GADSDEN CONSULTING

FLOOD RISK ASSESSMENT

LOCATION: SALTHOUSE FARM, MILLOM, LA18 5EX
CLIENT: NEIL PRICE LTD
JOB No: 24035

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Rev	Description	Issued By	Reviewed By	Date
04	Updated Flood Maps and Proposed Development	RB	MG	27/05/2025
03	Updated Section 4.4	RB	MG	20/03/2025
02	Updated Section 4.3	RB	MG	18/03/2025
01	Preliminary Issue	RB	MG	15/01/2025

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Contents

1. Introduction 5
1.1 Background 5
1.2 Planning Policy Context 5
1.3 Sequential Test 6
1.4 Climate Change 7
1.5 Local Policy Guidance 7
2. Site Characteristics & Development Proposal 8
2.1 Site Description 8
2.2 Development Proposal 8
2.3 Topography 8
2.4 Existing Drainage 8
2.5 Hydrology 8
2.6 Geology 9
3. Existing Flood Hazards 9
3.1 Introduction 9
3.2 Tidal & Fluvial Flooding 9
3.3 Groundwater 13
3.4 Drainage Systems & Pluvial Flooding (Surface Water) 13
4. Proposed Development 14
4.1 Introduction 14
4.2 Sequential & Exception Test 14
4.3 Proposed Site Levels 14
4.4 Proposed Drainage Strategy 14
4.5 Future Flood Risk & Exceedance Routes 15
4.6 Future Management 15
4.7 Emergency Planning 15
5. Summary 17

Appendix A – Topographical Survey

Appendix B – Drainage Design

Appendix C – Householder Surface Water Maintenance Pack

Appendix D – Management Company Maintenance Pack

Appendix E – Environment Agency Product 4

Tables

Table 1 - Flood Risk Vulnerability and Flood Zone Compatibility (extract from NPPF) 6
Table 2 - Recommended Contingency Allowances for Sea Level Rises 7
Table 3 - South West Lakes Management Catchment Peak River Flow Allowances 7
Table 4 - Flood Hazards and Mitigation Measures 14

Maps

Map 1 - EA Flood Map for Planning (River & Sea) 10
Map 2 - EA Flood Defences Map 11
Map 3 - EA Defended Climate Change Modelled Tidal Extent 11
Map 4 - EA Defences Removed Climate Change Modelled Tidal Extent and Height Map 12
Map 5 - EA Defended Climate Change Modelled Tidal Extent Map 12
Map 6 - EA Surface Water Flood Map 13

1. Introduction

1.1 Background

Gadsden Consulting have been appointed by Neil Price Ltd to undertake a Flood Risk Assessment in support of a planning application for proposed housing development at Salthouse Farm, Millom, LA18 5EX.

The purpose of this report is to comment upon the flood risk status of the area and the likelihood of increased flood risk to the development land or the surrounding area as a result.

1.2 Planning Policy Context

Current planning policy for flood risk and surface water management is dictated by the National Planning Policy Framework (NPPF). This Flood Risk Assessment (FRA) has been prepared in accordance with the requirements of the NPPF.

The NPPF states "A Site Specific Flood Risk Assessment is required for proposals of 1 hectare or greater in Flood Zone 1; all proposals for new development in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems". The NPPF explains that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere.

A sequential, risk-based approach to the location of development is outlined in the NPPF with the aim to avoid, where possible, flood risk to people and property and manage any residual risk, taking account of the impacts of climate change, by:

- applying the Sequential Test
- if necessary, applying the Exception Test
- safeguarding land from development that is required for current and future flood management
- using opportunities offered by new development to reduce the causes and impacts of flooding
- where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to facilitate the relocation of development, including housing, to more sustainable locations.

1.3 Sequential Test

The NPPF states that the aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding and that a sequential approach should be used in areas known to be at risk from any form of flooding. Development types are given a "Flood Risk Vulnerability Classification" in one of the following groups:

- Essential Infrastructure – including essential transport infrastructure, essential utility infrastructure, wind turbines
- Highly Vulnerable – including police, ambulance and fire stations, command centres, basements, caravan and mobile home parks for residential use and installations requiring hazardous consent.
- More Vulnerable – including hospitals, residential institutions, dwellings, educational facilities, landfill for hazardous substances and sites used for short stay holiday lets such as camping and caravans.
- Less Vulnerable – including shops, offices, restaurants, cafes and takeaways, general industry, storage and distribution, non-residential institutions, leisure facilities, agricultural and forestry activities.
- Water-Compatible Development – including flood control infrastructure, MOD installations etc

Table 1 below defines whether the development is appropriate based on the vulnerability classification and the environment agency's flood zone.

Table 1 - Flood Risk Vulnerability and Flood Zone Compatibility (extract from NPPF)

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate.
× Development should not be permitted.

1.4 Climate Change

The NPPF explains that global sea level will continue to rise, depending on greenhouse gas emissions and the sensitivity of the climate system. It states that, in preparing an FRA, the allowances for the rates of relative sea level rise shown in Table 2 should be used as a starting point for considering flooding from the sea.

Table 2 - Recommended Contingency Allowances for Sea Level Rises

Area of England	Allowance	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (metres)
North west	Higher central	4.5 (158)	7.3 (219)	10 (300)	11.2 (336)	1.01
North west	Upper end	5.7 (200)	9.9 (297)	14.2 (426)	16.3 (489)	1.41

The Technical Guidance to NPPF also states that when "the Environment Agency, as a statutory consultee, uses the management catchment climate change allowances from the peak river flow map as benchmarks." For flood risk assessments where the development site falls within flood zones 2 and 3a, the central allowance should be used for the vulnerability classification of 'less vulnerable'.

Table 3 - South West Lakes Management Catchment Peak River Flow Allowances

	Central	Higher	Upper
2020s	12%	14%	22%
2050s	17%	23%	38%
2080s	30%	39%	63%

1.5 Local Policy Guidance

The NPPF sets out that Local Plans should be supported by a Strategic Flood Risk Assessment (SFRA). For this development, the relevant guidance is the Copeland SFRA and this has been referred to in the production of this site-specific FRA.

2. Site Characteristics & Development Proposal

2.1 Site Description

The site is located off Salthouse Road (A5093), Millom. The site is surrounded by residential properties, a school, and agricultural land. It is approximately 400m to the north east of Millom train station.

The application site covers an area of approximately 0.265 hectares and is roughly rectangular in shape. There are no existing above ground structures on site and the site is accessed from the existing highway known as Salthouse Road (A5093).

2.2 Development Proposal

It is proposed to construct a new private shared access drive on site and 5 detached family homes with associated parking.

2.3 Topography

The site is generally flat, with two topsoil stockpiles on site in the western and south western corner. The levels on site range between 5.85m AOD and 8.20m AOD. The high point is located at one of the topsoil bunds on the western boundary and the low point is towards along the southern boundary.

The topographical survey can be seen in Appendix A.

2.4 Existing Drainage

United Utilities sewer records show a private 225mm vitrified clay surface water running in a south westerly direction approximately 60m to the south west of the site.

There is also a 150mm vitrified clay adopted combined sewer approximately 120m to the south west of the site. This ultimately discharges into the sewage treatment works approximately 1.75km to the south east of the site.

2.5 Hydrology

Salthouse Pool runs from north to south approximately 80m to the west of the site. This appears to then be culverted or diverted under the road and field to the south before opening up again and discharging into the Irish Sea to the east.

2.6 Geology

Preliminary geological information has been sourced from the British Geological Survey website. A summary of this information is as follows:-

- Made Ground – no records of made ground on-site.
- Superficial geology – Raised Marine Deposits - Sand and gravel. Sedimentary superficial deposit formed between 2.588 million years ago and the present during the Quaternary period.
- Bedrock – Birk Riggs Formation - Sandstone and argillaceous rocks, interbedded. Sedimentary bedrock formed between 430.5 and 427.4 million years ago during the Silurian period.

3. Existing Flood Hazards

3.1 Introduction

This section considers the following sources of flood hazards:

- Tidal
- Fluvial
- Groundwater
- Drainage systems

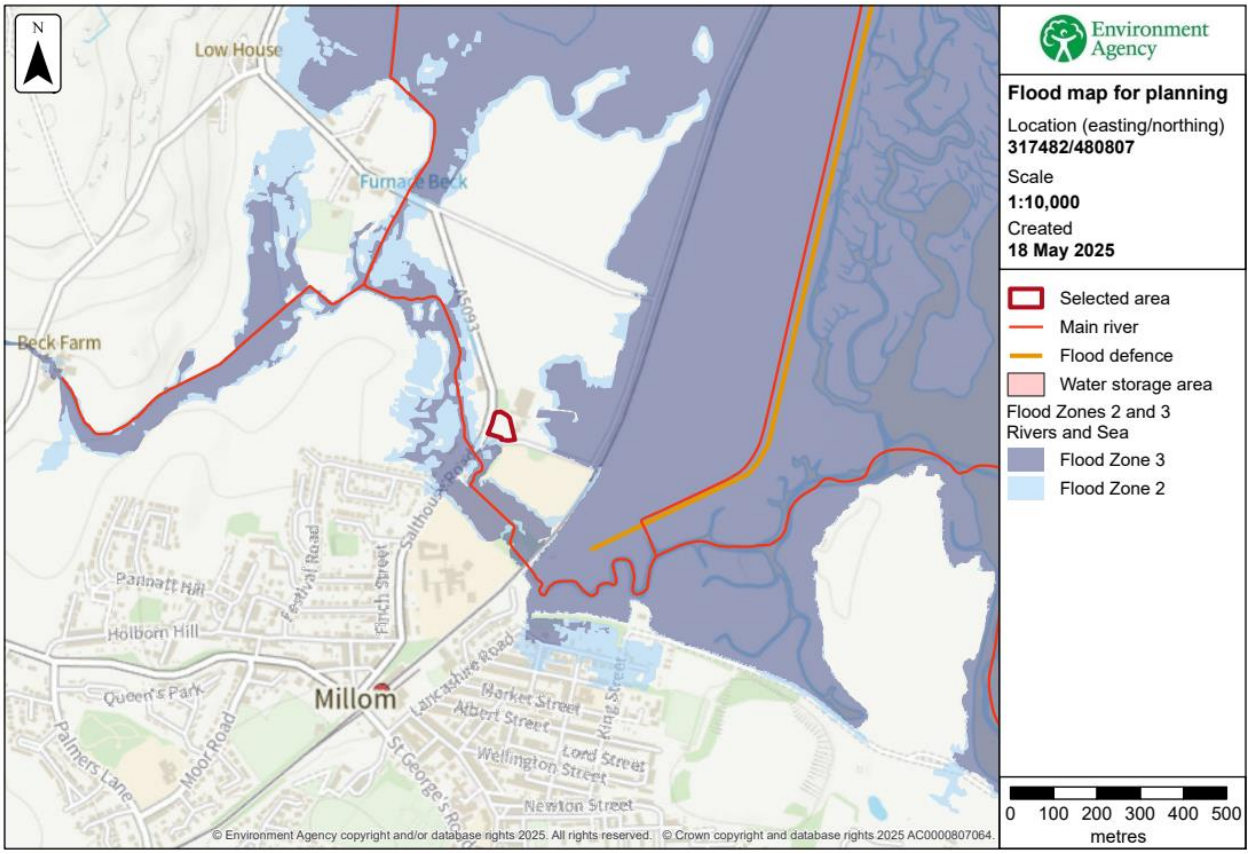
3.2 Tidal & Fluvial Flooding

The EA flood map shows the flood hazard from tidal and river sources. The latest flood information from the EA shows the site to mainly in flood zones 1, with a localised area to the south of the site in flood zone 2. EA Flood Zones are defined as follows: -

