FLOOD RISK ASSESSMENT
FOR RESIDENTIAL DEVELOPMENT AT
20 RESERVOIR ROAD, SURFLEET

FINAL REPORT

ECL1235/L BLISS

DATE MARCH 2024

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DISCLAIMER

This document has been prepared solely as a Flood Risk Assessment in support of a planning application for proposed residential development at 20 Reservoir Road, Surfleet. "Ellingham Consulting Ltd" accepts no responsibility or liability whatsoever for any use made of this document other than by the client "Mr & Mrs Heppenstall' for the purposes it was originally commissioned and prepared. All comments and opinions made are based upon information available to "Ellingham Consulting Ltd" during the necessary investigative process, and the conclusions and recommendations, could therefore, differ in the event of material subsequently being found erroneous, incomplete, or misleading. "Ellingham Consulting Ltd" therefore, accepts no liability should this prove to be the case.

1.0 INTRODUCTION

This Flood Risk Assessment has been prepared in accordance with National Planning Policy Framework (NPPF) and supporting planning practice guidance (PPG) on Flood Risk and Coastal Change.

In areas at risk of flooding or for sites of 1 hectare or more, developers are required to undertake a site-specific Flood Risk Assessment to accompany an application for planning permission. This Flood Risk Assessment has been produced on behalf of Mr & Mrs Heppenstall in respect of a development that consists of a replacement dwelling at 20 Reservoir Road, Surfleet.

A planning application for the proposed development is to be submitted by Mr L Bliss.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Site Location

The site is located at 20 Reservoir Road, Surfleet, Spalding, PE11 4DJ. The National Grid Reference of the site is 52793/32928.

The location of the site is shown in Figure 1.

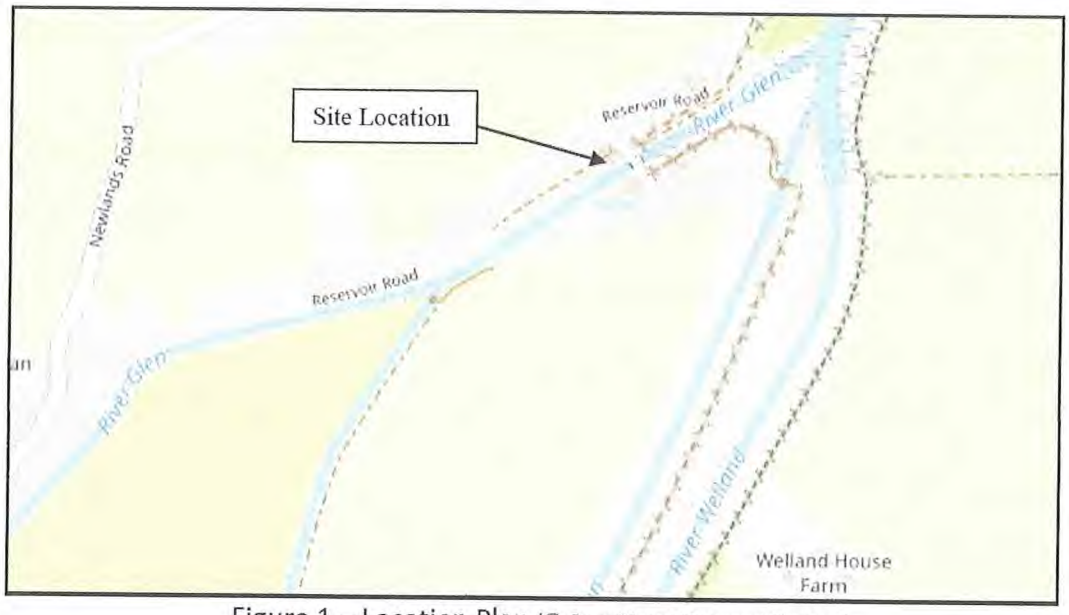

Figure 1 – Location Plan (© OpenStreetMap contributors)

2.2 Existing Site

The site is on the southern side of Reservoir Road and the southern boundary of the site is formed by the River Glen. The site is on either side of an access that runs parallel to the River Glen. The site consists of a timber store, garage, and static caravan on the northern side of the access and a dwelling to the south. The area of development is approximately 0.04 hectares.

Environment Agency LIDAR data shows that the site is flat with ground levels typically between +3.2m OD and +3.6m OD. In the area of the proposed dwelling the ground level is approximately +3.6m OD.

