

Preliminary Flood Risk Assessment

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1. Introduction

The following document is a Preliminary Flood Risk Assessment carried out by Oakshire Environmental, and includes details of the site, vulnerability classification, flood linkages and an evaluation of risk.

1.1 Project Overview

The client's proposed project involves the construction of a semi-detached dwelling and associated work at 76 Commercial Road, Spalding, PE11 2HE. Oakshire Environmental have carried out a Preliminary Flood Risk Assessment as described below.

1.2 Purpose of Investigation

The objectives of the Preliminary Flood Risk Assessment were to:

- Develop a detailed assessment of the site.
- Apply the Sequential Test and Exception Test.
- Identify potential flood sources, receptors and pathways at the site.
- Assess the level of potential flood risk.
- Determine the requirement or scope of further investigations or mitigation measures.

1.3 Scope of Work

- Brief introductory information has been noted to provide context to the report and include an Introduction, Project Overview, Scope of Work and Limitations.
- To develop a detailed assessment of the site and apply the Sequential Test and Exception Test, desk studies have been carried out to collate information obtained from sources including the Environment Agency, Local & National Authorities, Strategic Flood Risk Assessments and Digital Terrain Model (DTM) LiDAR topographical surveys.
- This information has been used to identify potential flood sources, receptors and pathways at the site, as part of an initial Conceptual Site Model.
- To assess the level of potential flood risk, a Conceptual Site Model have been produced to categorise the potential severity of the impact of the flood linkage on the receptor and the probability of the flood linkage being present.
- Following the assessment of flood linkages, an evaluation of flood risk, mitigation measures, surface water management and safe access and egress has been conducted to determine the requirement or scope of further investigations.
- Supporting appendix include photographs, maps, and plans of the site.

1.4 Limitations

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This report excludes consideration of potential hazards arising from any activities at the site other than normal use and occupancy for the intended land uses. Hazards associated with any other activities have not been assessed and must be subject to a specific risk assessment by the parties responsible for those activities. Oakshire Environmental does not warrant or guarantee that the site is free of hazardous or potentially hazardous materials or conditions. It should be noted that this report has been produced for environmental purposes only.

2. Site

The following section provides a description of the site, location, proposed development and vulnerability classification, utilising information obtained from the client and publicly available sources.

2.1 Site Description and Location

The site is located at the end of Barge Close, in Spalding, and is approximately 0.03ha. The site forms the side garden of an adjacent dwelling to the south east and is comprised of grass with a garage building and paving at the south east and an outbuilding at the north west. The site slopes from north west to south east with ground levels ranging from 4.20mAOD at the north west boundary to 3.38mAOD at the south east boundary.

The site is bordered by residential dwellings and gardens to the north east, north west and south west and Barge Close with additional dwellings to the south east. The surrounding area is predominantly residential with some commercial premises.

National Grid Reference: TF 25461 23353

2.2 Proposed Development

The proposed development involves the demolition of the existing garage and outbuilding and the construction of three two-storey dwellings at the south of the site along with paving covering the remainder of the site. The existing ground levels in the area the dwellings will be situated are between 3.4mAOD and 3.7mAOD.

2.3 Vulnerability Classification

Table 2 in the NPPF technical guidance (Flood Risk Vulnerability Classification) assesses the flood risk vulnerability of a site based on the site's use. Based on this assessment, the proposed residential development falls within the category of 'more vulnerable'.

The flood risk map for planning indicates that the site falls within Flood Zone 3. The South East Lincolnshire Strategic Flood Risk Assessment (SFRA) shows that the site is not within the functional flood plain (Flood Zone 3b).

More vulnerable developments are permitted in Flood Zone 3a provided the Exception Test is passed so this will be carried out.

It should be noted that these Flood Zones do not take into account the impact of any flood defences or site specific mitigation measures.

Table 1: Flood Risk Vulnerability Classification table from National Planning Policy Framework Technical Guidance

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	×	Exception Test required	•	•
Zone 3b	Exception Test required	×	×	×	•

Key: • Development is appropriate
 × Development should not be permitted

2.4 Sequential Test

An appraisal of the South East Lincolnshire Strategic Housing Land Availability Assessment (SHLAA) has been conducted with a search radius of the entire Spalding development area. Only 1 site is shown to be developable and in a lower flood zone (Flood Zone 2) than the proposed site. The search was, therefore, expanded to include other developable sites in Flood Zone 3a of a comparable size with a lower flood hazard and/or modelled flood depth.

Table 2: Sequential Assessment of sites in Spalding outlined in the South East Lincolnshire SHLAA

Strategic Housing Land Availability Assessment		
Site Location	Size (ha)	Comments
Land to the east of Spalding Common	4.66	Flood Zone 2 Site is far too large for the proposed development Site is not as accessible to Spalding's existing services and facilities as other sites and is not located within/adjacent Spalding's existing built up area (defined settlement limit) Hazard mapping shows that there is a 'Danger for most' and depth mapping shows flood depths between 0.5m and 1m
Land to the south of Horseshoe Lane	0.33	Flood Zone 3a Site is not as accessible to Spalding's existing services and facilities as other sites and is not located within/adjacent Spalding's existing built up area (defined settlement limit) Services and facilities are not accessible by foot, bicycles share the existing highway network and there are no bus stops on Horseshoe Road. A large scale development could provide improved transport links, however, this would be an unreasonable cost for the proposed development.
Land to the east of Spalding Road (Pin013)	0.28	Flood Zone 3a Hazard mapping shows that there is a 'Danger for some' and depth mapping shows flood depths between 0.25m and 0.5m
Farm Yard, Blue Gowt Drove	0.24	Flood Zone 3a It is not accessible to Spalding or Pinchbeck's existing services and is not located adjacent to Spalding or Pinchbeck's existing built-up area (defined settlement limit) because of the Vernatts Drain and the railway line. However, the development is intended to provide new crossings of the railway line and Vernatts Drain, which will enable access to Spalding and Pinchbeck's facilities. In addition, in conjunction with Pin024, only a large scale development will provide its own services and facilities. Services and facilities are not accessible by foot or bicycle and there are no bus stops. This site would not be suitable before the adjacent 'Preferred Housing' site is developed. However, the development of the Spalding Western Relief Road will require strategic allocations of land and the section of land to the north of Vernatts Drain is such an area. Only a large scale development can provide improved footpath, cycle and public transport links.
Land to the East of Tydd Road	0.82	Flood Zone 3a Site is not accessible to Spalding's existing services and is not located adjacent to Spalding's existing built-up area (defined settlement limit) because of the Vernatts Drain. Services and facilities are not accessible by foot or bicycle and there are no bus stops. Only a large scale development could provide the required transport links.
Blue Gowt Drove	0.31	Flood Zone 3a Services and facilities are not accessible by foot and there are no bus stops. Only a large scale development could provide the required transport links.
Highfield Nursery, Highfield Lane	0.85	Flood Zone 3a Services and facilities are not accessible by foot and there are no bus stops. Only a large scale development could provide the required transport links.

