FLOOD RISK ASSESSMENT
FOR RESIDENTIAL DEVELOPMENT AT
BARBERS DROVE NORTH, CROWLAND

FINAL REPORT

ECL0020/BURMOR CONSTRUCTION LTD

DATE JANUARY 2020

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(Dwg 16170272-BR-CROW-3D-TOPO rev A)

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(Dwg 2483 AL0205 P01)

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 Burmor Construction Ltd in respect of a development that consists of forty-one dwellings at Barbers Drove North, Crowland.

A planning application for the proposed development is to be submitted by Burmor Construction Ltd.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is located Barbers drove North, Crowland, PE6 0BE. The National Grid Reference of the site is 52425/30960.

The location of the site is shown in Figure 1.



Figure 1 – Location Plan (© OpenStreetMap contributors)

2.2 Existing Site

The site is currently an undeveloped area of land at the north western side of James Road, Crowland. The site is currently grassed. The area of development is approximately 1.43 hectares.

A topographic survey has been undertaken and is provided in Attachment 1. The site is typically between +1.7m OD and +1.3m OD. In general ground levels are lower in the southern half of the site. The carriageway level of James Road alongside the site is +1.9m OD.

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. There is a riparian drain along the eastern boundary of the site and the northern boundary of the site is formed by Greenbank Drain, an IDB main drain.

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 clay and silt.

2.3 Proposed Development

The proposed development consists of forty-one new dwellings. The dwelling will be a minimum of two storeys.

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

The site is located within Flood Zone 3, an area with a high probability of flooding, of the Environment Agency Flood Maps for Planning as shown in Figure 2.

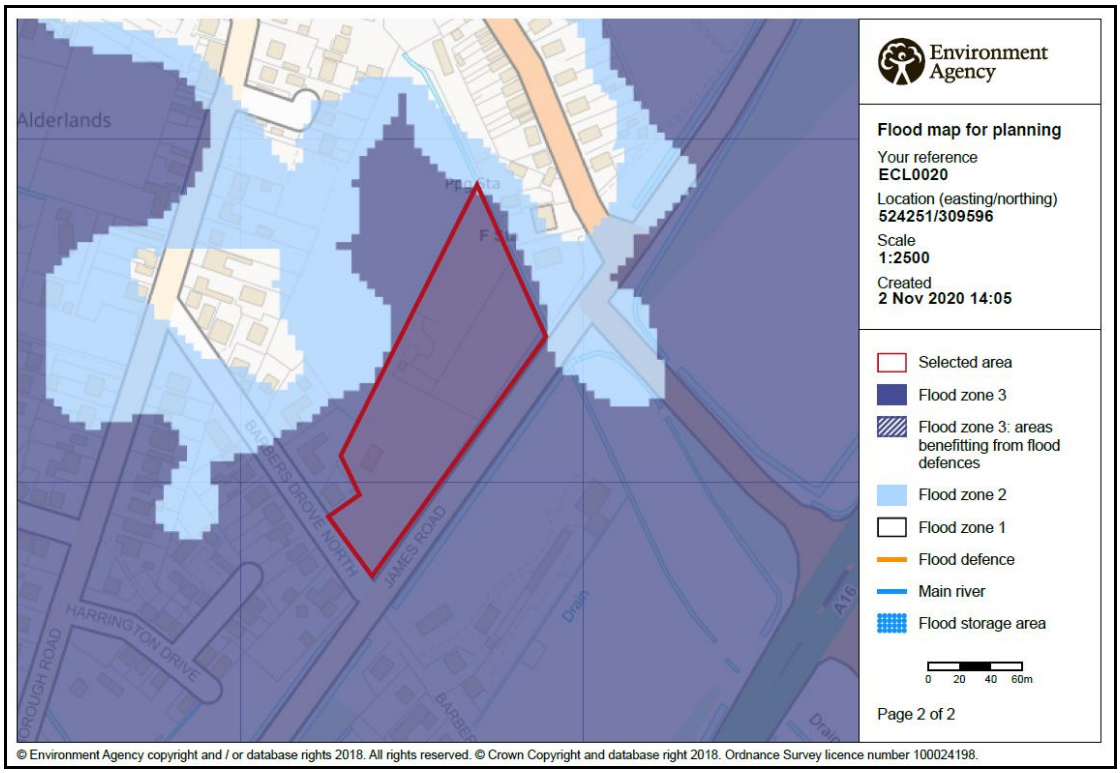


Figure 2 – Environment Agency Flood Map for Planning

The Environment Agency Long Term Flood Risk maps show that:

- the site has a medium risk of flooding from rivers or the sea (annual probability between 1% and 3.3%);
- parts of the southern half of the site have 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.

