FLOOD RISK ASSESSMENT
FOR RESIDENTIAL DEVELOPMENT AT
STOCKWELL GATE, WHAPLODE

FINAL REPORT

ECL0705/ANDREW M WRIGHT LTD

DATE FEBRUARY 2022

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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 and Exception 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 – Topographic Survey

ATTACHMENT 2 – Indicative Site Plan (Dwg 022103 PD02 D1)

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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 Mr J Welch in respect of a development that consists of 42 residential dwellings at Stockwell Gate, Whaplode.

A planning application for the proposed development is to be submitted by Andrew M Wright Ltd.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is on Stockwell Gate, Whaplode, Lincolnshire, PE12 6UE. The National Grid Reference of the site is 53325/32466.

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 eastern side of Stockwell Gate The site consists of agricultural land and a series of agricultural buildings close to the southern boundary of the site. The area of development is approximately 1.8 hectares.

A topographic survey of the site has been undertaken and is provided in Attachment 1. The agricultural land that forms the majority of the site is typically between +3.0m OD and +3.2m OD. The northern boundary of the site is the lowest part of the site. The southern part of the site in the area around the agricultural buildings is typically between +3.2m OD and +3.4m OD.

The site is in the South Holland Internal Drainage Board (IDB) District. Surface water at the site naturally drains through soakaway and hence to the IDB drain system. The Whaplode River, an IDB High Priority Watercourse, forms the eastern boundary of the site and there is an IDB High Priority Watercourse on the southern part of the western boundary.

The online British Geological Survey maps indicate that the site is likely to be underlain by West Walton Formation Mudstone and Siltstone. The bedrock is shown to be overlain with superficial deposits of clay and silt.

2.3 Proposed Development

The proposed development consists of 42 residential dwelling. The dwellings will be two storey except five dwellings close to the southern boundary that will be bungalows. Details of the proposed development are 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

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.

