



# Coastal Monitoring Update

Clive Moon

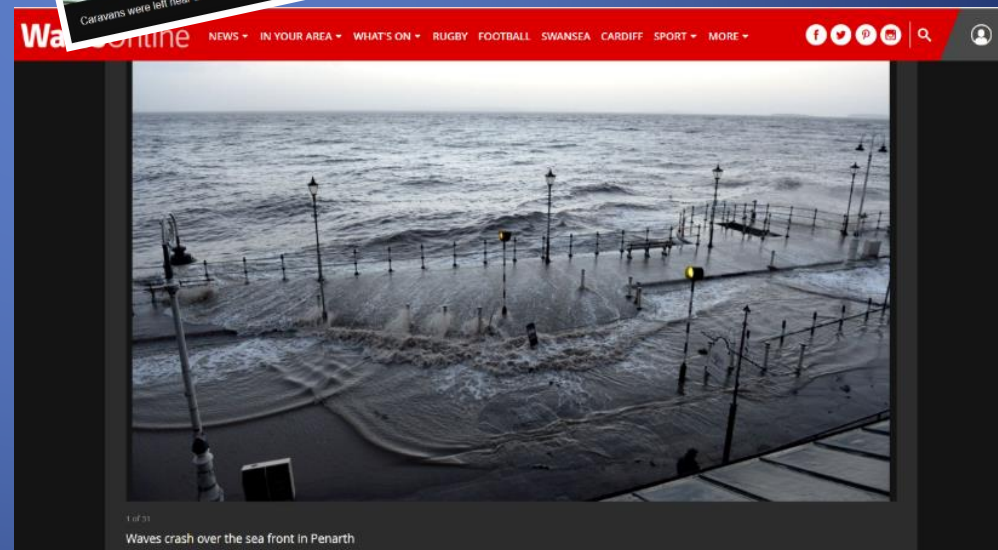
Engineering Manager - Environment

# Our coastline

- 45 km of coastline
- 4 km coastal defences
- Approx 572 properties at tidal flood or coastal erosion risk (majority defended up to 1 in 200yr event from flooding)
- > £15.8M land and property
- Critical infrastructure including Aberthaw power station and Barry sewage pumping station
- Tourism and recreation



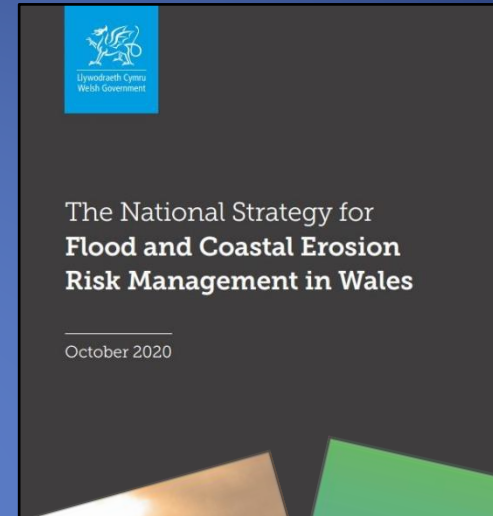
<http://www.bbc.co.uk/news/uk-wales-15629729>



<https://www.walesonline.co.uk/incoming/gallery/storms-hit-the-welsh-coastline-6467593>