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	Parts of the site are in the 'Low Hazard', 'Danger for Some' and Danger for Most' areas	The site is in the 'Danger for Most' area
Residual Peak Depth Map for the 1% fluvial and 0.5% tidal	The peak flood depth in northern part of the site is between 0.0m and 0.25m and in the southern part of the site 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 3 and the development is 'More Vulnerable' therefore it is 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 and Exception Test

It is for the Local Planning Authority, taking advice from the Environment Agency as appropriate, to consider the Sequential Test.

Large parts of the South Holland district between the River Welland and River Nene lie within Flood Zone 3. As such the opportunities to undertake the development at an alternative site with a lower flood risk are limited. The River Welland has defences that provide protection during the 0.5% annual probability (1 in 200 chance each year) event including climate change. The site therefore has a low probability of flooding.

The District Council's 5-year Housing Land Supply Assessment identifies four large sites within the settlement of Crowland. The four sites have been reviewed to determine whether they provide an alternative location for development at a lower flood risk. Based upon the information within the SFRA the alternative sites have a similar level of flood risk because they are in Flood Zone 3 and at each development part of the site is at risk of a breach with potential depths between 0.5m and 1.0m. As such it is reasonable to conclude that there are no available sites within Crowland that offer a lower level of flood risk and therefore the development is considered to pass the Sequential Test.

The Exception Test requires consideration of the wider sustainability benefits of a development and that the development would be safe and residual risks managed.

The Local Plan has a target of a net increase of at least 11,681 dwellings in South Holland over the 25-year local plan period. The Plan considers this new housing is required to ensure the sustainability of the Local Plan area. The proposed development will contribute to this target.

Section 5 of this Flood Risk Assessment describes the flood mitigation measures and the management of the residual risks, demonstrating that this development will be safe and not increase flood risk elsewhere. The development is considered to pass the Exception Test.

4.0 SITE SPECIFIC FLOOD RISK

4.1 Local Flood Assets

The site is 1.6km 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 900m west of the site.

There is a long-term strategy for the maintenance of the Environment Agency defences which is reviewed and updated every 5 years.

There is an extensive local drainage network managed by the Old West Internal Drainage Board. The nearest IDB main drain, Greenbank Drain forms the northern boundary of the site. The site and surrounding land drains by gravity to Smithy Fen Engine Pumping Station. The pumping station, which is operated and maintained by Old West IDB, discharges to the River Great Ouse (Old West).

There is an extensive local drainage network managed by North Level Internal Drainage Board. There is an IDB Main Drain on the northern boundary of the site which 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 local drainage network greater 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.

The standard of drainage provided by North Level IDB is assessed at 2% annual probability (1 in 50 chance each year), compatible with the Department of the Environment, Food and Rural Affairs (DEFRA) target level of service for rural drainage and flood defence works. The risk associated with flooding due to events greater than 2% annual probability (1 in 50 chance each year) is lowered due to the North Level IDB high priority watercourses incorporating a freeboard. This provides storage during events greater than 2% annual probability (1 in 50 chance each year).

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 100 chance each year) tidal event the peak depth at the site would be between 0.5m and 1.0m. An extract from this map is shown in Figure 3 below.

