Keigar Homes Ltd

Proposed Residential Development
Phase 2
Off Ferry Lane East
Barrow
North Lincolnshire

Flood Risk Assessment
Prepared by EWE Associates Ltd
Draft Rev0 April 2021

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CLIENT DETAILS

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CONTRACT

This report describes work commissioned by Keigar Homes Ltd following instruction by their representative during April 2021. Keigar Homes Ltd representative for the contract was Mr Mark Snowden. Lea Favill of EWE Associates Ltd carried out the work.

Date: 21st April 2021

Prepared by: …… [redacted] …… Lea Favill
Director

REVISION HISTORY

Draft Report Rev0 issued 21st April 2021
- 1No copy issued to Mr Mark Snowden (Keigar Homes Ltd)

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APPENDICES:

LIST OF TABLES

1. INTRODUCTION

Terms of Reference

This report was commissioned by Keigar Homes Ltd to support a planning application for the construction of a residential development within an agricultural area to the north of Ferry Lane East in Barrow. The site is located to the north of Ferry Lane East and to the north west of the centre of Barrow. The site is located to the north of the Phase 1 part of the development which included 9 residential units. The location of the site is shown on Table 2-1.

The development site lies within Zone 1 of the Environment Agency Flood Map (version 2.8.2), being the zone with risk of 1 in 1,000 year (0.1% Annual Exceedance Probability) or less for river and tidal/coastal flooding. The development site is within an existing developed area and is less than 1 hectare.

It is usual for the Agency to raise an objection to development applications within the floodplain or Zone 2 or 3 of the flood map until the question of flood risk has been properly evaluated. The Agency will also object to developments where the total site area is in excess of 1 hectare until suitable consideration has been given to surface water runoff.

Approach to the Assessment

As there is a single source of flood risk – onsite surface water runoff – it is necessary to determine flood water levels at the site for the desired return periods emanating from this source. Consideration has also been given to the site flooding from either overland flow or ponding of localised rainfall within the site.

The closest tidal watercourse is the River Humber/Barrow Haven which is 1km to the north of the site. The site is above the extreme tidal flood level within the River Humber/Barrow Haven. It is therefore concluded that the River Humber/Barrow Haven represents a low flood risk to the site.

The closest main river fluvial watercourse is the Beck which is at least 450m to the north of the site. The site is above the extreme flood level within the watercourse. It is therefore concluded that the Beck represents a low flood risk to the site.

There is an ordinary fluvial watercourse approximately 150m north of the site. The site is above the extreme flood level within the watercourse. It is therefore concluded that the ordinary watercourse represents a low flood risk to the site.

The proposed development will increase the paved and roofed area within the site. There are no roofed or paved areas within the site supported by formalised drainage. The existing method of draining the site will be appraised. EWE Associates Ltd have undertaken a drainage feasibility study for the proposed development.

A walk over of the site was conducted by Mr Lea Favill, a senior river engineer during April 2021; during the visit a photograph survey of the site was undertaken. There is no topographical survey available for the site.

Application of Sequential & Exceptions Test

The development site lies partly within Zone 1 of the Environment Agency Flood Map (version 2.8.2), being the zone with risk of 1 in 1,000 year (0.1% AEP) or less for river and tidal/coastal flooding. The proposed development is residential, as such considered to be more vulnerable.

Table 1-1: Flood Risk Vulnerability and Flood Zone 'Compatibility'

Flood Risk Vulnerability classification		Essential Infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	**Exception Test required**	✓
	Zone 3b	Exception Test required	✓	×	×	×