- **Flood Zone 1** (low probability) is defined as land assessed as having less than a 0.1% annual probability of flooding from a river or the sea.
- **Flood Zone 2** (medium probability) is defined as land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% - 0.1%) or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% - 0.1%) in any year.
- **Flood Zone 3** (high probability) is defined as land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year. The Technical Guidance to NPPF splits Flood Zone 3 in to two sub-categories:

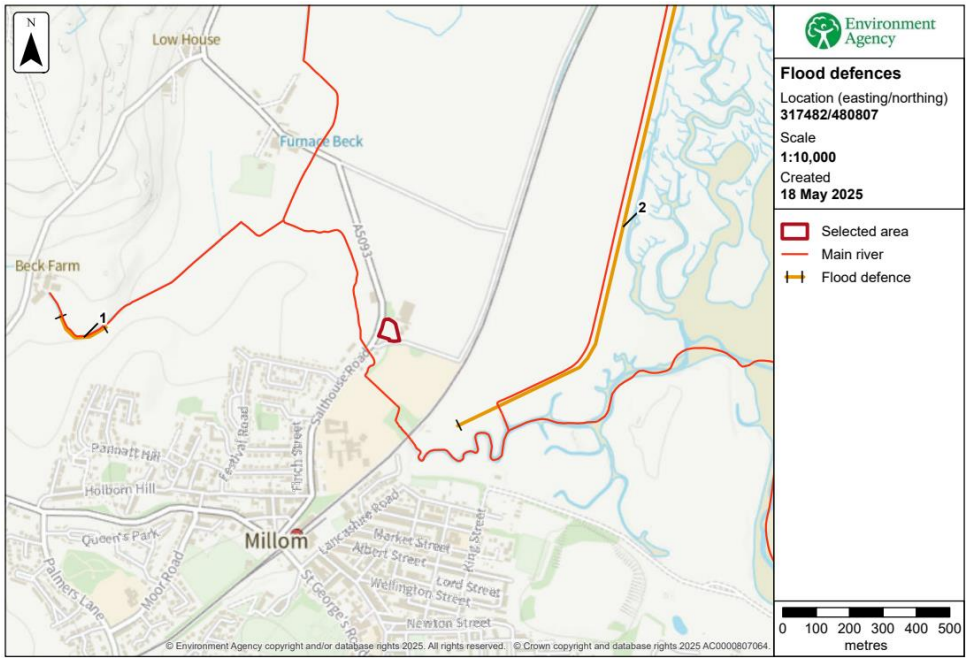
1. **Flood Zone 3a** (high probability) is defined as land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
2. **Flood Zone 3b** is defined as functional floodplain.

Map 1 - EA Flood Map for Planning (River & Sea)



The site benefits from protection against tidal flooding with defences in the form of an embankment as shown in the map below. The effective crest of the embankment is 6.12m AOD.

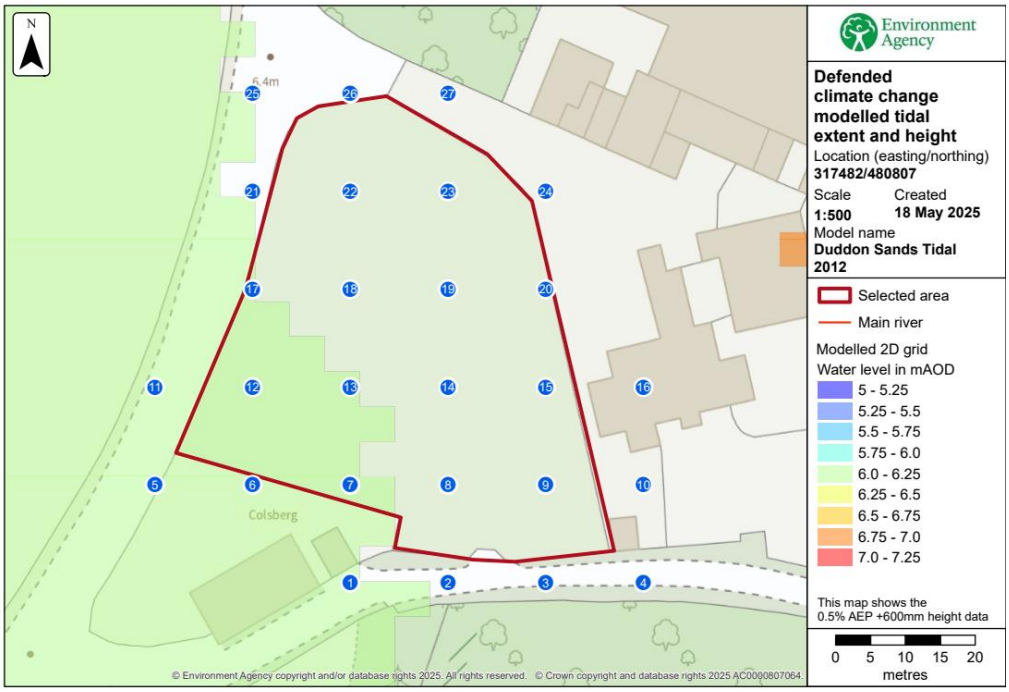
Map 2 - EA Flood Defences Map



The Environment Agency map below shows the 0.5% annual exceedance probability (AEP) defended modelled tidal extent with an allowance for climate change and 600mm sea level rises.

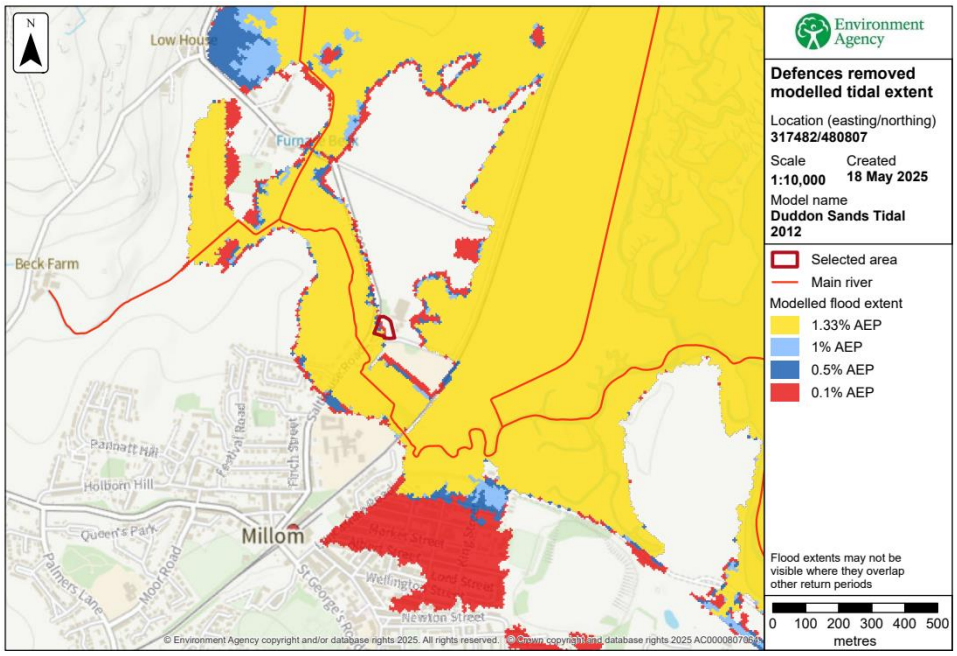
The map indicates that the south western corner of the site would flood under this criteria, with the level of 6.19m AOD given to nodal points 6, 7, 12, 13 & 17. This would mean part of the site to the west would flood under this circumstance. The defences removed map for the same return period and climate change allowance shows the majority of the site to flood, with levels reaching 6.95m AOD.

Map 3 - EA Defended Climate Change Modelled Tidal Extent



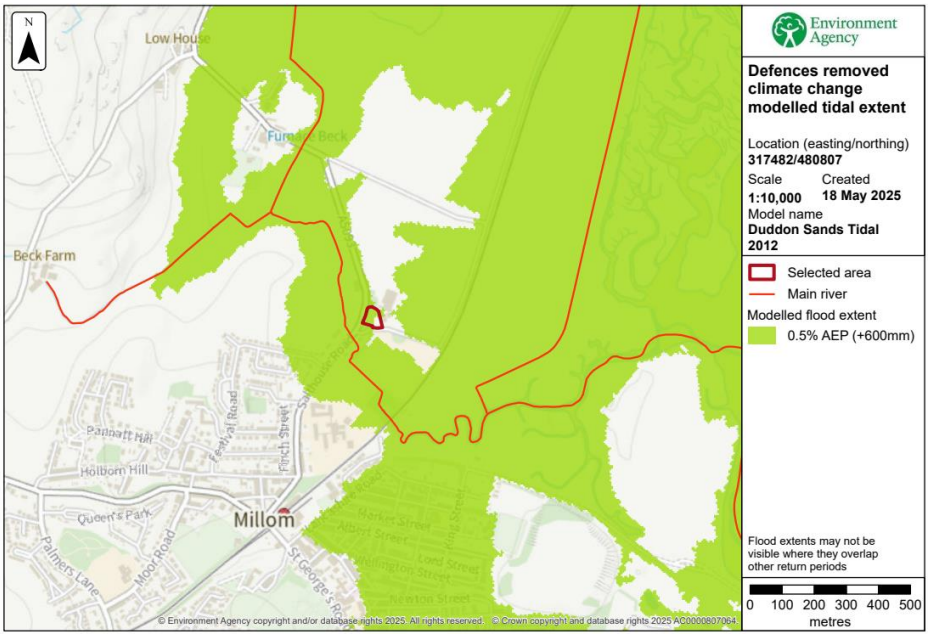
The map below shows the defences removed modelled tidal extent and height, with an allowance for climate change. This indicates that part of the site would flood under the 1.33% annual exceedance probability (AEP) event, and under the 1%, 0.5% and 0.1% AEP events.

Map 4 - EA Defences Removed Climate Change Modelled Tidal Extent and Height Map



The EA map below shows the defences removed climate change modelled tidal extents of the 0.5% AEP with a 600mm climate change allowance. This map indicates that part of the site would flood under the modelled return period.

Map 5 - EA Defended Climate Change Modelled Tidal Extent Map



Due to the sites location, tidal and fluvial flooding are connected. Map 4 indicates that under certain tidal events Salthouse Pool would back up and break its banks, causing flooding to part of the site. No information has been provided by the EA for Salthouse Pool.

3.3 Groundwater

The risk of groundwater flooding is unlikely as stated on the .gov.uk website . This is supported by the Copeland Borough Council SFRA which states '*A limited potential for groundwater flooding exists within the Borough. In the whole of the South West Lakes Catchments, less than 10 properties are thought to be at risk*.'

We therefore consider the site to be at low risk of groundwater flooding.

3.4 Drainage Systems & Pluvial Flooding (Surface Water)

Surface Water (pluvial) flooding is defined as flooding caused by rainfall-generated overland flow before the runoff enters a watercourse or sewer. In such events, sewerage and drainage systems and watercourses may be entirely overwhelmed.

