FLOOD RISK ASSESSMENT
FOR RESIDENTIAL DEVELOPMENT ON
BROADWAY, CROWLAND

FINAL REPORT

ECL0885/ANGLIA BUILDING CONSULTANTS

DATE NOVEMBER 2022

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1.0 INTRODUCTION

This Flood Risk Assessment has been prepared in accordance with National Planning Policy Framework (NPPF) and supporting planning practice guidance (PPG) on Flood Risk and Coastal Change.

In areas at risk of flooding or for sites of 1 hectare or more, developers are required to undertake a site-specific Flood Risk Assessment to accompany an application for planning permission. This Flood Risk Assessment has been produced on behalf of Churchfield Developments in respect of a development that consists of two residential dwellings on Broadway, Crowland.

A planning application for the proposed development is to be submitted by Anglia Building Consultants.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is located on land adjacent to 38 Broadway, Crowland, Lincolnshire, PE6 0BH. The National Grid Reference of the site is 52391/30999.

The location of the site is shown in Figure 1.

Figure 1 – Location Plan (© OpenStreetMap contributors)

2.2 Existing Site

The site is on the northern side of Broadway. The site is an undeveloped plot to the west of 38 Broadway. The site has an access on its northern boundary from Hardwick Close. The area of development is approximately 0.06 hectares.

The site was included within a topographic survey undertaken to support the application for development within Hardwick Close to the north of the site. Site ground levels vary between +2.8m OD on the northern boundary of the site and +2.5m OD on the southern boundary. The typical site level is +2.6m OD. The carriageway level of Broadway is +2.9m OD. A review of LiDAR confirms these levels.

The site is in the North Level Internal Drainage Board (IDB) district. Surface water at the site would naturally drain through soakaway and hence to the IDB drainage system. The nearest IDB Main Drain is Greenbank Drain approximately 350m east of the site.

The online British Geological Survey maps indicate that the site is likely to be underlain by Oxford Clay Formation mudstone. The bedrock is shown to be overlain with superficial deposits of Abbey Sand and Gravel.

2.3 Proposed Development

The proposed development consists of two dwellings. The dwellings will have two storeys. A Site Plan is provided in Attachment 2.

2.4 Local Development Documents

The South East Lincolnshire Local Plan 2011 – 2036, adopted in March 2019, is the Local Plan for the district. Policy 4: Approach to Flood Risk states the requirements for flood risk reduction.

The South East Lincolnshire Level 1 and Level 2 Strategic Flood Risk Assessment (SFRA) was prepared in June 2017.

The Joint Lincolnshire Flood Risk and Drainage Management Strategy has been prepared by Lincolnshire County Council as the Lead Local Flood Authority. The purpose of the Strategy is to increase the safety of people across Lincolnshire by reducing the number of people at risk of flooding, increasing the resilience of local communities, and reducing the impact of flooding.

2.5 Flood Zones

An extract from the Environment Agency Flood Map for Planning is shown in Figure 2. The site is located within Flood Zone 1, an area with a low probability of flooding.

