

Flood Risk Assessment

Proposed Residential Development
Normanton Road, Crowland
AMA980 Revision 0
July 2025

Prepared for: Allison Homes Ltd

amazi

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A **Not Used**

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S5101-3D-01&02.DWG

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E **Environment Agency flood data (Product 4 ref: CCN-2024-382210)**

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G **Anglian Water sewer map (east of site)**

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Revision 0 23 July 2025

1 Introduction

1.1 Amazi Consulting Ltd has been instructed by Allison Homes Ltd to prepare this Flood Risk Assessment (FRA) associated with the proposed residential development at land east of Normanton Road, Crowland, Lincolnshire south of Bridge Road, Sutton Bridge, Lincolnshire nr PE6 0JJ.

1.2 This FRA has been prepared in accordance with National Planning Policy Framework (NPPF), February 2025, and its accompanying gov.uk Planning Practice Guidance (PPG): *Flood Risk and Coastal Change* (2022). It is expected that this report will be reviewed by the relevant flood risk authorities as part of the documentation submitted for planning permission, and the reader will have some understanding of the technical issues relating to development and flood risk. This FRA focusses upon flood risks to the site. The site drainage has been assessed separately by Infrastructure Design Ltd.

1.3 This FRA report has been prepared for the sole use of Allison Homes Ltd and its contents cannot be copied or relied upon by others except as noted above, without the written authority of Amazi Consulting Ltd.

1.4 This Assessment has been undertaken as a desk study and relies upon data supplied by Government agencies. This flood data is currently the best available for assessing flood risks at the site. It does not attempt to comment upon insurance or for flood events other than as stipulated by planning policy. There is always the risk, however small, that flooding could be different to that assessed.

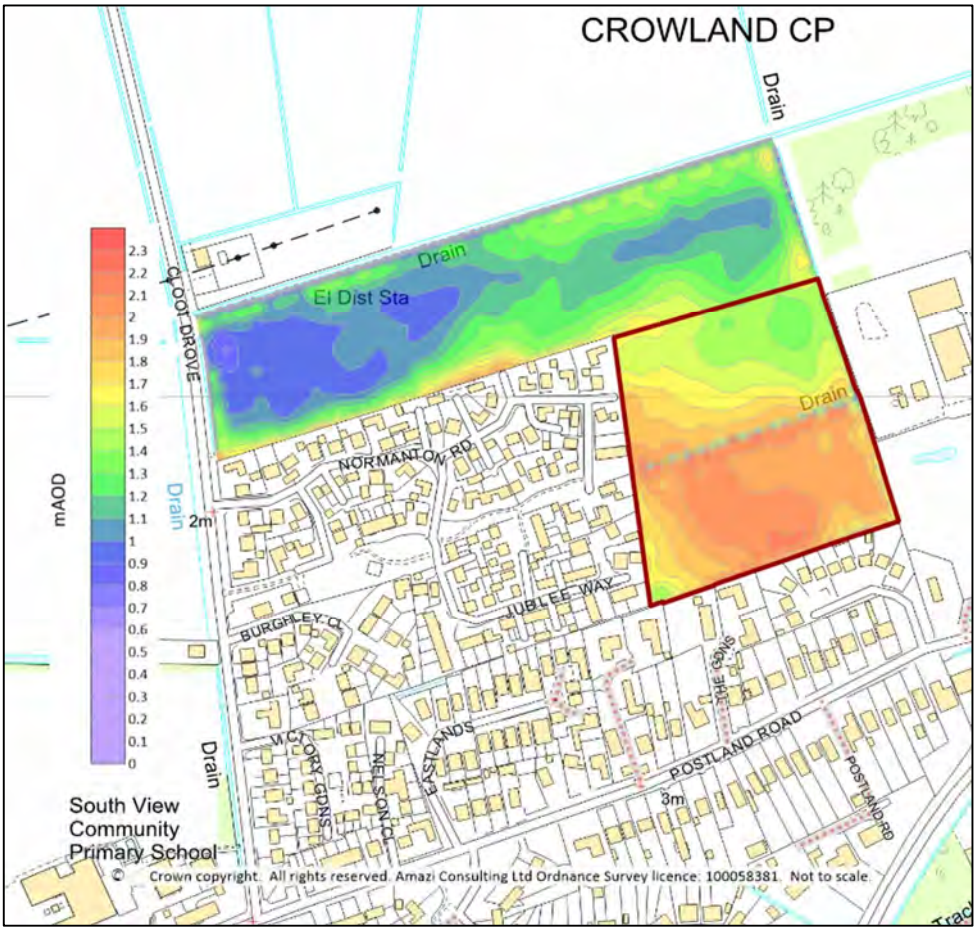
2 Site Description

2.1 Existing

2.1.1 Table 2.1 summarises the key site information.

Table 2.1 – Existing site overview

Address	Normanton Road, Crowland Lincolnshire
Post code	Near PE6 0JJ
NGR	524600 mE, 310970 mN
Site area	3.47 ha
Current land use	Arable farmland
Adjacent land use	North: Arable farmland East: Partially commercial South: Residential West: Residential with Cloot Drove beyond
Location plan	 ***Figure 2.1 – Site location***

Site topography	Refer to survey in Appendix B and relates to OS GPS datum (mAOD). This survey shows site ground levels vary from 2.2 and 1.33 mAOD.  ***Figure 2.2 – Survey contours*** (Source: S5101-3D-01&02.dwg)
Local topography	There is limited land, mainly to the south, which falls towards the site.

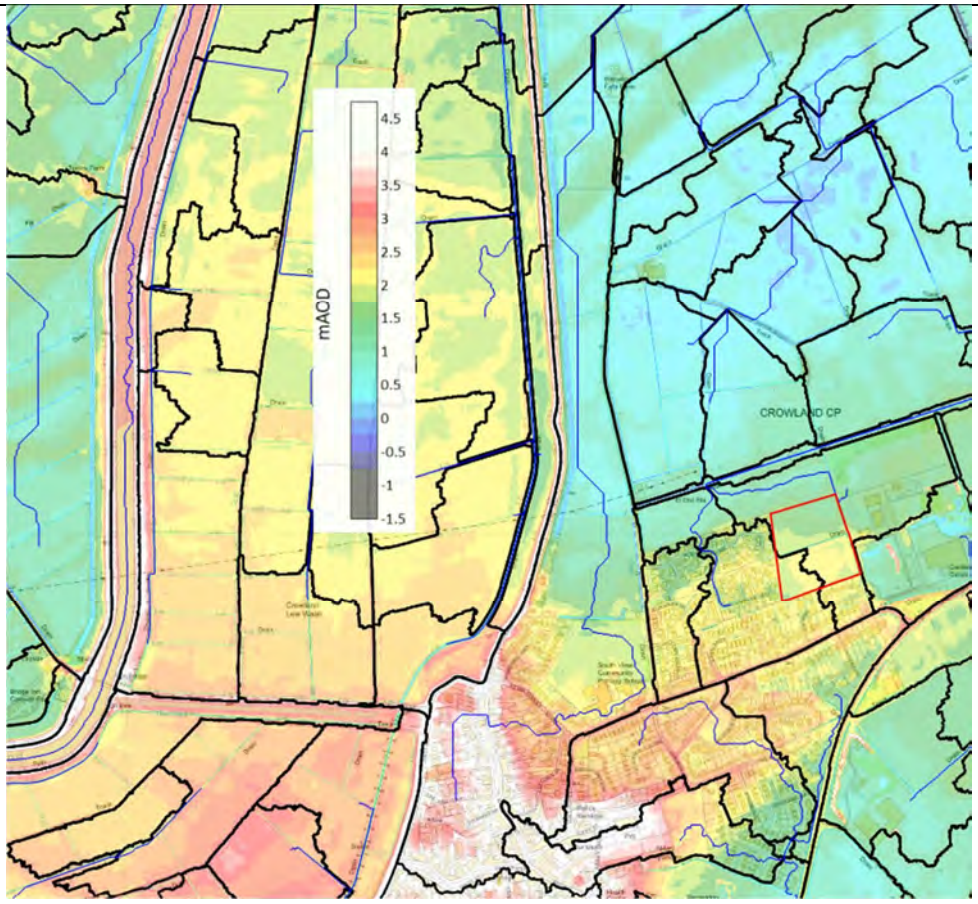


Figure 2.3 – Contours in wider area
(Source: data.gov.uk lidar composite: TF21sw_DTM_1m.tif, downloaded 15 January 2025) Shows the approximate outline of topographical sub-catchments (outlined in black) and drainage paths/valleys (in blue linesygg1). These are theoretical only and do not include the effects of drainage systems or localised topographical features (kerbs, buildings, pipes, ponds, walls, small watercourses etc.), and localised depressions have been filled.

Local planning authority	South Holland District Council
Lead Local Flood Authority	Lincolnshire County Council
Internal drainage board	Welland and Deepings

2.1.3 The existing land use is classified as *less vulnerable* in accordance with Annex 3 of the NPPF.

2.2 Proposed

2.2.1 The proposed development is shown on the drawing in Appendix C and comprises: the construction of 80 residential units and associated infrastructure.

2.2.2 Overall, proposed ground levels will be similar to existing, or slightly higher. The minimum proposed finished floor level is 1.75 mAOD.

2.2.3 Current planning guidance indicates that the design life of a residential development should be a minimum of 100 years. The year 2125 is therefore considered appropriate in assessing the possible impacts of climate change upon flood risk.

2.2.4 The proposed development use is classified as *more vulnerable* in accordance with Annex 3 of the NPPF. All of the dwellings are located fully within undefended flood zone 3*. Table 2 of the Planning Practice Guidance (Paragraph: 079 Reference ID: 7-079-20220825) given below indicates in red the appropriate nature of the development's vulnerability classification.

*See Appendix D

(For flood zone information, refer to section 3.1.)

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

Flood Zones	Flood Risk Vulnerability Classification				
	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	X *

Key:

✓ Exception test is not required

X Development should not be permitted

2.2.5 The site is plot Cro050 allocated for housing in the South East Lincolnshire Local Plan (2011-2036, Inset Map No3, March 2019). The entire site is allocated for housing in the South East Lincolnshire Strategic Housing Land Availability Assessment - Crowland (January 2018), sites: Cro004, and Cro050. The Sequential Test is therefore considered to be satisfied for this area.

3 River Flooding

3.1 Flood Zones

3.1.1 As shown within Figure 3.1, the north of the site is within flood zones* 2 and 3, the areas at low and medium risk of river or tidal flooding. The southern field on the site is shown within flood zone 1 (low risk). This flood mapping represents areas at risk of flooding for present day only and does not take account of climate change. This mapping has been produced assuming that there are no flood defences and as stated in Appendix E, this may give a slightly misleading picture. The actual risks at the site are different as explained below.
*Refer to Appendix D.

3.1.2 There are various drainage systems around the site but this section of the report focuses upon the Main River flooding. To the west of Cloot Drove is an area of land beyond which is an internal drainage board area – the Crowland Low Washlands. 0.8 km further to the west is the River Welland. Both the washlands and the river are at a similar or higher elevation than the site.