The surface water flood map shown below indicates that the majority of the site is at very low risk of surface water flooding. This means that the risk of surface water flooding on site is less than 0.1% each year (1 in 100 year event). There are what appears to be two localised areas of medium to high surface water flooding (1% EAP-3.3% AEP and more than 3.3% AEP respectively), however these appear to be localised depressions.

Map 6 - EA Surface Water Flood Map

Extent of flooding from surface water

High Medium Low Very low Location you selected

4. Proposed Development

4.1 Introduction

As detailed in section 3 of this report the following flood hazards need to be considered in the development of this site: -

Table 4 - Flood Hazards and Mitigation Measures

Flood Hazard	Mitigation for Impact on Development
Tidal (Zone 2)	Finished floor level to be raised above critical flood level
Fluvial (Zone 2)	N/A
Groundwater	N/A
Surface Water	Formal drainage network to be installed, limiting discharge off-site

4.2 Sequential & Exception Test

As previously discussed the aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding.

The proposed development falls partly within flood zone 2, with the majority of the site in flood zone 1. The vulnerability classification is “more vulnerable”, therefore table 1 states that the development is appropriate.

4.3 Proposed Site Levels

Based on the information collected and the vulnerability classification, the site is at risk from both tidal and fluvial flooding. The most critical levels relating to the site are from tidal flooding at 6.19m AOD (defended 0.5% + climate change + 600mm sea level rises).

Levels on site range from 5.75 – 8.2m AOD. The levels below the critical flood level of 6.19m AOD are all in the south western corner of the site. It is proposed to install finished floor levels at a minimum of 6.79m AOD. This would provide a 600mm freeboard above the critical flood level.

4.4 Proposed Drainage Strategy

Any proposed drainage scheme should minimise the rate of runoff from the site to greenfield runoff rates. Planning Policy guidance suggests the following hierarchy for surface water discharge: -

1. Into the ground (Infiltration)
2. To a surface water body;
3. To a surface water sewer;
4. To a combined sewer.

BRE365 Soakaway testing has been undertaken by the client and deemed infiltration drainage unsuitable for the site.

The highways, house roof and driveway areas will be served by geocellular attenuation baskets. The flow from the site will be restricted using a vortex flow control device. The surface water network will then cross Salthouse Road before travelling south west and discharging into Salthouse Pool.

Attenuation features have been designed for return periods up to and including the 100 year event, with a 50% allowance for climate change and a 10% allowance for urban creep.

The runoff rate will be restricted to 5.0l/s using a vortex flow control device. The greenfield rate would require a small orifice to restrict the discharge and these can be prone to blockage and maintenance issues.

The drainage design can be seen in Appendix B.

4.5 Future Flood Risk & Exceedance Routes

Flood risk to the new dwellings is ow. All attenuation features have been designed to a return period of 100 years plus climate change of 50% and a 10% allowance for urban creep.

Exceedance routes will be provided to guide any flood water away from the properties and towards the existing highway.

4.6 Future Management

Plot drainage will be the responsibility of the individual homeowner. A maintenance pack will be provided and ban be seen in Appendix C.

The main drainage network serving the site, including the attenuation baskets and flow control manhole, will be the responsibility of a management company set up by the developer. The management company maintenance pack can be seen in Appendix D.

4.7 Emergency Planning

The Environment Agency monitor river levels within the main rivers affecting the area, and based upon weather predictions provided by The Met Office, make an assessment of the anticipated maximum water level that is likely to be reached within the proceeding hours (and/or days). Where these predicted water levels are expected to result in the inundation of populated areas, the Environment Agency will issue a series of flood warnings within defined flood warning areas, encouraging residents and businesses to take action to avoid damage to property in the first instance. Environment Agency flood warnings provide the earliest warning for residents and businesses. This 3-level (flood alert, flood warning, severe flood warning) warning service is free online and should be signed up to by the owner as part of an individual flood plan. The Environment Agency can alert individuals in a variety of ways such as recorded messages, text and email. These warnings should be monitored during extreme weather conditions and the EA also advise on when the warnings are no longer in place.

Emergency planning is the responsibility of Westmorland and Furness Council. The proposed development is located within one of the County's key service centres. During a District-wide flood event, the council and other Emergency Services could find it difficult to help in some areas. Warning times are short, travel distances can be long and roads may be cut off or damaged by flooding. For further information on the EA flood warning system refer to: Environment Agency – Flood Warnings: What they are and what they do (November 2010).

5. Summary

The majority of the application site falls within flood zone 1, however there is a small part of the site in flood zone 2. Based on NPPF, the flood risk vulnerability classification of the proposal is 'more vulnerable' and the development is appropriate.

The site will be served by a formal drainage network with geocellullar attenuation baskets and a restricted flow rate of 5l/s for surface water off site. The system will discharge into Salthouse Pool to the south west of the site. The network has been designed for return periods up to 100 years plus a 50% allowance for climate change and a 10% allowance for urban creep.

There is potential for both tidal and fluvial flooding to the site. The 0.5% AEP + climate change tidal flooding event provide a level of 6.19m AOD) based on information from the Environment Agency. A freeboard of 600mm has been added to the critical flood level to provide a minimum finished floor level of 6.79m AOD. This will ensure the development is safe for its 100 year designed lifetime.

The development of this site and proposed drainage strategy as described in this report will have no detrimental effect on flood risk to the surrounding area and will be well protected from flooding due to the raised finished floor level relative to the modelled flood levels.

Appendix A

N

A5093

EXISTING ACCESS

SALTHOUSE FARM

TOPSOIL

TOPSOIL

COLSBERG

AGGIE'S LONNIN

SALTHOUSE POOL

MH
CL 6.57
IL ????

WATER
CL 6.17
IL ????

MH F5 FOUL
CL 6.02
IL 5.451

MH F4 FOUL
CL 6.130
IL 5.513

MH F6 FOUL
CL 6.015
IL 5.294

TC

0 2.5 5 7.5 10 12.5
METRES

1 : 250

No.	Date	Revision
P1	03/01/25	Issued for preliminary approval

Status
PLANNING

Paper Size
A2

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Responsibility is not accepted for errors made by others in scaling from this drawing - All construction information should be taken from figured dimensions only.

All heights, levels, sizes and dimensions to be checked on site and any discrepancies be notified prior to any manufacture or commencement of works.

Project
Residential Development
Salthouse Farm, Millom

Title
SITE TOPOGRAPHICAL SURVEY

Drawn	Checked	Date
TC	NP	25 October 2024

Job Ref	Scale
3189	1:250 @A2

Sheet	Revision
P102	P1

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Appendix B

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	18.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.084	5.00	6.656	1200	317488.773	480808.095	1.656
2	0.084	5.00	6.194	1200	317462.738	480820.660	1.500
3	0.000		6.000	1200	317447.211	480817.980	1.464
4	0.000		5.800	1200	317434.253	480786.832	1.601
5			5.500	1200	317413.022	480758.851	1.652

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	28.908	0.600	5.000	4.694	0.306	94.5	225	5.36	50.0
1.001	2	3	15.757	0.600	4.694	4.536	0.158	100.0	225	5.56	50.0
1.002	3	4	33.736	0.600	4.536	4.199	0.337	100.0	225	5.99	50.0
1.003	4	5	35.124	0.600	4.199	3.848	0.351	100.0	225	6.44	49.3

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.345	53.5	11.4	1.431	1.275	0.084	0.0	70	1.071
1.001	1.307	52.0	22.8	1.275	1.239	0.168	0.0	104	1.265
1.002	1.307	52.0	22.8	1.239	1.376	0.168	0.0	104	1.265
1.003	1.307	52.0	22.4	1.376	1.427	0.168	0.0	103	1.260

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	28.908	94.5	225	Circular_Default Sewer Type	6.656	5.000	1.431	6.194	4.694	1.275
1.001	15.757	100.0	225	Circular_Default Sewer Type	6.194	4.694	1.275	6.000	4.536	1.239
1.002	33.736	100.0	225	Circular_Default Sewer Type	6.000	4.536	1.239	5.800	4.199	1.376
1.003	35.124	100.0	225	Circular_Default Sewer Type	5.800	4.199	1.376	5.500	3.848	1.427

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable
1.001	2	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
1.002	3	1200	Manhole	Adoptable	4	1200	Manhole	Adoptable
1.003	4	1200	Manhole	Adoptable	5	1200	Manhole	Adoptable

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	317488.773	480808.095	6.656	1.656	1200				
						0	1.000	5.000	225
2	317462.738	480820.660	6.194	1.500	1200	1	1.000	4.694	225
									
						0	1.001	4.694	225
3	317447.211	480817.980	6.000	1.464	1200	1	1.001	4.536	225
									
						0	1.002	4.536	225
4	317434.253	480786.832	5.800	1.601	1200	1	1.002	4.199	225
									
						0	1.003	4.199	225
5	317413.022	480758.851	5.500	1.652	1200	1	1.003	3.848	225
									

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	✓
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	18.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.300	Check Discharge Rate(s)	✓
Summer CV	0.750	Check Discharge Volume	✓
Winter CV	0.840	100 year 360 minute (m³)	
Analysis Speed	Normal		

Storm Durations

15	60	180	360	600	960	2880	5760	8640
30	120	240	480	720	1440	4320	7200	10080

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
100	0	0	0
100	50	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.95
Greenfield Method	IH124	Growth Factor 100 year	2.48
Positively Drained Area (ha)		Betterment (%)	0
SAAR (mm)		QBar	
Soil Index	1	Q 1 year (l/s)	
SPR	0.10	Q 30 year (l/s)	
Region	1	Q 100 year (l/s)	
Growth Factor 1 year	0.85		

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Pre-development Discharge Volume

Site Makeup	Greenfield	Return Period (years)	100
Greenfield Method	FSR/FEH	Climate Change (%)	0
Positively Drained Area (ha)		Storm Duration (mins)	360
Soil Index	1	Betterment (%)	0
SPR	0.10	PR	
CWI		Runoff Volume (m^3)	

Node 2 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	4.694	Product Number	CTL-SHE-0109-5000-0800-5000
Design Depth (m)	0.800	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	4.694
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	160

Depth (m)	Area (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)	Depth (m)	Area (m^2)	Inf Area (m^2)
0.000	90.0	0.0	0.800	90.0	0.0	0.801	0.0	0.0

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Results for 2 year Critical Storm Duration. Lowest mass balance: 97.09%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	5.078	0.078	12.5	0.1681	0.0000	OK
60 minute winter	2	46	4.836	0.142	14.0	12.4303	0.0000	OK
60 minute winter	3	46	4.582	0.046	4.8	0.0525	0.0000	OK
60 minute winter	4	47	4.245	0.046	4.8	0.0526	0.0000	OK
60 minute winter	5	47	3.894	0.046	4.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	12.5	1.358	0.234	0.3502	
60 minute winter	2	Hydro-Brake®	3	4.8				
60 minute winter	3	1.002	4	4.8	0.810	0.092	0.1988	
60 minute winter	4	1.003	5	4.8	0.817	0.092	0.2051	19.5

