

Millom Iron Line

Flood Risk Assessment

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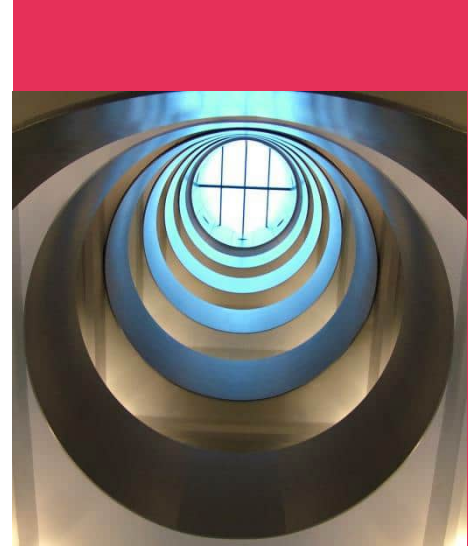
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1.0 Introduction

1.1 Project Background

Curtins was instructed by Cumberland Council to undertake a Flood Risk Assessment (FRA) for the development of Hodbarrow Nature Reserve, Millom. The nearest post code is LA18 4EN and the site is centred on National Grid Reference (NGR) 317429mE 478489mN. What3Words reference: rebounder.named.graphic.

The report provides information on the nature of flood risk at the site and follows Government guidance with regards to development and flood risk and is based on currently available information.

Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material deviation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

Where the proposed works to which this report refers are undertaken more than twelve months following the issue of this report, Curtins shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations at no cost to Curtins.

1.2 Scope of Assessment

The assessment is to be undertaken in accordance with the standing advice and requirements of the Environment Agency (EA) for Flood Risk Assessments as outlined in the Communities and Local Governments Planning Policy Guidance to the National Planning Policy Framework (NPPF).

The redline site area is approximately 58.3 hectares (ha) and confirms the full extent of the application site as indicated on drawing 289-LYR-XX-ZZ-DWG-L-1001 by Layer Studio is provided in Appendix A.

Following scrutiny of the Environment Agency (EA) flood zone maps it has been identified that the site boundary falls across three flood risk classifications.

- Flood Zone 1 (FZ1) (Low probability of flooding from Rivers and Sea). Land having a less than 0.1% (1 in 1000) annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
- Flood Zone 2 (FZ2) (Medium probability of flooding Rivers and Sea). Land having between a 1% AEP (1 in 100) and 0.1%AEP (1 in 1,000) annual probability of river flooding; or land having between a 0.5% AEP (1 in 200) and 0.1% AEP (1 in 1,000) annual probability of sea flooding. (Land shown in light blue on the Flood Map)

- Flood Zone 3 (FZ3) (High probability of flooding from Rivers and Sea). Land having a 1% AEP (1 in 100) or greater annual probability of river flooding; or Land having a 0.5%AEP (1 in 200) or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map).

A FRA is required to accompany a planning application, as the site is both is larger than 1ha and lies in part within FZ2 and FZ3. The FRA is required to address all sources of potential flood risk and take into account the management of surface water run-off. The FRA should also consider the impact of climate change both to and from development proposals.

In July 2018, the Government made changes to the National Planning Policy Framework¹ (currently para 169) which made Sustainable Urban Drainage Systems (SuDS) a requirement for the determination of planning applications for 'major' developments.

SuDS will therefore be a requirement on this site as the site is considered to be 'major' development by the Town and Country Planning Order 2015 as total proposed development floor space is 1000m² or more.

The assessment will:

- Investigate all potential risks of flooding to the site,
- Consider the impact the development may have elsewhere with regards to flooding.
- Consider proposals to mitigate any potential risk of flooding determined to be present.

This report reviews the following information:

- Architects' Site Layout Proposals
- Environment Agency Flood Map for Planning (FMfP).
- Environment Agency Product 4 Data
- Environment Agency Extreme Sea Levels Data
- Environment Agency North West Region – Cumbrian Tidal Areas Benefitting from Defences Revisited, July 2013.
- Environment Agency Risk of Flooding from Surface Water (RoFSW).
- UK Government Long Term Flood Risk Information for reservoir flooding.
- Environment Agency historic flood maps.
- North West England and North Wales Shoreline Management Plan SMP2, February 2011.
- Cumbria Coastal Strategy, Cumbria County Council, 2020
- Cumberland Council Local Flood Risk Management Strategy, adopted September 2022.
- Cumberland Council Flood Investigation (Section 19) Reports.
- Cumberland, Council Copeland Local Plan 2013-2028, adopted December 2013

¹https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf

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- Cumberland Council Copeland Emerging Local Plan, The Copeland Local Plan 2021-2038: Examination, submitted September 2022.
 - Copeland Borough Council Strategic Level 1 Flood Risk Assessment (SFRA), dated October 2021.
 - Ground level data taken from Environment Agency 1m resolution Light Detection and Ranging (LiDAR) data.
 - Drawing 289-LYR-XX-ZZ-DWG-L-1000 GA | Site Masterplan Existing Site Plan
 - Drawing P10913/amr sheets 1 to 6 (Topographic Survey).

2.0 Development Proposals

2.1 Proposed Development

The General Arrangement Site Masterplan, drawing 289-LYR-XX-ZZ-DWG-L-1000 by Layer Studio is provided in Appendix A.

The overall proposed development comprises:

Erection of welcome building with café, retail space, staff facilities and car park, repair and stabilisation works at Hodbarrow Beacon, repair and stabilisation works and installation of ‘camera obscura’ structure at Towsey Hole Windmill, installation of cladding and new living roof to existing bird hide, erection of new bird hides and viewing platforms, creation of new multi-use pathways with signage, gateway features and street furniture, making good of existing byway (BOAT) along sea wall, enhancement of wildlife habitats, and associated access, landscaping and drainage infrastructure.

Figure 2-1 below, extracted from Layer Studio’s Design and Access Statement highlights specific points of interest in respect to the development proposal.



Figure 2-1: Location of landmarks and key spaces

In respect to the Welcome Building, facility includes a Café, Arts Centre, Gift Shop, Staff Office and Public Toilets, the approximate building footprint has been measured from the Architect’s Plan as

700m². The Finished Floor Level (FFL) is proposed at **13.70mAOD**, approximately equal to existing ground levels to afford level access.

In respect to the other elements of the development, no significant changes to existing ground levels are envisaged by the proposals.

2.2 Vulnerability

On the basis of the development proposal and reference to NPPF Annex 3 and Planning Practice Guidance Table 2² (PPF Reference ID: 7-079-20220825), the vulnerability classification of the Welcome Building will constitute a Less Vulnerable classification: *Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure.*

The proposed Car Parks also falls within the Less Vulnerable classification.

In respect to the other elements of the development proposals within the site, these fall within Water-compatible development: *Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.*

2.3 Estimated Lifecycle of Development

The current EA guidance on planning flood risk suggests a design life of non-residential development of at least 75 years. This is presumed for the purpose of this FRA.

² <https://www.gov.uk/guidance/flood-risk-and-coastal-change#Table-2-Flood-Risk-Vulnerability-Classification>

3.0 Site Characterisation

3.1 Site Location

The site lies approximately 0.6km south of the town of Millom and 0.8km east of the village of Haverigg on the northwest of the Duddon Estuary in southwest Cumbria. The nearest post code is LA18 4EN and the site is centred on National Grid Reference (NGR) 317429mE 478489mN. What3Words reference: rebounder.named.graphic. Figure 3-1 below shows the site in the context of its siting within the local area.

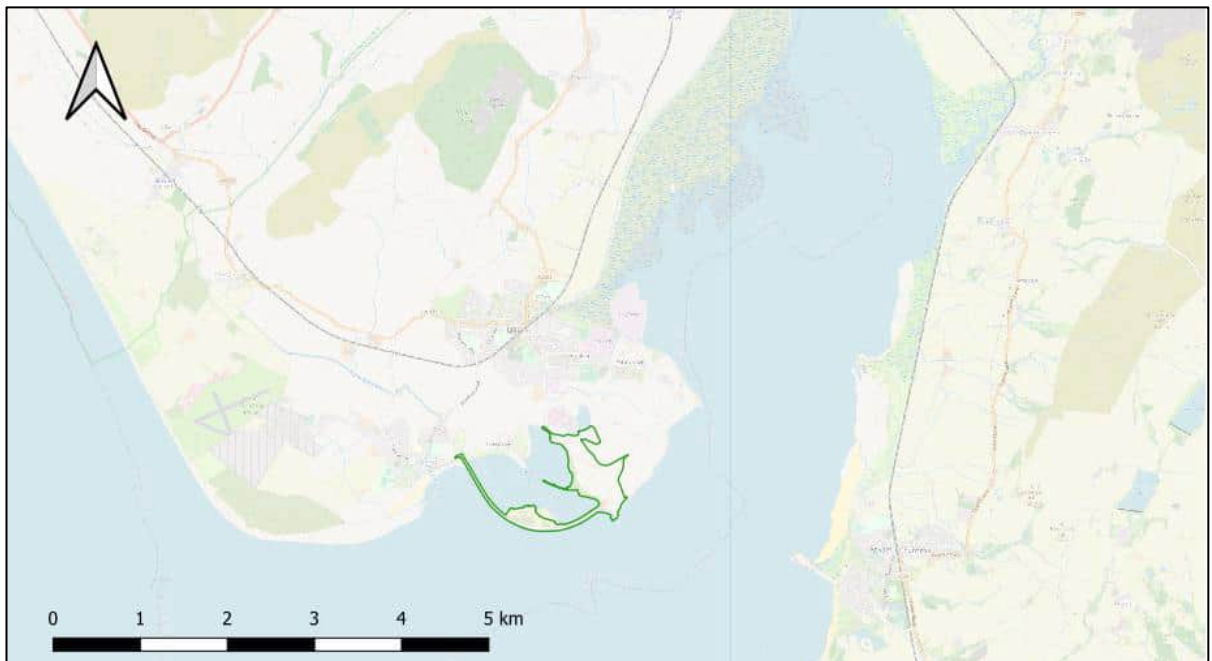


Figure 3-1: Site Location Plan

3.2 Site Description

Hodbarrow Nature Reserve is a brownfield site, situated on the former Hodbarrow Iron Mine, which was closed in 1968. In its entirety, the Hodbarrow Reserve is approximately 105ha in size, broadly comprising two large waterbodies, the lagoon, large areas of dense scrub, grassland, the sea wall, sand dunes, sandy and rocky beaches and bare rock. The development site itself is located partly within and around the Reserve, with the site of the proposed Iron Line welcome building and associated car park lies adjacent to the north-east of Hodbarrow Nature Reserve, outside of the reserve (and designated site) boundaries.

A substantial amount of rubble and slag remains across the site, from the historic iron mine and associated buildings, now demolished. Four substantial structures remain on the reserve: a concrete bird hide situated near the lagoon island on the sea wall, a steel lighthouse on the sea wall opposite

the bird hide, the original stone lighthouse in the south-west of the reserve and the remains of a stone windmill in the south of the reserve. A byway open to all traffic (BOAT) runs from Mainsgate Road across the reserve to the south-east, before turning to the south-west and extending along the sea wall to Haverigg caravan park. The BOAT is in a poor condition along much of its length, with many potholes and deep ruts across its surface. In addition to the BOAT, there are numerous formal and informal paths across the reserve, created by walkers and cyclists, most of which are unsurfaced.

3.3 Topography

A topographic survey was undertaken of the site in July 2022 by amrGeomatics, provided as drawing P10913/amr Sheets 1 to 6 in Appendix A. Figure 3-2 provides a visualisation of the site topography.

The eastern side of the site is undulating, with levels between 22mAOD and 4mAOD. The location proposed for the New Welcome Building is at around 13.7mAOD. Levels around the Lagoon are around 5.5mAOD to 6.0mAOD along its eastern landward boundary. The sea wall, separating the Estuary from the Lagoon ranges in level generally between 9.7mAOD to 10.6mAOD.

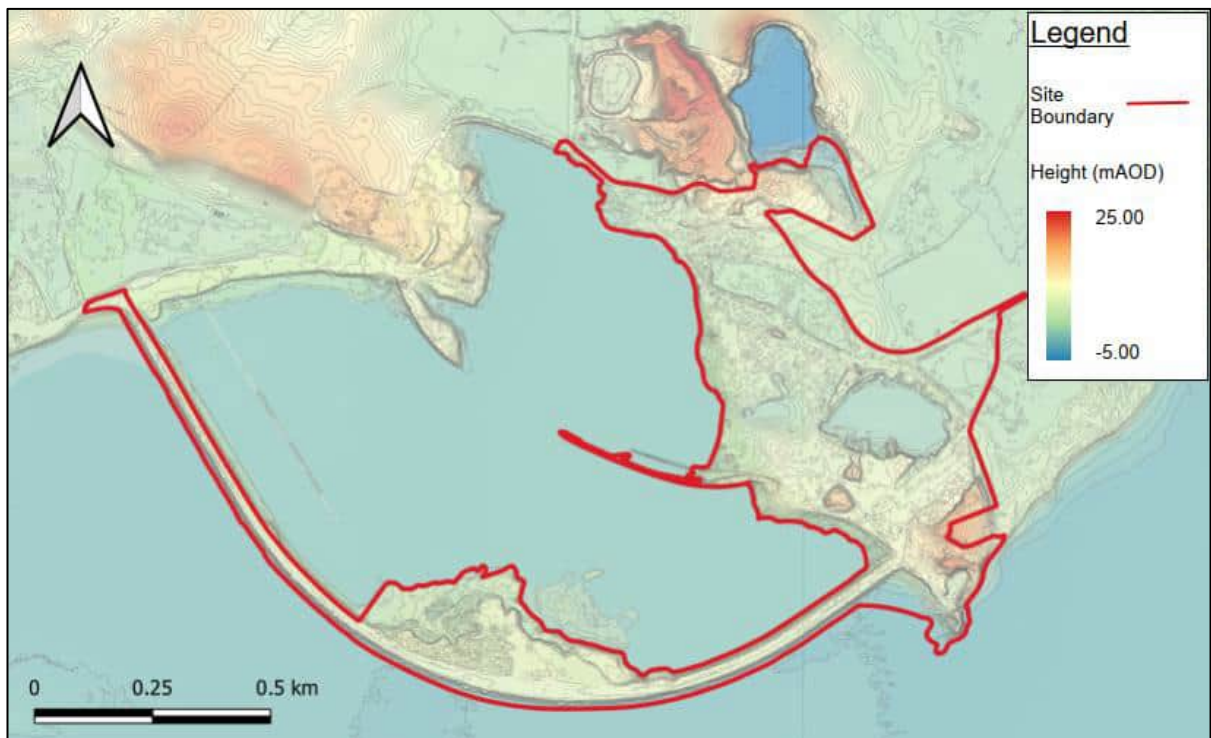


Figure 3-2: Site Topography Heat Map

3.4 Waterbodies

The following waterbodies have been identified within and vicinity of the site:

- Hodbarrow Lagoon lies adjacent to the site boundary, to the west and north.
- The Duddon Estuary lies adjacent to the site boundary, to the south and west.

- Red Hills Quarry (disused and flooded) lies immediately north of the site.
- Haverigg Pool (Main River) lies approximately 350m to the west of the site.
- The Irish Sea lies 2.5km to the southwest of the site.

3.5 Geology and Hydrogeology

The British Geological Survey (BGS)³ map for the site indicates the site is underlain by the following geological sequence:

Table 3-1: BGS Geological Sequence

Geological Unit	Classification	Description	Aquifer Classification
Artificial Ground	INFILLED GROUND	Infilled Ground is an area where the pre-existing land surface has been excavated (Worked Ground) and subsequently partially or wholly backfilled (Made Ground). Composition: variable, e.g. a backfilled quarry, landfill.	
	WORKED GROUND	Worked Ground is an area where the land surface (natural or artificial) has been lowered as a result of man-made excavations. The purpose of the excavation is unspecified. Composition: void	
	MADE GROUND	Made Ground is an area where the pre-existing (natural or artificial) land surface is raised by artificial deposits. The purpose of the made ground is unspecified	

³ British Geological Survey, GeolIndex Onshore, Superficial Deposits and Bedrock Geology, 1:50,000.

Geological Unit	Classification	Description	Aquifer Classification
Superficial Deposits	RAISED MARINE DEPOSITS - SAND AND GRAVEL (RESTRICTED TO THE EASTERN EXTREMITY ID THE SITE)	Raised marine and coastal zone deposits are isostatically uplifted marine and coastal zone deposits which crop out in part above high water mark. Variable lithology. Gravel (shingle), sand, silt and clay; commonly charged with organic debris (plant and shell).	
Solid Geology	RED HILL LIMSTONE FORMATION	Carbonate bioclastic, intraclastic and peloidid grainstones, coarse-grained and virtually structureless following bioturbation.	Secondary A Comprise permeable layers that can support local water supplies and may form an important source of base flow to rivers.
	MARTIN LIMSTONE FORMATION	Mainly carbonate Mudstones, but with significant grainstones, locally cross-bedded, and oolites in upper part; ranges from peritidal to marine. Extensively dolomitized	
	LOW FURNESS BASAL FORMATION	Conglomerate, Sandstones siltstones and mudstones subordinate evaporites, presumed of terrigenous origin in lower Duddon Conglomerates part of limestones and siltstones mostly red with interbedded conglomerates; all resumed of marine origin.	
	ARUNDIAN SUBSTAGE – ARUNDIAN SUBSTAGE	At base, mid to dark grey Even-bedded carbonate grainstones and packstones; middle part, dark grey thinly bedded packstones and Packstones with many	

Geological Unit	Classification	Description	Aquifer Classification
		shaly interbeds; upper part, even bedded packstones and grainstones.	

There are no Groundwater Source Protection Zones (SPZ)⁴ within 2km of the site.

Groundwater vulnerability has been assessed as high risk; the site is situated on a Productive Bedrock and Secondary Superficial Aquifer which has well connected fractures, contributing to a high pollutant speed and a dilution of >550mm/year. There is low soluble rock risk in relation to groundwater vulnerability.

No groundwater abstractions are listed within 1km of the site.

3.6 Existing Drainage

No existing drainage services have been identified within the site boundary.

United Utilities Sewer Records indicate Millom is well served by the public sewer system; the closest public sewer to the site is located within Mainsgate Road, approximately 270m to the north of the entrance to the site.

It is understood that surface water drainage is provided from the disused Redhills Quarry to the north of the site by means of a private pumping station, discharging flow at a controlled rate to United Utilities Wastewater Treatment Works (WwTW) approximately 0.5km to the northeast.

3.7 Other Existing Utilities

A public utility search has not been undertaken for the site.

⁴ Source Protection Zones (SPZs) are defined around large and public potable groundwater abstraction sites.

4.0 Planning Policy

4.1 National Planning Policy

Paragraph 159 of the NPPF⁵ states that: Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.

Paragraph 167 of the NPPF states that: When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

- within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;
- the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;
- it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;
- any residual risk can be safely managed; and
- safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

4.2 Local Planning Policy

The Copeland Local Plan⁶, adopted December 2013, falls under the umbrella title of the Local Development Framework. The Core Strategy (CS) and Development Management Policies (DMP) sets out the overall strategic direction for planning by providing policies to guide decisions on planning applications over the period to 2025.