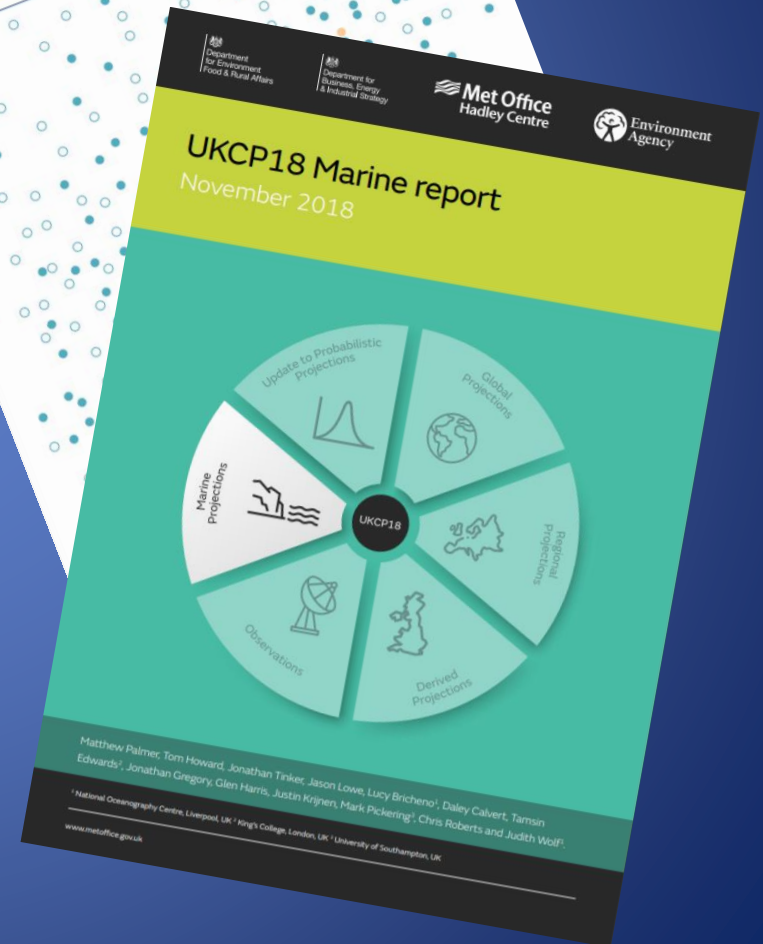
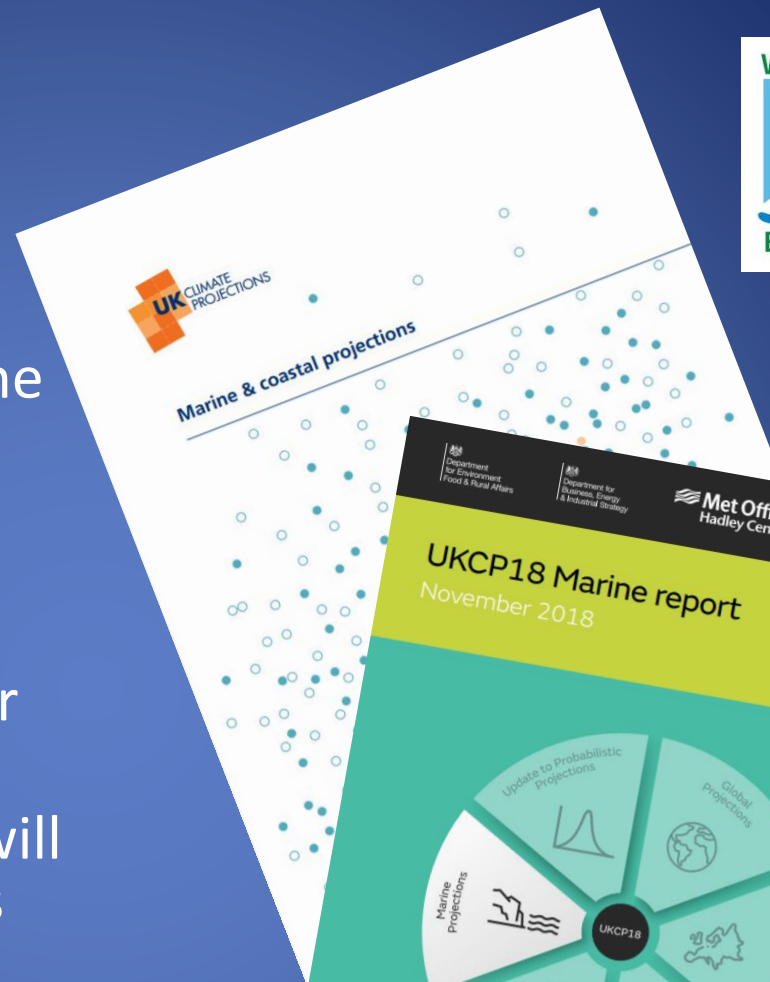
# Strategic Context