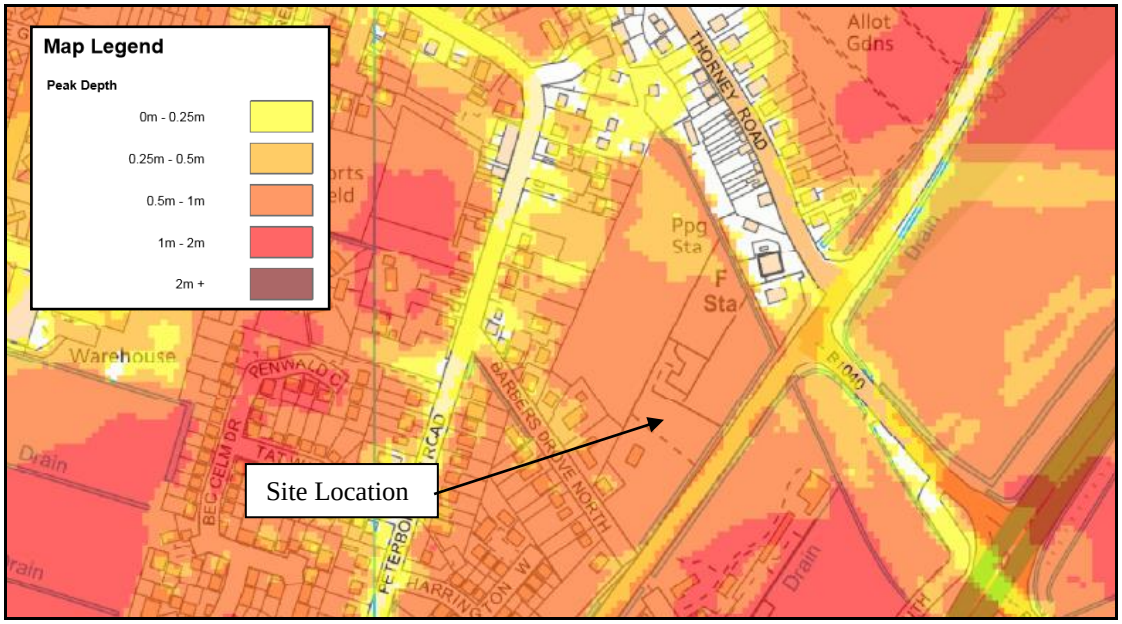


Figure 3 – SFRA 2116 Residual Peak Depth Map

Based upon typical site levels ranging from +1.3m OD and +1.7m OD and the maximum depth of flooding at the site being 1.0m a maximum flood level of +2.3m OD can be determined.

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 maps show that the peak flood depth at the site is between 0.5m and 1.0m. The maximum flood level is estimated to be +2.3m OD.

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:

- the finished floor levels of the dwellings will have a minimum level of +2.3m OD; and
- there will be 0.3m of flood resilient construction above finished floor level.

The risk is further mitigated because the proposed dwellings will have two storeys.

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 provides a Flood Warning Service which includes Flood Warning Codes and uses direct warning methods where the risks and impacts of flooding are high.

In addition to direct and indirect flood warnings, the Environment Agency operates a 24 hour a day Floodline Service providing advice and information on flooding. The occupiers of the dwellings should register with the Floodline Direct Warnings Service to receive any future 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 utilising temporary pumping equipment.

A surface water drainage strategy had been prepared to support this development which demonstrated that there will not be an increase in flood risk from the development.

6.0 CONCLUSIONS AND RECOMMENDATIONS

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

- The proposed development consists of forty-one new dwellings at Barbers Drove North, Crowland.

- 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 maximum flood depth of between 0.5m and 1.0m could occur at the site should there be a breach of the Corporation Bank.

- The site is located within an Internal Drainage Board catchment with a minimum standard of drainage of 2% annual probability (1 in 50 chance each year) which accords with DEFRA guidelines for rural development. The risk of flooding is lowered further due to the North Level IDB high priority watercourses incorporating a significant freeboard. This provides storage during events greater than 2% annual probability (1 in 50 chance each year).