✓ Development is appropriate

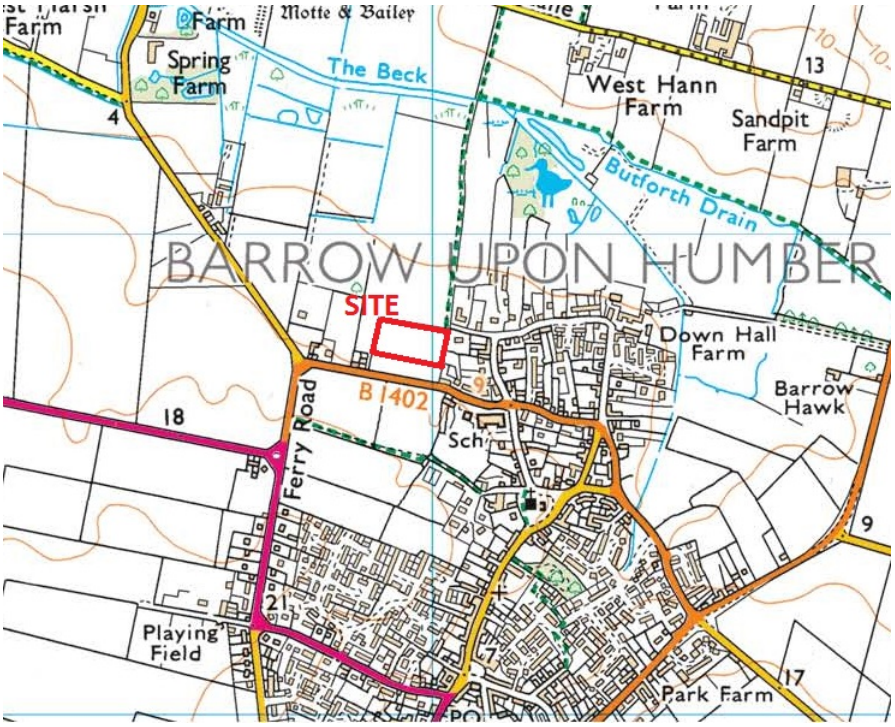
× Development should not be permitted

It is considered therefore, that a sequential test and exceptions test will not be required for this development project.

2. DETAILS OF THE SITE

Site Location

Table 2-1: Location Plan



Site Details

Table 2-2: Site Details

Site Name	Phase 2 Land off Ferry Lane East Barrow
Existing Land Use	Agricultural Land
Proposed Development	Residential
Grid Reference	TA 06949 21724
County	North Lincolnshire
Local Planning Authority	North Lincolnshire Council
Internal Drainage Board	North East Lindsey Internal Drainage Board
Others	Not Applicable
Post Code	DN19 7AZ

Site Description

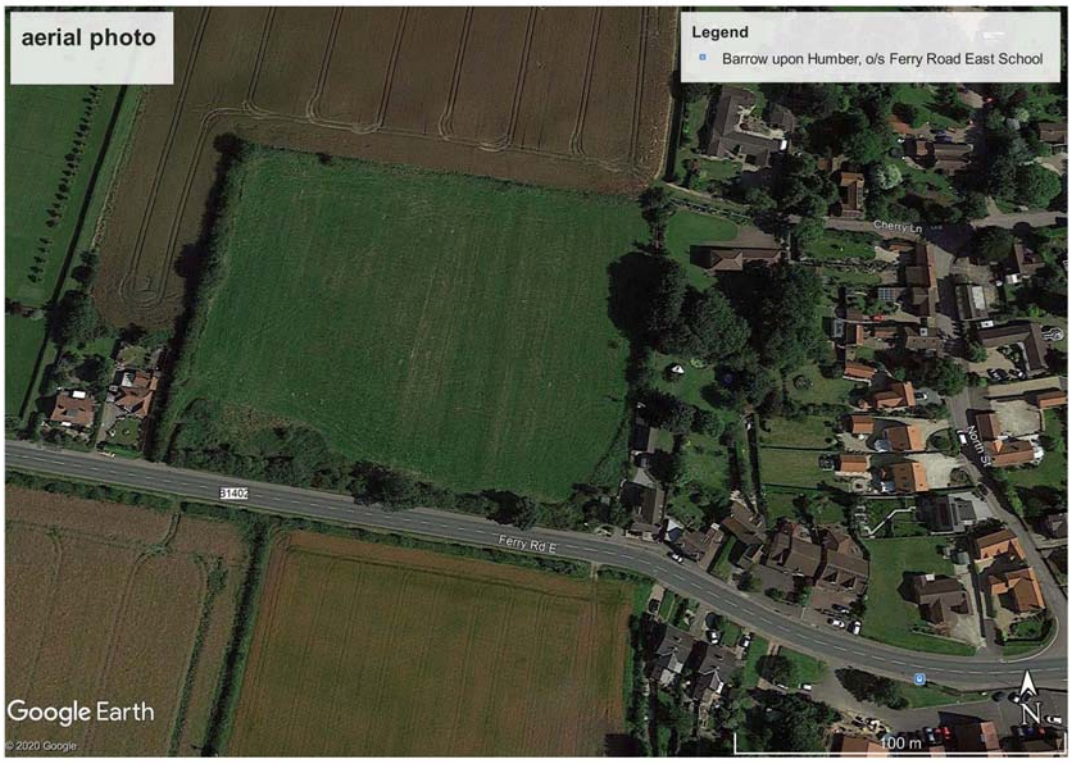
The proposed development site is currently agricultural land. There are no existing buildings or paved areas within the site which are formally drained. An aerial photograph of the existing site is provided below.

