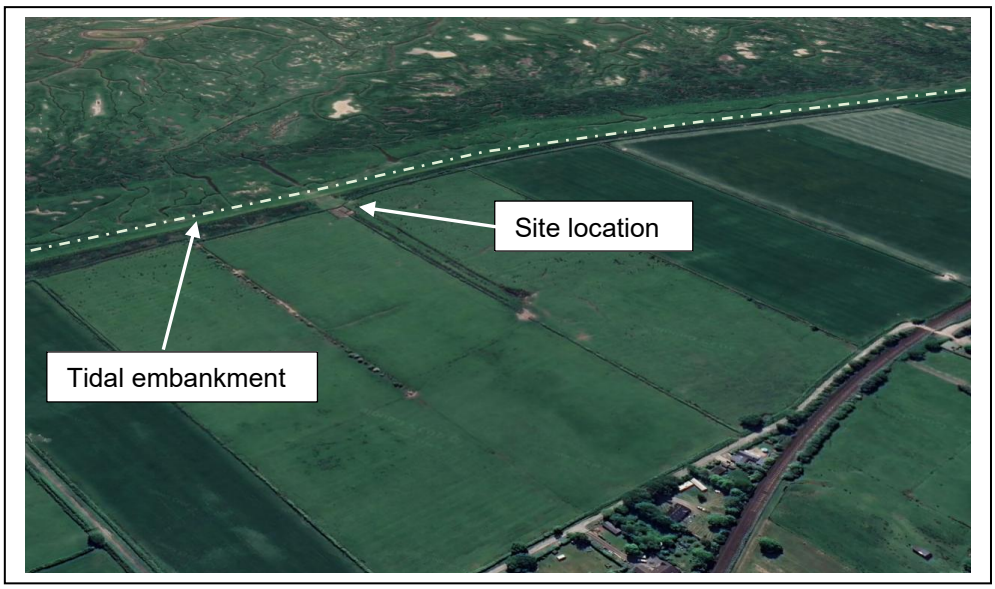
Rubicon Project Consultancy Ltd

Flood Risk Assessment

Windmill Water pump at
Waterblean Farm
The Hill
Millom
Cumbria
LA18 5HA

September 2025



Millom Marshes/ Duddon Estuary Embankment © Google Earth

Version	Prepared by	Non-Technical Review by	Date
Draft 0.1	Rachel Gerrard	Phil Gerrard	9 September 2025
Final 1.0	Rachel Gerrard	Phil Gerrard	18 September 2025
2.0	Rachel Gerrard	Section 2.a updated	22 January 2026

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The contents of this FRA follows the Site Specific Flood Risk Assessment checklist as specified in the Flood Risk and Coastal change guidance at:

https://www.gov.uk/guidance/flood-risk-and-coastal-change#contents

Contents

Figures

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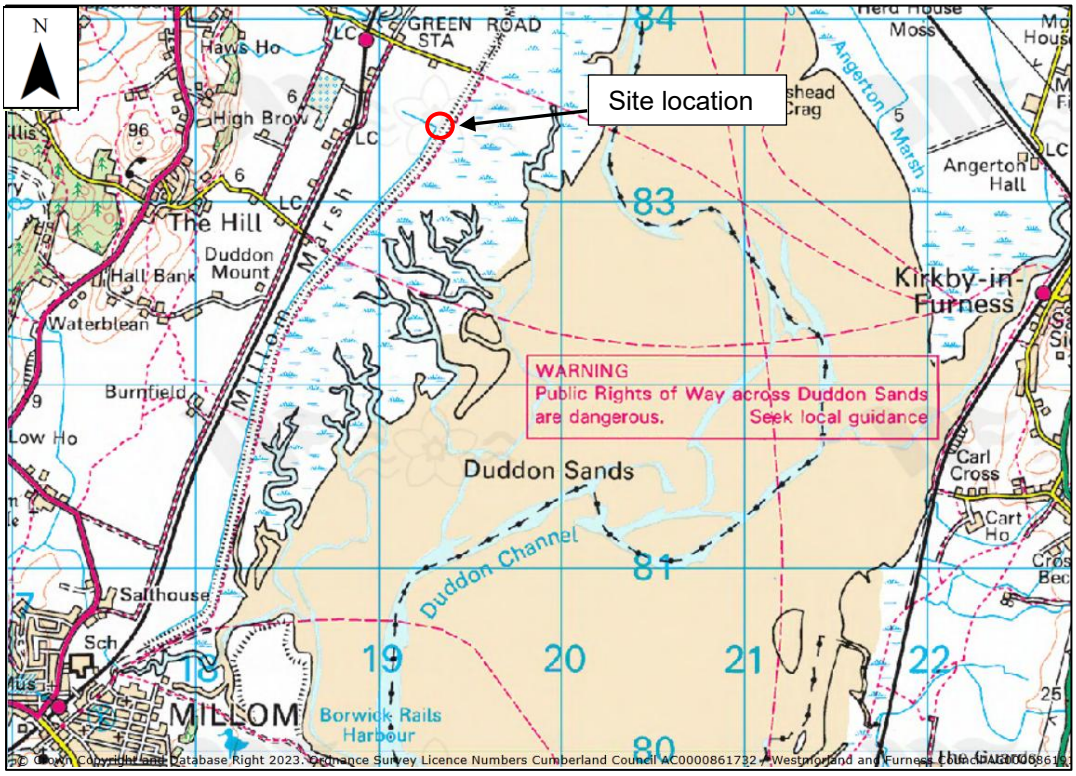
1 - Development Site and Location

