OAKSHIRE
ENVIRONMENTAL

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Preliminary Flood Risk Assessment

06 June 2023

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Supervised by Mr Joseph Turner

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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 demolition of existing buildings and erection of a residential dwelling and associated work on land adjacent to 204 Pennygate, Spalding, PE11 1LS. 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

Quantum Intelligent Trading Ltd is previously and hereafter referred to as “Oakshire Environmental” or “the company”. Oakshire Environmental has exercised such professional skill, care and diligence as may reasonably be expected of a properly qualified and competent consultant when undertaking works of this nature. This report is only valid when used in its entirety and any information or advice contained within the report should not be relied upon until considered in the context of the whole report. Oakshire Environmental disclaims any responsibility to the client, as named on the front of this report (“the client”), and others in respect of any matters outside the scope of this work. Any comments made on the basis of information obtained from the client or other third parties are given in good faith on the assumption that the information is accurate. This report has been prepared solely for the benefit of the client and any other party using or placing reliance upon any information contained in this report does so at their own risk. Oakshire Environmental accepts no responsibility or liability for the contents of this report being used for any purpose or project for which it was not commissioned. Oakshire Environmental accepts no liability whatsoever for any loss or damage arising from the interpretation or use of this report and in no event shall the company be liable for any punitive, exemplary or other special damages, or for any indirect, incidental or consequential damages, including with respect to the performance or non-performance of any services, whether arising under breach of contract, tort or any other legal theory, and regardless of whether the company has been advised of, knew of, or should have known of the possibility of such damages. Furthermore, Oakshire Environmental does not accept any liability for the consequences of any legislative changes or the release of subsequent guidance documentation and following delivery of the report has no obligation to advise the client or any other party of such changes or their repercussions.

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 on Pennygate, in Spalding, and is approximately 500m^2. The site is comprised of a detached modular building at the south west, part of an extension to the neighbouring residential dwelling at the south east and a gravel parking area at the north. The buildings have previously been used as a Health and Well-Being Centre. The site is generally flat with ground levels ranging from 2.93mAOD at the south west to 3.14mAOD at the north east.

The site is bordered by residential dwellings and gardens to the east and south, Pennygate to the north with residential dwellings beyond and a sewage pumping station to the west with additional dwellings beyond. The surrounding area is predominantly residential with some commercial premises.

The River Welland (an Environment Agency main river) is situated 1.25km south east of the site and Vernatt's Drain is situated 870m north west along with a smaller unnamed land drain 270m north. The site is situated within Flood Zone 3 of the 'Flood risk map for planning', which means that the land has a high probability of flooding (>1% annual probability of river flooding).

National Grid Reference: TF 24456 21686

2.2 Proposed Development

The proposed development involves the demolition of the existing detached building and extension at the south of the site and the construction of a two-storey dwelling at the north east. The existing ground levels in the area the dwelling will be situated are between 2.99mAOD and 3.14mAOD.

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).

While the Sequential Test is not required for residential extensions, the proposed developed involves the construction of a new dwelling so the Sequential Test will be carried out.

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	x	Exception Test required	●	●
Zone 3b	Exception Test required	x	x	x	●

Key: ● Development is appropriate
X 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. 18 sites are shown to be developable in 6 to 10 years (i.e. 2023 to 2028) in lower flood zones (Flood Zone 2) than the proposed site.

Table 2: Sequential Assessment of all 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 Road	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 facilites. 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.
Blue Gowt Drove	0.31	Flood Zone 3a As above regarding services and facilities
2-4 St John's Road	0.98	Flood Zone 3a Equal hazard and depth to the site (No hazard and No depth) Development already complete
Former PO Sorting Office, The Crescent	0.10	Flood Zone 3a Equal hazard and depth to the site (No hazard and No depth)
Hawthorn Bank	0.22	Flood Zone 3a Equal hazard and depth to the site (No hazard and No depth) Development already complete
Land to the east of South Drove	0.80	Flood Zone 3a Hazard mapping shows that there is a 'Danger for most' and depth mapping shows flood depths between 1m and 2m
Land to the east of Spalding Common (Stm003)	0.71	Flood Zone 3a Hazard mapping shows that there is a 'Danger for most' and depth mapping shows flood depths between 0.5m and 1m
Land to the east of Spalding Common (Stm007)	0.66	Flood Zone 3a Hazard mapping shows that there is a 'Danger for most' and depth mapping shows flood depths between 1m and 2m
Land to the east of Spalding Common (Stm008)	0.12	Flood Zone 3a Hazard mapping shows that there is a 'Danger for most' and depth mapping shows flood depths between 0.5m and 1m

Land off Cradge Bank	0.18	Flood Zone 3a Equal hazard and depth to the site (No hazard and No depth) 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
Land to the north of Burr Lane (Stm025)	0.26	Flood Zone 3a Hazard mapping shows that there is a 'Danger for most' and depth mapping shows flood depths between 1m and 2m
Land to the west of Fen End Lane	0.24	Flood Zone 3a Equal hazard and depth to the site (No hazard and No depth) Services and facilities are not accessible by foot and bicycles have to share road space, which may discourage their use. There are no bus stops on roads adjoining the site.
Former Jewsons premises	0.49	Flood Zone 3a Hazard mapping shows that there is a 'Danger for most' and depth mapping shows flood depths between 1m and 2m
80-89 Commercial Road	0.16	Flood Zone 3a Hazard mapping shows that there is a 'Danger for most' and depth mapping shows flood depths between 1m and 2m
Land to the east of Wygate Park (Wyg003)	3.6	Flood Zone 3a Hazard mapping shows that there is a 'Danger for most' and depth mapping shows flood depths between 0.5m and 1m
Land to the east of Wygate Park (Wyg004)	6.79	Flood Zone 3a Hazard mapping shows that there is a 'Danger for most' and depth mapping shows flood depths between 0.5m and 1m

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 most notably due to the equal or higher risk of flooding, 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 1.25km north west of the River Welland and the Environment Agency's flood map for planning shows that the site would be at risk of flooding 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 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 event for the year 2115 shows that the site is not at residual risk of flooding.

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 at the site is very low and no flooding is anticipated on the site or in the immediate vicinity in a 1% AEP event.

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. Given the site's location adjacent to a sewage pumping station, there is an elevated residual risk of sewer flooding at the site in the event of this pumping station becoming overwhelmed.

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 the residual risk to the site is also negligible. This modelling also shows that the site would be unaffected in the event of an overtopping or breach of flood defences in a 0.1% AEP event for the year 2115.

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 is anticipated on Pennygate to the north of the site, however, the site would be unaffected.

