ABINGTON
CONSULTING ENGINEERS
CHARTERED CIVIL ENGINEERS

FLOOD RISK ASSESSMENT

FOR PROPOSED

HOLIDAY LODGE DEVELOPMENT

AT

LAND TO REAR OF ELDER HOUSE

ANDERBY ROAD

CHAPEL ST LEONARD

LINCOLNSHIRE

7th June 2023
First Issue

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Contents

Revisions

Rev.	Date	Description
-	7/6/23	First Issue.

1.0 Introduction

1.1 This Flood Risk Assessment has been produced in support a planning application for a proposed holiday lodge development (36 lodges) at land to the rear of Elder House, Anderby Road, Chapel St Leonards.

2.0 Planning Policy & Methodology

2.1 Planning policy for flood risk is set out in the National Planning Policy Framework (NPPF) updated in July 2021 and the National Planning Policy Guidance published in February 2014. The policy document sets out key planning objectives in relation to land usage and flood risk management. The development proposals are designed to be compliant with the requirements of the National Planning Policy Framework.

2.2 A Flood Risk Assessment has been carried out to assess the effects of flooding on the development and how the development might affect flood risk elsewhere.

2.3 A drainage strategy has been developed to demonstrate that the site can be adequately drained and compliance to the SUDS Hierarchy.

3.0 Development Location & Description

3.1 The site is located on the northern outskirts of Chapel St Leonards. To the east is residential development and just beyond this is the North Sea. To the south is a holiday home development and to the north and west are agricultural fields. A location plan is shown below with the site outlined in red.

Location Plan

3.2 The site is currently undeveloped rough ground and measures approximately 1.50 hectares. A topographical survey presented in Appendix 1 shows the site is generally flat and lies at levels between 2.1m and 2.5m AOD. On the eastern boundary is Anderby Road which is at about 4.4m AOD.

3.3 The proposed development will be for the construction of 36 holiday lodges together with access road, private driveways and gardens. A copy of the proposed development layout plan is presented in Appendix 1.

4.0 Potential Sources of Flooding

4.1 The following mechanisms have been identified as potential sources of flooding:

- Fluvial flooding from Willoughby High Drain.
- Fluvial flooding from local open drains
- Flooding from tidal surge in the North Sea.
- Surface water run-off from impermeable areas on the development.
- Surface water run-off from land uphill of the development.
- Possible elevated groundwater levels.

4.2 The public sewer records in Appendix 1 shows there are no public surface water sewers near the site.

4.3 There are no reservoirs, canals or other artificial sources of flooding identified in the immediate vicinity of site which might cause a risk of flooding.

5.0 Appraisal of Sources of Flooding

5.1 General

5.1.1 The Environment Agency provided a package of information to assist with the Flood Risk Assessment and this can be seen in Appendix 2. The flood map shows the site as being in Flood Zone 3 defined as 0.5% (1 in 200) or greater chance of flooding in a year from the sea, and/or a 1% (1 in 100) chance of flooding from a river.

5.1.2 The historical flood map shows the last recorded flooding of the site was in January 1953, although the source of flooding is not mentioned.

5.1.3 The site benefits from the Saltfleet to Gibraltar Point Beach Management Scheme which uses sand banks as sea defences. This is combined with existing hard defences which reduce the risk of tidal flooding along the coastline to a 0.5% (1 in 200) chance of occurring in any one year.

5.2 Flooding from Willoughby High Drain

5.2.1 Willoughby High Drain runs through Chapel St Leonard approximately 800m south of the site. Included in the Environment Agency’s package is flood modelling data for Willoughby High Drain. The levels provided are ‘in channel’ and therefore may not represent the flood levels on the flood plain. A model node location plan shows that the closest node to the site is WILL01_0161.

5.2.2 The modelled fluvial flood levels are presented on Datasheet Re. CCN-2023-310044 in Appendix 2. The following flood levels have been modelled:

- 1.52m AOD for a 1% AEP (1 in 100 year)
- 1.77m AOD for a 0.1% AEP (1 in 1000 year)

As the lowest level on site is approximately 2.10m AOD, no flooding would be experienced on site for these events.

5.3 Fluvial flooding from local open drains

5.3.1 Flooding from local open drains will largely be influenced by the flood levels of Willoughby High Drain or the sea level and will therefore not be the primary source of flooding. Cocking Pit

Drain runs along the western site boundary and this links into Willoughby High Drain further south within Chapel St Leonards.

5.3.2 The Modelled Flood Extents (baseline) map shows no flooding on site from the Cocking Pit Drain for a 0.1% (1 in 1000) flood event.

5.4 Flooding from tidal surge in the North Sea

5.4.1 The East Coast and Wash: Immingham to the West Lighthouse flood model has been used to assess flood risk from the North Sea. Key node points for the model show the site falls between the Boygrift and Gibraltar Point nodes. Modelled tide levels show that Gibraltar Point yields the higher levels and so these have been used in the assessment of flood levels on the development site.

5.4.2 The modelled flood levels for Gibraltar Point, using the 97.5% confidence bound are:

- 5.49m AOD for a 0.5% AEP (1 in 200 year)
- 6.09m AOD for a 0.1% AEP (1 in 1000 year)

As the lowest level on site is approximately 2.10m AOD, if the coastal flood defences were absent, flood depths would be:

- Up to 3.39m for a 0.5% AEP (1 in 200 year)
- Up to 3.99m for a 0.1% AEP (1 in 1000 year)

5.4.3 The coastal defences provide protection for a 0.5% (1 in 200) chance of occurring in any one year. Based on the levels quoted in 5.4.2 above, the likely level of the top level of the defences in the vicinity of the site would be 5.49m AOD. This is confirmed by the levels shown on the topographical survey just to the east of Anderby Road which range from 5.48m to 5.55m AOD in front of the site.

5.4.4 Notes relating to the East Coast and Wash: Immingham to the West Lighthouse flood model state that levels are based on still water levels. Given the site is approximately 100m from the coastline and flooding from the sea would have to cross the sea defences, it is likely that waves would largely dissipate by the time they reach the site in the event of a major flood. However, assuming this is not the case, and the flood defences did not exist, the following wave heights have been calculated using 5% for extreme wave heights and 10% as an extreme wave height sensitivity test:

- Extreme wave height (5%) 5.76m AOD for a 0.5% AEP (1 in 200 year)
- Extreme wave height (5%) 6.39m AOD for a 0.1% AEP (1 in 1000 year)
- Extreme wave height sensitivity test (10%) 6.04m AOD for a 0.5% AEP (1 in 200 year)
- Extreme wave height sensitivity test (10%) 6.70m AOD for a 0.1% AEP (1 in 1000 year)

Relative to the lowest site level of 2.1m AOD, these would result in the following wave heights above the ground:

- Extreme wave height (5%) 3.66m for a 0.5% AEP (1 in 200 year)
- Extreme wave height (5%) 4.29m for a 0.1% AEP (1 in 1000 year)
- Extreme wave height sensitivity test (10%) 3.94m for a 0.5% AEP (1 in 200 year)
- Extreme wave height sensitivity test (10%) 4.60m for a 0.1% AEP (1 in 1000 year)

5.4.5 The Environment Agency have produced mapping for breach and overtopping scenarios of the flood defences at the site. For a 0.5% (1 in 200) annual chance scenario the following risks occur:

- Breach hazard – 2.0 (danger to all)

- Breach depth – 1.6m +
- Breach velocity – 2.5m/s +
- Overtopping hazard – none
- Overtopping depth – none
- Overtopping velocity – none