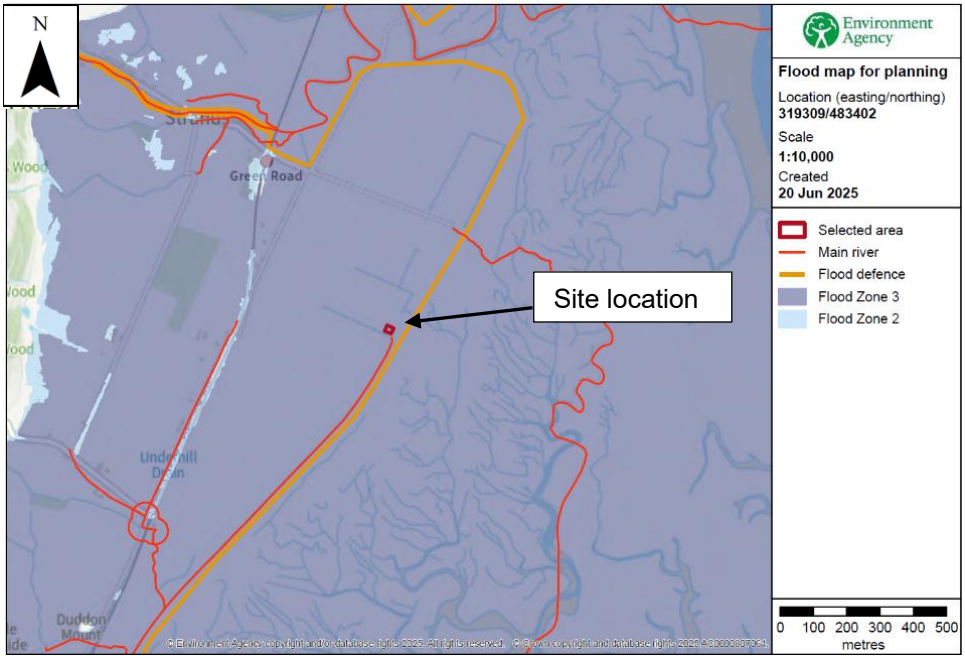
a. The site at Waterblean Farm, The Hill, Millom, LA18 5HA is on the west side of Duddon Sands 4 km North East of Millom. NGR SD193834. See Figure 1 – Location Plan.

Figure 1 Location plan



b. The current land use is agricultural.
c. The land is in Flood Zone 3, see Figure 2 below.
d. The site is not at risk from Surface Water flooding or reservoir flooding. See Appendix A.