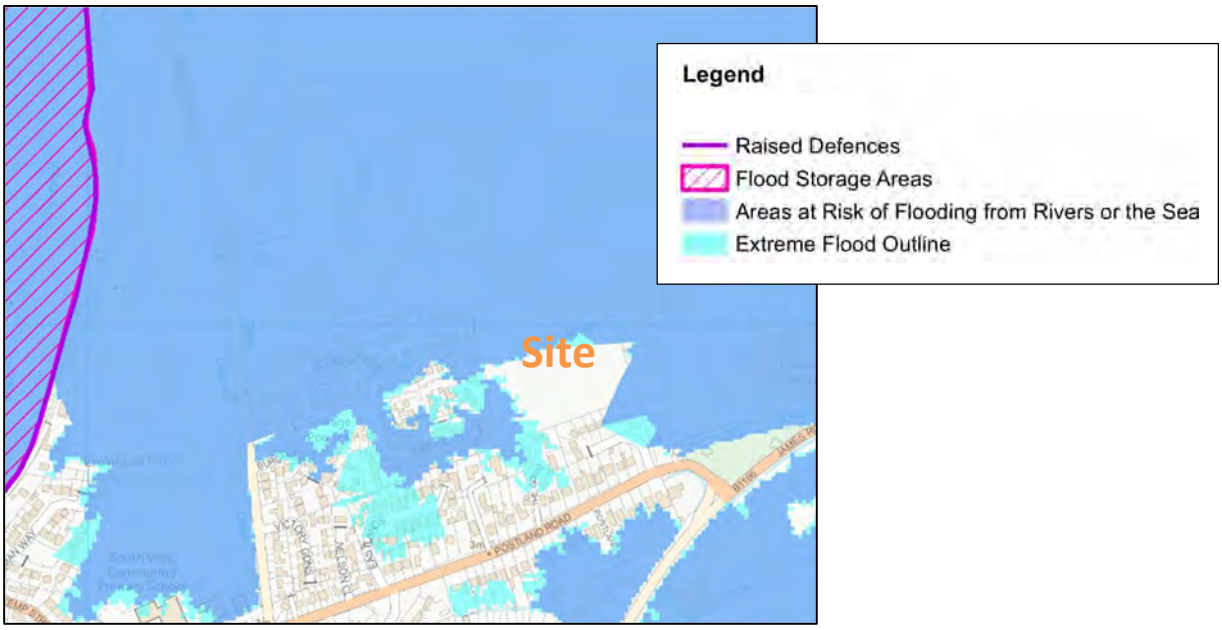


Figure 3.1 - Flood Zones
(Source: extract from Appendix E)

3.2 Defences

3.2.1 Appendix E states that '*this site is not at risk of flooding from any main river'.* The development land is situated within a widespread area of low lying land which is defended from tidal and fluvial flooding. The defences are described below.

3.2.2 Figure 3.2 shows the two raised defences between the River Welland and the site. The bank of the river near the site is a minimum effective crest height of 4.74 mAOD. The defences

closest to the site have a minimum crest level of 5.523 mAOD. This data also confirms that the defences near the site are embankments which are inspected annually.

3.2.3 Appendix E also confirms the effectiveness of the existing defence systems:

> One measure affording protection to the site is the Crowland & Cowbit Washlands, which undergoes regular inspections. As a result of the extreme flows experienced during storm Henk, the "Cradge" bank experienced a breach which led to water entering the washlands area. This water was stored here, as per its design, until such a time as river levels receded sufficiently to allow stored water to drain back in to the Welland. This breach has now been repaired.

The historic flood mapping in Appendix E indicates that the site and surroundings areas flooded in 1947, presumably tidally influenced before some of the existing defences were constructed.

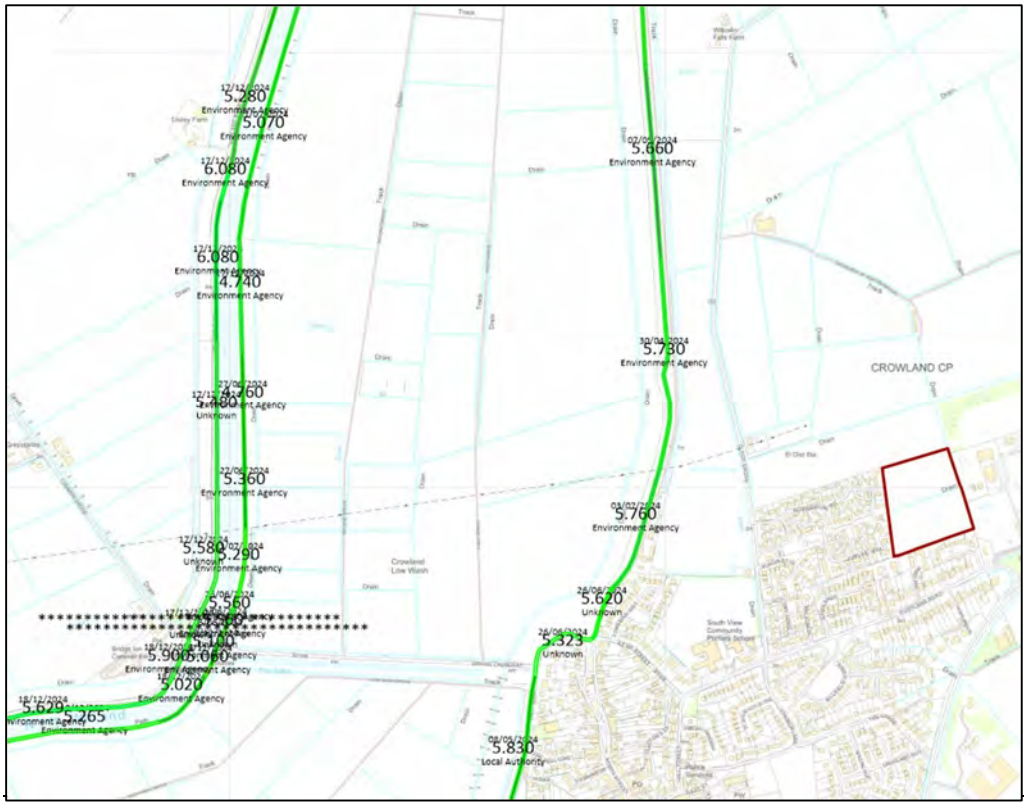


Figure 3.2 - Defences

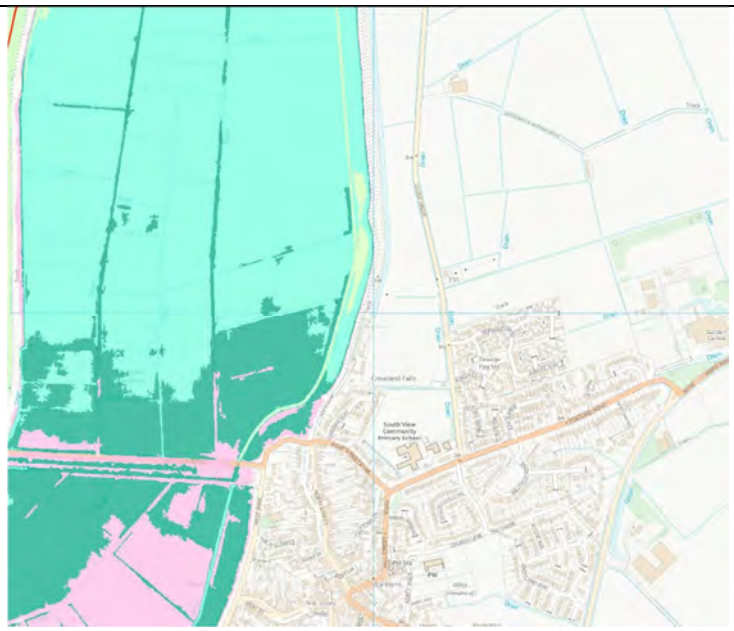
(Source: Spatial_Flood_Defences_Including_Standardised_Attributes.shp, 15 January 2025)

3.2.4 Crowland washlands are in policy Sub-area 8 of the River Welland Catchment Flood Management Plan (2009), although on the map Crowland itself is in sub-area 3. Either way, the 'vision and preferred policy' for these two areas is: Policy option 4: *Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change.*' Most of the specifics for this policy area are focused upon Spalding. However it seems as though it can be assumed that defences will be maintained into the future.

3.3 River Levels

3.3.1 The Environment Agency has usefully provided Product 4, 5, 6 and 7 flood data (ref: CCN-2024-382210). Product 4 data is in Appendix E which is summarised in Table 3.1.

Table 3.1 - Summary of peak predicted in channel River Welland water levels

Return period/ Annual exceedance probably %	Peak flood level within river channel* (mAOD)	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
1:2/ 50%	3.84	
1:10/ 10%	4.42	
1:50/ 2%	4.86	
1:100/ 1%	4.92	
1:200/ 0.5%	4.93	
1:100 +20%CC/ 1%+20%CC	4.94	
1:1,000/ 0.1%	4.93	
1:1,000 + 20%CC/ 0.1% + 20%CC	4.94	

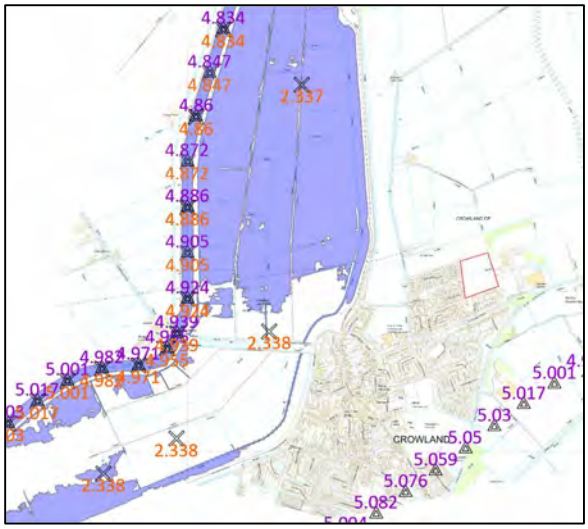
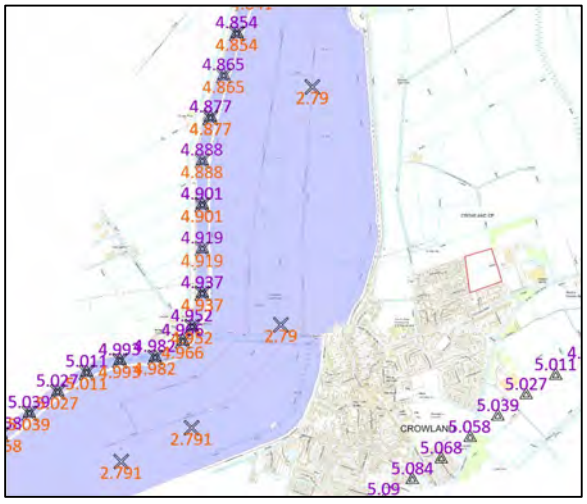
*Node WELLAND 27778. CC = climate change.

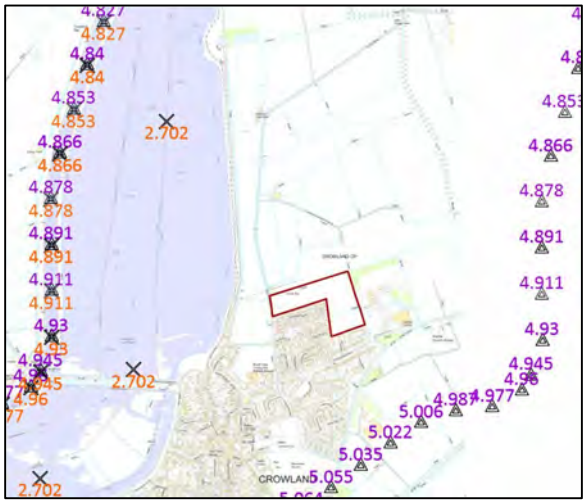
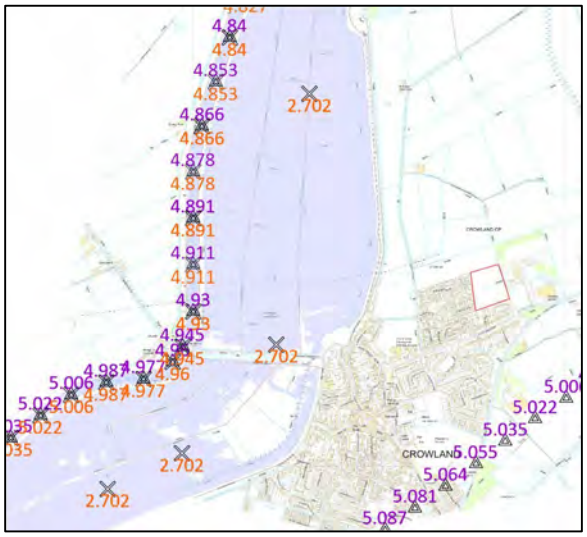
3.3.2 The current Government peak river flow climate change allowance for the Welland Management Catchment is 17% (central, 2080s) (https://environment.data.gov.uk/hydrology/climate-change-allowances/river-flow?mgmtcatid=3112). The 20% allowances in the Environments Agency data are therefore applicable for use (slightly higher, so slightly more precautionary).