5.4.6 For a 0.1% (1 in 1000) annual chance scenario the following risks occur:

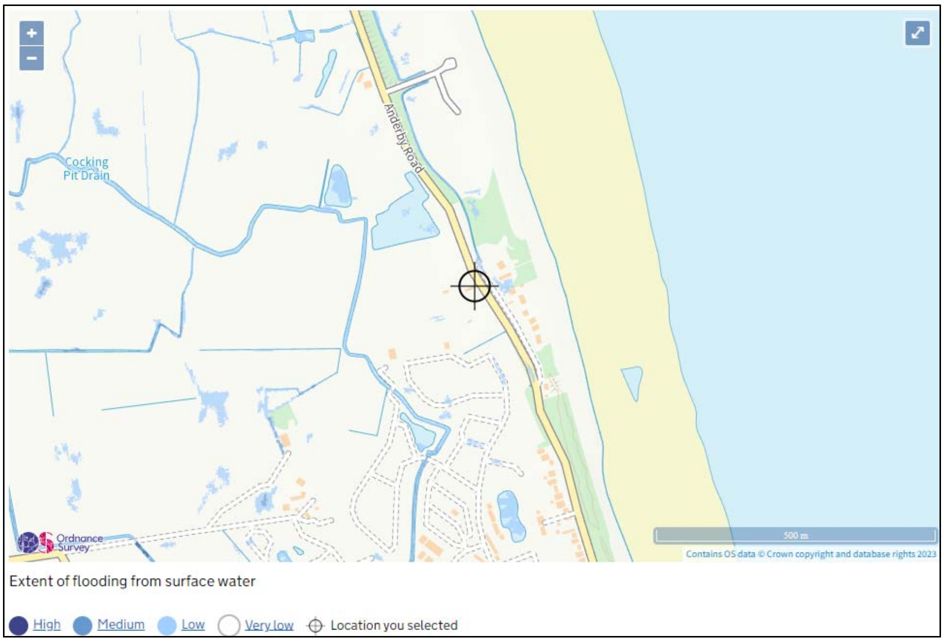
- Breach hazard – 2.0 (danger to all)
- Breach depth – 1.6m +
- Breach velocity – 2.5m/s +
- Overtopping hazard – none
- Overtopping depth – none
- Overtopping velocity – none

5.5 Flooding from surface water run-off from impermeable areas on the development

5.5.1 The site is currently rough ground and therefore exhibits greenfield run-off rates. When the site is developed, this will increase the drained impermeable area resulting in increased run-off. Therefore, the surface water run-off will need to be managed in order to ensure that this does not have a detrimental impact on flooding downstream of the site.

5.6 Flooding from surface water run-off from land uphill of the development

5.6.1 A copy of the Environment Agency's pluvial flood map is presented below.



Environment Agency Pluvial Flood Map

5.6.2 The map shows that there is no risk of pluvial flooding to the site.

5.7 Flooding from elevated groundwater levels

5.7.1 There are no low points on site where elevated groundwater could collect.

6.0 Probability

6.1 The fluvial flood modelling demonstrates that the site is not at risk from a 1 in 1000 year fluvial flood event and therefore it is deemed to be at low risk of fluvial flooding, typically less than 1 in 1000 annual probability.

6.2 The coastal flood modelling demonstrates that the site is not at risk from a 1 in 200 year fluvial flood event and therefore it is deemed to be at medium risk of coastal flooding, typically less than 1 in 200 annual probability.

7.0 Climate Change

7.1 The Environment Agency provides recommended allowances for increase peak rainfall intensity of between 20% and 40% which should be used for any surface water drainage design. The guidance states that a 40% allowance should be made unless it can be proven that using the lower allowance will not lead to additional flood risk. For this development a 40% allowance is recommended.

7.2 The Environment Agency's guidance on climate change allowances for peak river flow recommends using the central allowance for more vulnerable developments. For the Witham Management Catchment this is 21% for a development design life extending into the 2080s.

7.3 Climate change figures used in the Willoughby High Drain model by the Environment Agency are 25%, 35% and 65%. Using 25% as the closest to the recommended 21% above, the following flood levels are obtained:

- 1.73m AOD for a 1% AEP (1 in 100 year) plus 25% climate change
- 1.82m AOD for a 0.1% AEP (1 in 1000 year) plus 25% climate change

As the lowest level on site is approximately 2.10m AOD, no flooding would be experienced on site for these events for a development design life extending into the 2080s.

7.4 The highest flood level calculated in the model is 1.98m AOD which is for a 0.1% AEP (1 in 1000 year) plus 65% climate change. This level of climate change is only likely to occur way beyond a development design life of 100 years and so no flooding is likely to be experienced from fluvial flooding.

7.5 An assessment of the sea level allowances is based on:

- Higher central allowance based on the 70th percentile
- Upper end allowance based on the 95th percentile
- H++ allowance

For the Anglian region, based on a development design life of 100 years, the following allowances are assessed:

- Higher central allowance of 1.20m
- Upper end allowance of 1.6m
- H++ allowance of 1.9m

7.6 The modelled flood levels using the 97.5% confidence bound for a 0.5% AEP (1 in 200 year) event are:

- For the higher central allowance 6.69m AOD
- For the upper end allowance 7.09m AOD
- For the H++ allowance 7.39m AOD

This would result in flood depths of up to:

- For the higher central allowance 4.59m
- For the upper end allowance 4.99m
- For the H++ allowance 5.29m

7.7 The modelled flood levels using the 97.5% confidence bound for a 0.1% AEP (1 in 1000 year) event are:

- For the higher central allowance 7.29m AOD
- For the upper end allowance 7.69m AOD
- For the H++ allowance 7.99m AOD

This would result in flood depths of up to:

- For the higher central allowance 5.19m
- For the upper end allowance 5.59m
- For the H++ allowance 5.89m

7.8 The modelled flood levels using the 97.5% confidence bound for a 0.5% AEP (1 in 200 year) event plus allowance for extreme wave height are:

- For the higher central allowance plus extreme wave height (5%) 6.96m AOD
- For the upper end allowance plus extreme wave height (5%) 7.36m AOD
- For the H++ allowance plus extreme wave height (5%) 7.66m AOD
- For the higher central allowance plus extreme wave height sensitivity test (10%) 7.24m AOD
- For the upper end allowance plus extreme wave height sensitivity test (10%) 7.64m AOD
- For the H++ allowance plus extreme wave height sensitivity test (10%) 7.94m AOD

This would result in flood depths of up to:

- For the higher central allowance plus extreme wave height (5%) 4.86m
- For the upper end allowance plus extreme wave height (5%) 5.26m
- For the H++ allowance plus extreme wave height (5%) 5.56m
- For the higher central allowance plus extreme wave height sensitivity test (10%) 5.14m
- For the upper end allowance plus extreme wave height sensitivity test (10%) 5.54m
- For the H++ allowance plus extreme wave height sensitivity test (10%) 5.84m

7.9 The modelled flood levels using the 97.5% confidence bound for a 0.1% AEP (1 in 1000 year) event plus allowance for extreme wave height are:

- For the higher central allowance plus extreme wave height (5%) 7.59m AOD
- For the upper end allowance plus extreme wave height (5%) 7.99m AOD
- For the H++ allowance plus extreme wave height (5%) 8.29m AOD
- For the higher central allowance plus extreme wave height sensitivity test (10%) 7.90m AOD
- For the upper end allowance plus extreme wave height sensitivity test (10%) 8.30m AOD
- For the H++ allowance plus extreme wave height sensitivity test (10%) 8.60m AOD

This would result in flood depths of up to:

- For the higher central allowance plus extreme wave height (5%) 5.49m
- For the upper end allowance plus extreme wave height (5%) 5.89m
- For the H++ allowance plus extreme wave height (5%) 6.19m

- For the higher central allowance plus extreme wave height sensitivity test (10%) 5.80m
- For the upper end allowance plus extreme wave height sensitivity test (10%) 6.20m
- For the H++ allowance plus extreme wave height sensitivity test (10%) 6.50m

7.10 The Environment Agency have produced mapping for breach and overtopping scenarios of the flood defences at the site for a future date of 2115. For a 0.5% (1 in 200) annual chance scenario the following risks occur:

- Breach hazard – 2.0 (danger to all)
- Breach depth – 1.6m +
- Breach velocity – 2.5m/s +
- Overtopping hazard – between 1.25 and 2.0 (danger to most)
- Overtopping depth – 0.50m – 1.00m
- Overtopping velocity – 0.3m/s – 1.0m/s

5.4.6 For a 0.1% (1 in 1000) annual chance scenario the following risks occur:

- Breach hazard – 2.0 (danger to all)
- Breach depth – 1.6m +
- Breach velocity – 2.5m/s +
- Overtopping hazard – between 1.25 and 2.0 (danger to most)
- Overtopping depth – 0.50m – 1.00m
- Overtopping velocity – 0.3m/s – 1.0m/s

8.0 Surface Water Drainage Disposal

8.1 Drainage Options

8.1.1 The British Geological Survey data shows that the underlying bedrock is Burnham Chalk Formation – chalk (Refer to geological data presented in Appendix 3). Superficial deposits are also described as Tidal Flat Deposits – clay and silt.

