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

FINAL REPORT

ECL0020-2/RW ARCHITECTURLAL

DATE MARCH 2023

ELLINGHAM CONSULTING LTD
Email: tim@ellinghamconsulting.co.uk

CONTENTS

1.0 INTRODUCTION

2.0 SITE LOCATION AND DESCRIPTION
- 2.1 Site Location
- 2.2 Existing Site
- 2.3 Proposed Development
- 2.4 Local Development Documents
- 2.5 Available Flood Risk Information

3.0 FLOOD RISK VULNERABILITY
- 3.1 The Sequential and Exception Test
- 3.2 Vulnerability Classification
- 3.3 Application of the Sequential Test

4.0 SITE SPECIFIC FLOOD RISK
- 4.1 Local Flood Assets
- 4.2 Sources of Flooding
- 4.3 Probability of Flooding
- 4.4 Historic Flooding
- 4.5 Climate Change
- 4.6 Residual Risks

5.0 FLOOD RISK MITIGATION
- 5.1 Summary of Risks
- 5.2 Mitigation Measures

6.0 CONCLUSIONS

ATTACHMENT 1 – Proposed Site Layout Plan
(Dwg RWA-009692-22-01)

DISCLAIMER
This document has been prepared solely as a Flood Risk Assessment in support of a planning application for proposed residential development at Barbers Drove North, Crowland. "Ellingham Consulting Ltd" accepts no responsibility or liability whatsoever for any use made of this document other than by the client "Harrison & Cooke" for the purposes it was originally commissioned and prepared. All comments and opinions made are based upon information available to "Ellingham Consulting Ltd" during the necessary investigative process, and the conclusions and recommendations, could therefore, differ in the event of material subsequently being found erroneous, incomplete, or misleading. "Ellingham Consulting Ltd" therefore, accepts no liability should this prove to be the case.

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 Harrison & Cooke in respect of a development that consists of two dwellings at Barbers Drove North, Crowland.

A planning application for the proposed development is to be submitted by RW Architectural.

The proposed dwellings are part of a development of forty one dwellings approved under H02-0064-21

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 52421/30950.

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 on the north western side of James Road, Crowland. The site is currently grassed. The area of development is approximately 0.08 hectares.

A topographic survey has been undertaken. The site is typically between +1.3m OD and +1.5m OD. In general ground levels are highest on the south western boundary of the site alongside Barbers Road South. The carriageway level of Barbers Road South alongside the site is +1.7m 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 south eastern boundary of the site and Greenbank Drain, an IDB main drain is 200m north 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 clay and silt.

2.3 Proposed Development

The proposed development consists of two new dwellings. The dwelling will have two storeys. A Site Layout is provided in Attachment 1.

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 3, an area with a high probability of flooding.