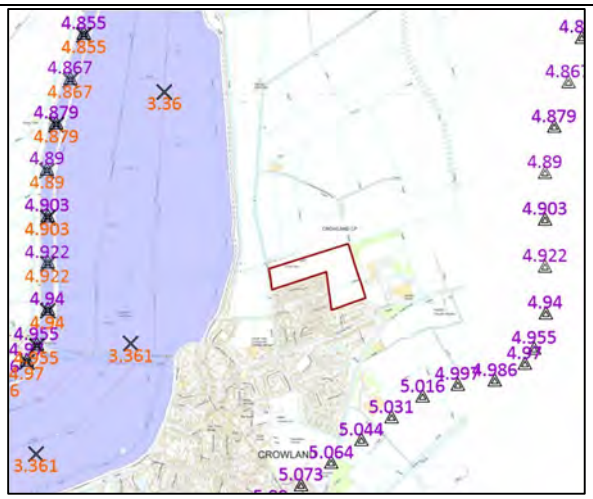
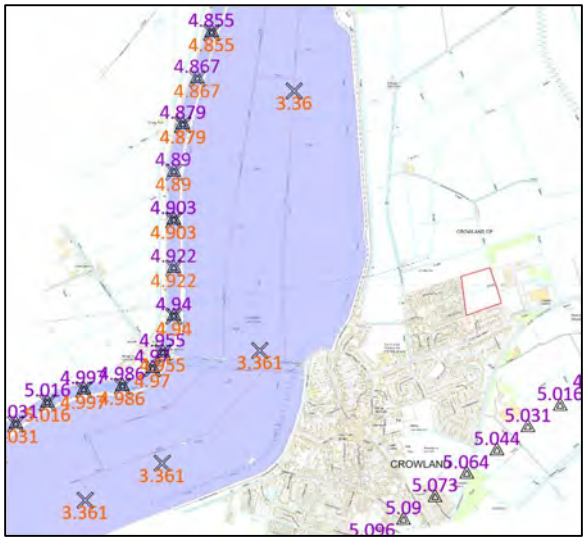
3.3.3 The flood defences are higher than the predicted flood levels, with a freeboard of at least 0.5 m.

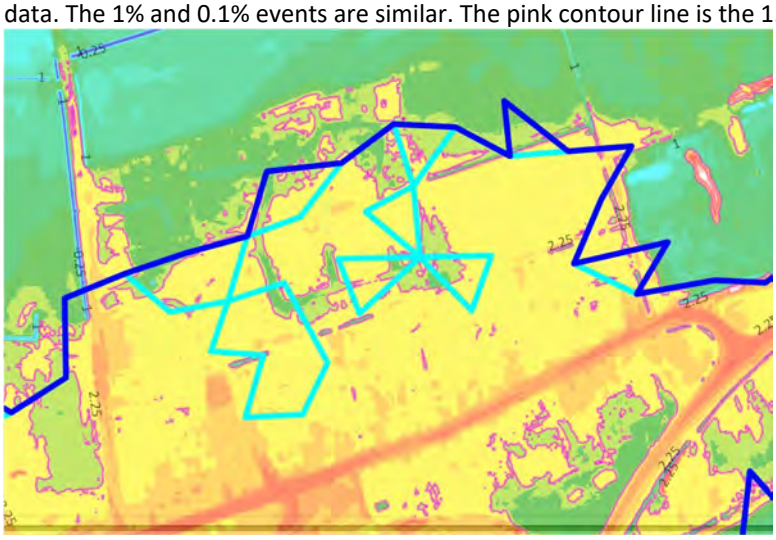
3.3.4 The Environment Agency has also supplied data of floodplain water levels which we have post processed to create Table 3.2.

Table 3.2 - Environment Agency P4 and P6 defended data – combined peak levels

Defences	Event	River channel (node 27778)	Washland	Site
Defended	1:100/1%:  welland_245_aep1_final.shp 2.337 XYWelland_combined_peak_levels_v245 .tab attribute: AEP1 4.86 WSE_Levels.TAB attribute: AEP1 (ignore repeat of data to the south of the site – this is included in the originating files received, but is clearly not relevant)	4.924*	2.338*	Dry
	1:100CC/1%CC:  welland_245_aep1cc_final.shp 2.337 XYWelland_combined_peak_levels_v245 .tab attribute: AEP1CC 4.86 WSE_Levels.TAB attribute: AEP1CC (ignore repeat of data to the south of the site – this is included in the originating files received, but is clearly not relevant)	4.937*	2.79*	Dry

Defences	Event	River channel (node 27778)	Washland	Site
	1:1,000/0.1%:   welland_245_aep0_1_v2_final.shp 2.337 XYWelland_combined_peak_levels_v245 .tab attribute: AEP0_1 4.86 WSE_Levels.TAB attribute: AEP0_1 (ignore repeat of data to the south of the site – this is included in the originating files received, but is clearly not relevant)	4.930*	2.702*	Dry
	1:1,000CC/0.1%CC:	4.94*	3.361*	Dry

Defences	Event	River channel (node 27778)	Washland	Site
	  welland_245_aep0_1cc_v2_final.shp 2.337 XYWelland_combined_peak_levels_v245 .tab attribute: AEP0_1CC 4.86 WSE_Levels.TAB attribute: AEP0_1CC (ignore repeat of data to the south of the site – this is included in the originating files received, but is clearly not relevant)			
Undefended	There is some undefended flood level data in the P6 files, although the dbf file Post-XYWelland_Lower_UNDEF_peak_levels_v246.dbf does not include data near the site, it stops at chainage 34070 upstream. So the undefended flood levels have been crudely estimated from comparing undefended flood extents to lidar ground level			

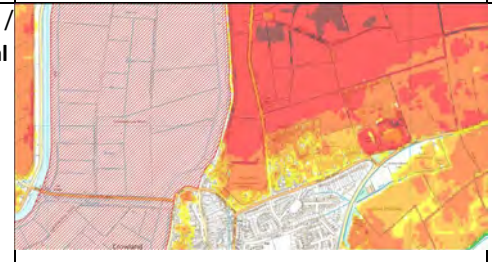
Defences	Event	River channel (node 27778)	Washland	Site
	data. The 1% and 0.1% events are similar. The pink contour line is the 1.9 m AOD.  → Welland_UNDEF_246_AEP1.shp → Welland_UNDEF_246_AEP0_1.shp Fundamentally the site is protected so the fully undefended data is unrealistic.			

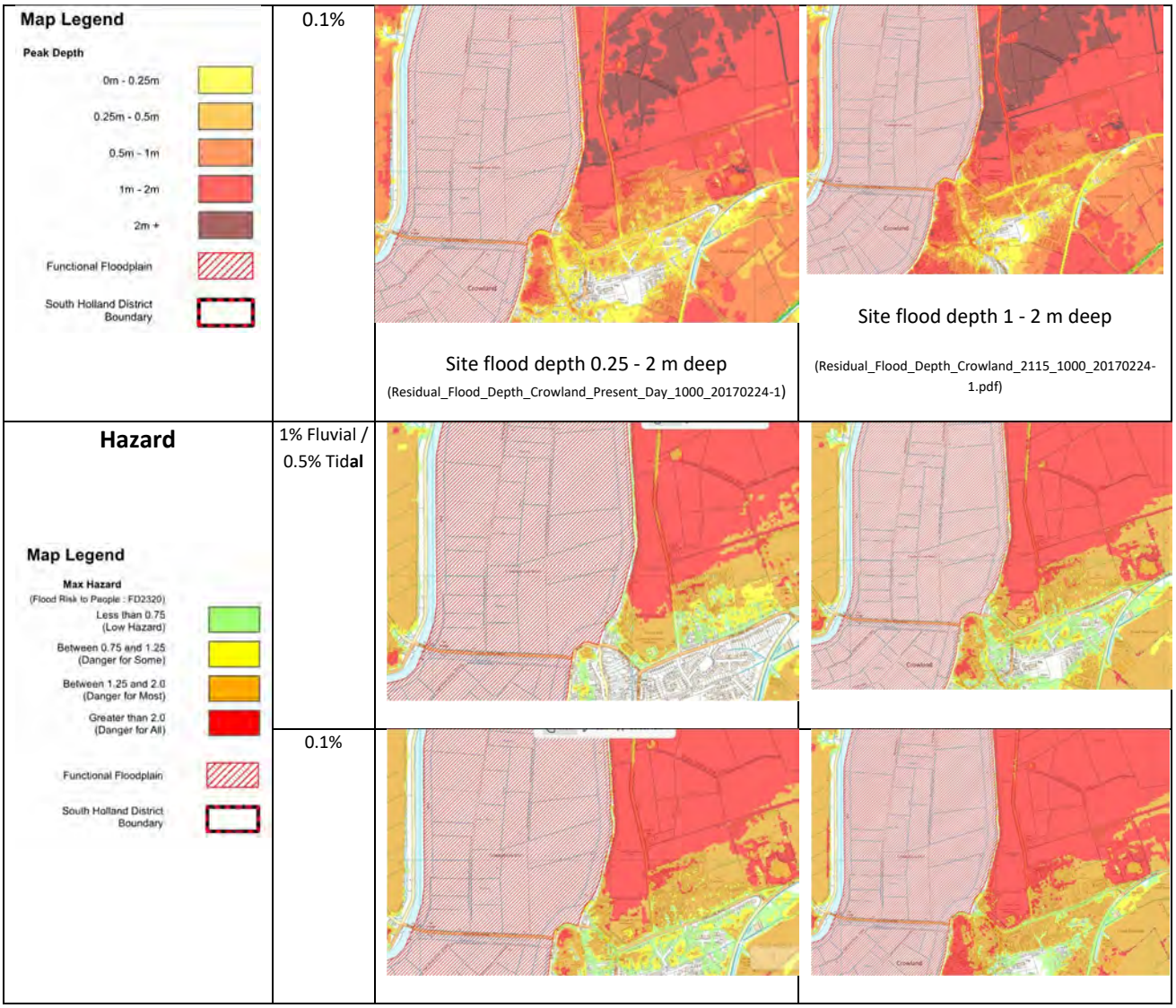
CC = including climate change – see section 3.3.2

3.4 Residual Risks

3.4.1 Since the defences are above the predicted River levels, there should not be a risk of defence overflow. There are, however, possible risks to the site if defences failed. This is called residual risk. The South Lincolnshire Strategic Flood Risk Assessment (SFRA), 2017, provides information on residual risks as summarised in Table 3.3. This data does not provide flood levels at the site, but does demonstrate that if the defences were to catastrophically fail, then the site is likely to be at risk of hazardous flooding. The breach locations used in the analysis are given in Figure 3.4.

Table 3.3 - Summary of SFRA defence breach results

Flood characteristic	Event/s	Present day (2015)	Future (2115)
Depth	1% Fluvial / 0.5% Tidal	 Site flood depth 0.25 - 2 m deep (Residual_Flood_Depth_Crowland_Present_Day_1_Fluvial_05_Tidal_20170224-1.pdf)	 Site flood depth 0.25 - 2 m deep (Residual_Flood_Depth_Crowland_2115_1_Fluvial_05_Tidal_20170224-1.pdf)



3.4.2 The SFRA also includes the level data given in Table 3.4 and the breach location in Figures 3.5 and 3.6. We note that those water levels (understood to be river levels upstream of the breach) are different to the levels in Tables 3.1 and 3.2. The higher 0.1% + CC levels are quoted to 'include waves'. We would refer to the data in Tables 3.1 and 3.2 though since this has been supplied by the Environment Agency for our assessment of this site.