- Flood and coastal erosion risk managed in accordance with National Strategy for FCERM in Wales
- Two SMPs; Severn Estuary and Lavernock Point to St Ann's Head

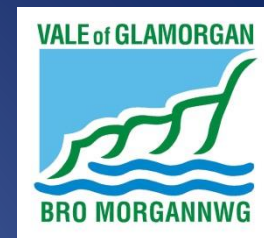


# Climate change

- UK coastal flood risk is expected to increase over the 21st century and beyond under all climate change scenarios
- Increase in frequency and magnitude of extreme water levels
- Increased future flood risk will be dominated by the effects of time-mean sea level rise
- Vale coastline could experience sea level increases > 1m by 2100



# Flood Risk



| VALE OF GLAMORGAN<br>PROPERTIES AT RISK<br>OF FLOODING |               | Defended Risk |        |       | Undefended Risk |        |       |
|--|---------------|---------------|--------|-------|-----------------|--------|-------|
|  |               | Low           | Medium | High  | Low             | Medium | High  |
| Source   | Sea           | 566           | 3      | 3     | 217             | 82     | 273   |
|  | Rivers        | 533           | 155    | 137   | 424             | 183    | 218   |
|  | Surface Water | 3,031         | 873    | 1,015 | 3,031           | 873    | 1,015 |

Source: Properties at Risk of Flooding Wales (August 2024), StatsWales; National Flood Risk Assessment data, National Resources Wales

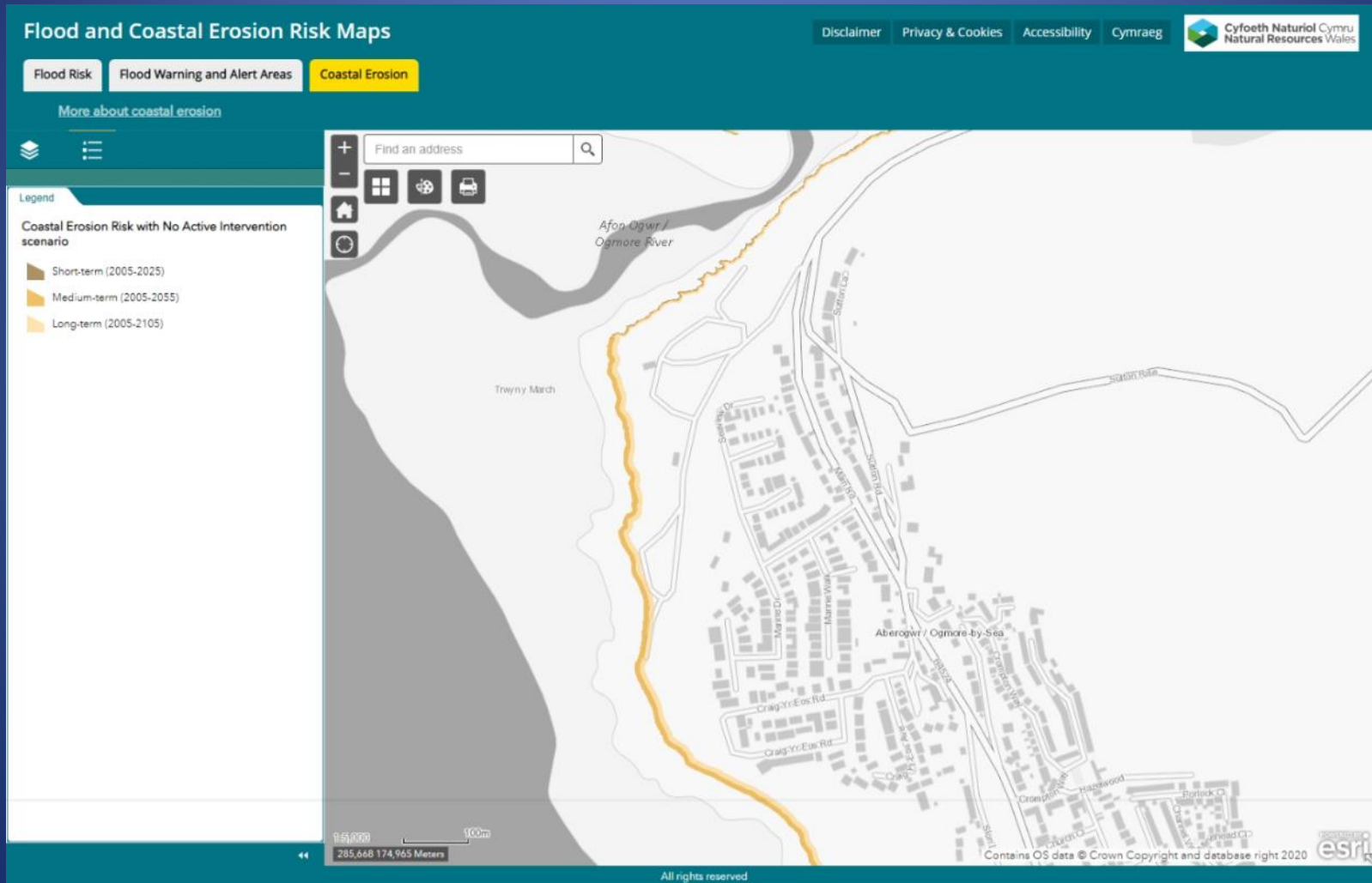
Note: Several hundred properties are at risk of flooding from more than one source, particularly in the low risk categories