3.2 Potential Flood Receptors

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

- Residential end users
- Proposed dwelling

3.3 Potential Flood Pathways

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

- River Welland
- Low lying land
- Sewage pumping station
- Surface water along Pennygate

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	Residential end users Proposed dwelling	**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 event for the year 2115 shows that the site is also not at residual risk of flooding.
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	Sewage pumping station		**Medium**	**Unlikely**	**Low**	The very low risk of surface water flooding in the area suggests that the risk of sewer flooding is likely to be low. Given the site's location adjacent to a sewage pumping station, there is an elevated residual risk of sewer flooding at the site in the event of this pumping station becoming overwhelmed.
Climate Change	River Welland		**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 the residual risk to the site is also negligible.
	Surface water along Pennygate		**Mild**	**Unlikely**	**Very Low**	Using the modelled 0.1% AEP flood event as a proxy for climate change modelling, shallow flooding is anticipated on Pennygate to the north of the site, however, the site would be unaffected.

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 dwelling from river flooding from the River Welland to the south east.
- There is a **very low risk** to residential end users and the proposed dwelling from groundwater flooding due to the low lying land.
- There is a **low risk** to residential end users and the proposed dwelling from sewer flooding from the sewage pumping station to the west.
- There is a **low risk** to residential end users and the proposed dwelling from river flooding, taking into account climate change.
- There is a **very low risk** to residential end users and the proposed dwelling from 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 identified flood risk, flood mitigation measures are not considered necessary.

The site is situated within the Environment Agency's 'Pinchbeck and the West of Spalding' Flood Warning Area, so it is advised that residents sign-up to receive these warnings.

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 entirely by gravel hardstanding, therefore, surface water currently discharges into highway drains on Pennygate and onto adjoining land to the south following the topography of the ground.

The proposed development will not increase the impermeable surface cover across the site and is likely to result in a reduction due to the provision of soft landscaping in proposed garden areas. As a result, the rate and volume of runoff will be equal to or less than the existing run-off rate and volume, floodplain storage capacity will be maintained or increased and the flood risk off-site will be unchanged or reduced.

Furthermore, the demolition of the existing buildings will result in a net reduction in building footprint across the site which will also increase floodplain storage capacity.

4.5 Safe Access and Egress

The site is protected by flood defences and the residual risk of flooding in the event of an overtopping or failure of these defences is negligible. Safe access and egress will, therefore, be possible to and from the proposed dwelling during design conditions, without the intervention of emergency services.

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 and residual 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 will remain safe from flooding for its lifetime while not increasing flood risk off-site, therefore, the Exception Test is 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 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 flooding and a very low risk from surface water flooding, when taking into account climate change.

The proposed development will not increase the impermeable surface cover across the site and the demolition of the existing buildings will result in a net reduction in building footprint. As a result, the rate and volume of runoff will be equal to or less than the existing run-off rate and volume, floodplain storage capacity will be maintained or increased and the flood risk off-site will be unchanged or reduced.

The site is protected by flood defences and the residual risk of flooding in the event of an overtopping or failure of these defences is negligible. Safe access and egress will, therefore, be possible to and from the proposed dwelling during design conditions, without the intervention of emergency services.

It can be concluded that the proposed residential development will be safe from flooding for its lifetime, while not increasing flood risk elsewhere, and will provide sustainability benefits that outweigh the flood risk. It should be noted that this conclusion is 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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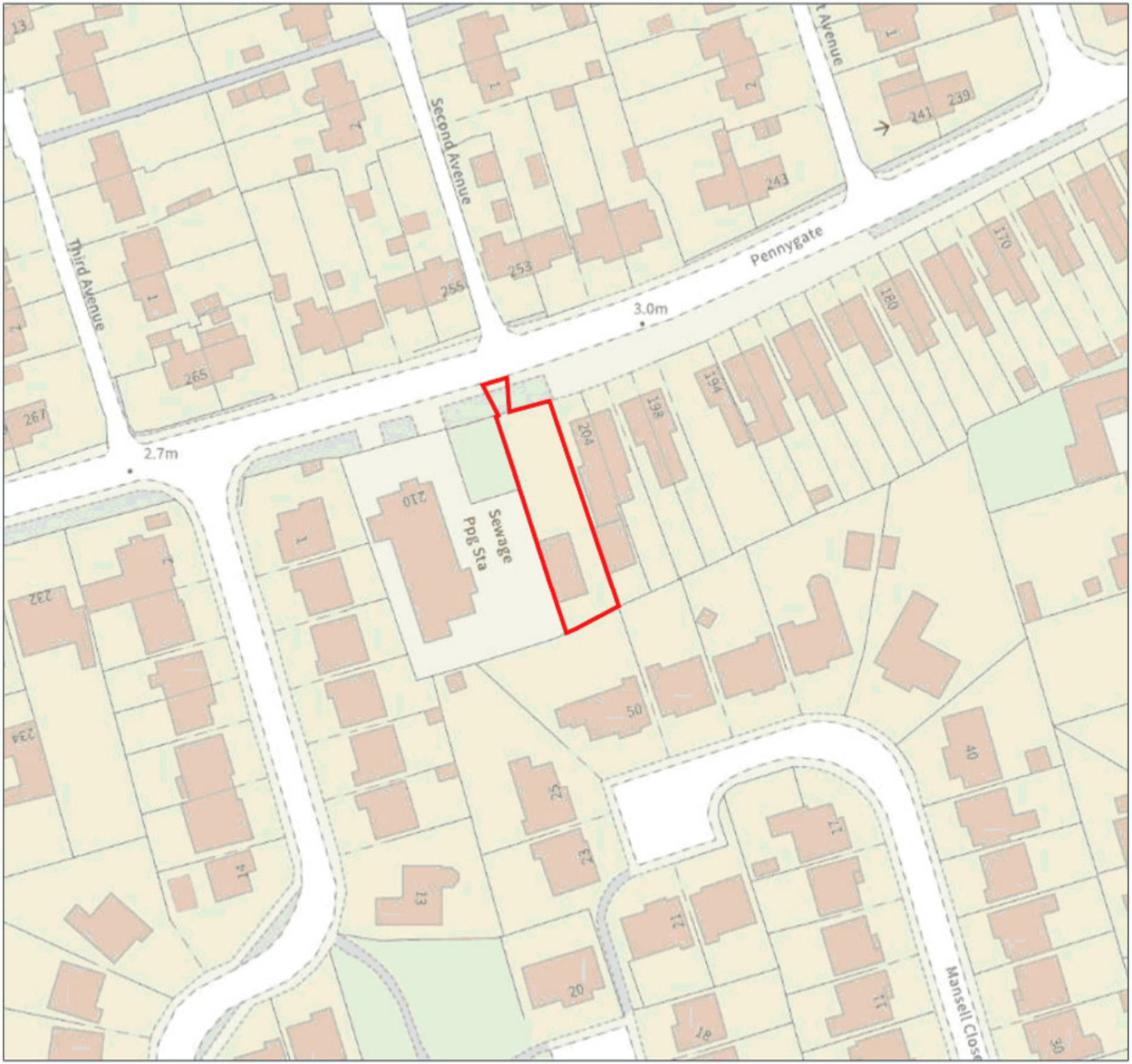
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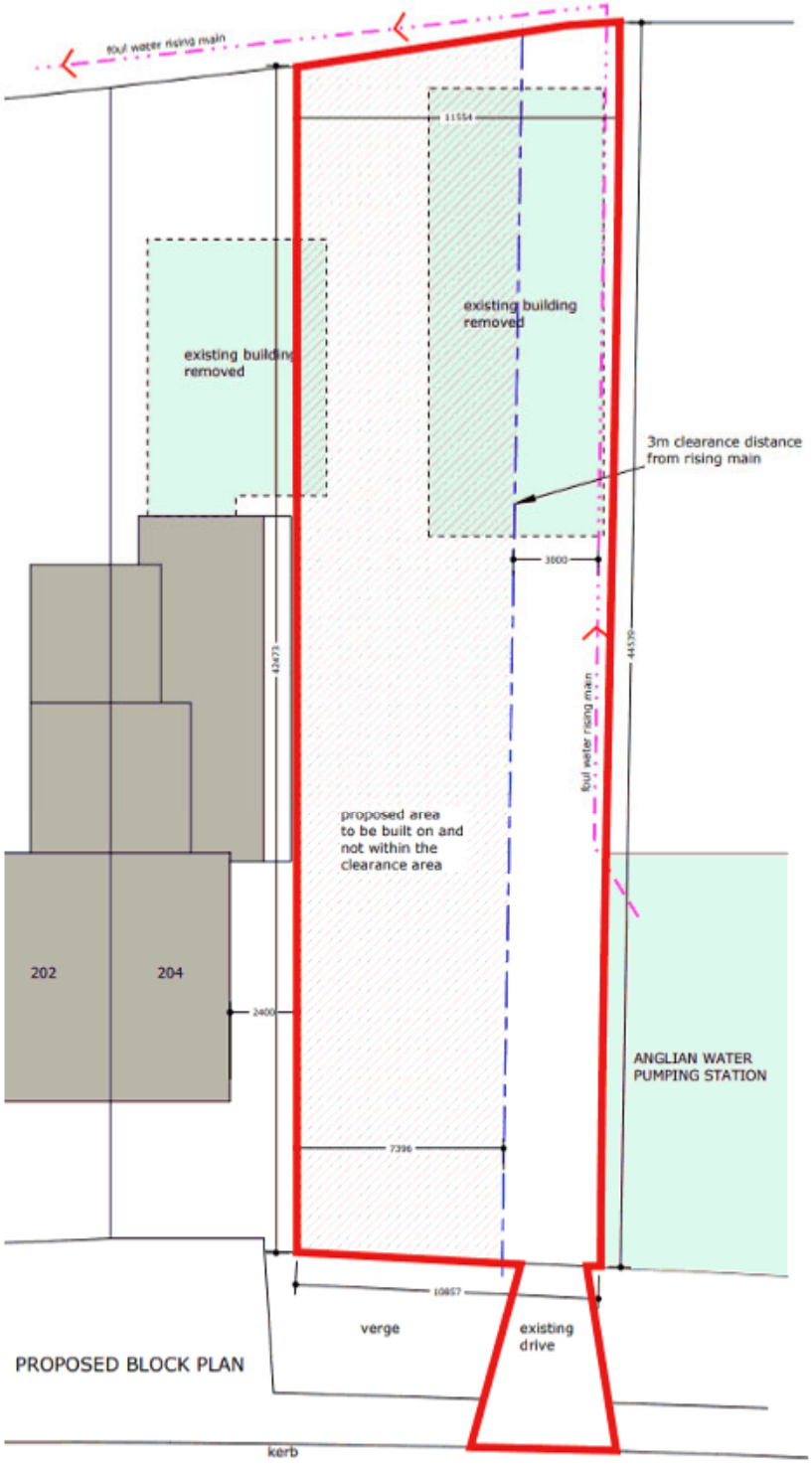
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Appendix - Site Maps & Plans	
Description	
Site location plan	
Sources	
Contains OS data © Crown copyright and database rights	
Key	
	Site boundary
▲	North