Table 3.4 - Crowland to Cowbit Washes Breach Parameters

Breach Location	Breach Base Elevation (m AOD)	Maximum Water Level (m AOD) 1%	Maximum Water Level (m AOD) 1% + Climate Change	Maximum Water Level (m AOD) 0.1%	Maximum Water Level (m AOD) 0.1% + climate Change
A	2.1	3.74	4.43	4.44	5.37
B	2.3	3.74	4.43	4.44	5.37
C	3.3	3.74	4.43	4.44	5.37
D*	4.1	3.74	4.43	4.44	5.37
E	1.5	3.74	4.43	4.44	5.37
F	1.6	3.74	4.43	4.44	5.37

*Breach base taken as high ground level landward of defence (North Street)

Source: 2016 Update of South Holland Strategic Flood Risk Assessment - Modelling and Mapping Note (2017)

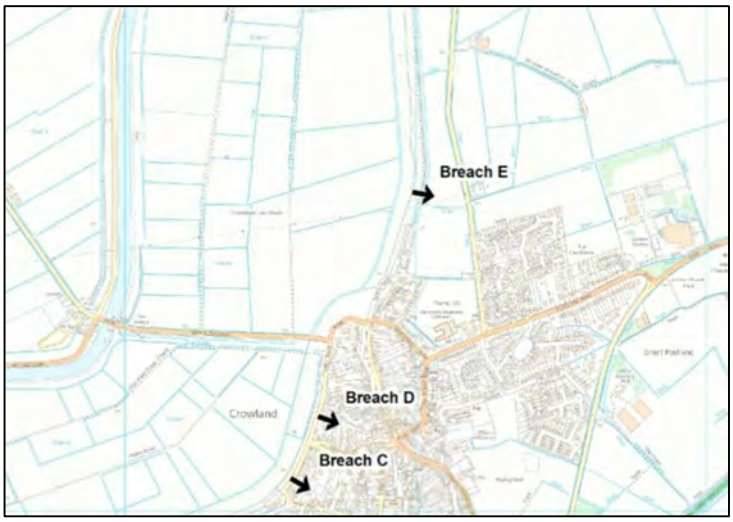


Figure 3.5 - Figure 4 of 2016 Update of South Holland Strategic Flood Risk Assessment - Modelling and Mapping Note (2017)

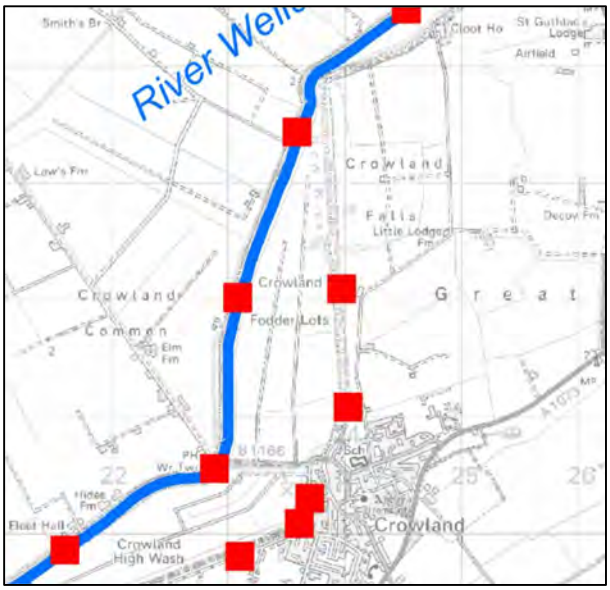


Figure 3.6 - Main MA1 Breah locations from SFRA

3.4.3 The SFRA confirms that *'the Environment Agency's Flood Map shows …. a large part of the South Holland District are at a high probability of flooding' (para 1.1.2).* Also *'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……appropriate mitigation against potential impacts will be required (i.e. the consequences of defence failure)'* (para 3.1.5).

3.4.4 We note that the residual Flooding at site is fluvially dominated. Obvious from fact that the 2015 and 2115 outlines are fairly similar (i.e. not tide level surge type difference).

3.4.5 The SFRA residual Risk flood extents confirms that the site is not within the functional floodplain even during the 2115 1:1,000 year event.

3.4.6 Fundamentally the SFRA data confirms that the flood depths at the site in an extreme event of defence failure, may reach a peak of 0.25 to 2 m. This is a broad variation in estimate though, especially given the fact that the site ground levels vary by <1 m. However since there is a risk in the failure event, the developer intends to implement the flood mitigation measures set out if Table 3.4.

Table 3.4 - Propose flood mitigation

Mitigation measure	**Comment**
Building resilience	During detailed design reference will be made to the following documents: • CLG, *Improving the Flood Performance of New Buildings* (2007) • CIRIA *Code of practice for property flood resilience* (C790), • *Flood Resilient Building* BS85500:2015, • Flood resistant and resilient construction and CIRIA improving flood resilience advice Sheets 1-8. Flood resilience measures extend the duration over which the building can withstand an exposure to water. A water tight structures are not proposed. The developer intends to include flood resilience measures to a minimum of 300 mm above finished floor levels. Recommended Measures may include: • All **doors and glazing** shall have frame to brickwork joints fully sealed • Any **plaster boarding** at ground floor level will be laid horizontally. • **Electrical services** to run at ceiling level and drop down to service points where ever possible given the specialist nature of the building. Electricity meter placed at high level. • Proposed extension: Low absorbency **brickwork** where applicable, i.e. clay engineering or DPC brick with less than 7% moisture content by absorption. • **Closed cell type insulation** that is well fixed.
Flood Levels	Proposed floor levels are to be raised to at least 0.3 m above existing ground level, and at least 150 mm above the surrounding finished ground levels. The minimum site finished floor level is 1.75 mAOD. All properties will be a minimum of two storeys. No sleeping accommodation at ground floor.

3.4.7 The hydraulic modelling this is based upon includes assumptions in model parameters and input data, and the modelling methodologies. For example, the breach modelling grid is quite course and the tidal boundary data is for the year 2115 (using former sea level estimates etc. The flood data is currently the best available data for assessing flood risks at

the site. There is also information not included in the data available, for example, duration of flooding.

3.4.8 The site is shown at risk of flooding from reservoirs. This is understood to be associated with the wider washlands/floodplains and is therefore assessed in the paragraphs above.

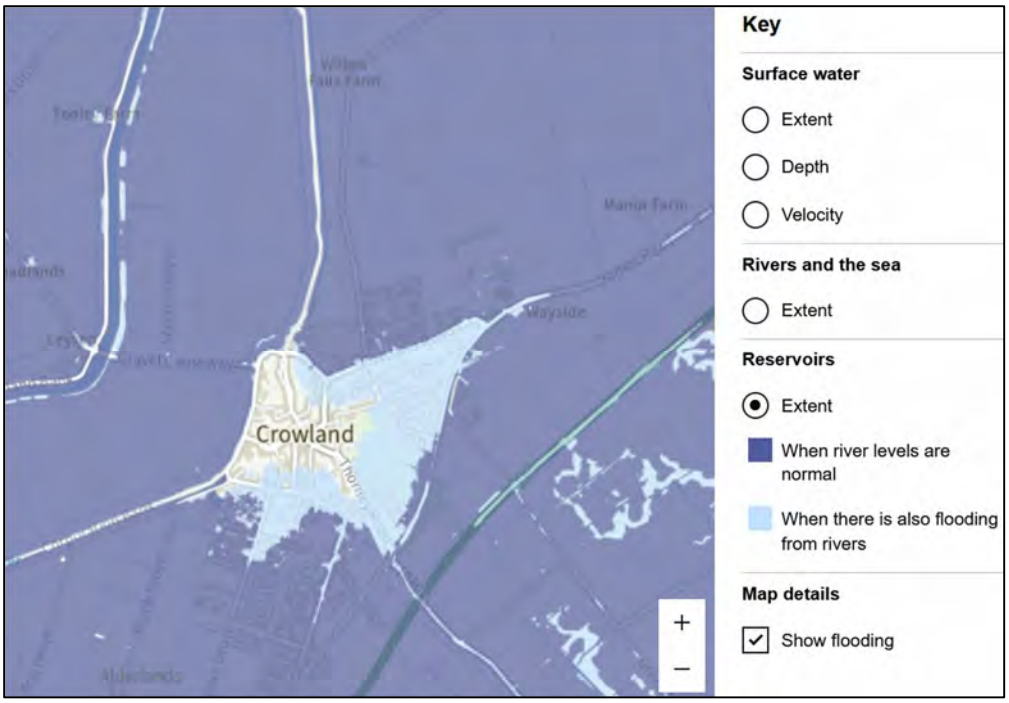


Figure 3.7 - Risk of flooding from reservoirs

3.5 Flood Management

3.5.1 Fundamentally the site is protected from River flooding. It is only if there is a failure of flood defences that there is a risk of hazardous flooding. So appropriate flood management measures are necessary.

3.5.2 The site owners/occupiers and any infrastructure management companies should sign up to receive flood warnings. Evacuation from the site should be prior to flooding occurring and southwards to higher ground. The duration of flooding could be several days.

3.5.3 All site owners/occupiers should be aware of the possible flood risks. They should be aware of what actions to take in advance of flooding and when flooding nearby is imminent. Further advice on suitable preparation measures is given at: https://www.gov.uk/government/publications/personal-flood-plan and https://www.lincolnshireresilienceforum.org/resources/flood-plan/
A copy of the Government's flood plan template is given in Appendix F.

3.5.4 Other advice and information on preparing for flooding is available from the following websites:

Environment Agency Floodline: 0345 988 1188 and
https://www.gov.uk/prepare-for-a-flood
National Flood Forum booklet:
https://nationalfloodforum.org.uk/about-flooding/preparing/checklist-action-plan/
Lincolnshire Resilience Forum: https://lincolnshireresilienceforum.org/
https://www.lincolnshireresilienceforum.org/wp-content/uploads/2024/01/Bite-Size-River-Surface-Water-Flooding-9.6.23.pdf

3.5.5 It is not safe to enter floodwater (walk, swim, cycle or drive etc.). It may be fast flowing, contain debris, be contaminated, cold or hide unseen dangers. Evacuation should be undertaken in advance of flood water reaching the vicinity of the site and the escape route, and always in accordance with the instructions of the emergency authorities.

4 Local Watercourses & Internal Drainage Board (IDB)

4.1 The watercourses at the site are summarised in Figure 4.1 and Table 4.1.

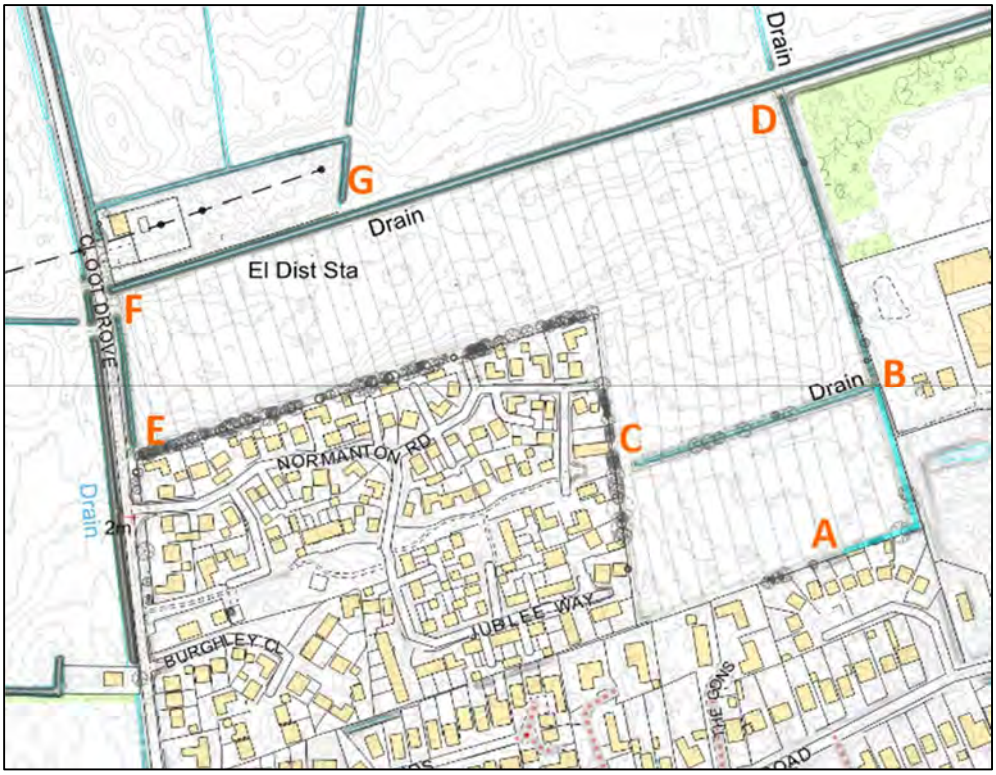


Figure 4.1 - Watercourses at the site

Table 4.1 - Watercourse summary

Watercourses at site	A-B: The survey indicates a very shallow depression along this boundary. It does not appear to have much drainage function, but this will need to be checked via a drainage survey to confirm it only receives a small inflow from the site itself. This vegetated boundary is to remain as existing. C-B: This is shown as a watercourse on the site survey. It has no inlet at the west end and is shown to continue in a northwards direction beyond location B. The proposed development includes road and footpath crossings of this watercourse which will require prior Land Drainage Consent from Cambridgeshire County Council. A corridor for access is provided in the site layout and the organisation that is responsible for the this green space corridor will be responsible to maintain the watercourse. B-D: Shown on the survey to be as continuation of the upstream channels. Invert level varies from 1 mAOD at B, to c0.1 mAOD at D. The depth varies from approximately 0.6 m to over 1m at the