High Risk; Greater than or equal to 1 in 30 (3.3%) chance in any given year.

Medium Risk; Less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) chance in any given year for rivers and surface water flooding and less than 1 in 30 (3.3 per cent) but greater than or equal to 1 in 200 (0.5 per cent) for the sea.

Low Risk; Less than 1 in 100 (1%) for rivers and surface water flooding and 1 in 200 (0.5 per cent) for the sea but greater than or equal to 1 in 1,000 (0.1%) chance in any given year.

# Flood & Coastal Erosion Risk Mapping



<https://flood-risk-maps.naturalresources.wales/>

# What is the WCMC's role?



**Gwyn Nelson**  
(Programme Manager)



**William Russell**  
(Coastal Process Scientist)



**Ben Ranson**  
(Coastal Process Scientist)



**Alice Connolly**  
(Assistant Coastal Process Scientist)



**Hannah Richards**  
(SCBCEG Coastal Officer)



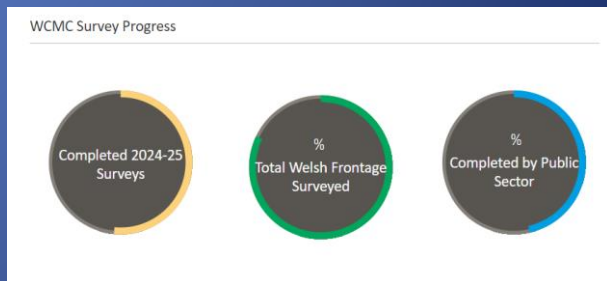
**Purpose:**  
*Monitoring coastal change for informed risk management decisions, while promoting continuous learning and education for all stakeholders.*