The CS and DMP Document contains a set of development management policies for the local planning authority area of Copeland, within the Cumberland Unitary Authority. When a planning application is submitted, the Authority uses development management policies (planning policies) alongside other policies in the Core Strategy to help it assess whether the application should be granted planning permission.

The relevant CS and DMP Policies to flood risk are identified as:

⁵ National Planning Policy Framework, Ministry of Housing, Communities and Local Government, July 2021

⁶ https://www.copeland.gov.uk/sites/default/files/attachments/copeland_local_plan_2013_2028.pdf

- Policy ENV1 - Flood Risk and Risk Management

Policy ENV1 – Flood Risk and Risk Management

The Council will ensure that development in the Borough is not prejudiced by flood risk through:

- Permitting new build development only on sites located outside areas at risk of flooding, with the exception of some key sites in Whitehaven.
- Ensuring that developments on important regeneration sites in Whitehaven Town Centre and Harbourside and Pow Beck Valley are designed to address the existing levels of flood risk without increasing flood risk elsewhere.
- Ensuring that new development does not contribute to increased surface water run-off through measures such as Sustainable Drainage Systems, where these are practical. Where they are not this should be achieved by improvements to drainage capacity.
- Supporting measures to address the constraints of existing drainage infrastructure capacity and avoiding development in areas where the existing drainage infrastructure is inadequate.
- Support for new flood defence measures to protect against both tidal and fluvial flooding in the Borough, including appropriate land management as part of a catchment wide approach.

Individual development proposals will be assessed with regard to Development and Flood Risk under Policy DM24.

- Policy ENV2 – Coastal Management

Policy ENV2 – Coastal Management

To reinforce the Coastal Zone's assets and opportunities the Council will:

- Promote the developed coast as a destination for leisure, culture and tourism, with strong links to Whitehaven Harbour / town centre in the north and to Millom in the south.
- Maximise opportunities along the undeveloped coast for tourism and outdoor recreation through support for the North West Coastal Trail and Colourful Coast projects.
- Support the management of more of the undeveloped coast for biodiversity.
- Support energy generating developments that require a coastal location along the undeveloped coast, provided that the potential impacts on biodiversity, landscape and heritage assets are carefully assessed against the benefits. Where negative impacts are likely these must be mitigated against and compensated for.
- Protect the intrinsic qualities of the St Bees Head Heritage Coast in terms of development proposals within or affecting views from the designation. At the same time encourage schemes which assist appropriate access to and interpretation of the Heritage Coast area.
- Work with partners to manage the risks associated with coastal erosion and flooding and ensure that all new development is located outside areas identified as being at risk either now or in future phases of the Shoreline Management Plan.

- DM24 Development Proposals and Flood Risk

Policy DM24 – Development Proposals and Flood Risk

Where a proposed development is likely to be at risk from flooding or increases risk of flooding elsewhere, a Flood Risk Assessment (FRA) will be required to be submitted as part of the planning application.

Development will not be permitted where it is found that:

- A. There is an unacceptable risk of flooding; or
- B. The development would increase the risk of flooding elsewhere; or
- C. The development would cause interference with or loss of access to a watercourse and the benefits of the development do not outweigh the risks of flooding.

Where a development requires the provision of additional flood defence and mitigation works, any costs, including maintenance, should be met by the developer.

4.3 Local Plan 2021 - 2038

The Cumberland Local Plan 2021 – 2038 Local Plan addendum document, and all associated submission documents are stated by the council to be sent to the Secretary of State in September 2022 for Public Examination by an independent Planning Inspector. The Inspector is to assess the draft and the evidence during the remainder of 2022, with a view that the Local Plan would be adopted in March 2023.

At the time of preparing this Flood Risk Assessment, the Cumberland Local Plan has not been adopted.

A review of draft policies in respect to flood risk has been undertaken. ENV1 is to be replaced by DS8 and DS9, ENV2 is to be replaced by N4, N8 and T2 and, DM24 is to be replaced by DS5 and DS8. No significant changes in policy respect to flood risk have been identified.

4.4 Site Specific NPPF Flood Risk Categorisation

To assess the NPPF flood risk classification for the site, the first step is to inspect both the EA web-based flood mapping data for flooding from rivers and sea and the Local Planning Authority SFRA (where available) and surface water and reservoirs. The rivers and sea flood map is used to inform planning of a sites Flood Zone(s); however, the surface water and reservoir flood maps should also be used to identify other flood risks.

From the Environment Agency flooding from rivers and seas map, presented later, it can be seen that a large area of the site is classified as Flood Zone 1 (FZ1) (Low Probability: Land having a less than 0.1% (1 in 1000) annual probability of river or sea flooding). However, the redline boundary within the east and south of the proposed development area encroaches into land designated as FZ3 (High Probability: Land having a 1% (1 in 100-yr) or greater annual probability of river flooding; or Land having

a 0.5% (1 in 200-yr) or greater annual probability of sea flooding (Land shown in dark blue on the Flood Map).

The site is also in an area that has some protection from flood defences. Flood defences reduce the probability of flooding from a particular source (a river or the sea) but do not completely remove the risk. They can fail or a flood could happen which is larger than the one the defence is designed to protect against.

From the detailed maps provided in the Strategic Flood Risk Assessment⁷ for Cumberland (Copeland Borough Council), the site is confirmed to lie in Flood Zone 3a.

For the purpose of this assessment, the site is classified as being in FZ3a.

4.5 Site Specific Flood Zone Compatibility

The proposals for the development site fall within the following category:

- 'Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure' and 'Car Parks'.
- 'Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.'

These development types are classed as 'Less Vulnerable' and 'Water Compatible' respectively in the Flood Risk Vulnerability Classification with reference to NPPF Table 2⁸.

The Welcome Building and associated Car Park site is located within Flood Zone 1, for which 'Less Vulnerable' development is deemed to be appropriate. The other elements of the development proposal are deemed water compatible. Table 4-1 below, reproduced from Table 3⁹ of the NPPF technical guidance shows the development compatibility within Flood Zones.

⁷ https://www.copeland.gov.uk/sites/default/files/attachments/copeland_level_1_sfra_final_report.pdf

⁸ <https://www.gov.uk/guidance/flood-risk-and-coastal-change#Table-2-Flood-Risk-Vulnerability-Classification>

⁹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/575184/Table_3_-_Flood_risk_vulnerability_and_flood_zone__compatibility_.pdf

Table 4-1: NPPF Flood Risk Vulnerability Classification (reproduced from Table 3⁸)

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	✗	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	✗	✗	✗	✓*

Key:

✓ Development is appropriate.

✗ Development should not be permitted.

Notes

† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

** * In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test

It is anticipated that the lifespan of the development will be 75 years (as non-residential). If planning approved in 2023, the “lifetime” will be to 2098.

5.0 Assessment of Flood Risk

5.1 Sources of Flood Risk

This study assesses the risk from different types of flooding to the development and the risk of flooding from the development, taking into consideration climate change, as well as how flood risks should be managed. The approach to assessing flood risk at the development site was informed by the requirements of NPPF in conjunction with the client and Environment Agency requirements.

5.2 Environment Agency Online Flood Map for Planning

The Environment Agency (EA) provide an online map that identifies flood zone locations for planning purposes. An extract of this can be seen in Figure 5-1.

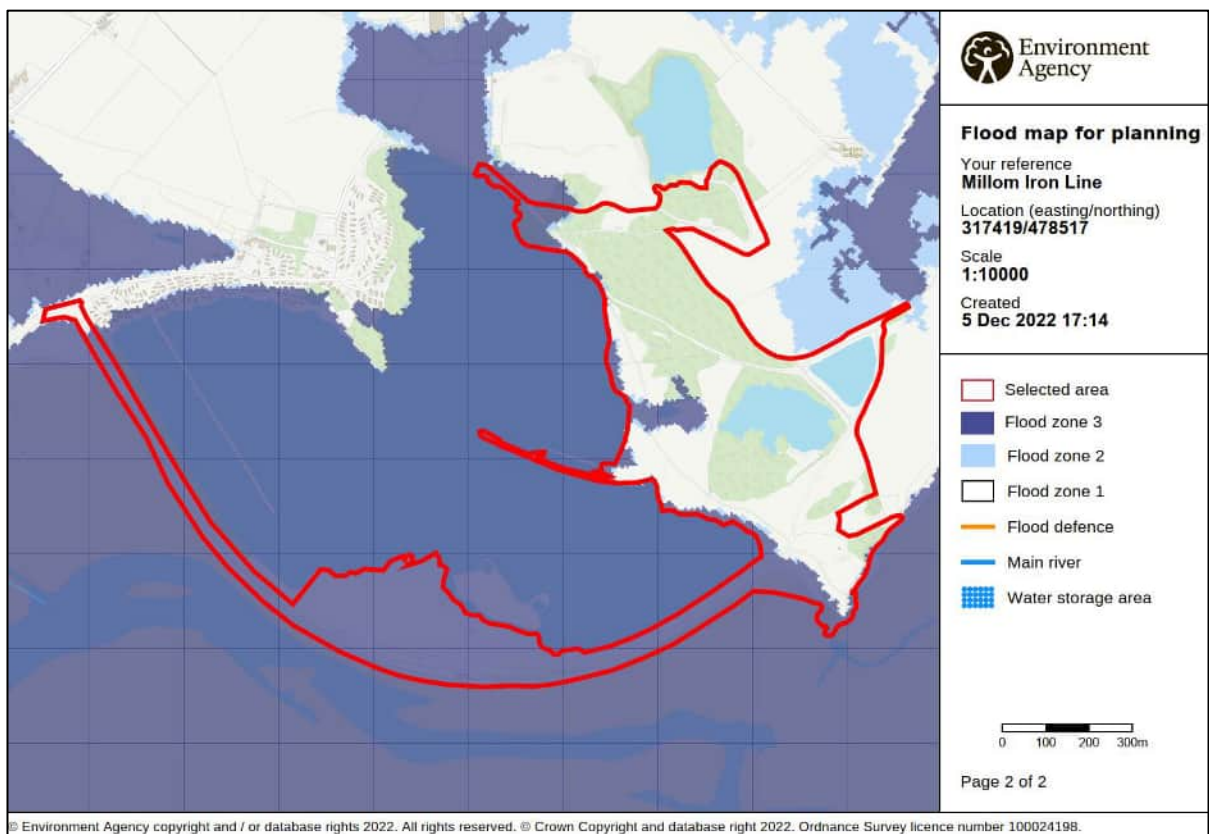


Figure 5-1: Environment Agency Flood Map for Planning (Rivers and Sea)

From the Environment Agency flooding from rivers and sea map:

- Zone 1 Low Probability: Land having a less than 0.1% (1 in 1,000) annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)

- Zone 2 Medium Probability: Land having between a 1% (1 in 100) and 0.1% (1 in 1,000) annual probability of river flooding; or land having between a 0.5% (1 in 200) and 0.1% (1 in 1,000) annual probability of sea flooding. (Land shown in light blue on the Flood Map).
- Zone 3a High Probability: Land having a 1% (1 in 100-yr) or greater annual probability of river flooding; or Land having a 0.5% (1 in 200-yr) or greater annual probability of sea flooding (Land shown in dark blue on the Flood Map).

The flood map also contains the following information, where present:

- Flood defences built in the last five years to protect against river floods with a 1% (1 in 100-yr) chance of happening each year, together with some natural or constructed entities which retain, store or channel water and which may protect against smaller floods.
- Areas benefiting from flood defences - areas that benefit from the flood defences shown, in the event of a river flood with a 1% (1 in 100-yr) chance of happening each year, or a flood from the sea with a 0.5% (1 in 200-yr) chance of happening each year. If the defences were not there, these areas would flood.

It can be seen from the mapping that the part of the site is located within the dark blue shading noted on the drawing key as Flood Zone 3, the 1% (1 in 100-yr) annual probability flood outline, suggesting the site is at **HIGH** risk of river flooding.

The east of the site, proposed for the Welcome Building is located entirely within Flood Zone 1.

In addition to the Flood Map for Planning, the Environment Agency has provided Product 4 Data; Detailed Flood Risk Assessment Map, including flood zones, defences and storage areas, areas benefiting from defences, statutory main river designations, historic flood event outlines and more detailed information from our computer river models (including model extent, information on one or more specific points, flood levels, flood flows). The data is provided in Appendix D as: below.

- Map 1: Flood Zones – confirming the extent of Tidal Flood Zone 2 and Flood Zone 3.
- Map 2: 0.1% AEP (1 in 1000-yr) Undefended Tidal Flood Extent and selected flood levels.
- Map 3: 0.5% AEP (1 in 200-yr) Undefended Tidal Flood Extent and selected flood levels.
- Map 4: 0.5% AEP (1 in 200-yr) Undefended + Climate Chance (+600mm Sea Level Rise).
- Map 5: 0.1% AEP (1 in 1000-yr) Defended Tidal Flood Extent and selected flood levels.
- Map 6: 0.5% AEP (1 in 200-yr) Defended Tidal Flood Extent and selected flood levels.
- Map 7: 0.5% AEP (1 in 200-yr) Defended + Climate Chance (+600mm Sea Level Rise).

The EA data is provided from the Cumbrian Tidal 2012 2D modelling project and represents the most up-to date data available.

In respect to the Flood Zones, the Product 4 data confirms that the proposed Welcome Building and associated Car Park lies within Flood Zone 1

In respect to the Welcome Building and associated Car Park, the adjacent modelled flood levels are as follows:

- 0.1% AEP undefended – 4.49m AOD
- 0.5% AEP undefended – 6.28m AOD
- 0.5% AEP undefended +CC – 6.93m AOD
- 0.1% AEP defended – No flood risk in the vicinity.
- 0.1% AEP defended – No flood risk in the vicinity.
- 0.5% AEP defended +CC – 6.34m AOD

The proposed Finished Floor Level of the Welcome Build is to be set at 13.70m AOD, and therefore some 6.77m above the highest modelled tidal level of 6.93m AOD, relating to the 0.5% AEP (1 in 200-yr) plus climate change.

The existing ground levels in the vicinity of the proposed Welcome Building Car Park are around 3.20m AOD. However, the surrounding topography is at significantly higher elevations, preventing tidal flood water reaching the car park site.

In respect to the landmarks and key spaces within the proposed development boundary, see Figure 2-1 above, surveyed levels indicate at these locations indicate only the Quarry Hides and Lagoon View are at risk of flooding. Table 5-1 below shows the predicted flood depths based on EA modelled flood levels and surveyed ground levels.

Table 5-1: Modelled Flood Depths at Landmarks and Key Spaces

Reference Number	Description	Easting	Northing	Surveyed Ground Level (m AOD)	Modelled Flood Depth (m)					
					0.1% AEP Undefended	0.5% AEP Undefended	0.5% AEP Undefended + CC	0.1% AEP Defended	0.5% AEP Defended	0.5% AEP Defended + CC
1	WELCOME BUILDING	317902	478988	13.7	-	-	-	-	-	-
2	HODBARROW BEACON	318002	478324	16.58	-	-	-	-	-	-
3	TOWSEY HOLE WINDMILL	318260	478201	19.43	-	-	-	-	-	-
4	HAVERRIGG LIGHTHOUSE	317392	477918	9.1	-	-	-	-	-	-
5	TERN ISLAND HIDE	317417	478009	10.1	-	-	-	-	-	-
6	ANNIE LOWTHER HIDE	317851	478377	10.31	-	-	-	-	-	-
7	QUARRY HIDES	318244	478566	5.71	0.78	0.52	1.22	-	-	-
8	LAGOON VIEW	317660	478879	6.88	-	-	0.05	-	-	-
9	FLOOR THRESHOLD	317856	478566	7.58	-	-	-	-	-	-
10	WHITEROCK JUNCTION	318151	478209	10.88	-	-	-	-	-	-
11	IRON LINE ENTRANCE	317660	478879	8.85	-	-	-	-	-	-

Though not a formal flood defence, the outer lagoon wall (the BOAT) provides a tidal defence from the Estuary level to approximately 9.7m AOD. This is reflected by the defended scenario model results. However, in respect to planning and flood risk, EA guidance states assessment and any required mitigation is undertaken against the undefended scenario.

In respect to flood risk from Rivers and Sea, it is concluded that the risk to the proposed Welcome Building is LOW and will remain LOW when considering the impacts of climate change (sea level rise).

Similarly, the development proposals for the Landmarks and Key Spaces, except for the Quarry Hides and Lagoon View, is LOW and will remain LOW when considering the impacts of climate change (sea level rise).

Measures to mitigate flood risk from River and Tidal flooding are, where required are proposed in Section 6.

5.3 Flood Defences

The EA has not provided, as part of the Product 4 dataset, a map showing flood defences local to the site. This includes the Flood Wall to Hodbarrow Lagoon. It is concluded therefore that this is not an EA Asset. The responsibility of maintaining this structure will therefore lie with Cumberland Council.

The EA does however provide mapped information on the area considered to be defended by the Flood Wall as an open data layer.

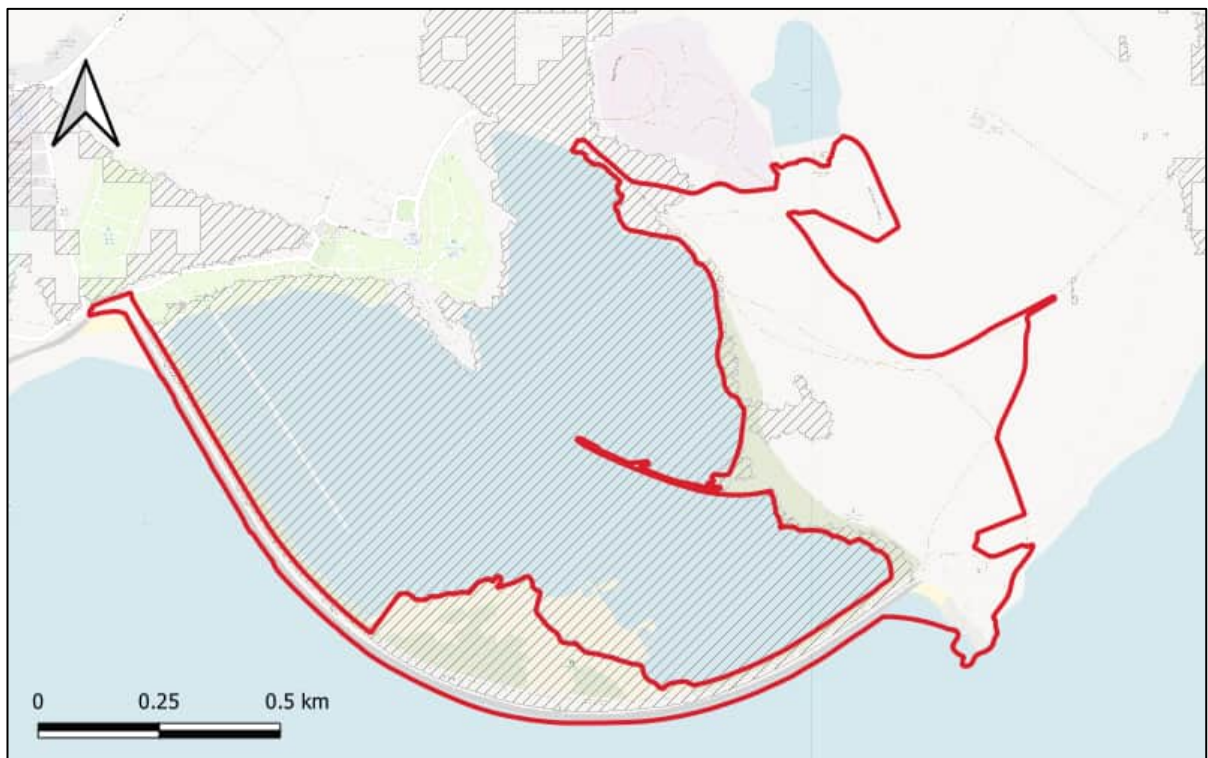


Figure 5-2: Environment Agency Reduction in Risk of Flooding from Rivers and Sea

The area broadly matches the difference between the modelled defended and undefended 0.1% (1 in 1000-yr) extents provided within the Product Data.