8.1.2 The published geology suggests that infiltration will not be a suitable means of surface water disposal.

8.1.3 There are no public surface water sewers near the site.

8.1.4 A ditch linking to the Cocking Pit Drain is located immediately to the northern site boundary and the Cocking Pit Drain is located on the western boundary.

8.1.5 Table 1 below is an extract from 'SUDS a Practical Guide published by the Environment Agency Thames Region (2006). It sets out the Sustainable Drainage Systems (SUDS) hierarchy in terms of the most to least sustainable solutions. This has been generally adopted by Lead Local Flood Authorities although they give greater preference to infiltration techniques to accord with the Building Regulations hierarchy in Approved Document H3.

Most Sustainable	SUDS technique	Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit
↑	**Living roofs**	✔	✔	✔
	Basins and ponds - Constructed wetlands - Balancing ponds - Detention basins - Retention ponds	✔	✔	✔
	Filter strips and swales	✔	✔	✔
	Infiltration devices - soakaways - infiltration trenches and basins	✔	✔	✔
↓	**Permeable surfaces and filter drains** - gravelled areas - solid paving blocks - porous paviors	✔	✔	
Least Sustainable	**Tanked systems** - over-sized pipes/tanks - storms cells	✔		

Table 1 – SUDS Hierarchy

8.1.6 The most appropriate surface water disposal techniques should be selected from this table once site constraints and disposal options have been established. Where appropriate, more than one design solution should be chosen.

8.2 Living Roofs

8.2.1 The site is not in a sensitive landscape area and therefore living roofs are considered unnecessarily expensive.

8.3 Basins and Ponds

8.3.1 There is sufficient room to accommodate a balancing pond on site.

8.4 Filter Strips and Swales

8.4.1 Swales could be considered where there is sufficient room on site to convey surface water.

8.5 Infiltration Devices

8.5.1 Based on the assessment of the geology set out above, infiltration techniques would not be suitable for this site.

8.6 Permeable Surfaces and Filter Drains

8.6.1 Permeable surfaces could be used on this site provided suitable sub-base drainage is used to capture the water and convey it to the drainage system.

8.8 Tanked Systems

8.8.1 Tanked systems are at the bottom of the SuDS hierarchy and have therefore been discounted.

8.9 Proposed Drainage System

8.9.1 Where permeable surfacing is to be used such as gravel driveways, sub-base drainage will collect surface water and discharge it into the piped drainage system.

8.9.2 Where impermeable surfacing is to be used such as the tarmac access road, gullies will collect surface water and discharge it into the piped drainage system.

8.9.3 Roof water will be collected by gutters and discharged into the piped drainage system via rainwater pipes.

8.9.4 The piped drainage system will discharge into a balancing pond where the surface water will be attenuated and released to the drain on the northern boundary at a green-field run-off rate using a flow control chamber.

9.0 Flood Risk Management Measures

9.1 Drainage

9.1.1 Based on the assessment above, the only option for surface water disposal is to discharge into the adjacent drain.

9.1.2 Calculations presented in Appendix 4 based on the Institute of Hydrology's Report 124 show that the development area generates a green-field run-off rate of 2.5 l/s for Q_{bar}. This will be used as the limited discharge rate to watercourse.

9.1.3 Surface water will be collected and attenuated as described in 8.9 above.

9.1.4 Surface water will be attenuated in a balancing pond based on accommodating a 100 year storm plus a 40% allowance for climate change. The resulting volume of the storage is 678.1m^3.

9.1.5 Micro Drainage calculations are presented in Appendix 4. An indicative surface water drainage layout is presented on drawing 23021/101 in Appendix 1.

9.2 Buildings

9.2.1 The analysis of fluvial flood levels shows that the site is safe from flooding for all current and climate change scenarios. Typically finished floor levels would be established at 600mm above the 0.1% (1 in 1000) event level which would be 2.37m AOD.

9.2.2 Coastal flooding depths on site ranges between 3.39m to 6.50m depending on which return period, wave height and climate change scenario is chosen. All of these would be catastrophic to the development and cannot be designed by setting minimum floor levels alone. Similarly breach scenarios of the sea defences would also be catastrophic. However, overtopping of the sea defences (which is the most likely scenario) is generally manageable. It is therefore recommended that the finished floor levels are designed to cater for overtopping scenarios only with all log cabins located 1.0m above the existing ground level. The cabins shall be raised to this level by stilts and access shall be by steps or ramp. Buildings should be anchored to the ground by concrete foundation to the stilts.

9.2.3 For depths of water in excess of 1.0m it is recommended that water should be allowed through the buildings to avoid structural damage and levels are designed to allow water to drain away.

9.2.4 Common to all buildings, electrical, gas, water and telecom services are to be suitably elevated so as not to be damaged by major flooding events. Foul drainage waste pipes should be sealed to prevent flood water damage by reverse flow.

9.2.5 Where possible, flood resilient material should be used to construct buildings. Also, it is recommended that flood resilient flooring is used.

9.3 Flood Risk Management of Staff and Visitors

9.3.1 The site operator will subscribe to the Environment Agency's Floodline service (0345 988 1188) and also check for flood warnings on https://flood-warning-information.service.gov.uk/warnings.

9.3.2 Upon the issue of a flood alert, the site operator will initiate a Flood Response Plan which will involve the evacuation of the all visitors and staff from the site to a nominated safe location. The Flood Response Plan should also include a register of people on site so the operator can ensure everyone is evacuated.

9.4 Flood Risk Management of Vehicles

9.4.1 The Flood Response Plan should require all vehicles to be removed from site in the event of a flood warning.

9.5 Flood Risk Management of Waste

9.5.1 The Flood Response Plan should require waste to be removed from site in the event of a flood warning, provided it is practical to do so within a time period prior to the onset of a flood. Priority should be given to removal of hazardous waste.

10.0 Off Site Impacts and Proposed Mitigation Measures

10.1 Site levels should not be increased to ensure there is no loss of flood plain storage.

10.2 There are no other off-site impacts from the development.

11.0 Management of Residual Risks

11.1 Drainage should be managed and maintained by the site operator. A drainage maintenance manual should be produced and maintenance schedules followed.

11.2 A Flood Response Plan should be produced which sets out the procedures for the site operator to follow when faced with a flood warning.

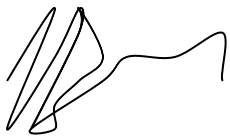
12.0 Conclusions

12.1 Flood risk resulting from extreme coastal flood events should be managed by elevating buildings and making buildings flood resilient.

12.2 Flood risk resulting from extreme coastal flood events should be managed by implementing the Flood Response Plan to protect visitors, staff, vehicles and reduce pollution risk from waste.

12.3 The SUDS hierarchy has been adhered to.

12.4 Appropriate drainage management will ensure that the development will be safe from surface water run-off and there will be no increased run-off from the development. This includes the provision of a balancing pond as part of the proposed development.