2-4 St John's Road	0.98	Flood Zone 3a Development already complete
Former PO Sorting Office, The Crescent	0.10	Flood Zone 3a Development would require the demolition of the existing disused post office which would incur an unreasonable cost given the scale of the development
Hawthorn Bank	0.22	Flood Zone 3a Development already complete
Land off Cradge Bank	0.18	Flood Zone 3a Development already complete
Land to the north of Burr Lane (Stm023)	0.29	Flood Zone 3a Hazard mapping shows that there is a 'Danger for some' and depth mapping shows flood depths between 0.25m and 0.5m Burr Lane is not suitable to provide access to services and facilities for new residential development in this area, having no footways, poor access onto Barrier Bank and poor pedestrian and cycling linkages to the rest of Spalding. There are also no bus stops on roads adjoining the site.
Land to the west of Fen End Lane	0.24	Flood Zone 3a Services and facilities are not accessible by foot and bicycles have to share road space, which may discourage their use. There are also no bus stops on roads adjoining the site.
Land to the north of Burr Lane (Stm029)	0.92	Flood Zone 3a Hazard mapping shows that there is a 'Danger for some' and depth mapping shows flood depths between 0.25m and 0.5m Site is not located within or adjacent to Spalding's existing built up area (defined settlement limit). Burr Lane is not suitable to provide access to services and facilities for new residential development in this area, having no footways, poor access onto Barrier Bank and poor pedestrian and cycling linkages to the rest of Spalding and there are also no bus stops on roads adjoining the site.

Based on the findings of this assessment, there are no other developable sites that would be more appropriate for the proposed development than the proposed site due to their inappropriate locations, therefore, the Sequential Test has been passed.

3. Initial Conceptual Site Model

The following section outlines potential flood sources, pathways and receptors, utilising information gathered in the previous sections, to develop an initial conceptual site model.

3.1 Potential Flood Sources

Rivers & Seas

The site is situated 40m south east of the River Welland and 670m west of the Coronation Channel. The Environment Agency's flood map for planning shows that the site would be at risk of flooding in a 1% AEP fluvial event if no defences were present.

There are flood defences along the River Welland as it passes the site in the form of natural high ground with a design Standard of Protection (SoP) of 100 years and the Coronation Channel to the east has a design SoP of 50 years.

Modelled flood extents for the River Welland, taking into account these flood defences, shows that no flooding would occur up to and including a 0.1% AEP event.

Flood maps from the South East Lincolnshire SFRA showing the hazard and depth of flooding in the event of direct overtopping or breach of the flood defences in a 1% AEP fluvial event, for a present day scenario, shows that there would be a danger for most with flood depths between 0.5m and 1m.

Environment Agency data shows that the site and the surrounding area has not previously flooded.

The risk of tidal flooding is considered to be negligible.

Surface Water

Surface water runoff is caused by heavy rainfall that can overwhelm the drainage network. The Environment Agency Risk of Flooding from Surface Water mapping can be used to identify areas at risk of surface water flooding. Map data shows that surface water predominantly follows topographical flow paths of existing watercourses or dry valleys and can pond in low-lying areas. The risk is most often confined to roads with some run-off flow routes around properties.

Environment Agency maps show that the risk of surface water flooding across most of the site is very low, however, there is a low risk of surface water flooding at the south east and a high risk to the east of the site. In a 1% AEP event, no surface water flooding is anticipated on the site and flood depths below 0.3m are anticipated to the east which would pose a low risk to the proposed development.

Groundwater

Flooding from groundwater can occur when the water table rises and reaches ground level allowing water to seep through to the surface. This means that water may rise up through floors or underground rooms such as cellars or basements. Groundwater flooding is much slower to occur than river flooding and will usually happen days, weeks or even months after heavy or prolonged rainfall. And it may last weeks or even months.

The site and surrounding land is relatively low lying, suggesting a potential risk of groundwater flooding, however, the underlying bedrock is an unproductive aquifer and there is an extensive network of land drains and pumping infrastructure in the area that keeps the water table artificially low. Furthermore, there are no records of groundwater flooding in the vicinity of the site and no proposed below ground infrastructure suggesting a negligible risk from groundwater flooding.

Sewers

Sewer flooding occurs when heavy rainfall and flooding overloads sewer capacity or when sewers cannot discharge to watercourses due to high water levels. Sewer flooding can also be caused by blockages, collapses, equipment failure or groundwater leaking into sewer pipes. Sewer flooding is often synonymous with other sources of flooding such as river, surface water and groundwater flooding.

The very low risk of surface water flooding in the area suggests that the risk of sewer flooding is likely to be low.

Reservoirs

The level and standard of inspection and maintenance required for reservoirs means that the risk of flooding from reservoirs is generally very low. The Crowland and Cowbit Washes are a flood storage reservoir situated downstream of the site and Environment Agency mapping shows that the site is not at risk of flooding in the event that this were to fail or overtop, even when there is also river flooding.

Climate Change

Climate change projections show an increased chance of warmer, wetter winters and hotter, drier summers with a higher likelihood of more frequent and intense rainfall. This is likely to make severe flooding happen more often. It is necessary to ensure that a development will be safe from flooding for its lifetime, which is generally considered to be 100 years for a residential development. Environment Agency guidance recommends that the impacts of climate change on peak river flow are assessed based on management catchments and recommends the use of the 'central' allowances for more vulnerable developments. To assess the impacts of climate change on peak rainfall intensity in large rural catchments the peak river flow allowances should also be used. The central climate change allowance for the 2080s in the Welland management catchment is 17%.

Modelling of the 1% AEP flood extent including a climate change allowance of 20% shows that the site would not be impacted due to the presence of flood defences. Breach hazard and depth mapping for a 1% AEP event for the year 2115 shows that there would be a danger for most with flood depths between 1m and 2m. In channel flood levels from the Welland Catchment Strategic model suggest that the maximum flood level for the site in a 1% AEP event, including a 20% allowance for climate change, would be no more than 5.30mAOD in the event of a breach or overtopping of flood defences. This is considered to be a conservative estimate given that flood waters would not reach this level when spread out across a large area.

Surface water modelling, taking into account climate change, has not been carried out for the site. In the absence of such modelling, the modelled 0.1% AEP flood event can be used as a proxy. Based on this, shallow flooding (<0.3m depth) is anticipated at the south east of the site and flood depths between 0.3m and 0.9m are anticipated on Barge Close to the east.

3.2 Potential Flood Receptors

Given the proposed use of the site, the following receptors are considered:

- Residential end users
- Proposed dwellings

3.3 Potential Flood Pathways

Based on the expected on-site receptors, relevant pathways for the above receptors include:

- River Welland
- Coronation Channel
- Topographical low points
- Low lying land

Pathways between off-site sources and off-site receptors is beyond the scope of this assessment.

3.4 Risk Assessment Methodology

The potential level of risk posed by a particular source is determined by assessing the potential severity of the impact of the flood linkage on the receptor, if it is assumed to be present, and the probability of the flood linkage being present.

Severities are categorised from Minor to Severe and probabilities are categorised from Unlikely to High Likelihood to give a potential level of risk output.

Table 3: Risk Matrix

Probability	Severity of Consequence			
	Severe	Medium	Mild	Minor
High Likelihood	Very High Risk	High Risk	Moderate Risk	Low / Moderate Risk
Likely	High Risk	Moderate Risk	Low / Moderate Risk	Low Risk
Low Likelihood	Moderate Risk	Low / Moderate Risk	Low Risk	Very Low Risk
Unlikely	Low / Moderate Risk	Low Risk	Very Low Risk	Very Low Risk

Very High Risk

There is a high probability that severe harm could arise to a designated receptor from an identified source; or there is evidence that severe harm to a designated receptor is currently happening.

High Risk

Harm is likely to arise to a designated receptor from an identified source.

Moderate Risk

It is possible that harm could arise to a designated receptor from an identified source. It is relatively unlikely that any such harm would be severe or if any harm were to occur it is more likely that the harm would be relatively mild.

Low Risk

It is possible that harm could arise to a designated receptor from an identified source, however, it is likely that this harm, if realised, would normally be mild.

Very Low Risk

There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

3.5 Conceptual Site Model

The information in this section has been compiled to produce an initial conceptual site model outlining the potential sources, pathways and receptors to consider at the site. The level of risk was categorised by considering the severity and probability, as outlined in the previous section.

