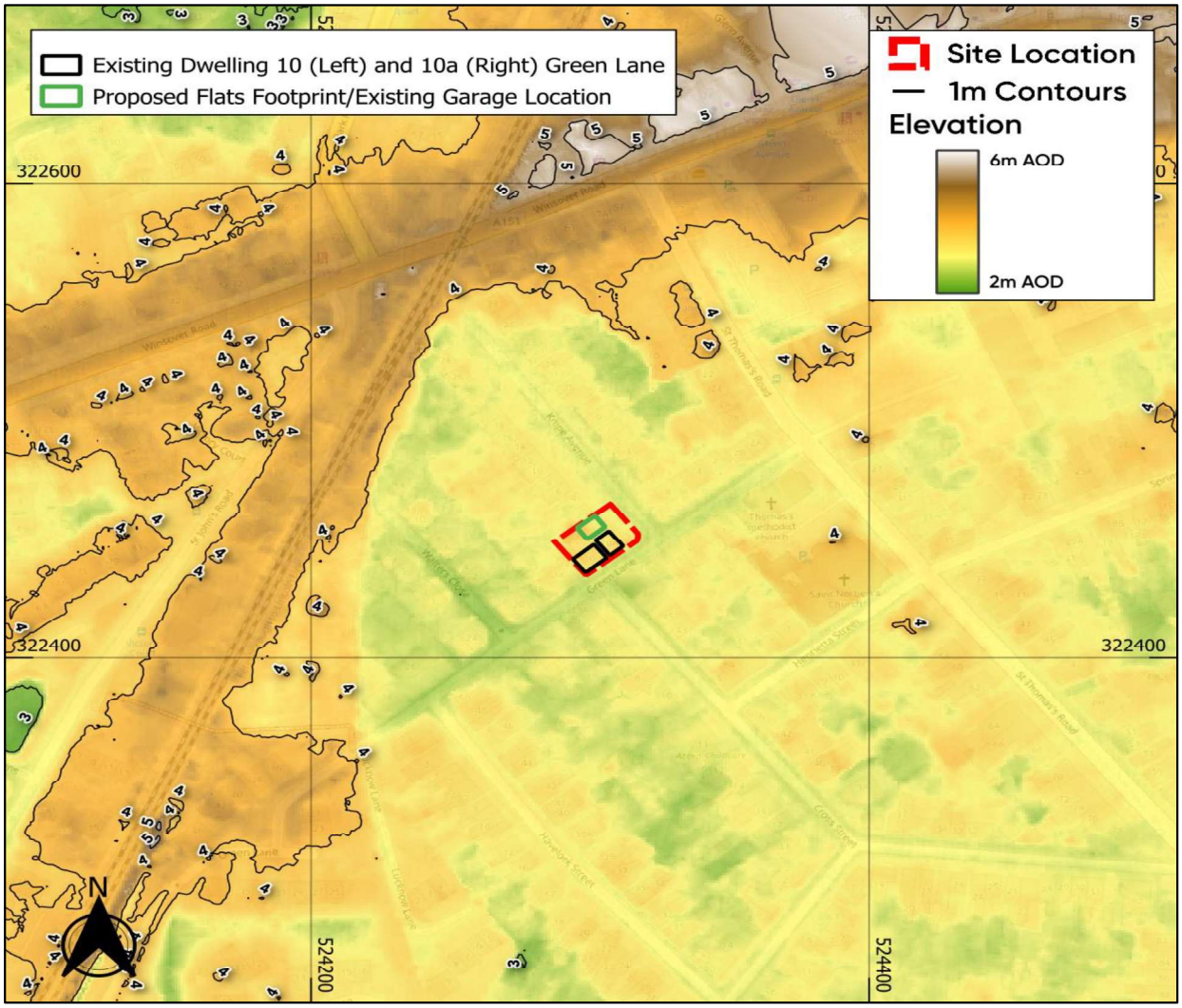



Figure 2: Site Topography (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

1.6. South Holland District Council is the Local Planning Authority (LPA) for the site, and Lincolnshire County Council is the designated Lead Local Flood Authority (LLFA). The site sits within the Environment Agency's Lincolnshire and Northamptonshire region.

## Planning Policy and Guidance

1.7. UK government planning guidance states[1] that an FRA is required for developments which are:

- *in flood zone 2 or 3 including minor development and change of use*
- *more than 1 hectare (ha) in flood zone 1*
- *less than 1 ha in flood zone 1, including a change of use in development type to a more vulnerable class (for example from commercial to residential), where they could be affected by sources of flooding other than rivers and the sea (for example surface water drains, reservoirs)*
- *in an area within flood zone 1 which has critical drainage problems as notified by the Environment Agency*

1.8. The site is located within Flood Zone 3 and therefore an FRA is required in accordance with the NPPF.

1.9. The objective of this FRA is to demonstrate that the proposals are acceptable in terms of flood risk. This report summarises the findings of the study and specifically addresses the following issues in the context of the current legislative regime:

- Fluvial/ Tidal flood risk
- Surface water flood risk
- Risk of flooding from other sources

[1]**https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications#when-you-need-an-assessment**

# 2. Planning Policy

2.1. Inappropriate development in a flood risk area could pose significant risk in terms of personal safety and damage to property for the occupiers of the development or for people elsewhere. The approach taken in the assessment of flood risk at the planning stage is set out in national, regional, and local planning policy and associated guidance. This section summarises the key policies and guidance relevant to the proposed development.

## National Planning Policy Framework (NPPF)

2.2. The National Planning Policy Framework[2] (NPPF) (DLUHC, 2023) which includes UK Government policy on development and flood risk states:

> *159. Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.*
>
> *167. When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:*
>
> *a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;*
>
> *b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;*
>
> *c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;*

[2] https://www.gov.uk/guidance/national-planning-policy-framework, **last updated Sept 2023**

*d) any residual risk can be safely managed; and*

*e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.*

2.3. Footnote 55 of the NPPF states:

*A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.*

2.4. Flood Zones in England are defined as follows:

Table 1: Flood Zone Definitions

| Flood Zone | Definition |
|---|---|
| Zone 1 Low Probability | Land having less than 1 in 1,000 annual probability of river or sea flooding (all land outside Zones 2 and 3). |
| Zone 2 Medium Probability | Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. |
| Zone 3a High Probability | Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. |
| Zone 3b The Functional Floodplain | This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise:<br>land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or<br>land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding).<br>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. (Not separately distinguished from Zone 3a on the Flood Map) |

2.5. An FRA should be appropriate to the scale, nature, and location of the development. It should identify and assess the risk from all sources of flooding to and from the development and demonstrate how any flood risks will be managed over the lifetime of the development.

## Local Plan

2.6. South East Lincolnshire Local Plan (2011- 2036), adopted in March 2019 prepared by the Local Planning Authority, South Holland District Council jointly with Boston Borough Council and Lincolnshire County Council, sets out the policies for development in the local area. The proposed site lies under the jurisdiction of this LPA and therefore will be required to adhere to the local plan policies. The policy related to flood risk is replicated below:

*Policy 4: Approach to Flood Risk*

*Development proposed within an area at risk of flooding (Flood Zones 2 and 3 of the Environment Agency's flood map or at risk during a breach or overtopping scenario as shown on the flood hazard and depths maps in the Strategic Flood Risk Assessment) will be permitted, where:*

1. *It can be demonstrated that there are no other sites available at a lower risk of flooding (i.e. that the sequential test is passed). The sequential test will be based on a Borough or District wide search area of alternative sites within the defined settlement boundaries, unless local circumstances relating to the catchment area for the development justify a reduced search area, i.e. there is a specific need for the development in that location. The sequential test is not required for sites allocated in the Local Plan, minor development[1] 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).*
2. *It can be demonstrated that essential infrastructure in FZ3a & FZ3b, highly vulnerable development in FZ2 and more vulnerable development in FZ3 provide wider sustainability benefits to the community that outweigh flood risk.*
3. *The application is supported with a site-specific flood risk assessment, covering risk from all sources of flooding including the impacts of climate change and which:*
    a. *demonstrate that the vulnerability of the proposed use is compatible with the flood zone;*

b. *identify the relevant predicted flood risk (breach/overtopping) level, and mitigation measures that demonstrate how the development will be made safe and that occupants will be protected from flooding from any source;*

c. *propose appropriate flood resistance and resilience measures (following the guidance outlined in the Strategic Flood Risk Assessment), maximising the use of passive resistance measures (measures that do not require human intervention to be deployed), to ensure the development maintains an appropriate level of safety for its lifetime;*

d. *include appropriate flood warning and evacuation procedures where necessary (referring to the County's evacuation routes plan), which have been undertaken in consultation with the authority's emergency planning staff;*

e. *incorporates the use of Sustainable Drainage Systems (SuDS) (unless it is demonstrated that this is not technically feasible) and confirms how these will be maintained/managed for the lifetime of development (surface water connections to the public sewerage network will only be permitted in exceptional circumstances where it is demonstrated that there are no feasible alternatives);*

f. *demonstrates that the proposal will not increase risk elsewhere and that opportunities through layout, form of development and green infrastructure have been considered as a way of providing flood betterment and reducing flood risk overall;*

g. *demonstrates that adequate foul water treatment and disposal already exists or can be provided in time to serve the development;*

h. *ensures suitable access is safeguarded for the maintenance of water resources, drainage and flood risk management infrastructure.*

*Development in all flood zones, and development over 1 hectare in size in Flood Zone 1, will need to demonstrate that surface water from the development can be managed and will not increase the risk of flooding to third parties.*

*Change of use of existing buildings will be supported providing they do not pose an increase in risk to people. Change of use that would result in self- contained ground*

*floor residential accommodation in areas of hazard rating 'danger for some', 'danger for most' and 'danger for all' will not be supported. In these areas unrestricted access to a habitable room above the flood level and an emergency evacuation plan will be required.*

*Caravans, mobile homes and park homes intended for permanent residential use will not be permitted in areas at risk of flooding. Caravan, chalet, log cabin, camping and touring sites at risk of fluvial flooding where there is a 'danger for most' and 'danger for all' will not be permitted. Occupancy of caravan, chalet, log cabin, camping and touring sites at risk of tidal flooding will not be permitted to open between 1st November in any one year and the 14th March in the succeeding year.*

*No development will be permitted within a 50m buffer from the toe of the raised Witham Haven Banks (flood defences), as shown on the indicative Plan contained in Appendix 10, to allow access for construction and maintenance.*

*Flood risk management infrastructure shall be provided at the strategic level, where development opportunities allow, to reduce the hazard and probability of flooding.*

## Sequential and Exception Tests

2.7. The Sequential and Exception Tests are applied in specific cases defined by UK Government policy. Their purpose is to drive development to areas of low flood risk and to support developments which improve flood risk for developments in areas at risk of flooding.

### Sequential Test

2.8. The proposed development is for the conversion of the existing garage to residential flats. Furthermore, the proposed development is at low risk of flooding from fluvial/ tidal and pluvial sources. Therefore, the proposed development is considered to be sequentially located in terms of flood risk.

### Exception Test

2.9. The Exception Test is applied to sites based on the Flood Zone and the nature of the development. As the proposed development consists of residential apartments it would be classed as 'More Vulnerable' in line with government development use classes.

2.10. The Flood Risk Vulnerability Classification table[3] provided below in

2.11. Table 2: shows which vulnerabilities are appropriate in each Flood Zone.

2.12. The proposed development sits wholly within Flood Zone 3 and the proposed development consists of 'More Vulnerable' uses. Table 2 shows that Flood Zone 3 is an appropriate location for 'More Vulnerable' uses with the implementation of the Exception Test.