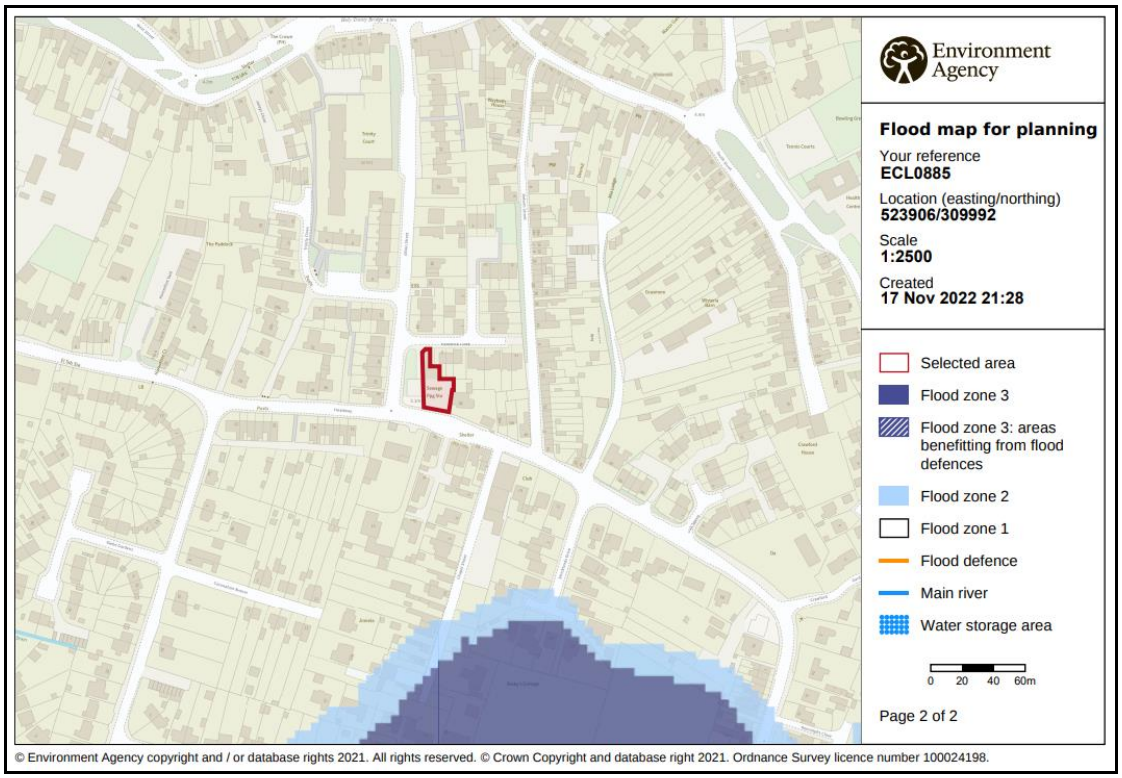


Figure 2 – Environment Agency Flood Map for Planning

The Environment Agency Long Term Flood Risk maps show that:

- the site has a very low risk of flooding from rivers or the sea (annual probability less than 0.1%);
- the site has a low risk of surface water flooding (annual probability between 0.1% and 1%); and
- the site is within an area at risk of reservoir flooding when there is also flooding from rivers.

Table 1 shows the level of risk at the site within the South East Lincolnshire SFRA.

SFRA Map	Present Day	2116
Residual Flood Hazard Map for the 1% fluvial and 0.5% tidal event	The site is in the 'Danger for Some' area	The site is in the 'Danger for Most' area
Residual Peak Depth Map for the 1% fluvial and 0.5% tidal event	The peak flood depth is between 0.25m and 0.5m.	The peak flood depth is between 0.5m and 1.0m.

Table 1 – Flood Risk within SFRA Maps

3.0 FLOOD RISK VULNERABILITY

3.1 The Sequential and Exception Test

The NPPF requires the application of a Sequential Test to ensure that new development is in areas with the lowest probability of flooding.

The Exception Test is a method to demonstrate and help ensure that flood risk to people and property will be managed, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available.

3.2 Vulnerability Classification

Table 2 of the PPG Flood Risk and Coastal Change categorises different types of uses and development according to their vulnerability to flood risk. The proposed development is covered by the description of buildings used for dwellings and is classified as 'More Vulnerable'.

Table 3 of the PPG Flood Risk and Coastal Change sets out Flood Risk Vulnerability and flood zone 'compatibility'. The site is in Flood Zone 1 and the development is 'More Vulnerable' therefore it is not necessary to complete the Exception Test.

PPG Flood Risk and Coastal Change defines that the lifetime of the development in terms of flood risk and coastal change is 100 years.

3.3 Application of the Sequential Test

It is for the Local Planning Authority, using the evidence provided and taking advice from the Environment Agency as appropriate, to consider whether an application passes the Sequential Test.

The site is located in Flood Zone 1 and therefore it is therefore not possible to undertake the development at an alternative site with a lower probability of flooding. The site is considered to pass the Sequential Test.

4.0 SITE SPECIFIC FLOOD RISK

4.1 Local Flood Assets

The site is 1.1km east of the River Welland. Crowland Washes provides floodplain storage for the River Welland. The village of Crowland is protected from the River Welland by the Corporation Bank approximately 350m west of the site.

There is a long-term strategy for the maintenance of the Environment Agency defences which is reviewed and updated periodically.