Table 4: Conceptual site model

Sources	Pathways	Receptors	Severity	Probability	Potential Level of Risk	
Fluvial Flooding	River Welland Coronation Channel	Residential end users Proposed dwellings	Medium	Unlikely	Low	Modelled flood extents for the River Welland, taking into account flood defences, shows that no flooding would occur up to and including a 0.1% AEP event and flood maps showing the hazard and depth of flooding in the event of direct overtopping or breach of the flood defences in a 1% AEP fluvial event, for a present day scenario, shows that there would be a danger for most with flood depths between 0.5m and 1m.
Surface Water Flooding	Topographical low points		Mild	Unlikely	Very Low	The risk of surface water flooding across most of the site is very low, however, there is a low risk of surface water flooding at the south east and a high risk to the east of the site. In a 1% AEP event, no surface water flooding is anticipated on the site and flood depths below 0.3m are anticipated to the east which would pose a low risk to the proposed development.
Groundwater Flooding	Low lying land		Mild	Unlikely	Very Low	The site and surrounding land is relatively low lying, suggesting a potential risk of groundwater flooding, however, the underlying bedrock is an unproductive aquifer and there is an extensive network of land drains and pumping infrastructure in the area that keeps the water table artificially low. Furthermore, there are no records of groundwater flooding and no proposed below ground infrastructure suggesting a negligible risk from groundwater flooding.
Sewer Flooding	Topographical low points		Medium	Unlikely	Low	The low risk of surface water flooding on the site suggests that the risk of sewer flooding is likely to be low. If sewer flooding occurred it would impact the topographical low points to the east of the site.
Climate Change	River Welland Coronation Channel		Medium	Unlikely	Low	Climate change modelling shows that the site would not be impacted by fluvial flooding due to the presence of flood defences and breach hazard and depth mapping for a 1% AEP event for the year 2115 shows that there would be a danger for most with flood depths between 1m and 2m.
	Topographical low points		Mild	Low Likelihood	Low	Using the modelled 0.1% AEP flood event as a proxy for climate change modelling, shallow flooding (<0.3m depth) is anticipated at the south east of the site and flood depths between 0.3m and 0.9m are anticipated on Barge Close to the east.

4. Conclusions

4.1 Risk Evaluation

The initial conceptual site model identified the following potential flood linkages present at the site and the following conclusions have been drawn:

- There is a **low risk** to residential end users and the proposed dwellings from river flooding from the River Welland to the north west.
- There is a **very low risk** to residential end users and the proposed dwellings from surface water flooding in topographical low points.
- There is a **very low risk** to residential end users and the proposed dwellings from groundwater flooding due to the low lying land.
- There is a **low risk** to residential end users and the proposed dwellings from sewer flooding in topographical low points.
- There is a **low risk** to residential end users and the proposed dwellings from river and surface water flooding, taking into account climate change.

4.2 Existing Flood Mitigation Measures

There are currently no flood mitigation measures at the site.

4.3 Proposed Flood Mitigation Measures

Based on the residual risk of fluvial flooding in the event of a breach or overtopping of flood defences, no sleeping accommodation will be provided on the ground floor of the proposed dwellings and the finished first floor level should be situated no lower than 5.60mAOD to provide a 300mm freeboard above the maximum flood level in the event of a breach of flood defences.

Flood resilience measures should be also incorporated. Flood resilience measures accept that water will enter the building but through careful design and changes to the construction will minimise damage and allow faster cleaning, drying, repairing and re-occupancy of the building after a flood. Measures are preferably passive and should include the use of flood resilient wall and floor materials such as lime plaster and waterproof laminates, water resilient cavity and floor insulation, raising electrical sockets and running electrical cabling from the ceiling. Active measures such as moving sensitive equipment or belongings to upper floors when flooding is expected can also be used.

It would also be impractical to raise the finished floor level of the proposed dwellings above the modelled breach flood depth.

4.4 Surface Water Management

Generally, it is desirable to discharge surface water runoff into the ground before allowing discharge to a surface water body, surface water sewer, highway drain, or a combined sewer. The site is covered mostly by grass with buildings and paved areas at the north west and south east, therefore, surface water currently discharges predominantly into the ground with excess runoff discharge to Barge Close to the east following the topography of the site.

The proposed development will increase the impermeable surface cover across the site, therefore, Sustainable Drainage Systems (SuDS) will be incorporated into the development to ensure that the flood risk off-site is not increased.

Given that the site is only at risk of flooding in the event of a breach or overtopping of flood defences, it is not necessary to provide compensatory flood storage.

4.5 Safe Access and Egress

The site is protected by flood defences and safe access and egress will, therefore, be possible to and from the proposed dwellings in all events up to and including a 0.1% AEP event, with an allowance for climate change, without the intervention of emergency services.

In the event of a breach or overtopping of flood defences there would be a significant hazard at the site and along Barge Close including flood depths between 1m and 2m, therefore, safe access and egress will not be possible during a breach event.

The site is situated within the Environment Agency's 'East of Spalding and surrounding areas' Flood Warning Area, so it is advised that residents sign-up to receive these warnings and seek to evacuate the site in advance of a breach event, if possible. Based on the modelled fluvial flood extent in the event of a breach or overtopping of flood defences, the most appropriate evacuation route would be to head north east to the end of Barge Close, turn right onto Commercial Road, take the first exit at the roundabout to cross the West Elloe Bridge and head south west on Albion Street which is not at residual risk of flooding and from which many areas outside the maximum breach flood extent can be reached.

This evacuation route is shown in the Appendix.

Alternatively, safe refuge will be possible on the first floor of the proposed dwelling, therefore, if evacuation is not possible, residents should remain in the dwellings on the first floor.

4.6 Exception Test

The Exception Test is applied after the Sequential Test has been undertaken and when 'more vulnerable' development cannot be located in Flood Zones 1 and 2. The Exception Test requires the proposed development to show that it will provide wider sustainability benefits to the community that outweigh the flood risk and that it will be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce flood risk overall.

Given the very low actual risk of flooding at the site, the provision of additional housing supply through the redevelopment of a brownfield site within the existing built up area of Spalding is considered to outweigh the flood risk.

This report also shows that the development can be made safe from flooding for its lifetime, without increasing flood risk off-site, through the implementation of appropriate mitigation and SuDS measures, therefore, the Exception Test can be passed.

4.7 Further Investigation

The site lies within Flood Zone 3, based on the Environment Agency's Flood Map for Planning. Assessment of the risk to the site from all sources of flooding, including consultation of the South East Lincolnshire SFRA, shows that the site is considered to be at low risk from river and sewer flooding and a very low risk from surface water and groundwater flooding. The risk from reservoir flooding is considered to be negligible.

There is also considered to be a low risk to the site from river and surface water flooding, when taking into account climate change.

Based on the residual risk of fluvial flooding in the event of a breach or overtopping of flood defences, no sleeping accommodation will be provided on the ground floor of the proposed dwellings and the finished first floor level should be situated no lower than 5.60mAOD to provide a 300mm freeboard above the maximum flood level in the event of a breach of flood defences. Flood resilience measures should be also incorporated.

The proposed development will increase the impermeable surface cover across the site, therefore, Sustainable Drainage Systems (SuDS) will be incorporated into the development to ensure that the flood risk off-site is not increased.

In the event of a breach or overtopping of flood defences there would be a significant hazard at the site and along Barge Close including flood depths between 1m and 2m, therefore, safe access and egress will not be possible during a breach event.