**Current Funding Period:**  
2021-2026

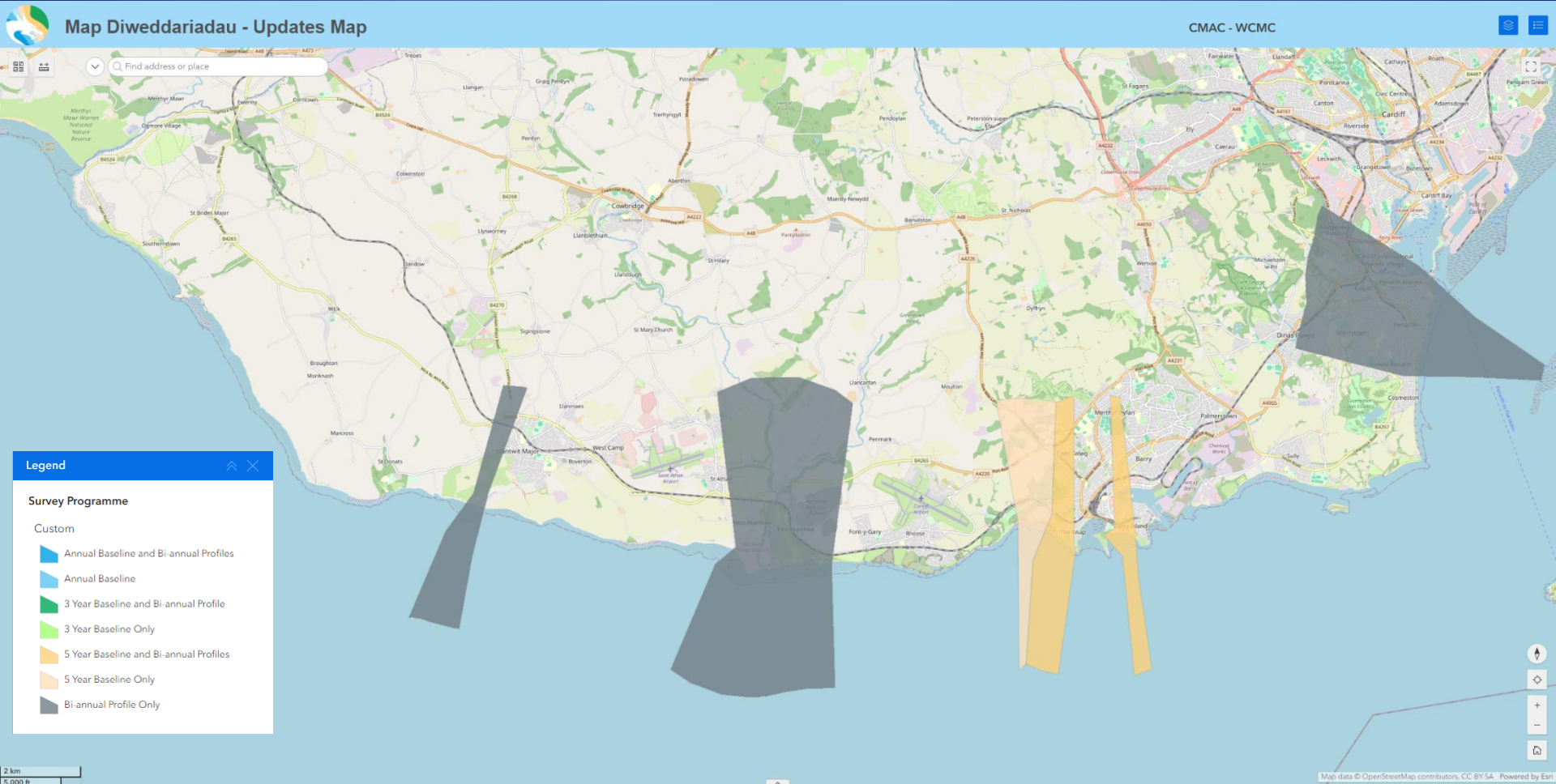
**Approved funding:**  
£1.977M



[www.cmac.cymru](http://www.cmac.cymru) | [www.wcmc.wales](http://www.wcmc.wales)