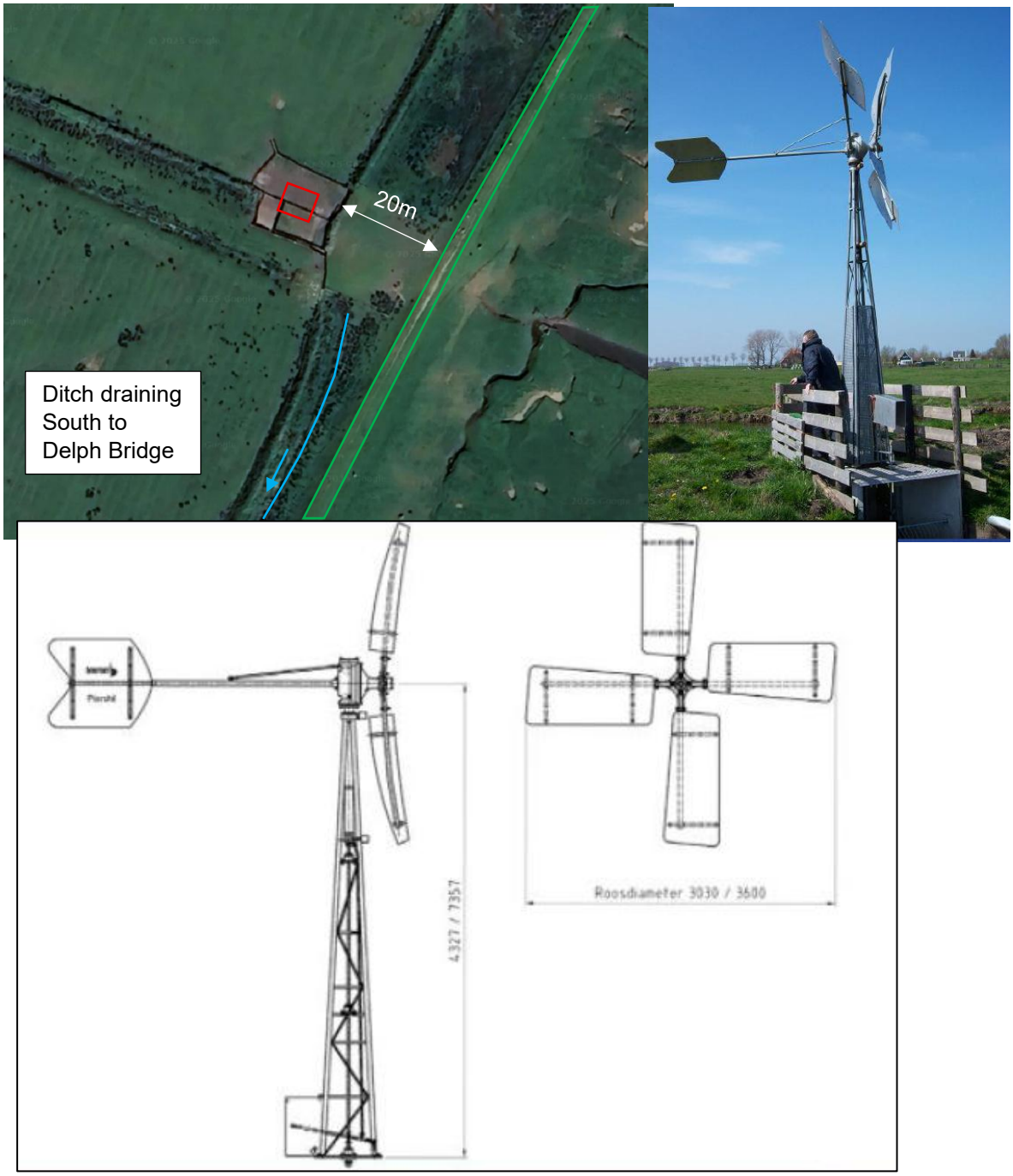
Figure 2 Flood Zones map



2 - Development Proposals

a. The development proposal is to install a mechanical windmill water pump at the site, to pump water from the field drains into a ditch beside the embankment. The ditch drains 3.4km south to Delph Bridge, just outside Millom, where it passes under the embankment. See Figure 3 below.

Figure 3 Site Plan /windmill water pump details



The existing ground levels at the site are at approximately 4.85mAOD.

b. The flood risk vulnerability classification of the proposed development is “Water Compatible” as it is a mechanical water pump, used to reduce water levels on the dry side of the tidal flood embankment after heavy rainfall.

c. For Flood Risk Assessment purposes, the expected lifetime would be 50 years.

3 - Sequential Test

The location of the windmill water pump is determined by it's application, hence it needs to be situated on a watercourse near to the tidal flood embankment. This site is the most effective location on Waterblean Farm for the wind powered water pump.