It is advised that residents sign-up to receive Environment Agency Flood Warnings and seek to evacuate the site in advance of a breach event, if possible. Based on the modelled fluvial flood extent in the event of a breach or overtopping of flood defences, the most appropriate evacuation route would be to head north east to the end of Barge Close, turn right onto Commercial Road, take the first exit at the roundabout to cross the West Elloe Bridge and head south west on Albion Street which is not at residual risk of flooding and from which many areas outside the maximum breach flood extent can be reached. Alternatively, safe refuge will be possible on the first floor of the proposed dwelling, therefore, if evacuation is not possible, residents should remain in the dwellings on the first floor.

It should be noted that these conclusions are based on the currently proposed development plan, therefore, flood risk at the site should be re-assessed if material changes are made to the proposed development.

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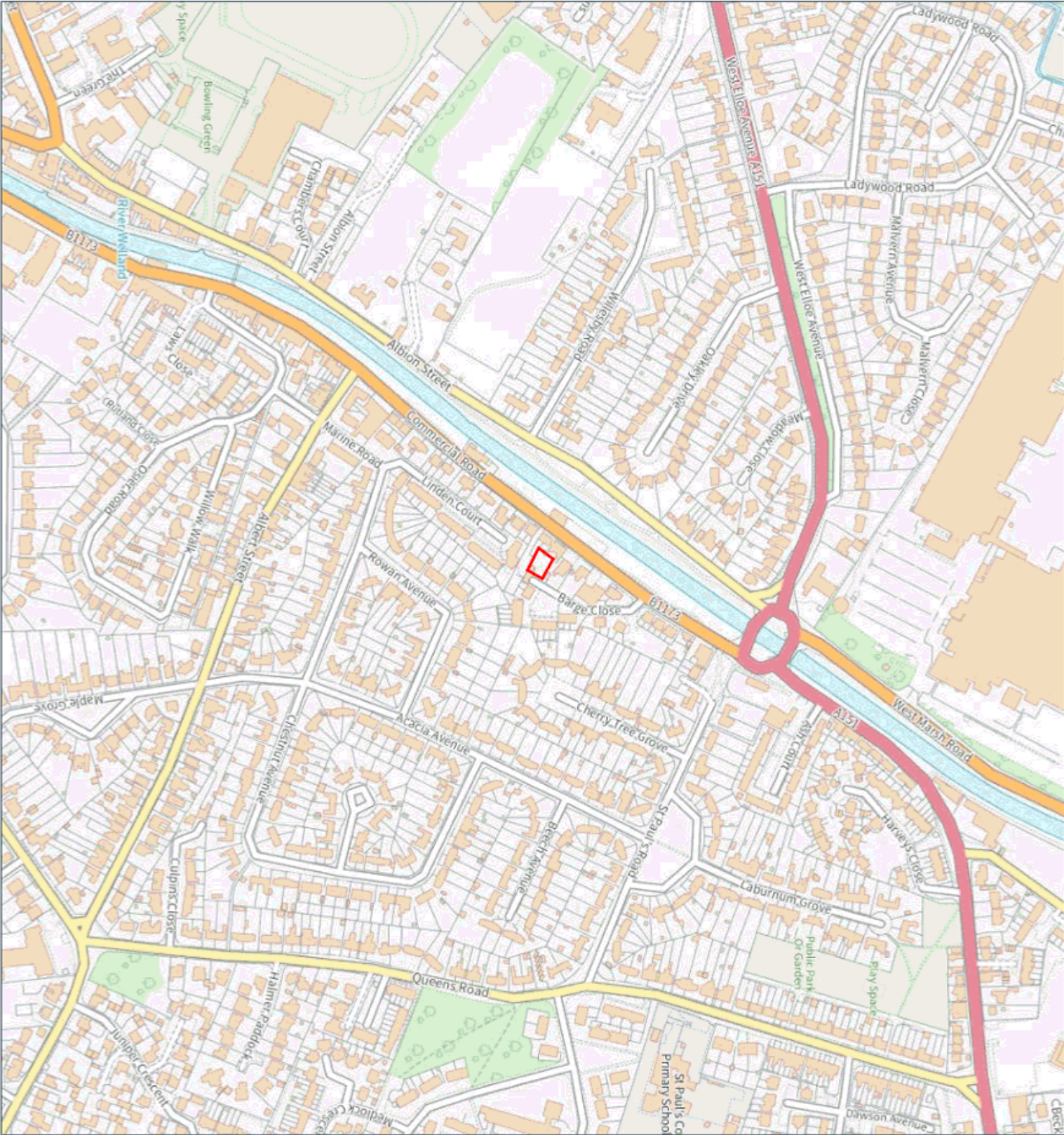
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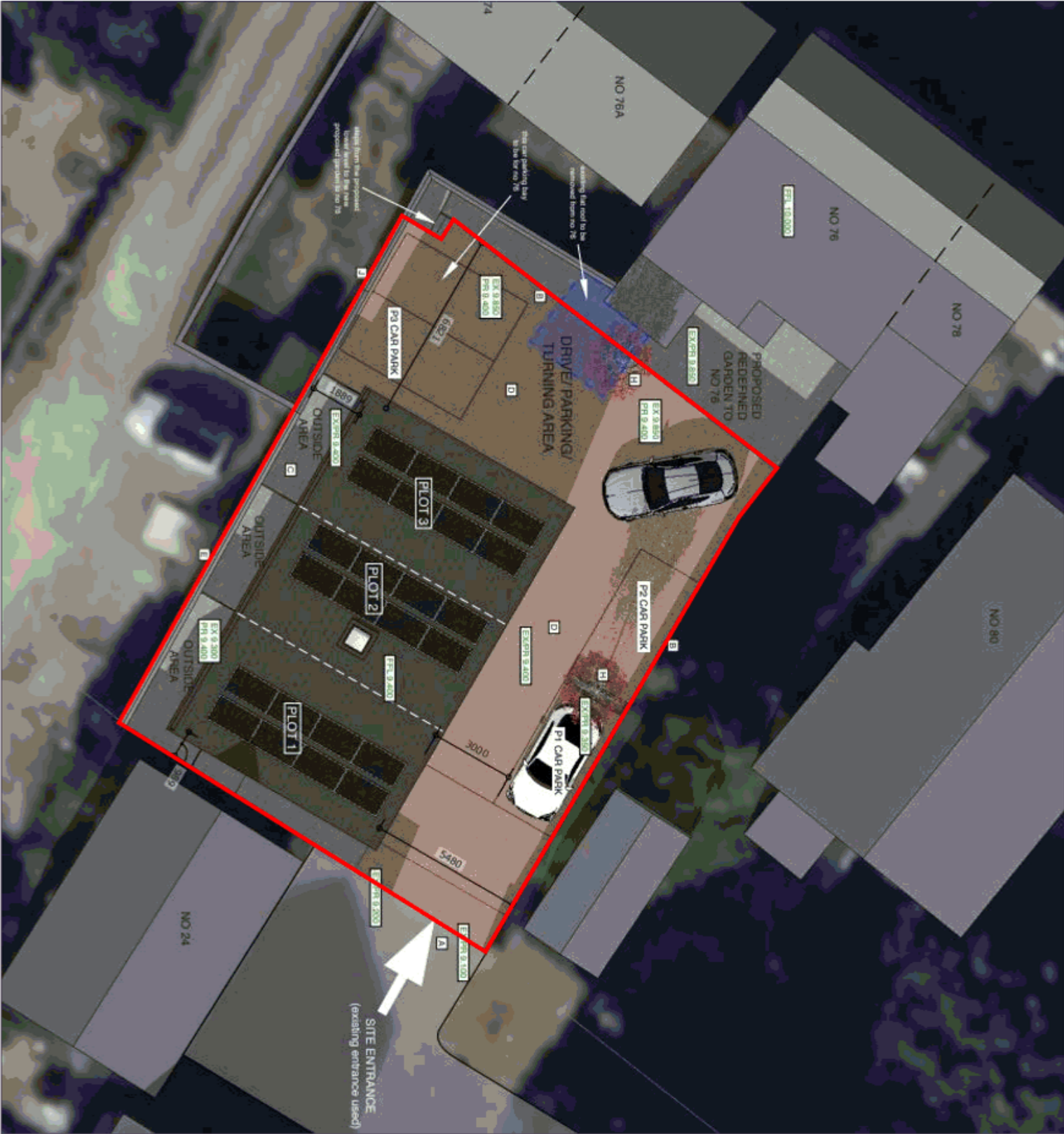
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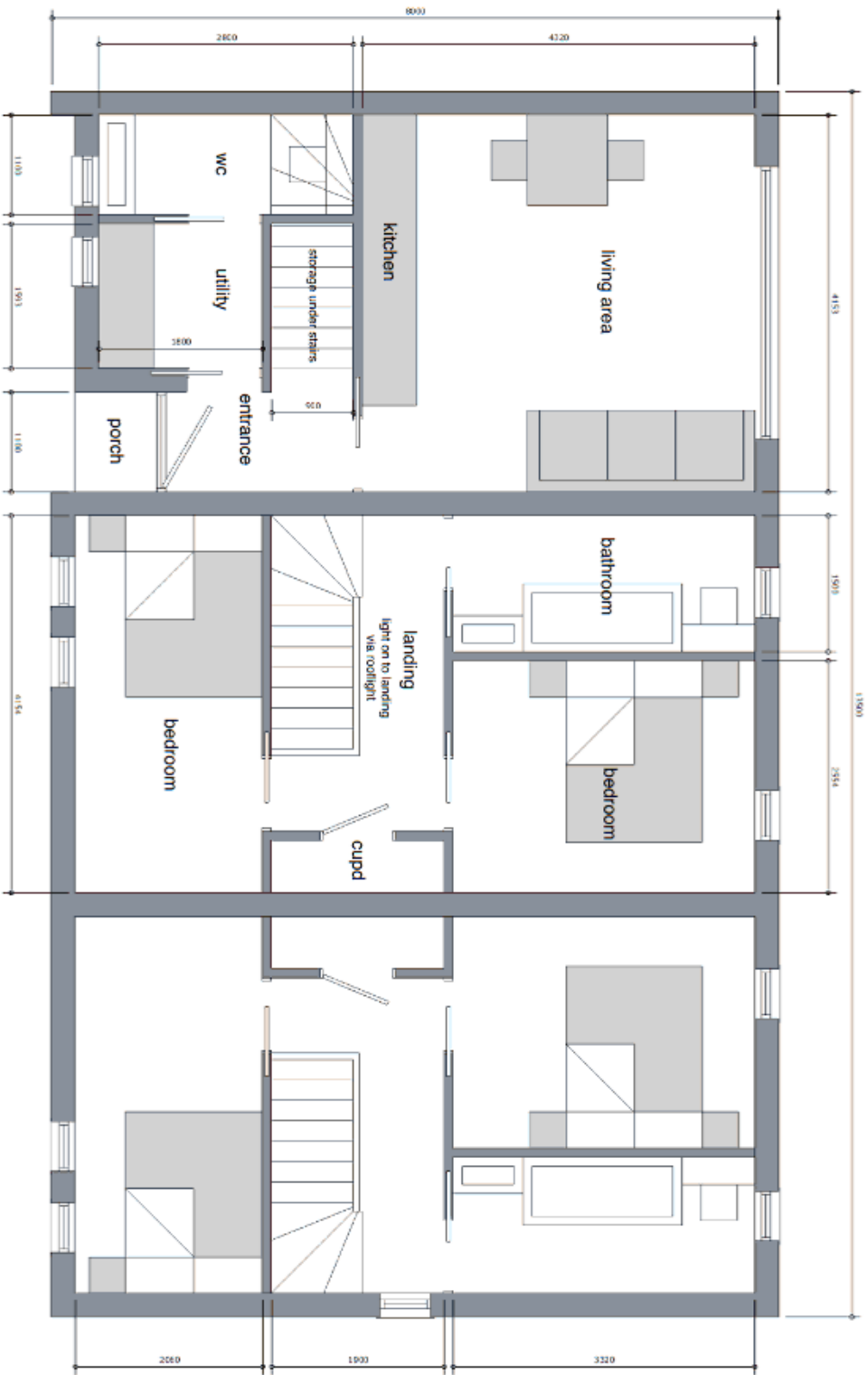