Table 2: Flood risk vulnerability and flood zone 'incompatibility'.

| | Flood Risk Vulnerability Classification | | | | |
|---|---|---|---|---|---|
| **Flood Zones** | **Essential Infrastructure** | **Highly Vulnerable** | **More Vulnerable** | **Less Vulnerable** | **Water Compatible** |
| Zone 1 | ✓ | ✓ | ✓ | ✓ | ✓ |
| Zone 2 | ✓ | Exception Test required | ✓ | ✓ | ✓ |
| Zone 3a | Exception Test required | x | Exception Test required | ✓ | ✓ |
| Zone 3b | Exception Test required | x | x | x | ✓ |

2.13. For the Exception Test to be passed, the proposed development must meet the following criteria:

A. It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh the flood risk, as informed by a Strategic Flood Risk Assessment;

B. A Flood Risk Assessment demonstrates that the development will be safe, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

2.14. Part A of the Exception Test is outside the scope of this FRA. The planning application submitted by the client is required is to be accompanied by an FRA which shows that the development can

**3https://www.gov.uk/guidance/flood-risk-and-coastal-change#table2**

meet the requirements of the Part B of the Exception Test, with an overall reduction of flood risk to the site and surrounding area.

## Summary

2.15. This flood risk assessment has been prepared with due consideration to the above local and national policy.

# 3. Consultation and Review

## Consultation

3.1. Consultation has been undertaken with the EA Lincolnshire and Northamptonshire region. EA flood model data has been requested and the data was received in the form Product 4 data. At present this site is not covered by any fluvial Environment Agency hazard mapping. A copy of the data can be found in Appendix B.

3.2. Detailed Hazard Mapping available within the 2017 Update of South Holland Strategic Flood Risk Assessment has also been reviewed. This data has been reviewed in order to determine a more accurate depiction of flooding at the site. A copy of the data can be found in Appendix C.

## Documents and Online Mapping

3.3. Local Governments and Lead Local Flood Authorities provide documents which contain data and policies on flood risk and new development in their areas. These documents are introduced and briefly summarised below. For the purposes of this FRA, these documents have been reviewed for relevant information and any relevant data is discussed within the appropriate sub heading of this report.

3.4. The following sources of information have been reviewed for this assessment:

- Flood Map for Planning on the Environment Agency website *https://flood-map-for-planning.service.gov.uk/*
- Long Term Flood Risk Information on the Environment Agency website *https://www.gov.uk/check-long-term-flood-risk*
- National Planning Policy Framework (NPPF) (Department for Levelling Up, Housing and Communities, 2023)
- Planning Practice Guidance - Flood Risk and Coastal Change (Department for Levelling Up, Housing and Communities, 2022)
- Geoindex Onshore (British Geological Survey, 2023)

- South East Lincolnshire Local Plan 2011-2036[4] (South East Lincolnshire Joint Strategic Planning Committee, 2019)
- South East Lincolnshire Strategic Flood Risk Assessment[5] (South East Lincolnshire Joint Strategic Planning Committee, 2017)
- Lincolnshire County Council Preliminary Flood Risk Assessment[6] (Lincolnshire County Council, 2011 & 2017).
- Joint Lincolnshire Flood Risk and Water Management Strategy 2019-2050[7] (Lincolnshire County Council, 2011 & 2017).

## Preliminary Flood Risk Assessment (PFRA)

3.5. The PFRA published in 2011 and updated in 2017 is a high-level appraisal of flood risk across Lead Local Flood Authority Lincolnshire County Council. The flood risk from all sources, including fluvial, surface water, groundwater, and surcharged sewers is evaluated. It is the basis upon which the Local Flood Risk Management Strategy is produced.

3.6. The PFRA summarises historical flood incidents in Lincolnshire County Council.

## Strategic Flood Risk Assessment (SFRA)

3.7. The SFRA, published in 2017, provides the evidence base for the Local Planning Authority South Holland District Council Local Plan and guidance for consideration when determining planning applications.

3.8. The SFRA seeks to place new development into areas of lower flood risk taking into account current flood risk, future flood risk, and the effect a proposed development would have on the risk of flooding.

3.9. The SFRA mapping provided by South Holland District Council has been used throughout production of this report as a source of information, particularly pertaining to historical flood incidents.

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**4 http://www.southeastlincslocalplan.org/**
**5 https://www.sholland.gov.uk/article/5307/Planning-Policy**
**6 https://www.lincolnshire.gov.uk/flood-risk-management/preliminary-flood-risk-assessment/1**
**7 https://www.lincolnshire.gov.uk/directory-record/63754/flood-risk-and-water-management-strategy**

## Joint Lincolnshire Flood Risk and Water Management Strategy

3.10. The Joint Lincolnshire Flood Risk and Water Management Strategy sets out roles and responsibilities for flood risk management, assesses the risk of flooding in the area, where funding can be found to manage flood risk, and the policies, objectives, and actions of the Lead Local Flood Authority.

3.11. Joint Lincolnshire Flood Risk and Water Management Strategy is used within this report to identify any flood management infrastructure and historical incidences of flooding.

# 4. Sources of Flood Risk

## River Flooding (Fluvial/ Tidal)

4.1. Flooding from watercourses arises when flows exceed the capacity of the channel, or where a restrictive structure is encountered, resulting in water overtopping the banks into the floodplain.

4.2. Tidal flooding occurs when a high tide and high winds combine to elevate sea levels. An area behind coastal flood defences can still flood if waves overtop the defences or break through them. Tidal flooding can also occur a long way from the coast by raising river levels. Water may overtop the riverbank or river defences when tide levels are high.

4.3. According to the Product 4 EA datasets:

> *This site is considered to be at risk of flooding from main rivers.*
>
> *This site is not considered to be at risk from tidal flooding.*

### Main Rivers

4.4. The nearest EA main river is the River Welland, located approximately 535m east of the site boundary.

### Ordinary Watercourses

4.5. The nearest ordinary watercourse is Vernatt's Drain (artificial river), located approximately 1460m north of the site.

4.6. There are no other mapped watercourses within the vicinity of the site.

### Historical Fluvial/ Tidal Flooding

4.7. The EA Recorded and Historical Flood Outlines shows that there is no record of historical fluvial/tidal flooding on-site (Figure 3).

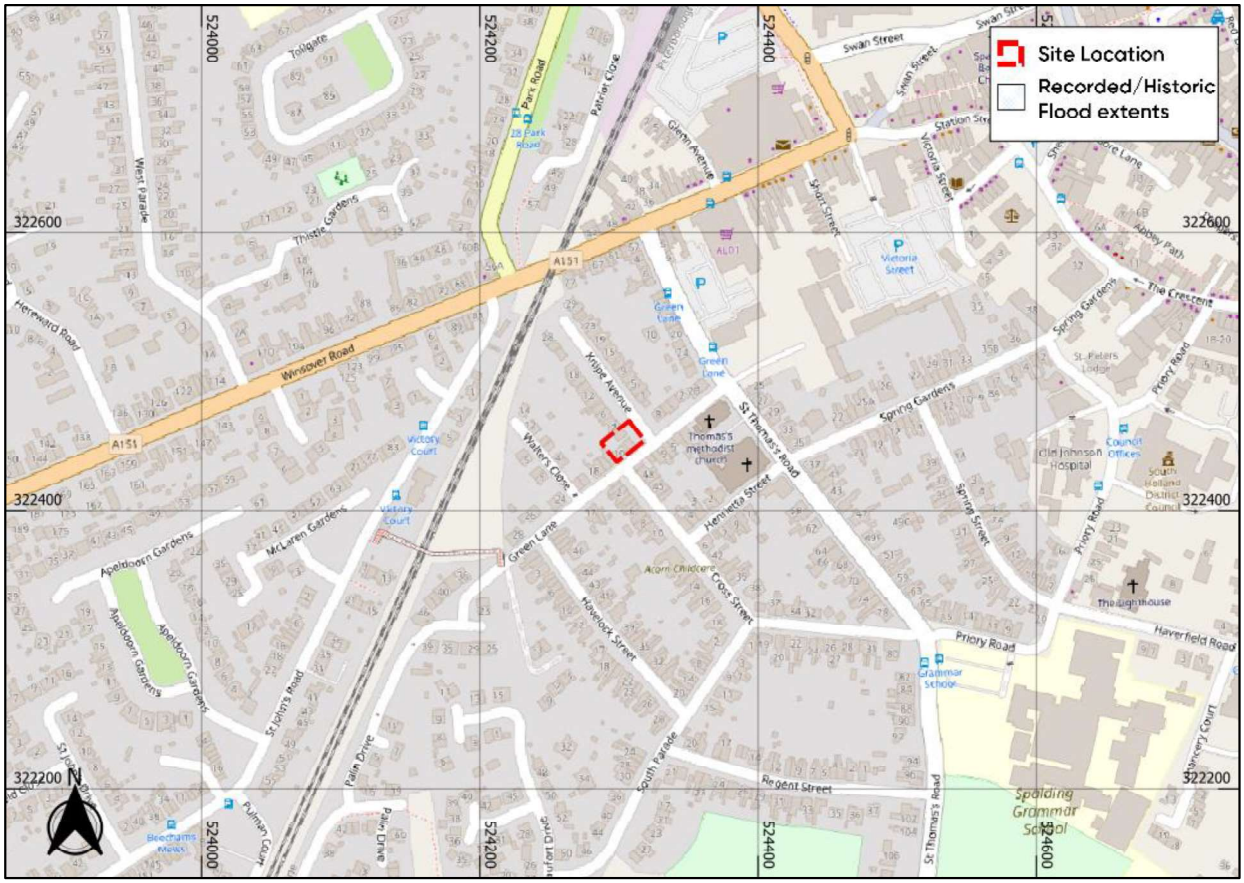



Figure 3: EA Historic Flood Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

## EA Flood Map for Planning

4.8. The EA Flood Map for Planning (Figure 4 and Figure 5) shows the site is located within Flood Zone 3 (fluvial/tidal). Flood Zone 3 denotes a risk of flooding from fluvial sources greater than 1 in 100 (1%) and greater than 1 in 200 (0.5%) from tidal sources.

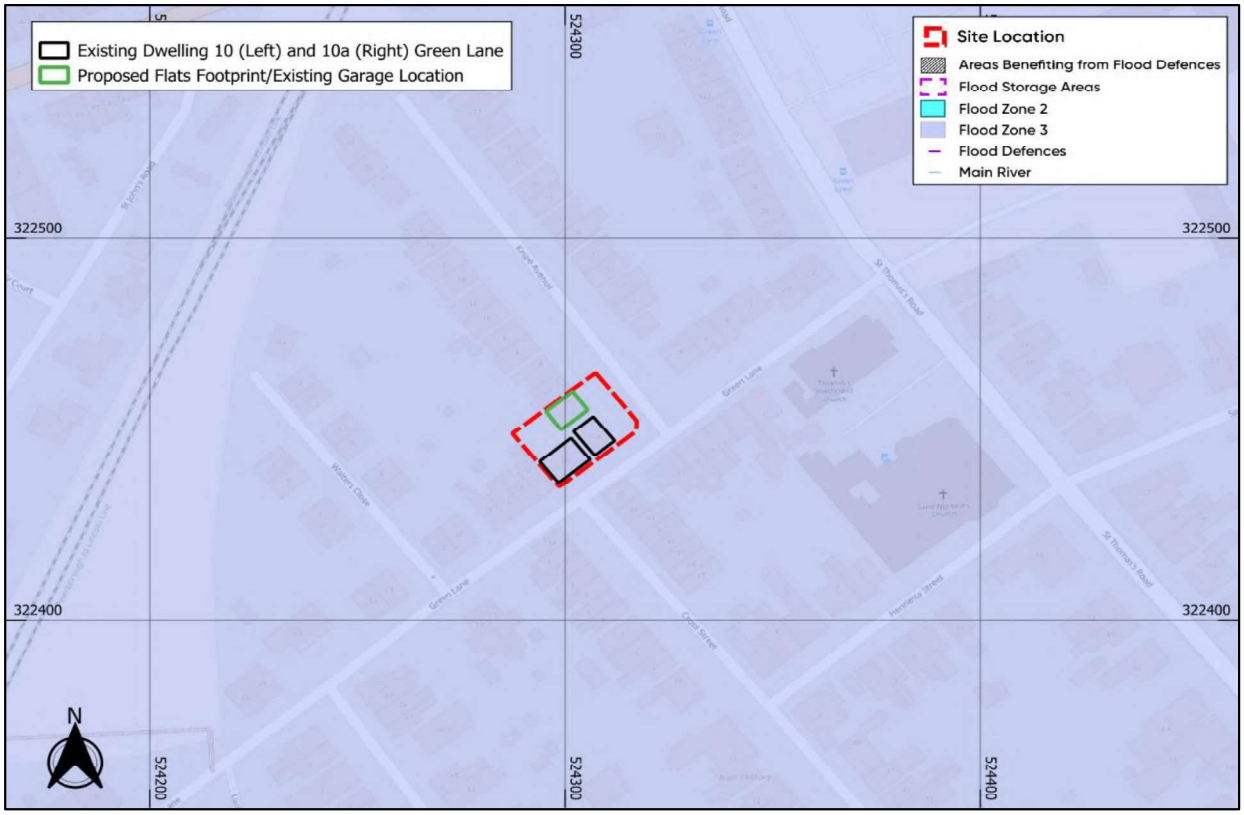



Figure 4: EA Flood Map for Planning (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

## EA Flood Defences

4.9. The EA have stated the following in the Product 4 data:

> *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.*

4.10. There are EA registered fluvial flood defences located to the east/ southeast of the site along River Welland (Figure 5). According to the EA data, the existing defences benefitting the site consist of Crowland – Cowbit Washes and embankment.