# Where in the Vale?



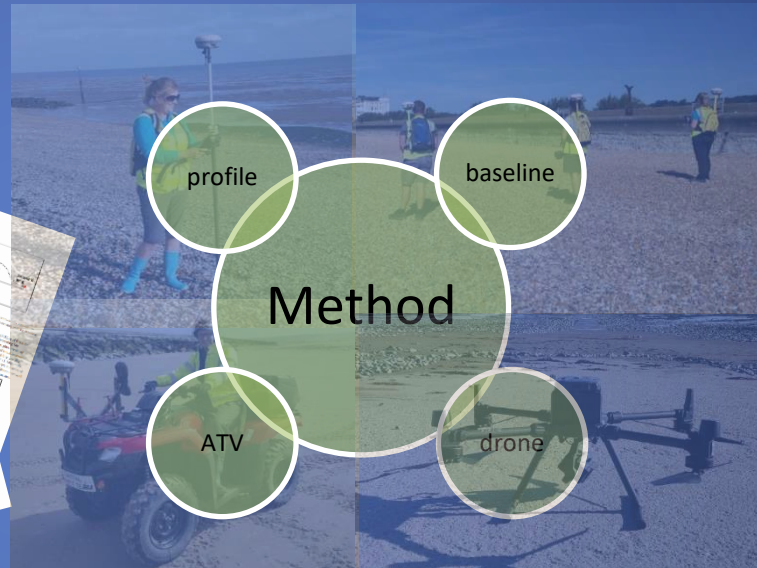


# Data Collection

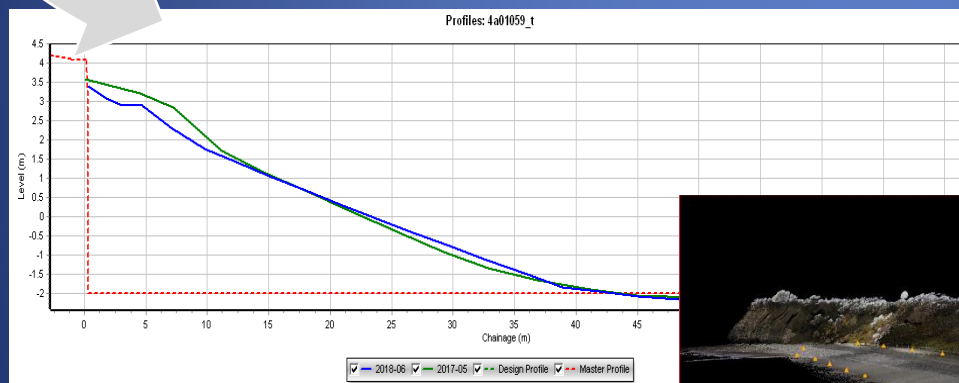


Wales Coastal Monitoring Centre  
Topographic Specification  
V2

Specification




# Data collection



# Accessing data



?

### Menu

- Survey Unit Status
- Profile Lines
- Hydrodynamics

Select A Survey Unit i


All v

Datum i

MLWN - Mean Low Wat... v

Clear Selected

### Survey Unit Status i



### Survey Unit

Coastal Group

| Survey Schedule   | Information |
|-------------------|-------------|
| Baseline Surveys  |             |
| Profile Surveys   |             |
| First Survey      |             |
| Latest Survey     |             |
| Total No. Surveys |             |

| Shoreline Management Intent | Policy |
|-----------------------------|--------|
| Long Term                   |        |
| Medium Term                 |        |
| Short Term                  |        |

| Nature Designations | Present? |
|---------------------|----------|
| SSSI                |          |
| SAC                 |          |
| RAMSAR              |          |
| NNR                 |          |

#### MAP KEY:

Survey Unit Status

- 0-1  $\sigma$  Low Variability
- 1-2  $\sigma$  Moderate Variability
- >2  $\sigma$  High Variability
- Insufficient Data

#### Survey Unit i

Absolute

Standard Deviation

$\sigma$



# Accessing data



**Menu**

Survey Unit Status

Profile Lines

Hydrodynamics

Select a Survey Unit ?

All v

Select a Profile ?

8b2.3\_012 v

Datum ?

MLWN - Mean Low Wat... v

Date

All v

Clear Selected

## Whitmore Bay, Barry Island

Profile Cross Sectional Area (CSA) Time Series ?