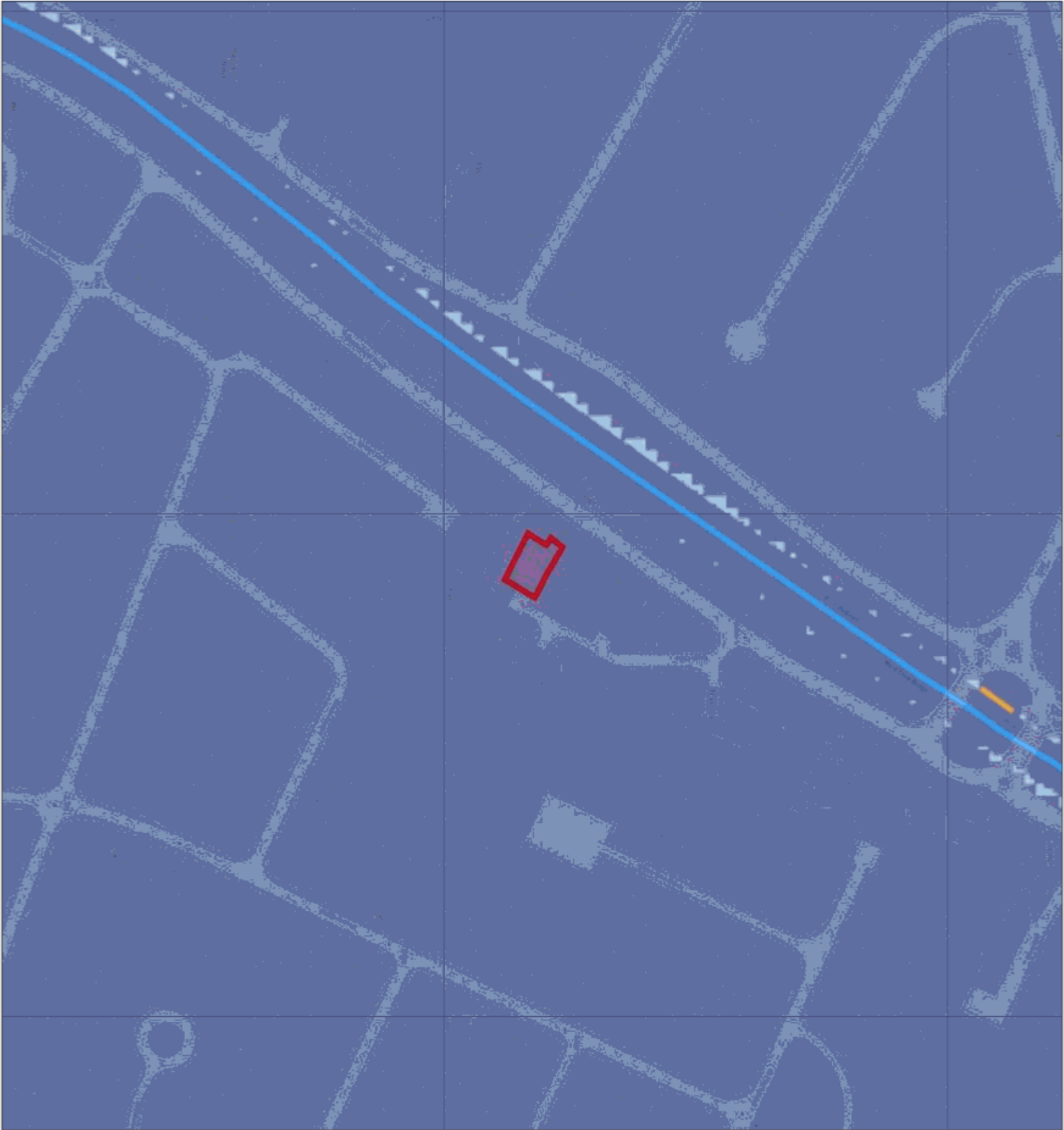
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Description	
Site location plan	
Sources	
Contains OS data © Crown copyright and database rights	
Key	
	Site boundary
	North