There is an extensive local drainage network managed by North Level Internal Drainage Board. There nearest IDB Main Drain, Greenbank Drain approximately 350m east of the site, discharges to the New South Eau and then into the North Level main Drain. The North Level Main Drain outfalls to the River Nene via Tydd Pumping Station.

During the operation and maintenance of its pumping stations, associated structures, and channel systems, the IDB seeks to maintain a general standard capable of providing flood protection to its district. A routine maintenance programme is in place to ensure that the Boards assets are commensurate with the standard of protection that is sought.

Current maintenance standards of the North Level Internal Drainage Board and the Environment Agency are generally good.

4.2 Sources of Flooding

The potential sources of flooding that have been identified during this assessment are:

- local blockages to the North Level IDB drainage system;
- an event in the drainage network that exceeds the standard of protection;
- failure of Tydd Pumping Station; and
- overtopping and breaching of the Crowland Wash Corporation Bank.

4.3 Probability of Flooding

The probability of flooding associated with blockages in the North Level IDB drainage system is low due to the maintenance standards achieved and managed by the IDB.

Through the operation and maintenance of the pumping stations and the channel system the Board seek to maintain a general standard capable to providing flood protection to agricultural land and developed areas of 1 in 20 years and 1 in 100 years, respectively. The risk associated with flood events that exceed the standard of protection provided is lowered due to the North Level IDB main drains incorporating freeboard. This freeboard provides storage during the exceedance events.

The Corporation Bank provides protection against the 1% annual probability (1 in 100 chance each year) event. The defence falls within the Reservoirs Act 1975 legislation. As such it is inspected annually by a Supervising Engineer who will assess its structural integrity to provide protection to people and property.

4.4 Historic Flooding

During the preparation of this assessment, no evidence was discovered of the site being flooded.

4.5 Climate Change

Climate change is likely to impact the site through increased rainfall intensity and duration affecting the local drainage network and increased flood levels. The Corporation Bank provides protection against the 1% annual probability (1 in 100 chance each year) event including climate change.

4.6 Residual Risk

There is a residual risk of flooding at the site should a breach occur. The South East Lincolnshire SFRA includes maps demonstrating the impact of a breach in 2116. These show that when the climate change allowances are applied to the combination of a 1% annual probability (1 in 100 chance each year) fluvial event and a 0.5% annual probability (1 in 200 chance each year) tidal event the site is at risk with depths between 0.5m and 1.0m. An extract from this map is shown in Figure 3 below.