Appendix - Site Maps & Plans
Description
Proposed block plan
Sources
Julian Warrick Architectural Design Consultant



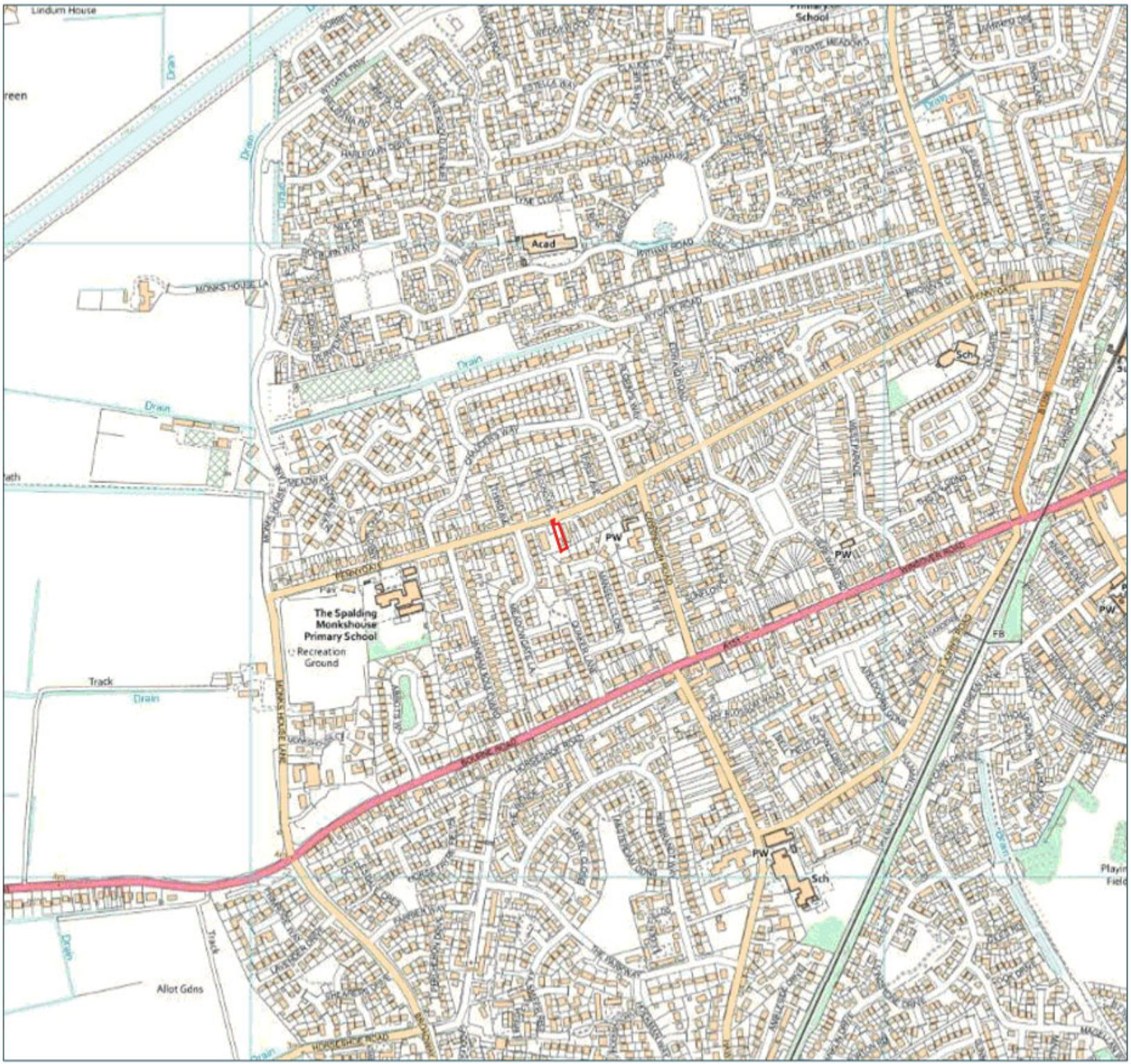
Appendix - Site Photos
Description
Photo of the site from Pennygate, facing south west
Sources
Google, 2022.