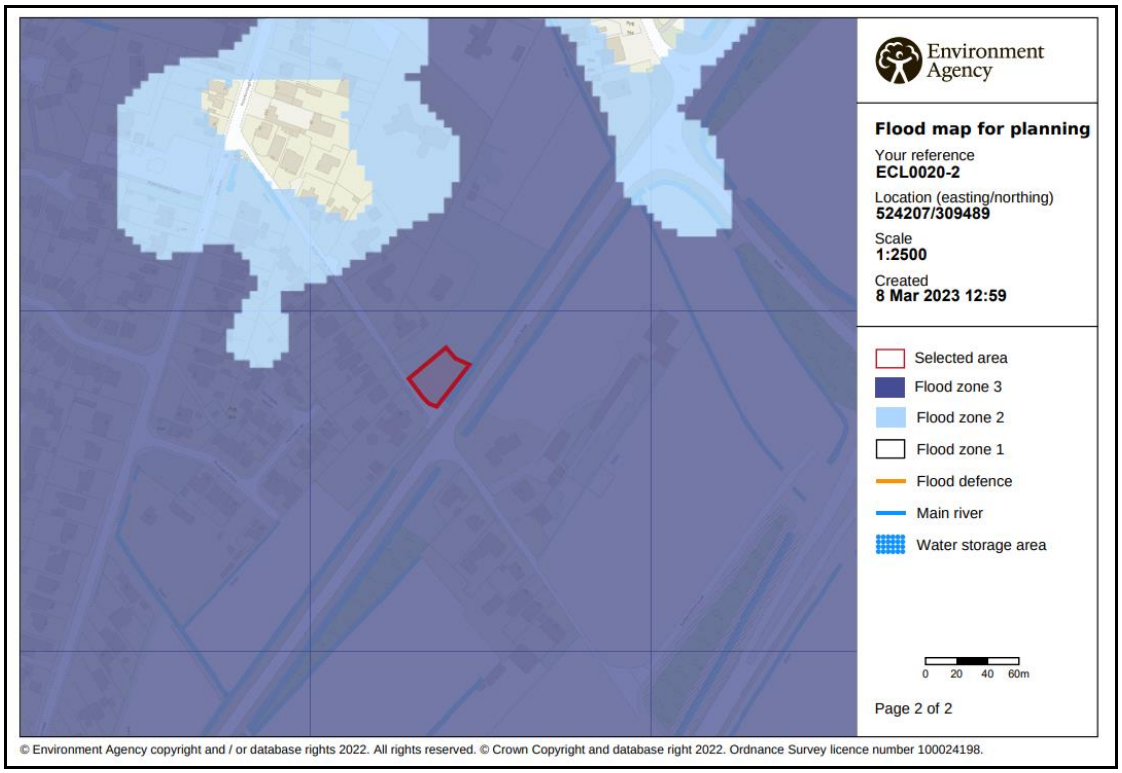


Figure 2 – Environment Agency Flood Map for Planning

The Environment Agency Long Term Flood Risk maps show that:

- the site has a medium risk of flooding from rivers or the sea (annual probability between 1% and 3.3%);
- parts 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 '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 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, using the evidence provided and taking advice from the Environment Agency as appropriate, to consider whether an application passes the Sequential Test.

A development of 41 dwellings has been approved under application H02-0064-21. The proposed development formed part of the approved application. The site is therefore 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 periodically.

There is an extensive local drainage network managed by North Level Internal Drainage Board. The nearest IDB main drain, Greenbank Drain, is 200m north 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 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.

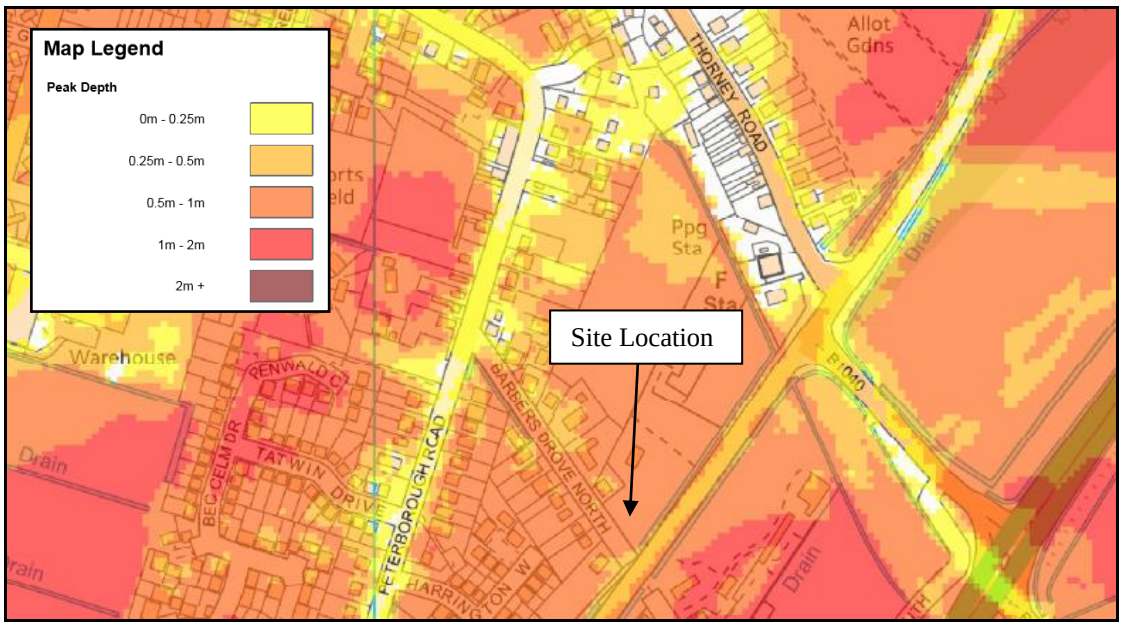


Figure 3 – SFRA 2116 Residual Peak Depth Map

Based upon typical site levels ranging from +1.3m OD and +1.5m 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.

6.0 CONCLUSIONS

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

- The proposed development consists of two 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.