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Results for 30 year Critical Storm Duration. Lowest mass balance: 97.09%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	5.108	0.108	23.6	0.2317	0.0000	OK
120 minute winter	2	92	5.014	0.320	17.2	28.0520	0.0000	SURCHARGED
60 minute summer	3	38	4.583	0.047	5.0	0.0537	0.0000	OK
60 minute summer	4	69	4.247	0.048	5.0	0.0538	0.0000	OK
180 minute summer	5	152	3.895	0.047	5.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	23.5	1.450	0.439	0.6728	
120 minute winter	2	Hydro-Brake®	3	5.0				
60 minute summer	3	1.002	4	5.0	0.821	0.096	0.2056	
60 minute summer	4	1.003	5	5.0	0.828	0.096	0.2121	33.7

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Results for 100 year Critical Storm Duration. Lowest mass balance: 97.09%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute winter	1	98	5.154	0.154	11.3	0.3295	0.0000	OK
120 minute winter	2	98	5.153	0.459	22.6	40.2956	0.0000	SURCHARGED
30 minute summer	3	20	4.583	0.047	5.0	0.0537	0.0000	OK
15 minute summer	4	19	4.247	0.048	5.0	0.0538	0.0000	OK
15 minute summer	5	19	3.895	0.047	5.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
120 minute winter	1	1.000	2	11.3	0.931	0.211	0.9923	
120 minute winter	2	Hydro-Brake®	3	5.0				
30 minute summer	3	1.002	4	5.0	0.825	0.096	0.2056	
15 minute summer	4	1.003	5	5.0	0.828	0.096	0.2121	23.9

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Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 97.09%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	1	148	5.487	0.487	12.9	1.0436	0.0000	SURCHARGED
180 minute winter	2	148	5.486	0.792	24.8	69.4768	0.0000	SURCHARGED
15 minute summer	3	10	4.584	0.048	5.0	0.0538	0.0000	OK
960 minute summer	4	705	4.247	0.048	5.0	0.0538	0.0000	OK
15 minute winter	5	77	3.895	0.047	5.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
180 minute winter	1	1.000	2	12.2	0.917	0.229	1.1497	
180 minute winter	2	Hydro-Brake®	3	5.0				
15 minute summer	3	1.002	4	5.0	0.857	0.096	0.2056	
960 minute summer	4	1.003	5	5.0	0.828	0.096	0.2121	155.9

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Appendix C

GADSDEN CONSULTING
CIVIL & STRUCTURAL ENGINEERS

GADSDEN CONSULTING
Unit 20
Meetings Industrial Estate
Park Road
Barrow-in-Furness
Cumbria
LA14 4TL
Email: info@gadsdens.co.uk
Website: gadsdens.co.uk
Tel: 01229 813 333

Householder Sustainable Drainage Maintenance Plan

Development at Salthouse Farm, Millom

1.0 Introduction

Sustainable drainage systems or SuDS are an environmentally friendly approach to managing rainfall that uses the landscape. SuDS aim to: -

- Control the flow, volume and frequency of water leaving a development site
- Prevent pollution by intercepting silt and cleaning runoff from hard surfaces
- Provide attractive surroundings for the community
- Create opportunities for wildlife

2.0 Surface water drainage & SuDS serving this property

The highway drainage serving the site as well as the roof and driveway water from your property discharges into the private sewer serving the site before discharging into Salthouse Pool. Once the surface water enters the main network serving the site, it is the responsibility of the management company.

House roof and driveway surfaces are served by downspouts, gulleys and ACO channel drains (or similar) within your property before entering the public sewer. As the property owner you are responsible for maintenance and upkeep of the system serving your property.

As the property owner you are responsible for maintenance and upkeep of the system serving your house. SuDS features should not be interfered with in any fashion without the prior approval of the Lead Local Flood Authority (Westmorland and Furness Council).

3.0 Management & Maintenance

The surface water drainage and SuDs requiring management and maintenance for this property are summarised in Table 1 below: -

Table 1 – Householder Maintenance Schedule

Maintenance Item	Regularity	Action	Purpose	Diagram
ACO or similar channel to driveway	Monthly	Remove litter, grass cuttings and other vegetation from the surface of the grills	Prevent grills becoming blocked allowing water to get away	
ACO or similar channel to driveway	Annually	Remove debris, grass cuttings etc from inside the channel itself. This can be easily done by lifting the lid to the corner unit and cleaning out the sump by hand wearing a suitable pair of gloves	Prevent the silt trap filling up and debris entering the soakaway system	 Corner unit Sump unit
Gullies to downspouts	Monthly	Remove litter, grass cuttings and other vegetation from the gulley grate	Prevent grate/cover becoming blocked allowing water to get away	
Gullies to downspouts	Annually	Remove debris, grass cuttings etc from inside the gulley itself. This can be easily done by lifting the cover and cleaning out the gulley by hand wearing a suitable pair of gloves	Prevent the trap filling up and debris entering the soakaway system	
Silt Trap Manhole and Inspection Chambers	Annually	-Remove silt from base of silt trap manhole	Prevent silt trap filling up and debris entering the system	

Appendix D

GADSDEN CONSULTING
CIVIL & STRUCTURAL ENGINEERS

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LA14 4TL
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Website: gadsdens.co.uk
Tel: 01229 813 333

Sustainable Drainage Management Plan

Housing Development at Salthouse Farm, Millom

1.0 Introduction

Sustainable drainage systems or SuDS are an environmentally friendly approach to managing rainfall that uses the landscape. SuDS aim to: -

- Control the flow, volume and frequency of water leaving a development site
- Prevent pollution by intercepting silt and cleaning runoff from hard surfaces
- Provide attractive surroundings for the community
- Create opportunities for wildlife

2.0 SuDS at Salthouse Farm, Millom

The SuDS are designed to prevent flooding of the housing development and control the flow of water from the site. This site utilises geocellullar attenuation baskets and a vortex flow control to attenuate and restrict the discharge off site.

The surface water crosses Salthouse Road and discharges further to the south via a headwall into Salthouse Pool.

3.0 Managing the SuDS

The surface water drainage and SuDS requiring management and maintenance for this site are summarized in Table 1 below: -

Table 1 – Maintenance Schedule

	Maintenance Item	Action	Regularity
1	Manholes, Pipes etc	Lift manhole covers, visual inspection. If debris/silt has built up arrange jetting. Arrange CCTV survey if performance deteriorates.	Annually and/or as required
2	Inlets & Outlets	Inspect and remove silt, litter and debris. Strim for 1m around	Monthly
3	Attenuation Baskets/Tank	Inspect baskets and jet if silt is building up	Annually and/or as required
4	Attenuation Baskets/Tank	Reconstruct tank and/or replace or clean baskets if performance deteriorates. Replace impermeable membrane surround if required	Annually and/or as required

Appendix E

Flood risk assessment data

Location of site: 317482 / 480807 (shown as easting and northing coordinates)
Document created on: 18 May 2025
This information was previously known as a product 4.
Customer reference number: MC745KYTACHE

Map showing the location that flood risk assessment data has been requested for.

How to use this information

You can use this information as part of a flood risk assessment for a planning application. To do this, you should include it in the appendix of your flood risk assessment.

We recommend that you work with a flood risk consultant to get your flood risk assessment.

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of flooding
- information on the models used
- definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- flood defences and attributes
- information to help you assess if there is a reduced flood risk from rivers and the sea because of defences
- modelled data
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
- help and advice

Information that's unavailable

This document **does not** contain:

- past floods

We do not have past flooding data for this location.

Please note that:

- flooding may have occurred that we do not have records for
- flooding can come from a range of different sources
- we can only supply flood risk data relating to floodng from rivers or the sea

You can contact your Lead Local Flood Authority or Internal Drainage Board to see if they have other relevant local flood information. Please note that some areas do not have an Internal Drainage Board.

Surface water and other sources of flooding

When using the surface water map on the check your long term flood risk service the following considerations apply:

- surface water extents are suitable for use in planning
- surface water climate change scenarios may help to inform risk assessments, but the available data fall short of what is required to assess planned development
- surface water depth information should not be used for planning purposes

To find out about other factors that might affect the flood risk of this location, you should also check:

- reservoir flood risk
- groundwater flood risk - you could use the British Geological Survey groundwater flooding data, groundwater: current status and flood risk and the guide on mining and groundwater constraints for development - further information may be available from the lead local flood authority (LLFA)
- your local planning authority's SFRA, which includes future flood risk

Your Lead Local Flood Authority is Cumberland.

For information about sewer flooding, contact the relevant water company for the area.

About the models used

Model name: Duddon Sands_Tidal 2012
Scenario(s): Defended tidal, defences removed tidal, defended climate change tidal, defences removed climate change tidal
Date: 1 July 2013

This model contains the most relevant data for your area of interest.

Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occuring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.

Flood map for planning (rivers and the sea)

Your selected location is in flood zone 2.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

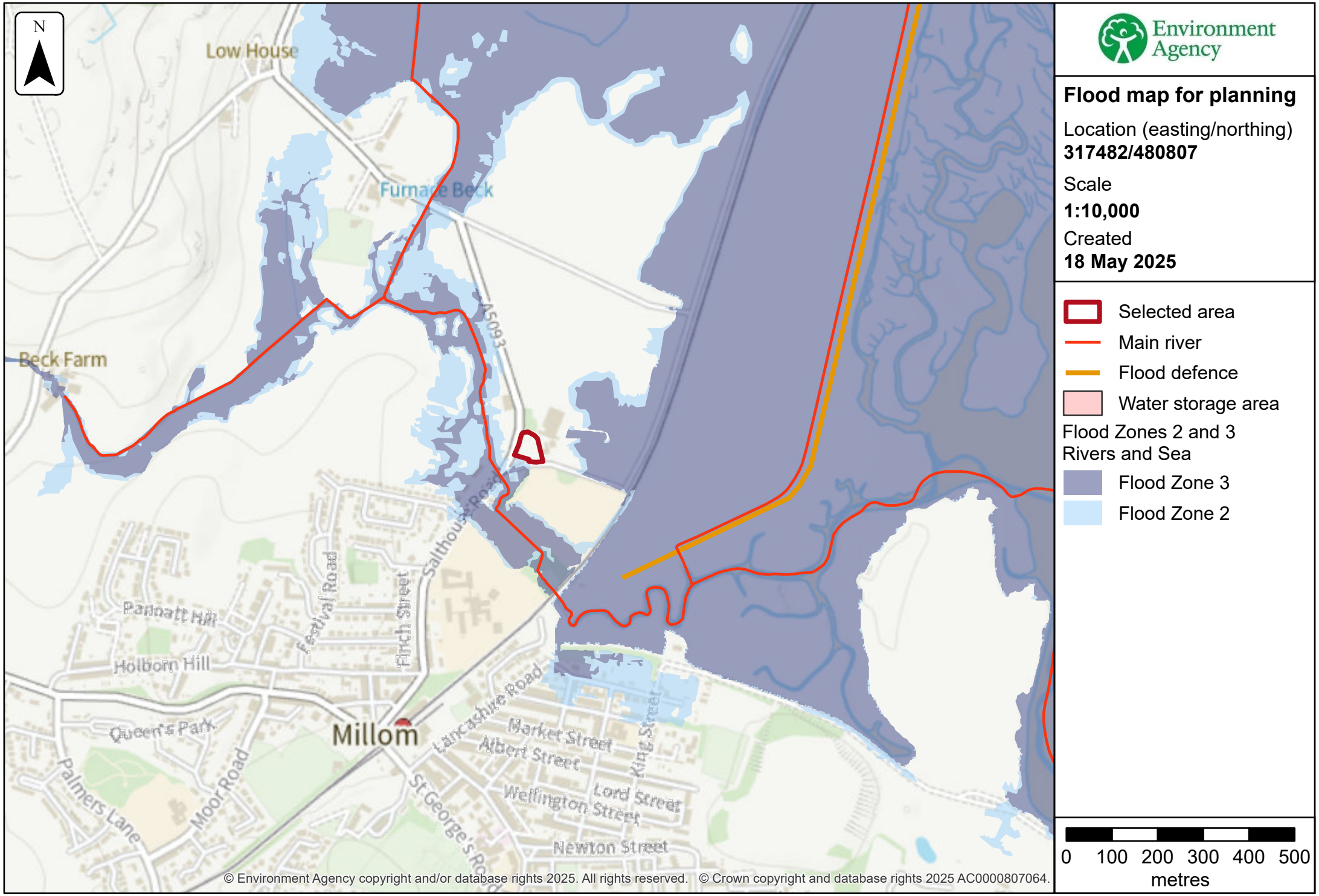
- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change