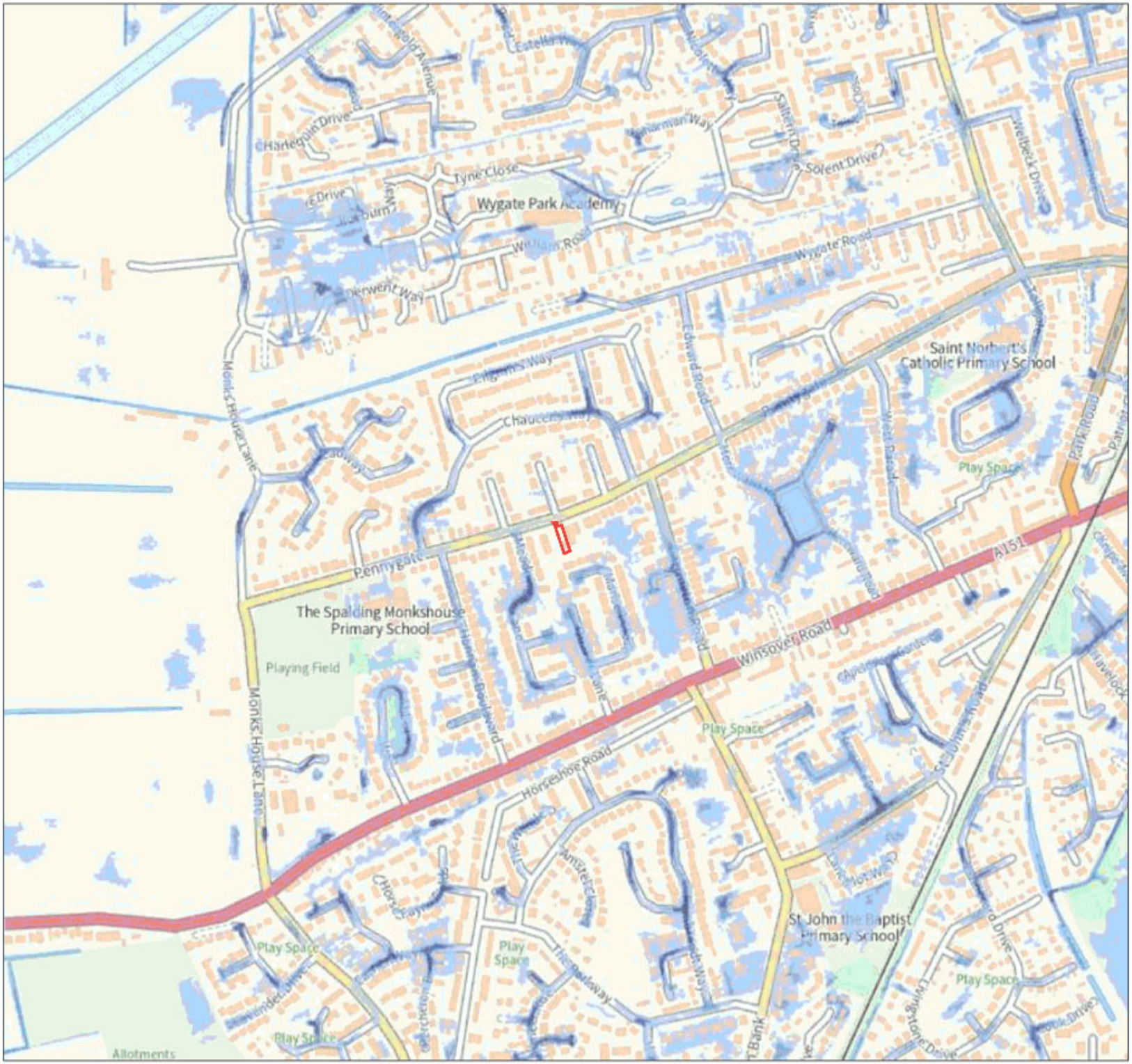
Appendix - Site Photos
Description
Photo of the site from Pennygate, facing south
Sources
Google, 2022.