4 - Climate change

The potential flood risk at the site will increase with climate change. The Climate change allowances for a 'water compatible' development in a Flood Zone 3 for Sea Level rise requires the use of the higher central allowance. In the North West, for a development with an expected lifespan until 2075, the higher central allowance rise in sea levels for climate change is 477mm. The model provided by the Environment Agency uses an increase of 600mm so this has been used in this assessment.

The site benefits from the Duddon flood defence embankment which lies north-south alongside the site and has an effective crest level of 6.14m AOD. Flood maps provided by the Environment Agency show that the climate change level for the Defended 0.5% (200yr) flood including a 600 mm allowance will be 6.91 m AOD.. If the embankment were to fail the undefended climate change 0.5% plus 600mm is 7.03m AOD. See Appendix C. The tidal embankment is at low risk of water overtopping and erosion due to it's sheltered position from the westerly winds. See Appendix D.

5 - Site Specific Flood Risk

a. The main source of flooding to the site is tidal flooding from the Duddon Estuary. See Figure 2.
b. From Environment Agency flood maps the probability of the site flooding is 0.5% See map Appendix C.
c. Surface water and Reservoir flood maps (see Appendix A) show that the site is not at risk of flooding from this sources.
d. The design (0.5%) defended flood height with an allowance of 600mm for climate change is 6.91m AOD. The existing site ground level is 4.85mAOD which is 1.06m below the design flood level.
e. The Windmill water pump is designed to be water compatible due to it's intended use.
f. The predicted climate change flood level is 6.91m AOD. The windmill blades will be located at a minimum of 2.5m from ground level, well above the design flood level.
g. The development will not cause increased flood risk elsewhere as the structure footprint is small in comparison to the floodplain.
h. This windmill has been designed to power a pump to reduce the water levels on the dry side of the tidal flood embankment. There are no opportunities within this development to reduce the causes of flooding. The impacts of flooding within the field system will be reduced but it is unlikely to extend much beyond the fields to benefit roads or property.
i. The flood information used to inform the risk level for this assessment have been taken from the Duddon Sands Tidal 2012 model obtained from the Environment Agency. A modelled data source gives the highest level of certainty to the assessment.

6 - Surface Water Management

The surface water management at the site will be improved by the installation of the windmill water pump which will be maintained by the landowner.

7 - Occupants and Users of the Development

The windmill water pump installation will require a small number of extra visits from the landowner to maintain the pump but will not change nature and times of use.

8 – Exception Test

An exception test is not required as this is a water compatible development.

This windmill water pump doesn't provide wider sustainability benefits to the community but does enable the landowner to remove excess water and farm the land providing wider sustainability benefits in work and employment.

The proposed development will remain safe over its lifetime and won't increase flood risk elsewhere. It will improve the drainage of the land but the impact of this on people and property beyond the farm land will be limited.

9 - Residual Risk

a. Tidal flood risk will always remain at the site due to its location.
b. Over the lifetime of the development any increase in flood risk will be managed by the landowners.