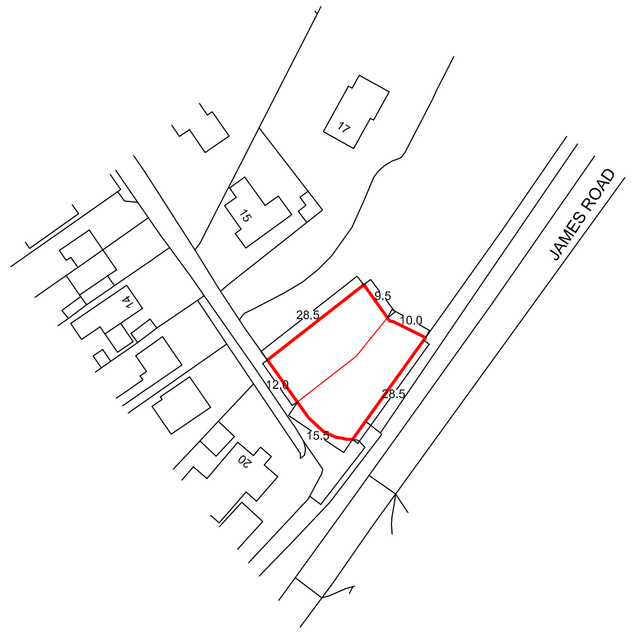
- The site is located within an Internal Drainage Board catchment with a minimum standard of drainage of 2% annual probability (1 in 50 chance each year) which accords with DEFRA guidelines for rural development. The risk of flooding is lowered further due to the North Level IDB high priority watercourses 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 0.8m to 1.0m above ground level) with 0.3m of flood resilient construction above finished floor level.

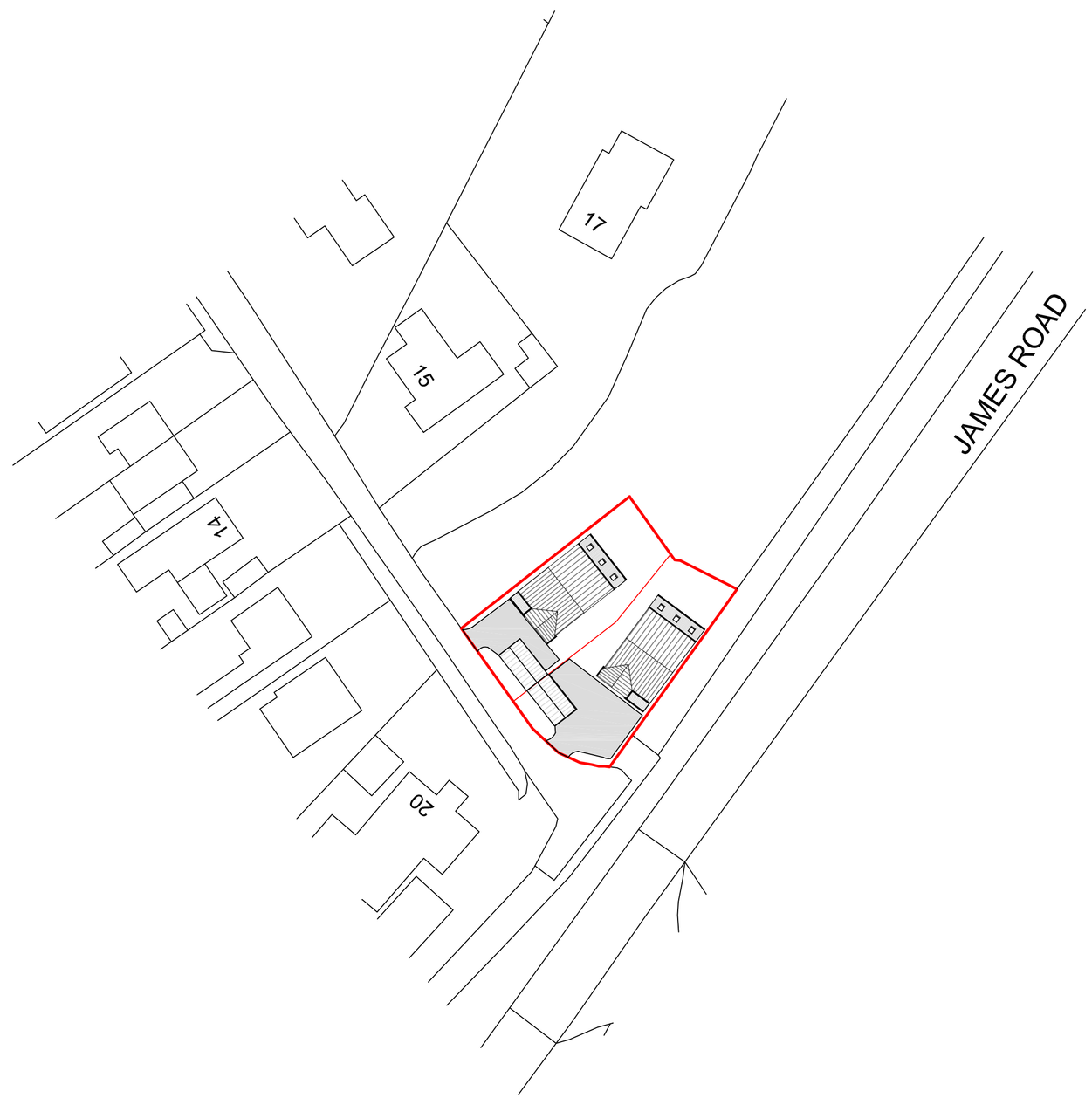
- The development passes the Sequential Test and Exception Test and is therefore suitable for the proposed location.