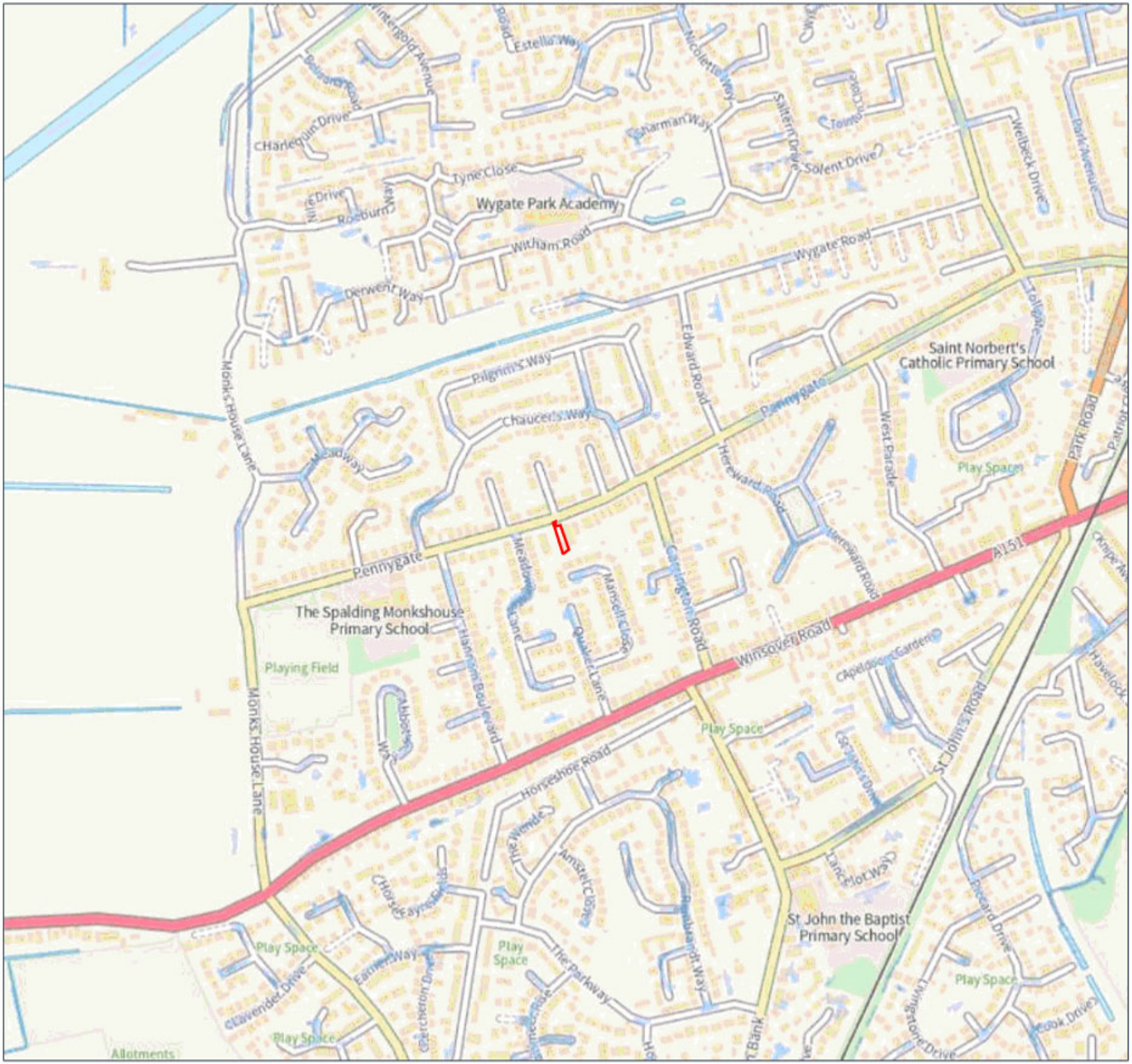
Appendix – Flood Risk Maps	
Description	
Flood zone map for planning	
Sources	
Environment Agency OS data © Crown copyright and database rights	
Key	
	Site boundary
	Flood Zone 1
	Flood Zone 2
	Flood Zone 3
	Main river
	Flood defence
▲	North



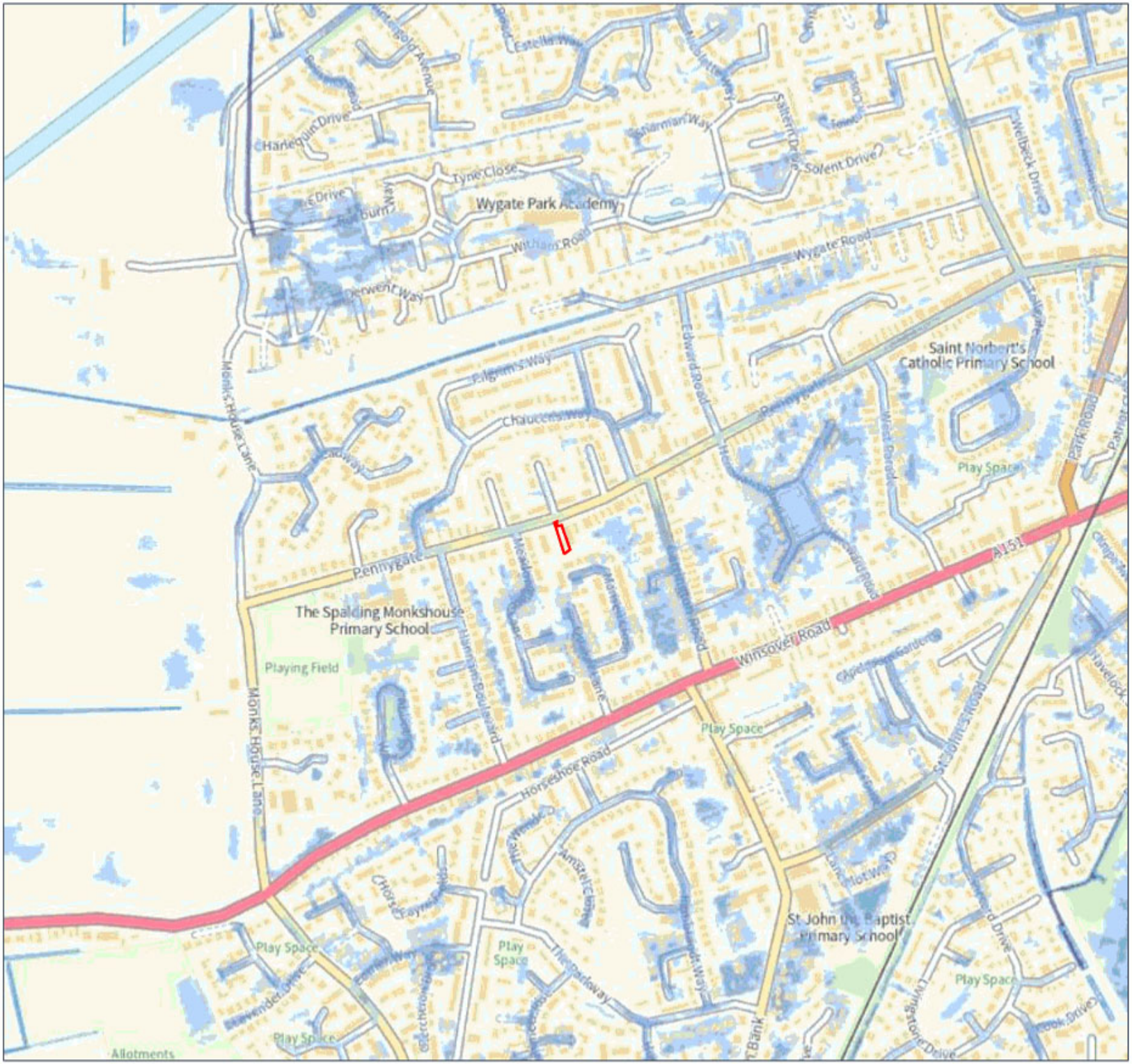
Appendix - Flood Risk Maps	
Description	
Modelled flood extents from the Welland Catchment Strategic flood model, taking into account flood defences	
Sources	
Welland Catchment Strategic OS data © Crown copyright and database rights	
Key	
	Site boundary
	5% AEP
	1% AEP
	1% AEP (+20%CC)
	0.1% AEP
	0.1%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