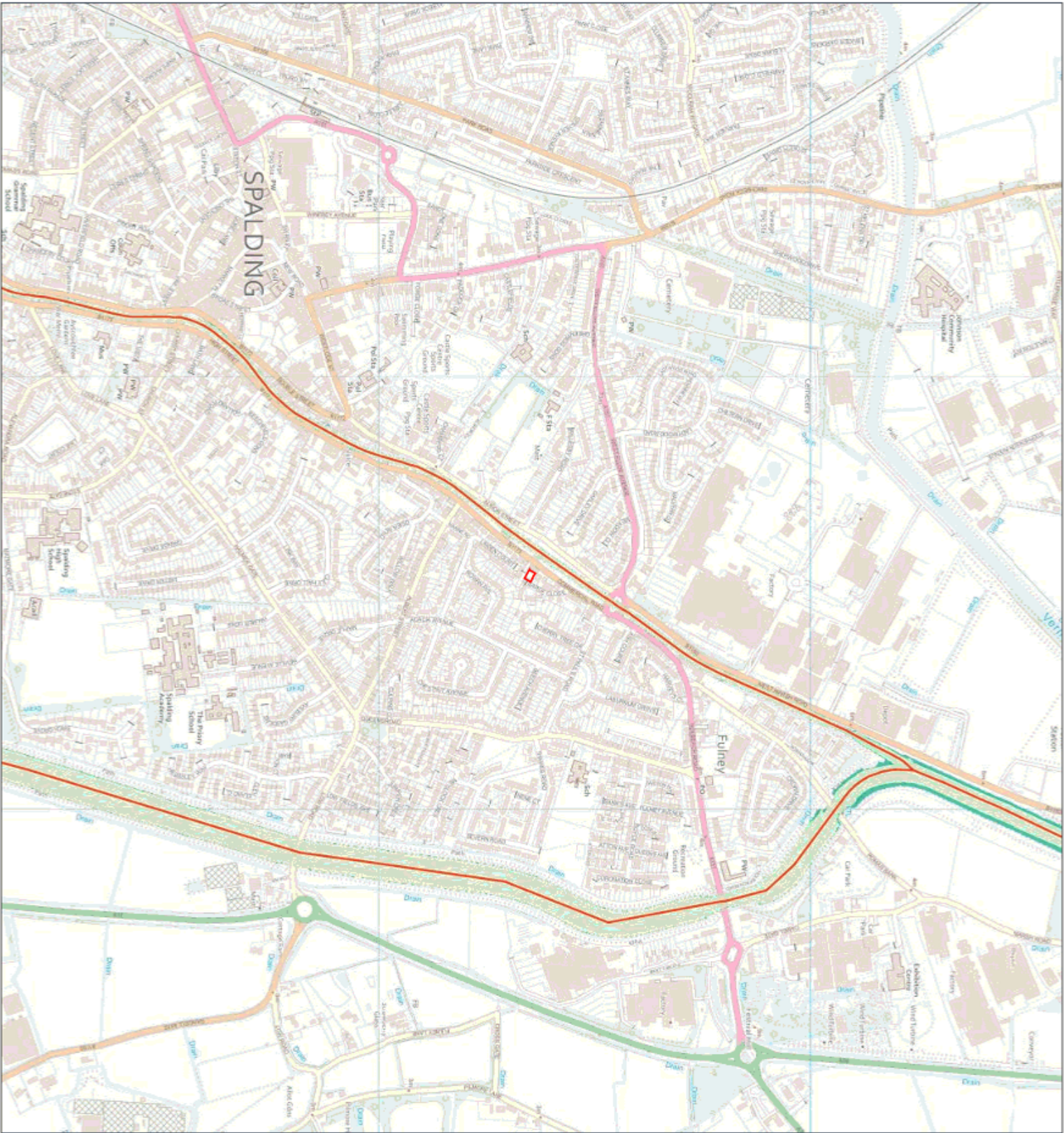
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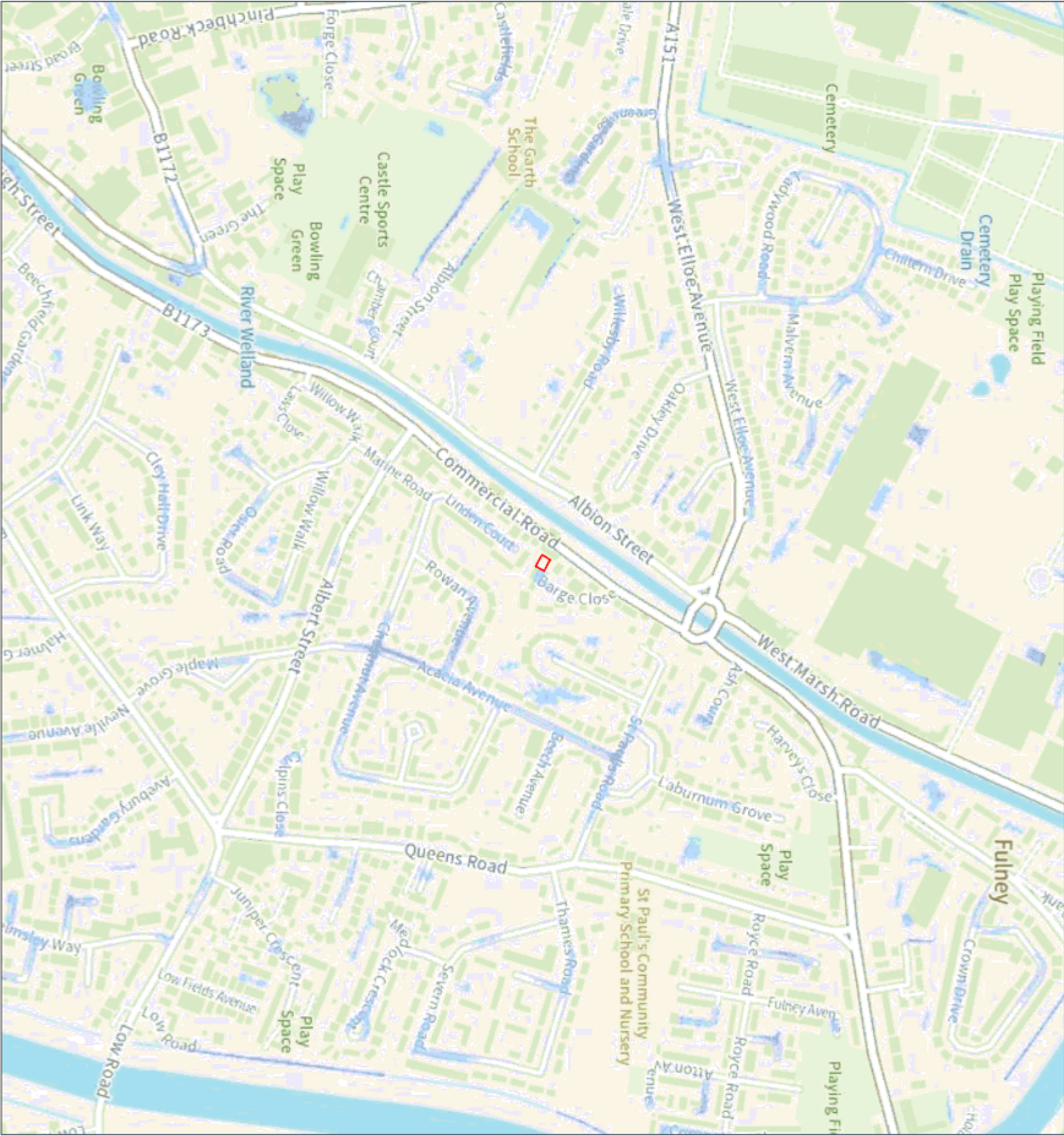
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Description	
Flood zone map for planning	
Sources	
Environment Agency OS data © Crown copyright and database rights	
Key	
	Site boundary
	Flood Zone 1
	Flood Zone 2
	Flood Zone 3
	Main river
	Flood defence
	North



