

FLOOD RISK ASSESSMENT

**Electricity Sub-Station
Cudworth Parkway, Barnsley**

**Mr E Lidster
November 2022**

DOCUMENT ISSUE RECORD

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The information in this report is based on statistical data and qualitative analysis which are for guidance purposes only. This study provides no guarantee against flooding or of the absolute accuracy of water levels, flows and associated probabilities.

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EXECUTIVE SUMMARY

This Flood Risk Assessment is compliant with the requirements set out in the National Planning Policy Framework, and the associated online Planning Practice Guidance. It has been produced on behalf of Mr E Lidster. This report demonstrates that the proposed development is not at significant flood risk, and will not increase flood risk to others, subject to the recommended flood mitigation strategies being implemented.

Policy

Development Type	Flood Zone	Vulnerability
Electricity Sub-Station	3	Essential Infrastructure

Climate Change Allowance

Peak River Flow

DON & ROTHER MANAGEMENT CATCHMENT	
Allowance Category	Percentage Increase
Higher Central	38

Flood Risk and Mitigation

Flood Risk Source	Level of Risk Without Mitigation	Proposed Mitigation
Fluvial	High	Base of sub-station at minimum 41.60m AOD
Pluvial Groundwater Sewers	Low	
Tidal Reservoir Canal/Artificial	None	

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1.0 INTRODUCTION

- 1.1 This Flood Risk Assessment, (FRA), is compliant with the requirements set out in the National Planning Policy Framework, (NPPF), and the associated online Planning Practice Guidance.
- 1.2 The FRA has been produced on behalf of Mr E Lidster in respect of a planning application for an electricity sub-station at Cudworth Parkway, Barnsley.

Data Used

- 1.3 This FRA is based on the following information:
- Topographic Survey
 - Proposed Plans
 - British Geological Survey Drift & Geology Maps
 - Environment Agency Data
 - British Geological Survey Hydrogeology Data

Existing Site

- 1.4 The site is located at grid reference SE3794608869 as shown in **Figure 1.1** below.

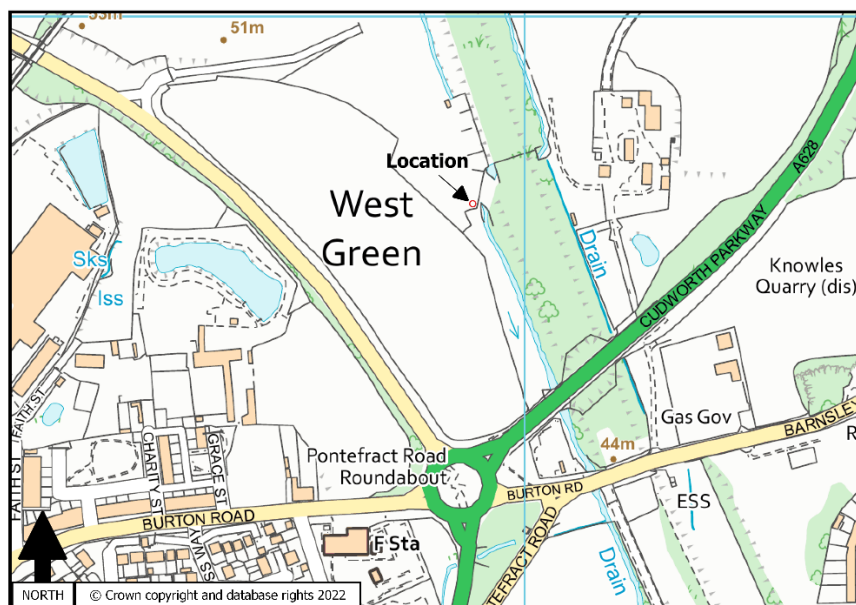


Figure 1.1 Site Location

- 1.5 A full topographic survey is included as **Appendix 1**. The online British Geological Survey maps indicates that the site is located on superficial deposits of sand and gravel over a bedrock of coal.

Proposed Development

- 1.6 The proposed development consists of an electricity sub-station.

2.0 FLOOD RISK PLANNING POLICY

National Planning Policy Framework

- 2.1 The NPPF sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. A supporting web-based Planning Practice Guidance is also available.
- 2.2 The guidance uses four Flood Zones to characterise flood risk which refer to the probability of river and sea flooding, ignoring the presence of defences.