……………………………………………….. 7th June 2023

Ian Brazier BEng (Hons) CEng MICE
On Behalf of Abington Consulting Engineers

APPENDIX 1 – Drawings & Plans

KEY:

BUILDING
FENCE
HEDGE
CHANNEL
WALL
BANK EDGE
STORM DRAINAGE
FOUL DRAINAGE
CHANGE OF SURFACE
OVERHEAD ELECTRIC
OVERHEAD TELEPHONE
TREE
BOREHOLE
MANHOLE
CONTROL STATION

B	BOLLARD	RE	ROD EYE
BIN	BIN	RI	RIDGE
BT	BRITISH TELECOM	SP	SIGN POST
CR	PIPE CROWN	STAY	STAY
CTV	CABLE TELEVISION	SV	STOP VALVE
EA	EARTH	TBM	BENCH MARK
EL	ELECTRIC BOX	TH	THRESHOLD
EP	ELECTRIC POLE	TL	TRAFFIC LIGHT
EV	EAVES	TP	TELEGRAPH POLE
FH	FIRE HYDRANT	TS	TRAFFIC SIGNAL
G	GULLY	VC	VENT COLUMN
GA	GAS VALVE	VP	VENT PIPE
IC	INSPECTION CHAMBER	WL	WATER LEVEL
IL	INVERT LEVEL	WM	WATER METER
KO	KERB OFFLET	WT	WALL TOP
LH	LAMP HOLE		
LP	LAMP POST		
MP	MARKER POST		
PB	POST BOX		

NOTES:

1. Survey plotted to OS National Grid.
2. All levels related to OS Datum.
3. GPS/GLONASS ETRS89 observations transformed to OSGB36 using OSTN15 Transformation.
4. ETRS89 ellipsoid heights converted to heights above mean sea level using National Geoid Model OSGM15.

Initial Survey Date: 26 JAN 2022

CONTROL STATIONS

Stn:	Eastings:	Northings:	Height:
9000	555868.914	373765.188	2.378
9001	555968.287	373767.066	2.763
9002	555994.232	373783.902	3.908
9003	555998.393	373786.778	4.190
9004	555948.342	373860.740	3.960
9005	556016.444	373751.223	3.726
9006	555930.022	373773.980	2.155

Rev:	Amendments:	Date:

Client: MARC LOVELL

Project Title: ANDERBY ROAD CHAPEL ST.LEONARDS LINCOLNSHIRE

Drawing Title: OGL SURVEY

Scale: 1:500
Date: 29 JAN 2022
Drawing No: AS2591/1
Rev: A1
C.A.D. Title: MARCLOVELLCHAPEL260122
Drawn By: D.J.SMITH

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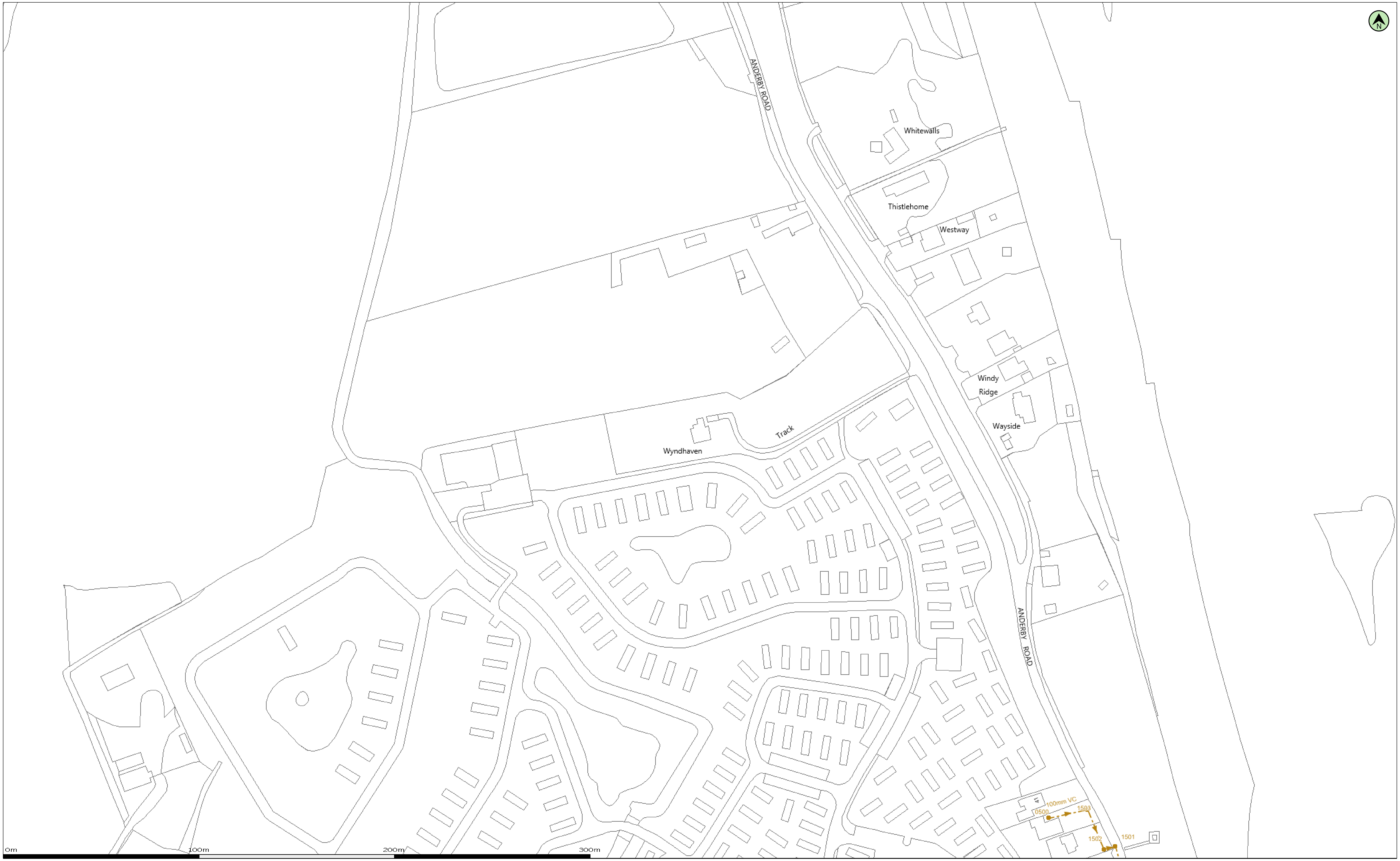


Date: 15/05/23	Scale: 1:1250	Map Centre: 555909,373715	Data updated: 30/04/23	Our Ref: 1176285 - 1	Wastewater Plan A2

Foul Sewer
Surface Sewer
Combined Sewer
Final Effluent
Rising Main*
Private Sewer*
Decommissioned Sewer*

Outfall*
Inlet*
Manhole*

Sewage Treatment Works
Public Pumping Station
Decommissioned Pumping Station
*(Colour denotes effluent type)

ian@abingtonconsulting.co.uk

Chapel St Leonards

love every drop
anglianwater

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert
0500	F	-	-	-
1501	F	3.07	1.61	1.46
1502	F	-	-	-
1503	F	-	-	-

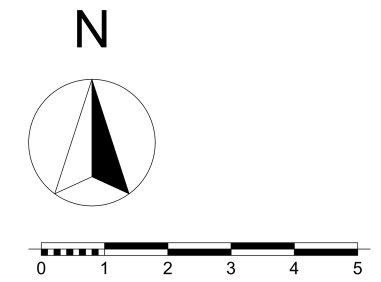
Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Please Note:

- *This drawing may be printed and scaled FOR PLANNING PURPOSES.*
- *All dimensions to be CHECKED ON SITE and any DISCREPANCY reported to Perfect Planning.*
- *The site boundary shown is the best assumed from available data & does NOT represent legal ownership*
- *All dimensions in mm unless otherwise stated.*



A Amends to clients comments 30-01-23

Revisions.