4.11. These defences are in a 'fair' condition and provide a standard of protection equal to the 1 in 100 year (1.0%AEP) event. Regular inspections are conducted to promptly detect and address any potential defects in the defences.

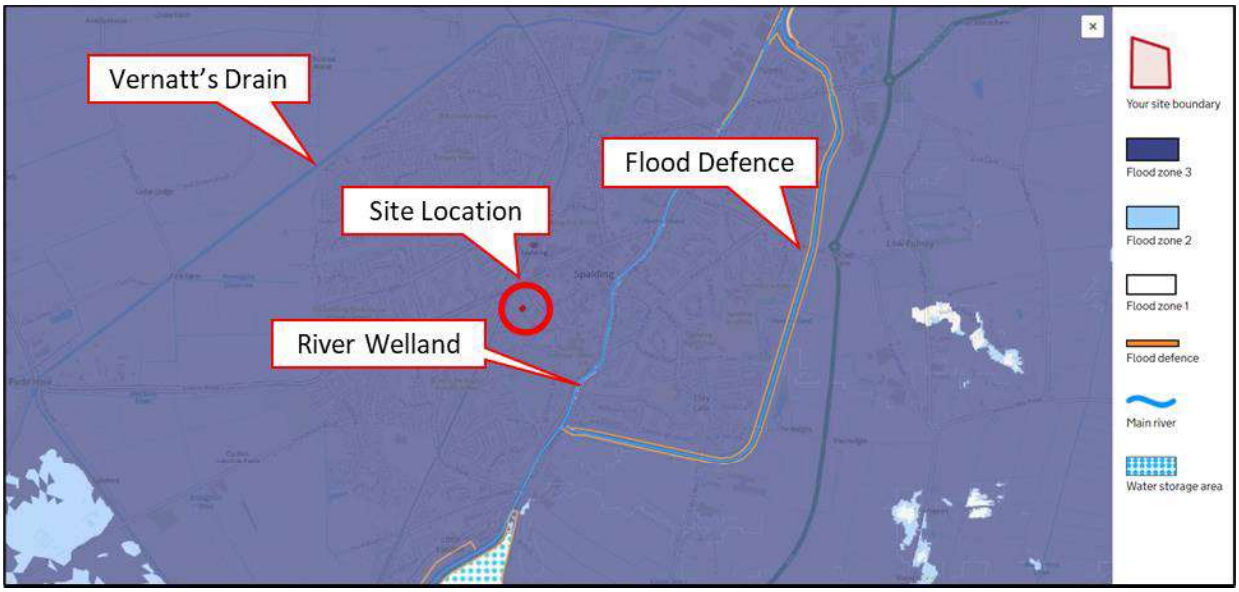



Figure 5: Flood Map for Planning. Contains OS data © Crown copyright and database rights 2023. The map shows the watercourses and flood defence.

## Climate Change

4.12. The site is located within the Welland Management Catchment, which has updated higher central peak flow river allowances of 5% for the 2020s, 4% for the 2050s, and 17% for the 2080s.

4.13. As the proposal is for a more vulnerable development and that the design life is understood to reach at least until 2080s, a peak flow allowance of 17% would be required for fluvial flood flows. The EA Product 4 includes a 1 in 100 year event with a 20% allowance for climate change and thus, this is considered to be a conservative estimate of the 1 in 100 year +CC (17%) design event.

## EA Data - Welland Glen (2016) Model

4.14. Following consultation with the EA, Aegaea were provided modelling data for the Welland Glen (2016) model in order to analyse the fluvial flood risk to the site. The model includes fluvial modelled flood levels and flows. The EA noted that these levels are "in-channel" levels and therefore may not represent the flood level on the floodplain, particularly where the channel is embanked or has raised defences.

4.15. The EA have also provided fluvial Modelled Flood Extents taking into account flood defences and climate change allowances. However, the EA stated that at present the site is not covered by any fluvial Environment Agency hazard mapping. Detailed Hazard Mapping is available within the 2017 Update of South Holland Strategic Flood Risk Assessment which will be analysed in this report.

4.16. Figure 6 shows the fluvial Modelled Flood Extents. The data shows the site has been found to lie outside the modelled flood extent (not affected in the modelled 3.33%AEP, 1.0%AEP, 1.0%AEP+20%CC, 0.1%AEP and 0.1%AEP+20%CC. As such the site remains unaffected by fluvial flooding.

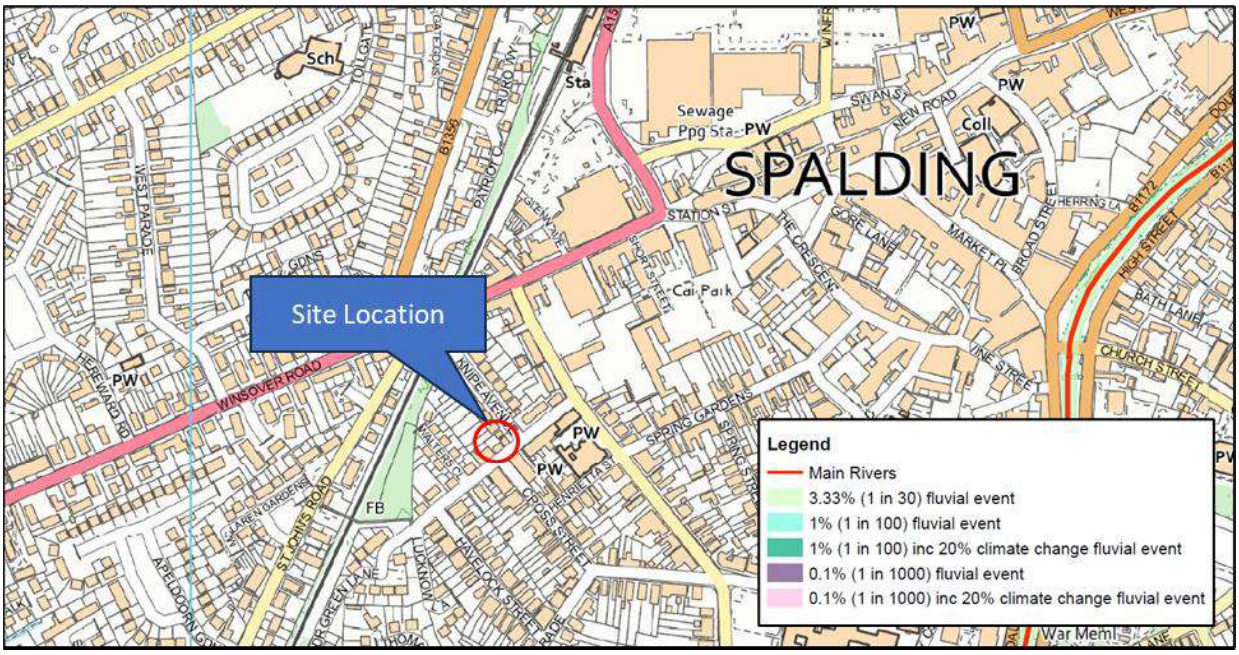



Figure 6: EA data - Modelled Flood Extents (with defences) Model: Welland Glen (2016)

## SFRA Modelling Results - Fluvial and Tidal Hazard Mapping (Spalding)

4.17. The SFRA (2017) includes results from the 2017 modelling exercise in form of hazard mapping completed by Royal HaskoningDHV in order to assess the residual risk to the site. The hazard mapping includes modelled flooding resulting from both overtopping and breaching of flood defences.

4.18. According to the SFRA, the height of the defences used in all modelling scenarios was based on present day defence heights. Each breach was simulated separately, with the width of the breach determined by the specific type and location of the defence.

4.19. Two scenarios were modelled, representing the '1 in 100 (1.0%) fluvial/ 1 in 200 (0.5%) tidal' 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 accommodates the lifetime of development).

4.20. When accounting the climate change allowance (2115 year) scenario, the results show the site is not affected in the modelled 1 in 100 (1.0%) fluvial/ 1 in 200 (0.5%) tidal and 1 in 1000 (0.1%) (Figure 7).

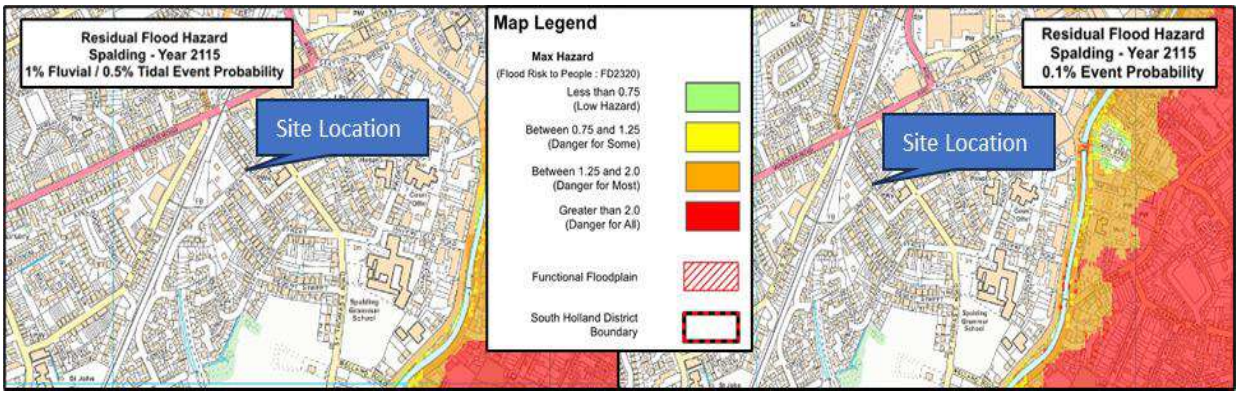



Figure 7: SFRA Fluvial and Tidal Hazard Mapping (1in 100 year fluvial/ 1 in 200 year tidal + 2115 CC) and 1 in 1000 year + 20115 CC

4.21. When accounting the 'present' day scenario, the site is also not shown to be affected in the modelled 1 in 100 (1.0%) fluvial/ 1 in 200 (0.5%) tidal and 1 in 1000 (0.1%) (Figure 8).