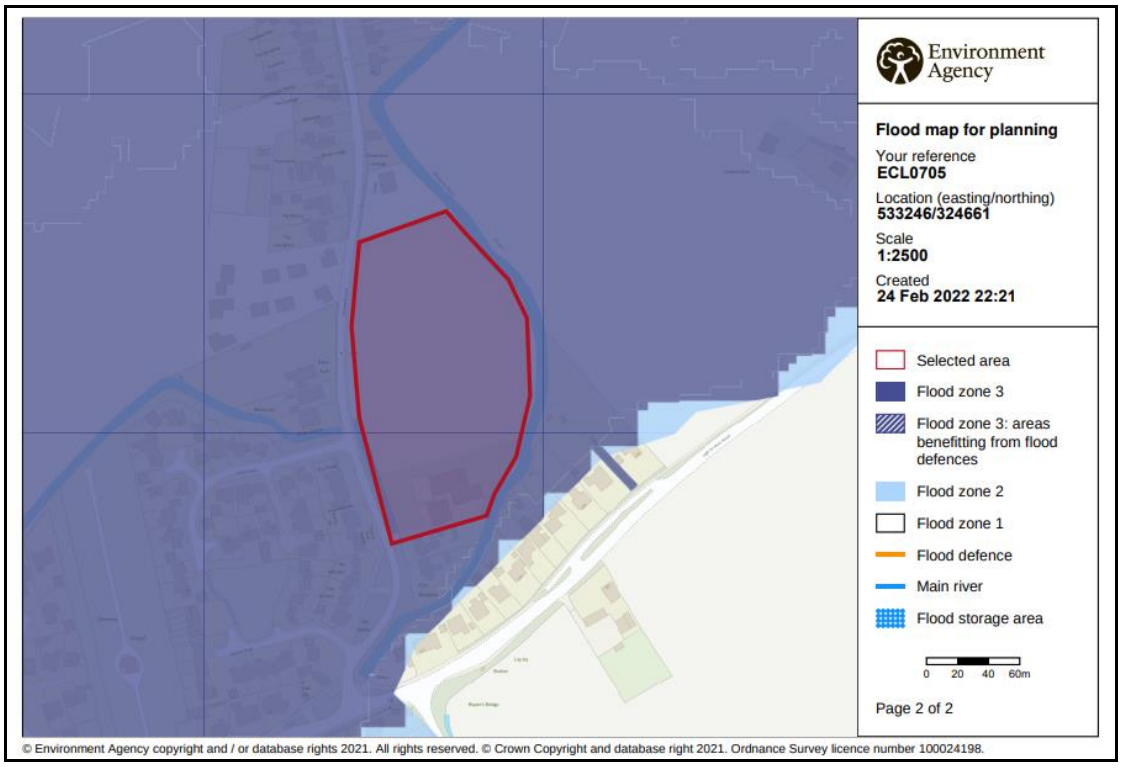


Figure 2 – Environment Agency Flood Map for Planning

The Environment Agency Long Term Flood Risk maps show that:

- the site is within an area with a very low risk of flooding from rivers or the sea (annual probability less than 0.1%);
- the northern part of the site is at risk of surface water flooding with on area having a high risk (annual probability greater than 3.3%); and
- the site is not 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	The site is outside the 'Low Hazard' area	The site is in the Low Hazard' area
Residual Peak Depth Map for the 1% fluvial and 0.5% tidal event	The site is outside the area at risk of flooding.	The flood depth at the site is between 0.0m - 0.25m.

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.

Large parts of the South Holland district between the River Welland and River Nene lie within Flood Zone 3. As such, opportunities to undertake the development at an alternative site with a lower flood risk are limited.

The SFRA states that as it is necessary to use the refined flood risk information (hazard and depth maps) to assist with the application of the sequential test. The refined flood risk information contained within the SFRA demonstrates the site is not at risk during the present day 1% fluvial and 0.5% tidal event. The site therefore has a low probability of flooding and 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 and the provision of rural housing is a benefit.

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 South Holland IDB district is protected by the Wash tidal defences along the Holbeach Marsh frontage with embankment levels at a minimum of +7.0m OD. The Wash tidal defences are 12km from the site.

The River Welland tidal defences are approximately 6.4km to the north west of the site. The tidal defences between Spalding and Fossdyke also have minimum embankment levels of +7.0m OD.

Both defences are the responsibility of the Environment Agency. 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 South Holland IDB. There is an IDB High Priority Watercourse, the Whaplode River, on the eastern boundary of the site. The site and surrounding land are within the Holbeach River catchment and drains in a northerly direction to discharge to the tidal River Welland at the Holbeach River Outfall Sluice.

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 South Holland 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:

- surface water flooding;
- local blockages to the IDB drainage system;
- an event in the local drainage network that exceeds the standard of protection;
- failure of Holbeach River Outfall Sluice; and
- overtopping and breaching of the Wash or River Welland tidal defences.

4.3 Probability of Flooding

During the 1% annual probability surface water event an area in the north of the site is at risk of flooding to a depth below 0.3m.

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

The standard of drainage provided by South Holland 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 South Holland IDB high priority watercourses incorporating a freeboard. This provides storage during events greater than 2% annual probability (1 in 50 chance each year).

The site is within an area benefitting from defences. The flood embankments to the Wash and the River Welland tidal defences provide protection during a 0.5% annual probability (1 in 200 chance each year) event. The flood risk from the Wash is lowered further by second line defences and various informal banks constructed during the reclamation of Holbeach Marsh.

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 tide levels.

The flood level in the River Welland at Fossdyke during the 0.5% annual probability (1 in 200 chance each year) event inclusive of climate change to 2069 is estimated to be 6.41m AOD. The minimum defence level of the River Welland embankments is 7.0m AOD.

In summary the site is not at risk for the design life of the development (i.e., 100 years).

4.6 Residual Risk

The South East Lincolnshire SFRA includes maps demonstrating the impact of climate change in 2116. The Residual Peak Depth maps within the SFRA indicate the maximum flood depths associated with a breach of the tidal defences. 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 peak flood depth at the site is between 0.0m and 0.25m. An extract from this map is provided in Figure 3.