ATTACHMENT 1

PROPOSED SITE LAYOUT PLAN
(Dwg RWA-009692-22-01)



Ordnance Survey, (c) Crown Copyright 2022. All rights reserved. Licence number 100022432



Ordnance Survey, (c) Crown Copyright 2022. All rights reserved. Licence number 100022432

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

VISUAL SCALE 1:50 @ A1

0m 2m 4m 6m 8m 10m

VISUAL SCALE 1:100 @ A1

Rev	Description	Date

RW ARCHITECTURAL
Architectural Design
Wheatcroft, Rosedale, EN7 6JU.
07874849922

PROJECT

Proposed 4 Bed Detached House & Detached Garage Site at Barbers Drove, Crowland.

CLIENT

I.G. Khan Investment Ltd

DRAWING

Block Plan
Proposed Site Layout Plan

DRAWING NUMBER:	DATE:
RWA-009692-22-01	01/03/23
DRAWN BY:	SCALE (@ A1):
RW	1 : 500

COPIES OF THESE DRAWINGS MUST NOT BE TAKEN, TRACED OR ALTERED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH THEY ARE ISSUED WITHOUT WRITTEN PERMISSION OF RW ARCHITECTURAL. THESE SERVICES ARE PRODUCED ONLY FOR THE PURPOSE OF OBTAINING PLANNING OR BUILDING REGULATION APPROVAL AND SHOULD NOT BE USED AS A SPECIFICATION FOR THE PROPOSED WORK AND MUST NOT BE USED AS A CONTRACT DOCUMENT ALONE.
THE PROPOSED WORK WILL NOT BE SUPERVISED/INSPECTED BY RICHARDS ARCHITECTURAL (unless agreed otherwise in writing by the client). THEREFORE IT IS THE CLIENT OR THEIR APPOINTED BUILDER/CONTRACTORS RESPONSIBILITY TO CONTROL WORKMANSHIP/MATERIALS AND SPECIFICATION AND ANY VARIATIONS TO THE CONTRACT. IT IS NEITHER PRACTICAL OR REASONABLE TO SHOW ALL THE RELEVANT MATTERS ON THE DRAWINGS. THE FACT THAT MATTERS ARE NOT MENTIONED DOES NOT ALEVIATE THE BUILDER/CONTRACTOR FROM RESPONSIBILITES OF NON-COMPLIANCE IN CARRYING OUT THE WORK. ALL WORKS AND MATERIALS TO BE FITTED AND INSTALLED TO THE MANUFACTURERS INSTRUCTIONS AND COMPLY WITH THE MANUALS AND APPROVED DOCUMENTS OF THE BUILDING REGULATIONS AND CURRENT NHBC TECHNICAL REQUIREMENTS. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE. MEASUREMENTS ON THIS DRAWING ARE NOT TO BE SCALED FOR CONSTRUCTION/ORDERING PURPOSES. ALL DIMENSIONS FOR SETTING OUT OF THE WORKS AS SHOWN ON THE DRAWING TO BE CHECKED BY THE BUILDER/CONTRACTOR PRIOR TO THE COMMENCEMENT OF WORK AND ANY DISCREPANCIES REPORTED IMMEDIATELY. WHERE APPLICABLE DIMENSIONS SHOWN ARE EITHER THE OUTSIDE/INSIDE OF 'new OR brickwork AND NOT FINISHED PLASTER. IT IS RECOMMENDED THAT A SITE SOIL SURVEY IS UNDERTAKEN PRIOR TO COMMENCEMENT OF WORKS. THE ACTUAL POSITIONING OF APPARATUS MUST BE ESTABLISHED BY THE BUILDER/CONTRACTOR PRIOR TO COMMENCEMENT OF WORK AND REPOSITIONED TO SUIT THE INDIVIDUAL SERVICE SUPPLIERS INSTALLATION RECOMMENDATIONS.
RICHARDS ARCHITECTURAL WILL NOT SHARE ANY CONFIDENTIAL INFORMATION WITH OTHER PARTIES WITHOUT YOUR CONSENT. FOR A COPY OF OUR PRIVACY POLICY PLEASE CONTACT INFO@RICHARDSARCHITECTURAL.CO.UK

HEALTH & SAFETY
the client is to ensure that the appointed contractor is familiar with and complies with Health & Safety for Building Sites and Work Places.