The site is in an area surrounded by land that is within the Welland and Deepings Internal Drainage Board (IDB) District.

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

2.3 Proposed Development

The proposed development consists of a replacement dwelling. The dwelling will have two storeys and be in a similar location to the existing dwelling. The garage will be replaced by a garage that will have a workshop on the first floor.

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 Available Flood Risk Information

An extract from the Environment Agency Flood Map for Planning is shown in Figure 2. The site is located within Flood Zone 3b (water storage area) and therefore has a high probability of flooding.

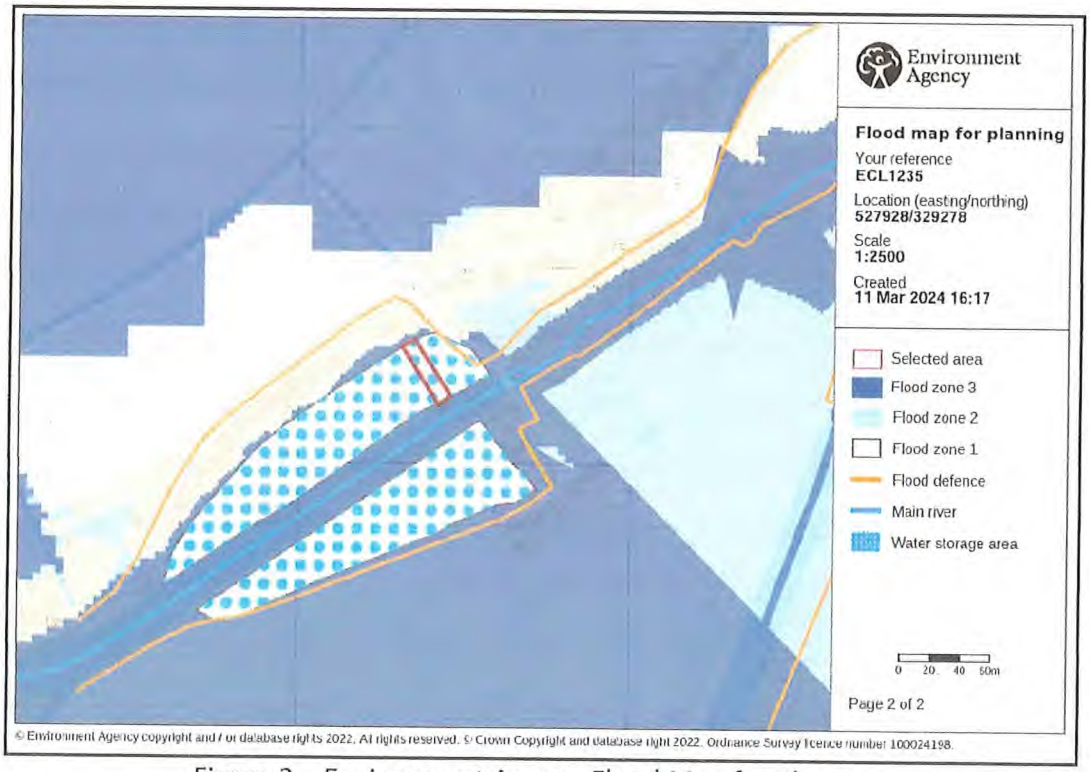

Figure 2 – Environment Agency Flood Map for Planning

The Environment Agency Long Term Flood Risk maps show that:

- the site has a high risk of flooding from rivers or the sea (annual probability greater than 3.3%);
- the site has a low risk of surface water flooding (annual probability between 0.1% and 1%); and
- the site is not within an area at risk of reservoir flooding.

The South East Lincolnshire SFRA includes maps indicating the residual flood hazard and residual peak flood depths. These maps show that the site is within an area defined as Functional Floodplain.

Flood risk assessment data provided by the Environment Agency for an adjacent site is provided in Attachment 1.

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 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.

The proposed development is a replacement dwelling and therefore it is not necessary to apply the Sequential Test to the development.

The Exception Test requires consideration of the wider sustainability benefits of a development and that the development would be safe and residual risks managed.

A replacement dwelling at the site will provide a sustainability benefit as a consequence of the building requirements for new dwellings.