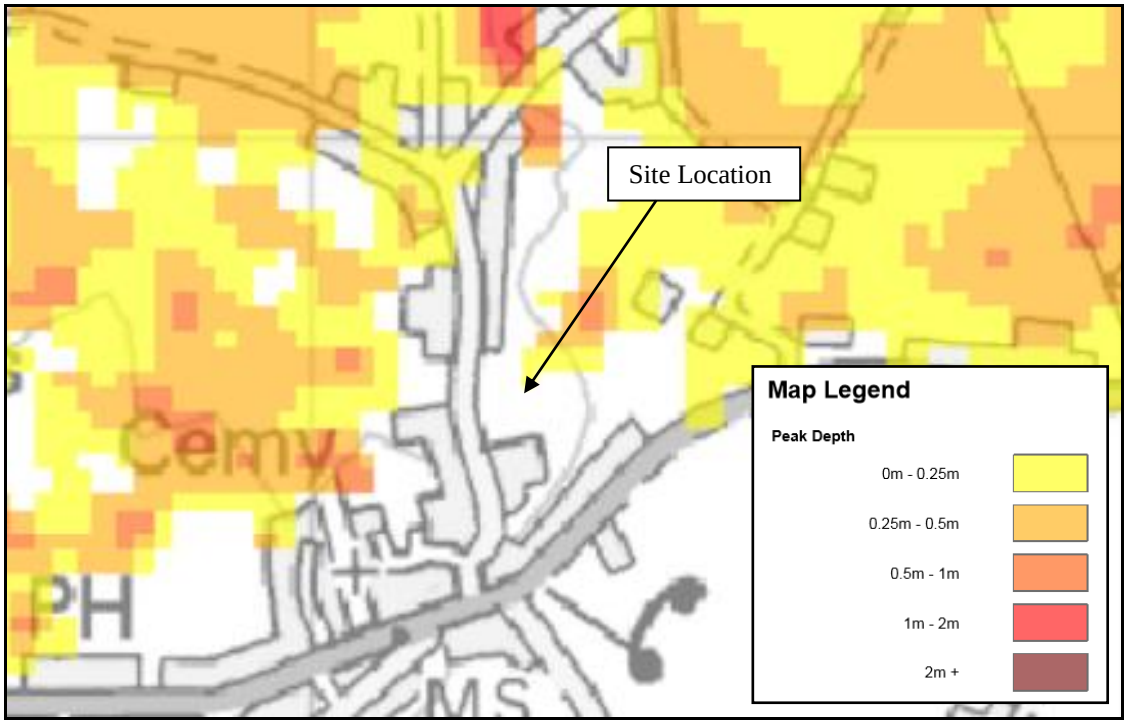


Figure 3 – SFRA 2115 Residual Peak Depth Map during the 1% fluvial and 0.5% tidal Annual Probability Event

The proposed development includes single storey dwellings and therefore the finished floor level of these dwellings needs to consider the 0.1% annual probability (1 in 1000 chance each year) event in 2115. The South East Lincolnshire SFRA includes 0.1% annual probability (1 in 1000 chance each year) maps for specific locations but theses do not cover the site. Through a comparison of flood depths during the 1% and 0.1% annual probability events for 2115 for the areas that the maps cover it can be estimated that the flood depths are 0.1m higher for the more extreme event.

The single storey dwellings are proposed in the southern part of the site where ground levels are generally higher. As such it is not anticipated that the peak flood depth in this part of the site during the 0.1% annual probability (1 in 1000 chance each year) event in 2115 would be greater than 0.25m.

5.0 FLOOD RISK MITIGATION

5.1 Summary of Risks

The site is at risk of surface water flooding with flood depths up to 0.3m. The probability of this development flooding from localised drainage systems is low. Failure of Holbeach River Outfall Sluice 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 0.5% annual probability (1 in 200 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 from overtopping of the defences.

The SFRA considers the residual risk associated with a breach in the defences. From the maps the flood depth during the 0.5% annual probability (1 in 200 chance each year) tidal event is between 0.0m and 0.25m. During the 0.1% annual probability (1 in 1000 chance each year) tidal event the maximum flood depth in the area of the proposed single story dwellings is estimated to not be greater than 0.25m.