Sequential Test

- 2.3 The NPPF requires the application of a Sequential Test to ensure that new development is in areas with the lowest probability of flooding and the Flood Zones provide the basis for applying the Test.

Flood Zone Definition

Flood Zone 1	Low probability (1 in 1000 annual probability of river or sea flooding (<0.1%)).
Flood Zone 2	Medium probability (between 1 in 100 and 1 in 1000 annual probability of river flooding (1.0%-.0.1%) or between 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5%-.0.1%) in any given year).
Flood Zone 3a	High probability (1 in 100 or greater annual probability of river flooding (>1.0%) or 1 in 200 or greater annual probability of sea flooding (>0.5%) in any given year).
Flood Zone 3b	This zone comprises land where water must flow or be stored in times of flood. Land which would flood with an annual probability of 1 in 20 (5.0%), or is designed to flood in an extreme flood (0.1%) should provide a starting point for discussions to identify functional floodplain.

- 2.4 The Flood Zones do not consider the projected effects of climate change and may not represent potential flooding from smaller watercourses.
- 2.5 The aim is to steer new development to Flood Zone 1 and where there are no reasonably available sites in Flood Zone 1, local planning authorities in their decision making should consider the flood risk vulnerability of land uses and consider reasonably available sites in Flood Zone 2, applying the Exception Test if required.
- 2.6 Only where there are no reasonably available sites in Flood Zones 1 or 2 should the suitability of sites in Flood Zone 3 be considered, considering the flood risk vulnerability of land uses and applying the Exception Test if required.
- 2.7 The guidance also sets out the vulnerability to flooding of different land uses and some of these are detailed below.

Flood Risk Vulnerability Classification

Essential Infrastructure	Transport Infrastructure; Utility Infrastructure; Wind Turbines.
Water Compatible	Flood Control Infrastructure; Water and Sewage Infrastructure; Navigation Facilities.
Highly Vulnerable	Emergency Services (which are required in times of flood); Basement Dwellings; Caravans, Mobile Homes and Park Homes, (intended for permanent residential use); Installations requiring Hazardous Substances Consent.
More Vulnerable	Hospitals and other Health Services; Residential Institutions; Dwelling Houses, Drinking Establishments; Nightclubs; Hotels; Non-residential uses for Health Services; Nurseries; Educational Establishments; Landfill and Hazardous Waste Management Facilities; Sites used for Holiday or short-let Caravan and Camping sites, (subject to a specific warning and evacuation plan).
Less Vulnerable	Commercial Establishments; Emergency Services not required in times of flood; Land and Buildings used for Agriculture and Forestry. Waste Treatment; Minerals Working; Water Treatment Works; Sewage Treatment Works.

Appropriate Development

- 2.8 Based on the vulnerability of a development the guidance states what Flood Zone(s) the development is appropriate within. The flood risk compatibility is summarised below.

Flood Zone 1	Appropriate Development – All.
Flood Zone 2	Exception Test - Highly vulnerable. Appropriate Development - Essential Infrastructure; More vulnerable; Less vulnerable and Water Compatible.
Flood Zone 3a	Should not be permitted – Highly vulnerable. Exception Test – Essential Infrastructure, More vulnerable. Appropriate Development – Less vulnerable; Water compatible.
Flood Zone 3b	Should not be permitted – Highly vulnerable; More vulnerable; Less vulnerable. Exception Test – Essential Infrastructure. Appropriate Development – Water compatible.

- 2.9 The Planning Practice Guidance also states that all sources of flooding should be considered when preparing a FRA.

Exception Test

- 2.10 The Exception Test is a method to demonstrate and help ensure that flood risk to people and property will be managed satisfactorily, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available.
- 2.11 The first part of the Exception Test is to show that the proposed development will provide wider sustainability benefits to the community that outweigh flood risk. The second part is the requirement for a FRA to demonstrate that it will be safe for its lifetime, without increasing flood risk elsewhere and where possible reduce flood risk overall.

Development Proposals

- 2.12 The proposed development consists of an electricity sub-station.

Flood Zones

- 2.13 The Flood Zones are shown on **Figure 2.1** below which shows the site to be in Flood Zone 3.