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 eastern boundary of the site is formed by the River Glen. The site is within a flood storage area of the River Glen immediately upstream of Surfleet Sluice. The standard of protection offered by existing land levels is estimated to be no more than 50% annual probability (1 in 2 chance each year). Reservoir Road to the north of the site forms a defence that protects the land to the north and retains water within the flood storage area.

The River Glen has its confluence with the tidal River Welland 300m downstream of Surfleet Sluice. The Sluice Gate and the adjoining embankments offer protection during a tidal flood event in the River Welland.

The River Glen and River Welland are both main rivers. These watercourses, together with Surfleet Sluice and adjoining embankments, 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. The condition of Environment Agency assets is generally good.

4.2 Sources of Flooding

The potential sources of flooding that have been identified during this assessment are:

- a fluvial event in the River Glen; and
- failure of Surfleet Sluice.

Based upon the Environment Agency Long Term Flood Risk Maps the site has a very low risk of surface water flooding. As such surface water flooding has not been considered further in this assessment.

4.3 Probability of Flooding

Present day flood levels for the River Glen were obtained from the Environment Agency. The flood levels (m AOD) at a model node that best represents the flood levels at the site are shown in the Table 1 below.

Node	Annual Probability				
	5%	2%	1%	0.5%	0.1%
Glen 467	4.16	4.16	4.17	4.22	4.30

Table 1 – Present day flood levels (m AOD)

The flood depth at the site during the present day 1% annual probability (1 in 100 chance each year) event is approximately 0.6m.

The Model Flood Extents Map provided by the Environment Agency confirms that the site is at risk during the 5% annual probability (1 in 20 chance each year) event.

4.4 Historic Flooding

The historic flood map provided by the Environment Agency shows that the site flooded from the River Glen at Easter 1998.

4.5 Climate Change and Residual Risk

Climate change is likely to impact the site through increased rainfall intensity and duration increasing flood levels in the River Glen and River Welland.

Climate change flood levels were provided by the Environment Agency for the model node that best represents flood levels at the site. The flood level for the 1% annual probability (1 in 100 chance each year) event with a 20% climate change allowance is +4.78m OD. This is a depth of approximately 1.2m in the area of the proposed dwelling.

The Environment Agency peak river flow map shows that for the Welland Management Catchment the peak river flow central allowance is 17% for the 2080's (100 year) timeframe. The flood level of +4.78m OD is therefore a conservative estimate for the climate change central allowance.

There is a residual risk of flooding at the site should there be a failure of Surfleet Sluice.

5.0 FLOOD RISK MITIGATION

5.1 Summary of Risks

The standard of protection offered by existing land levels at the site is estimated to be no more than 50% annual probability (1 in 2 chance each year).

The site is at risk of flooding from the River Glen during the 1% annual probability (1 in 100 chance each year) to a level of +4.17m OD, an estimated depth of 0.9m. Over time there will be a gradual increase in risk to the site due to climate change. During the design life of the development the site is at risk to a level of +4.78m OD, an estimated depth of 1.5m.

The development increases the impermeable area and therefore there will be an increased volume of surface water that has the potential to increase flood risk.

5.2 Mitigation Measures

Based upon the information available during the preparation of this flood risk assessment, it is recommended that the floor level of the dwelling is at +5.08m OD, 0.3m above the 1% annual probability flood level with climate change. It is recommended that there is 0.3m of flood resilient construction above finished floor level. The property shall be built with openings underneath that should be left unobstructed to allow floodwaters to flow beneath the structure.

The developer should ensure that the eventual occupier of the replacement dwelling is sufficiently aware of the risk of flooding, and the standard of the existing defences. The Environment Agency operates a flood warning system for properties at risk of flooding to enable householders to protect life or take actions to manage the effect of flooding on property. Floodline Warnings Service is a national system run by the Environment Agency for broadcasting flooding warnings. The occupier of the dwelling should register to receive flood warnings.

It is recommended that surface water run-off is managed so that stormwater from the dwelling 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 one 2-storey replacement dwelling and 2 storey-garage at 20 Reservoir Road, Surfleet.

- The proposed development is within a water storage area that is Flood Zone 3b. The standard of protection offered by existing land levels at the site is estimated to be no more than 50% annual probability (1 in 2 chance each year).

- During the 1% annual probability (1 in 100 chance each year) event including an allowance for climate change the flood level at the site is +4.78m OD.

- It is recommended that:

    - the floor level is at +5.08m OD;
    - there is 0.3m of flood resilient construction above finished floor level; and
    - the property shall be built with openings underneath that allow floodwaters to flow beneath the structure.