N
Low House
Furnace Beck
A5093
Beck Farm
Salthouse Road
Festival Road
Finch Street
Padnall Hill
Holborn Hill
Queen's Park
Millom
Lancashire Road
Market Street
Albert Street
King Street
Lord Street
Wellington Street
Newton Street
St George's Road
Moor Road
Palmers Lane
Environment Agency
Flood map for planning
Location (easting/northing)
317482/480807
Scale
1:10,000
Created
18 May 2025
Selected area
Main river
Flood defence
Water storage area
Flood Zones 2 and 3
Rivers and Sea
Flood Zone 3
Flood Zone 2
0 100 200 300 400 500
metres
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Flood defences and attributes

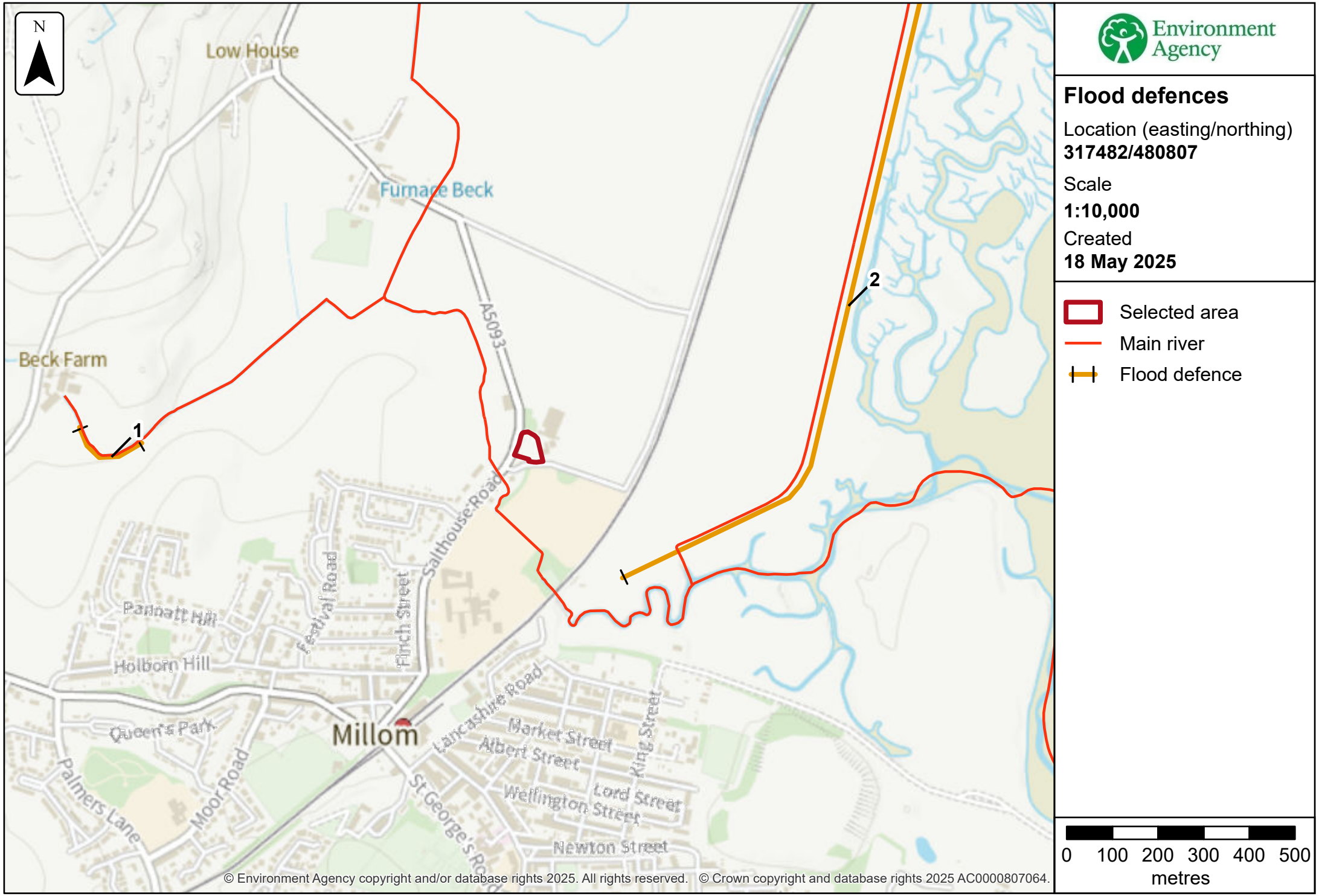
The flood defences map shows the location of the flood defences present.

The flood defences data table shows the type of defences, their condition and the standard of protection. It shows the height above sea level of the top of the flood defence (crest level). The height is In mAOD which is the metres above the mean sea level at Newlyn, Cornwall.

It's important to remember that flood defence data may not be updated on a regular basis. The information here is based on the best available data.

Use this information:

- to help you assess if there is a reduced flood risk for this location because of defences
- with any information in the modelled data section to find out the impact of defences on flood risk


N
Low House
Furnace Beck
A5093
Beck Farm
1
2
Salthouse Road
Festival Road
Finch Street
Pannatt Hill
Holborn Hill
Queen's Park
Millom
Lancashire Road
Market Street
Albert Street
King Street
Lord Street
Wellington Street
Newton Street
St George's Road
Palmers Lane
Moor Road
Environment Agency
Flood defences
Location (easting/northing)
317482/480807
Scale
1:10,000
Created
18 May 2025
Selected area
Main river
Flood defence
0 100 200 300 400 500
metres
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Flood defences data

Label	Asset ID	Asset Type	Standard of protection (years)	Current condition	Downstream actual crest level (mAOD)	Upstream actual crest level (mAOD)	Effective crest level (mAOD)
1	105301	Embankment	100	Poor	9.51	12.08	9.51
2	176654	Embankment	100	Fair			6.12

Any blank cells show where a particular value has not been recorded for an asset.

Modelled data

This section provides details of different scenarios we have modelled and includes the following (where available):

- outline maps showing the area at risk from flooding in different modelled scenarios
- map(s) showing the approximate water levels for the return period with the largest flood extent for a scenario and table(s) of sample points providing details of the flood risk for different return periods

Climate change

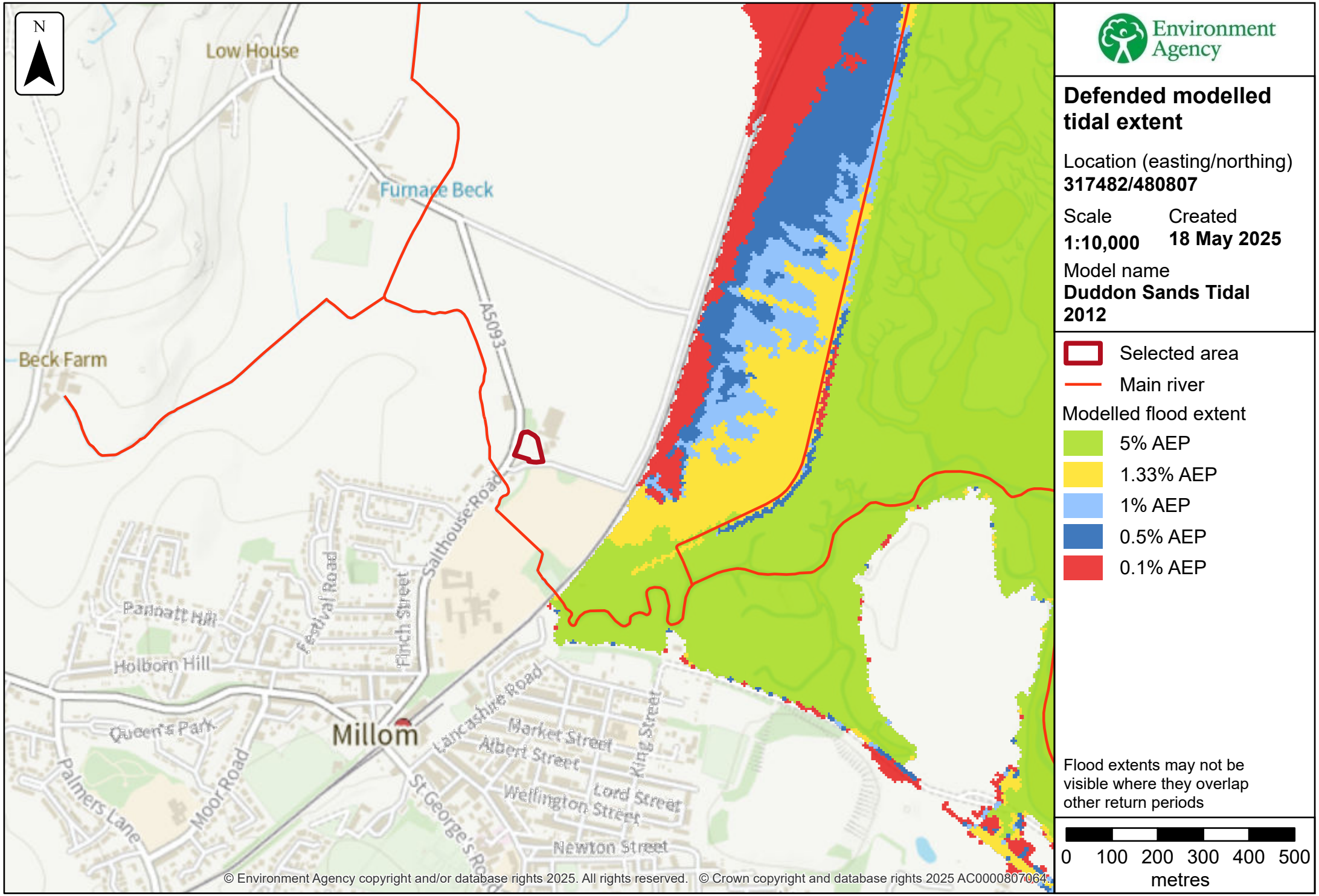
The climate change data included in the models may not include the latest flood risk assessment climate change allowances. Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