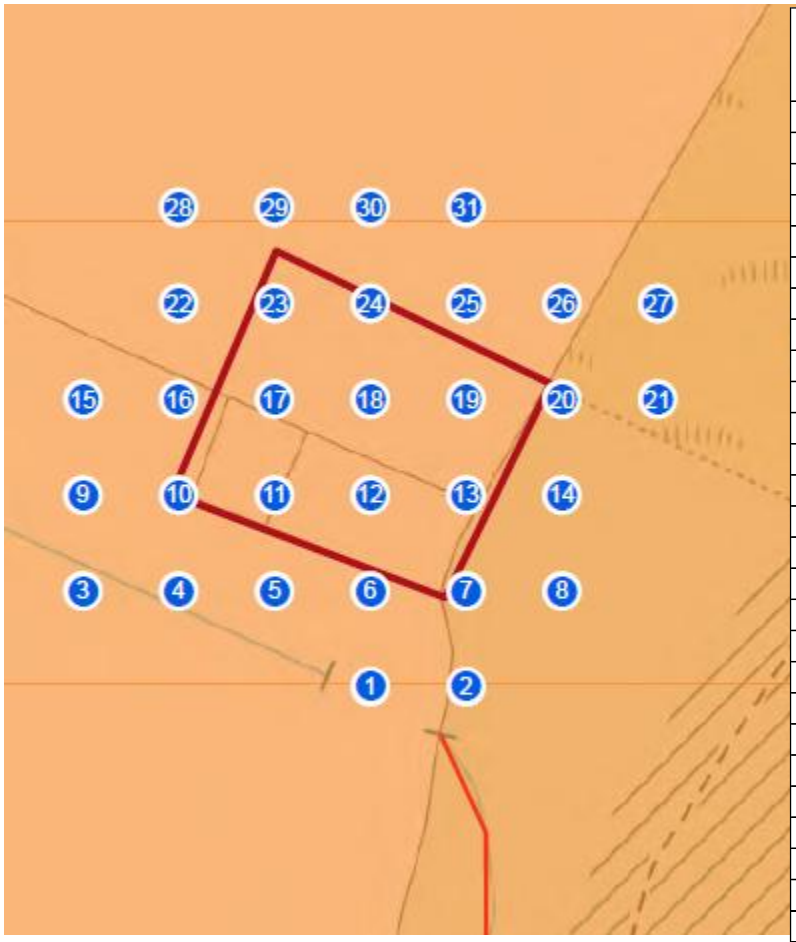
10 - Flood Risk Assessment credentials

This Flood Risk Assessment has been produced and written by Rachel Gerrard B.Eng C.Eng MICE, completed September 2025.