	downstream end. The flow continues downstream via a pipe (USIL = 0.08 mAOD, DSIL = -0.13 mAOD (pipe diameter not given on survey). D-F: This watercourse is the North Level Internal drainage Board Brickfield Drain. It has an approximately level invert of -0.5 mAOD. The survey does not show and connections between this drain and the watercourses to the north at locations D and G, but the mapping in Section 4 shows the Brickfield Drain continues eastwards beyond the site. There is a pipe at -0.74 mAOD at the west end of this watercourse. E-F: A watercourse with a pipe at its north end (IL = 0.12 mAOD). The exact flow directions in these low lying areas where watercourses are generally quite flat, can be difficult to establish without more detailed surveys.

4.2 The map in Figure 4.2 shows the site lies within the North Level District Internal Drainage Board (IDB) catchment. Figure 4.3 shows the Brickfield Drain, an IDB watercourse, which is 100 m north of the site. This appears to flow northwards and is then pumped Into the River Welland via the North Level's Postland Pumping Station (comprising 3 No. 600 mm diameter pumps).

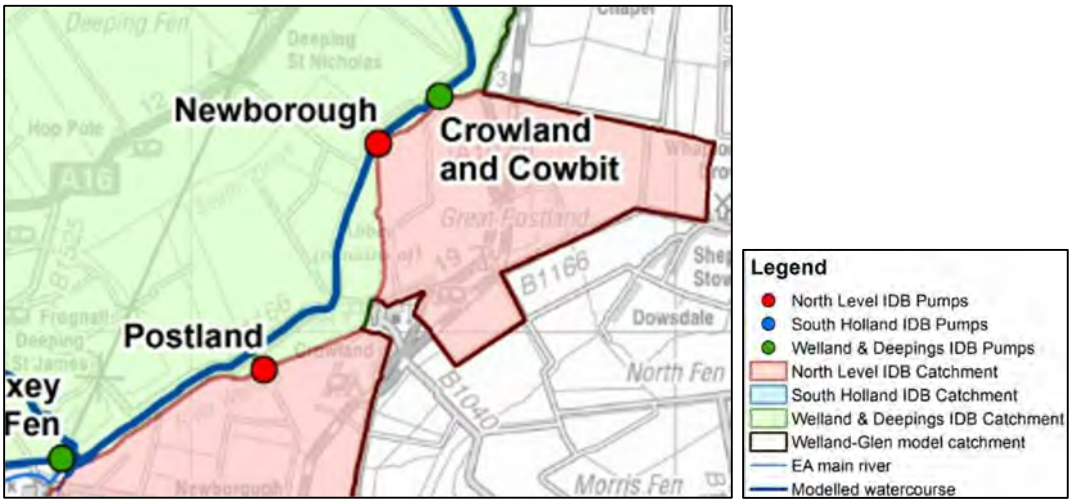


Figure 4.2 - Extract from Environment Agency product 5 Figure 5.2

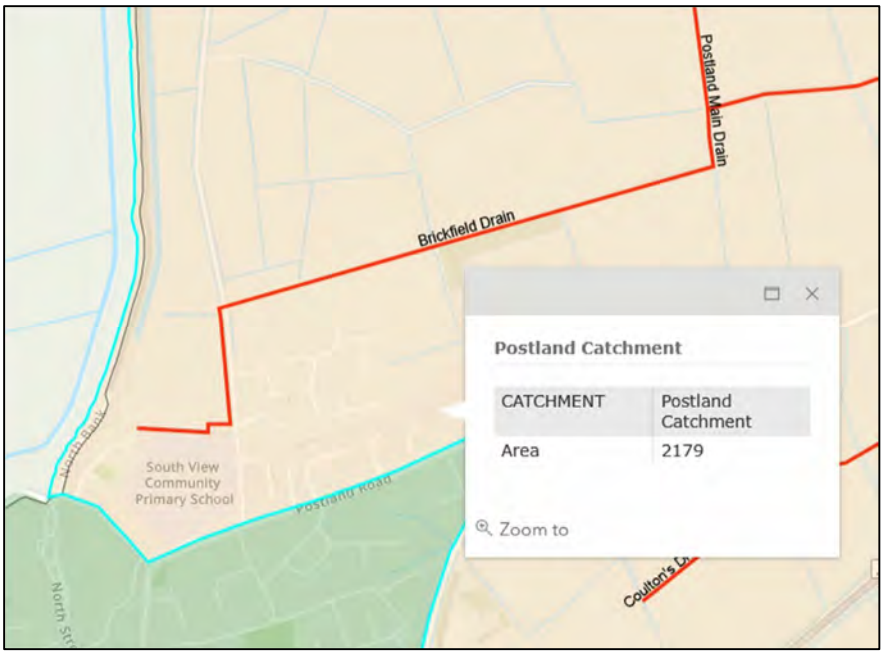


Figure 4.3 - Extract from North Level District IDB map
(Source: https://www.northlevelidb.org/about/district-map/)

4.3 An enquiry has been issued to the North Level District IDB to advise of the development and to request the availability of flood/water level data relevant to the site.

4.4 Within 100 metres west of Cloot Drove Is the Welland and Deepings Internal Drainage Board area, as shown on Figure 4.4.

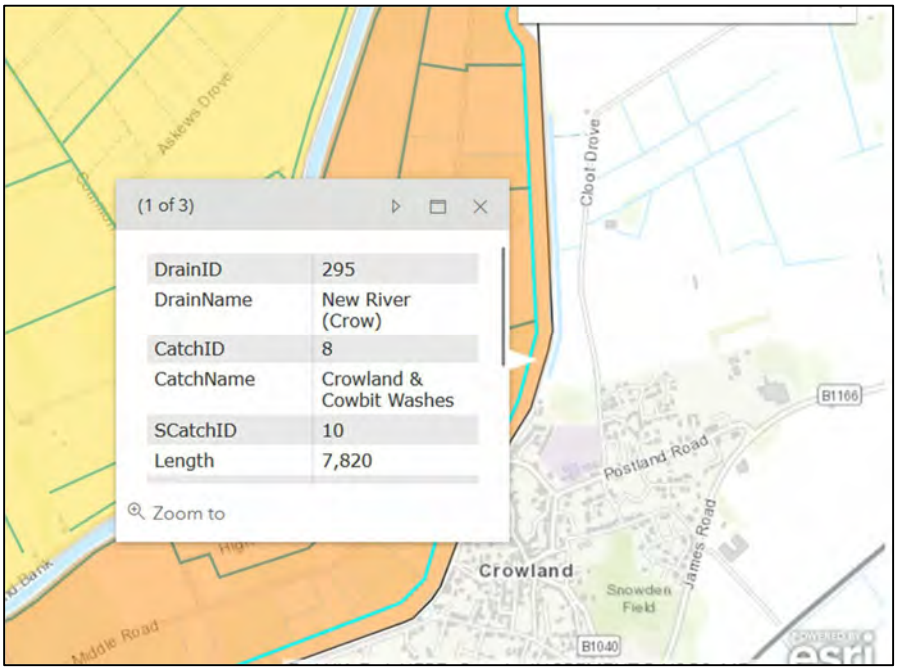


Figure 4.4 - Extract from Welland District IDB map
(Source: https://www.wellandidb.org.uk/about-us/map-of-our-district/)

5 Groundwater Flooding

5.1 Figure 5.2 shows the Geosmart GW5 (v2.1) groundwater flood risk mapping which confirms that the site is in CLASS 2: MODERATE: *There is a moderate risk of groundwater flooding in this area with a chance of greater than 1% annual probability of occurrence.*

5.2 An intrusive soil investigation has been undertaken by BRD (Ref BRD4519-OR2-A, December 2024), which includes the application site and the large field north of the site. The following quotes are taken from this BRD report:

> The *investigation has shown the ground conditions under the site comprise Superficial Deposits that range widely in nature and strength. They ranged from very soft to stiff fine-grained soils and loose to dense coarse-grained soils, and locally contained some organic materials. It is considered likely some of the soils are Tidal Flat Deposits and some are Abbey Sand and Gravel, however in places it has proven impossible to determine one from the other. Consequently, all the soils encountered have been referred to as Superficial Deposits*.
>
> *Most of the site is underlain by a Superficial Secondary A Aquifer, the Abbey Sand and Gravel, with the underlying Oxford Clay Formation and the Tidal Flats Deposits classified as Unproductive Strata.*
>
> *The site is not within a Source Protection Zone (SPZ)*
>
> *Excavations down to approximately 1.5m should remain stable in the short term, and should any minor seepages be encountered. However, for deeper excavations, groundwater ingress with associated excavation instability should be anticipated and pumping from a sump may not be sufficient to keep the excavations dry.*
>
> *Due to the presence of shallow groundwater the site is not suitable for surface water disposal to soakaways.*
>
> *To allow a more detailed assessment of the groundwater levels during the wetter months, longer term monitoring through the winter months could be considered.* (§ Summary).
>
> *This area is known to have shallow groundwater levels and observations of the water level in the surrounding ditches and made during the investigation and subsequent monitoring indicate the local groundwater level is approximately 1.5m depth.*
>
> *During the progressing of the machine excavated trial pits groundwater seepages, which were generally fast, were noted at depths between 0.80m and 2.30m. On completion of the boreholes standing water levels between 1.50m and 2.80m depth were recorded. At the subsequent monitoring visit the standing water levels in the borehole wells was recorded between 0.40m and 1.80m depth (*§ 4.4).

We note that the investigations extended to c 4 m below ground level.

5.3 Table 5.1 is a summary of the groundwater related data given in the BRD report.

Table 5.1 - Groundwater data

Test name	ground level* (mAOD)	water strike testing 18-21 November 2024 (mbgl)	water strike 18-21 November 2024 (mAOD)	Monitored water 28 November 2024 (mbgl)	Monitored water 28 November 2024 (mAOD)
TP1	1.957	2.2	-0.243		
TP2	1.959	2.1	-0.141		
TP3	1.935	2.2	-0.265		
TP4	1.956	2.5	-0.544		
TP5	1.796	2.3	-0.504		
TP6	1.41	2	-0.59		
TP7	1.482	2.1	-0.618		
WS1	2.185	1.2	0.985	0.76	1.425
WS2	1.98	2.1	-0.12		
WS3	1.932	0.8	1.132	0.41	**1.522**
WS4	2.252	2.3	-0.048	1.67	0.582
WS5	1.448	1.9	-0.452		
WS6	1.786	1.8	-0.014		
WS7	1.848	1.9	-0.052	1.46	0.388

*given on BRD test log. Refer to Figure 5.1 for test locations.