Appendix - Flood Risk Maps	
Description	
Modelled fluvial flood extents from the Welland Catchment Strategic flood model, taking into account flood defences	
Sources	
Welland Catchment Strategic OS data © Crown copyright and database rights	
Key	
	Site boundary
	5% AEP
	1% AEP
	1% AEP (+20%CC)
	0.1% AEP
	0.1% AEP (+20%CC)
▲	North



Appendix - Flood Risk Maps	
Description	
Environment Agency map showing the extent of flooding from surface water	
Sources	
Environment Agency OS data © Crown copyright and database rights	
Key	
	Site boundary
	Very Low
	Low
	Medium
	High
	North



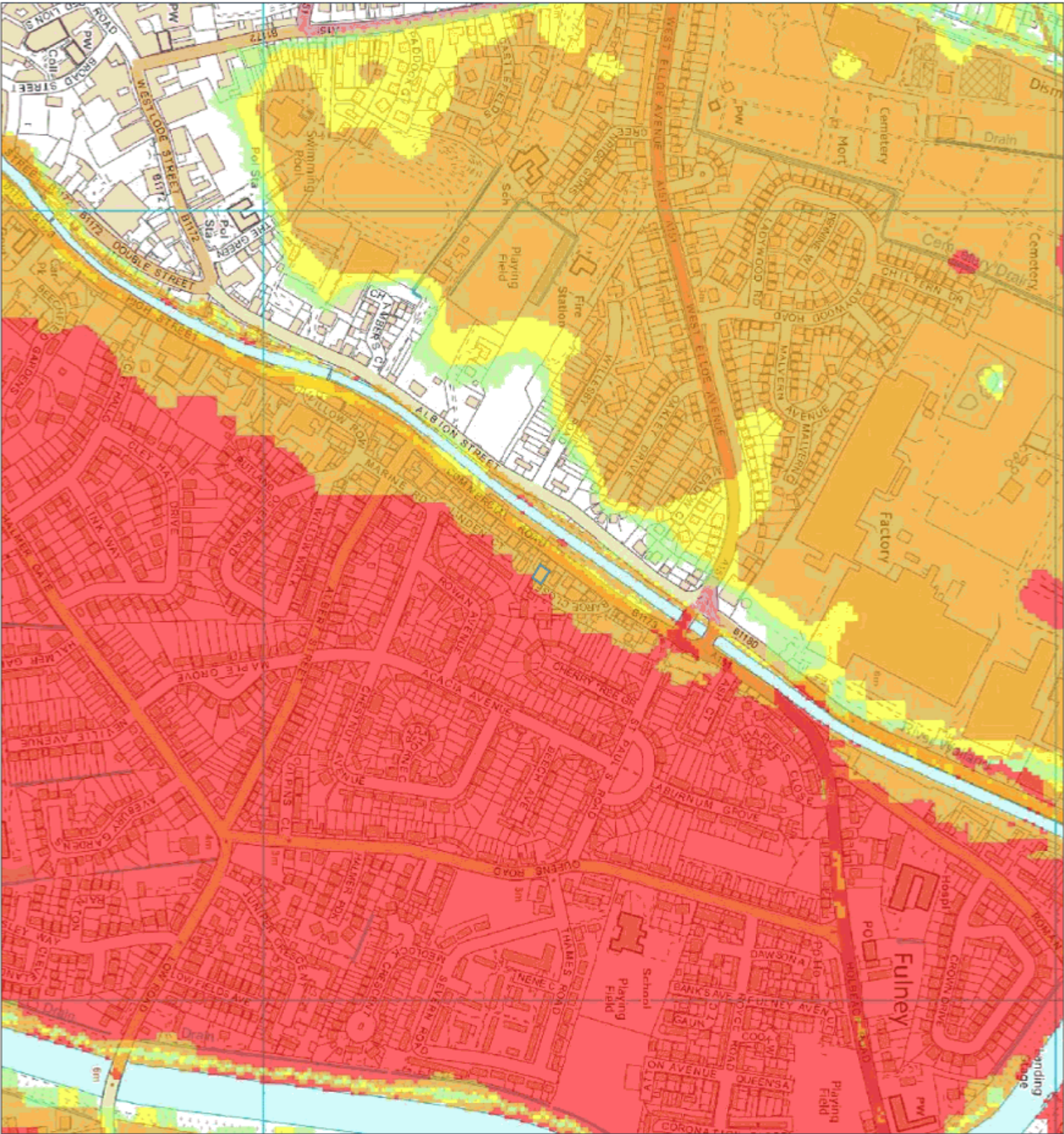
Appendix - Flood Risk Maps	
Description	Environment Agency map showing the modelled depth of flooding from surface water in a 1% AEP event
Sources	Environment Agency OS data © Crown copyright and database rights
Key	
	Site boundary
	Below 0.3m
	0.3m to 0.9m
	Over 0.9m
▲	North