APPENDIX A – Other sources of Flood Risk

Surface Water Flood Risk

APPENDIX B – Topographic Survey

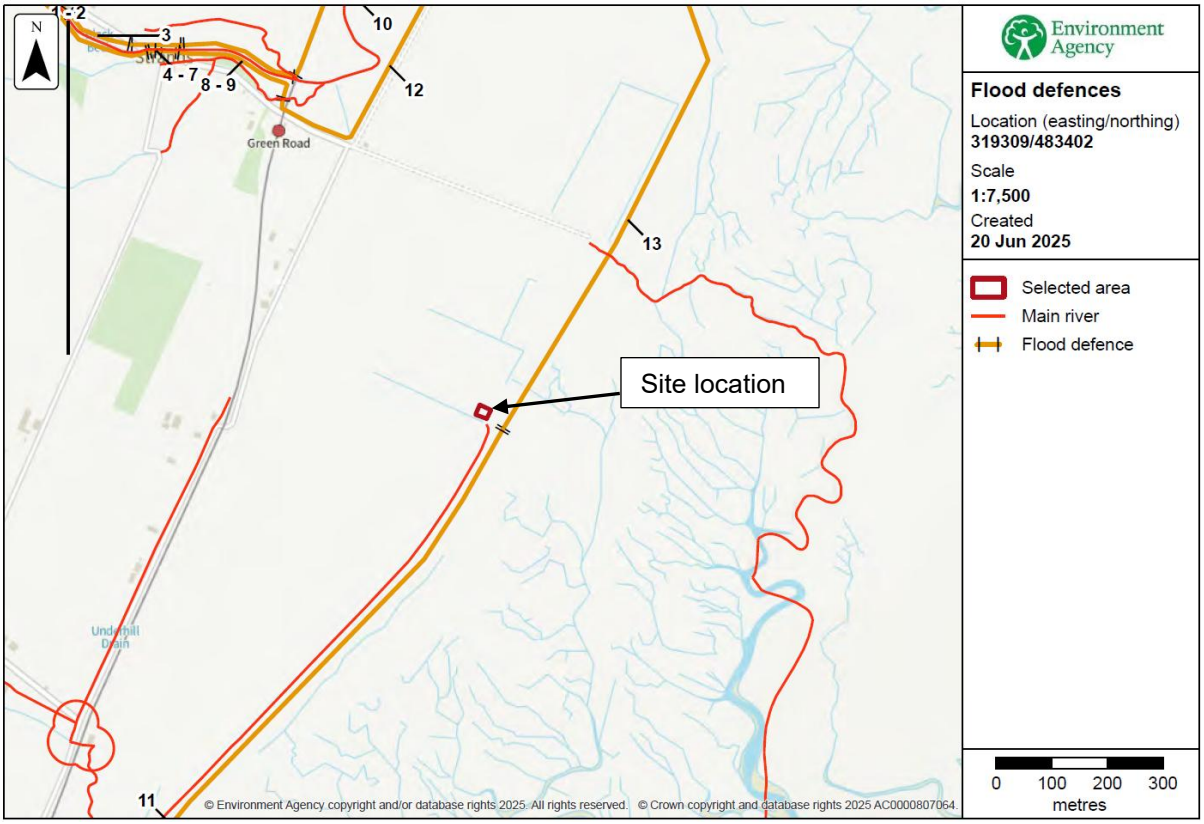


Location Number	Flood height (mAOD)	Depth (m)	Level (mAOD)
1	5.26	0.91	4.35
2	5.27	0.55	4.72
3	5.27	0.54	4.73
4	5.29	0.66	4.63
5	5.29	0.7	4.59
6	5.28	0.26	5.02
7	5.28	0.18	5.10
8	5.31	0.13	5.18
9	5.28	0.37	4.91
10	5.31	0.48	4.83
11	5.32	0.47	4.85
12	5.31	0.32	4.99
13	5.31	0.23	5.08
14	5.32	0.12	5.20
15	5.33	0.49	4.84
16	5.35	0.58	4.77
17	5.35	0.5	4.85
18	5.34	0.48	4.86
19	5.34	0.46	4.88
20	5.35	0.39	4.96
21	5.37	0.47	4.90
22	5.35	0.6	4.75
23	5.35	0.54	4.81
24	5.35	0.49	4.86
25	5.35	0.47	4.88
26	5.36	0.47	4.89
27	5.36	0.57	4.79
28	5.35	0.6	4.75
29	5.35	0.57	4.78
30	5.35	0.52	4.83
31	5.36	0.53	4.83

Environment Agency flood data used to obtain approximate ground levels.

APPENDIX C – Environment Agency Information

Flood Defence information



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)
11	176653	Embankment	100	Fair			6.14
12	176651	Embankment	100	Fair			6.16
13	176652	Embankment	100	Fair			6.19