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

ATTACHMENT 1

ENVIRONMENT AGENCY FLOOD RISK INFORMATION

Environment Agency

Tim Ellingham
tim@ellinghamconsulting

Our ref: 230125/AT10 (amended)

Date: 27/01/2023

Dear Tim,

Provision of Flood Risk Information for Reservoir Road, Surfleet Seas End

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 **January 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

A copy of the Historic Flood Extent Map showing the extent of previous recorded flooding in your area is attached. The map shows Surfleet Reservoir stored water in 1998. It is also known to have stored water on other occasions, most notably in 1994, 2000, 2009 and 2013. This only covers information we hold and it is possible other flooding may have occurred which other organisations, such as the Local Authority or Internal Drainage Boards, may have records.

3. Schemes in the area

There are no ongoing capital projects to reduce or sustain the current flood risk to this site.

4. Fluvial Flood Risk Information

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

The site may 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.

The River Glen joins the tidal River Welland at Surfleet Seas End. To stop tidal/salt water entering the River Glen there is a tidal sluice (Surfleet Sluice) located adjacent to Reservoir Road. There are high embankments along the tidal Welland to defend against flooding from extreme high tides and surges. During periods of high tide, the River Glen cannot discharge water into the River Welland as it is 'tide-locked' – the tide levels in the River Welland are higher than the level of water in the River Glen. During periods of tide-lock the water from the River Glen catchment cannot discharge into the River Welland and it is stored in Surfleet Reservoir to avoid flooding of agricultural land. In most conditions this water remains within the channel flowing through the reservoir, however there are occasions where the reservoir fills and flooding occurs. This is typically when high flows in the River Glen (such as following prolonged rainfall) coincide with high or surge tides. In these instances, flooding of the berm and properties can and does occur.

4.1 Fluvial Defence Information

The area of interest comprises the Surfleet Reservoir which is a fluvial flood storage reservoir designed to contain fluvial flood water when discharge from the River Glen is tide-locked.

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 not considered to be at risk from tidal flooding.

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. 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 Alexander Tan using the email address below and quoting our CCN reference number above.

Yours sincerely,

Team dial: +442030253535

for Alastair Windler
Welland and Nene Partnerships and Strategic Overview Team Leader
e-mail PSOWN@environment-agency.gov.uk

Enc.
Flood Map
Historic Flood Event Outlines Map
Modelled Node Points Map
Modelled Fluvial Levels and Flows Data Sheet
Modelled Flood Extent Maps

Flood Map centred on TF 27724 29120 - created January 2023 [Ref: 230125/AT10]

Environment Agency

Scale 1:10,000

N

Legend

- Main Rivers
- Raised Defences
- Flood Storage Areas
- Areas at Risk of Flooding from Rivers or the 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.

Created by the Partnerships and Strategic Overview Team, Kettering

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Historic Flood Map centred on TF 27724 29120 - created January 2023 [Ref: 230125/AT10]