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

The site has a low 'actual risk' of flooding. Based upon the information available during the preparation of this flood risk assessment, it is recommended that the floor level of the dwellings is 0.3m above typical ground level and there is 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 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.

During an exceedance event it is anticipated that sufficient time would be available to take precautionary actions to limit the potential impact of flooding.

Should there be a failure of Holbeach River Outfall Sluice 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.

A surface water drainage strategy has been prepared to support the proposed development. Surface water within the site will be 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 42 residential dwellings that will include five single storey dwellings at Stockwell Gate, Whaplode.

- The proposed development is in Flood Zone 3. The site is protected during the 1% annual probability (1 in 100 chance each year) fluvial event and 0.5% annual probability (1 in 200 chance each year) tidal event including climate change by the Wash tidal defences and River Welland tidal defences.

- 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 South Holland IDB Watercourses incorporating a significant freeboard. This provides storage during events greater than 2% annual probability (1 in 50 chance each year).

- There is a residual risk associated with a breach of the defences with depths up to 0.25m.

- It is recommended that the finished floor levels of the dwellings are 0.3m above typical ground level and that there is 0.3m of flood resilient construction above finished floor level.

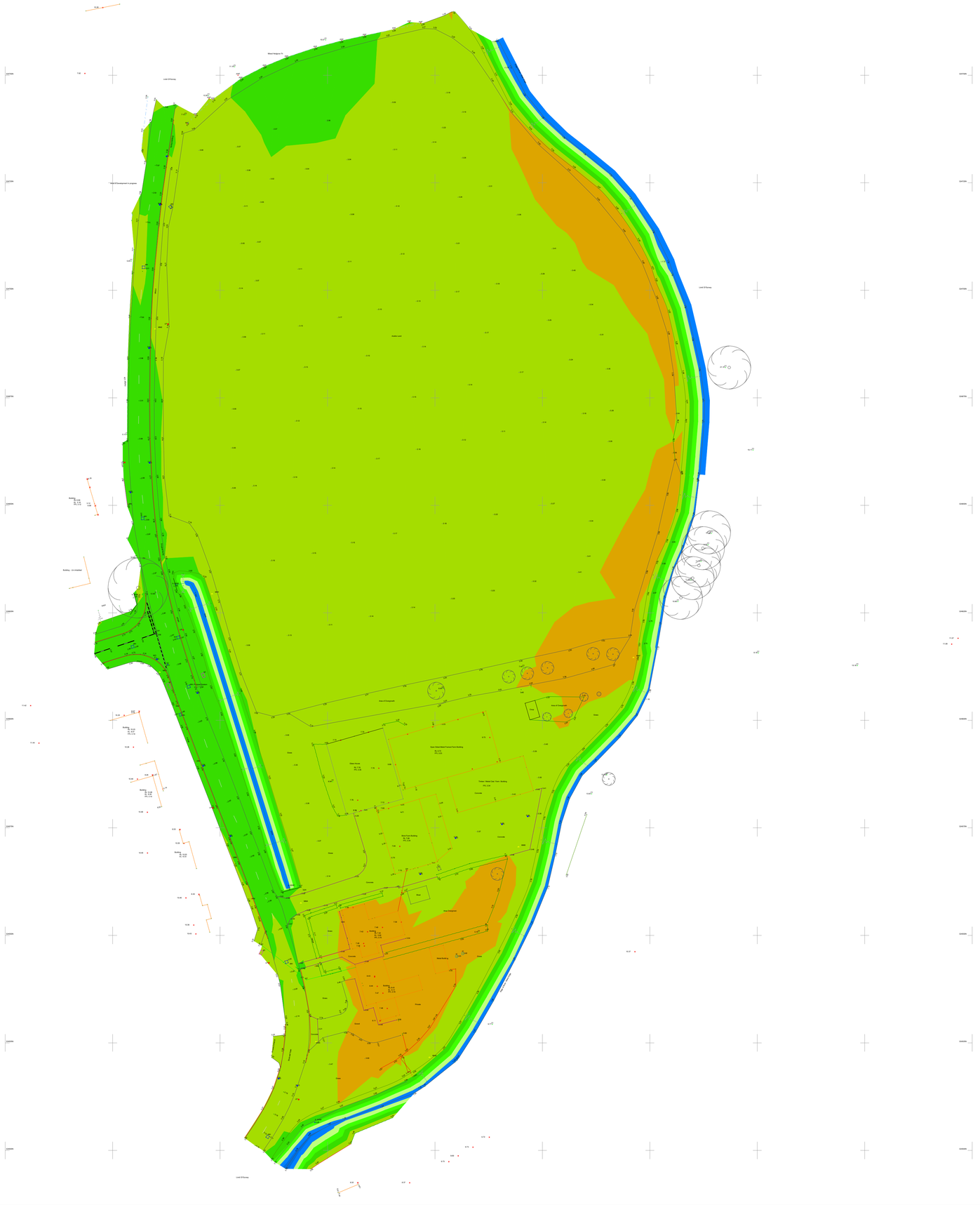
- The development passes the Sequential Test and Exception Test and is therefore suitable for the proposed location.