The total site covers an area of 11400m² (1.140 hectares). The land within the site boundary based on google earth lies at a level of between 6.4mOD at the north east corner up to 8.5mOD within the southern boundary of the site.

The site is located to the north west of the village centre of Barrow. There is existing residential development to the east and west of the proposed development site.

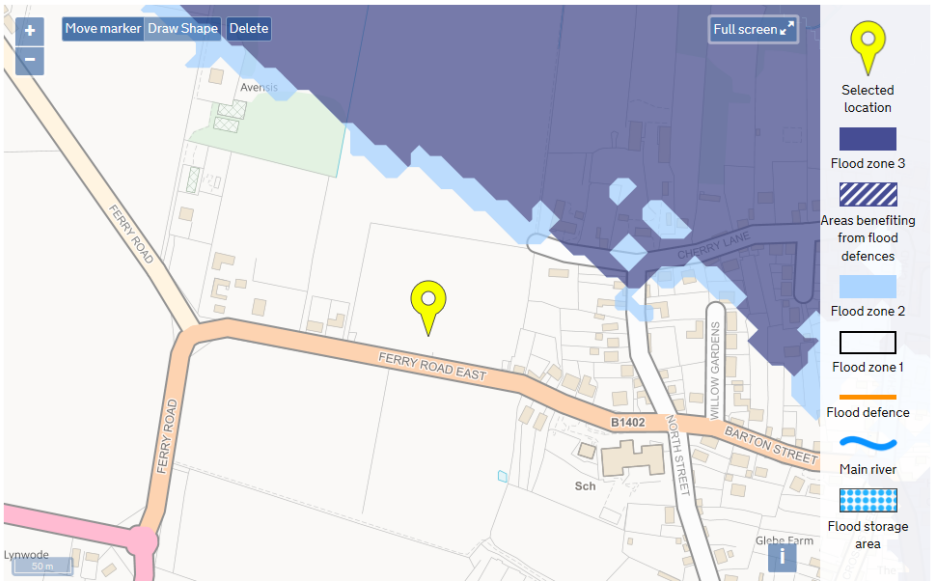
The proposal is to provide a residential development which includes residential dwellings, private drives and access road. The impermeable area within the proposed development site has been estimated at 4512m² (0.451 hectares) and includes roofed areas, driveways and access road. The proposed masterplan is provided at Appendix A of this report.

Site Photographs



3. INITIAL ASSESSMENT

Environment Agency Flood Map



Environment Agency Reservoir Flood Map

Extent of flooding from reservoirs

Maximum extent of flooding Location you selected

Environment Agency Surface Water Flood Map

Extent of flooding from surface water

High Medium Low Very low Location you selected

Past Flooding History

A search on the British Hydrological Society Chronology of British Hydrological Events website[1] found no records of past flooding within the Barrow area close to the site.

Undertaking an internet-based search for flooding in the area provided no further information.

SFRA Flooding History

The SFRA contained no references to the site being flooded.

Environment Agency Flooding History

The Environment Agency provided no further information.

Environment Agency Reservoir Flood Risk

The Environment Agency reservoir risk map shows that the site and Barrow are not located in an area which could be affected by a reservoir failure. As such the probability of a flooding is extremely low.

1 http://www.dundee.ac.uk/geography/cbhe/

Environment Agency Surface Water Flood Risk

The Environment Agency surface water risk map that the site is within a very low risk area. There is some shallow ponding within Ferry Lane East to the south of the site.

Overland Flow & Ponding

There is higher ground to the south which is likely to infiltrate into the subsoils. Any excessive runoff will be initially intercepted by the highway drainage within Ferry Lane East. Consequently, no further consideration will be given to this mechanism.

There are no depressed areas within the site which could encourage ponding, therefore, this flood mechanism has not been considered further.