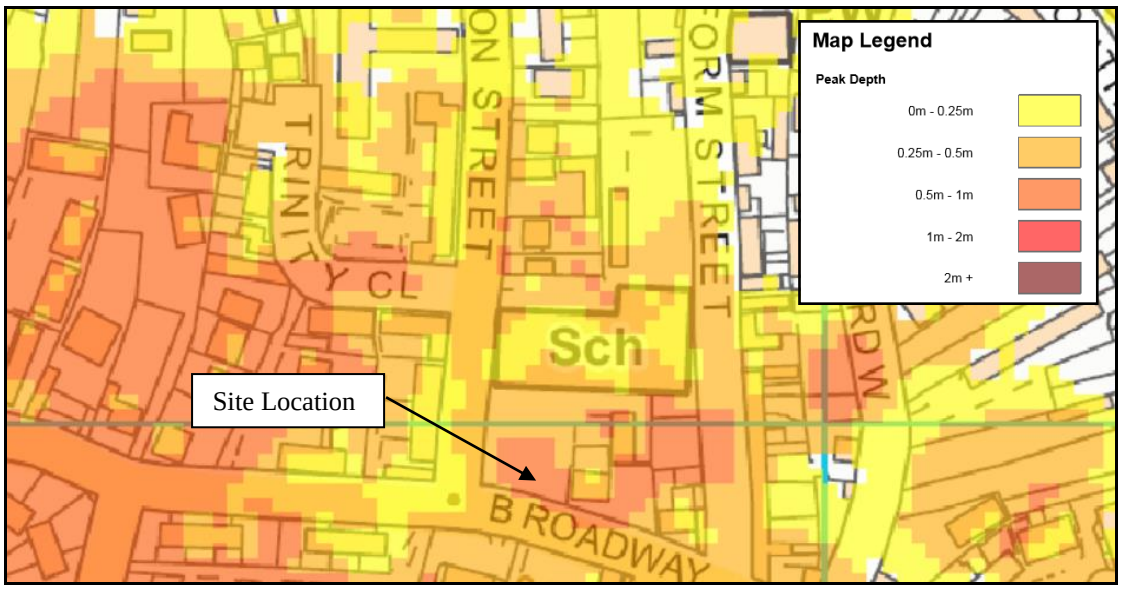


Figure 3 – SFRA 2116 Residual Peak Depth Map

The depth of flooding on Broadway is between 0.25m and 0.5m. Based upon the carriageway level of +2.9m OD a flood level of +3.4m OD can be estimated. This is 0.8m above typical ground levels within the site.

5.0 FLOOD RISK MITIGATION

5.1 Summary of Risks

The probability of this development flooding from localised drainage systems is low. Failure of Tydd Pumping Station could lead to an increased level of risk at the site.

The probability of the site flooding from any Environment Agency system is less than 1% annual probability (1 in 100 chance each year) because of the standards of the existing flood defences. Over time there will be a gradual increase in risk to the site due to climate change. During the design life of the development it is not anticipated that the site would flood.

The SFRA considers the residual risk associated with a breach in the defences. The residual flood level during a 1% annual probability (1 in 100 chance each year) fluvial event and a 0.5% annual probability (1 in 200 chance each year) tidal event in 2116 is estimated to be +3.4m OD. This is a flood depth of 0.8m within the site.

The proposed arrangement increases the impermeable area and therefore there will be an increased volume of surface water that has the potential to increase flood risk.

5.2 Mitigation Measures

Based upon the information available during the preparation of this flood risk assessment, to mitigate against the remote risk of flooding it is recommended that:

- the finished floor level of the dwellings is at a minimum level of +3.4m OD; and
- there will be 0.3m of flood resilient construction above finished floor level.

The developer should ensure that the eventual occupiers of the dwellings are sufficiently aware of the risk of flooding, and the standard of the existing defences. The Environment Agency operates a flood warning system for properties at risk of flooding to enable householders to protect life or take actions to manage the effect of flooding on property. Floodline Warnings Service is a national system run by the Environment Agency for broadcasting flooding warnings. The occupiers of the dwellings should register to receive flood warnings.

Should there be a failure of Tydd Pumping Station and conditions were such to put properties and land at risk of flooding, the Internal Drainage Board would take emergency action to maintain the drainage level of service by using temporary pumping equipment.

It is recommended that surface water run-off is managed so that stormwater from the development will not affect any adjoining properties or increase the flood risk elsewhere.

6.0 CONCLUSIONS

As a result of the assessment, the following conclusions have been reached.

- The proposed development consists of two 2 storey dwellings on land adjacent to 38 Broadway, Crowland.

- The site is located within an Internal Drainage Board catchment and through the operation and maintenance of the pumping stations and the channel system the Board seek to maintain a general standard capable to providing flood protection to agricultural land and developed areas of 1 in 20 and 1 in 100 years, respectively.

- The site is in Flood Zone 1. The Corporation Bank provides protection against the 1% annual probability (1 in 100 chance each year) event including climate change in the River Welland. During the life of the development, a flood depth between 0.5m and 1.0m could occur at the site should there be a breach of the Corporation Bank.