8b2.3\_012 - MLWN

Season ● Autumn ● Spring ● Summer ● Winter

**Map Key:**

Number of Profile Surveys

- Less
- More

Cross Sectional Area Standard Deviation

-5                      5

Hover over a point to learn more

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Ordnance Survey, © Vexcel Imaging, © 2024 Microsoft Corporation,  
Microsoft Bing, © OpenStreetMap

Profile Viewer ?

8b2.3\_012 - MLWN

| Date       |
|------------|
| 15/06/1998 |
| 01/04/1999 |
| 15/09/1999 |
| 09/03/2001 |
| 01/10/2001 |
| 15/04/2002 |
| 11/09/2002 |
| 31/03/2003 |

Profile Cross Sectional Area (CSA) Variability ?



# Accessing data



**Menu**

Survey Unit Status

Profile Lines

Hydrodynamics

Select a Survey Unit ?

All v

Select a Profile ?

8b2.3\_012 v

Datum ?

MLWN - Mean Low Wat... v

Date

All v

Clear Selected

**Survey Unit Offshore Wave Locations** ?

Prevailing Wave Direction (°) Average Wave Power (kW/m)

237.45 1.89

**Profile Cross Sectional Area (CSA) Time Series** ?

8b2.3\_012 - MLWN

Season ● Autumn ● Spring ● Summer ● Winter

CSA (m<sup>2</sup>)

**8b2.3 30 Days of Offshore Wave Power Leading Up To: 11/09/2002** ?

8b2.3\_012 - MLWN

— Offshore Wave Power (kW/m) — Named Storms

Top 5%: 7.43

Wave Power (kW/m)

Date

| Days Leading Up To: | Average Wave Power (kW/m) |
|---------------------|---------------------------|
| 11/09/2002          |                           |
| 30 Days Prior       | 0.60                      |
| 60 Days Prior       | 0.89                      |
| 180 Days Prior      | 1.33                      |
| 365 Days Prior      | 2.07                      |

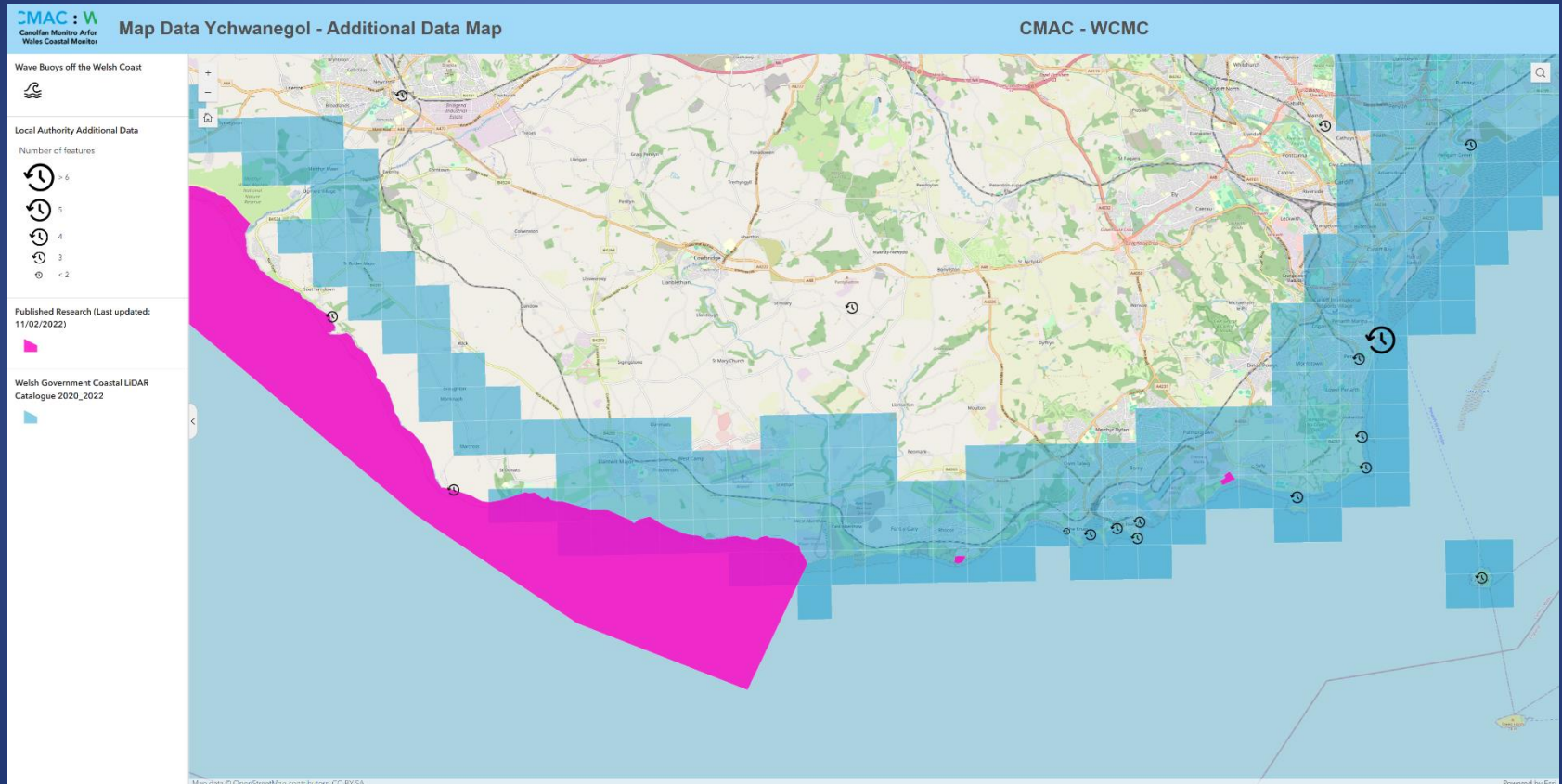
**Count of Extreme Wave Events By Winter Period**