Groundwater Flooding

Information on groundwater flooding is limited within the area. The SFRA makes no comment regards the potential for ground water flooding in the district. In addition, reference to the Groundwater Vulnerability Map and Source Protection Zones produced by the Environment Agency indicate that the district is underlain by an aquifer. The aquifer is at least 15m below the level of the site. As such, risk from ground water flooding is considered to be low.

Sewer Flooding

Anglian Water is the statutory water undertaker and is responsible for the public sewer systems within the Barrow area. Anglian Water maintains a register of historical sewer flooding events (DG5 Register) within the area. There are no reported incidents close to the site. The SFRA provided no further information.

There are 150mm diameter foul sewers located within Chestnut Rise and Millfields Way to the east of the site. As such, risk from sewer flooding is considered to be low.

Possible Flooding Mechanisms

As there is a single source of flood risk – onsite runoff– it is necessary to determine flood water levels at the site for the desired return periods emanating from this source.

The proposed development will increase the impermeable area within the site; as such, consideration will need to be given to the existing drainage route and the drainage characteristics in order to evaluate the impact that surface water runoff from the site will have on the site and elsewhere.

4. FLOOD RISK ASSESSMENT

Requirements of the Environment Agency

The Environment Agency, as part of its development control procedures, generally require finished floor levels to be set above the 1% AEP plus climate change flood water level at the site. The development is residential in nature, as such, it is considered that access and egress from the development site will be essential during times of extreme floods.

Increase in Surface Water Runoff due to Development

Existing Drainage

The existing site is approximately 11400m² in area and is agricultural land that doesn't appear to be supported by any formalised drainage. There are no buildings or paved areas within the site.

There are no open or culverted watercourse close to the site. There are no surface water or combined sewer within close proximity of the site either.

Soil permeability test have been performed on the adjacent Phase 1 development. The site is underlain with chalk which will allow a reasonable infiltration of approximately 5.5l/s via a single 140mm diameter borehole.

Discharge to Infiltration System

An initial strategy has been developed which is shown at Appendix C of this report. The proposal includes roofed and paved areas which total an area of 4512m². Table 4-1 below shows how the individual areas are likely to be drained.

Table 4-1: Proposed Infiltration Devices

Area	Catchment Area	SUDs Device
Roof drainage	2293m²	Crate Soakaways
Private Drives	974m²	Permeable Paving
Access Road	1245m²	Lined Soakaway
	4512m²	

Following completion of site investigation works the drainage strategy will be modified and sized to suit.

5. MITIGATION MEASURES

Raising Floor Levels/Land Raising

The flood risk from tidal, fluvial, and ordinary watercourses is considered to be very low. Ground floor levels should be elevated a minimum of 150mm above the external ground level to reduce risk of localised flooding.

Emergency Access & Egress

It is considered that dry access and egress will be available at all times from the development.

Control of Runoff

Consideration has been given to the hierarchy for surface water disposal which recommends the SUDs approach which includes infiltration as the first tier. At this stage it is considered that infiltration drainage is a practical solution for the site as the site is underlain by chalk with reasonable infiltration.

It is considered that following the development there will be an increase in impermeable area and subsequently runoff from the site will also be increased to approximately 4512m² (0.451 hectares).

It is recommended that during the detailed phase of the development the following items are considered.