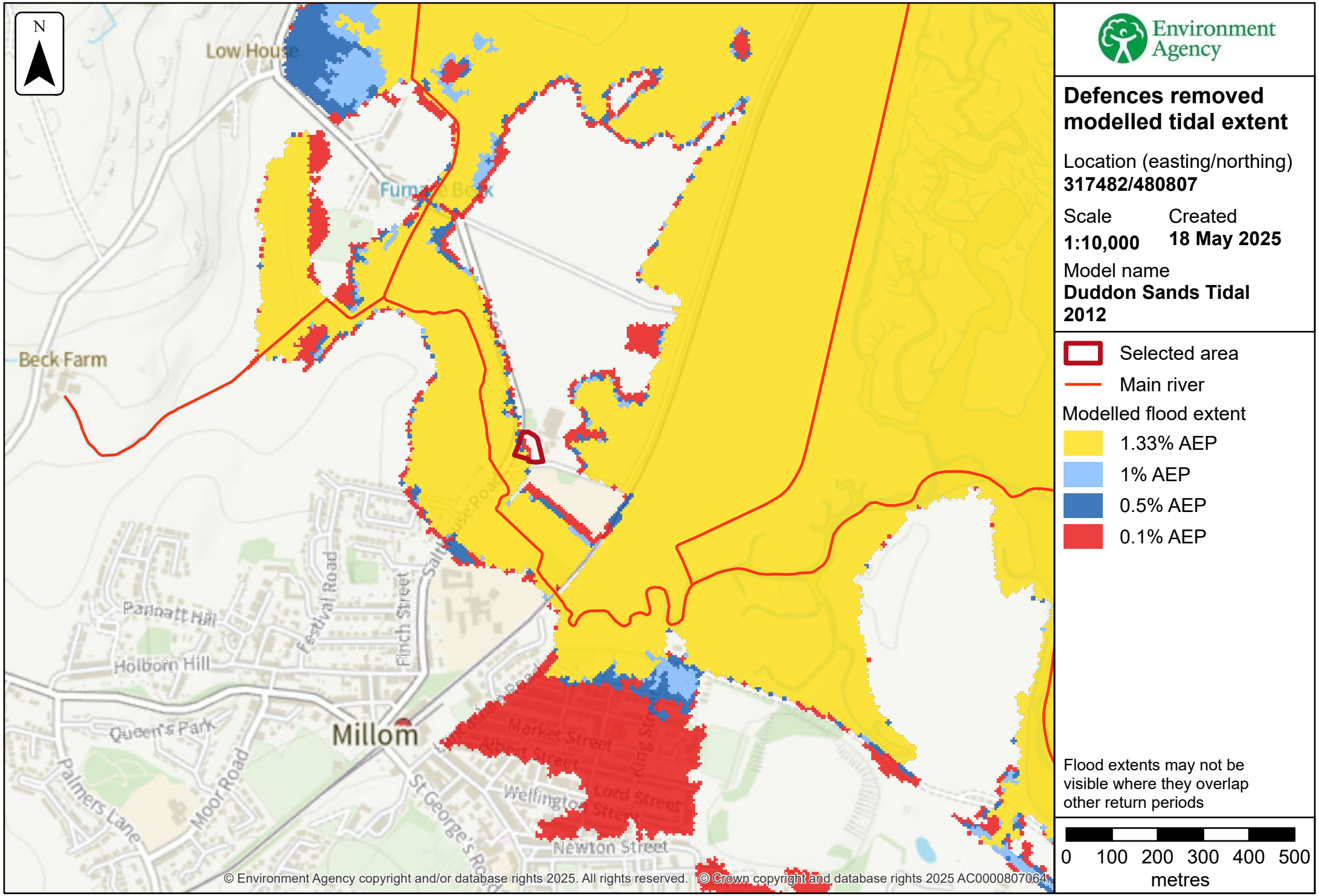
The Environment Agency will incorporate the new allowances into future modelling studies. For now, it's your responsibility to demonstrate that new developments will be safe in flood risk terms for their lifetime.

Modelled scenarios

The following scenarios are included:

- Defended modelled tidal: risk of flooding from the sea where there are flood defences
- Defences removed modelled tidal: risk of flooding from the sea where flood defences have been removed
- Defended climate change modelled tidal: risk of flooding from the sea where there are flood defences, including estimated impact of climate change
- Defences removed climate change modelled tidal: risk of flooding from the sea where flood defences have been removed, including estimated impact of climate change


N
Low House
Furnace Beck
A5093
Beck Farm
Salthouse Road
Festival Road
Finch Street
Pannatt Hill
Holborn Hill
Queen's Park
Millom
Lancashire Road
Market Street
Albert Street
King Street
Lord Street
Wellington Street
Newton Street
St George's Road
Moor Road
Palmers Lane
Environment Agency
Defended modelled tidal extent
Location (easting/northing)
317482/480807
Scale
1:10,000
Created
18 May 2025
Model name
Duddon Sands Tidal 2012
Selected area
Main river
Modelled flood extent
5% AEP
1.33% AEP
1% AEP
0.5% AEP
0.1% AEP
Flood extents may not be visible where they overlap other return periods
0 100 200 300 400 500
metres
© Environment Agency copyright and/or database rights 2025. All rights reserved. © Crown copyright and database rights 2025 AC0000807064.


N
Low House
Beck Farm
Millom
Holborn Hill
Queen's Park
Palmers Lane
Moor Road
St George's Road
Newton Street
Market Street
Albert Street
Lord Street
Wellington Street
Finch Street
Festival Road
Environment Agency
Defences removed modelled tidal extent
Location (easting/northing)
317482/480807
Scale
1:10,000
Created
18 May 2025
Model name
Duddon Sands Tidal 2012
Selected area
Main river
Modelled flood extent
1.33% AEP
1% AEP
0.5% AEP
0.1% AEP
Flood extents may not be visible where they overlap other return periods
0 100 200 300 400 500
metres
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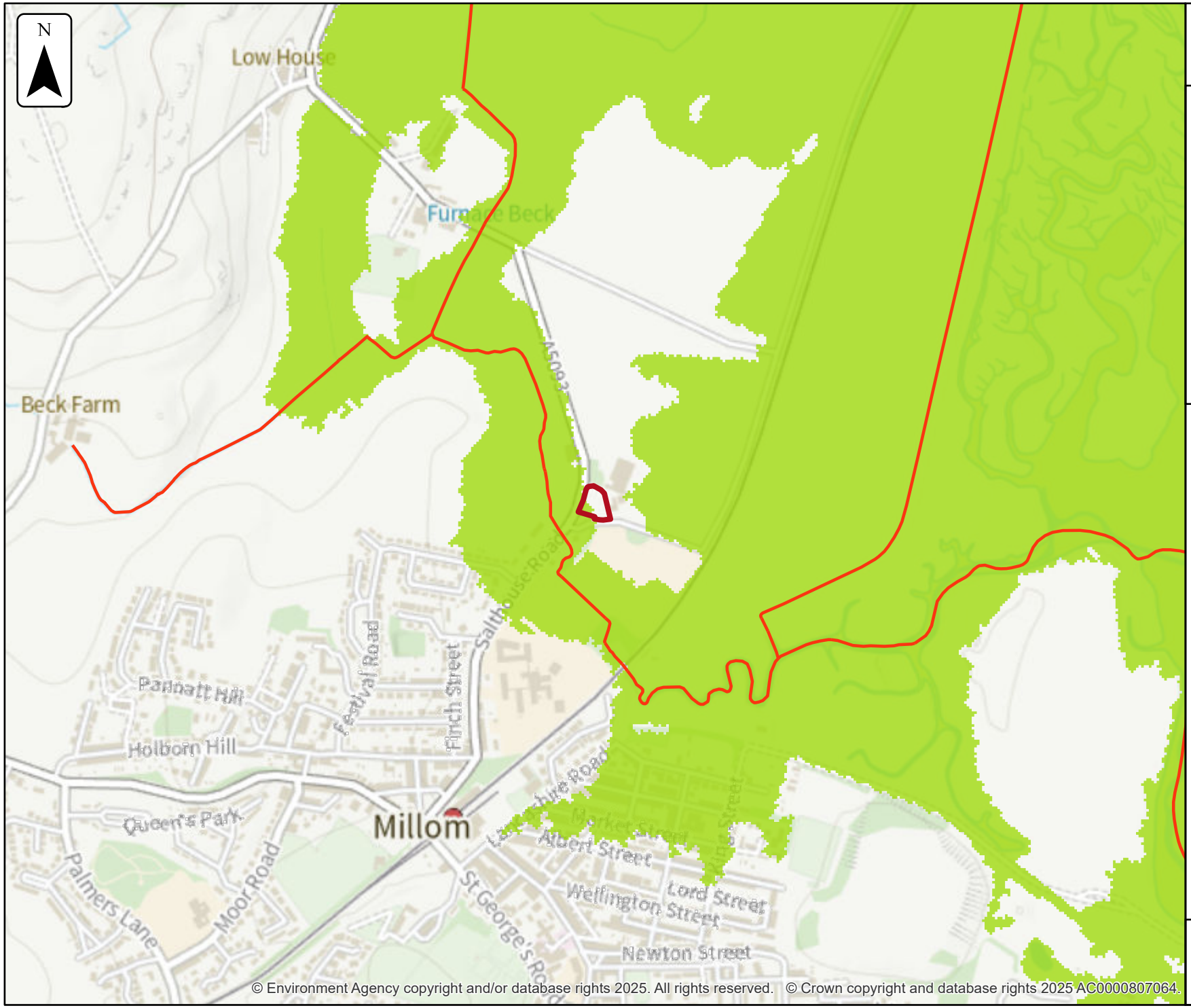