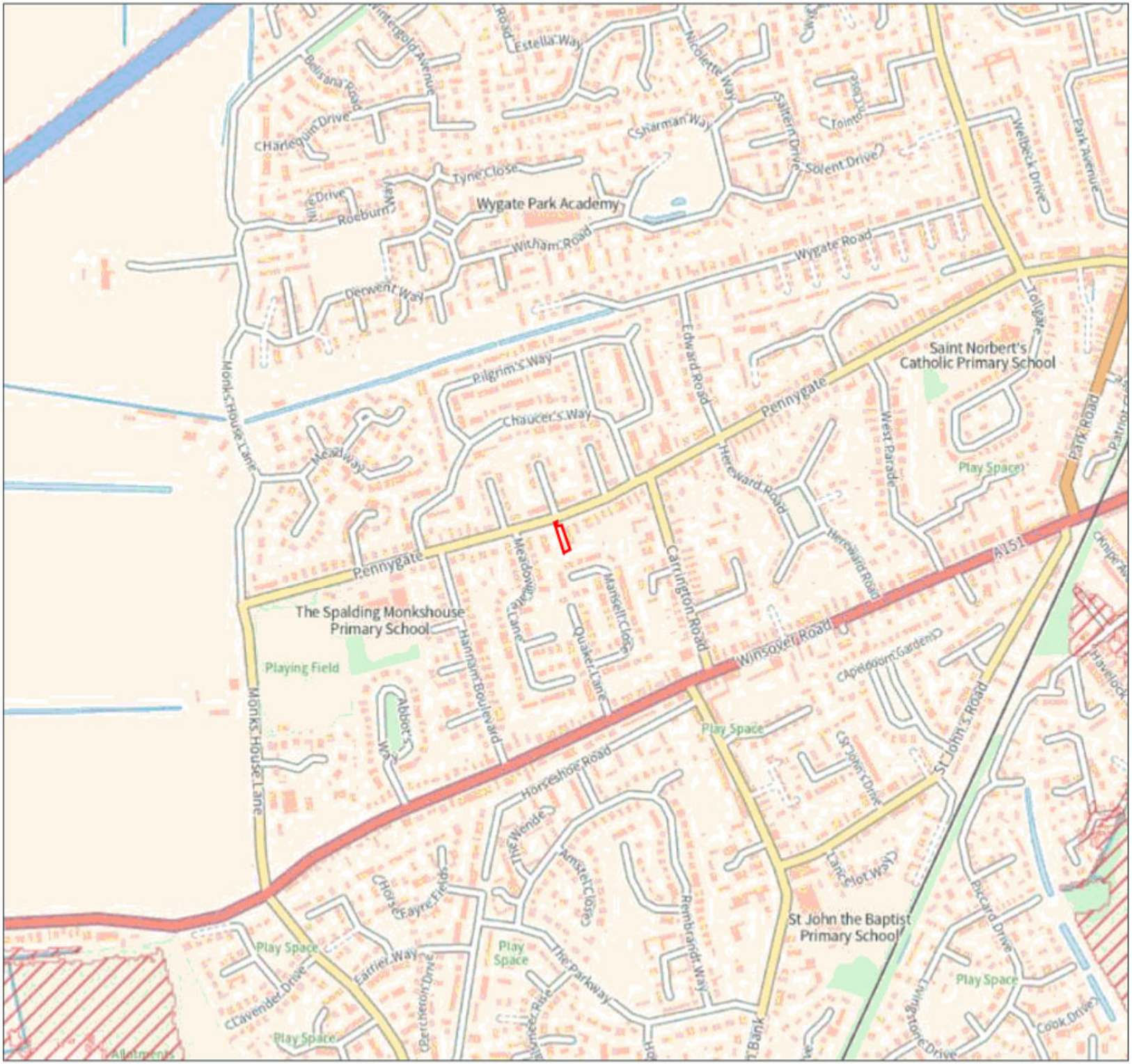
Appendix - Flood Risk Maps	
Description	
Environment Agency map showing the extent of flooding from surface water	
Sources	
Environment Agency OS data © Crown copyright and database rights	
Key	
	Site boundary
	Very Low
	Low
	Medium
	High
▲	North



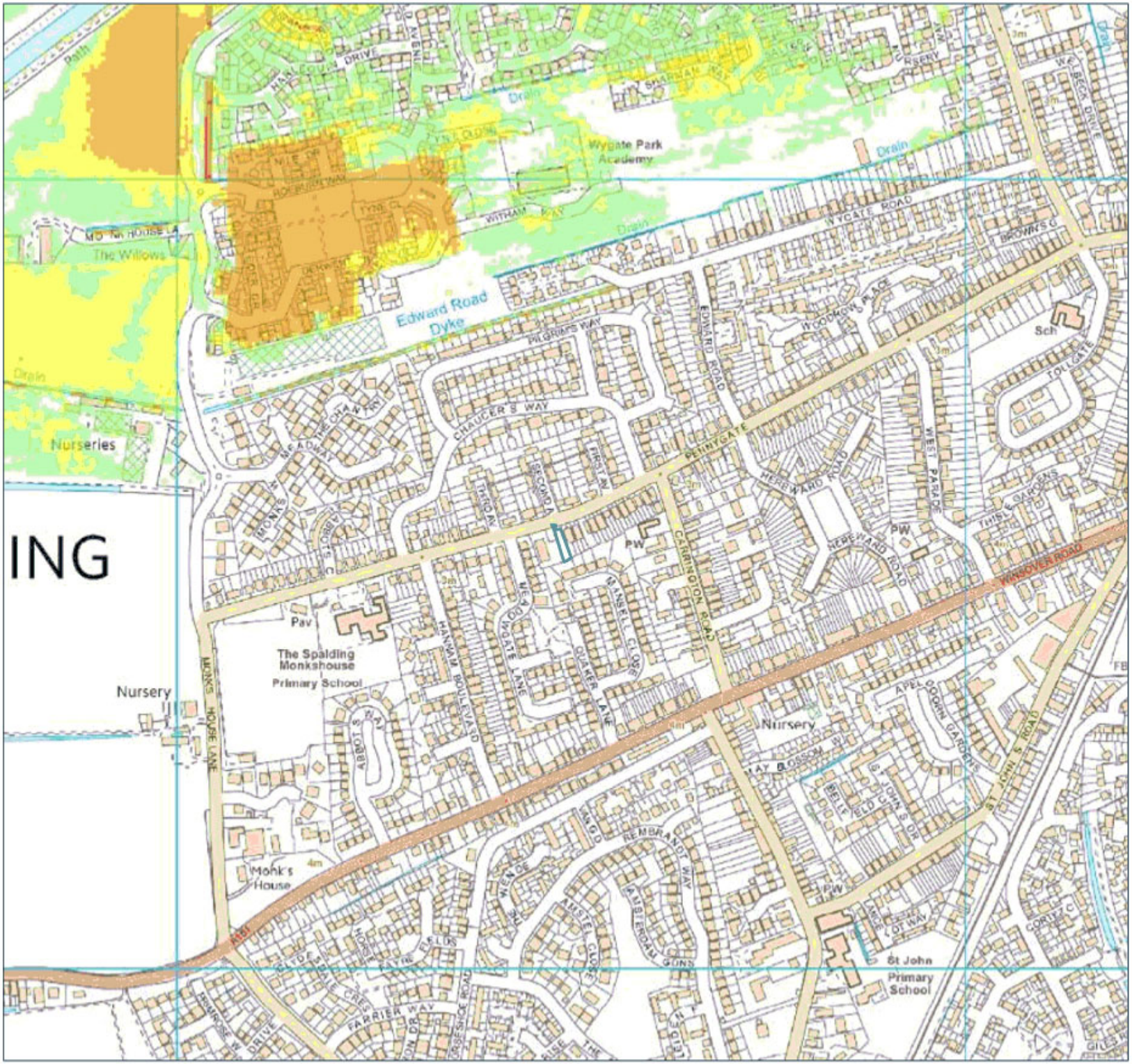
Appendix - Flood Risk Maps	
Description	
Environment Agency map showing the modelled depth of flooding from surface water in a medium risk scenario (1% - 3.3% chance each year)	
Sources	
Environment Agency OS data © Crown copyright and database rights	
Key	
	Site boundary
	Below 0.3m
	0.3m to 0.9m
	Over 0.9m
▲	North