The site lies within the coastal zones defined in the Shoreline Management Plan¹⁰ (SMP2) Cells 11c (Rossall Point to Hodbarrow Point, including the Duddon Estuary) and Cell 11d (Hodbarrow Point to St Bees).

The SMP indicates 'holding the line' for all major settlements as the policy for most of the undeveloped coast in Copeland is No Active Intervention, which means there is no planned investment in coastal defences on those stretches.

The Cumbria Coastal Strategy¹¹, produced in April 2020, builds upon the Shoreline Management Plan and sets out how Cumbria County Council will manage the risks of coastal flooding and erosion in the county.

The strategy further divides SMP Cells Sub-cells. Those relevant to the development site are:

- 11c16.10 Duddon Estuary (Millom Iron Works)
- 11c16.11 Hodbarrow Mains
- 11d1 Hodbarrow Point to Haverigg

Millom Iron Works – current SMP policy is No Active Intervention through allowing existing redundant defences and quay structures to deteriorate.

Hodbarrow Mains - No Active Intervention in the short term, Management Realignment including the construction of set back flood embankments to manage flood risk to flood assets in Millom when flood risk justifies and then Hold the line in beyond this.

Hodbarrow Point to Haverigg - The current Shoreline Management Plan policy is Hold the line for the short term but moving to Managed realignment beyond this.

The Coastal Strategy, whilst continuing to develop acknowledges the shared flood area frontage with policy units 11c16.10, 11c16.11 and 11d1.1. This means that any tidal flooding through this frontage has the potential to affect a wider area. The strategy concludes that it would be appropriate to consider revision of the Shoreline Management Plan policy for the western part of the frontage to hold the line by designating a new policy unit, 11c16.10.1. The proposed policy unit diagram (extracted from the Cumbria Coastal Strategy) is provided as Figure 5-3 below.

¹⁰ North West and North Wales Coastal Group, *North West England and North Wales Shoreline Management Plan SMP2 Main SMP2 Document*, Halcrow Group, February 2011.

¹¹ <https://www.cumbria.gov.uk/elibrary/Content/Internet/544/17312/43413152620.pdf>

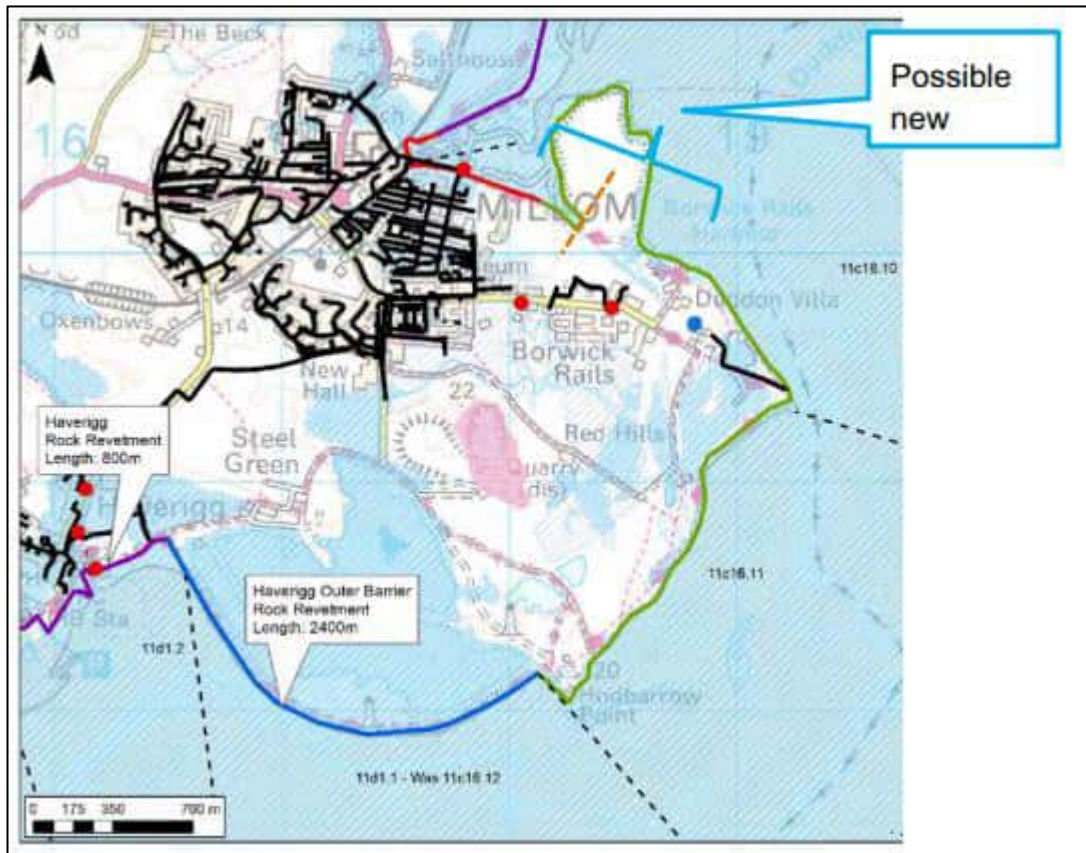


Figure 5-3: Cumbria Coastal Strategy – Proposed Policy Unit 11c16.10.1

In respect to the defence provided by the “Haverigg Outer Barrier”, the Coastal Strategy states *“The Shoreline Management Plan policy suggests realignment may be required during the medium term (20 to 50 years). But given the current good condition and the substantial nature of the armouring the defences may be sustainable beyond 50 years with only minor maintenance and therefore the need for realignment to a set back defence could potentially be deferred beyond 50 years. This could defer the short term need for a more detailed study of the approach to the set back defences, long term implications of future conditions on the barrier and the need for mitigation or replacement of currently protected habitats.”*

Given the SMP2 was published 12 years ago, the timescales quoted suggest realignment may be required between 2031 and 2061. However, subject to appropriate maintenance the lifetime of the barrier could be extended.

In respect to the development proposals, the failure or removal of the barrier would not increase the risk of flooding to the Welcome Building as this is sited beyond the extent of the undefended flood extents. However, the wider Hodbarrow Reserve would be significantly negatively impacted.

5.4 Environment Agency Surface Water Flood Risk Mapping

An extract of the Environment Agency flood risk from surface water map showing extent and depths of flooding is shown in Figure 5-2 with the site area outlined in red.



Figure 5-4: Environment Agency Flood Risk from Surface Water Map – Extent of Flooding

High risk means that each year this area has a chance of flooding of greater than 3.3%. (1 in 30-yr rainfall return period event)

Medium risk means that each year this area has a chance of flooding of between 1% and 3.3% (1 in 100-yr rainfall return period event and 1 in 30-yr rainfall return period event)

Low risk means that each year this area has a chance of flooding of between 0.1% and 1% (1 in 1000-yr rainfall return period event and 1 in 100-yr rainfall return period event)

Very low risk means that each year this area has a chance of flooding of less than 0.1% (1 in 1000-yr rainfall return period event)

The surface water mapping is based on applying rainfall from different design return period storms and durations directly on to a 2m Digital Terrain model (DTM), modified to add 300mm height to building footprints and reduce heights by 125mm along roads and therefore provides a broad assessment of risk of overland flooding from direct runoff.

It can be seen from the map that discreet locations within the site are shown to be at risk of flooding from surface water. The map also indicates that these areas are where ponding occurs in low lying areas, and do not form overland flow routes through the site.

In respect to the area proposed for the Welcome building, no flood risk from surface water is predicted.

There is however an area at the north-eastern corner of the site, adjacent to the disused Redhills Quarry where the depth of flooding during the low risk scenario could be up to 900mm in depth. This is in the vicinity of the proposed Welcome Building Car Park.

There is also an area just beyond the north-western site entrance (to the west of Mainsgate Road) where flood risk from surface water during the Low probability scenario may result in flood depths up to 900mm deep with the carriageway. However, no encroachment into the site is predicted.

On this basis, the site overall is considered at **VERY LOW** risk from surface water flooding. Given the nature of the site, i.e., a nature reserve, the discreet areas identified as being at risk of flooding from surface water are not considered significant in respect to the development proposals. However, the risk of surface water flooding to the Welcome Building Car Park is considered **HIGH**.

Whilst not indicated on the RoFSW mapping, occasional flooding has been reported along the main access road off Mainsgate Lane. It is understood this is due to condition/capacity issues with the culvert crossing the access road, which we understand to discharge water from the former quarry site to the Lagoon. No information on flood depth has been confirmed however, reviewing the topography indicates a flood depth greater than around 300mm would overtop the raised ground to the southwest of the access road, and flow into the lagoon. Based on current knowledge, the reported flooding of the access road is considered by this assessment to pose a **LOW** risk.

Measures to mitigate flood risk from Surface Water are, where required, proposed in Section 6 and within the accompanying Drainage Strategy.

5.5 Environment Agency Reservoir Flood Risk Mapping

The Environment Agency provide mapping to show flood risk from reservoirs. This is the risk of catastrophic failure and given that the majority of reservoirs in this area are maintained by the Environment Agency, United Utilities or Local Authority the probability of such failure is very low. An extract of the map is shown in Figure 5-3 below.

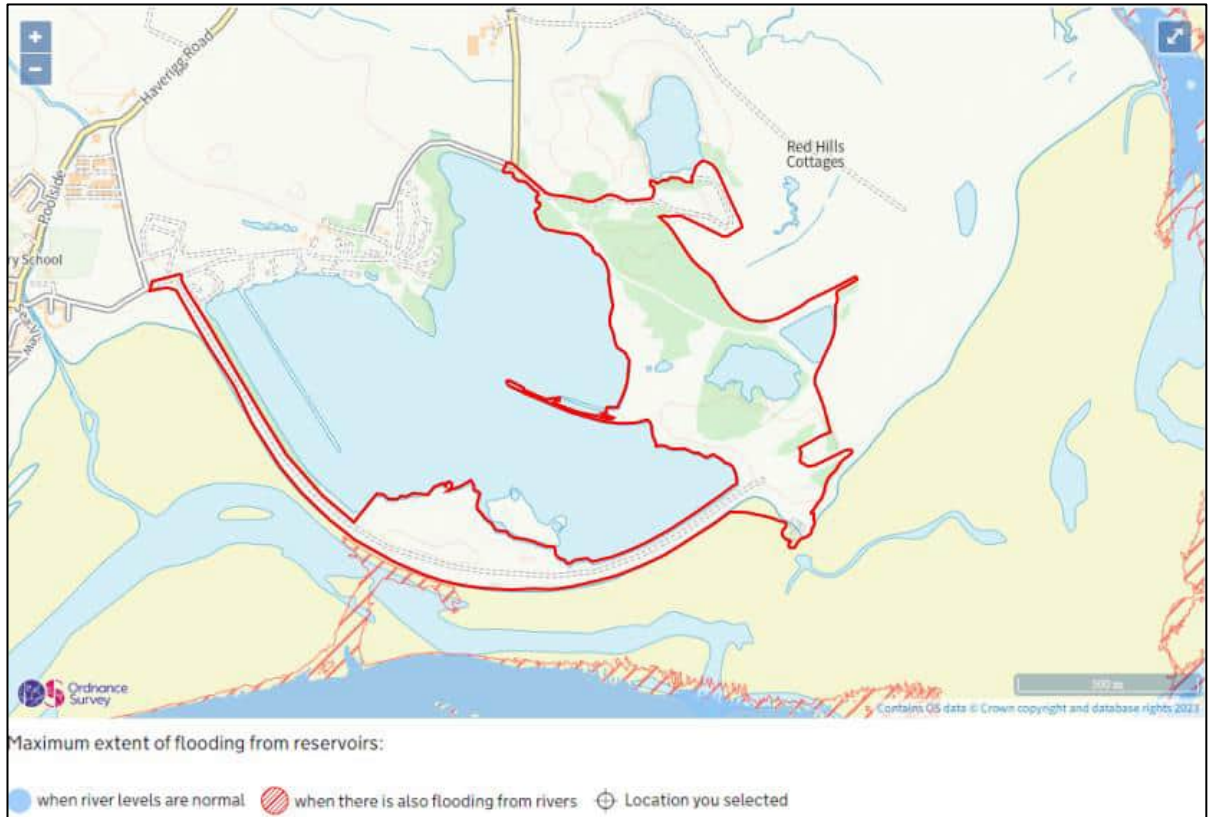


Figure 5-5: Environment Agency Flood Risk from Reservoirs – Extent of Flooding

The Reservoir Flood Map indicates there is no risk of flooding from this source when there is also flooding from the Duddon Estuary and other contributing watercourses.

Flooding from reservoirs is extremely unlikely. An area is considered at risk if peoples' lives could be threatened in the event of a dam or reservoir failure. Therefore, the site can be considered to be at **VERY LOW** risk from this source. Measures to mitigate flood risk from Reservoirs are, where required are proposed in Section 6

5.6 Flooding from Groundwater

Groundwater flooding is caused by the emergence of water from beneath the ground, either at point or diffuse locations. The occurrence of groundwater flooding is usually local and unlike flooding from rivers, the sea, surface water or reservoirs, does not generally pose a significant risk to life due to the slow rate at which the water level rises. However, groundwater flooding can cause significant damage to property, especially in urban areas, and can pose further risks to the environment and ground stability.

There are several mechanisms that increase the risk of groundwater flooding including prolonged rainfall, high in-bank river levels, artificial structures, groundwater rebound, and mine water rebound. Properties with basements or cellars or properties that are located within areas deemed to be susceptible to groundwater flooding are at particular risk. Development within areas that are susceptible

to groundwater flooding will generally not be suited to SuDS; however, this is dependent on detailed site investigation and risk assessment at the FRA stage.

The EA's national dataset, Areas Susceptible to Groundwater Flooding (AStGWF), is a low resolution map which uses four susceptibility categories to show the proportion of a network of 1 km grid squares where geological and hydrogeological conditions show that groundwater might emerge. It does not show the likelihood of groundwater flooding occurring and is not suitable for planning considerations at a site-specific level. It should only be used as a trigger for further investigation as to the possibility of groundwater flooding.

The AStGWF is shown on the SFRA Maps. However, these maps are not available at present.

The site is not reported to be at risk by the owners and based on the minimal superficial geology and bedrock of low solubility below, it can therefore be considered to be at **LOW** risk of flooding from this source. Measures to mitigate flood risk from Groundwater, where required, are proposed in Section 6

5.7 Flooding from Canals and Artificial Waterbodies

There are no canals in the vicinity of the site.

The Lagoon is however considered to be an artificial water body, the water level being largely dependent on direct rainfall, runoff from the local topography and surface water discharge from the holiday parks to the western shoreline. Neither the Environment Agency Flood Map for River and Sea or Surface Water indicate the Lagoon to be a source of flood risk. It is however understood that a pump is installed and managed by the holiday park owners to control the level of the Lagoon.

The disused Redhills Quarry to the north of the site is also considered to be an artificial waterbody. As discussed in Section 3.6, it is understood that water levels in the quarry are controlled by means of a private pumping station, discharging flow at a controlled rate to United Utilities Wastewater Treatment Works (WwTW) approximately 0.5km to the northeast. The Environment Agency Risk of Flooding from surface water map indicates flood risk within the quarry, however, there is no connectivity indicated between this and that indicated in the north-eastern corner of the site.

Based on current understanding of the Artificial Water Bodies adjacent to the site, the risk of flooding from this source is considered **VERY LOW**. Measures to mitigate flood risk from Artificial Waterbodies, where required are proposed in Section 6

5.8 Public Sewers, Highway Drainage Flooding and Infrastructure Failure

No existing drainage services have been identified within the site boundary.

United Utilities Sewer Records indicate Millom is well served by the public sewer system; the closest public sewer to the site is located within Mainsgate Road, approximately 270m to the north of the entrance to the site.

No incidents of flooding within the site, from this source, have been identified by this assessment. Historically however, flooding has occurred within Millom, cited as being associated with the public drainage infrastructure. This is discussed in detail in the following sections.

Surface water drainage infrastructure from the disused Redhills Quarry to the north of the site by means of a private pumping station, discharging flow at a controlled rate to United Utilities Wastewater Treatment Works (WwTW) approximately 0.5km to the northeast. No flooding to the site from this source has been identified by this assessment.

Based on current understanding of the drainage systems within and in the vicinity of the site, the risk of flooding from this source is considered **VERY LOW**. Measures to mitigate flood risk from Public Sewers, Highway Drainage Flooding and Infrastructure Failure are, where required are proposed in Section 6 and within the accompanying Drainage Strategy.

5.9 Historic Flooding

The EA has not provided historic flood event maps as part of the Product 4 flood risk data pack for the site, suggesting that there is no record of flooding within the site.

A review of the EA's web-based mapping service¹² has been undertaken to confirm any recorded flood event data. Figure 5-4 below shows recorded flood outlines in the vicinity of the site and wider area.