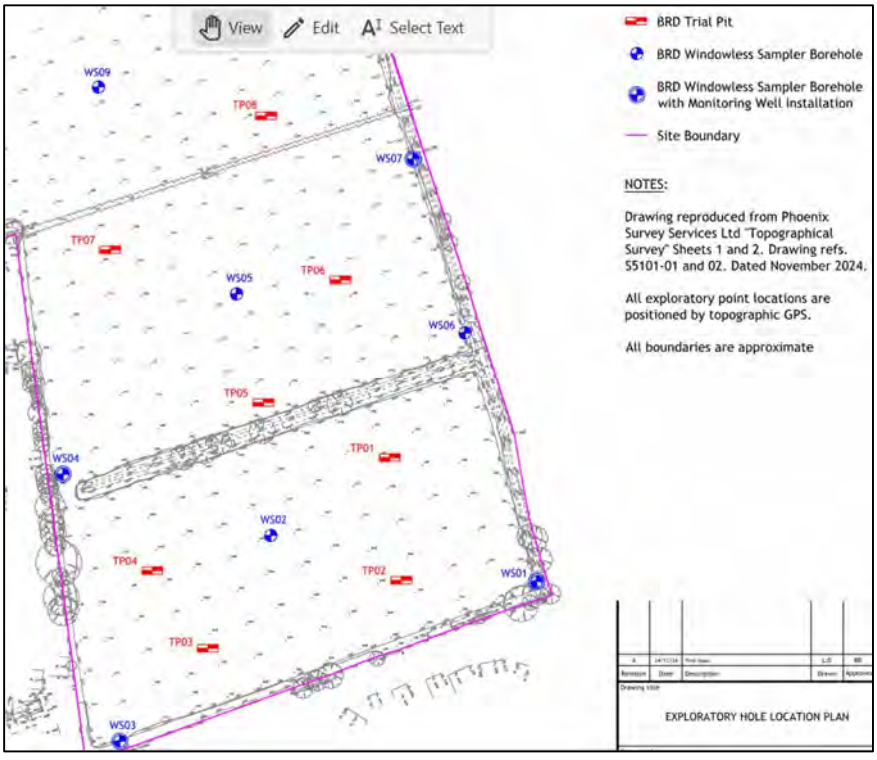


Figure 5.1 - Extract from BRD drawing BRD4519-OD1A

5.4 So although the site is at a low elevation, the surrounding watercourses are expected to act to convey sub-surface flows and water is not expected to surface at the site except in the most extreme of circumstances. The site is at a low elevation and the local watercourses (and hence groundwater) systems are artificially controlled, the groundwater flood risk may be different to that suggested by the mapping in Figure 5.1. There is, however, also a risk that the groundwater could rise higher than was observed during the soil investigations. The proposed finished floor levels (FFL) are shown on Infrastructure Design Ltd drawings. The site levels designs will also include exceedance flow routes, so if shallow flooding were to occur at the surface (whether surface water or groundwater) it would be routed through the development in areas of low vulnerability to the drainage systems downstream.

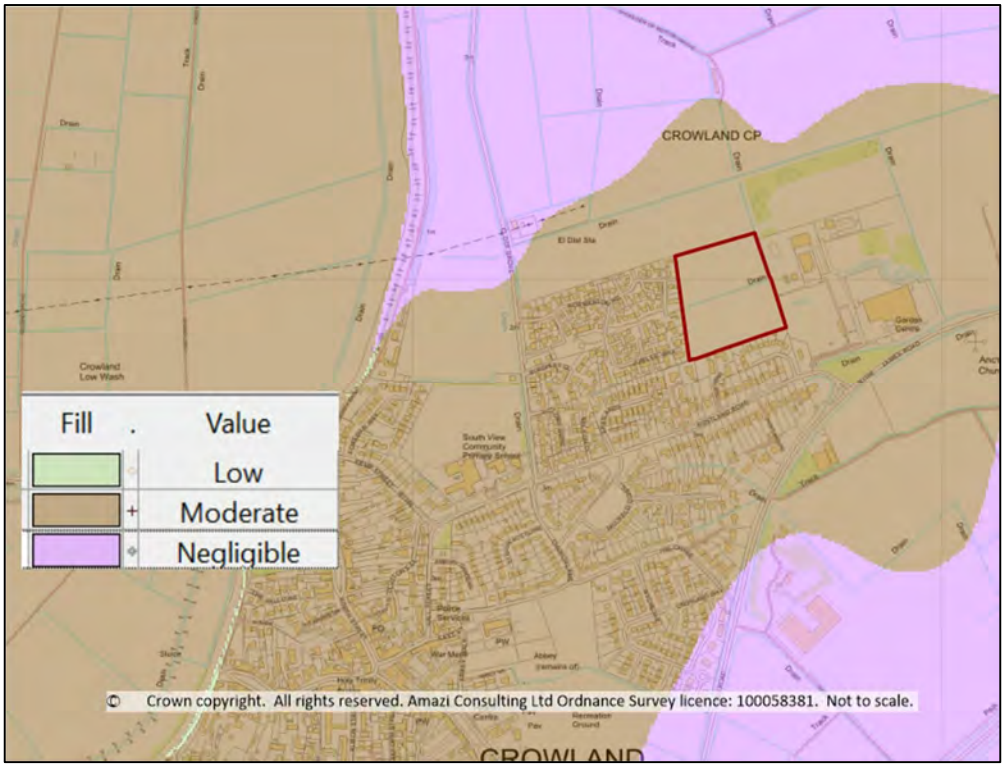


Figure 5.2 - Groundwater flood risk

(Source: Geosmart GW5 (v2.1), 14 February 2025)

5.5 Site infrastructure will need to be designed and constructed to withstand potential high groundwater levels.

6 Surface Water Flooding

6.1 Figure 6.1 shows the national Risk of Flooding from Surface Water mapping in the vicinity of the application site. It indicates that there are some isolated areas at risk of surface water flooding on the site, all of which correspond with localised low areas in the site topography. Figure 2.3 illustrates that there is no overland flow route from off-site towards or through the site because there is very limited topographical catchment uphill of the site.

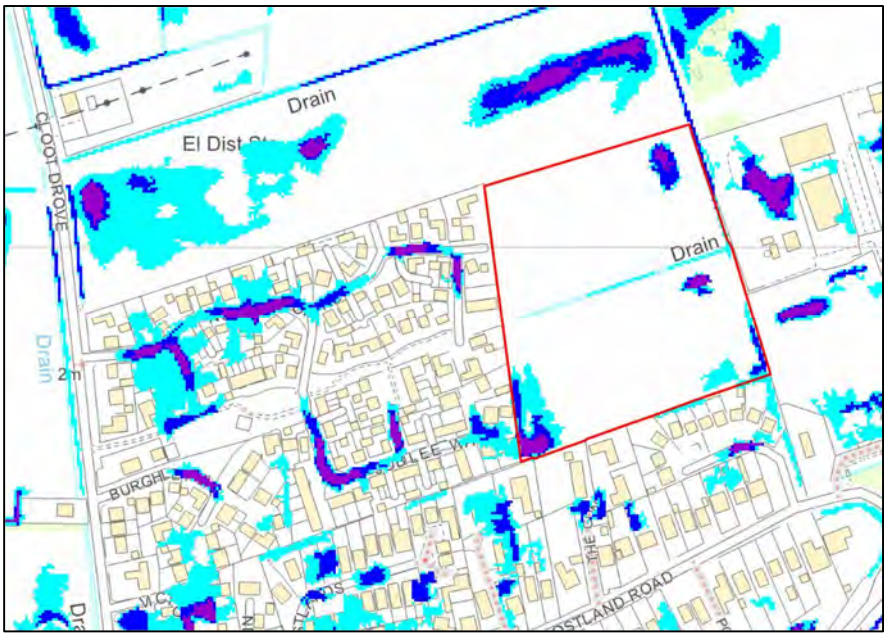


Figure 6.1 - Risk of Flooding from Surface Water

High ⇨ *up to 1:30 year return period*
Medium ⇨ *1:30 to 1:100 year return period*
Low ⇨ *1:100 to 1:1,000 year return period*
(Source: rofsw_4bandPolygon.shp, downloaded 07 March 2025)

6.2 This surface water flood risk therefore mainly arises from the site itself. The site proposals include a site surface water system that manages rain falling on the site, and overland runoff via exceedance flow routes.

Also, referring to the watershed mapping on Figure 2.3:

- Land to the east is cut off by the watercourse at the site's east boundary
- Land to the south between the site and Postland Road is an urbanised area which includes a public surface water drainage system with various large diameter outfalls into the watercourse in the west verge of Cloot Drove. So much of this surface runoff will be directed westwards, rather than overland towards the site. Refer to Anglian Water sewer mapping in Appendix G.

So in general, the local drainage system will act to convey flows past the site. None of this is considered the flood mapping, as stated in section 6.5.

6.3 To further understand the shallow nature of the existing site flood risk, please refer to Figure 6.2. This data suggests that mainly the areas shown at risk are a very low risk of flooding up

to 0.2 m i.e. an annual chance of occurrence of less than 0.1% in any given year (rarer than the 1:1,000 year return period).

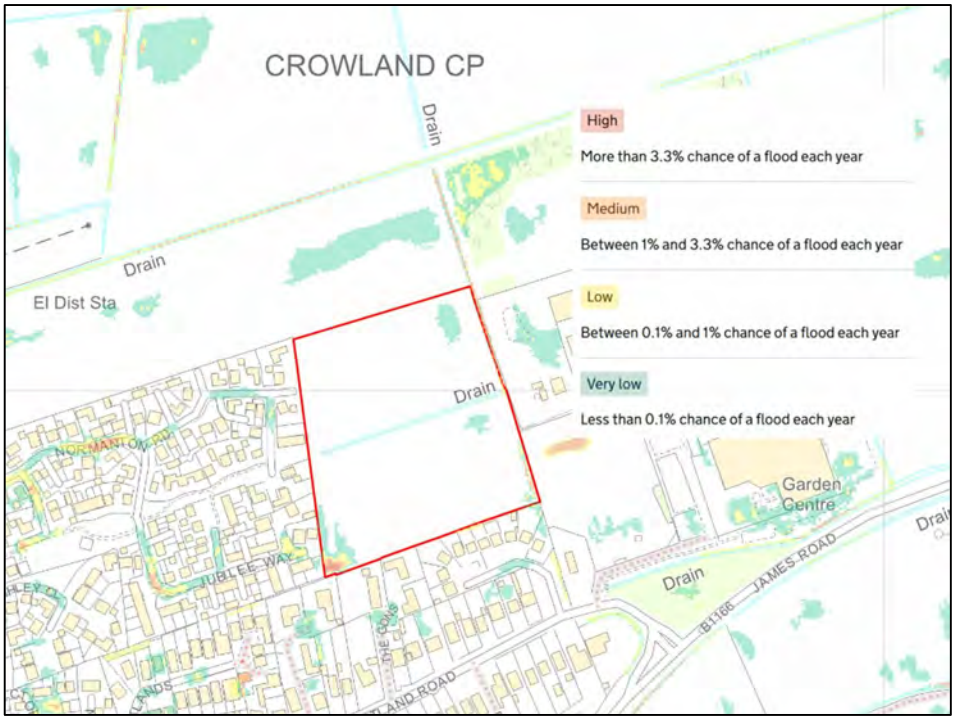


Figure 6.2 - Risk of Flooding from Surface Water – 0 to 0.2 m deep
(Source: rofsw_4band_0_2m_depthPolygon.shp)



Figure 6.3 - Risk of Flooding from Surface Water – Future extent (2040-2060)
(Source: https://check-long-term-flood-risk.service.gov.uk/map)

6.4 Figure 6.3 shows that the predicted future extents are similar to the current day. Future risks will be managed as mentioned in section 6.2.

6.5 The risk of flooding from surface water (RoFSW) data in this report is published by the Government and is accompanied by a high level description that confirms '*RoFSW is created using a combination of local flood model information and national flood modelling. These are used to generate the probabilities of flood risk for each 2m grid square of land, with the aim of using the best available flood risk information in any one location….. flood estimation is not an exact science, and any flood risk assessment needs to be understood and used in that context….RoFSW outputs are generally not suitable for property level assessment; instead they estimate flood risk to an area of land. The method used does not provide information relating to when the floodwater may be deep enough to start causing damage or disruption to homes, roads or other infrastructure.'*

7 Summary

7.1 The proposed development comprises the construction of 80 dwellings and associated infrastructure.

7.2 The development is located fully within flood zone 3, the area at high risk of tidal flooding if defences did not exist.