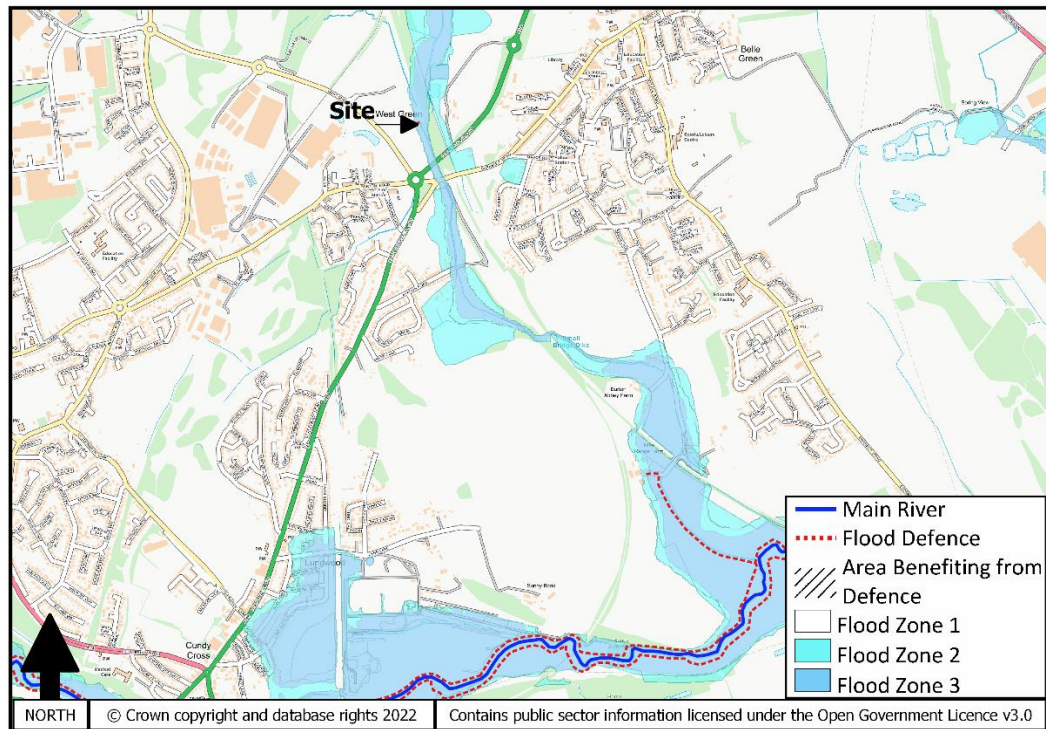


Figure 2.1 Flood Zones

Development Vulnerability

- 2.14 Electricity sub-stations are Essential Infrastructure.

Exception Test

- 2.15 A FRA is required to ensure the development will remain safe over its lifetime from all sources of flooding and not increase flood risk elsewhere.

3.0 CLIMATE CHANGE

- 3.1 The NPPF sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change.
- 3.2 As the Government's expert on flood risk on 19th February 2016 the Environment Agency, (EA), published revised climate change allowances to support the NPPF. The sea level rise allowances were revised on the 17th December 2019, the peak river flows revised on the 20th July 2021 and the peak rainfall allowances were revised on 10th May 2022.
- 3.3 The climate change allowances are based on projections and different scenarios of carbon dioxide (CO₂) emissions to the atmosphere and provide predictions of anticipated change for:
- peak river flow and peak rainfall intensity by river Management Catchment;
 - sea level rise;
 - offshore wind speed and extreme wave height.

Peak River Flow Allowances

- 3.4 The peak river flow allowances show the anticipated changes to peak flow by Management Catchment with three allowances; central; higher central and upper end. This proposed development is in the Don & Rother Management Catchment.
- 3.5 The appropriate allowance depends on the Flood Zone and vulnerability classification of the development and for this proposal it is appropriate to use the Higher Central allowance.
- 3.6 The following climate change allowances in peak river flows therefore need to be applied:

DON & ROTHER	
Allowance Category	Percentage Increase
Higher Central	38

Table 3.1 Climate Change Allowances for Peak River Flow

Peak Rainfall Intensity Allowance

- 3.7 Increased rainfall affects river levels and land and urban drainage and should be applied to surface water drainage systems. However, the proposed development does not increase the impermeable area enough for these allowances to apply.

Sea Level Allowances

- 3.8 There is a range of allowances for each region and epoch or time frame for sea level rise. However, this site is not affected from tidal sources, see section 4.