¹² <https://environment.data.gov.uk/DefraDataDownload/?mapService=EA/RecordedFloodOutlines&Mode=spatial>

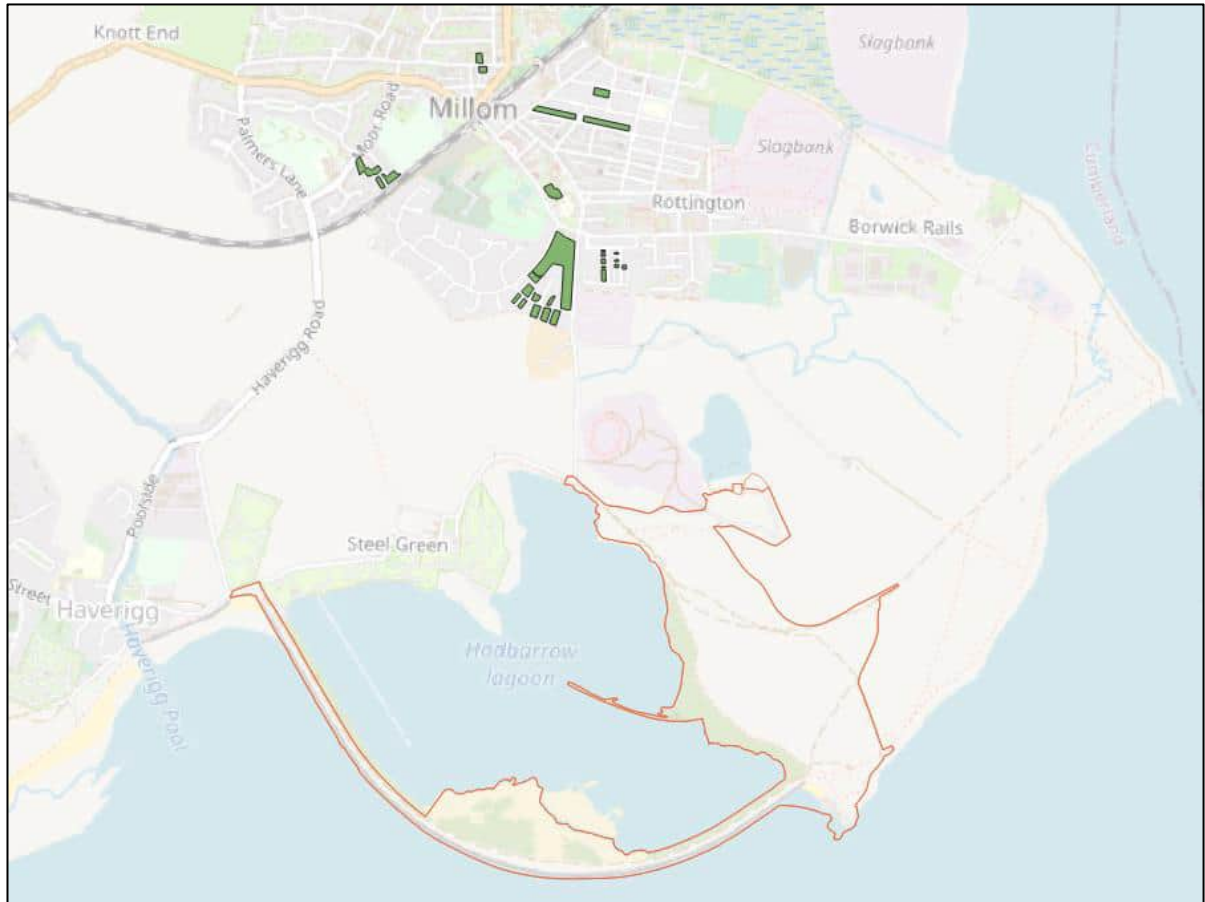


Figure 5-6: Historic Flood Outlines for Millom (Environment Agency)

The metadata attached to the historic flood outlines identify the event to have occurred on 30th September 2017 and the source to be local drainage / surface water.

Under Section 19 of the Flood and Water Management Act 2010, on becoming aware of a flood in its area, a Lead Local Flood Authority (LLFA) must, to the extent that it considers necessary or appropriate, investigate and subsequently publish the results of its investigation.

Cumbria, Cumbria County Council (CCC) undertook such an investigation¹³ following the September 2017 flooding in Millom and Haverigg. The areas identified in the subsequent report of January 2018 coincide with those shown on the EA's historic flood outline map.

The report concludes that the cause of the flooding was due to the intense rainfall event overwhelming the drainage assets, however, in some locations it may have been compounded by faults on some of the drainage systems. At the time of the report's draft publication (January 2018) work had already begun to repair identified faults.

¹³ <https://cumbria.gov.uk/elibrary/Content/Internet/544/3887/6729/6732/43277185622.pdf>

The report also identified recommended actions to reduce the risk of flooding for the future. These actions are categorised as Community Resilience, Upstream Management, Maintenance and Strengthening Defences.

As referenced in Section 5.4 occasional flooding has been reported along the main access road off Mainsgate Lane. The frequency of flooding is not confirmed however, based on current knowledge, the reported flooding of the access road is considered by this assessment to pose a low risk.

Measures to mitigate flood risk associated with historic flooding are, where required, proposed in Section 6 and within the accompanying Drainage Strategy.

5.10 Climate Change

Guidance on the impacts of climate change on flood risk is provided on the GOV.UK website page 'Flood risk assessment: climate change allowances'¹⁴. This was initially published on the 19th February 2016 and was last updated on 27th May 2022.

The guidance covers the impacts on peak river flow, peak rainfall intensity, sea level rise, offshore wind speed and extreme wave height.

The development lifetime of 75 years and assumed planning approval date of 2023 would mean that climate change must be considered using the 2080's epoch uplifts.

Whilst the EA have provided model results for a climate change scenario, the modelling work was undertaken in 2012 and in respect to sea level rise the climate change results may not reflect current guidance.

In respect to tidal flooding, guidance currently advises the use of the Environment Agency's R&D project, 'Coastal Flood Boundary Conditions for UK Mainland and Islands' (SC060064)¹⁵ alongside Table 1 of its climate change allowances guidance¹⁶ for determining likely tidal levels at the end of lifetime of the development.

The Environment Agency's R&D project, 'Coastal Flood Boundary Conditions for UK Mainland and Islands' (SC060064)¹⁷ provides information on extreme sea levels around the coasts of England, Wales, Scotland and Northern Ireland, along flood levels of priority tidal rivers and estuaries.

A review of the coastal design sea level data has been undertaken to both confirm the current design sea level and for assessment in the impact of climate change using the Duddon Estuary data.

¹⁴ <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

¹⁵ <https://www.data.gov.uk/dataset/73834283-7dc4-488a-9583-a920072d9a9d/coastal-design-sea-levels-coastal-flood-boundary-extreme-sea-levels-2018>

¹⁶ <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#sea-level-allowances>

¹⁷ <https://www.data.gov.uk/dataset/73834283-7dc4-488a-9583-a920072d9a9d/coastal-design-sea-levels-coastal-flood-boundary-extreme-sea-levels-2018>

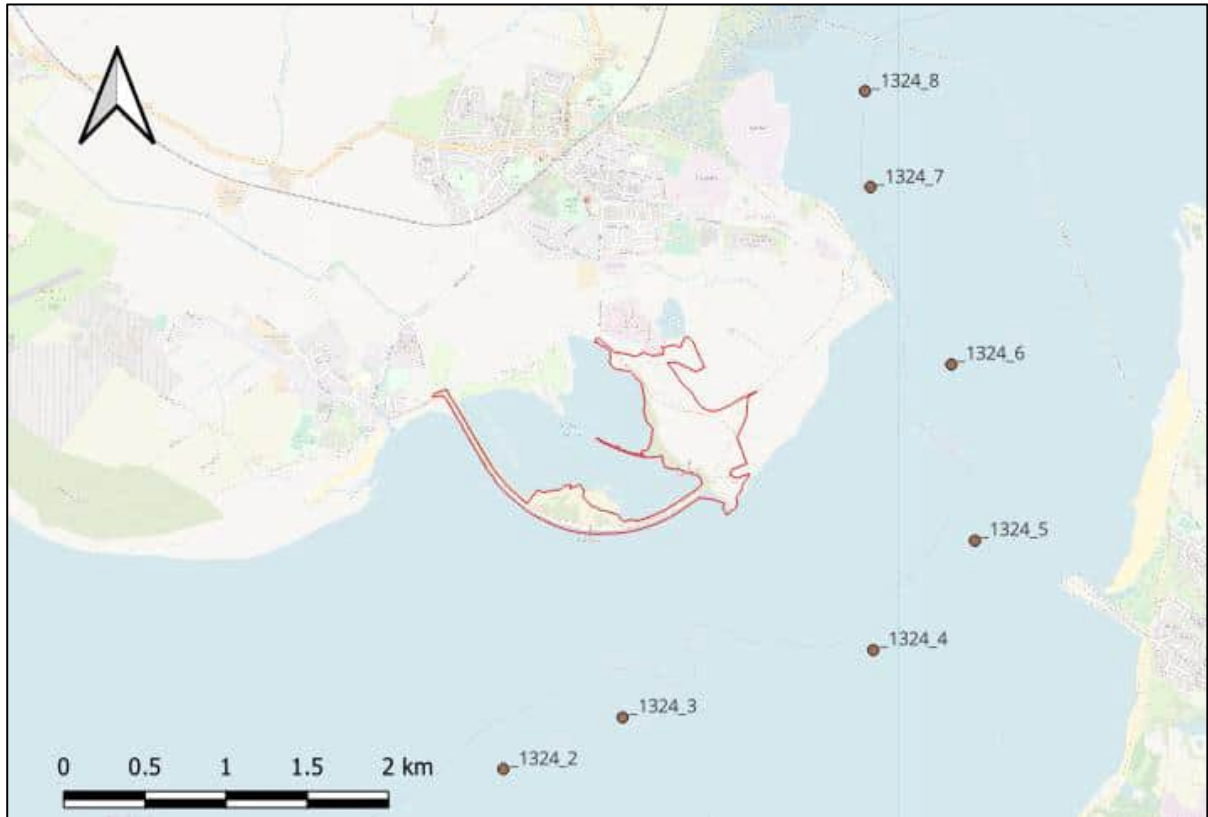


Figure 5-7: Coastal Design Sea Levels - Duddon Estuary Node Locations

The extreme sea levels along the estuary are identified by unique chainage. It is considered that nodes 1324_2 to 1324_6 are relevant to the site, with 1324_4 the most applicable. The 0.5%AEP (1 in 200-yr) extreme tide level ranges from 6.25m AOD to 6.34m AOD.

In respect to tidal flooding, the site location in Millom puts the development within the North West River Basin District. Figure 5-6 below shows details the sea level rise for each epoch.

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

Figure 5-8: Sea level allowances by river basin district (extract from Table 2¹⁶)

The climate change flood level in respect to tidal flood risk is taken as the 0.5% AEP (1 in 200-yr) flood level to the end of design life of the Welcome Building, stated previously as 75 years hence. i.e., to 2098.

Table 5-2 below shows the determined sea level rise and tidal estuary climate change flood levels for both the Higher Central and Upper End scenarios as required by the EA guidance.

Table 5-2: Predicted Sea Level Rise and Climate Change Levels in 2098

Higher Central

Duddon Estuary Node	Base Sea Level 2017 (mAOD)	Total Sea Level Rise between years (mm)					Climate Change Sea Level (2098) (mAOD)
		2017-2035	2036-2065	2066-2095	2096-2098	Total	
1324_2	6.25	81	219	300	33.6	633.6	6.88
1324_3	6.27	81	219	300	33.6	633.6	6.90
1324_4	6.30	81	219	300	33.6	633.6	6.93
1324_5	6.32	81	219	300	33.6	633.6	6.95
1324_6	6.34	81	219	300	33.6	633.6	6.97

Upper End

Duddon Estuary Node	Base Sea Level 2017 (mAOD)	Total Sea Level Rise between years (mm)					Climate Change Sea Level (2098) (mAOD)
		2017-2035	2036-2065	2066-2095	2096-2098	Total	
1324_2	6.25	102.6	297	426	48.9	874.5	7.12
1324_3	6.27	102.6	297	426	48.9	874.5	7.14
1324_4	6.30	102.6	297	426	48.9	874.5	7.17
1324_5	6.32	102.6	297	426	48.9	874.5	7.19
1324_6	6.34	102.6	297	426	48.9	874.5	7.21

The results of the above Higher Central assessment compare well with the EA's model output data for both the current undefended 0.5% AEP (1 in 200-yr) tidal flood level of 6.28mAOD and the undefended 0.5% AEP (1 in 200-yr) plus climate change (600mm SLR) tidal flood level of 6.93mAOD.

The upper end allowance is based on the 95th percentile (confidence limit) and results in a climate change extreme tide level of 7.17mAOD at Node 1324_4.

Considering the match between the EA modelled climate change results and the results of the Higher Central assessment using the Coastal Flood Boundary Conditions for UK Mainland and Islands, it is considered stating this figure (**6.93mAOD**) as the appropriate climate change tidal level.

5.11 Design Flood Level

The Environment Agency Flood Risk and Coastal Change Guidance¹⁸ defines the “Design Flood” as

- river flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year); or tidal flooding with a 0.5% annual probability (1 in 200 chance each year); or
- surface water flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year),
- plus an appropriate allowance for climate change.

Of the flood level assessments undertaken, the highest predicted flood levels are those from the EA Product 4 data which considers tidal flood risk:

- 0.5% AEP (1 in 200-yr) undefended –6.28mAOD (Flood Zone 3)
- 0.1% AEP 1 in 1000-yr) undefended – 7.49mAOD (Flood Zone 2)

When considering climate change, for the Tidal Flood Risk, which has been confirmed as the modelled undefended 0.5% AEP (1 in 200-yr) plus 600mm sea level rise for the northwest river basin district, giving a predicted climate change flood level at for the site as:

- 0.5% AEP (1 in 200-yr) plus 600mm – **6.93mAOD (The Design Flood Level)**

¹⁸ <https://www.gov.uk/guidance/flood-risk-and-coastal-change>

5.12 Summary of Flood Risk

From the evidence collated, the main types of flooding that may apply to the proposed development site are as follows:

- Fluvial flooding to the site – **NONE**
- Tidal flooding to the site - **HIGH**
- Reservoir flooding to the site – **NONE**
- Groundwater flooding to the site – **VERY LOW**
- Public Sewers and Drainage flooding to the site – **VERY LOW**
- Surface water flooding to the site – **LOW (HIGH FOR WELCOME BUILDING CAR PAK)**
- Surface water flooding from the site – **LOW**
- Historic Flooding – **NONE**
- Canals and Artificial Sources –**VERY LOW**

6.0 Flood Risk Mitigation

6.1 Fluvial / Tidal Flood Risk Mitigation

This assessment has concluded that part of the site is at risk from tidal flooding from the 0.5%AEP plus climate change undefended event.

The development site lies across Flood Zone 1, Flood Zone 2 and Flood Zone 3, with the proposed Welcome Building and Car Park located in Flood Zone 1. The majority of landmarks and key spaces lie above the predicted climate change flood levels though the wider site lies within Flood Zone 3 and are designated as Water Compatible.

6.2 Finished Floor Levels

The EA's standing advice on setting finished ground floor levels for sites in Flood Zone 2 or Flood Zone 3 is that they should be set a minimum of whichever is higher of 300mm above the:

- average ground level of the site
- adjacent road level to the building
- estimated river or sea level.

The estimated flood level is defined as:

- a river flood level with a 1%AEP (1 in 100-yr) or greater annual probability plus an allowance for climate change
- tidal flood level with a 0.5%AEP (1 in 200-yr) annual probability plus an allowance for climate change

Using the EA information, the design flood level has been determined to be:

- 0.5% AEP (1 in 200-yr) plus 600mm – **6.93mAOD**

Finished Floor Levels should, where possible, be a minimum of 300mm above the 0.5%AEP Flood Level, i.e., no lower than **7.23mAOD**

In respect to the Welcome Building, the proposed finished floor level will be set at **13.70mAOD**, approximately equal to existing ground levels to afford level access.

6.3 Surface Water Flooding to the site Mitigation

Based on the above assessment, the risk of surface water flooding to the site is considered to be very low, with the exception of the area proposed for the Welcome Building Car Park which is considered high.

The Welcome building is situated on elevated land, though will have a level access. Provided external levels are set to fall away from the building, the risk to the building from surface water is therefore considered very low post development.

Mitigation in respect to flood risk to the proposed car park should be provided by a suitably designed surface water drainage scheme. The accompanying Surface Water Drainage Strategy provides further details.

Anecdotal flooding of the access road is understood to be the result of a blocked / poorly maintained culvert. Mitigation measures in this location should consider improve maintenance and or replacement of the culvert if found inadequate either hydraulically or structurally.

Provided a surface water drainage scheme is implemented, flood risk from surface water is considered low, post development.

6.4 Surface Water Flooding from the site Mitigation

Any new development site drainage should be designed in accordance with current best practice to provide adequate capacity not to flood for the critical 1 in 30-year storm event and flood water generated from up to the critical 1 in 100-year plus climate change storm event shall be constrained within the areas on site so not to cause damage to buildings, essential services or adjoining developments & services.

In respect to rainfall, the site lies in the South West Lakes Management Catchment. The Environment Agency published climate change allowances¹⁹ for peak rainfall intensities which should be applied to new developments.

The current guidance requires climate change uplifts in peak rainfall must be considered for both the 1% (1 in 100-yr) and 3.3% (1 in 30-yr) annual exceedance probability events.

In following the standard hierarchy of drainage solutions, consideration should firstly be given to the discharge of surface water runoff by sustainable methods such as infiltration.

The accompanying Drainage Strategy reviews the surface water discharge options and presents a full design to demonstrate surface water is adequately dealt with from both the Welcome Building and associated car park.

The other features associated with development proposals do not require additional surface water management in respect to formal drainage, with the exception of the culvert crossing the access road.

¹⁹ <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

6.5 Reservoir Flooding Mitigation

There are reservoirs within the wider vicinity of the site. The EA Flood Risk from Reservoir map indicates the site is not at risk from this source. No specific measures are required at this location to mitigate against reservoir flooding.

6.6 Groundwater Flood Mitigation

Groundwater flooding tends to be more persistent than other sources of flooding, typically lasting for weeks or months rather than hours or days. Groundwater flooding does not generally pose a significant risk to life due to the slow rate at which the water level rises; however, it can cause significant risk to property.

The site is considered at very low risk of groundwater flooding based on the evidence from geological data.

External ground levels across the site should fall away from the proposed Welcome Building and ensure that the creation of low points is avoided (other than those used intentionally for drainage features) in order that in the unlikely event of groundwater flooding, the flood water is safely routed away from the building on site.

Providing the above mitigation measures are imposed, the risk from groundwater flooding would be considered very low post development.

6.7 Public Sewer, Highway Drainage Flooding and Infrastructure Failure Mitigation

No existing drainage services have been identified within the site boundary.

The nearest public sewers are located 270m to the west of the site.

No specific measures are therefore required within the development site to mitigate against flooding from sewers.

Other drainage infrastructure identified within the vicinity of the site relates to the management of the Hodbarrow Lagoon and disused Redhills Quarry. Mitigation measures where if required are discussed in Section 6.8 below.

6.8 Canal and Artificial Waterbodies Flooding Mitigation

There are no canals in the vicinity of the site.

The Lagoon is however considered to be an artificial water body, the water level being largely dependent on direct rainfall, runoff from the local topography and surface water discharge from the holiday parks to the western shoreline. It is that a pump is installed and managed by the holiday park owners to control the level of the Lagoon. Similarly, the disused Redhills Quarry to the north of the site is also considered to be an artificial waterbody. Water levels in the quarry are also controlled by means

of a private pumping station, discharging flow at a controlled rate to United Utilities Wastewater Treatment Works (WwTW) approximately 0.5km to the northeast.

The water levels in both waterbodies are monitored and well controlled. It is therefore unlikely flooding from either source poses a risk, even under a pumping failure scenario. No specific measures are therefore required within the development site to mitigate against flooding from artificial waterbodies.

7.0 Managing Residual Flood Risk

7.1 Residual Risk

Residual risks are those remaining after applying the sequential approach to the location of development and taking mitigating actions. In this case, the residual risk is the risk of fluvial flooding to the site and the occupants of the building. The following sections describe how and by whom these risks should be managed for this site.