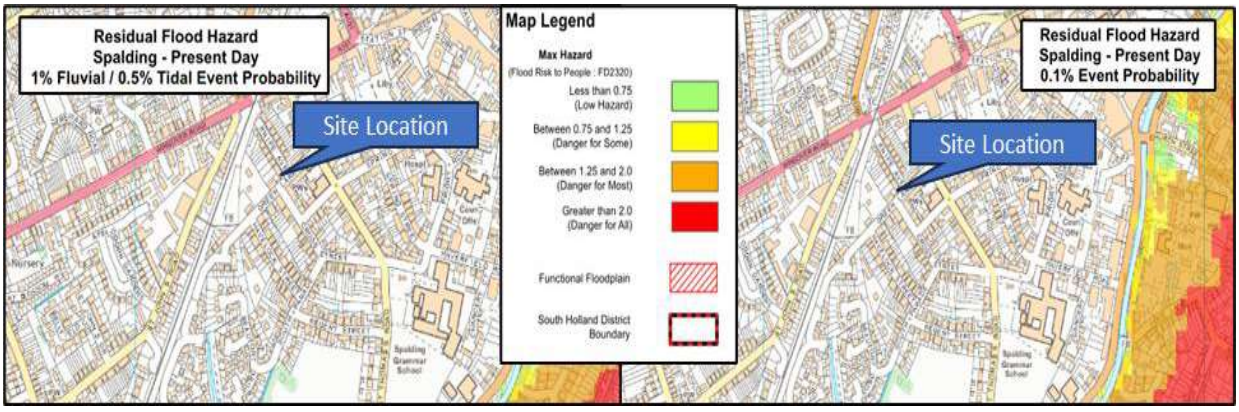



Figure 8: SFRA Fluvial and Tidal Hazard Mapping (1in 100 year fluvial/ 1 in 200 year tidal and 1 in 1000 year) – 'Present' day

4.22. Based on the information above, the risk of flooding from fluvial and tidal sources is considered to be low.

## Canals

4.23. The Canal and River Trust (CRT) generally maintains canal levels using reservoirs, feeders, and boreholes and manages water levels by transferring it within the canal system.

4.24. Water in a canal is typically maintained at predetermined levels by control weirs. When rainfall or other water enters the canal, the water level rises and flows out over the weir. If the level continues rising it will reach the level of the storm weirs. The control weirs and storm weirs are normally designed to take the water that legally enters the canal under normal conditions. However, it is possible for unexpected water to enter the canal or for the weirs to become obstructed. In such instances the increased water levels could result in water overtopping the towpath and flowing onto the surrounding land.

4.25. Flooding can also occur where a canal is impounded above surrounding ground levels and the retaining structure fails.

4.26. There are no canals identified within 1000m of the site. The risk of flooding to this site from canals is considered to be low.

4.27. The risk of flooding to this site from canals is considered to be low.

## Pluvial

4.28. Pluvial flooding can occur during prolonged or intense storm events when the infiltration potential of soils, or the capacity of drainage infrastructure is overwhelmed leading to the accumulation of surface water and the generation of overland flow routes.

4.29. Annual surface water flood risk is labelled by the EA as:

- 'High Risk'; >3.3% AEP (annual probability greater than 1 in 30).
- 'Medium Risk'; 1.1% to 3.3% AEP (annual probability between 1 in 100 and 1 in 30).
- 'Low Risk'; 0.1% to 1% AEP (annual probability between 1 in 1000 and 1 in 100).
- 'Very Low Risk'; <0.1% AEP (annual probability less than 1 in 1000).

4.30. Examination of the EA's Flood Risk from Surface Water mapping (Figure 9) shows the site is at risk of flooding in modelled 'Low Risk' surface water flood event.

4.31. However, the proposed development remains unaffected by surface water flooding in each of the modelled surface water flood events.

4.32. Knipe Avenue is affected in the modelled 1.0%AEP event and the southern part of Green Road is affected in the modelled 3.3%AEP event.

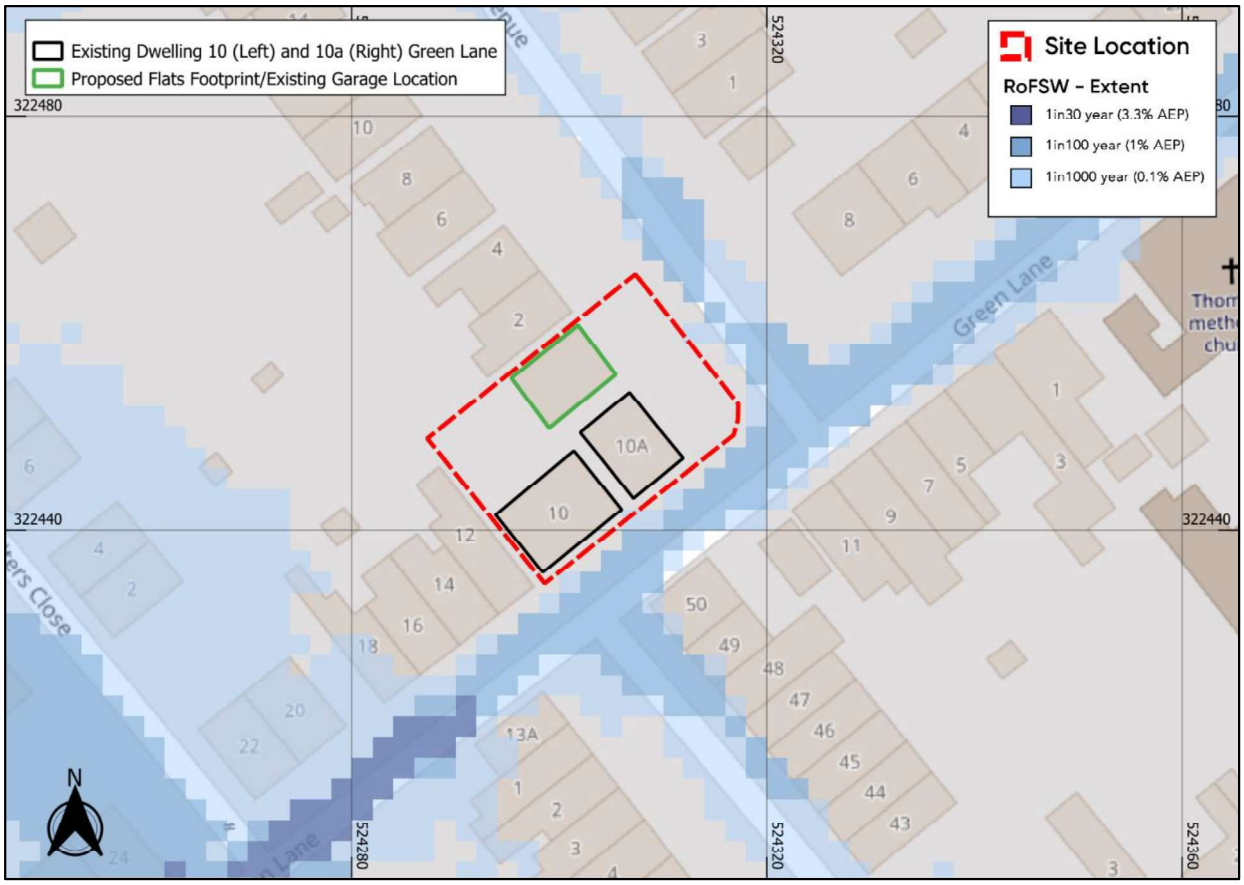



Figure 9: EA Surface Water Flood Risk Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.33. Analysis of flood depths during the modelled 'High' risk event (Figure 10) shows the southern part of the main access road (Green Lane) could be affected by flooding with the flood depths at this area could range between 150mm and 300mm.

4.34. However, the site in general and the proposed development in particular is not shown be affected by surface water flooding. Knipe Avenue also shown not to be affected.

4.35. The EA hazard rating of the flood extent on the southern part of the main access road (Green Lane) is shown to be 'Moderate' with the rating being (0.75 – 1.25). However, the northern part of Green Lane and Knipe Avenue remain unaffected (no Hazard). As such, safe access/ egress may be possible during this event (3.3%AEP).

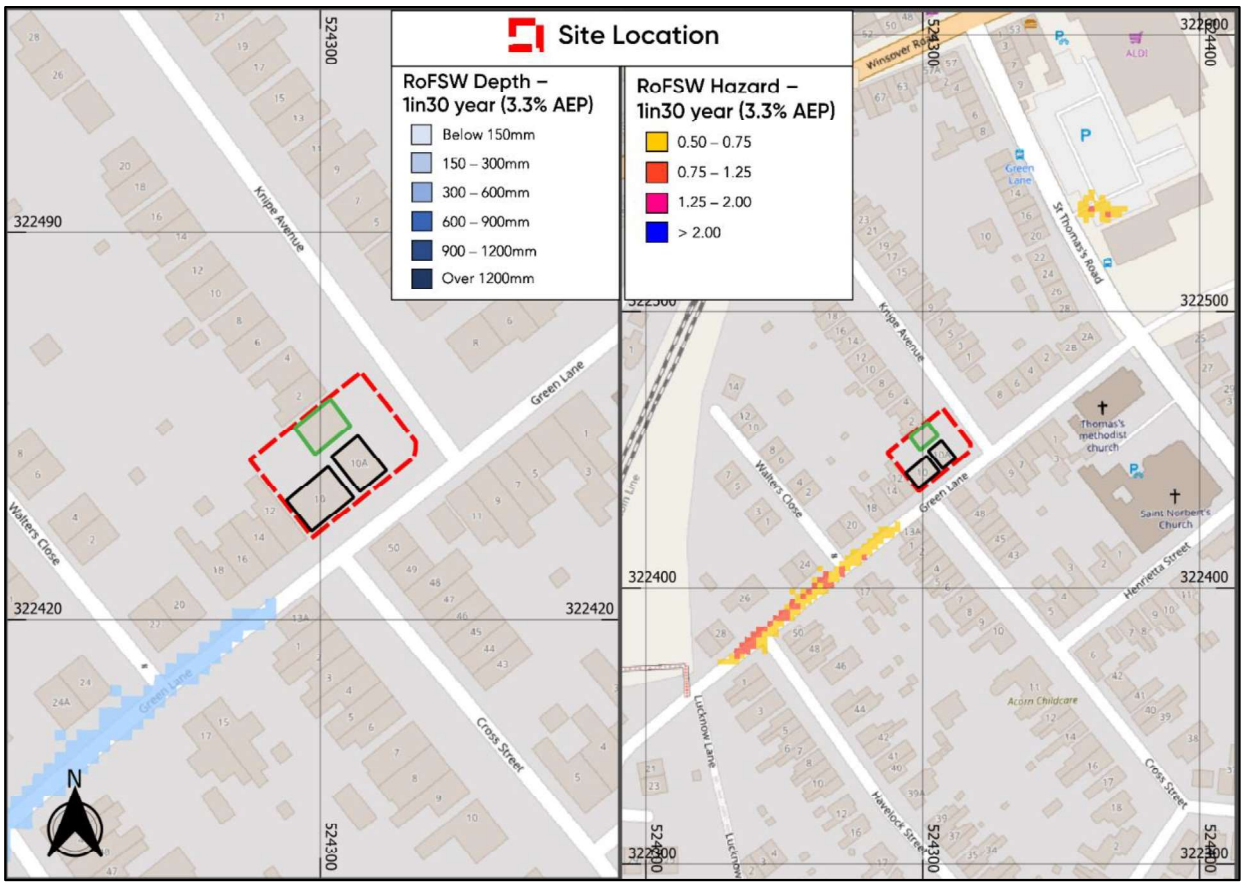



Figure 10: EA Surface Water Flood Risk Mapping 3.3% AEP (Source: Base map and data from Google Satellite Imagery © Contains public sector information licensed under the Open Government Licence v3.0). Proposed footprint is shown in green.

4.36. Analysis of flood depths during the modelled 'Medium' risk event (Figure 11) shows the main access road (Green Lane) and the southern part of Knipe Avenue could be affected by flooding.

4.37. The northern part of Green Lane and southern part of Knipe Avenue could experience flood depths between 150mm and 300mm. However, the southern part of Green Lane could experience flood depths between 300mm and 600mm.

4.38. The EA hazard rating of the flood extent on the southern part of the main access road (Green Lane) is shown to be 'Moderate' with the rating being (0.75 – 1.25). However, the hazard rating on the majority of the northern part of Green Lane and Knipe Avenue is shown to be 'Low' with the rating being (0.50 – 0.75). As such, safe access/ egress may be possible during this event (1.0%AEP).