4.0 FLOOD RISK SOURCES

- 4.1 The following flood risk sources have been identified and where mitigation is required to reduce the flood risk this is discussed in **Section 5**.

Fluvial

Main River

- 4.2 The nearest EA Main River to the site is approximately 2.00km to the south.
- 4.3 The flood zones are from the adjacent ordinary watercourse and therefore flood levels are not available.

Ordinary Watercourses

- 4.4 The site does not lie within any Internal Drainage Board District.
- 4.5 The risk of flooding from fluvial sources is high.

Tidal

- 4.6 The site is not at risk from tidal sources.

Pluvial

- 4.7 The EA have produced maps showing flooding when rainwater lies or flows over the ground. The surface water flooding extents are shown below in **Figure 4.1**. Unlike the fluvial mapping, which is based on a detailed hydraulic model, this mapping is based purely on applying rainfall to a digital terrain model. As such this mapping serves to represent a worst-case scenario which may well overstate the actual probability of flooding in this area.
- 4.8 There is a caveat, as to the use of these maps and that they are not to be used to identify that an individual property will flood. Because of the way they have been produced and the fact that they are indicative these maps are not appropriate to act as the sole evidence for any specific planning or regulatory decision or assessment of risk in relation to flooding at any scale without further supporting studies or evidence.

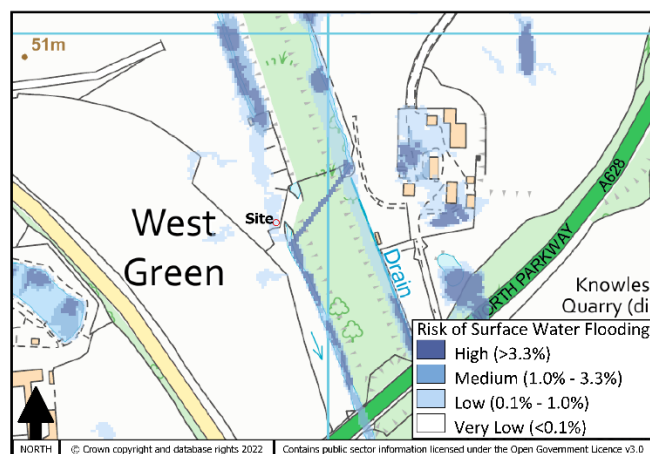


Figure 4.1 Surface Water Flooding Extents

- 4.9 The risk of flooding from pluvial sources is low with potential flood depths of 150mm to 300mm.

Groundwater

- 4.10 The site is located on a moderately productive aquifer and there are no known instances of groundwater flooding in the area.
- 4.11 The risk of flooding from groundwater is low.

Sewers

- 4.12 Public maintained are unlikely to pose a significant flood risk as they are well maintained.
- 4.13 The risk of flooding from existing sewers is low.

Reservoirs

- 4.14 The EA has prepared reservoir failure flood risk mapping to show the largest area that might be flooded if a reservoir were to fail and release the water it holds. The mapping displays two scenarios as follows:
- Dry this is the extent when the river levels are normal,
 - Wet this is the extent when there is also flooding from rivers.
- 4.15 The site is not at risk of flooding from reservoirs.

Canals and Artificial Water Bodies

- 4.16 The site is not at risk of flooding from canals.

5.0 MITIGATION

- 5.1 Section 4.0 has identified the sources of flooding which could potentially pose a risk to the site and the proposed development. This section of the FRA sets out the mitigation measures which are to be incorporated within the proposed development to address and reduce the risk of flooding to within acceptable levels.

Site Layout

- 5.2 The proposed development is at a high risk of flooding from fluvial sources.
- 5.3 Flood levels are not available for the site and therefore the base of the substation will be raised a minimum of 600mm above the existing ground level to a level of 41.60m AOD.