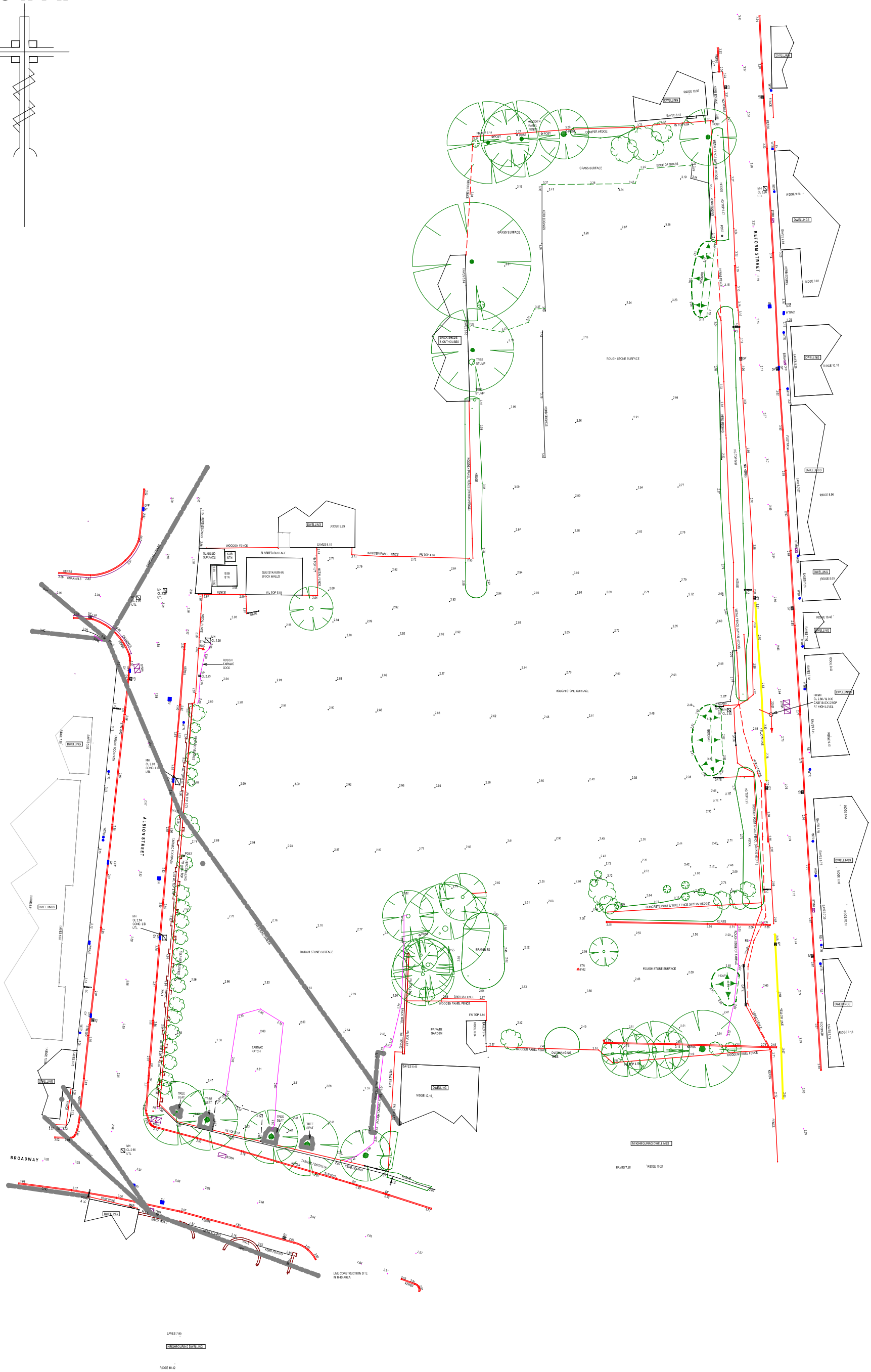
- It is recommended that the minimum floor level of the dwellings is +3.4m OD with 0.3m of flood resilient construction above finished floor level.

- The development passes the Sequential Test and Exception Test and is therefore suitable for the proposed location.

ATTACHMENT 1

PROPOSED SITE PLAN
(DWG P-22-2251-103)