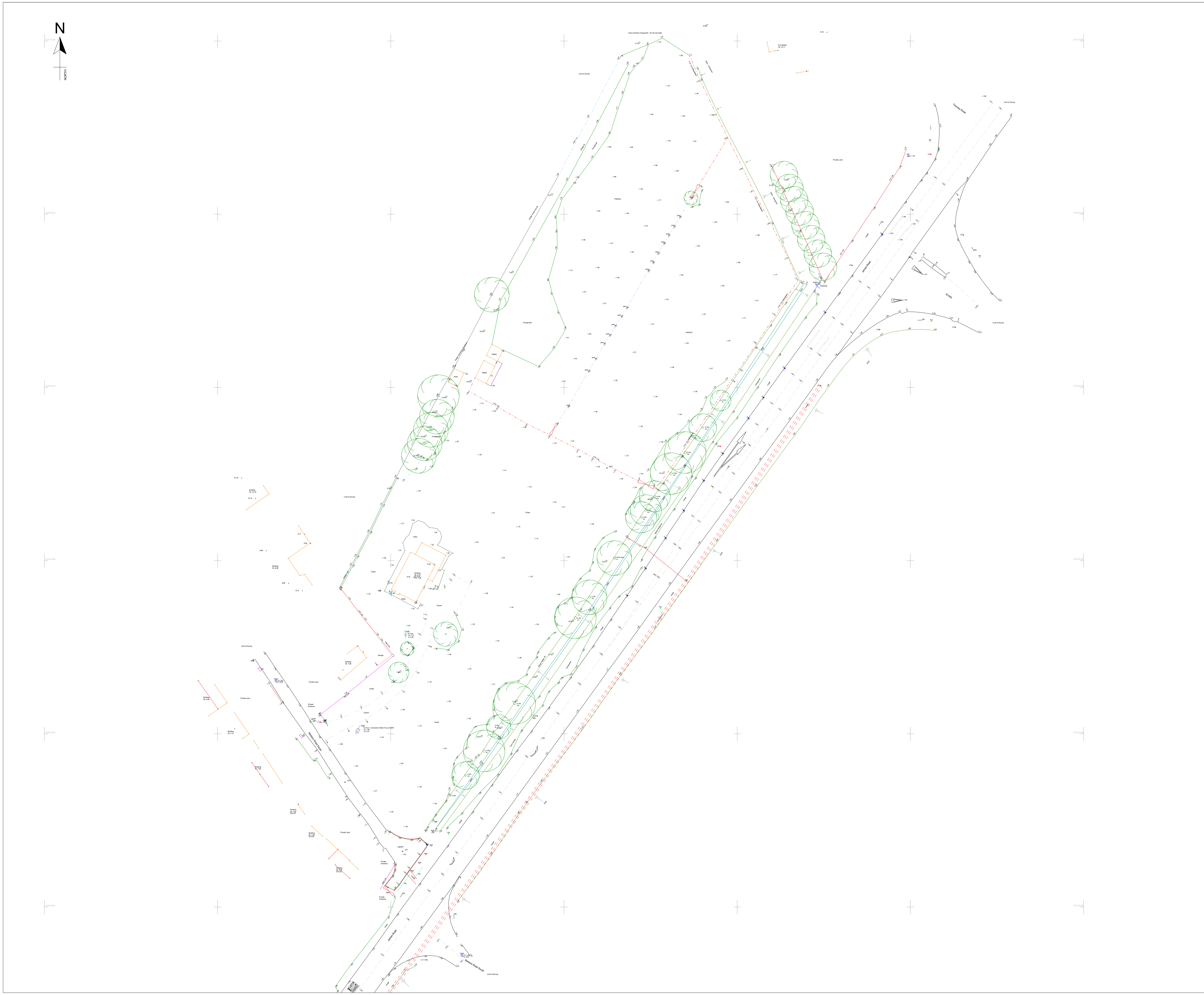
- It is recommended that the minimum floor level of each dwelling is +2.3m OD (typically 0.6m to 1.0m above ground level) with 0.3m of flood resilient construction above finished floor level.