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Project:
Residential Development

Land at Elder House
Anderby Road
Chapel St Leonards
PE24 5XQ

Client:
Mr R Goyal

Drawing Title:

Initial Sketch Layout

Drawing by:	Checked by:
AL / IG / SK	AL / IG
Date:	**Scale:**
09-12-22	1:500@A1
Drawing Number:	**Revision:**
645/01	A

REV.	BY	REVISION DETAILS	DATE

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PROJECT
Proposed Log Cabin Site at Chapel St. Leonards

TITLE
Indicative Surface Water Drainage Proposals

DRAWING NO. 23021/101 REVISION —

SCALE 1:500 @ A1

DRAWN EJB CHECKED IB DATE 7/6/23

APPENDIX 2 – Environment Agency Data

Ian@abingtonconsulting.co.uk

Our ref: CCN-2023-310044

Date: 30/05/2023

Dear Ian,

Provision of Flood Risk Information for Anderby Road, Chapel St Leonards.

Thank you for your request for our flood risk information for the above site. The information is set out below and attached. It is important you read any contextual notes on the maps provided.

If you are preparing a Flood Risk Assessment (FRA) for this site, please note this information may not be sufficient by itself to produce an adequate FRA to demonstrate the development is safe over its lifetime. Additional information may be required to carry out an appropriate assessment of all risk, such as consequence of a breach in defences.

We aim to review our information on a regular basis, so if you are using this data more than twelve months from the date of this letter, please contact us again to check it is still valid.

Please read the letter in full as the information covered has been updated in **March 2023.**

1. Flood Map

The attached map includes the current Flood Map for your area. The Flood Map indicates the area at risk of flooding, **assuming no flood defences exist**, for a flood with a 0.5% chance of occurring in any year for flooding from the sea, or a 1% chance of occurring for fluvial (river) flooding. It also shows the extent of the Extreme Flood Outline which represents the extent of a flood with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater.

In some locations, such as around the fens and the large coastal floodplains, showing the area at risk of flooding assuming no defences may give a slightly misleading picture in that if there were no flood defences, water would spread out across these large floodplains. This flooding could cover large areas of land but to relatively shallow depths and could leave pockets of locally slightly higher land as isolated dry islands. It is important to understand the actual risk of the flooding to these dry islands, particularly in the event of defence failure.

The Flood Map also shows the location of formal raised flood defences and flood storage reservoirs. It represents areas at risk of flooding for present day only and does not take account of climate change.

The Flood Map only indicates the extent and likelihood of flooding from rivers or the sea. It should also be remembered flooding may occur from other sources such as surface water sewers, road drainage, etc.

2. Historic Flood Event Outlines

The area was previously known to have flooded in January 1953. A copy of the Historic Flood Event Outlines Map showing the extent of previous recorded flooding in your area is attached. This only covers information we hold and it is possible recent flooding may have occurred which we are currently investigating, therefore this information may be subject to change. It is possible other flooding may have occurred which other organisations, such as the Lead Local Flood Authority (ie top tier council), Local Authority or Internal Drainage Board (where they exist), may have records.

3. Schemes in the area

The following capital project is ongoing to reduce or sustain the current flood risk to this site.

The Saltfleet to Gibraltar Point Beach Management scheme places around 550,000 cubic metres of sand annually in key locations along a 20km frontage of the Lincolnshire east coast. We have been artificially supplying sand to recharge the beach in this area since 1994. This scheme, in combination with the existing hard defences, reduces the risk from tidal flooding with a 0.5% chance of occurring in any one year. This flood risk management approach benefits 20,000 households, 24,500 static caravans, 1,700 businesses and up to 35,000Ha of agricultural land.

4. Fluvial Flood Risk Information

This site is considered to be at risk of flooding from main rivers.

The site may also be at risk from local ordinary watercourses for which other risk management authorities, such as the Lead Local Flood Authority (ie top tier council) or Internal Drainage Board (where they exist) have responsibility.

4.1 Fluvial Defence Information

There are no formal flood defences reducing the risk of flooding to this site.

4.2 Fluvial Modelled Levels and Flows

Available modelled fluvial flood levels and flows for the model nodes shown on the attached map are set out in the data table attached. This data is taken from the model named on the data table, which is the most up-to-date model currently available.

Please note these levels are “in-channel” levels and therefore may not represent the flood level on the floodplain, particularly where the channel is embanked or has raised defences.

Our models may not have the most up to date climate change allowances. In time we will update our models for the latest allowances. You should refer to 'Flood risk assessments: climate change allowances' to check if the allowances modelled are appropriate for the type of development you are proposing and its location. You may need to undertake further assessment of future flood risk using different allowances to ensure your assessment of future flood risk is based on best available evidence.

4.3 Fluvial Modelled Flood Extents

Please find attached a map showing available modelled flood extents, taking into account flood defences, for your area. This data is taken from the model named on the map, which is the most up-to-date model currently available.

In some cases the flood extents shown may not be from main river, but may be from other sources such as IDB lowland drainage networks.

4.4 Fluvial Hazard Mapping

For certain locations we have carried out modelling to map the maximum values of flood depth, velocity and hazard rating (danger to people) resulting from overtopping and / or breaching of defences at specific locations for a number of scenarios.

At present this information is available for fluvial flood risk in Northampton, Lincoln, Wainfleet and some isolated rural locations.

The number of locations we have this information for is expected to increase in time.

At present this site is not covered by any fluvial hazard mapping.

5. Tidal Flood Risk Information

This site is considered to be at risk from tidal flooding.

5.1 Tidal Defence Information

The existing tidal defences protecting this site consist of natural sand dunes and earth embankments supplemented by beach nourishment to maintain foreshore levels.

They are in fair condition and reduce the risk of flooding (at the defence) to a 0.5% (1 in 200) chance of occurring in any year. We inspect these defences routinely to ensure potential defects are identified.

Refer to paragraph 3 for details of any ongoing capital projects to reduce the flood risk to this site.

5.2 Tidal Flood Levels

The attached data sheets show our current best estimate for extreme tide levels.

Please read the information notes on the data sheets.

5.3 Tidal Hazard Mapping

For certain locations we have carried out modelling to map the maximum values of flood depth, velocity and hazard rating (danger to people) resulting from overtopping and / or breaching of defences at specific locations for a number of scenarios.

At present this information is available along the full coastal / tidal floodplain, except the tidal Witham Haven in Boston (upstream of Hobhole) where only breaching and not overtopping has been modelled and the tidal River Welland upstream of Fosdyke Bridge where neither breaching nor overtopping are available.

The number of locations we have this information for is expected to increase in time.

The attached maps show the maximum values of flood depth, velocity and hazard rating (danger to people) resulting from breaching of the defences at specific locations for the scenarios below. For some locations the breach mapping also includes flooding from overtopping if this is expected in that scenario. The location of modelled tidal breaches is shown on a separate attached map.

5.3.1 Tidal Hazard Mapping – Breaches

- Year 2006 0.5% (1 in 200) chance
- Year 2006 0.1% (1 in 1000) chance
- Year 2115 0.5% (1 in 200) chance
- Year 2115 0.1% (1 in 1000) chance

5.3.2 Tidal Hazard Mapping - Overtopping

The attached maps show the maximum values of flood depth, velocity and hazard rating (danger to people) resulting from simulated overtopping of defences for the following scenarios:

- Year 2006 0.5% (1 in 200) chance
- Year 2006 0.1% (1 in 1000) chance
- Year 2115 0.5% (1 in 200) chance
- Year 2115 0.1% (1 in 1000) chance

6. Development Planning

If you would like local guidance on preparing a flood risk assessment for a planning application, please contact our Sustainable Places team at LNplanning@environment-agency.gov.uk. It will help if you mention this data request and attach your site location plan.

We provide free preliminary advice; additional/detailed advice, review of draft FRAs and meetings are chargeable at a rate set to cover our costs, currently £100 (plus VAT) per hour of staff time. Further details are available on our website at https://www.gov.uk/guidance/developers-get-environmental-advice-on-your-planning-proposals.