7.2 Flood Warning

The site lies within an area where both Flood Alerts and Flood Warnings are provided by the Environment Agency. Figure 7-1 below shows the areas covered.

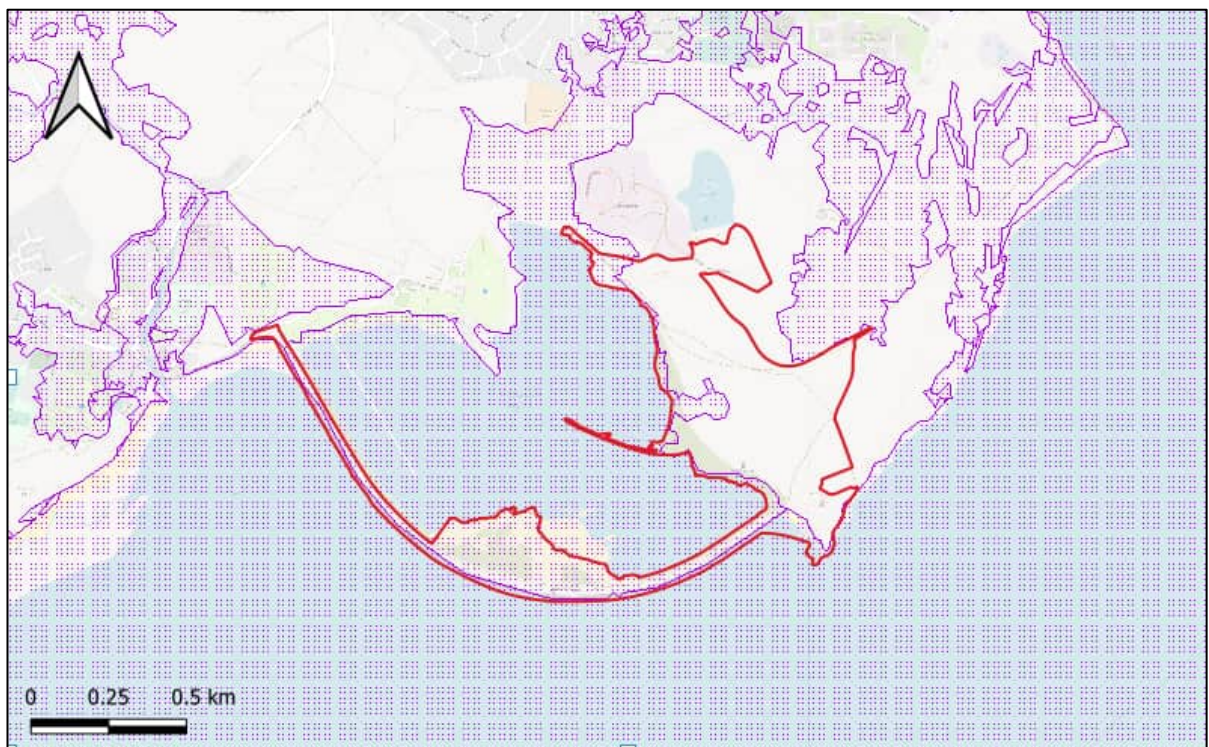


Figure 7-1: Environment Agency Flood Alert and Warning Areas

A Flood Alert is issued to warn people of the possibility of flooding and encourage them to be alert stay vigilant and make early / low impact preparations for flooding. Flood Alerts are issued earlier than Flood

Warnings to provide advance notice of the possibility of flooding and may be issued when there is less confidence that flooding will occur in a Flood Warning Area.

Flood Warning Areas are geographical areas where flooding is expected to occur and where the EA provide a Flood Warning Service. They generally contain properties that are expected to flood from rivers or the sea and in some areas, from groundwater. Specifically, Flood Warning Areas define locations within the Flood Warning Service Limit that represent a discrete community at risk of flooding. A discrete community is a recognised and named geographical community, which can be an urban area, a significant suburb of a large city or a village or a hamlet. The purpose of Flood Warnings is to alert people that flooding is expected, and they should take action to protect themselves and their property. Flood Warnings are issued when flooding is expected to occur.

The site lies in the Flood Warning Area for the Cumbrian Coastline at Cumbrian coastline at Duddon estuary, between Haverigg, Duddon Bridge, Dunnerholme and A595, Flood Warning Service (FWS) Code 011FWCN4B. The areas at risk include the Duddon Estuary including Haverigg, Port Haverigg Holiday Village, Millom and Millom Marsh.

In order to receive flood alerts and warning, the site owner should register to receive warnings directly from the EA's service.

<https://www.gov.uk/sign-up-for-flood-warnings>

The EA also provide a 24-hr service, **Floodline**, which can be reached by **phone: 0345 988 1188** where advice on how to stay safe during a flood can be obtained.

This information should be prominently displayed within the building and accessible to all occupants.

7.3 Evacuation Plan

A flood warning and evacuation plan is important at any site that has transient occupants (e.g., hostels and hotels, visitor attractions). It is anticipated that as an operational establishment, Hodbarrow Nature Reserve has an appropriate plan in place. It is recommended that this be reviewed at regular intervals as flood risk may change over time.

Whilst the proposed Welcome Building lies in an area of the site not at risk of flooding, certain parts of the site lie within the Flood Zone 3 and within the EA's Flood Warning area, along with access and egress points to the site.

Should evacuation not be possible, the Welcome Building will provide a means of safe refuge at ground floor level, set at an elevation of 13.70mAOD, 6.77m above the design flood level.

The Flood Warning, Evacuation / Safe Refuge Plan should be prominently displayed within the Welcome Building and accessible to all visitors and staff.

8.0 Conclusions and Recommendations

In consideration of the flood risk assessment and outline surface water management strategy for the site, the following conclusions and recommendations are made:

The site has been assessed to lie across Flood Zone 1, Flood Zone 2 and Flood Zone 3 by reference to the Environment Agency Flood Map for Planning. A further review of the Copeland Strategic Flood Risk Assessment confirms the Flood Zone 3 area to be Flood Zone 3a.

The development proposal is for non-residential development. By reference to NPPF Annex 3, the Welcome Building is to be located in an area of the site designated as Flood Zone 1, is classed as Less Vulnerable and therefore, in accordance with NPPF PPG Table 2 (Reference ID: 7-079-20220825) is concluded to be appropriate within this Flood Zone Flood Zone

The other elements of the proposed development; repair and stabilisation works at Hodbarrow Beacon, repair and stabilisation works and installation of 'camera obscura' structure at Towsey Hole Windmill, installation of cladding and new living roof to existing bird hide, erection of new bird hides and viewing platforms, creation of new multi-use pathways with signage, gateway features and street furniture, making good of existing byway (BOAT) along sea wall, enhancement of wildlife habitats, and associated access and landscaping are determined to be Water Compatible and therefore, in accordance with NPPF PPG Table 2 (Reference ID: 7-079-20220825) are concluded to be appropriate within all Flood Zones within the site.

The assessment has undertaken a review and quantified the risk of flooding from all sources, and concludes the following risk to and from the site as follows:

- Fluvial flooding to the site – **NONE**
- Tidal flooding to the site - **HIGH**
- Reservoir flooding to the site – **NONE**
- Groundwater flooding to the site – **VERY LOW**
- Public Sewers and Drainage flooding to the site – **VERY LOW**
- Surface water flooding to the site – **LOW (HIGH FOR WELCOME BUILDING CAR PAK)**
- Surface water flooding from the site – **LOW**
- Historic Flooding – **NONE**
- Canals and Artificial Sources –**VERY LOW**

With the exception of dealing with surface water flood risk to the site specifically to the area proposed for the Welcome Building Car Park and that anecdotally reported on the access road believed to be due

to culvert capacity / blockage, no further mitigation is required for other sources of flood risk by this assessment.

In respect to surface water flooding from the site, post-development, a Surface Water Drainage Strategy has been developed as part of the accompanying documents for a planning submission.

Fluvial and Tidal Flood Risk has been assessed on what the EA advise to be the most relevant information to the site.

This assessment concludes that the "Design Flood Level", including an appropriate allowance for climate change is **6.93mAOD**.

In accordance with current Environment Agency Guidance, Finished Floor Levels should be set, where possible, be a minimum of 300mm above the Design Flood Level,

It is recommended that Finished Floor Levels are set no lower than **7.23mAOD**.

As the proposed finished floor level for the Welcome Building is set at 13.70mAOD, the requirements for a minimum level are satisfied.

9.0 Appendices

Appendix A **Development Proposals**

Appendix B **Topographic Survey**

Appendix C **Environment Agency Data**



Appendix A Development Proposals

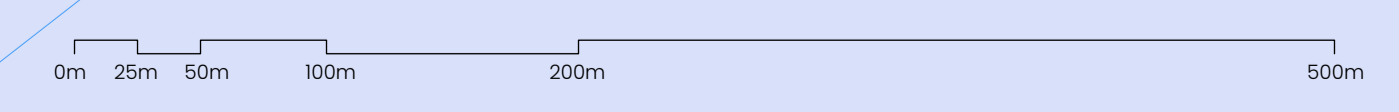
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F1.0 - PICNIC TABLE Location: Site wide Material: Corten Steel / Timber / Concrete	F8.1 - SINGLE LEAF GATE Location: To RSPB BOAT boundary Material: Subject to future detail
F2.0 - BENCH Location: Site wide Material: Corten Steel / Timber / Concrete	F9.0 - FEATURE FENCE Location: To NJT pond & Mainsgate Road entrance Material: Timber
F2.1 - BENCH (EXISTING) Location: Site wide Material: Timber	F10.0 - FEATURE ARTWORK Location: Site wide Refer to Design & Access Statement Chapter 7
F3.0 - WASTE BIN Location: Site wide Material: Corten Steel	F11.0 - CAR PARK PAY MACHINE Location: To car parks Material: -
F4.0 - WAYFINDING - SITE NAVIGATION Location: Site wide Material: Corten Steel w/ laser cuttings	F12.0 - LOW MARKER POST Location: To new sea wall habitat creation Material: Timber
F5.0 - WAYFINDING - ARRIVAL Location: Site wide Material: Corten Steel w/ laser cuttings	F13.0 - FEATURE MARKER POST Location: Site wide Material: Corten
F6.0 - INFO BOARD: ECOLOGY Location: Site wide Material: Corten Steel w/ laser cuttings	F14.0 - FEATURE CONC BENCH w/ TIMBER TOP Location: To welcome building / beacon / windmill Material: Concrete / Timber
F6.1 - INFO BOARD: MAP LOCATION Location: Site wide Material: Corten Steel w/ laser cuttings	F14.1 - FEATURE CONC BENCH Location: To Haverigg Lighthouse Material: Concrete
F6.2 - INFO BOARD: HERITAGE Location: Site wide Material: Corten Steel w/ laser cuttings	F15.0 - CYCLE PARKING Location: To Haverigg Lighthouse Material: Concrete
F7.0 - VIEWING SCREEN Location: To new sea wall Material: Timber	F16.0 - TIMBER LOGS Location: To car parking spaces Material: Concrete
F8.0 - DOUBLE LEAF GATE Location: Road to Welcome Building / HWRC Material: Subject to future detail	F17.0 - EV CHARGING LOCATIONS Location: To welcome building car park Material: -

NOTES:
 1. DO NOT SCALE FROM THIS DRAWING. ALWAYS WORK TO NOTED DIMENSIONS.
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THIS DRAWING WAS PLOTTED ON:
 01/06/2023

REVISION HISTORY				
DATE	REV	ZONE	DESCRIPTION	CHK
26/01/23	2		Site wide updates	MDM
31/03/23	3		Issued for information	MDM
01/06/2023	4		Red line amended	MDM

KEY	
GENERAL INFORMATION	
	APPLICATION BOUNDARY
HARDWORKS	
	S1.0 - SELF BINDING GRAVEL WITHOUT EDGINGS EXCEPT ON STEEP GRADIENTS (P) Location: To primary pedestrian routes Dims: 15m wide
	S2.0 - SELF BINDING GRAVEL WITHOUT FORMAL EDGINGS (V) Location: To B.O.A.T. Dims: 3m wide w/ passing places
	S3.0 - 3IM BROADWALK (P) Location: To scrub raised walkway Dims: 18m wide w/ low upstand
	S4.0 - VEHICULAR MACADAM (V) Location: To access road between welcome building and HWRC Dims: 4.8m wide w/ passing places
	S5.0 - VEHICULAR ROUTE (V) Location: To access road from Mainsgate Road to welcome building - existing surface made good Dims: 4.8m wide w/ passing places
	S6.0 - NATURAL STONE PAVING (P) Location: To Hodbarrow Beacon
	S7.0 - INSITU CONCRETE w/ SMOOTH FINISH (V) Location: To Hodbarrow Lighthouse and Welcome Building - in ground railway details
	S7.1 - INSITU CONCRETE w/ EXPOSED AGGREGATE FINISH (V) Location: To welcome building and in ground railway details
	S8.0 - STEEL GRATE w/ TIMBER UPSTAND (P) Location: To formal raised walkways w/ timber edge Dims: 15m wide
	S9.0 - GREEN GAP PAVING (V) Location: To Welcome Building layby
	S10.0 - STEEL INLAY (V) Location: To site wide surface detailing



ORIGINATOR

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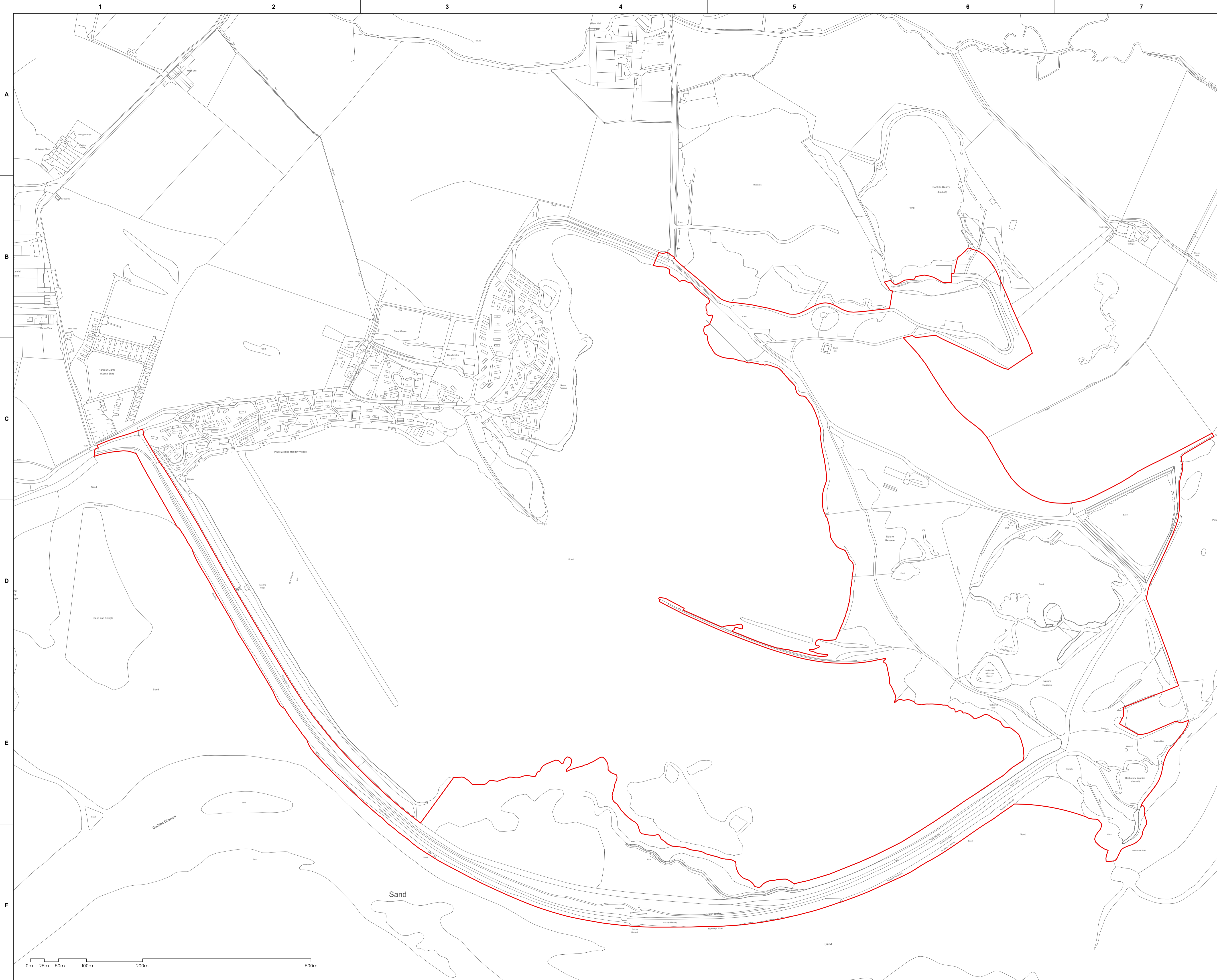
NEWCASTLE Firnisop One Hollin Lane 1 Salters Road Gosforth Newcastle upon Tyne NE3 3DH

Client: **Cumberland Council**

Project: **The Iron Line Millom, Cumbria**

Drawing Title: **GA | Site Masterplan**

Created By: MDM	Checked By: CL	Scale: 1:3000	Sheet Size: A1
Project Number: 289	Originator: LYR	Volume: XX-ZZ-DWG-L-1000	Number: 1
Work Stage: Planning	Status: Draft	Revision: 4	



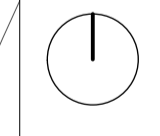
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REVISION HISTORY				
DATE	REV	ZONE	DESCRIPTION	CHK
09/05/2023	2		Line extended to accommodate FW strategy	MDM
15/05/2023	3		HWRC omitted	MDM
19/05/2023	4		Revision to south east	CL

KEY

GENERAL INFORMATION	
	APPLICATION BOUNDARY



ORIGINATOR

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Client
Cumberland Council

Project
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 Millom, Cumbria

Drawing Title
GA | Application Boundary

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Project Number 289	Originator LYR	Volume Level File Type Discipline Number XX-ZZ-DWG-L-1001	
Work Stage Planning	Status Draft	Revision 4	

Appendix B Topographic Survey



Legend

- Building
- Barrier
- Bottom of Bank
- British Telecom
- Concrete
- Canopy
- Drop Kerb
- Drain
- Fence
- Flower Bed
- Foliage
- Footpath
- Fence - Security
- Fence - Wire
- Grass
- Gate
- Hedge
- Kerb
- Kerb Top
- Lake / Pond
- Marsh
- Overhead Electricity Line
- Overhead Telephone Line
- Ramp
- Sign Post
- Tarmac
- Top of Bank
- Track
- Verge
- Road Markings
- Wall
- Contours
- Steep Slope
- Spot height in metres
- Post Box
- Borehole
- Bus Stop
- Cable TV
- Electricity Pole
- Earth Rod
- Fire Hydrant
- Floor Level
- Flag Pole
- Gas Valve
- Gas Marker
- Gate Post
- Gully
- Inspection Chamber
- Invert Level
- Lamp Post
- Manhole
- Marker
- Roding Eye
- Road Sign
- Stop Cock
- Septic Tank
- Survey Station
- Sign Post
- Stop Valve
- Traffic Light
- Telegraph Pole
- Water Meter
- Tree (deciduous)
- Tree (coniferous)
- Tree (unsurveyed)
- Shrub