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

ATTACHMENT 1

TOPOGRAPHIC SURVEY OF EXISTING LAND

(Dwg 16170272-BR-CROW-3D-TOPO rev A)



Notes :Legends

TOPOGRAPHICAL SURVEYS
ABBREVIATIONS

AV	Air Valve	MH	Manhole
BO	Bollard	MH/F	Manhole Foul
BO/R	Raising Bollard	MH/S	Manhole Surface
BAF	Concrete Baffle	MH/C	Manhole Combined
BS	Bus Stop	MP	Marker Post
BCH	Bench	RN	Road Name
B/W	Barb Wire Fence	NAL	Nal Socket
BX	Utilities Box	OHL-E	Overhead Lines Electric
BT	Communications Box	OHL-C	Overhead Lines Communications
C/P	Closed Panel Fence	PI	Petrol Interceptor
C/L	Chain Link Fence	P/R	Post & Rail Fencing
CL	Cover Level	P/W	Post & Wire Fencing
COL	Column	P-F	Palisade Fence
CN/P	Chestnut Paling Fence	RE	Rodding Eye
CCTV	Close Circuit Camera	RP	Reflective Post
CTV	Cable Television Box	RS	Road Sign
CB	Control Box	RL	Ridge Level
CONC	Concrete	SP	Sign Post
DC	Drainage Channel	SV	Service Valve (Water)
DR	Door	ST	Stay
DP	Down Pipe	SS	Sub Station
D/C	Dropped Crossing	SC	Water Stop Cock
ECB	Electrical Control Box	TP	Trial Pit
E-S	Electrical Sub Station Shed	TAP	External Water Tap
EP	Electric Pole	TT	Height of Tree
ERF	Estate Rail Fencing	TL	Traffic Light
ER	Earthing Rod	ToW	Top of Wall
EJB	Electric Junction Box (210v)	TP	Telegraph Pole
E-JB	Electric Junction Box (Mains)	U/C	Unknown Cover
ET/P	Electric Transformer on Pole	U/K	Unknown Tree
F/B	Flower Bed	UTL	Unable to Lift
FH	Fire Hydrant	VP	Vent Pipe
FP	Feeder Pillar	W/COB	Cobble Wall
FL	Floor Level	W/BR	Brick Wall
GY	Gully Grate	WC	Toilet Block
GAS	Gas Valve	WH	Weep Hole
HW/S	Headwall Sandbag	WL	Water Level
HW/C	Headwall Concrete	WM	Water Meter
IC	Inspection Chamber	WO	Wash Out
IL	Invert Level	WI	Window
RA	Railings		
KO	Kerb Outlet		
LP	Lamp Post		
LP-WIFI	Post External Light & Wifi		

Topographical Surveys

The description and heights of trees should be used as a guide only

All below ground survey details have been identified from above ground therefore all details relating to these will be approximate only

Some features or location may not have been surveyed due to obstructions or not reasonably visible at the time of the survey

General

This drawing shows the existing topography of the land adjacent to James Road & adjacent highway. Survey carried out 05.08.20.

Station	Easting	Northing	Level
ST1	524203.398	309466.102	1.829
ST2	524186.776	309486.071	1.762
ST3	524262.399	309576.764	1.368

SURVEY GRID AND LEVEL DATUM

Ordnance Survey (OS) national grid coordinates have been established for survey control point ST3 using GNSS and related to OSTN15(GB).The survey grid is orientated to Grid North with a scale factor of 1.000
All levels relate to the Ordnance Survey (OS) level datum using GNSS OSGM15 (GB) established at ST3

Revision	Details	Date
A	Topographical Survey	05/08/20

Disclaimer:

This plan should only be used for its original purpose. MFM accepts no responsibility for this plan if supplied to any party other than the original client.

All dimensions and or level information shown should be checked on site prior to design and construction.

This drawing is not to be used in whole or part other than for the intended purpose and project as defined on this drawing. Refer to the contract for full terms and conditions.

All dimensions in metres

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Client:

Burmor Construction
Burmor House
Sunderland Road
Market Deeping

Project Title:

Proposed Development Land Adjacent to James Road, Crowland

Drawing Title:

Topographical Survey of Existing Land Adjacent to James Road & Highway Crowland
3D

Scale:	Sheet Size:	Drawn:	Date:
1:500	A1	M.M	11.08.2020

Drawing Number:	Revision:
16170272-BR-CROW-3D-TOPO	A

ATTACHMENT 2

SITE PLAN PROPOSED
(Dwg 2483 AL0205 P01)