6.0 CONCLUSIONS


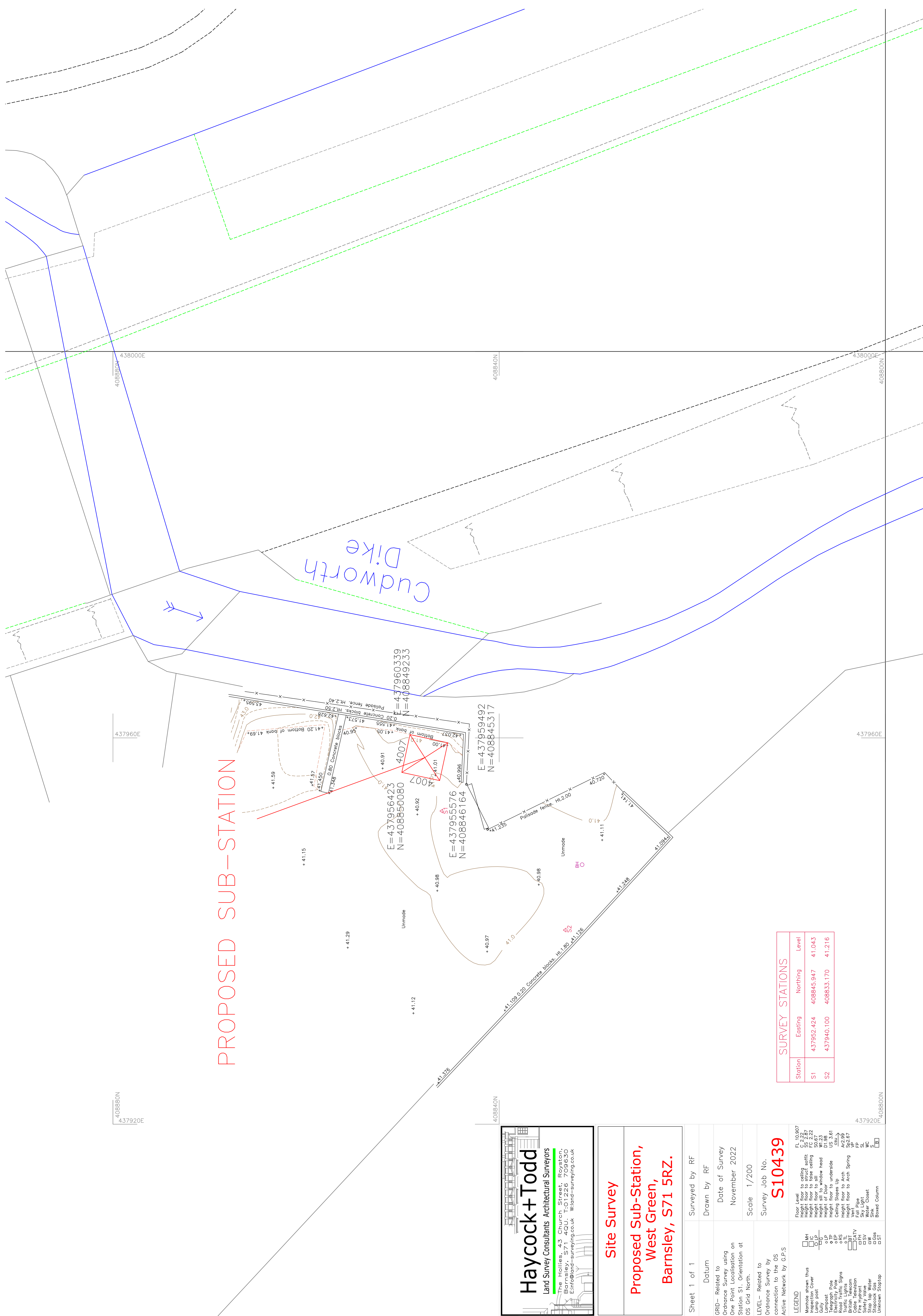
- 6.1 This FRA is compliant with the requirements set out in the NPPF and the associated online Planning Practice Guidance.
- 6.2 The FRA has been produced on behalf of Mr E Lidster.
- 6.3 This report demonstrates that the proposed development is not at significant flood risk, and will not increase flood risk to others, subject to the recommended flood mitigation strategies being implemented.
- 6.4 The identified risks and mitigation measures are summarised below;

Flood Risk Source	Level of Risk Without Mitigation	Proposed Mitigation
Fluvial	High	Base of sub-station at minimum 41.60m AOD
Pluvial Groundwater Sewers	Low	
Tidal Reservoir Canal/Artificial	None	

Table 6.1 Summary of Risk and Mitigation

Appendix 1

Topographic Survey



Haycock+Todd

Land Survey Consultants Architectural Surveyors

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Site Survey

Proposed Sub-Station,
West Green,
Barnsley, S71 5RZ.

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