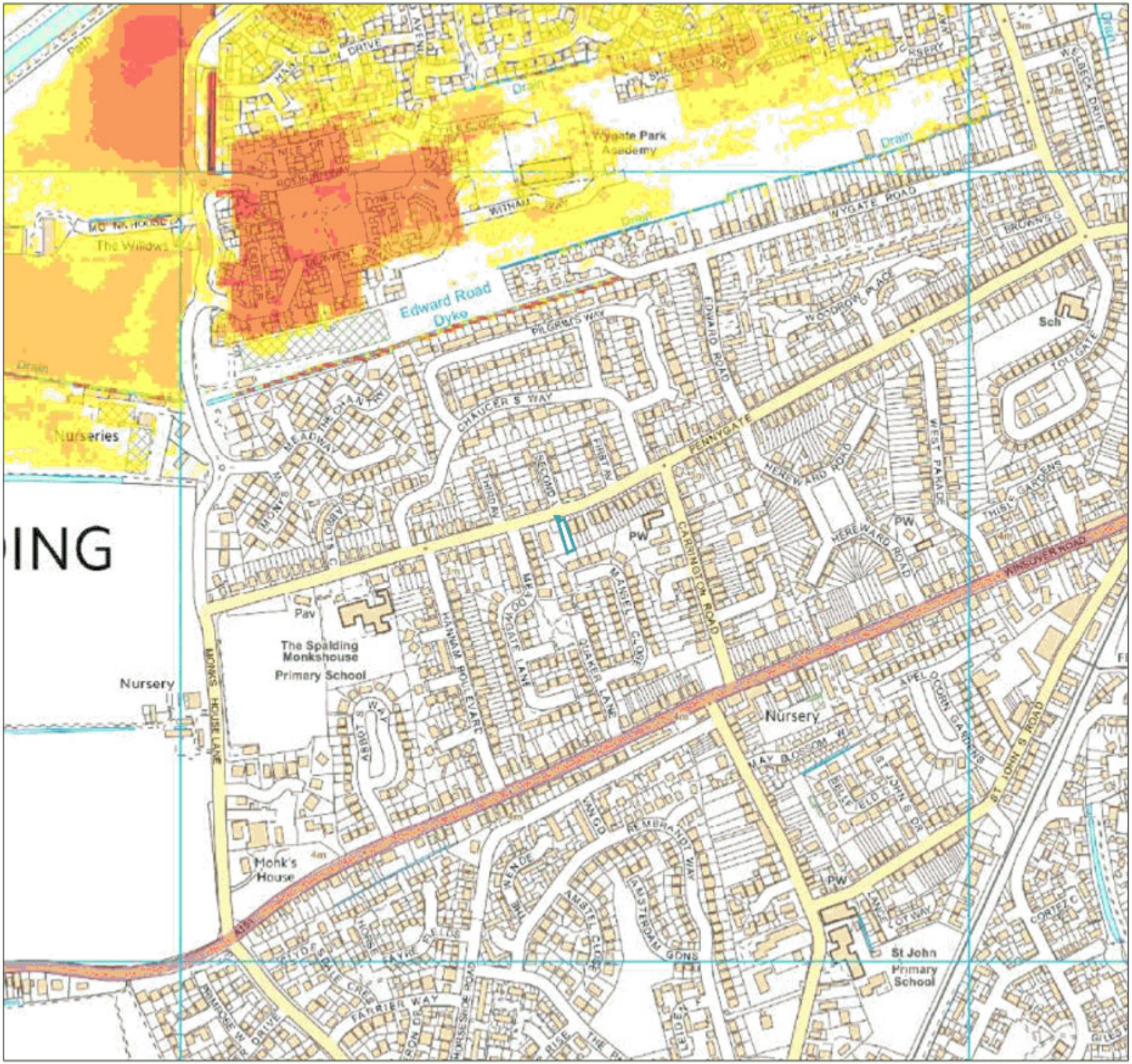
Appendix - Flood Risk Maps	
Description	
Environment Agency map showing the modelled depth of flooding from surface water in a low risk scenario (0.1% - 1% chance each year)	
Sources	
Environment Agency OS data © Crown copyright and database rights	
Key	
	Site boundary
	Below 0.3m
	0.3m to 0.9m
	Over 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