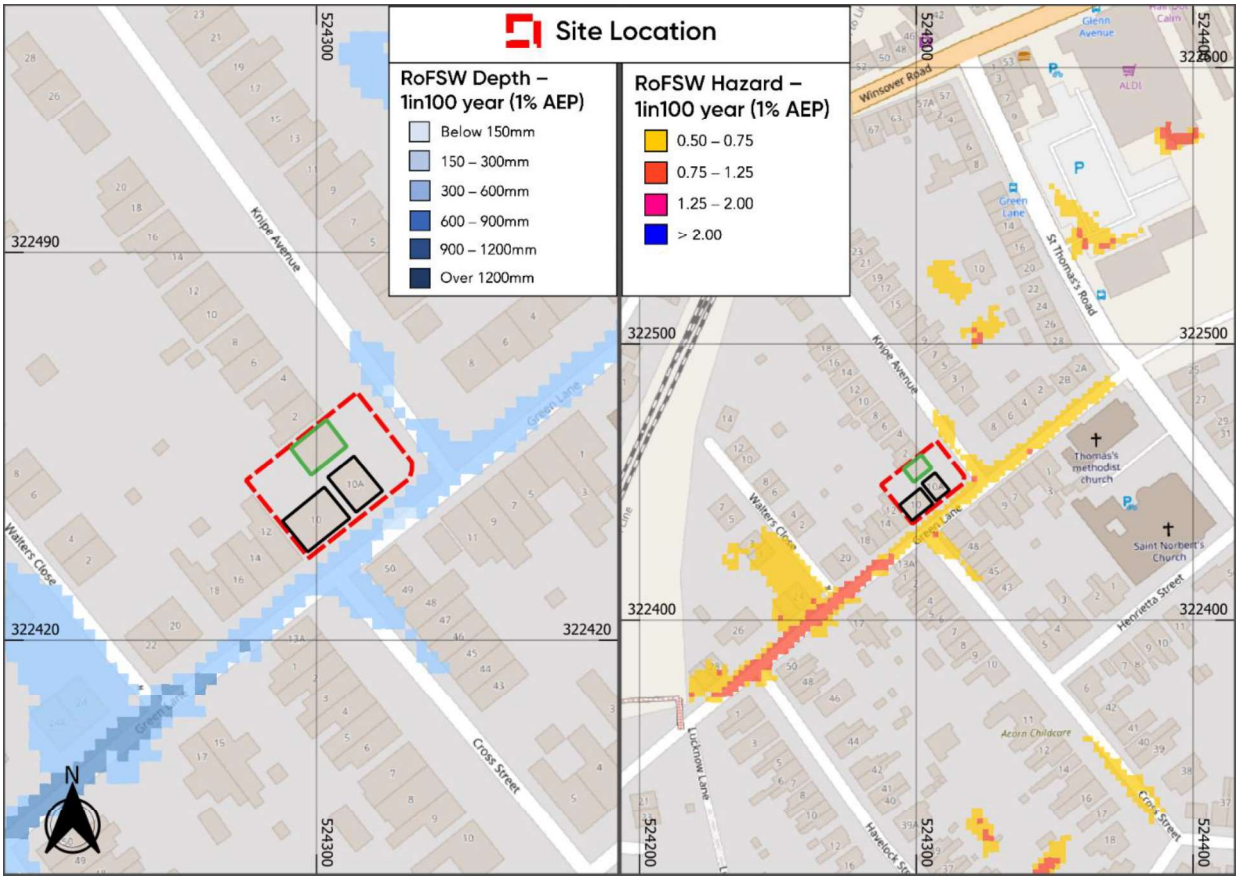



Figure 11: EA Surface Water Flood Risk Mapping 1.0% AEP (Source: Base map and data from Google Satellite Imagery © Contains public sector information licensed under the Open Government Licence v3.0). Proposed footprint is shown in green.

4.39. Analysis of flood depths during the modelled 'Low' risk event (Figure 12) shows the site, main access road (Green Lane) and Knipe Avenue could be affected by flooding. However, the proposed development remains unaffected by flooding.

4.40. A small area at the southern boundary of the site within the site curtilage could experience flood depths between 150mm and 300mm.

4.41. Green Lane and Knipe Avenue could experience flood depths between 300mm and 600mm.

4.42. The EA hazard rating/level of the flood extent on the majority of the main access road (Green Lane) and Knipe Avenue is shown to be 'Moderate' with the rating being (0.75 –1.25). The hazard rating on some areas on the southern part of Green Lane is shown to be 'Significant' with the rating being (1.25 – 2.00). As such, safe access/ egress may not be possible during this event (0.1%AEP) and safe refuge should be sought on site.

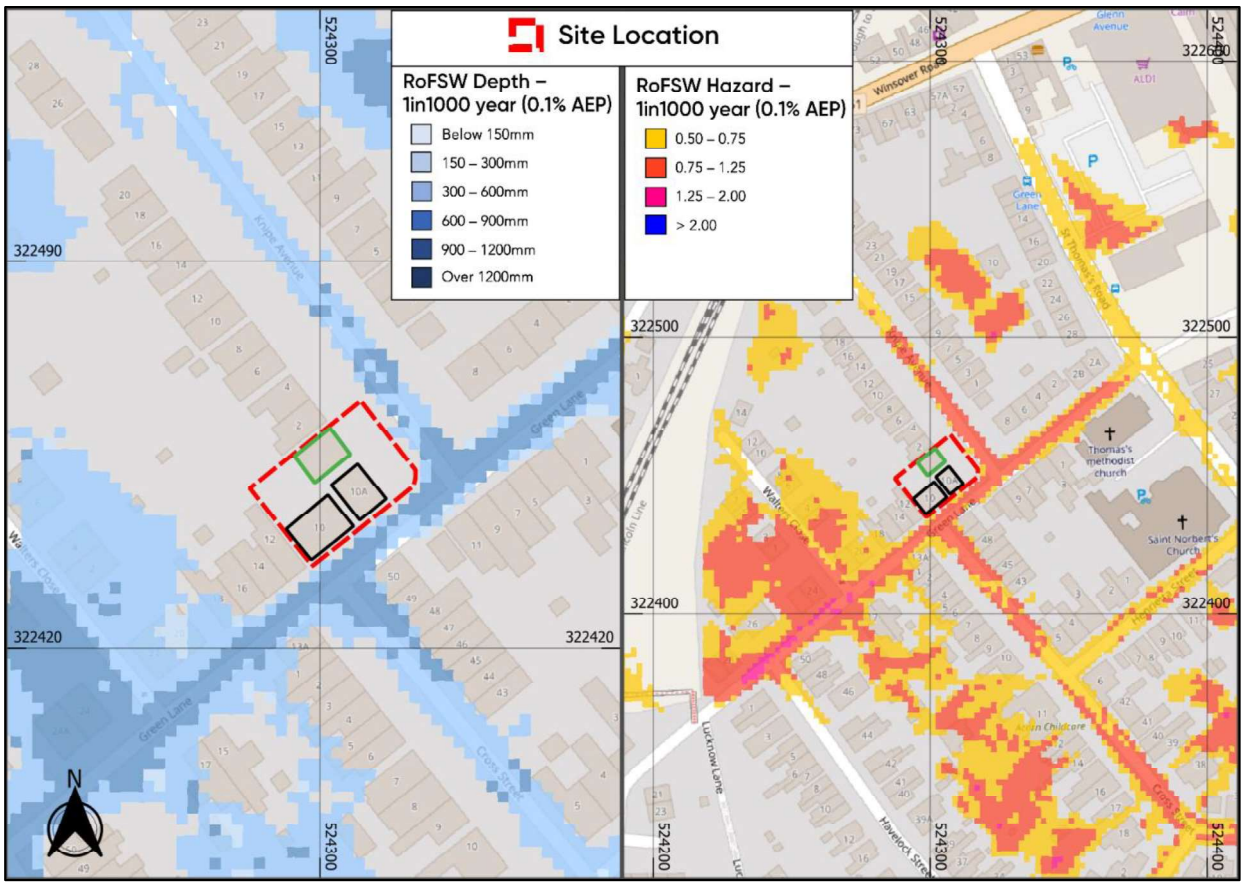



Figure 12: EA Surface Water Flood Risk Mapping 0.1% AEP (Source: Base map and data from Google Satellite Imagery © Contains public sector information licensed under the Open Government Licence v3.0). Proposed footprint is shown in green.

4.43. Based on the information above, the proposed development remains unaffected by surface water flooding, therefore, the risk is considered to be low. However, access roads are mainly affected in the modelled 1.0%AEP and 0.1%AEP events. Safe access/ egress may be possible in the modelled 3.3%AEP and 1.0%AEP events but may not be possible in the modelled 0.1%AEP event.

## Reservoirs

4.44. Flooding can occur from large waterbodies or reservoirs if they are impounded above the surrounding ground levels or are used to retain floodwater. Although unlikely, reservoirs and large waterbodies could overtop or breach leading to rapid inundation of the downstream floodplain.

4.45. According to the EA's Flood Risk from Reservoirs mapping (Figure 13) a small area of the site along the southern boundary is at risk of flooding in the event of a breach at the Rutland Water,

Empingham reservoir. The reservoir failure model is a 'wet day' scenario meaning that it would have to happen at the same time as other flooding for there to be enough water to reach the site.

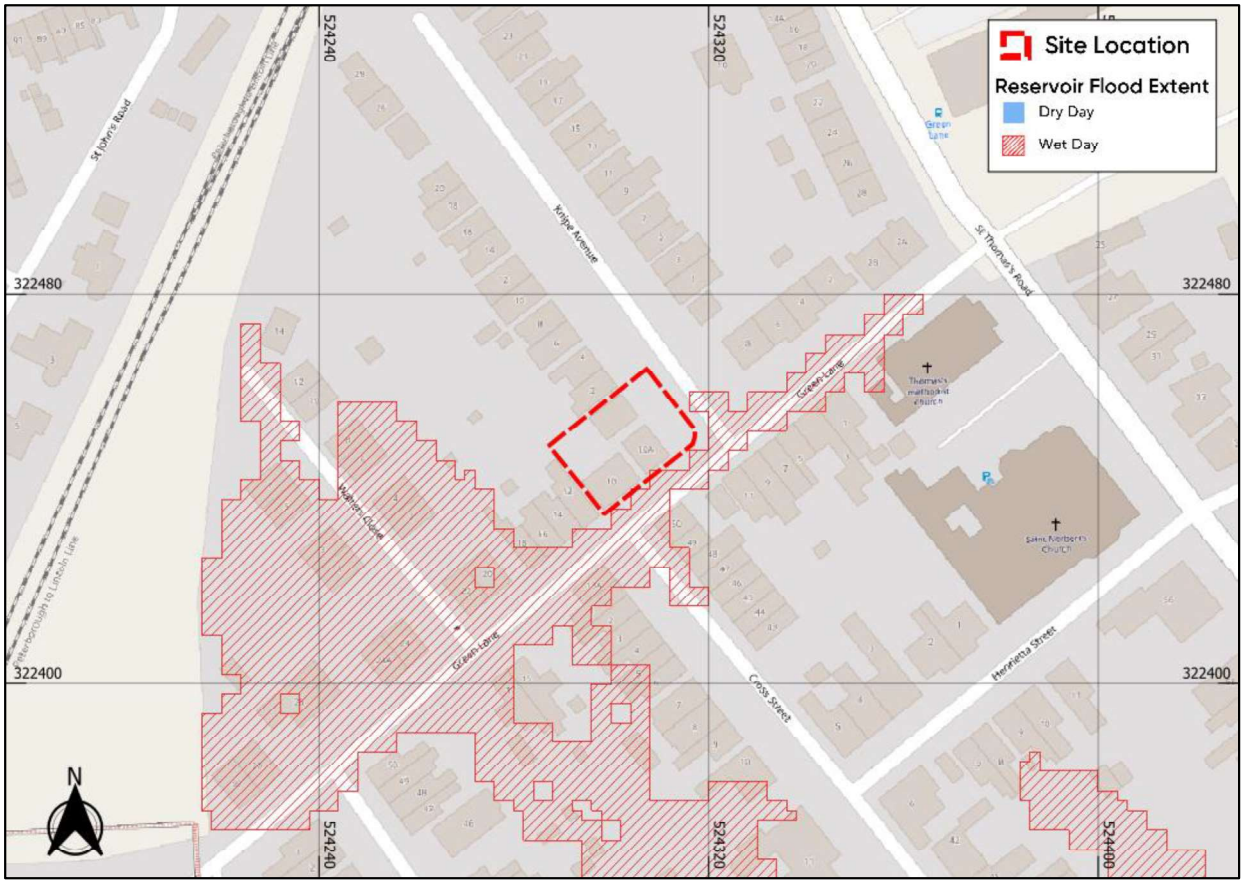



Figure 13: EA Reservoir Flood Risk Mapping (Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). ©https://www.openstreetmap.org and contributors. Contains public sector information licensed under the Open Government Licence v3.0)

4.46. All large reservoirs must be inspected and supervised by reservoir panel engineers as detailed by the Reservoirs Act 1975 in England and Wales. The EA are responsible to ensure that reservoirs are inspected regularly, and essential safety work carried out. As reservoirs are highly managed the maximum flood extent provided in the EA Risk of Flooding from Reservoirs mapping is considered a worst-case scenario.