Environment Agency

Defended climate change modelled tidal extent

Location (easting/northing)
317482/480807

Scale
1:10,000

Created
18 May 2025

Model name
Duddon Sands Tidal 2012

Selected area

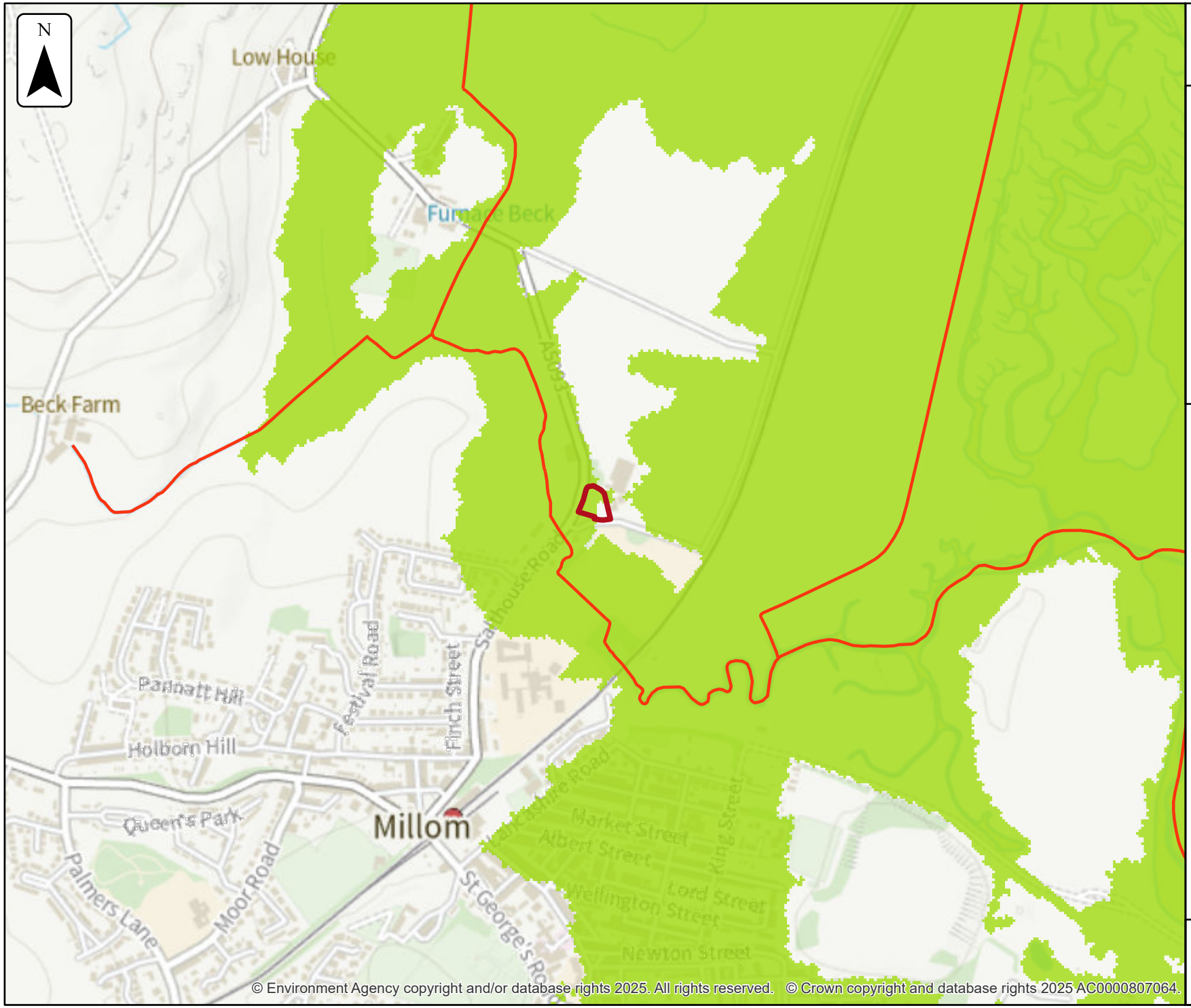
Main river

Modelled flood extent

0.5% AEP (+600mm)

Flood extents may not be visible where they overlap other return periods

0 100 200 300 400 500
metres



Environment Agency

Defences removed climate change modelled tidal extent

Location (easting/northing)
317482/480807

Scale
1:10,000

Created
18 May 2025

Model name
Duddon Sands Tidal 2012

Selected area

Main river

Modelled flood extent

0.5% AEP (+600mm)

Flood extents may not be visible where they overlap other return periods

0 100 200 300 400 500
metres

Environment Agency

Defended modelled tidal extent and height

Location (easting/northing)
317482/480807

Scale
1:500

Created
18 May 2025

Model name
Duddon Sands Tidal 2012

- Selected area
- Main river

Modelled 2D grid
Water level in mAOD

- 0 - 0.875
- 0.875 - 1.75
- 1.75 - 2.625
- 2.625 - 3.5
- 3.5 - 4.375
- 4.375 - 5.25
- 5.25 - 6.125
- 6.125 - 7.0
- 7.0 - 7.875

This map shows the 0.1% AEP height data

0 5 10 15 20
metres

Sample point data

Defended

Label	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height	Height	Height	Height	Height
1	317474	480773	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
2	317488	480773	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
3	317502	480773	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
4	317516	480773	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
5	317446	480787	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	317460	480787	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
7	317474	480787	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
8	317488	480787	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	317502	480787	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
10	317516	480787	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
11	317446	480801	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	317460	480801	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height	Height	Height	Height	Height
13	317474	480801	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
14	317488	480801	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
15	317502	480801	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	317516	480801	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
17	317460	480815	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
18	317474	480815	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
19	317488	480815	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	317502	480815	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	317460	480829	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
22	317474	480829	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
23	317488	480829	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	317502	480829	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height	Height	Height	Height	Height
25	317460	480843	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
26	317474	480843	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
27	317488	480843	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the Duddon Sands Tidal 2012 model. Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
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'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.

Defended

Label	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth
1	317474	480773	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
2	317488	480773	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
3	317502	480773	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
4	317516	480773	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
5	317446	480787	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
6	317460	480787	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
7	317474	480787	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
8	317488	480787	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
9	317502	480787	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
10	317516	480787	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
11	317446	480801	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
12	317460	480801	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth
13	317474	480801	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
14	317488	480801	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
15	317502	480801	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
16	317516	480801	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
17	317460	480815	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
18	317474	480815	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
19	317488	480815	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
20	317502	480815	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
21	317460	480829	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
22	317474	480829	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
23	317488	480829	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
24	317502	480829	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	50% AEP	20% AEP	10% AEP	5% AEP	3.33% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth	Depth
25	317460	480843	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
26	317474	480843	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
27	317488	480843	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData	NoData

Data in this table comes from the Duddon Sands Tidal 2012 model. Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.

Environment Agency

Defences removed modelled tidal extent and height

Location (easting/northing)
317482/480807

Scale
1:500

Created
18 May 2025

Model name
Duddon Sands Tidal 2012

- Selected area
- Main river

Modelled 2D grid
Water level in mAOD

- 0 - 0.875
- 0.875 - 1.75
- 1.75 - 2.625
- 2.625 - 3.5
- 3.5 - 4.375
- 4.375 - 5.25
- 5.25 - 6.125
- 6.125 - 7.0
- 7.0 - 7.875

This map shows the 0.1% AEP height data

0 5 10 15 20
metres

Sample point data

Defences removed

Label	Easting	Northing	3.33% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height
1	317474	480773	5.95	6.06	6.10	6.20	6.45
2	317488	480773	NoData	NoData	NoData	NoData	NoData
3	317502	480773	NoData	NoData	NoData	NoData	NoData
4	317516	480773	NoData	NoData	NoData	NoData	NoData
5	317446	480787	5.94	6.06	6.09	6.20	6.45
6	317460	480787	5.95	6.06	6.10	6.20	6.45
7	317474	480787	5.95	6.06	6.10	6.20	6.45
8	317488	480787	NoData	NoData	NoData	NoData	NoData
9	317502	480787	NoData	NoData	NoData	NoData	NoData
10	317516	480787	NoData	NoData	NoData	NoData	NoData
11	317446	480801	NoData	6.05	6.09	6.20	6.45
12	317460	480801	NoData	6.06	6.09	6.20	6.45

Label	Easting	Northing	3.33% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height
13	317474	480801	NoData	6.06	6.10	6.20	6.45
14	317488	480801	NoData	NoData	NoData	NoData	NoData
15	317502	480801	NoData	NoData	NoData	NoData	NoData
16	317516	480801	NoData	NoData	NoData	NoData	NoData
17	317460	480815	NoData	NoData	6.09	6.20	6.45
18	317474	480815	NoData	NoData	NoData	NoData	6.45
19	317488	480815	NoData	NoData	NoData	NoData	NoData
20	317502	480815	NoData	NoData	NoData	NoData	NoData
21	317460	480829	NoData	NoData	NoData	NoData	6.45
22	317474	480829	NoData	NoData	NoData	NoData	NoData
23	317488	480829	NoData	NoData	NoData	NoData	NoData
24	317502	480829	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	3.33% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Height	Height	Height	Height	Height
25	317460	480843	NoData	NoData	NoData	6.20	6.45
26	317474	480843	NoData	NoData	NoData	NoData	6.45
27	317488	480843	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			5.95	6.06	6.10	6.20	6.45

Data in this table comes from the Duddon Sands Tidal 2012 model. Height values are shown in mAOD, and depth values are shown in metres.
Any blank cells show where a particular scenario has not been modelled for this location.
Cells which contain text 'NoData' for a scenario show that return period has been modelled but there is no flood risk for that return period for that location.
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.

Defences removed

Label	Easting	Northing	3.33% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth
1	317474	480773	0.32	0.42	0.46	0.56	0.81
2	317488	480773	NoData	NoData	NoData	NoData	NoData
3	317502	480773	NoData	NoData	NoData	NoData	NoData
4	317516	480773	NoData	NoData	NoData	NoData	NoData
5	317446	480787	0.10	0.21	0.25	0.35	0.61
6	317460	480787	0.15	0.26	0.30	0.41	0.66
7	317474	480787	0.16	0.26	0.30	0.40	0.65
8	317488	480787	NoData	NoData	NoData	NoData	NoData
9	317502	480787	NoData	NoData	NoData	NoData	NoData
10	317516	480787	NoData	NoData	NoData	NoData	NoData
11	317446	480801	NoData	0.20	0.24	0.35	0.60
12	317460	480801	NoData	0.03	0.06	0.17	0.42

Label	Easting	Northing	3.33% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth
13	317474	480801	NoData	0.03	0.04	0.11	0.35
14	317488	480801	NoData	NoData	NoData	NoData	NoData
15	317502	480801	NoData	NoData	NoData	NoData	NoData
16	317516	480801	NoData	NoData	NoData	NoData	NoData
17	317460	480815	NoData	NoData	0.00	0.06	0.31
18	317474	480815	NoData	NoData	NoData	NoData	0.08
19	317488	480815	NoData	NoData	NoData	NoData	NoData
20	317502	480815	NoData	NoData	NoData	NoData	NoData
21	317460	480829	NoData	NoData	NoData	NoData	0.27
22	317474	480829	NoData	NoData	NoData	NoData	NoData
23	317488	480829	NoData	NoData	NoData	NoData	NoData
24	317502	480829	NoData	NoData	NoData	NoData	NoData

Label	Easting	Northing	3.33% AEP	1.33% AEP	1% AEP	0.5% AEP	0.1% AEP
			Depth	Depth	Depth	Depth	Depth
25	317460	480843	NoData	NoData	NoData	0.09	0.28
26	317474	480843	NoData	NoData	NoData	NoData	0.02
27	317488	480843	NoData	NoData	NoData	NoData	NoData
Max value in selected area:			0.16	0.26	0.30	0.40	0.65