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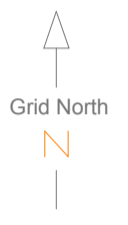
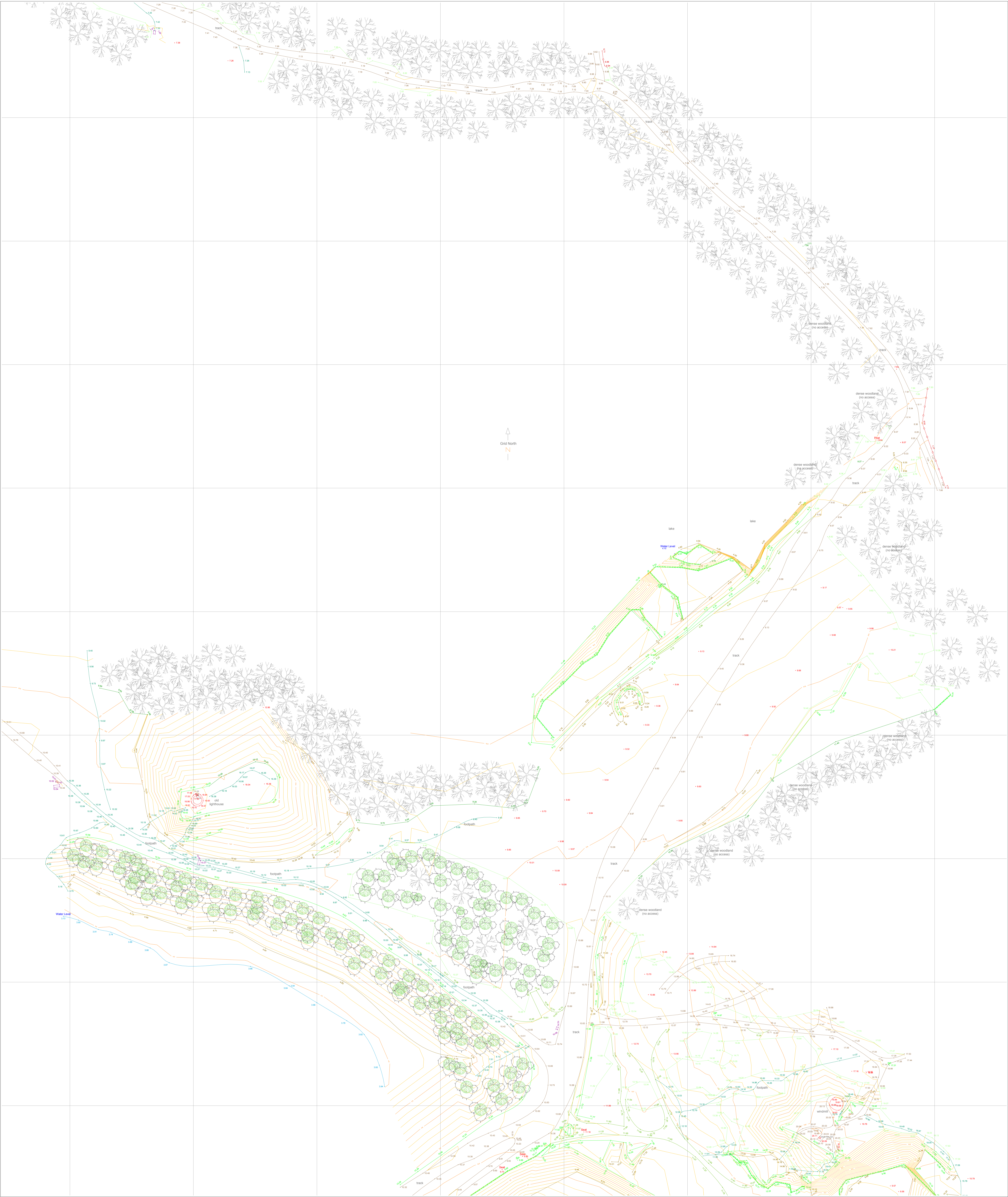
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 MILLOM

TOPOGRAPHICAL SURVEY

Date	07 JULY 2022	Drawing No.	P10913/amr/2
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Drawn By	MRH	Checked By	LR

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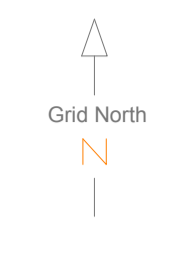
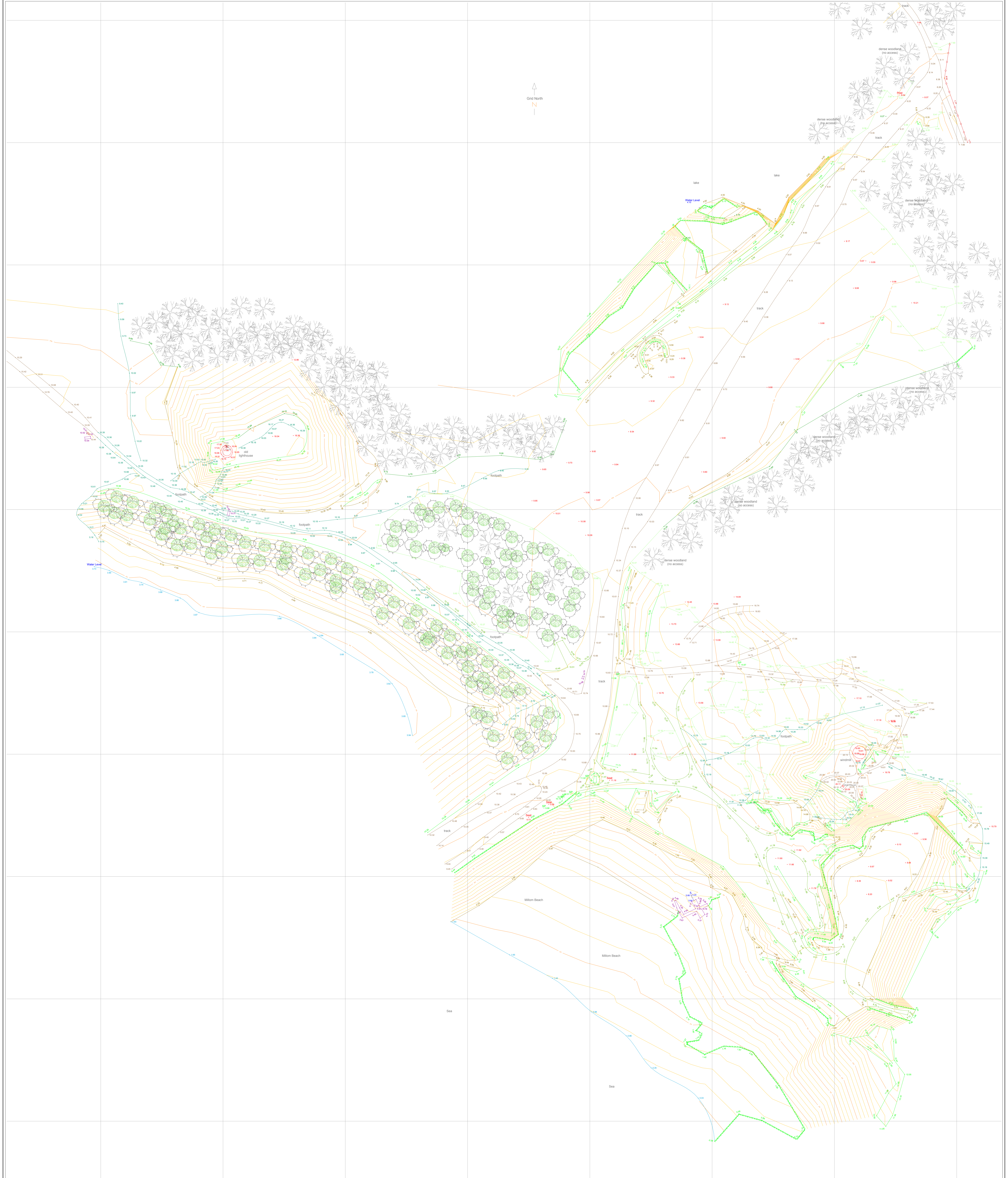
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Drawing **TOPOGRAPHICAL SURVEY**

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Legend

- | | | | | |
|--------------------|---------------------------|-----------------------|-------------------|-------------------|
| Building | Gate | Steep Slope | Invert Level | Tree (unsurveyed) |
| Barrier | Hedge | Spot height in metres | Lamp Post | Shrub |
| Bottom of Bank | Kerb | Post Box | Manhole | Road Markings |
| British Telecom | Kerb Top | Borehole | Marker | |
| Concrete | Lake / Pond | Bus Stop | Rodding Eye | |
| Canopy | Marsh | Cable TV | Road Sign | |
| Drop Kerb | Overhead Electricity Line | Electricity Pole | Stop Cock | |
| Drain | Overhead Telephone Line | Earth Rod | Septic Tank | |
| Fence | Ramp | Fire Hydrant | Survey Station | |
| Flower Bed | Sign Post | Floor Level | Sign Post | |
| Fence - Birdsmouth | Tarmac | Flag Pole | Stop Valve | |
| Foliage | Top of Bank | Gas Valve | Traffic Light | |
| Footpath | Track | Gas Marker | Telegraph Pole | |
| Fence - Security | Verge | Gate Post | Water Meter | |
| Fence - Wire | Wall | Gully | Tree (deciduous) | |
| Grass | Contours | Inspection Chamber | Tree (coniferous) | |



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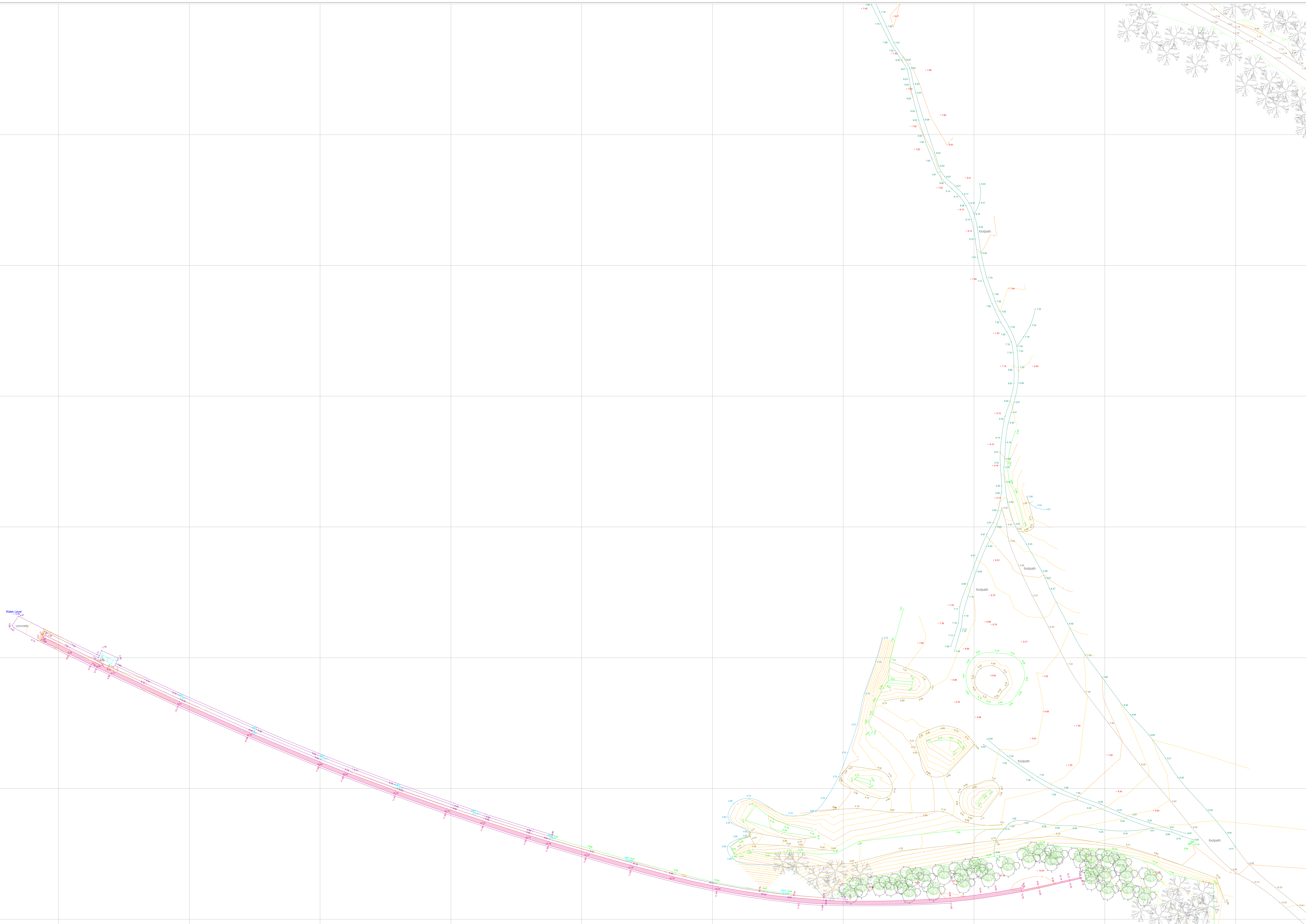
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Legend

- Building
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- British Telecom
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- Fence
- Flower Bed
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- Shrub



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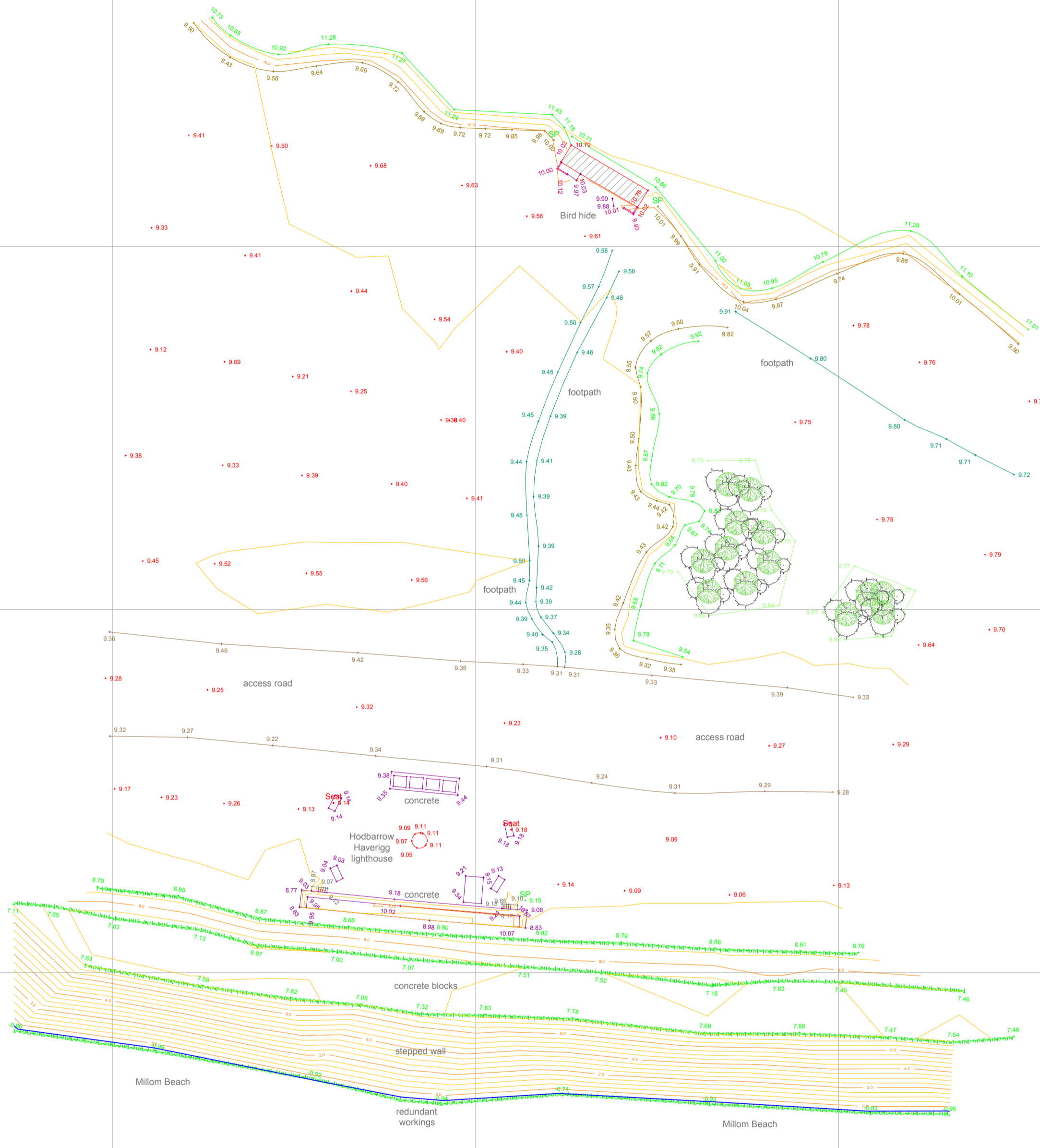
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Legend

- | | | | | |
|--------------------|---------------------------|-----------------------|-------------------|-------------------|
| Building | Gate | Steep Slope | Invert Level | Tree (unsurveyed) |
| Barrier | Hedge | Spot height in metres | Lamp Post | Shrub |
| Bottom of Bank | Kerb | Post Box | Manhole | Road Markings |
| British Telecom | Kerb Top | Borehole | Marker | |
| Concrete | Lake / Pond | Bus Stop | Rodding Eye | |
| Canopy | Marsh | Cable TV | Road Sign | |
| Drop Kerb | Overhead Electricity Line | Electricity Pole | Stop Cock | |
| Drain | Overhead Telephone Line | Earth Rod | Septic Tank | |
| Fence | Ramp | Fire Hydrant | Survey Station | |
| Flower Bed | Sign Post | Floor Level | Sign Post | |
| Fence - Birdsmouth | Tarmac | Flag Pole | Stop Valve | |
| Foliage | Top of Bank | Gas Valve | Traffic Light | |
| Footpath | Track | Gas Marker | Telegraph Pole | |
| Fence - Security | Verge | Gate Post | Water Meter | |
| Fence - Wire | Wall | Gully | Tree (deciduous) | |
| Grass | Contours | Inspection Chamber | Tree (coniferous) | |



SURVEY STATIONS MARKED WITH ROAD NAILS AND PEGS WITH COORDINATES RELATING TO OSGB36 NATIONAL GRID

SITE LEVELS MARKED AT STATIONS RELATE TO ORDNANCE DATUM OSGM15, VIA DIFFERENTIAL GPS.