4.47. As reservoir flooding is unlikely and the modelled flood depths are based on the worst-case scenario, flooding from this source may be considered as a relatively low risk.

## Groundwater

4.48. Groundwater flooding occurs in areas where underlying geology is permeable, and water can rise within the strata sufficiently to breach the surface.

4.49. The British Geological Survey's (BGS) mapping shows superficial deposits of Tidal Flat Deposits comprising clay and silt underlying the site. The bedrock underlying the site is Oxford Clay Formation comprising Mudstone.

4.50. Historical BGS borehole (Ref: TF22SW11/E) is located approximately 255m northeast of the site. The record confirms that the geology at this location composed of clay, sand and gravel. Water level was recorded at 6'0 (1.83m).

4.51. As the development proposals do not include any proposed basements the risk from groundwater to the development is considered to be low.

## Sewers

4.52. Foul or surface water sewers can be a cause of flooding if the drainage network becomes overwhelmed, either by blockage or due to local development beyond the designed capabilities of the drainage system.

4.53. Local policy documentation does not identify the site as being in a Critical Drainage Area.

4.54. Given the type of the development and the lack of recorded sewer flood incidents at the site location, the risk of flooding from sewers is considered to be low. However, it is recommended that non-return valves are fitted to any new sewer connections to minimise the risk of internal sewer flooding.

# 5. Flood Risk Mitigation

## Fluvial/ Tidal

5.1. The EA Flood Map for Planning shows the site is located within Flood Zone 3 (fluvial/tidal). However, based on the analysis within this report the proposed development is considered to be at low risk of flooding from fluvial and tidal sources. The site in general is not affected in all the modelled fluvial events based on the modelling data from the Welland Glen (2016) model. The site is also not affected in the modelled 1 in 100 (1.0%) fluvial/ 1 in 200 (0.5%) tidal and 1 in 1000 (0.1%) + CC (2115) and in 'present' day scenarios. As such mitigation measures are not recommended.

## Pluvial

5.2. The site is shown to be at low risk of flooding from surface water, however, the proposed development remains unaffected by surface water flooding. As such mitigation measures are not recommended.

## Canal, Reservoirs, Groundwater and Sewers

5.3. Flood risk from these sources is deemed to be low, therefore mitigation is not required.

5.4. It is recommended that all new drainage associated with the scheme be fitted with non-return valves and that any new plumbing should be constructed in a closed-cell design.

## Increase to Flood Risk Elsewhere

5.5. The proposed development is for a garage conversion into two residential dwelling (studio flats). It is understood that the proposed development does not result in any increase in built footprint.

5.6. Furthermore, the site is shown to be at low risk from all sources of flooding.

5.7. As such, the proposed development in isolation should have a negligible impact on flood risk elsewhere.

## Flood Warnings/ Alerts

5.8. Although the site is shown to be at low risk of flooding from fluvial / tidal source, the site is in an area benefiting from the Environment Agency (EA) flood warning service. As a precaution the site owners/ residents should sign up to the Pinchbeck and the West of Spalding EA warning service and/ or to the Lower Welland and other watercourses from Stamford to Spalding, including Market Deeping and Spalding EA alert service. These services allow site owners/ residents to register an address, which is at risk of flooding, along with contact details so that in the event of a flood being forecast, the site owner will be sent an alert directly to their chosen method of contact. As a further precaution and risk reduction, the owner of the site should sign up.

5.9. Flood warnings/alerts can be enforced at any time of the day or night. Signing up for this service provides site owners some notice before a flood event. The amount of time afforded before a flood occurs depends on the site-specific location (e.g. proximity to the source of flooding, topography of the surrounding area) and the flood mechanism (e.g. bank over topping versus a breach event). Flood alerts and warnings provide site managers with time to take necessary action, e.g. communication of the risk of flooding to occupants etc, evacuation of occupants offsite or to a safe level, removal of valuable items out of reach of flooding and the mounting of site-specific flood defences.

## Met Office Weather Warnings

5.10. Met Office is the national meteorological service for the UK; they issue weather warnings up to 5 days in advance, through the National Severe Weather Warning Service, when severe weather has the potential to bring impacts to the UK. It is also possible to stay up to date with weather warnings through the Met Office app (available on both Android and Apple), social media (Twitter, Facebook) or email alerts.

5.11. Furthermore, during periods of bad weather, owners/ residents should monitor local weather reports and sign up for the Met Office UK weather warnings. Warnings can be monitored through an Apple/Android app, Twitter or directly via emails.

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# 6. Conclusions

6.1. This FRA has been undertaken with reference to the requirements of NPPF and Planning Practice Guidance with respect to the development at 10 Green Lane, Spalding, South Holland, PE11 2YB. It has been written to support a planning application >and has been prepared with due consideration to the nature of the proposed development to provide the appropriate level of detail.

6.2. An assessment of the risk of flooding from all sources has been undertaken and is summarised in the table below:

| Source of Flooding | Flood Risk Summary |
|---|---|
| Fluvial/ Tidal | The EA Flood Map for Planning shows the site is located within Flood Zone 3 (fluvial/ tidal). However, based on the analysis within this report, the site in general and the proposed development is shown to be at low risk of flooding from fluvial and tidal sources, even in the event of a breach. As such mitigation measures are not required. |
| Pluvial | Based on the analysis within this report, the proposed development remains unaffected by surface water flooding. As such mitigation measures are not required.<br>However, access roads are mainly affected in the modelled 1.0%AEP and 0.1%AEP events. Safe access/ egress may be possible in the modelled 3.3%AEP and 1.0%AEP events but may not be possible in the modelled 0.1%AEP event |
| Reservoirs<br>Groundwater<br>Sewers<br>Canals | The site is considered to be at low risk from these sources.<br>It is recommended that all new drainage associated with the scheme be fitted with non-return valves and that any new plumbing should be constructed in a closed-cell design |

6.3. This FRA has identified no prohibitive constraints in developing the proposed site for the proposed usage.

6.4. The proposed development does not include any increase in built footprint and as such should not increase flood risk elsewhere.

6.5. This Flood Risk Assessment should be submitted as part of the planning application to satisfy the requirements under NPPF.

# Appendix B - EA Product 4 Data

Lisa Slater
lisa@aegaea.com

**Our ref:** CCN-2023-324233

**Date:** 14/09/2023

Dear Lisa,

**Provision of Flood Risk Information for Green Lane, Spalding.**

Thank you for your request for our flood risk information for the above site. The information is set out below and attached. It is important you read any contextual notes on the maps provided.

If you are preparing a Flood Risk Assessment (FRA) for this site, please note this information may not be sufficient by itself to produce an adequate FRA to demonstrate the development is safe over its lifetime. Additional information may be required to carry out an appropriate assessment of all risk, such as consequence of a breach in defences.

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.

Please read the letter in full as the information covered has been updated in **June 2023.**

## 1. Flood Map for Planning

The attached map includes the current Flood Map for Planning for your area. The 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 for Planning 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 for Planning 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.

## 2. Recorded Flood Outlines

With regards to the history of flooding I can advise we do not have any records of flooding in this area. It is possible recent flooding may have occurred which we are currently investigating, therefore this information may be subject to change. It is possible other flooding may have occurred which other risk management authorities, such as the Lead Local Flood Authority (ie top tier council) or Internal Drainage Board (where they exist) have responsibility.

## 3. Schemes in the area

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

## 4. Fluvial Flood Risk Information

This site is considered to be at risk of flooding from main rivers.

The site may also be at risk from local ordinary watercourses for which other risk management authorities, such as the Lead Local Flood Authority (ie top tier council) or Internal Drainage Board (where they exist) have responsibility.

### 4.1 Fluvial Defence Information

The existing fluvial defences reducing the risk of flooding to this site consist of Crowland-Cowbit Washes and embankment. They are in fair condition and provide protection against a flood event with a 1% chance of occurring in any year (1 in 100). We inspect these defences regularly to ensure that any potential defects are identified early.

### 4.2 Fluvial Modelled Levels and Flows

Available modelled fluvial flood levels and flows for the model nodes shown on the attached map are set out in the data table attached. This data is taken from the model named on the data table, which is the most up-to-date model currently available.

Please note these levels are “in-channel” levels and therefore may not represent the flood level on the floodplain, particularly where the channel is embanked or has raised defences.

Our models may not have the most up to date climate change allowances. In time we will update our models for the latest allowances. You should refer to 'Flood risk assessments: climate change allowances' to check if the allowances modelled are appropriate for the type of development you are proposing and its location. You may need to undertake further assessment of future flood risk using different allowances to ensure your assessment of future flood risk is based on best available evidence.

### 4.3 Fluvial Modelled Flood Extents

Please find attached a map showing available modelled flood extents, taking into account flood defences, for your area. This data is taken from the model named on the map, which is the most up-to-date model currently available.

In some cases the flood extents shown may not be from main river, but may be from other sources such as IDB lowland drainage networks.

### 4.4 Fluvial 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 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.

At present this site is not covered by any fluvial Environment Agency hazard mapping.

Detailed Hazard Mapping is available within the 2017 Update of South Holland Strategic Flood Risk Assessment. This can be downloaded via the following link:
http://www.southeastlincslocalplan.org/water/

## 5. Tidal Flood Risk Information

This site is not considered to be at risk from tidal flooding.

## 6. 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 LNplanning@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, unless specified otherwise, 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 **July 2021**. 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.

## 7. Data Licence and Other Supporting Information

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).

This information is provided in accordance with the Open Government Licence which can be found here: http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

Further information on flood risk can be found on the GOV.UK website at:
https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

## 8. Other Flood Risk Management Authorities

The information provided with this letter relates to flood risk from main river or the sea. The Flood Map for Surface Water can be viewed at https://www.gov.uk/check-long-term-flood-risk

Additional information may be available from other risk management authorities, such as the Lead Local Flood Authority (ie top tier council) or Internal Drainage Board (where they exist).

I hope we have correctly interpreted your request. If you have any queries or would like to discuss the content of this letter further please contact Annabelle Webster using the email address below and quoting our CCN reference number above.