Environment Agency

Scale 1:10,000

N

Legend

Main Rivers

Easter 1998 on the River Glen at Surfleet

Created by the Partnerships and Strategic Overview Team, Kettering

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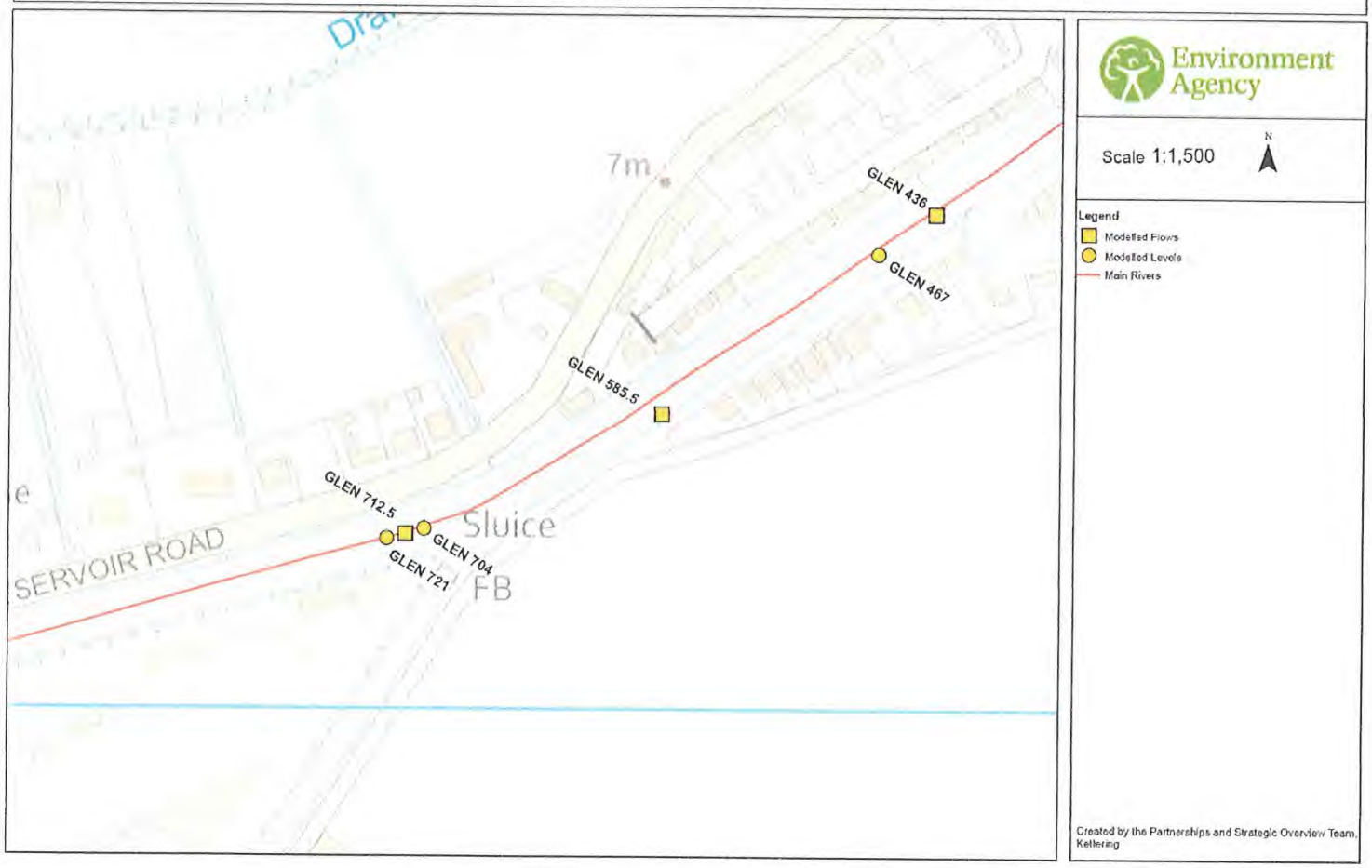
Node Map centred on TF 27724 29120 - created January 2023 [Ref: 230125/AT10]



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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).