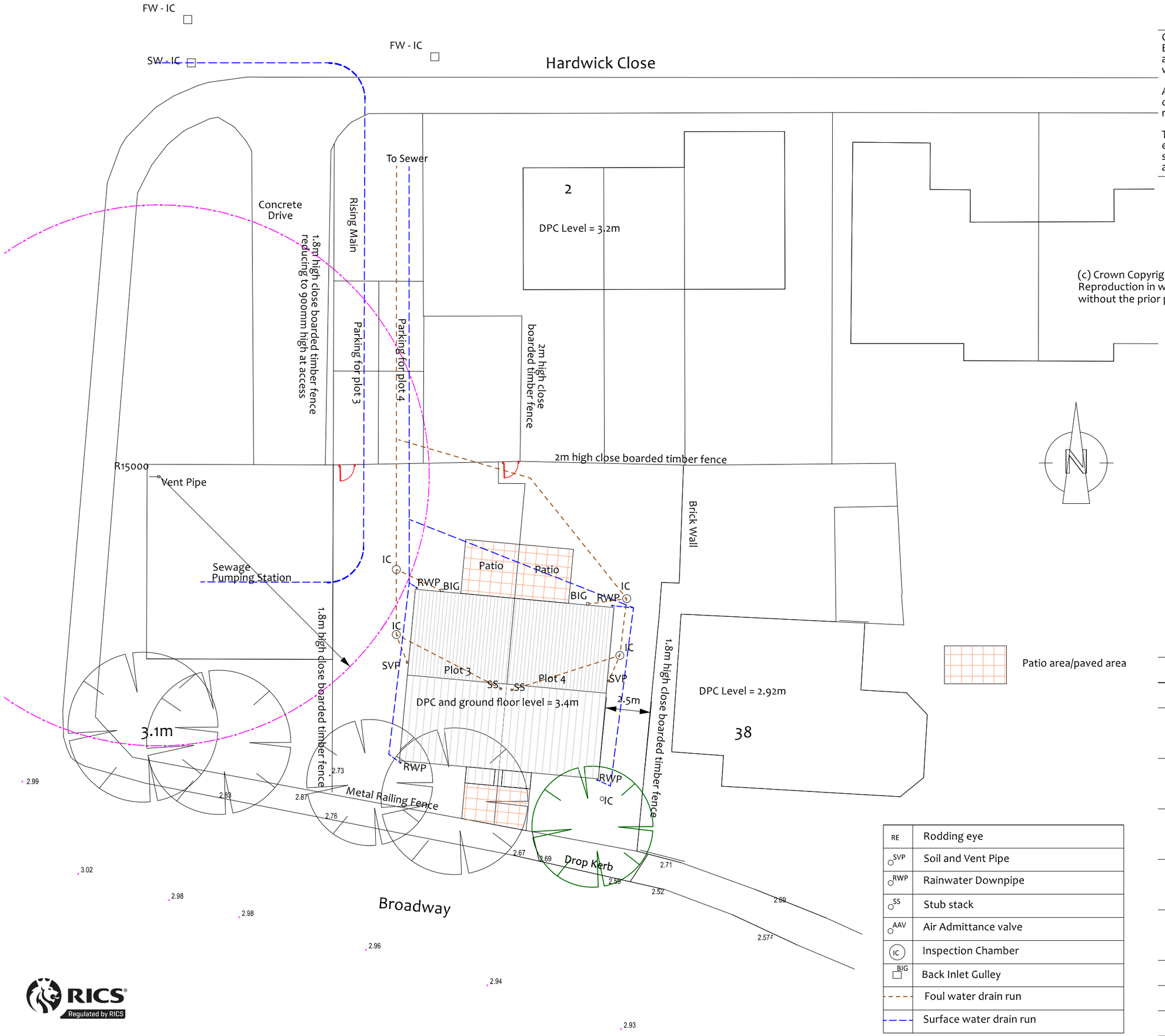
NORTH



Point	Easting	Northing	Elevation
9000	523878.481	310029.237	3.133
9001	523874.038	309989.612	3.112
9002	523906.274	309969.408	2.768
9100	523888.886	310038.898	4.768
9102	523857.930	309996.816	2.630

ATTACHMENT 2

PROPOSED SITE PLAN
(DWG P-22-2251-103)



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All dimensions and levels should be checked on site prior to commencement of works. Any discrepancy found should be reported to the agent.

This drawing is to be read in conjunction with all relevant engineers and specialist sub-contractors drawings and specifications, along with any other drawings, specification and details prepared by Anglia Building Consultants for the project.

0 1m 2m 3m 4m 5m 10m

Scale 1:200

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Patio area/paved area

RE	Rodding eye
SVP	Soil and Vent Pipe
RWP	Rainwater Downpipe
SS	Stub stack
AAV	Air Admittance valve
IC	Inspection Chamber
BIG	Back Inlet Gulley
	Foul water drain run
	Surface water drain run

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No	Date	Revision
A	8/12/22	Levels Added

Issue: For Planning Approval

Site: Land adjacent 38 Broadway, Crowland, Lincolnshire

Project: Residential Development

Drawing Title: Proposed Site Plan

Client: Churchfield Developments Ltd

Date: August 2022

Scale: 1:200 at A3

Drawing Number: P-22-2251-103-A

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