7.3 However, the site is defended from flooding by two sets of raised defences that protect the site from river flooding. The South Holland Strategic Flood Risk Assessment suggests that if the defences were to fail, the site could be at risk of flooding, and therefore the developer proposals to include the following design measures:

i. FFLs raised to a minimum of 300 mm above existing ground levels (minimum site FFL = 1.75 mAOD).
ii. Flood resilient construction to at least 300 mm above FFL.
iii. No single storey buildings and no sleeping accommodation (bedrooms) at ground floor.

7.4 The site lies within the catchment of the North Level IDB, but is not bounded by any IDB watercourses.

7.5 The existing ordinary watercourses at the site will be retained and easements for access provided for future maintenance.

7.6 The site surface water drainage will include sustainable drainage systems with outflow restricted to greenfield rates. Further information is given in a separate report by Infrastructure Design Ltd.

7.7 In order to mitigate for these possible flood risks, the proposed site levels and infrastructure includes exceedance flow routes. If flooding were to occur at the surface (whether surface water or groundwater) it would be routed through the development in areas of low vulnerability to the drainage systems downstream. Further information is given in a separate report by Infrastructure Design Ltd.

A

Not Used

B

Survey



C

Proposed Site



KEY

- SITE BOUNDARY
- AFFORDABLE RENT UNITS
- SHARED OWNERSHIP UNITS
- DENOTES MAINTENENCE STRIP TO EXISTING DITCH (5M OFFSET FROM TOP OF BANK)
- PROPOSED TREE PLANTING REFER TO LANDSCAPING PROPOSALS)
- 3M WIDE SWALE TO PRIMARY STREET

Cloot Drove, Crowland | Accommodation Schedule

Open Market Units

Unit Type	No. Beds	Storeys	No. of Units	Sqft./unit	Total Sqft
Hartley	1	2	6	635	3,810
Loxley	2	2	18	855	15,390
Morley	3	2	27	1001	27,027
Oatley	3	2	3	1001	3,003
Totley	4	2	6	1165	6,990
Total Open Market Dwellings			60		56,220 sqft

Affordable Rent Units

Unit Type	No. Beds	Storeys	No. of Units	Sqft./unit	Total Sqft
Hartley	1	2	2	635	1,270
Loxley	2	2	4	855	3,420
Morley	3	2	6	1001	6,006
Oatley	3	2	1	1001	1,001
Totley	4	2	1	1165	1,165
Total Affordable Rent			14		12,862 sqft

Shared Ownership Units

Unit Type	No. Beds	Storeys	No. of Units	Sqft./unit	Total Sqft
Loxley	2	2	2	855	1,710
Morley	3	2	1	1001	1,001
Oatley	3	2	2	1001	2,002
Totley	4	2	1	1165	1,165
Total Shared Ownership			6		5,878 sqft
Total Affordable			20		18,740 sqft
Total Dwellings			80		74,960 sqft

N 0 25 50 m

LAND AT CLOOT DROVE, CROWLAND - PROPOSED LAYOUT (ALLOCATION LAND)

PEGASUS GROUP

| PEGASUSGROUP.CO.UK | TEAM/DRAWN BY: TC | APPROVED BY: RWB | DATE: 22/07/2025 | SCALE: 1:500@A0 | DRWG: P24-1403_DE_003_I_01 | CLIENT: ALLISON HOMES |

Issue:

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D

NPPF Planning Practice Guidance Flood Risk and Coastal Change, Table 1

National Planning Policy Planning Practice Guidance: *flood risk and coastal change*

Table 1: Flood Zones

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 0.1% annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map for Planning – all land outside Zones 2, 3a and 3b)
Zone 2 Medium Probability	Land having between a 1% and 0.1% annual probability of river flooding; or land having between a 0.5% and 0.1% annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1% or greater annual probability of river flooding; or Land having a 0.5% or greater annual probability of sea. (Land shown in dark blue on the Flood Map)
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: • land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or • 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). 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)

Note: The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding. Reference should therefore also be made to the Strategic Flood Risk Assessment when considering location and potential future flood risks to developments and land uses.

Paragraph: 078 Reference ID: 7-078-20220825

E
Environment Agency data

Leigh Parratt
Leigh@amazi.co.uk

Our ref: CCN-2024-382210

Date: 22/11/2024

Dear Leigh,

Provision of Flood Risk Information for Cloot Drove, Crowland

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

The area was previously known to have flooded in March 1947 and April 1998.

A copy of the Recorded Flood Outlines Map showing the extent of previous recorded flooding in your area is attached. This only covers information we hold and 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 organisations, such as the Lead Local Flood Authority (ie top tier council), Local Authority or Internal Drainage Board (where they exist), may have records.

Please note, in some areas our Recorded Flood Outlines may not reflect the October 2023 - January 2024 flood incidents. Due to the scale of the events, it will take time to gather the information and verify the extent of the flooding before we are able to provide this information for all areas.

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

The site may be at risk from main rivers in the form of residual risk due to the failure of flood management infrastructure such as a breach of a raised flood defence. You may need to undertake further assessment of this residual risk using the data provided.

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

One measure affording protection to the site is the Crowland & Cowbit Washlands, which undergoes regular inspections. As a result of the extreme flows experienced during storm Henk, the "Cradge" bank experienced a breach which led to water entering the washlands area. This water was stored here, as per its design, until such a time as river levels receded sufficiently to allow stored water to drain back in to the Welland. This breach has now been repaired.

This site is not at risk of flooding from any main river. The site may 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.

4.2 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 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 Christopher using the email address below and quoting our CCN reference number above.

Yours sincerely,

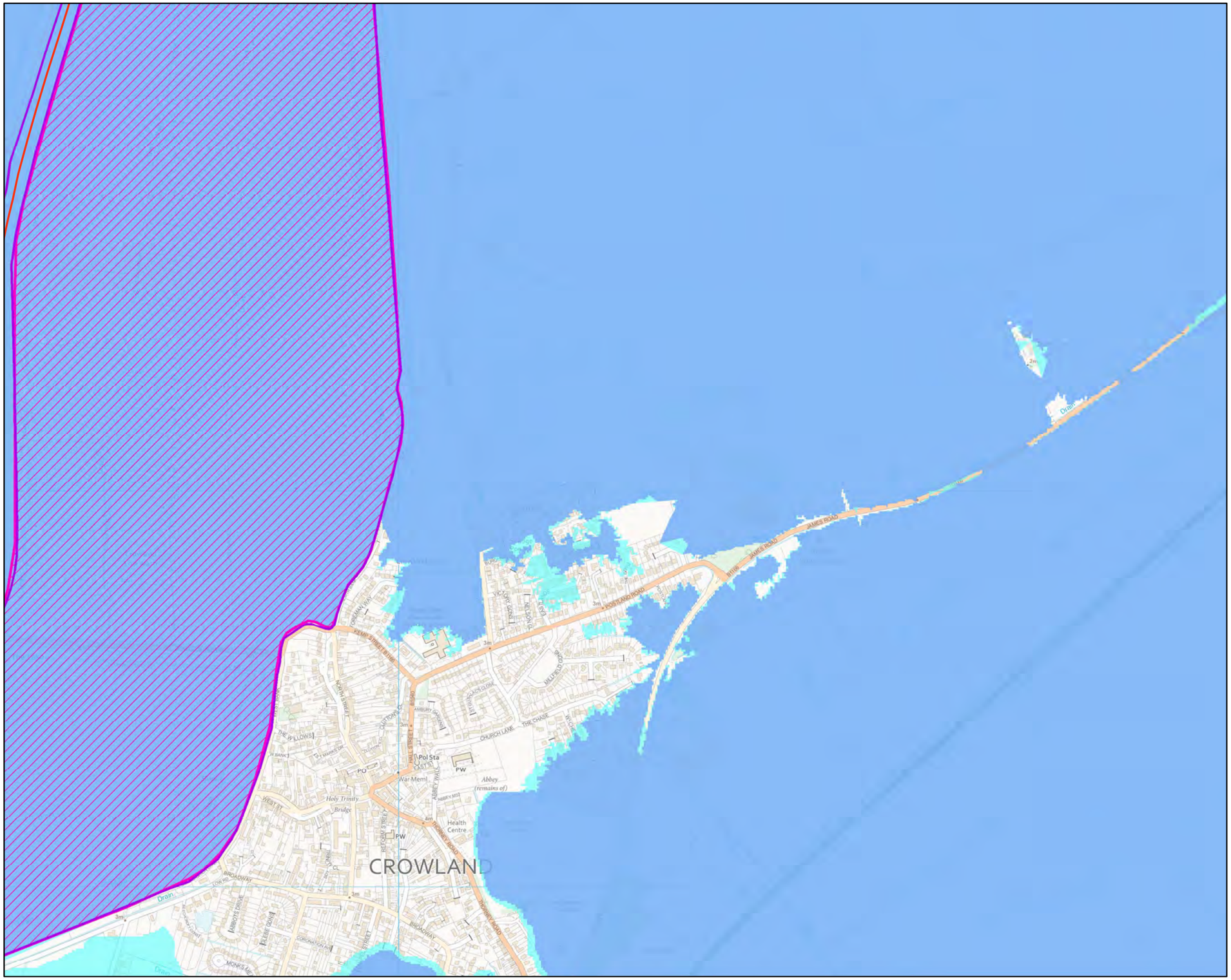


+44 7385226602

for John O'Neill
Welland and Nene Partnerships and Strategic Overview Team Leader
e-mail PSOWN@environment-agency.gov.uk

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

Flood Map centred on TF 24549 11004 - created November 2024 [Ref: CCN-2024-382210]



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.

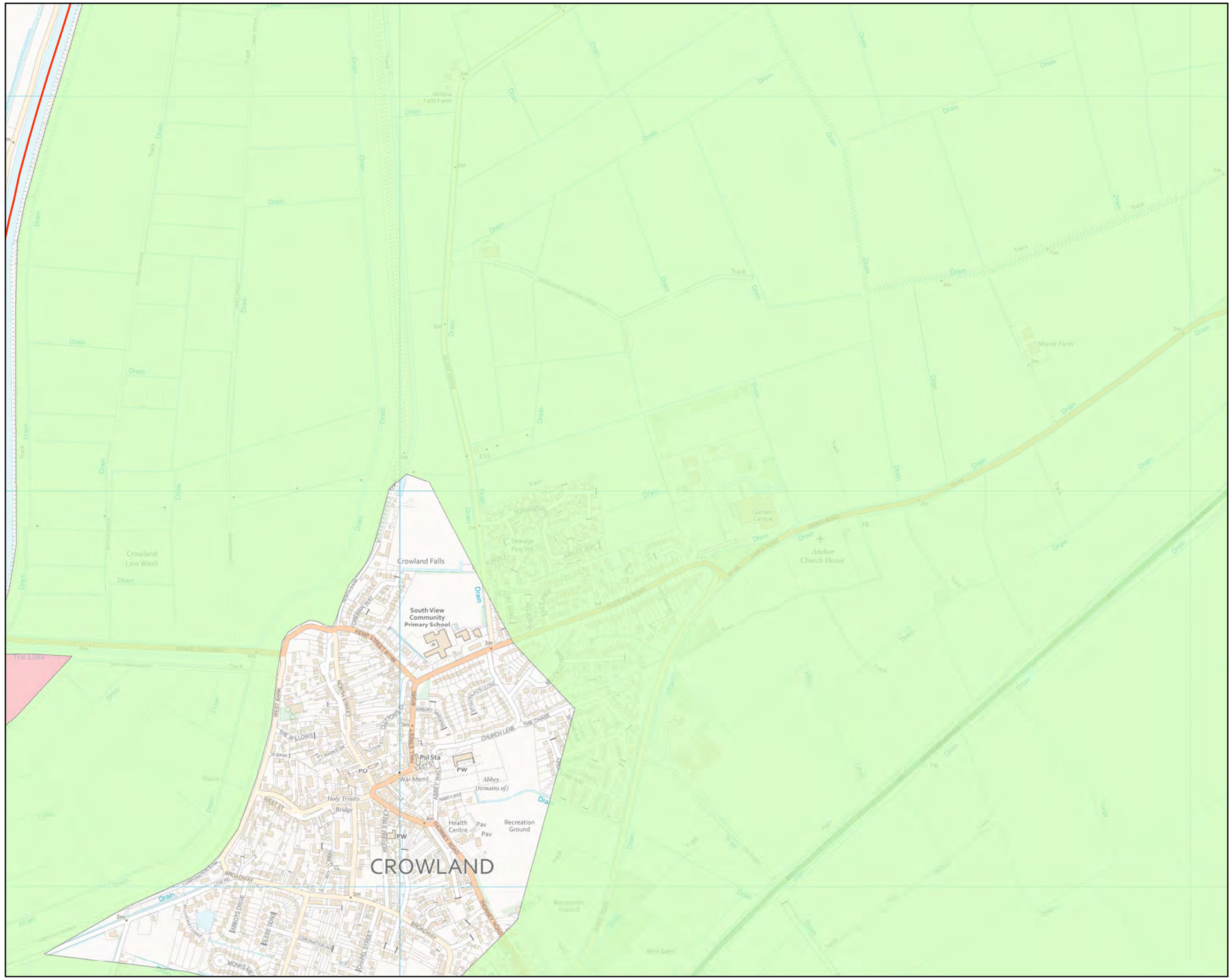
These two colours show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements. Sites outside the two extents, but behind raised defences, may be affected by flooding if the defences are overtopped or fail.