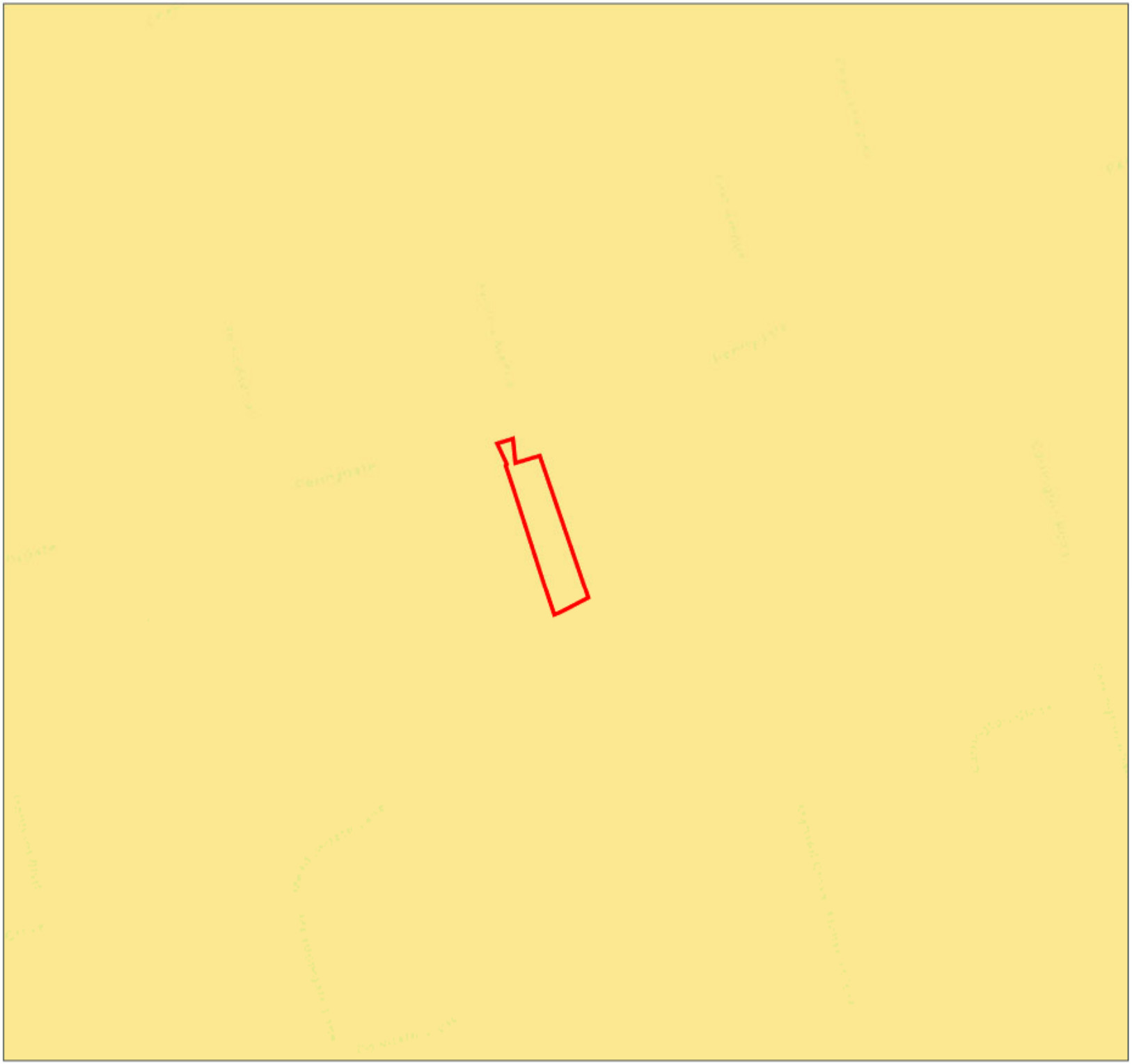
Map showing the residual flood depth in the event of an overtopping or failure of flood defences in a 1% AEP event for the year 2115

Sources

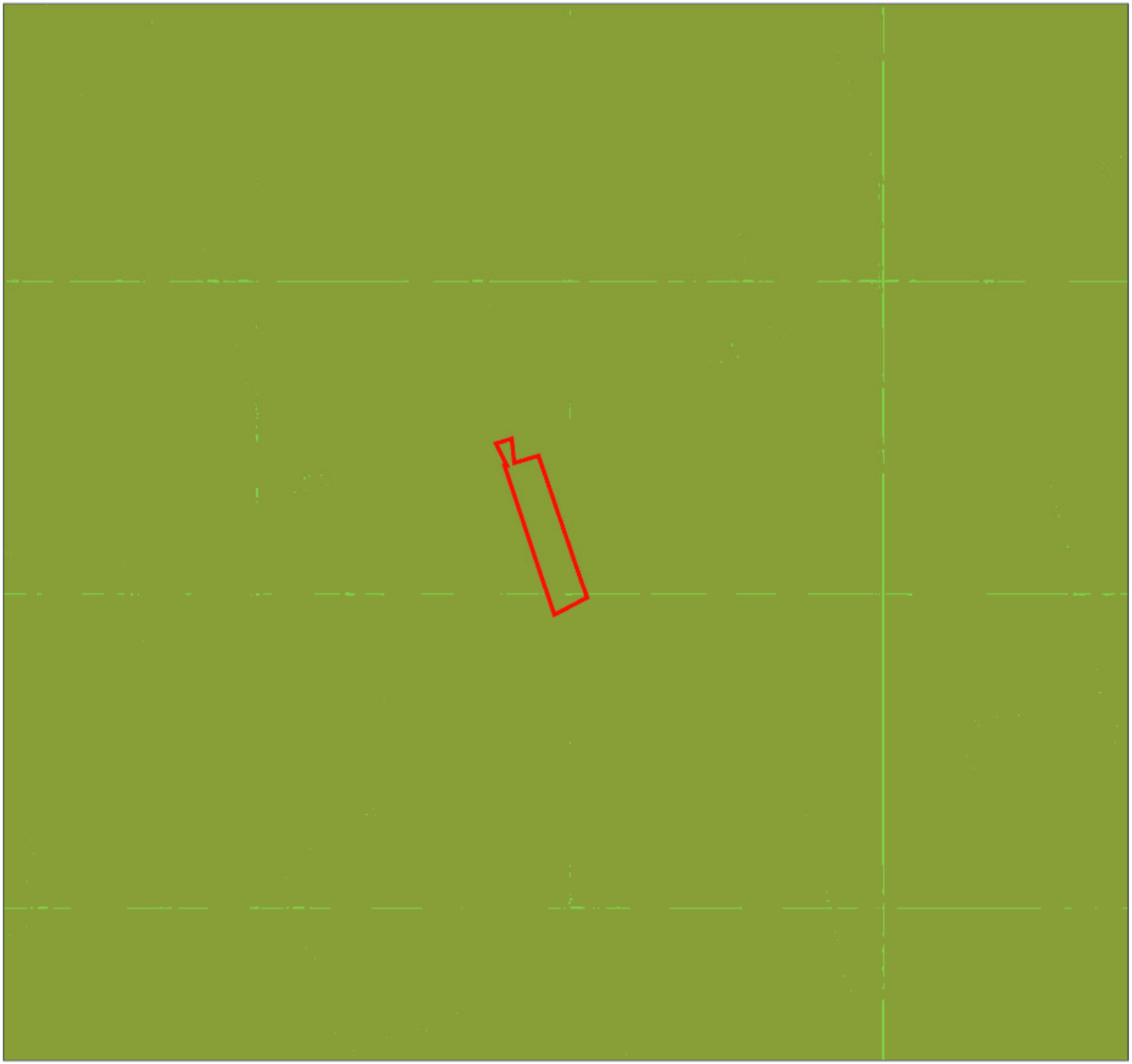
Royal HaskoningDHV
OS data © Crown copyright and database rights

Key

	Site boundary
	0m – 0.25m
	0.25m – 0.5m
	0.5m - 1m
	1m - 2m
	2m+
▲	North



Appendix - Geological Maps	
Description	
Superficial deposits at the site	
Sources	
British Geological Survey	
Key	
	Site boundary
	Tidal Flat Deposits
▲	North



Appendix - Geological Maps	
Description	
Bedrock geology at the site	
Sources	
British Geological Survey	
Key	
	Site boundary
	Oxford Clay Formation
▲	North