Data in this table comes from the Duddon Sands Tidal 2012 model. Height values are shown in mAOD, and depth values are shown in metres.
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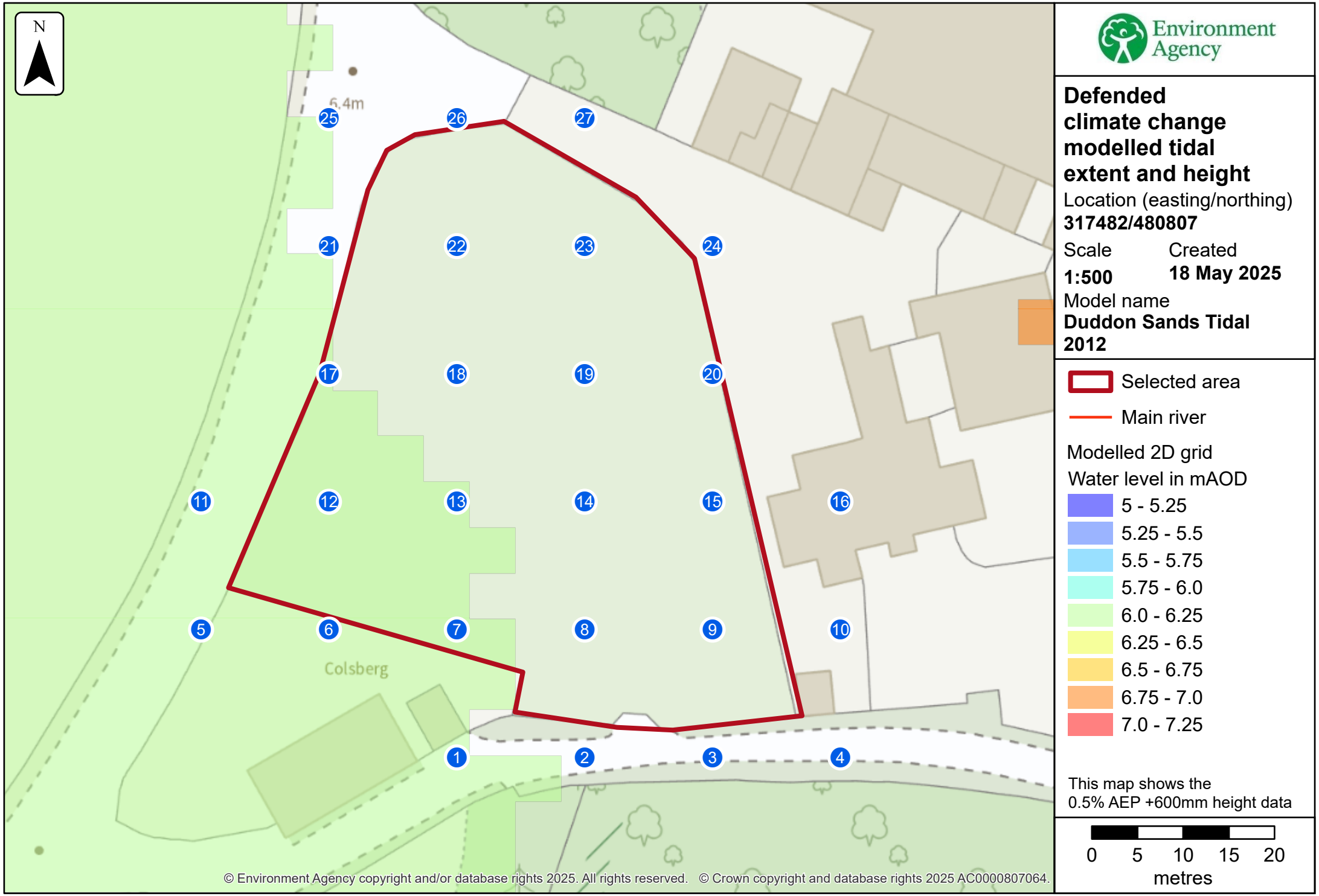
'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.



Environment Agency

Defended climate change modelled tidal extent and height

Location (easting/northing)
317482/480807

Scale
1:500

Created
18 May 2025

Model name
Duddon Sands Tidal 2012

Selected area

Main river

Modelled 2D grid
Water level in mAOD

- 5 - 5.25
- 5.25 - 5.5
- 5.5 - 5.75
- 5.75 - 6.0
- 6.0 - 6.25
- 6.25 - 6.5
- 6.5 - 6.75
- 6.75 - 7.0
- 7.0 - 7.25

This map shows the 0.5% AEP +600mm height data

0 5 10 15 20
metres

Sample point data

Defended climate change

Label	Easting	Northing	0.5% AEP (+600mm)	0.5% AEP (+600mm)
			Height	Depth
1	317474	480773	6.19	0.55
2	317488	480773	NoData	NoData
3	317502	480773	NoData	NoData
4	317516	480773	NoData	NoData
5	317446	480787	6.19	0.34
6	317460	480787	6.19	0.40
7	317474	480787	6.19	0.39
8	317488	480787	NoData	NoData
9	317502	480787	NoData	NoData
10	317516	480787	NoData	NoData
11	317446	480801	6.19	0.33
12	317460	480801	6.19	0.16

Label	Easting	Northing	0.5% AEP (+600mm)	0.5% AEP (+600mm)
			Height	Depth
13	317474	480801	6.19	0.10
14	317488	480801	NoData	NoData
15	317502	480801	NoData	NoData
16	317516	480801	NoData	NoData
17	317460	480815	6.19	0.05
18	317474	480815	NoData	NoData
19	317488	480815	NoData	NoData
20	317502	480815	NoData	NoData
21	317460	480829	NoData	NoData
22	317474	480829	NoData	NoData
23	317488	480829	NoData	NoData
24	317502	480829	NoData	NoData

Label	Easting	Northing	0.5% AEP (+600mm)	0.5% AEP (+600mm)
			Height	Depth
25	317460	480843	6.19	0.08
26	317474	480843	NoData	NoData
27	317488	480843	NoData	NoData
Max value in selected area:			6.19	0.39

Data in this table comes from the Duddon Sands Tidal 2012 model. Height values are shown in mAOD, and depth values are shown in metres.
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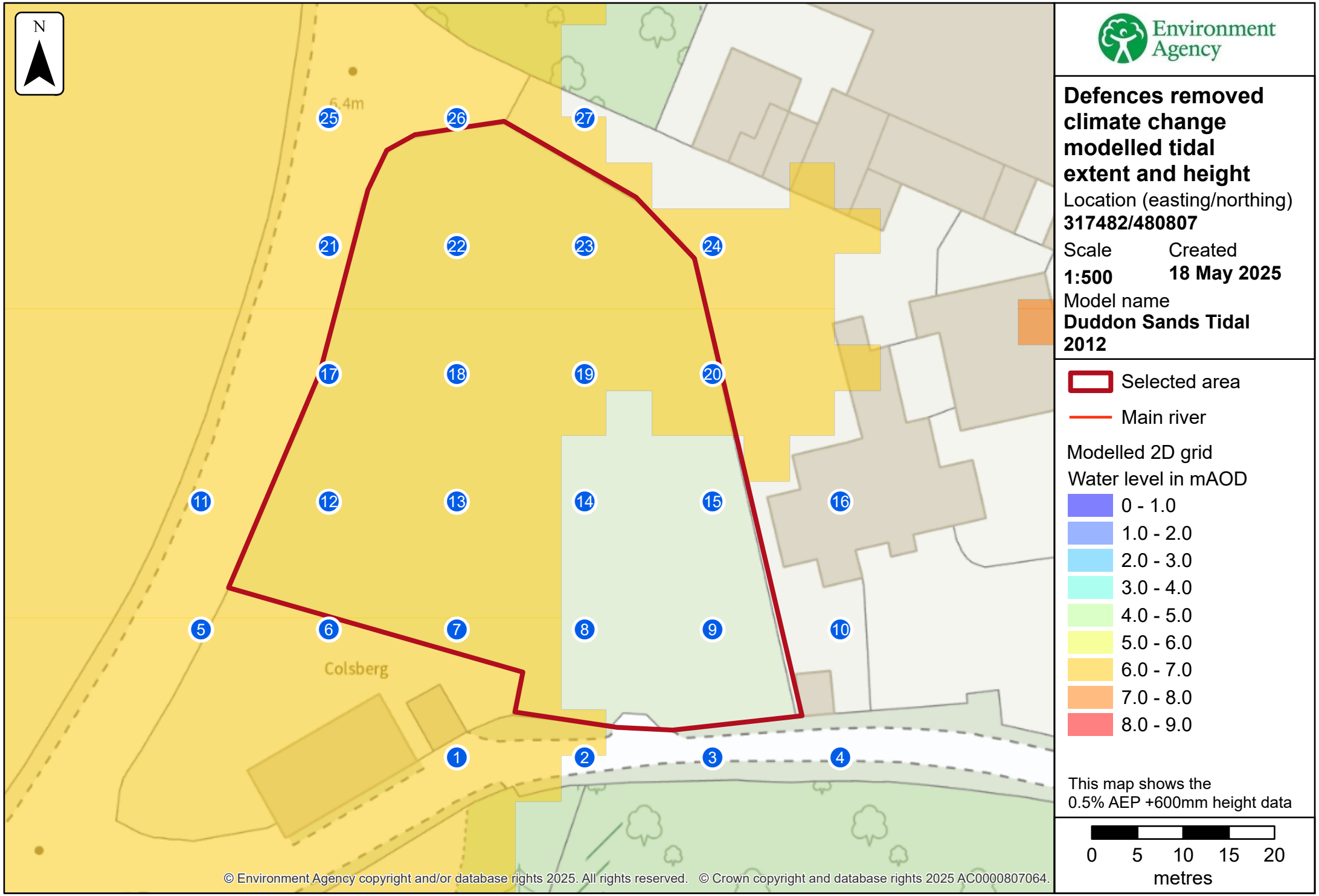

Environment Agency

Defences removed climate change modelled tidal extent and height

Location (easting/northing)
317482/480807

Scale
1:500

Created
18 May 2025

Model name
Duddon Sands Tidal 2012

Selected area

Main river

Modelled 2D grid
Water level in mAOD

- 0 - 1.0
- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- 6.0 - 7.0
- 7.0 - 8.0
- 8.0 - 9.0

This map shows the 0.5% AEP +600mm height data

0 5 10 15 20
metres

Sample point data

Defences removed climate change

Label	Easting	Northing	0.5% AEP (+600mm)	0.5% AEP (+600mm)
			Height	Depth
1	317474	480773	6.95	1.31
2	317488	480773	NoData	NoData
3	317502	480773	NoData	NoData
4	317516	480773	NoData	NoData
5	317446	480787	6.95	1.10
6	317460	480787	6.95	1.16
7	317474	480787	6.95	1.15
8	317488	480787	NoData	NoData
9	317502	480787	NoData	NoData
10	317516	480787	NoData	NoData
11	317446	480801	6.95	1.10
12	317460	480801	6.95	0.92

Label	Easting	Northing	0.5% AEP (+600mm)	0.5% AEP (+600mm)
			Height	Depth
13	317474	480801	6.95	0.84
14	317488	480801	NoData	NoData
15	317502	480801	NoData	NoData
16	317516	480801	NoData	NoData
17	317460	480815	6.95	0.81
18	317474	480815	6.95	0.55
19	317488	480815	6.95	0.13
20	317502	480815	6.95	0.20
21	317460	480829	6.95	0.77
22	317474	480829	6.95	0.54
23	317488	480829	6.95	0.06
24	317502	480829	6.95	0.13

Label	Easting	Northing	0.5% AEP (+600mm)	0.5% AEP (+600mm)
			Height	Depth
25	317460	480843	6.95	0.77
26	317474	480843	6.95	0.48
27	317488	480843	6.95	0.06
Max value in selected area:			6.95	1.15

Data in this table comes from the Duddon Sands Tidal 2012 model. Height values are shown in mAOD, and depth values are shown in metres.
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'Max value in selected area' is the deepest depth or highest height at any location within your drawn boundary.

Strategic flood risk assessments

We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment.

This should give you information about:

- the potential impacts of climate change in this catchment
- areas defined as functional floodplain
- flooding from other sources, such as surface water, ground water and reservoirs

Your Lead Local Flood Authority is Cumberland.

About this data

This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

Flood risk activity permits

Under the Environmental Permitting (England and Wales) Regulations 2016 some developments may require an environmental permit for flood risk activities from the Environment Agency. This includes any permanent or temporary works that are in, over, under, or nearby a designated main river or flood defence structure.

Find out more about flood risk activity permits

Help and advice

Contact the Cumbria and Lancashire Environment Agency team at inforequests.cmblnc@environment-agency.gov.uk for:

- more information about getting a product 5, 6, 7 or 8
- general help and advice about the site you're requesting data for