USE ONLY FOR THE PURPOSE INDICATED BELOW

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Drawn By **MRH** Checked By **LR**

DRAWING REVISION RECORD

No. Detail	DWG No.	Date	Intl.
1			
2			
3			
4			

amrGeomatics
Chartered Land Surveyors
www.amrGeomatics.co.uk

Site **"THE IRON LINE"**
MILLOM

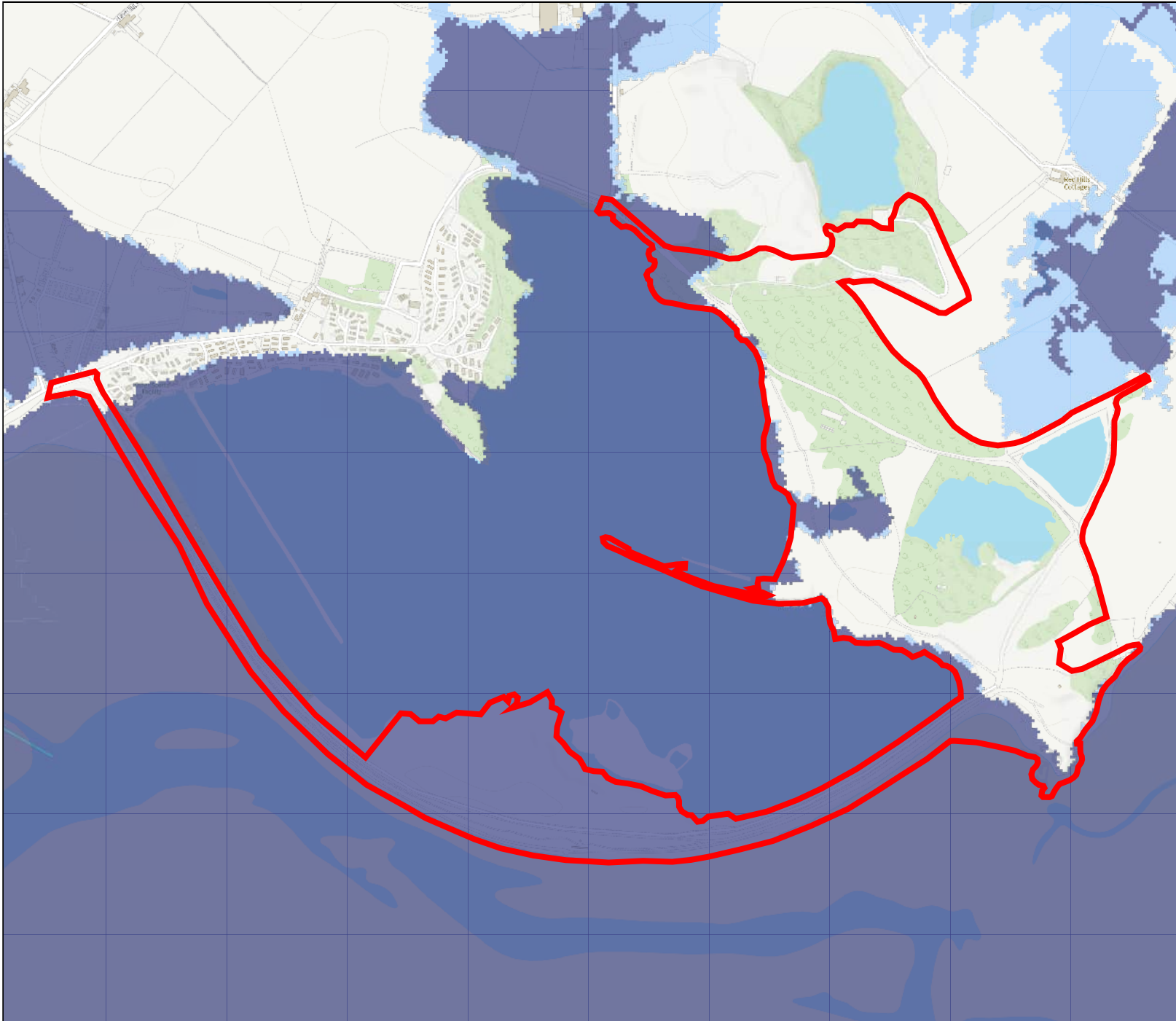
Drawing **TOPOGRAPHICAL SURVEY**

Date **07 JULY 2022** Drawing No. **P10913/amr/6**
Scale **1: 500 @ A2** Subm. 01



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Appendix C Environment Agency Data




Flood map for planning

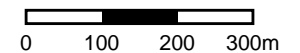
Your reference
Millom Iron Line

Location (easting/northing)
317419/478517

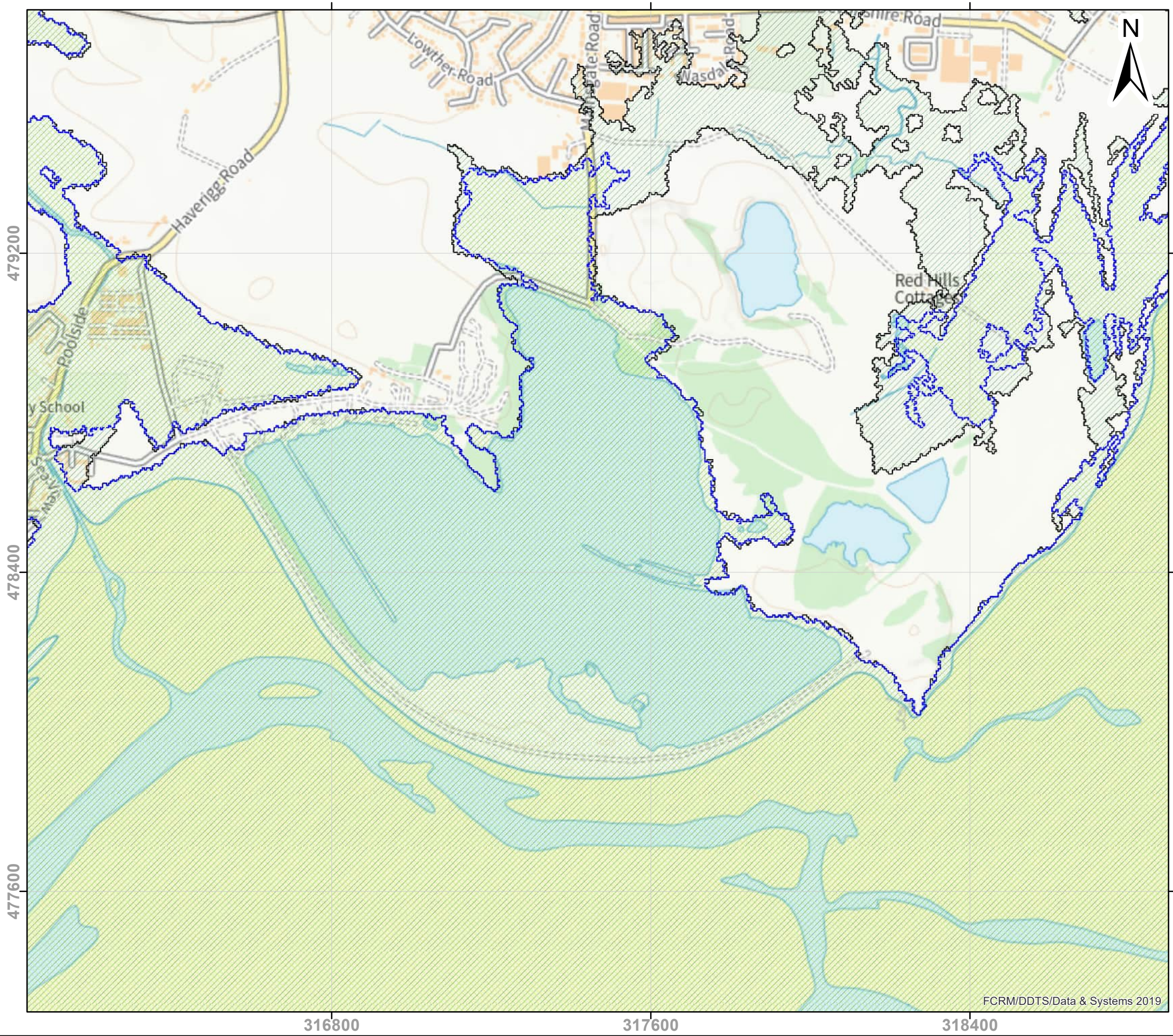
Scale
1:10000

Created
5 Dec 2022 17:14


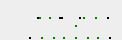
-  Selected area
-  Flood zone 3
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area



**Modelled 2d Data Map:
Hodbarrow Reservoir, Millom**
Produced: 14/03/2023
Our Ref: CL298827
NGR: 317419 , 478517
Flood Zones



Key

-  BASE FLOOD ZONE 3 TIDAL
-  BASE FLOOD ZONE 2 TIDAL



**Modelled 2d Data Map:
Hodbarrow Reservoir, Millom**
Produced: 14/03/2023
Our Ref: CL298827
NGR: 317419 , 478517
Cumbrian Tidal 2012

Key

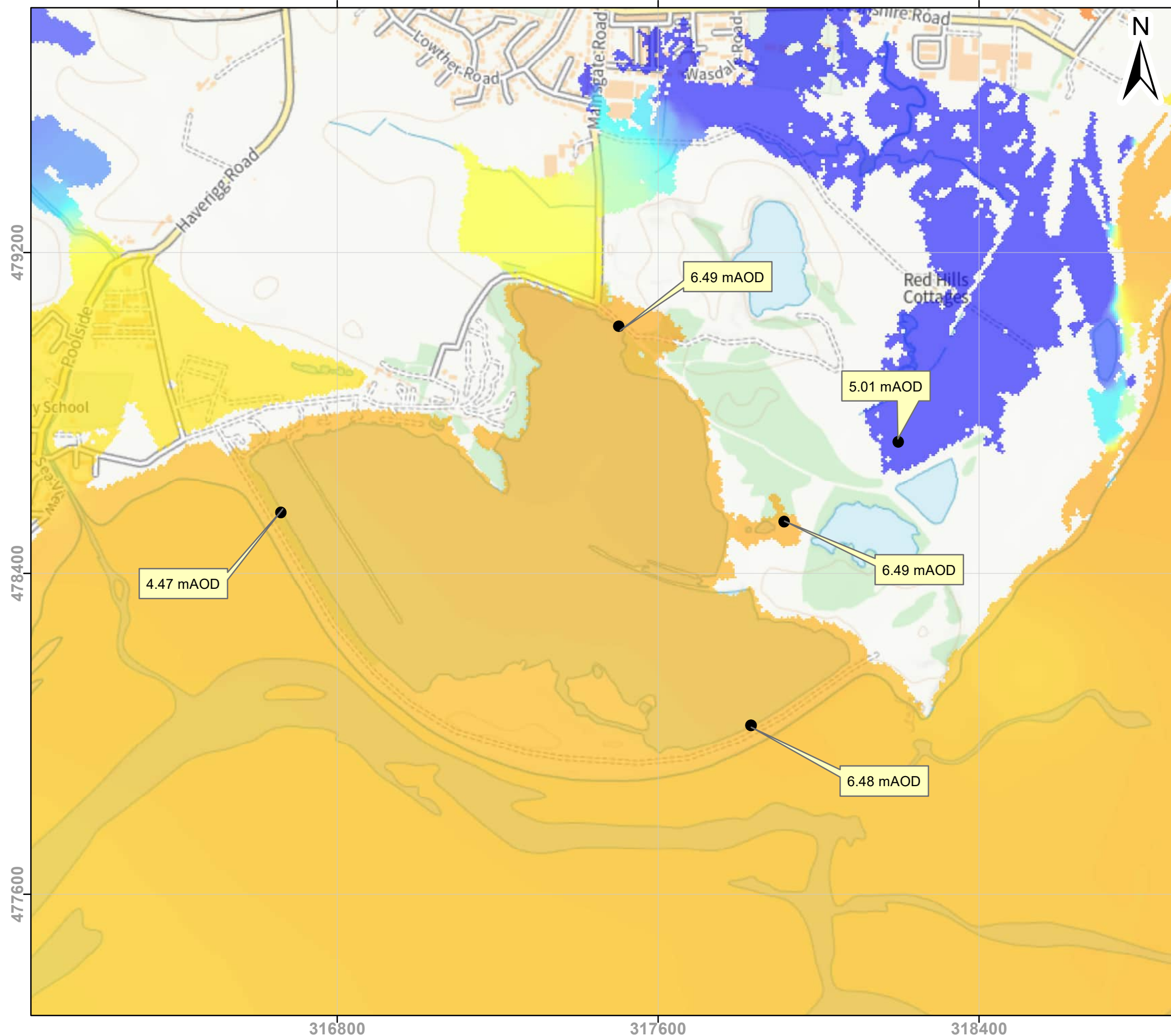
0.1% AEP Undefended

mAOD

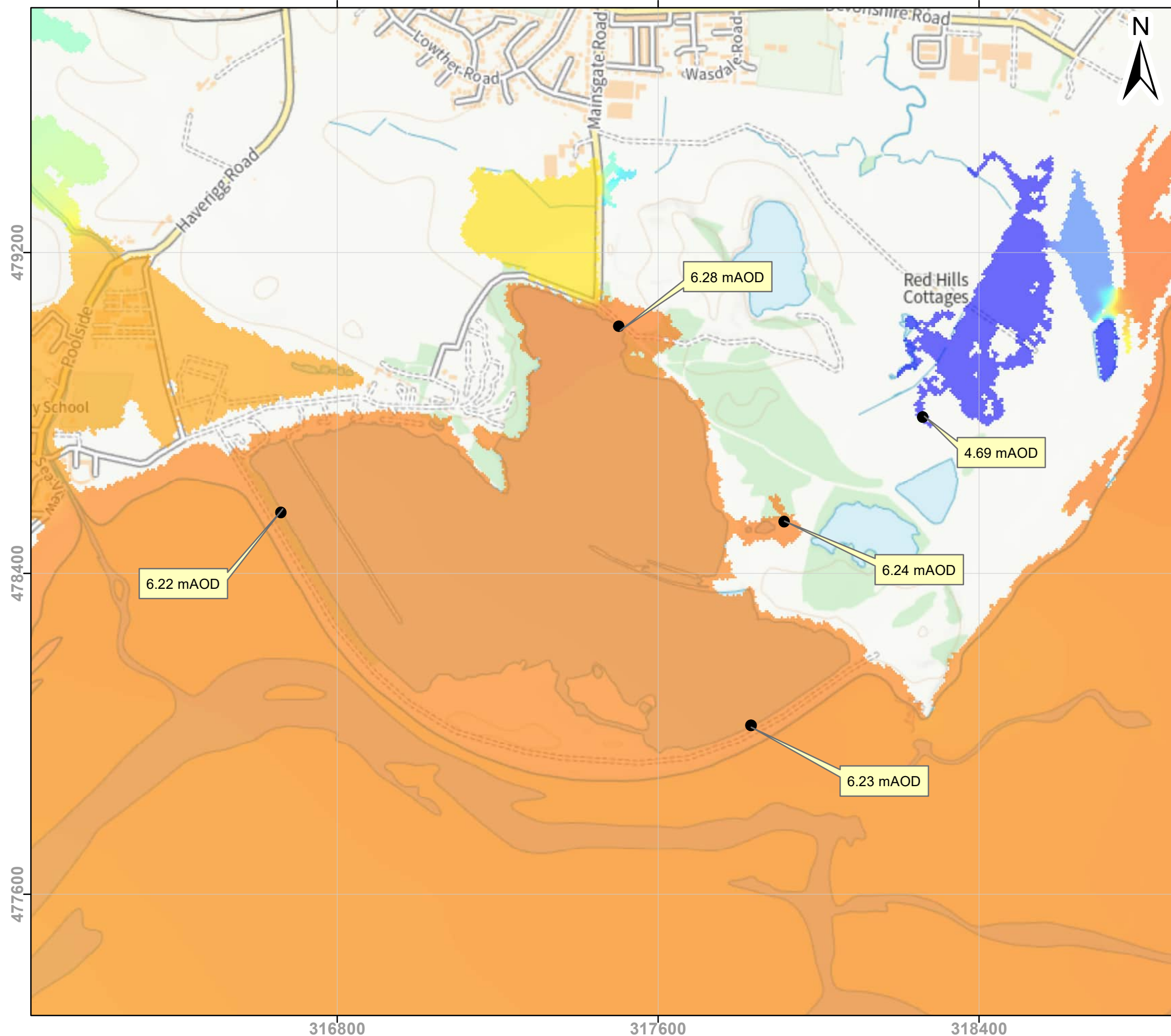


High : 6.6

Low : 4.7



**Modelled 2d Data Map:
Hodbarrow Reservoir, Millom**
Produced: 14/03/2023
Our Ref: CL298827
NGR: 317419 , 478517
Cumbrian Tidal 2012



Key

0.5% Undefended

mAOD



High : 6.3

Low : 3.8

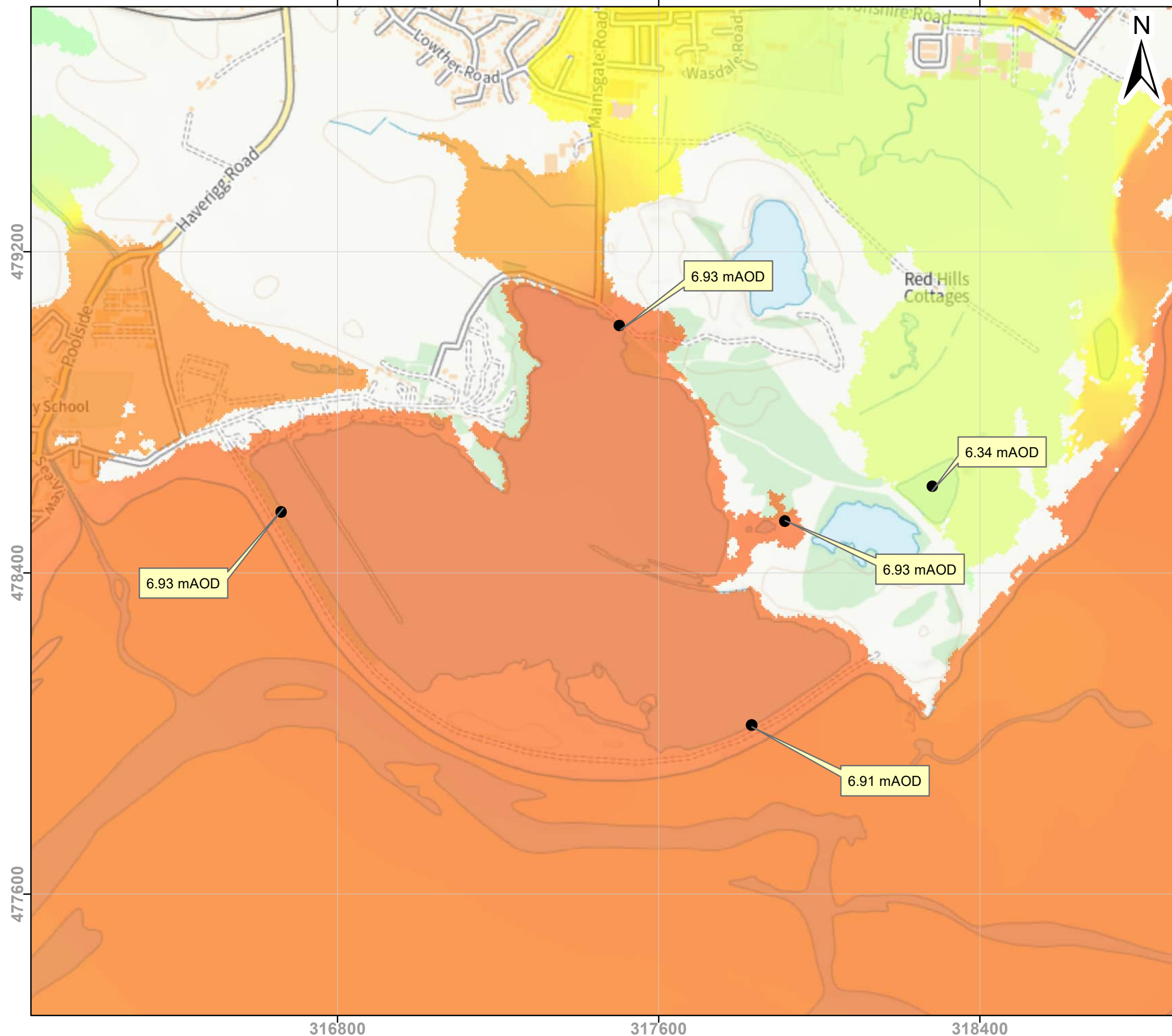
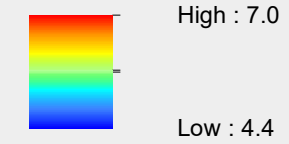