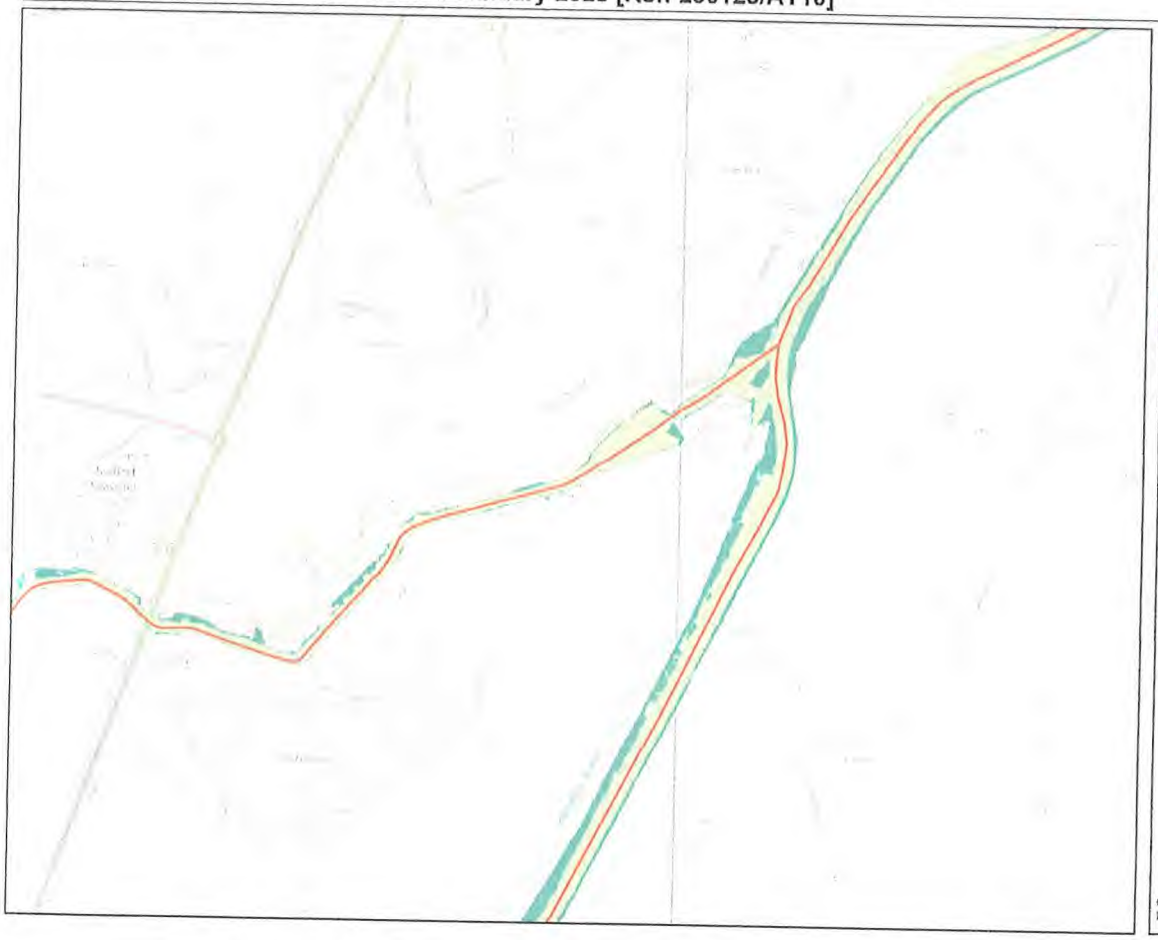
			Annual Exceedance Probability - Maximum Water Levels (mODN)										
Node Label	Easting	Northing	50% (1 in 2)	20% (1 in 5)	10% (1 in 10)	5% (1 in 20)	2% (1 in 50)	1.33% (1 in 75)	1% (1 in 100)	1% (1 in 100) inc 20% Climate Change	0.5% (1 in 200)	0.1% (1 in 1000)	0.1% (1 in 1000) inc 20% Climate Change
GLEN 467	527875	329200	3.90	4.04	4.13	4.19	4.16	4.17	4.17	4.78	4.22	4.30	4.83
GLEN 704	527675	329079	3.91	4.04	4.13	4.19	4.17	4.18	4.18	4.78	4.22	4.31	4.83
GLEN 721	527659	329075	3.91	4.04	4.13	4.19	4.17	4.18	4.18	4.78	4.22	4.31	4.83

Fluvial Flood Flows (m^3/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 (m^3/s).

			Annual Exceedance Probability - Maximum Flows (m^3/s)										
Node Label	Easting	Northing	50% (1 in 2)	20% (1 in 5)	10% (1 in 10)	5% (1 in 20)	2% (1 in 50)	1.33% (1 in 75)	1% (1 in 100)	1% (1 in 100) inc 20% Climate Change	0.5% (1 in 200)	0.1% (1 in 1000)	0.1% (1 in 1000) inc 20% Climate Change
GLEN 436	527900	329218	61.17	63.09	64.30	66.85	67.27	68.12	70.35	80.17	70.69	79.46	88.86
GLEN 585.5	527780	329130	58.71	60.86	62.61	64.73	64.89	65.93	65.92	77.20	68.97	76.89	85.97
GLEN 712.5	527667	329077	54.83	56.98	58.81	60.90	61.09	62.15	62.26	73.34	65.23	73.13	82.15

Modelled Flood Extents (with defences) Model: Welland Catchment Strategic 2016
centred on TF 27724 29120 - created January 2023 [Ref: 230125/AT10]



Environment Agency

Scale 1:10,000

N

Legend

- Main Rivers
- 5% (1 in 20) fluvial event
- 1% (1 in 100) fluvial event
- 1% (1 in 100) inc 20% climate change fluvial event
- 0.1% (1 in 1000) fluvial event
- 0.1% (1 in 1000) inc 20% climate change fluvial event

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