General advice on flood risk assessment for planning applications can be found on GOV.UK at https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications

Climate change will increase flood risk due to overtopping of defences. Please note, unless specified otherwise, the climate change data included has an allowance for 20% increase in flow. Updated guidance on how climate change could affect flood risk to new development - 'Flood risk assessments: climate change allowances' was published on GOV.UK in **July 2021**. The appropriate updated climate change allowance should be applied in a Flood Risk Assessment.

You should also consult the Strategic Flood Risk Assessment produced by your local planning authority.

7. Data Licence and Other Supporting Information

We respond to requests for recorded information we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR).

This information is provided in accordance with the Open Government Licence which can be found here: http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

Further information on flood risk can be found on the GOV.UK website at:
https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

8. Other Flood Risk Management Authorities

The information provided with this letter relates to flood risk from main river or the sea. The Flood Map for Surface Water can be viewed at https://www.gov.uk/check-long-term-flood-risk

Additional information may be available from other risk management authorities, such as the Lead Local Flood Authority (ie top tier council) or Internal Drainage Board (where they exist).

I hope we have correctly interpreted your request. If you have any queries or would like to discuss the content of this letter further please contact James Rowett using the email address below and quoting our CCN reference number above.

Yours sincerely,

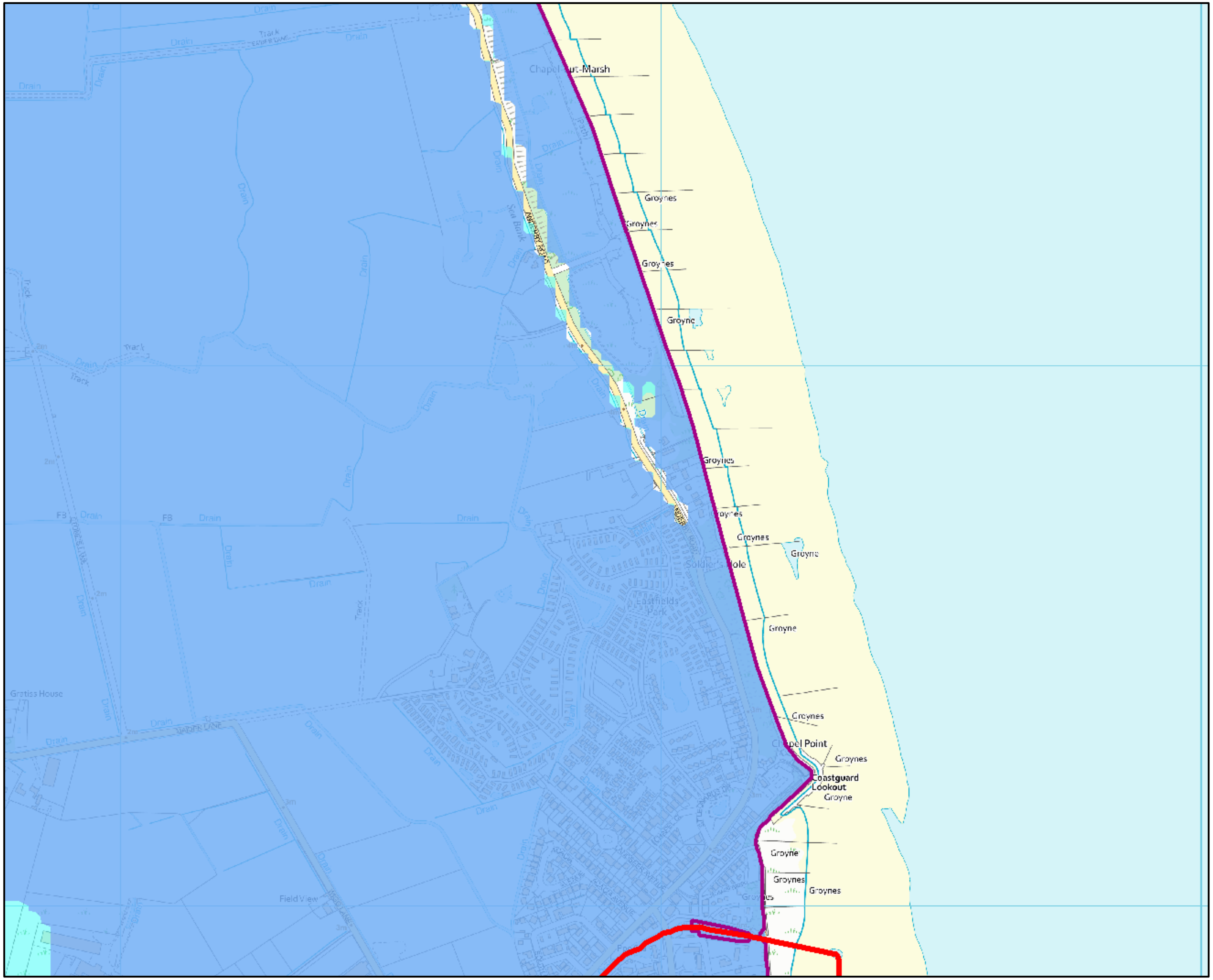
JRowett

James Rowett BSc(Hons)
South Humber and East Coast
Partnership and Strategic Overview Flood Officer
Lincs and Northants

for Paul Payne
South Humber and East Coast Partnerships and Strategic Overview Team Leader
e-mail PSO_Coastal@environment-agency.gov.uk

Enc.
Flood Map
Historic Flood Event Outlines Map
Model Node Locations Map
Modelled Fluvial Levels and Flows Data Sheet
Modelled Flood Extent Maps
Tidal Level Data Sheets - Map and Tables
Tidal Breach Points – Locations Map
Hazard Mapping – Breaching
Hazard Mapping – Overtopping

Flood Map centred on TF 55900 73770 - created May 2023 [Ref: CCN-2023-310044]



Environment Agency

Scale 1:10,000

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Legend

- Main River
- Raised Defences
- Areas at Rick of Flooding from Rivers and Sea
- Extreme Flood Outline

Dark blue shows the area that could be affected by flooding, either from rivers or the sea, if there were no flood defences. This area could be flooded:

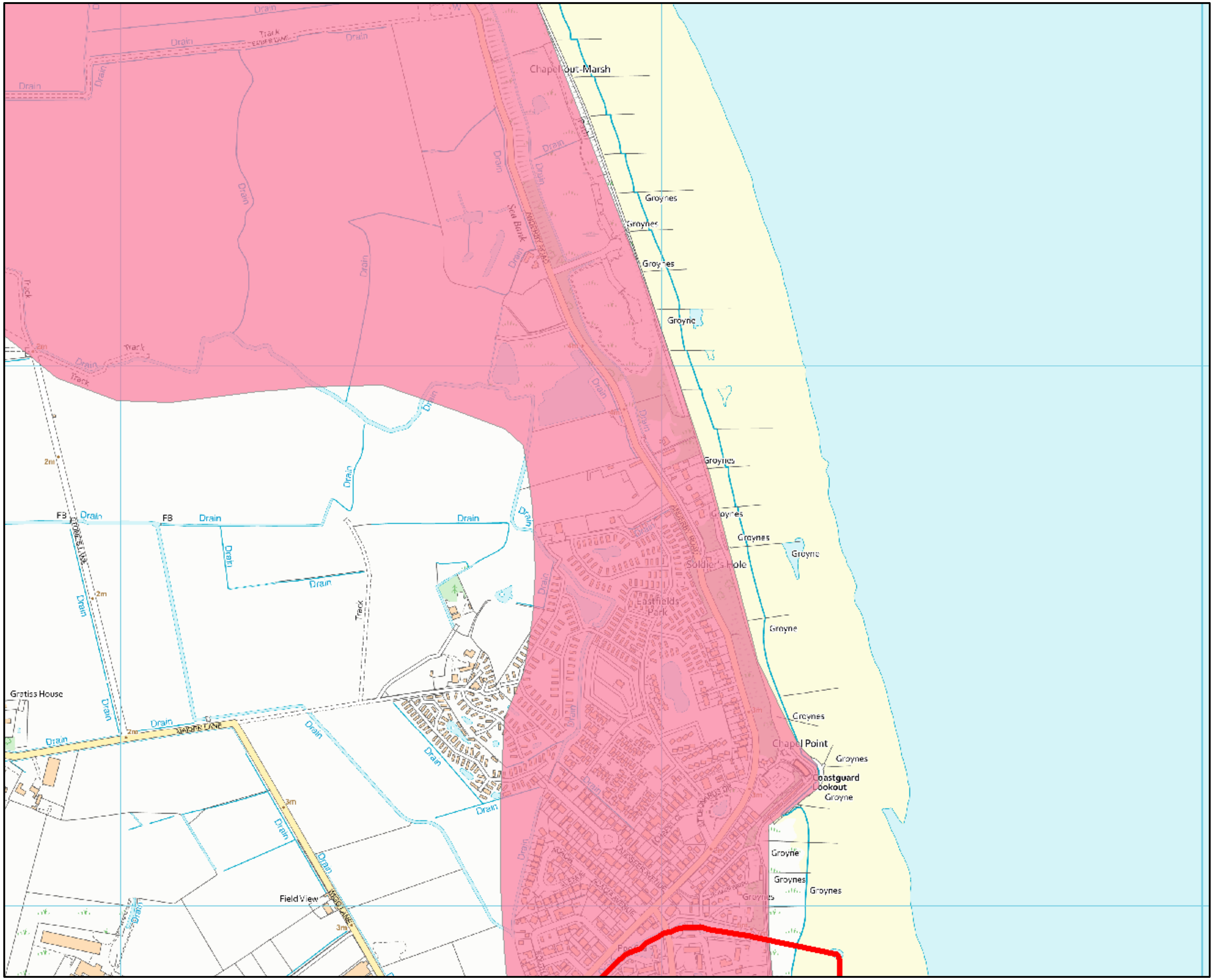
- from the sea by a flood that has a 0.5% (1 in 200) or greater chance of happening each year.

- or from a river by a flood that has a 1% (1 in 100) or greater chance of happening each year.

Light blue shows the extent of the Extreme Flood Outline, which represents the extent of a flood event with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater.

These two colours show the extent of the natural floodplain if there were no flood defences or certain other manmade structures and channel improvements. Sites outside the two extents, but behind raised defences, may be affected by flooding if the defences are overtopped or fail.

Historic Flood Map centred on TF 55900 73770 - created May 2023 [Ref: CCN-2023-310044]



Scale 1:10,000

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Main River

1953-January_Lincolnshire Coastline

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Model Node Locations centred on TF 55900 73770 - created May 2023 [Ref: CCN-2023-310044]

Environment Agency

Scale 1:24,000

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Legend

Model Nodes

Main River

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Datasheet [Ref: CCN-2023-310044] Model Name: Willoughby High Drain Model Date: 2018

Fluvial Flood Levels (mODN)

The fluvial flood levels for the model nodes shown on the attached map are set out in the table below. They are measured in metres above Ordnance Datum Newlyn (mODN).

Baseline Scenarios:

			Annual Exceedance Probability - Maximum Water Levels (mODN)										
Node Label	Easting	Northing	50% (1 in 2)	20% (1 in 5)	10% (1 in 10)	5% (1 in 20)	4% (1 in 25)	3.33% (1in 30)	2% (1 in 50)	1.33% (1 in 75)	1% (1 in 100)	0.5% (1 in 200)	0.1% (1 in 1000)
ORBY01_0040	555689	372653	0.42	0.5	0.96	1.24	1.31	1.35	1.47	1.52	1.54	1.65	1.79
WILL01_0161	556007	372947	0.36	0.38	0.91	1.2	1.27	1.32	1.44	1.49	1.52	1.63	1.77
WILL01_1104	555317	372311	0.84	0.95	1.11	1.33	1.4	1.44	1.54	1.59	1.62	1.72	1.85
WILL01_1497	554974	372137	0.96	1.1	1.25	1.43	1.49	1.53	1.63	1.68	1.71	1.81	1.94

Climate Change Scenarios:

			Annual Exceedance Probability - Maximum Water Levels (mODN)								
Node Label	Easting	Northing	1% (1 in 100) inc 25% Climate Change	1% (1 in 100) inc 35% Climate Change	1% (1 in 100) inc 65% Climate Change	0.5% (1 in 200) inc 25% Climate Change	0.5% (1 in 200) inc 35% Climate Change	0.5% (1 in 200) inc 65% Climate Change	0.1% (1 in 1000) inc 25% Climate Change	0.1% (1 in 1000) inc 35% Climate Change	0.1% (1 in 1000) inc 65% Climate Change
ORBY01_0040	555689	372653	1.75	1.78	1.81	1.79	1.80	1.82	1.84	1.85	2.00
WILL01_0161	556007	372947	1.73	1.76	1.79	1.77	1.78	1.80	1.82	1.82	1.98
WILL01_1104	555317	372311	1.81	1.83	1.86	1.84	1.85	1.87	1.89	1.90	2.03
WILL01_1497	554974	372137	1.88	1.90	1.93	1.91	1.92	1.94	1.99	2.01	2.12

Fluvial Flood Flows (m³/s)

The fluvial flood flows for the model nodes shown on the attached map are set out in the table below. They are measured in metres cubed per second (m³/s).

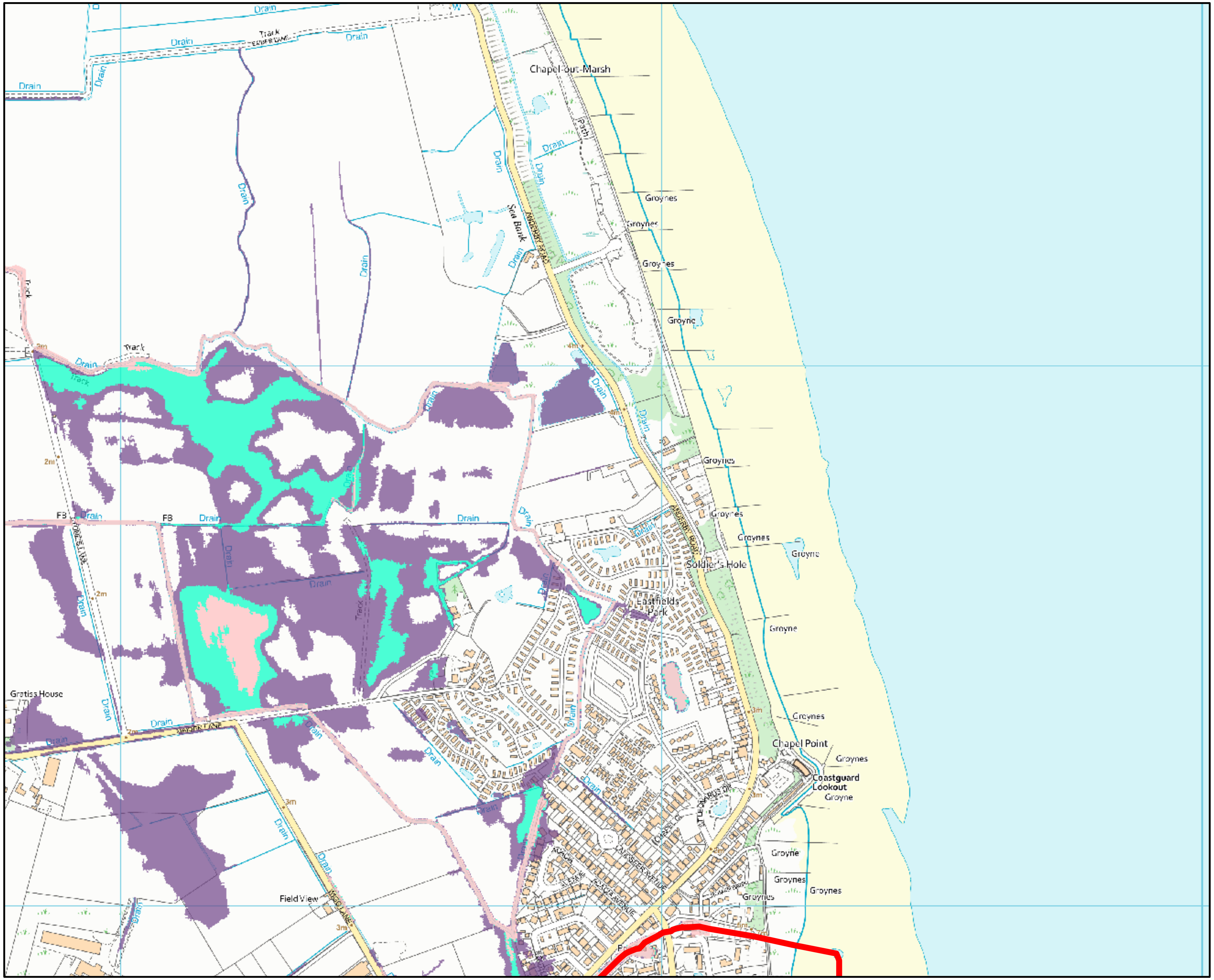
Baseline Scenarios:

Node Label	Easting	Northing	Annual Exceedance Probability - Maximum Flows (m³/s)										
			50% (1 in 2)	20% (1 in 5)	10% (1 in 10)	5% (1 in 20)	4% (1 in 25)	3.33% (1in 30)	2% (1 in 50)	1.33% (1 in 75)	1% (1 in 100)	0.5% (1 in 200)	0.1% (1 in 1000)
ORBY01_0040	555689	372653	2.79	2.70	3.76	4.69	4.96	5.15	5.62	5.87	6.04	6.38	6.70
WILL01_0161	556007	372947	7.83	8.13	11.10	13.05	13.68	14.05	15.14	15.99	16.54	17.88	20.55
WILL01_1104	555317	372311	3.53	4.58	5.35	6.17	6.45	6.62	7.10	7.29	7.58	8.18	9.02
WILL01_1497	554974	372137	3.53	4.58	5.32	6.11	6.38	6.55	7.02	7.30	7.58	8.16	9.01

Climate Change Scenarios:

Node Label	Easting	Northing	Annual Exceedance Probability - Maximum Flows (m³/s)								
			1% (1 in 100) inc 25% Climate Change	1% (1 in 100) inc 35% Climate Change	1% (1 in 100) inc 65% Climate Change	0.5% (1 in 200) inc 25% Climate Change	0.5% (1 in 200) inc 35% Climate Change	0.5% (1 in 200) inc 65% Climate Change	0.1% (1 in 1000) inc 25% Climate Change	0.1% (1 in 1000) inc 35% Climate Change	0.1% (1 in 1000) inc 65% Climate Change
ORBY01_0040	555689	372653	5.32	5.51	5.87	5.70	5.83	6.41	6.25	6.31	6.59
WILL01_0161	556007	372947	17.58	17.98	18.49	18.26	18.43	18.75	19.17	19.31	22.06
WILL01_1104	555317	372311	7.68	7.71	7.82	7.80	7.83	7.72	8.58	8.97	9.66
WILL01_1497	554974	372137	7.65	7.71	7.81	7.79	7.82	7.72	8.57	8.96	9.66

Modelled Flood Extents (baseline) Model: Willoughby High Drain 2018 [CCN-2023-310044]



Environment Agency

Scale 1:10,000

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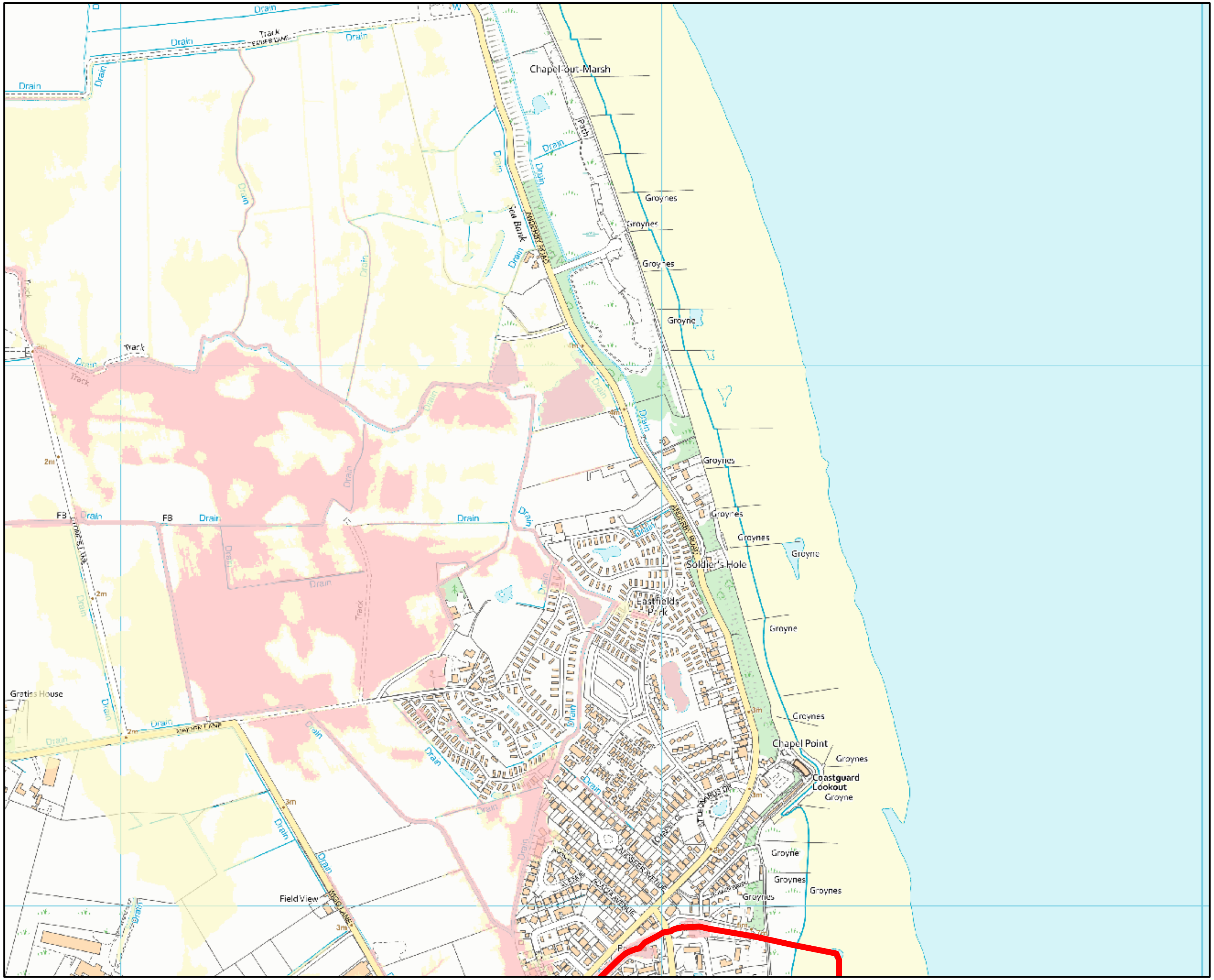
Legend

- Main River
- 2% (1 in 50) fluvial event
- 1% (1in 100) fluvial event
- 0.1% (1 in 1000) fluvial event

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Modelled Flood Extents (climate change)   Model: Willoughby High Drain 2018 [CCN-2023-310044]



Environment Agency

Scale 1:10,000

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Legend

Main River

1% (1 in 100) inc 25% climate change fluvial event

0.1% (1 in 1000) inc 25% climate change fluvial event