**Modelled 2d Data Map:
Hodbarrow Resevce, Millom**
 Produced: 14/03/2023
 Our Ref: CL298827
 NGR: 317419 , 478517
 Cumbrian Tidal 2012

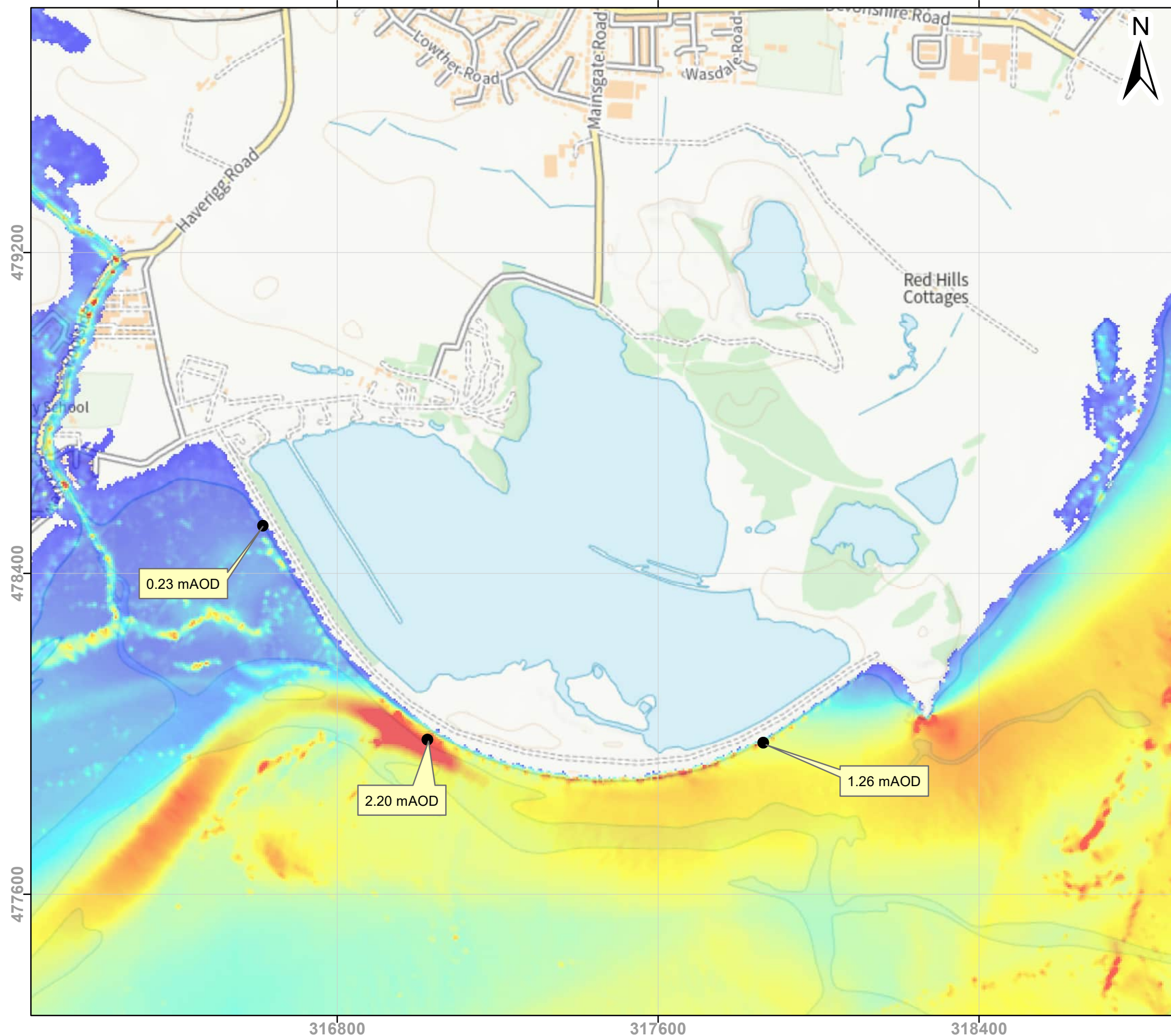
Key

0.5% AEP Undefended + CC (600mm SLR)

mAOD



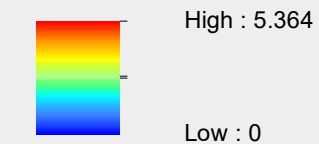
**Modelled 2d Data Map:
Hodbarrow Reservoir, Millom**
Produced: 14/03/2023
Our Ref: CL298827
NGR: 317419 , 478517
Cumbrian Tidal 2012



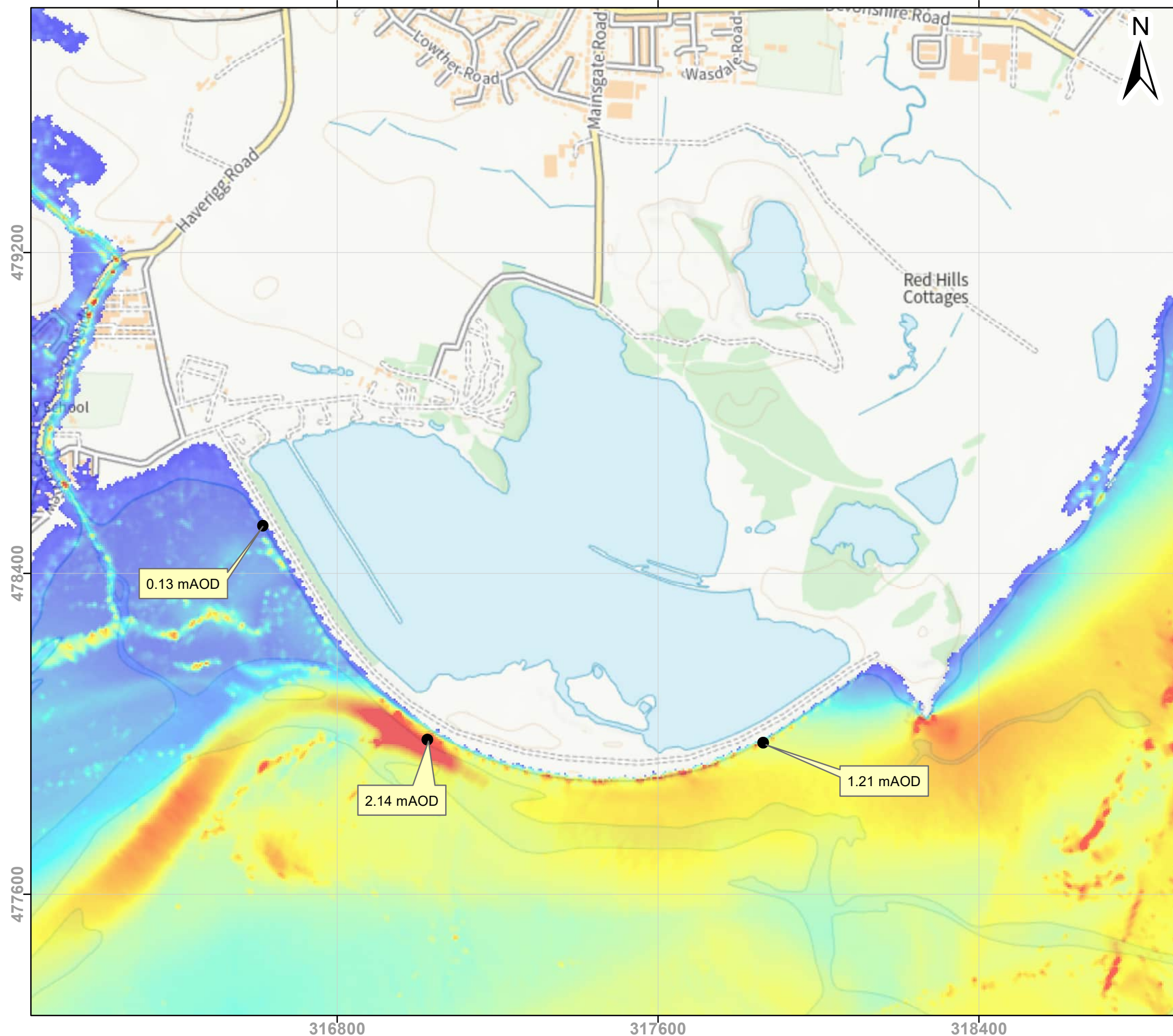
Key

0.1% AEP Defended

mAOD



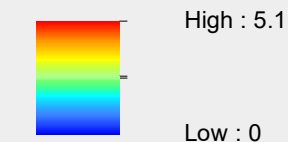
**Modelled 2d Data Map:
Hodbarrow Reservoir, Millom**
Produced: 14/03/2023
Our Ref: CL298827
NGR: 317419 , 478517
Cumbrian Tidal 2012



Key

0.5% AEP Defended

mAOD

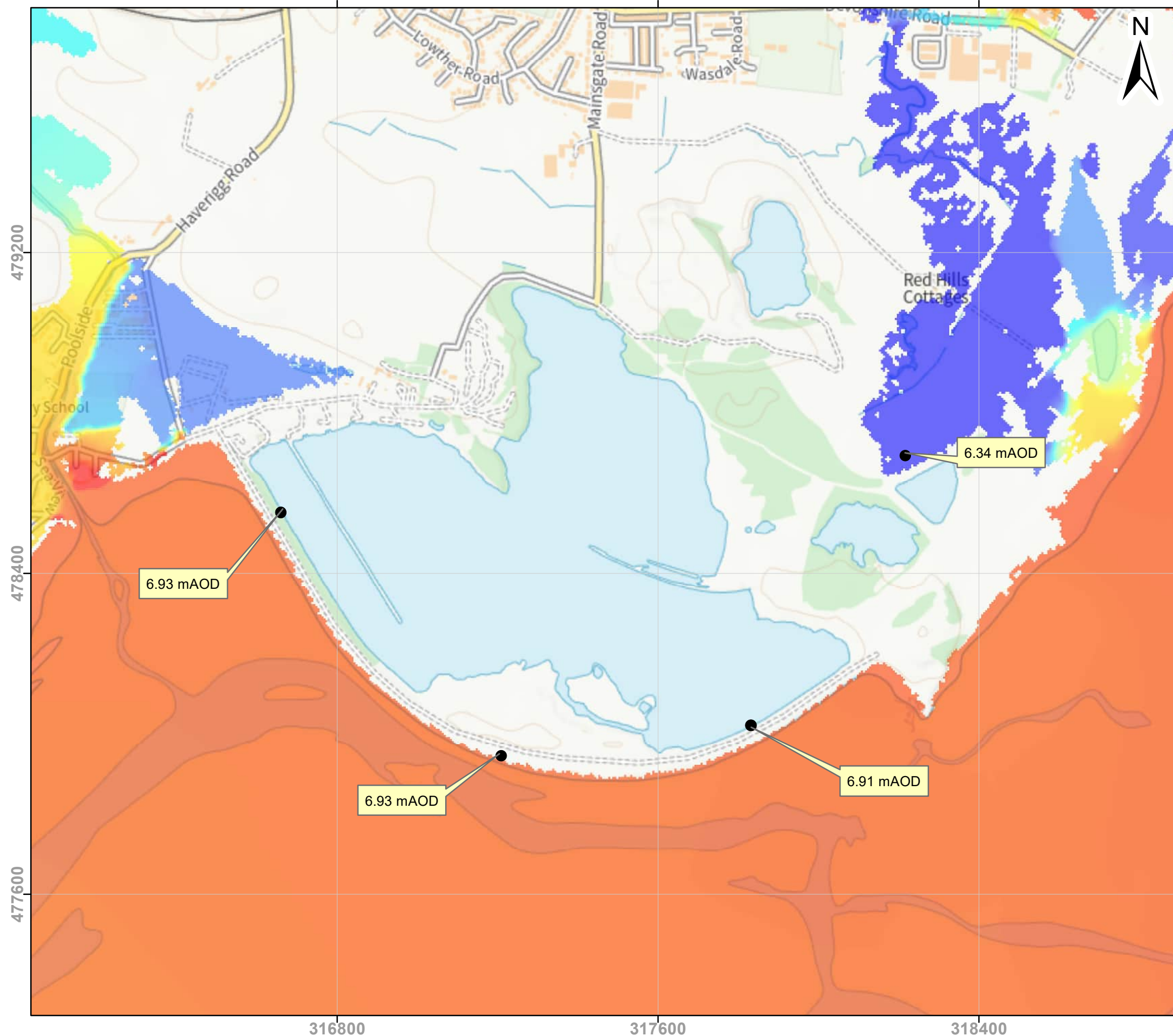
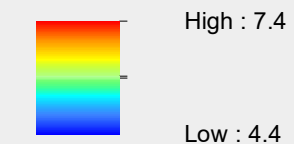


**Modelled 2d Data Map:
Hodbarrow Reservoir, Millom**
Produced: 14/03/2023
Our Ref: CL298827
NGR: 317419 , 478517
Cumbrian Tidal 2012

Key

0.5% AEP Defended + CC (600mm SLR)

mAOD

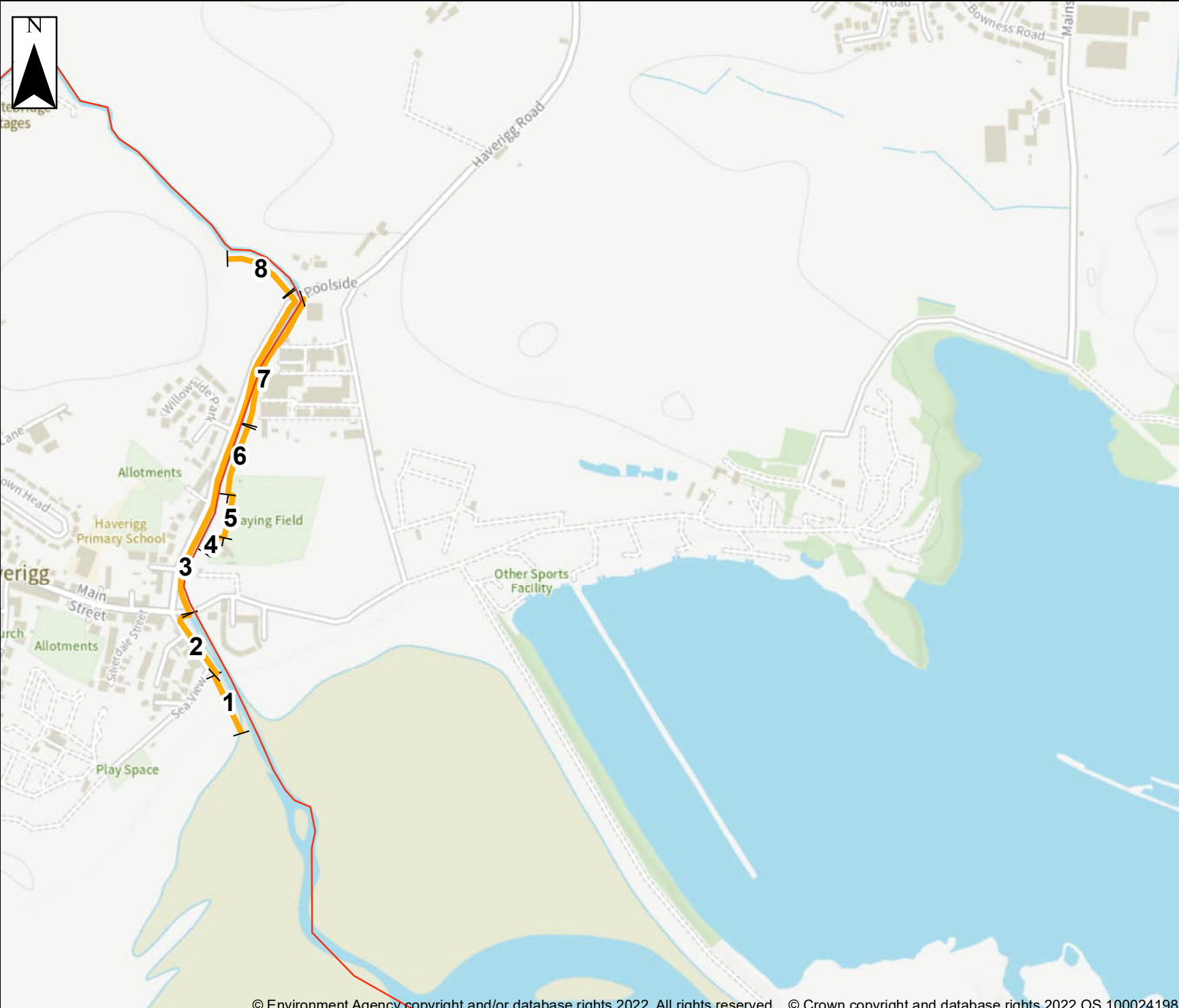


Flood defences and attributes

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.





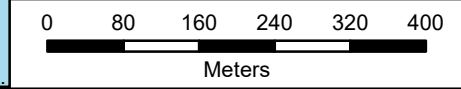
Flood Defences

Location (easting/northing)
317419 / 478517

Scale
1:8,000

Created
20 Mar 2022

-  Main river
-  Flood defence



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	127465	Wall	-	2 - Good	3.30	4.36	3.30
2	79170	Wall	100	2 - Good	6.52	6.53	6.52
3	79173	Wall	100	2 - Good	6.52	6.51	6.51
4	162818	Embankment	100	2 - Good	6.53	6.59	6.53
5	79142	Wall	100	2 - Good	6.59	6.59	6.59
6	79533	Embankment	100	2 - Good	6.56	6.43	6.43
7	79172	Wall	100	3 - Fair	6.49	6.49	6.49
8	55126	Embankment	50	3 - Fair	5.88	5.88	5.88

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

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