Created by the Partnerships and Strategic Overview Team, Kettering

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Historic Flood Map centred on TF 24549 11004 - created November 2024 [Ref: CCN-2024-382210]



Environment Agency

Scale 1:10,000

N

Legend

Main Rivers

Event name

LNA_1947_March_River Welland_Crowland

LNA_1998_April_River Welland

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Modelled Nodes Map centred on TF 24549 11004 - created November 2024 [Ref: CCN-2024-382210]



Environment Agency

Scale 1:10,000

N

Legend

- Modelled Flows
- Modelled Levels
- Main Rivers

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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).

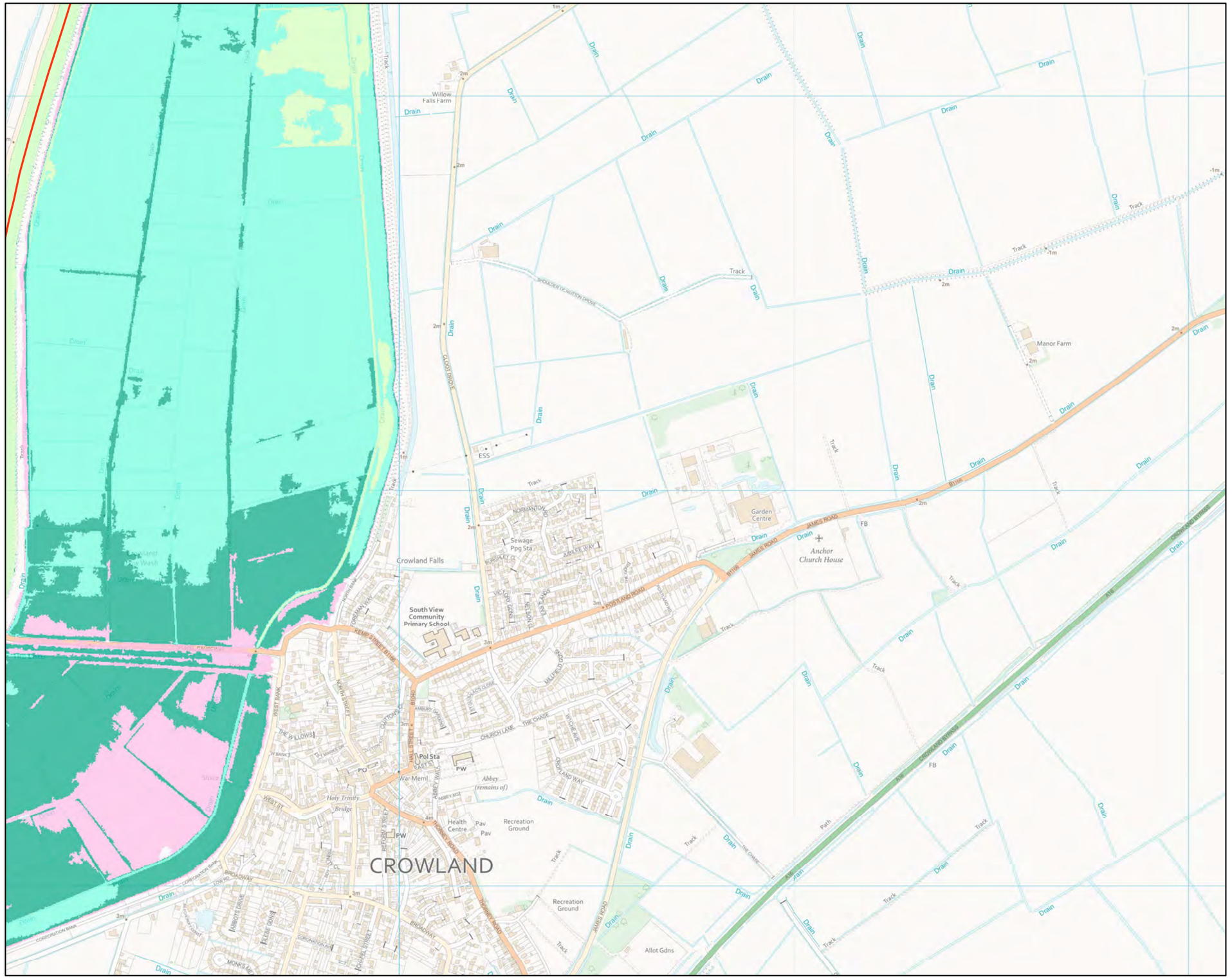
			Annual Exceedance Probability - Maximum Water Levels (mODN)											
Node Label	**Easting**	**Northing**	**50% (1 in 2)**	**20% (1 in 5)**	**10% (1 in 10)**	**5% (1 in 20)**	**3.33% (1in 30)**	**2% (1 in 50)**	**1.33% (1 in 75)**	**1% (1 in 100)**	**1% (1 in 100) inc 20% Climate Change**	**0.5% (1 in 200)**	**0.1% (1 in 1000)**	**0.1% (1 in 1000) inc 20% Climate Change**
WELLAND 27273	523001	311339	3.83	4.17	4.40	4.67	4.77	4.83	4.88	4.89	4.90	4.89	4.89	4.90
WELLAND 27525.5	523002	311087	3.84	4.18	4.41	4.68	4.78	4.84	4.89	4.91	4.92	4.91	4.91	4.92
WELLAND 27778	523002	310836	3.84	4.19	4.42	4.69	4.79	4.86	4.91	4.92	4.94	4.93	4.93	4.94

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**
WELLAND 27147	523000	311464	48.28	64.42	75.01	94.30	108.52	121.09	127.60	130.42	131.68	131.81	131.48	132.77
WELLAND 27399.3	523001	311213	48.12	64.24	75.01	94.33	108.56	122.91	131.60	134.11	136.37	136.47	136.27	137.02
WELLAND 27651.8	523002	310962	47.94	64.06	75.00	94.36	108.59	122.90	131.58	134.09	136.38	136.48	136.27	137.02

Modelled Flood Extents (with defences) Model: Welland Glen (2016)
centred on TF 24549 11004 - created November 2024 [Ref: CCN-2024-382210]



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

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F
Flood Preparation

Personal flood plan

Name

Environment Agency

Are you signed up to receive flood warnings? ☐
If not call Floodline on 0345 988 1188 to see if your area receives free flood warnings.

Let us know when you've completed your flood plan by calling Floodline on **0345 988 1188.** This will help us learn more about how people are preparing for flooding.

General contact list	Company name	Contact name	Telephone
Floodline	Environment Agency		0345 988 1188
Electricity provider			
Gas provider			
Water company			
Telephone provider			
Insurance company and policy number			
Local council			
Local radio station			
Travel/weather info			

Key locations

Service cut-off	Description of location
Electricity	
Gas	
Water	

Who can help/who can you help?

Relationship	Name	Contact details	How can they/you help?
Relative			
Friend or neighbour			

Be prepared for flooding. Act now

G

Anglian Water Mapping

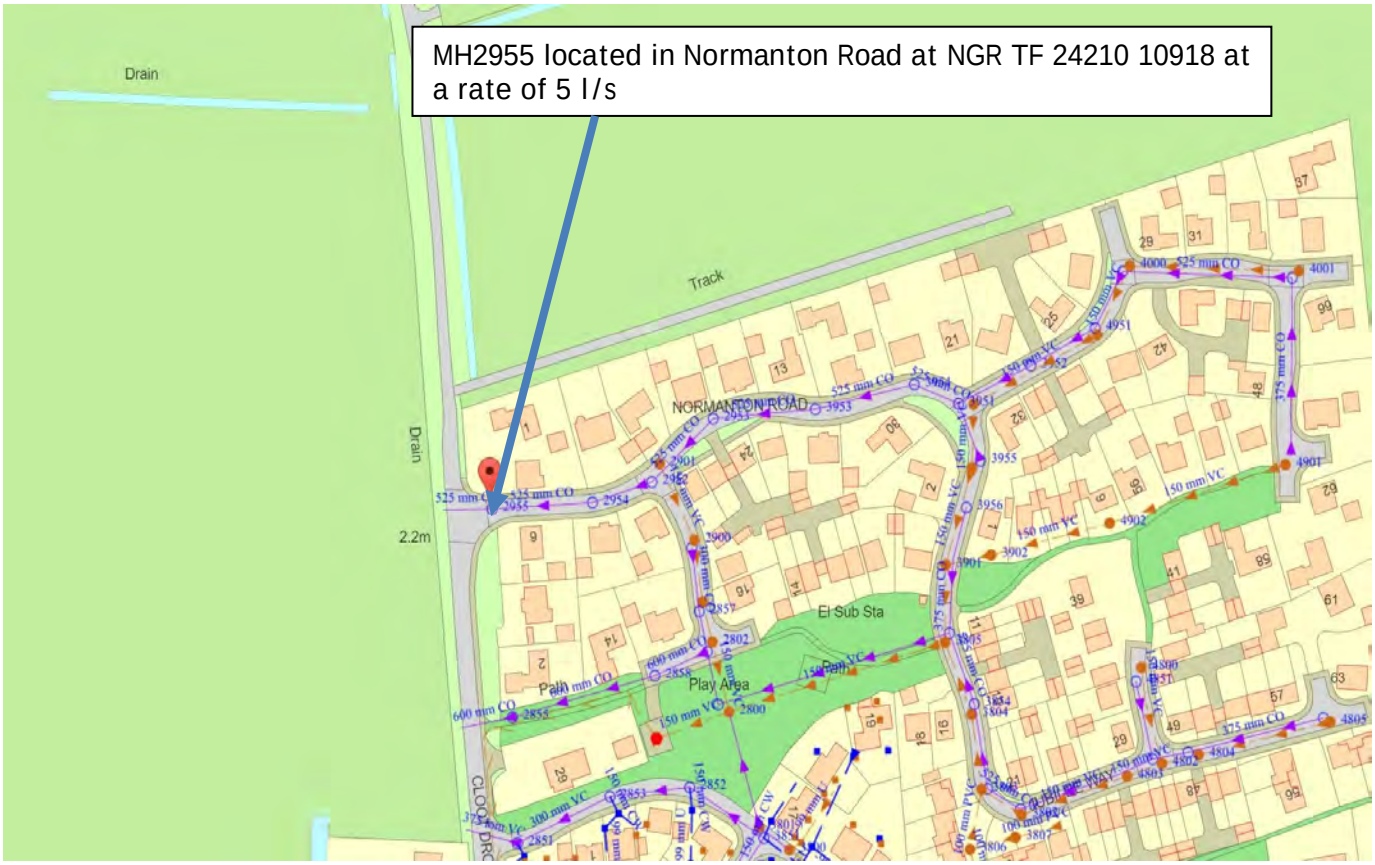


Figure 3: Showing your connection point for surface water



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cover photography: Lindsey Wakelin