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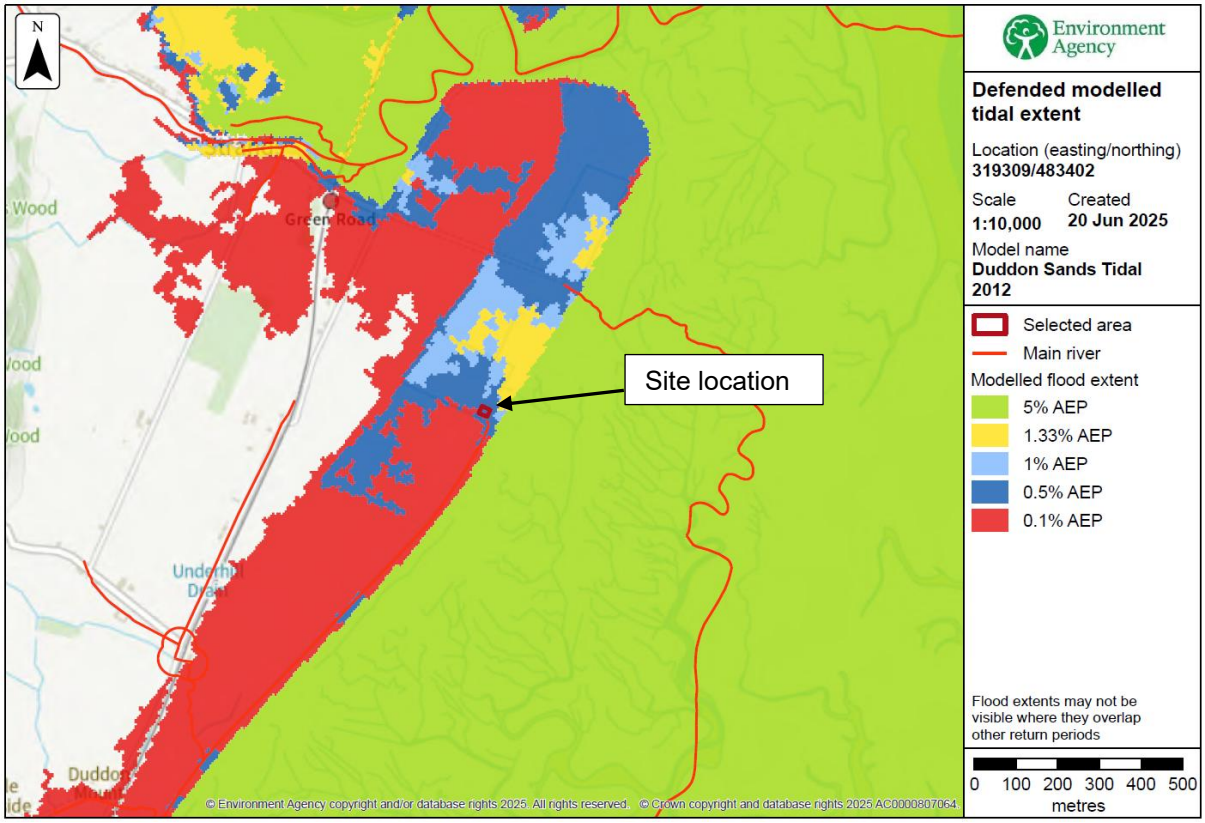
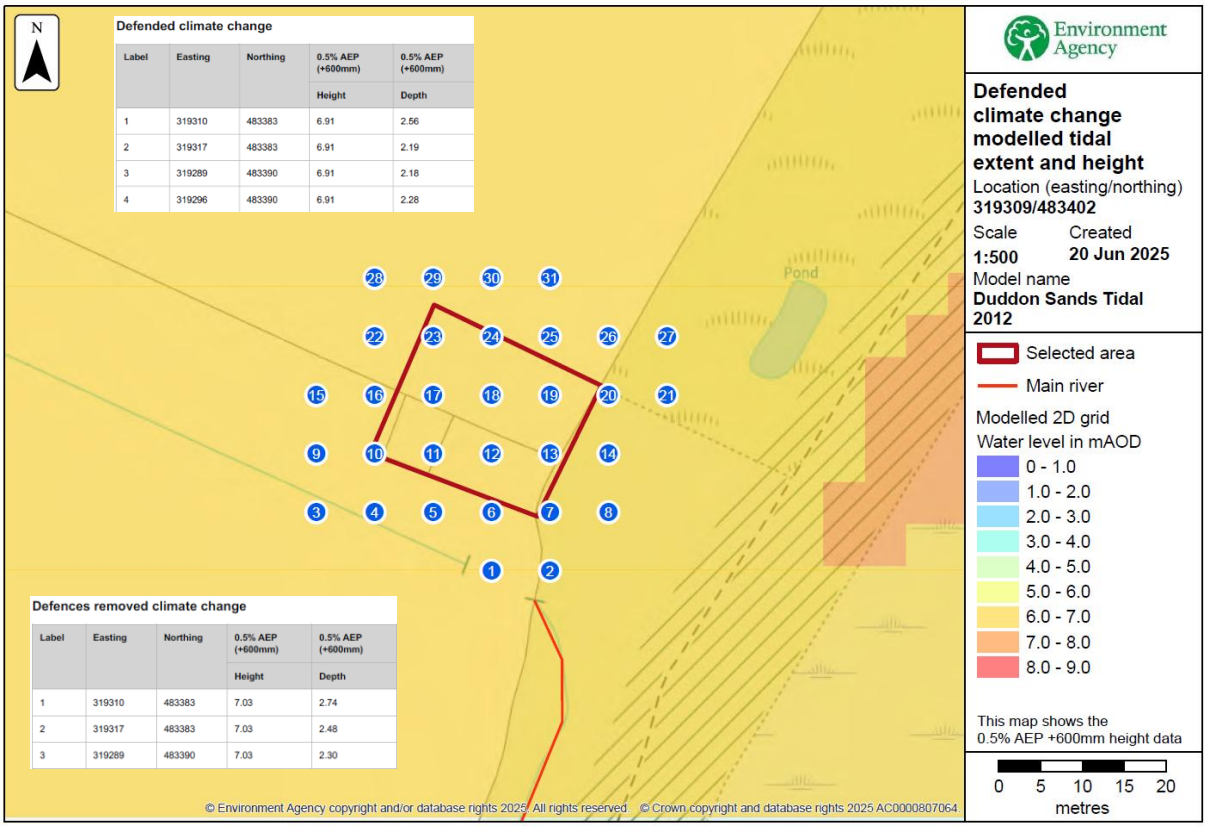
Modelled flood extents from the Duddon Sands Tidal 2012 model





APPENDIX D – Tidal Flood Embankment

The Millom Marsh flood embankment protects the site from the Duddon Sands tidal flooding, The embankment on the West side of the estuary is protected from the prevailing winds and therefore not subject to wave overtopping or coastal erosion. See assessment below.