Yours sincerely,

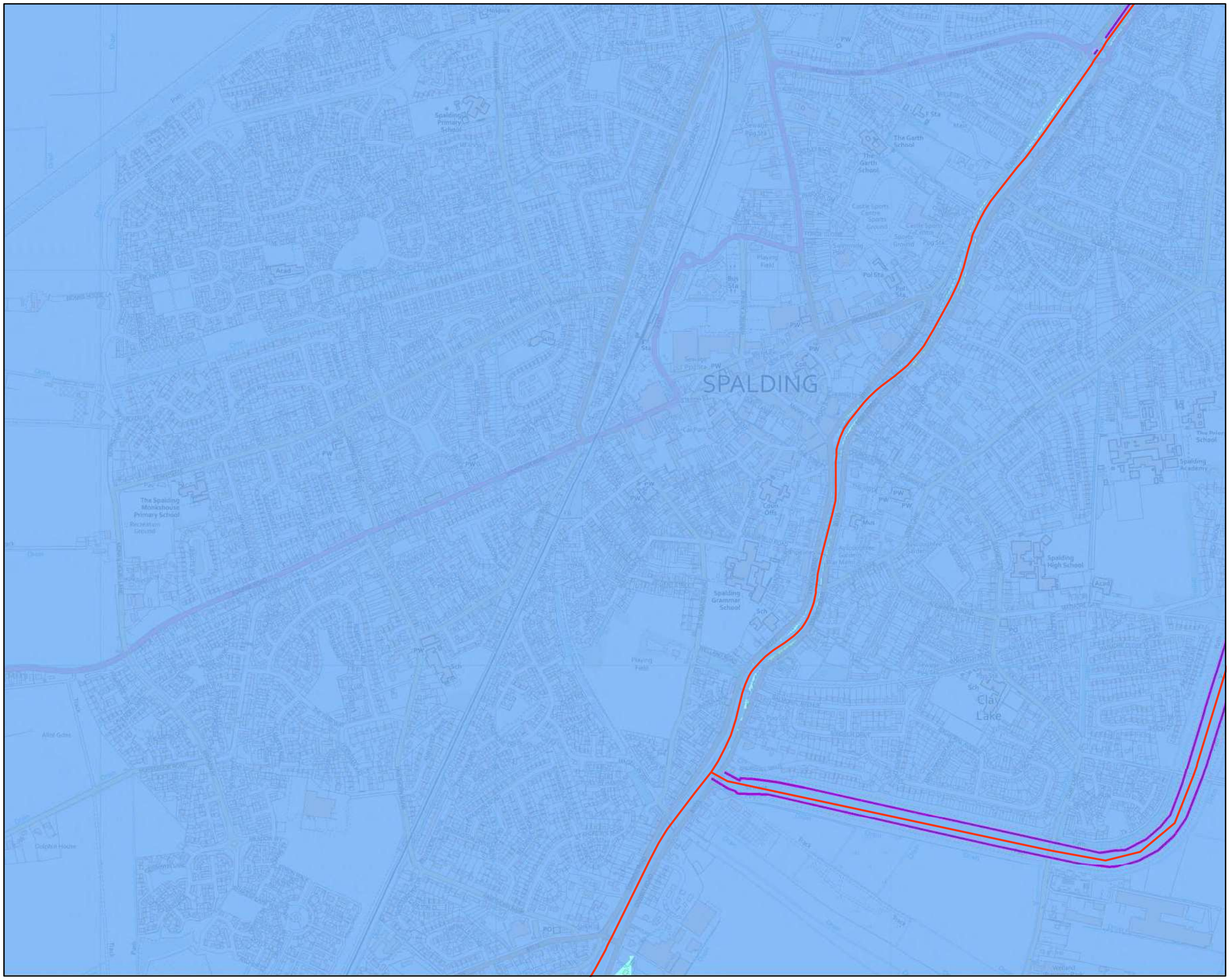


020 302 53535

**for Alastair Windler**
**Welland and Nene Partnerships and Strategic Overview Team Leader**
e-mail PSOWN@environment-agency.gov.uk

Enc.
Flood Map for Planning
Modelled Node Points Map
Modelled Fluvial Levels and Flows Data Sheet
Modelled Flood Extent Maps

# Flood Map centred on TF 24302 22444 - created September 2023 [Ref: CCN-2023-324233]




Environment Agency

Scale 1:10,000

N

**Legend**

- Main Rivers
- Raised Defences
- Flood Storage Areas
- Areas 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

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**Contact Us:** National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

# Modelled Node Points Map centred on TF 24302 22444 - created September 2023 [Ref: CCN-2023-324233]




Environment Agency

Scale 1:10,000

N

**Legend**

- Model Nodes - Flows
- Model Nodes - Levels
- Main Rivers

Created by the Partnerships and Strategic Overview Team, Kettering

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**Contact Us:** National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

## Fluvial Flood Levels (mODN)

The fluvial flood levels for the model nodes shown on the attached map are set out in the table below. They are measured in metres above Ordnance Datum Newlyn (mODN).

| | | | Annual Exceedance Probability - Maximum Water Levels (mODN) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Node Label** | **Easting** | **Northing** | **50% (1 in 2)** | **20% (1 in 5)** | **10% (1 in 10)** | **5% (1 in 20)** | **3.33% (1in 30)** | **2% (1 in 50)** | **1.33% (1 in 75)** | **1% (1 in 100)** | **1% (1 in 100) inc 20% Climate Change** | **0.5% (1 in 200)** | **0.1% (1 in 1000)** | **0.1% (1 in 1000) inc 20% Climate Change** |
| SPALDING_CHANNEL 1947 | 524880 | 322587 | 3.69 | 3.98 | 4.17 | 4.44 | 4.49 | 4.50 | 4.51 | 4.51 | 4.67 | 4.53 | 4.55 | 4.67 |
| SPALDING_CHANNEL 2190 | 524844 | 322350 | 3.69 | 3.97 | 4.17 | 4.43 | 4.49 | 4.50 | 4.51 | 4.51 | 4.67 | 4.52 | 4.54 | 4.67 |
| SPALDING_CHANNEL 2391 | 524803 | 322154 | 3.68 | 3.96 | 4.17 | 4.43 | 4.48 | 4.50 | 4.51 | 4.51 | 4.67 | 4.52 | 4.54 | 4.67 |

## Fluvial Flood Flows ($m^3/s$)

The fluvial flood flows for the model nodes shown on the attached map are set out in the table below. They are measured in metres cubed per second ($m^3/s$).

| | | | Annual Exceedance Probability - Maximum Flows ($m^3/s$) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Node Label** | **Easting** | **Northing** | **50% (1 in 2)** | **20% (1 in 5)** | **10% (1 in 10)** | **5% (1 in 20)** | **3.33% (1in 30)** | **2% (1 in 50)** | **1.33% (1 in 75)** | **1% (1 in 100)** | **1% (1 in 100) inc 20% Climate Change** | **0.5% (1 in 200)** | **0.1% (1 in 1000)** | **0.1% (1 in 1000) inc 20% Climate Change** |
| SPALDING_CHANNEL 2068.5 | 524861 | 322469 | 3.93 | 5.64 | 6.49 | 7.42 | 7.70 | 7.22 | 7.75 | 8.23 | 10.68 | 8.30 | 7.75 | 10.13 |
| SPALDING_CHANNEL 2290.5 | 524821 | 322252 | 4.23 | 6.27 | 7.07 | 8.10 | 8.47 | 7.91 | 8.39 | 8.89 | 11.36 | 9.07 | 8.52 | 11.11 |
| SPALDING_CHANNEL 2504 | 524741 | 322062 | 4.52 | 6.70 | 7.54 | 8.64 | 9.10 | 8.47 | 8.88 | 9.38 | 11.84 | 9.66 | 9.13 | 11.85 |

# Modelled Flood Extents (with defences) Model: Welland Glen (2016) centred on TF 24302 22444 - created September 2023 [Ref: CCN-2023-324233]




Environment Agency

Scale 1:10,000

N

**Legend**

- Main Rivers
- 3.33% (1 in 30) fluvial event
- 1% (1 in 100) fluvial event
- 1% (1 in 100) inc 20% climate change fluvial event
- 0.1% (1 in 1000) fluvial event
- 0.1% (1 in 1000) inc 20% climate change fluvial event

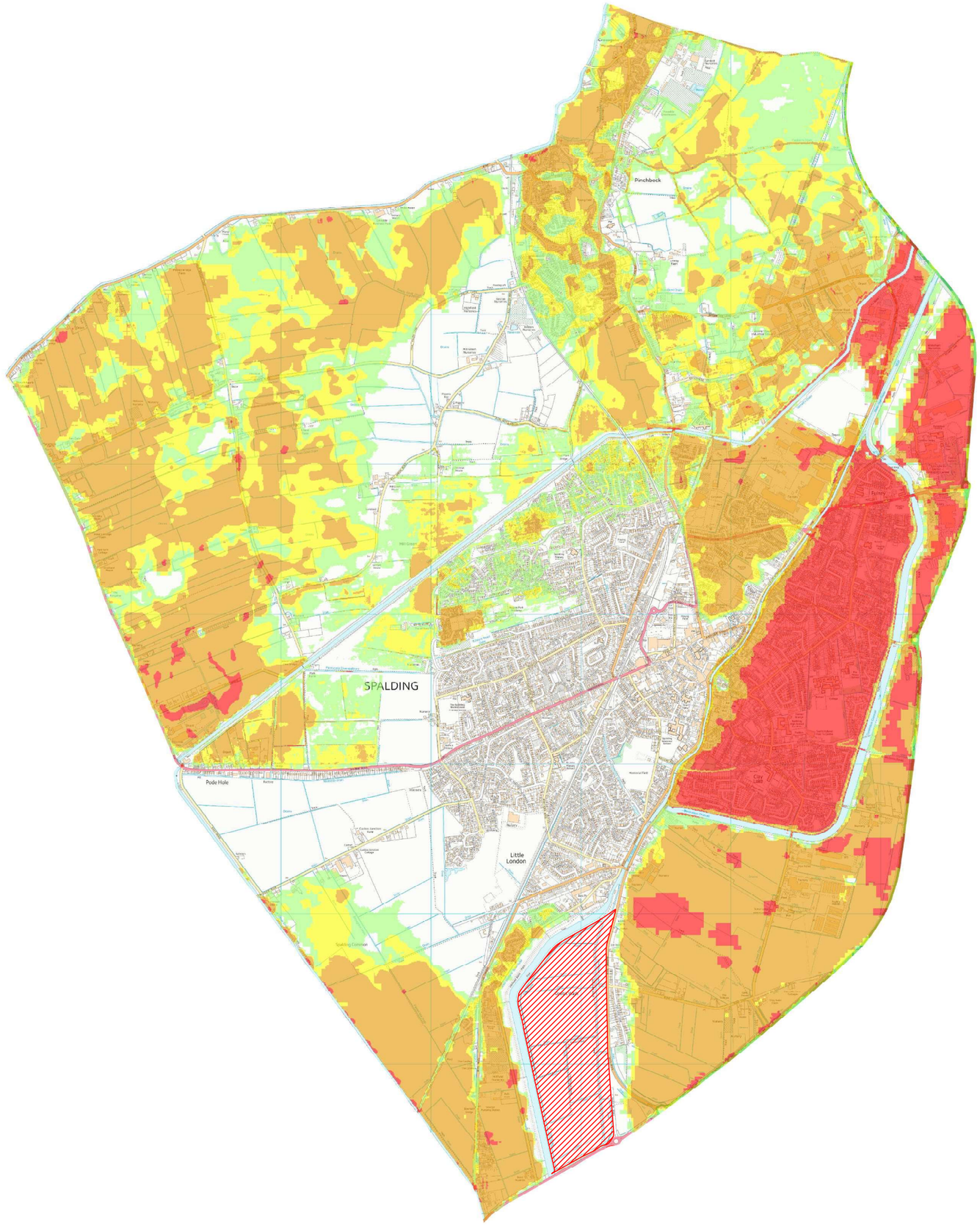
Created by the Partnerships and Strategic Overview Team, Kettering

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**Contact Us:** National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

# Appendix C - SFRA Mapping

N




## NOTES

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

2. This update only included new flood risk information from River Welland (Fluvial), River Glen (Fluvial) and Tidal hazard mapping (River Welland, River Nene and the Wash sea defences). No new information from the Internal Drainage Boards and associated systems was used for this update.