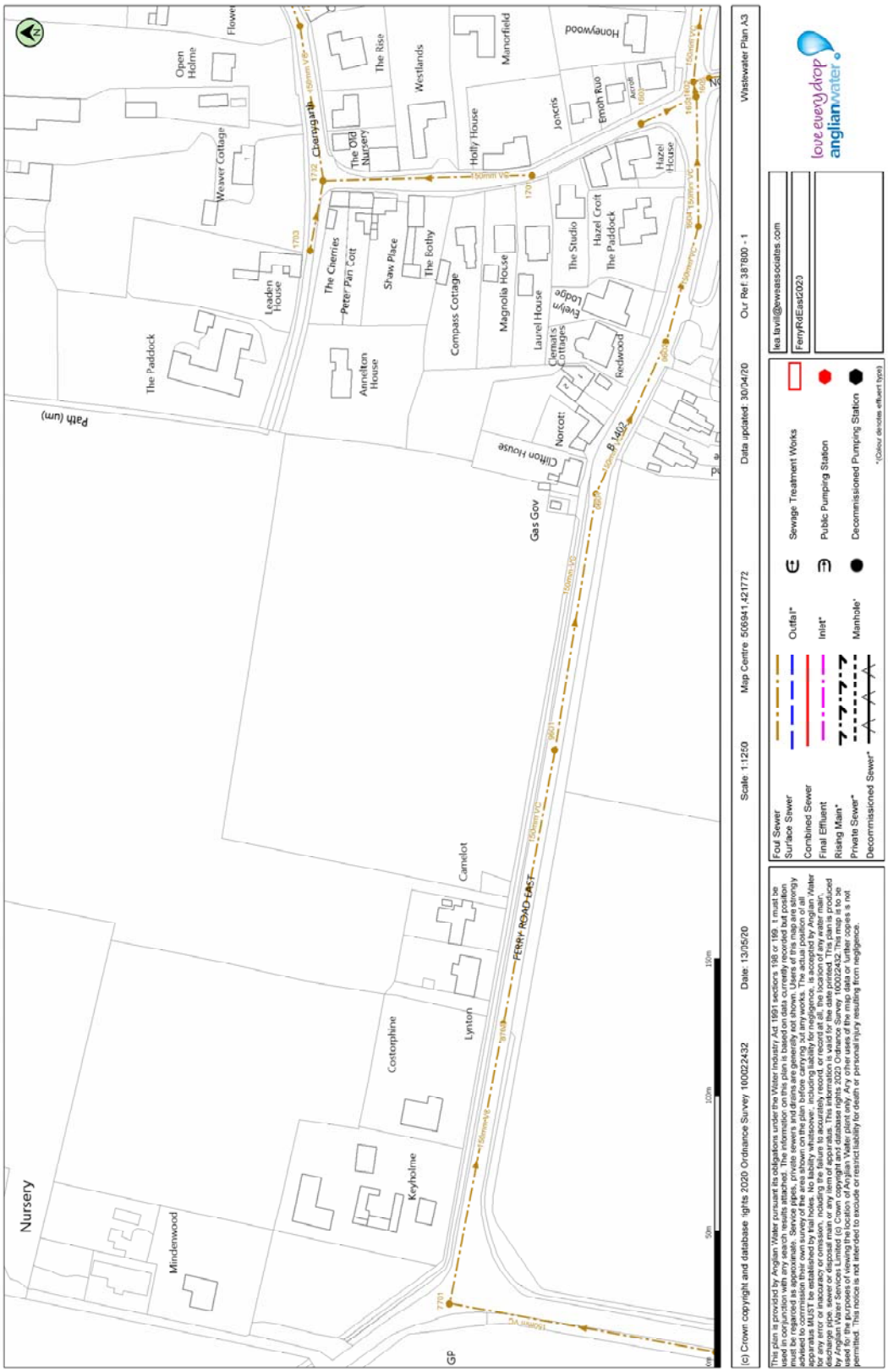
- Undertake SUDs drainage strategy for whole of development site.
- The proposed surface water drainage system should be modelled using Micro Drainage WinDes or similar. The model should be used to analyse the possibility that the design for surface water may fail or becomes blocked and as such should design a backup plan. Overland floodwater should be routed away from vulnerable areas. Acceptable depths and rates of flow are contained in EA and Defra document FD2320/TR2 “Flood Risk Assessment Guidance for New Development Phase 2”.
- The maintenance and adoption regimes for all elements of the development should be considered for the lifetime of the development.

6. CONCLUSION

It is concluded that there is a low risk of flooding from tidal and fluvial sources. A full drainage design will be required during the next stage of the development.

Appendix A: - Masterplan

Appendix B: - Sewer Plan



Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0601	F	9.11	7.39	1.72
0602	F	8.34	6.74	1.6
1601	F	7.34	5.75	1.59
1602	F	7.25	5.69	1.56
1603	F	7.26	5.88	1.38
1604	F	-	-	-
1605	F	7.33	-	-
1701	F	6.39	4.83	1.56
1702	F	5.55	4.17	1.38
1703	F	5.55	4.36	1.19
1704	F	5.28	3.94	1.34
6601	F	15.25	13.72	1.53
7701	F	11.48	10.13	1.35
8701	F	11.02	9.04	1.98
9601	F	9.93	8.22	1.71

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Our Ref: 387800 - 1

Appendix C: - Drainage Strategy Plan