Duddon Estuary To Tarn Point Management Area Summary 2014 — Copeland Borough Council

Risk Assessment

The primary risks arising from the behaviour of coastal forcing processes (wind, waves and tides) and the reaction of the shoreline (beach and cliff changes, artificial defence conditions) across this frontage are:

- Overtopping of artificial defences causing flooding of the hinterland,
- Breaching of artificial coastal defences, causing erosion of the shoreline
- Erosion of dunes and cliffs providing potential pathways for water penetration into the hinterland
- Wind blown sand nuisance to people and property

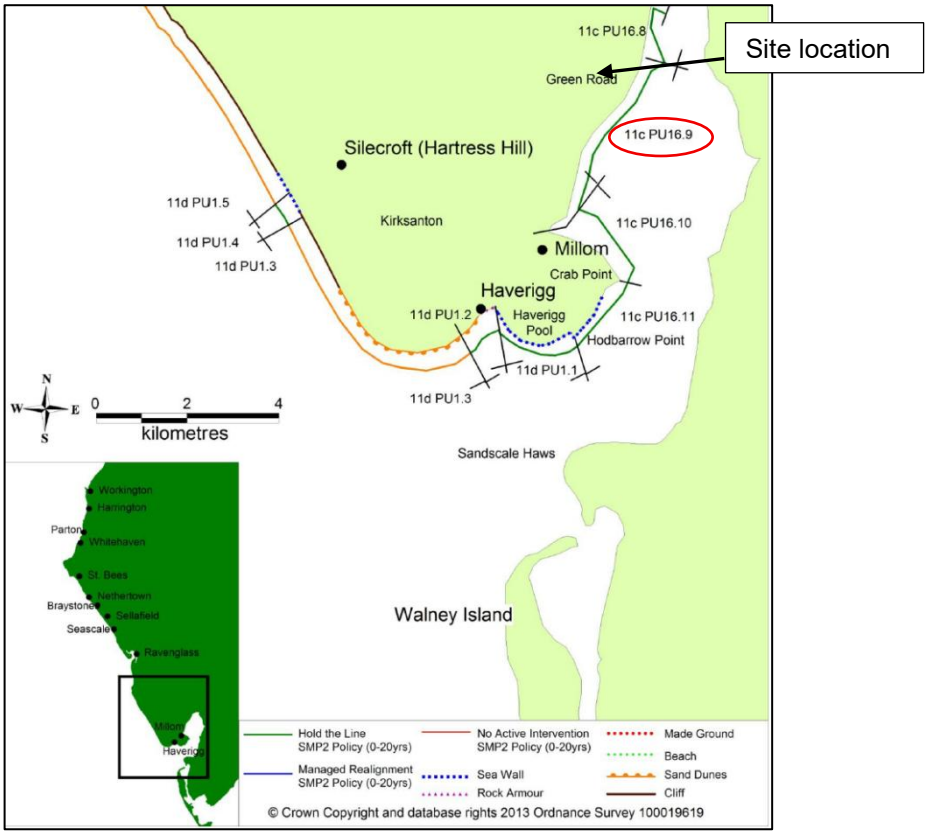
The primary consequences of this behaviour are:

- Damage to and/or loss of property and infrastructure
- Damage to environmental habitats.

The table below shows the overall risk rating(s) that apply within this section of frontage. Overall risk is defined from the probability of conditions/behaviour occurring and the consequences the conditions/behaviour would have.

Duddon Estuary to Tarn Point Overall Risk Rating

SMP Policy Unit (11c)	Section of Frontage	Probability Index	Consequence Index	Overall Risk Rating
16.8	Duddon Estuary (Both banks upstream of Viaduct and right bank south to Green Rd Station)	Low	Medium/High	Medium
16.9	Millom Marshes	Low	Medium	Low
16.10	Red Hills (Industrial area)	Low	Medium	Low
16.11	Hodbarrow Mains	Low	Medium/Low	Low



APPENDIX E – Site Photos