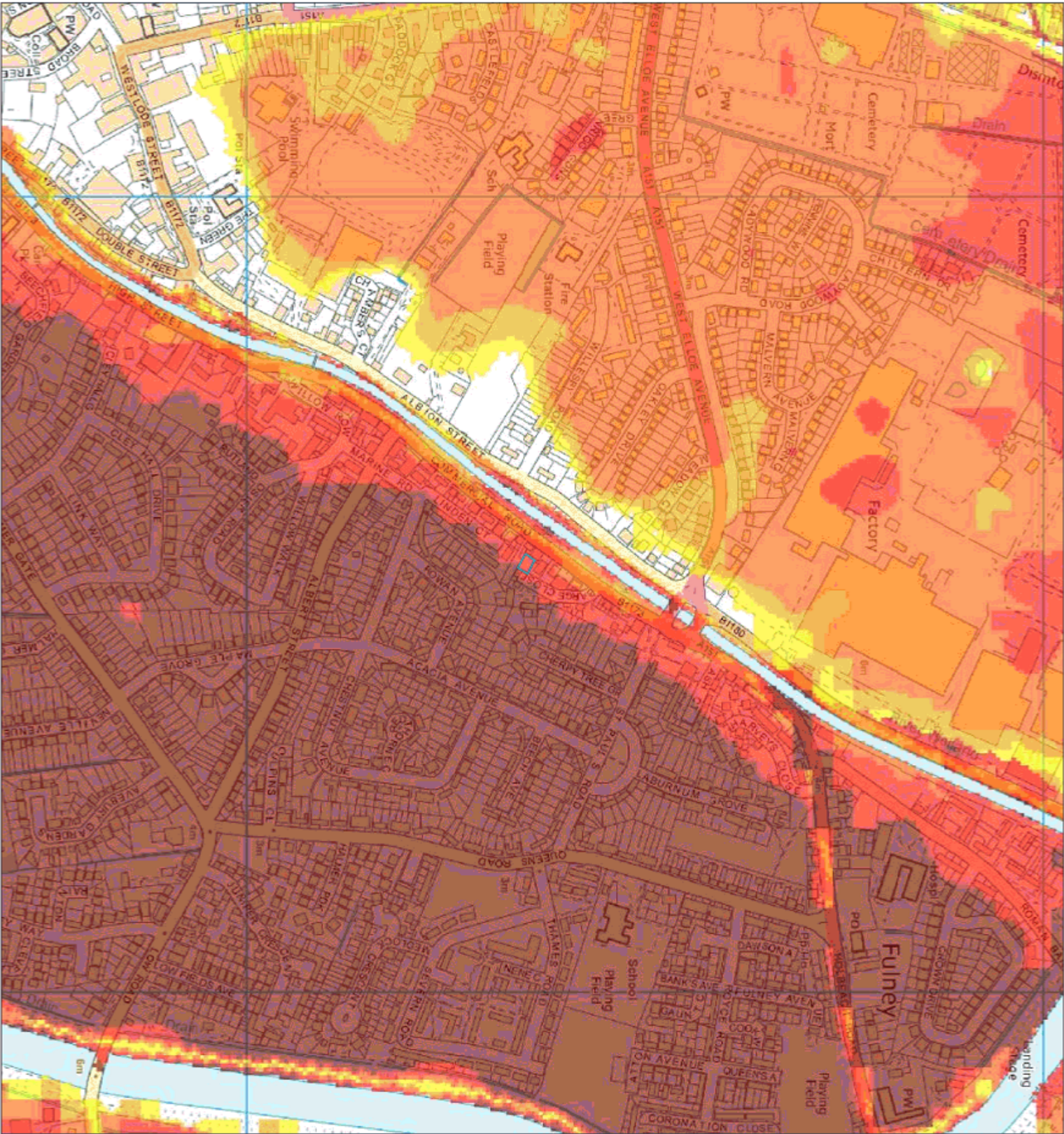
Appendix - Flood Risk Maps	
Description	Environment Agency map showing the modelled depth of flooding from surface water in a 0.1% AEP event
Sources	Environment Agency OS data © Crown copyright and database rights
Key	
	Site boundary
	Below 0.3m
	0.3m to 0.9m
	Over 0.9m
▲	North



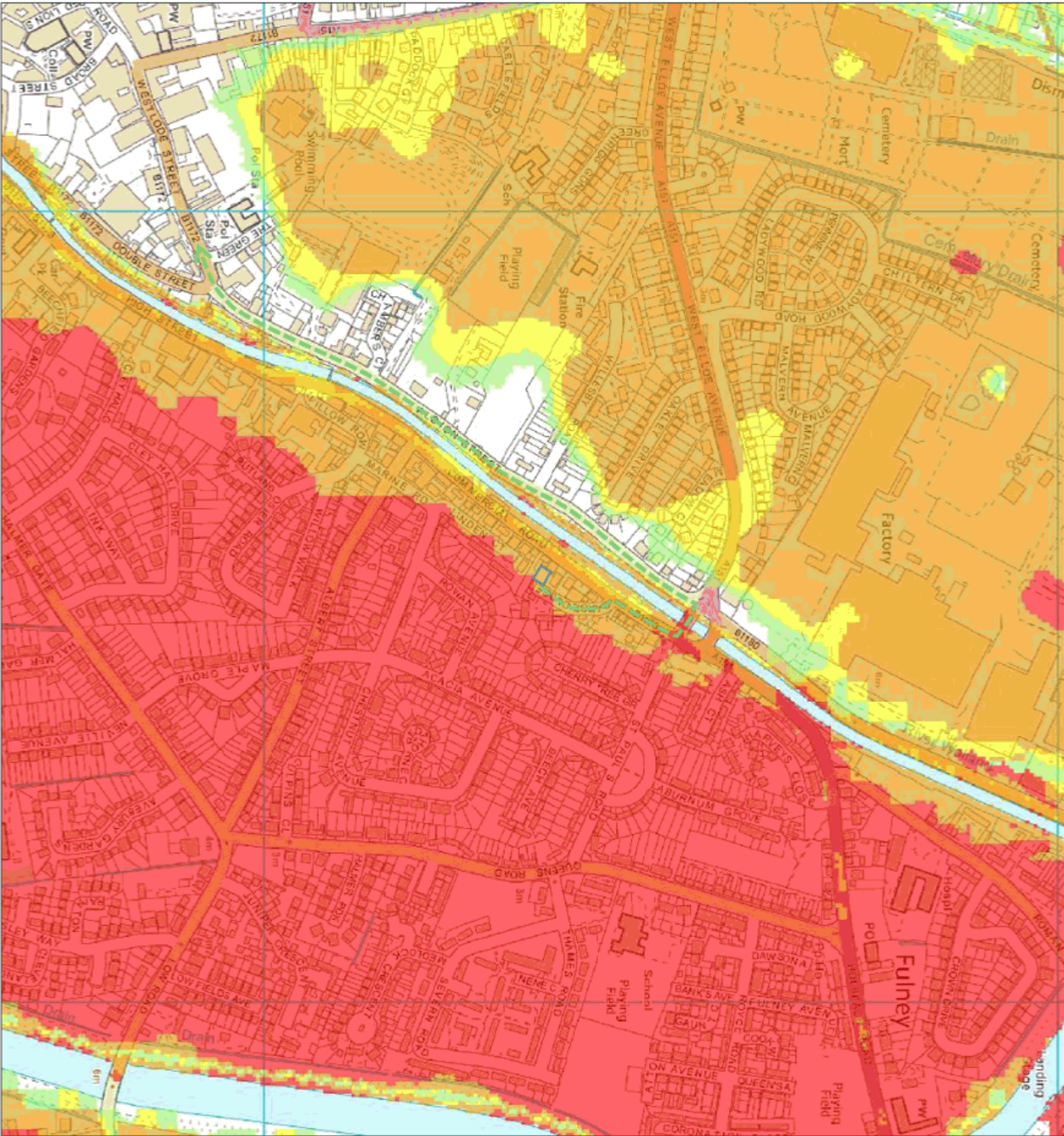
Appendix - Flood Risk Maps	
Description	Environment Agency map showing the modelled extent of flooding from reservoirs
Sources	Environment Agency OS data © Crown copyright and database rights
Key	Site boundary
	When river levels normal
	When there is river flooding
	▲ North



Appendix - Flood Risk Maps	
Description	Map showing the residual flood hazard in the event of an overtopping or failure of flood defences in a 1% AEP event for the year 2115
Sources	Royal HaskoningDHV OS data © Crown copyright and database rights
Key	
	Site boundary
	Low Hazard
	Danger for Some
	Danger for Most
	Danger for All
	North



Appendix - Flood Risk Maps	
Description	Map showing the residual flood depth in the event of an overtopping or failure of flood defences in a 1% AEP event for the year 2115
Sources	Royal HaskoningDHV OS data © Crown copyright and database rights
Key	
Site boundary	
0m – 0.25m	
0.25m – 0.5m	
0.5m - 1m	
1m - 2m	
2m+	
▲ North	



Appendix - Evacuation Route	
Description	
Residual flood hazard map showing proposed evacuation route	
Sources	Royal HaskoningDHV OS data © Crown copyright and database rights
Key	
	Site boundary
	Low Hazard
	Danger for Some
	Danger for Most
	Danger for All
	Proposed evacuation route
	North