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

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

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

6. Land outside South Holland District is not considered.

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

## Map Legend

**Max Hazard**
(Flood Risk to People : FD2320)

- Less than 0.75 (Low Hazard)
- Between 0.75 and 1.25 (Danger for Some)
- Between 1.25 and 2.0 (Danger for Most)
- Greater than 2.0 (Danger for All)
- Functional Floodplain
- South Holland District Boundary

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

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# UPDATE OF STRATEGIC FLOOD RISK ASSESSMENT

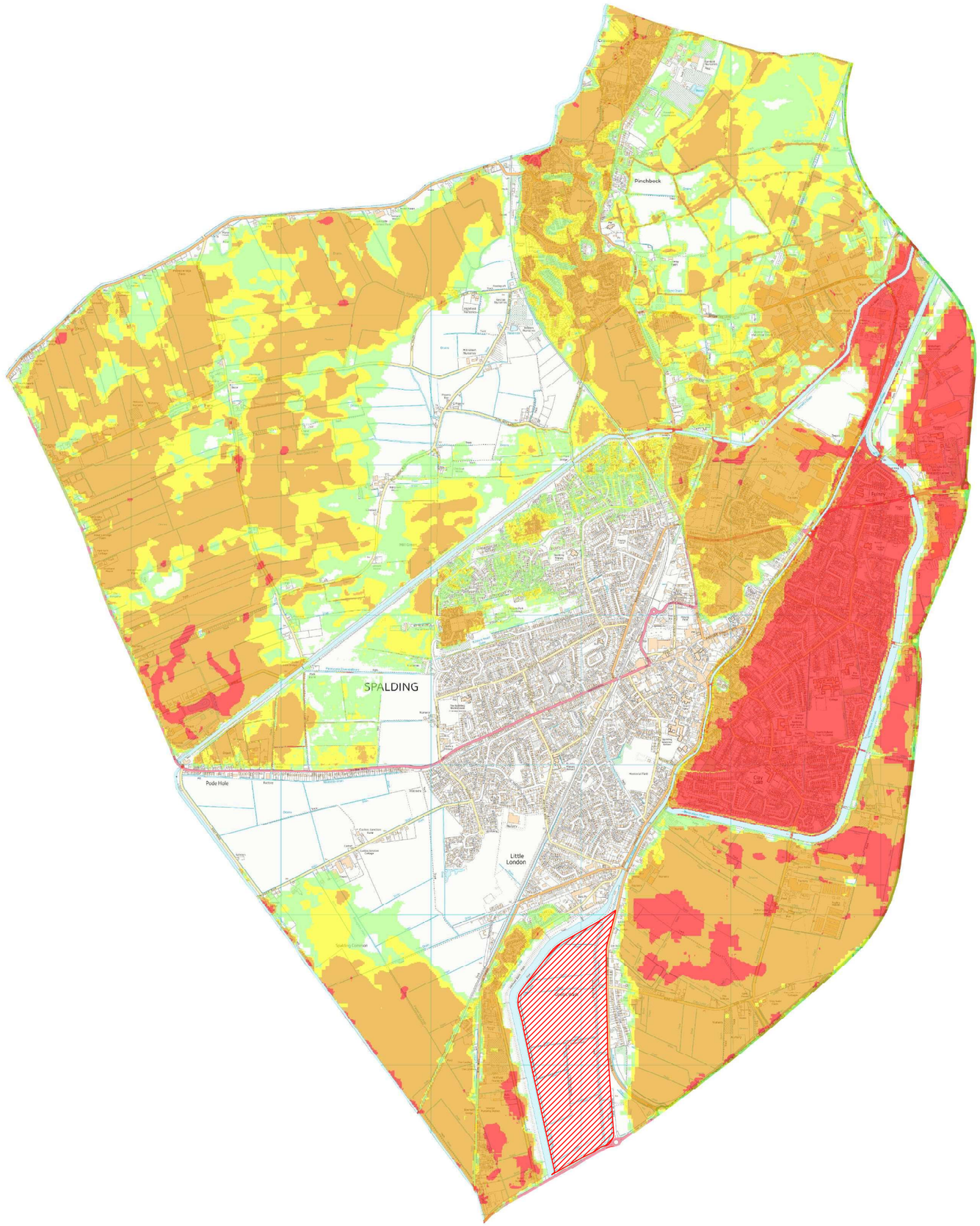
## Residual Flood Hazard
## Spalding - Year 2115
## 1% Fluvial / 0.5% Tidal Event Probability

**DATE OF ISSUE:** Feb 2017 **REV NO:** 2

**SCALE:** 1 : 16,000 @ A1

**MAP NO:**

N




## NOTES

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

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# UPDATE OF STRATEGIC FLOOD RISK ASSESSMENT

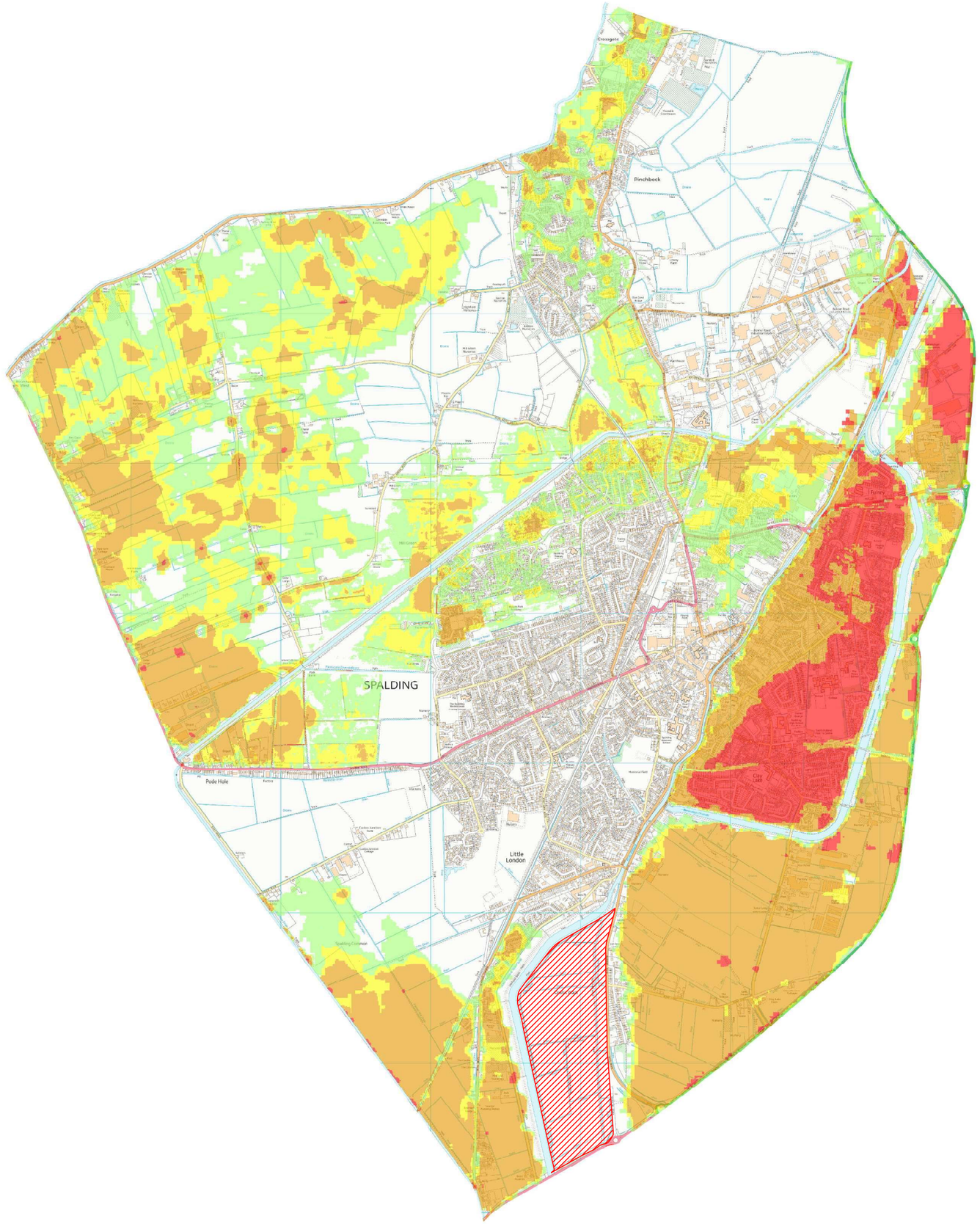
## Residual Flood Hazard
## Spalding - Year 2115
## 0.1% Event Probability

**DATE OF ISSUE:** Feb 2017 **REV NO:** 2

**SCALE:** 1 : 16,000 @ A1

**MAP NO:**

N




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# UPDATE OF STRATEGIC FLOOD RISK ASSESSMENT

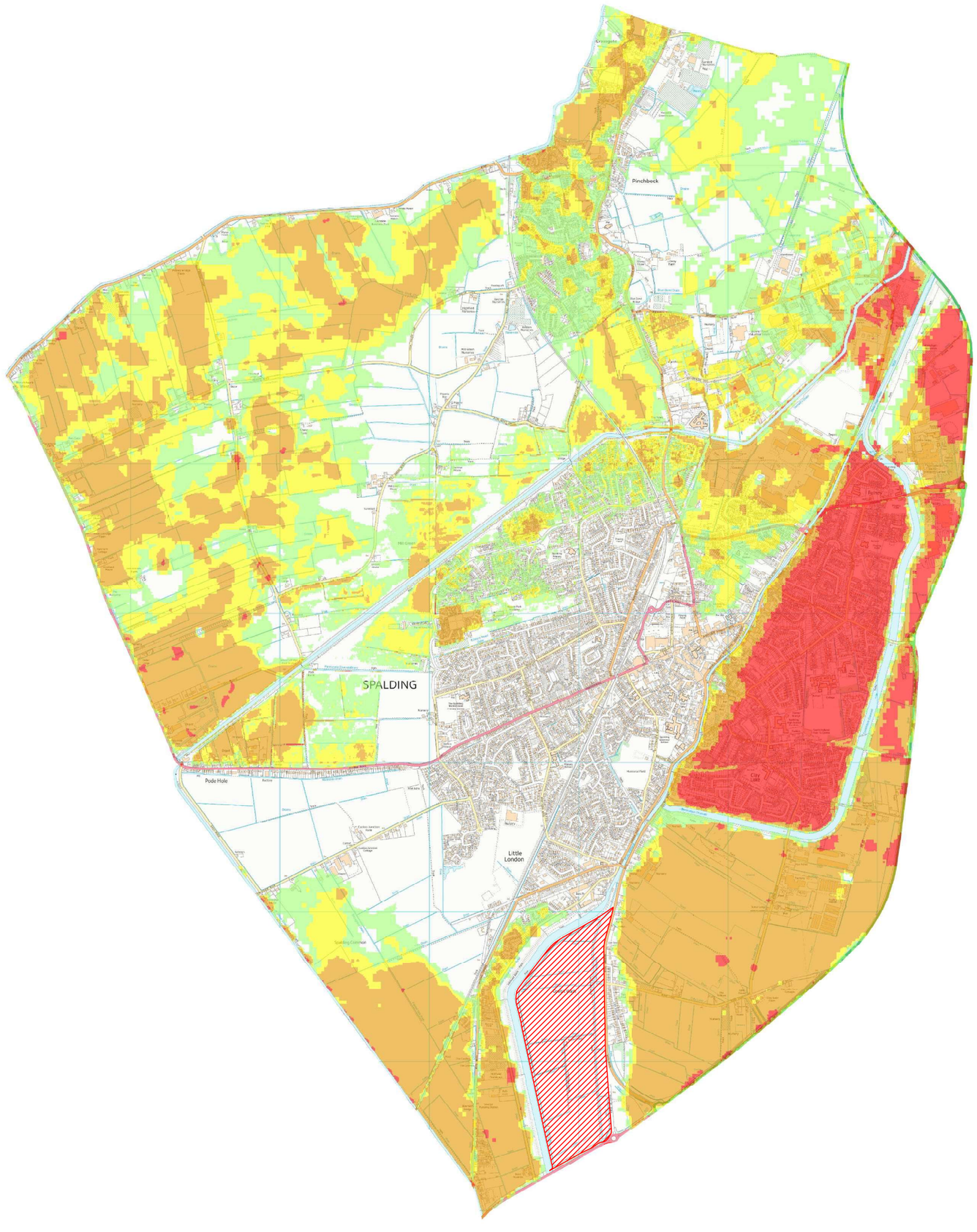
## Residual Flood Hazard
## Spalding - Present Day
## 1% Fluvial / 0.5% Tidal Event Probability

**DATE OF ISSUE:** Feb 2017 **REV NO:** 2

**SCALE:** 1 : 16,000 @ A1

**MAP NO:**

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# UPDATE OF STRATEGIC FLOOD RISK ASSESSMENT

## Residual Flood Hazard
## Spalding - Present Day
## 0.1% Event Probability

**DATE OF ISSUE:** Feb 2017 **REV NO:** 2

**SCALE:** 1 : 16,000 @ A1

**MAP NO:**