ATTACHMENT 1

TOPOGRAPHIC SURVEY

N

NORTH



Notes :Legends

Height ranges Above Ordnance Datum

5.0
4.5
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-1.0

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 off Stockwell Gate , Whaplode and the existing highway.Survey Carried out 7th May 2021

Station	Easting	Northing	Level
MM1	533198.123	324629.428	3.140
MM2	533184.885	324691.028	3.040
MM3	533185.955	324611.211	2.913
MM4	533218.788	324557.538	3.075
MM5	533222.302	324525.267	3.236
MM6	533248.724	324521.649	3.523
MM7	533296.180	324614.614	3.832
MM8	533269.428	324570.593	3.443

SURVEY GRID AND LEVEL DATUM

Ordnance Survey (OS) national grid coordinates have been established for survey control point MM1 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 MM1

Revision	Details	Date
A	Topographical Survey	07.05.21

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:

Mr Welch
Stockwell Gate
Whaplode

Project Title:

Land Off Stockwell Gate

Drawing Title:

Height Band Survey above Ordnance Datum of Land off Stockwell Gate
2d

Scale:	Sheet Size:	Drawn:	Date:
1:500	A1	M.M	10.05.21

Drawing Number:	Revision:
16170388-WELCH-STWG-HB-TOPO	A

ATTACHMENT 2

INDICATIVE SITE PLAN
(DWG 022103 PD02 D1)



All dimensions to be verified on site by Main Contractor before the start of any shop drawings or work whatsoever either on their own behalf or that of sub-contractors.

Report any discrepancies to the Contract Administrator at once.

This drawing is to be read with all relevant Architect's and Engineer's drawings and other relevant information.

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LEGEND: DO NOT SCALE

- Potential affordable dwellings (first homes, shared ownership or rented)
- 3 no. bungalows (2 bed) (with single garage)
- 2 no. houses (1 bed)
- 2 no. bungalows (3 bed) (with single garage)
- 10 no. houses (2 bed)
- 5 no. houses (2 bed)
- 4 no. houses (4 bed) (with double garage)
- 12 no. houses (3 bed) (with single garage)
- 4 no. houses (3 bed)
- Public open space
- RCP Refuse collection point

N

Note: This site plan forms part of an outline planning application (with all matters reserved). As such, the layout and dwellings shown are indicative only in order to demonstrate what might be possible on the application site.

DRAFT

Revision:	Date:	Description:	Drw:	Chk:
D1	13.01.22	Draft Issue -	AMW	AMW

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Drawing Title:
Indicative Site Plan

Client:
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Drawn:	Checked:	Date:	Scale:	Paper Size:
AMW	AMW	13.01.22	1:500	A2

Job No.:	Dwg No.:	Stage:	Revision:
022103	PD02	Planning	D1