8b2.3\_012

● 1 in 1/4 Years ● 1 in 1 Years ● 1 in 10 Years

Count

# Accessing data



Additional datasets around the Vale coastline

[www.cmac.cymru](http://www.cmac.cymru) | [www.wcmc.wales](http://www.wcmc.wales)



# Wave and tide data

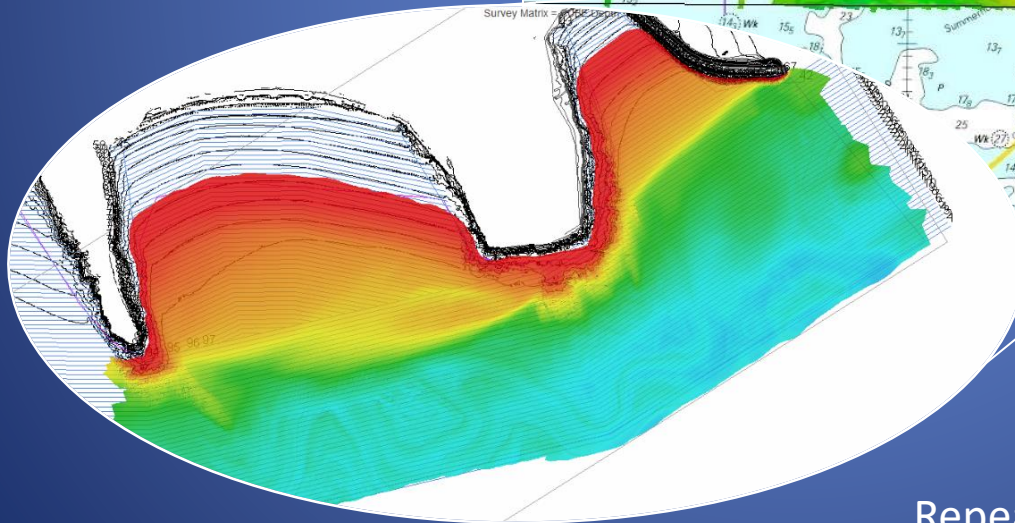
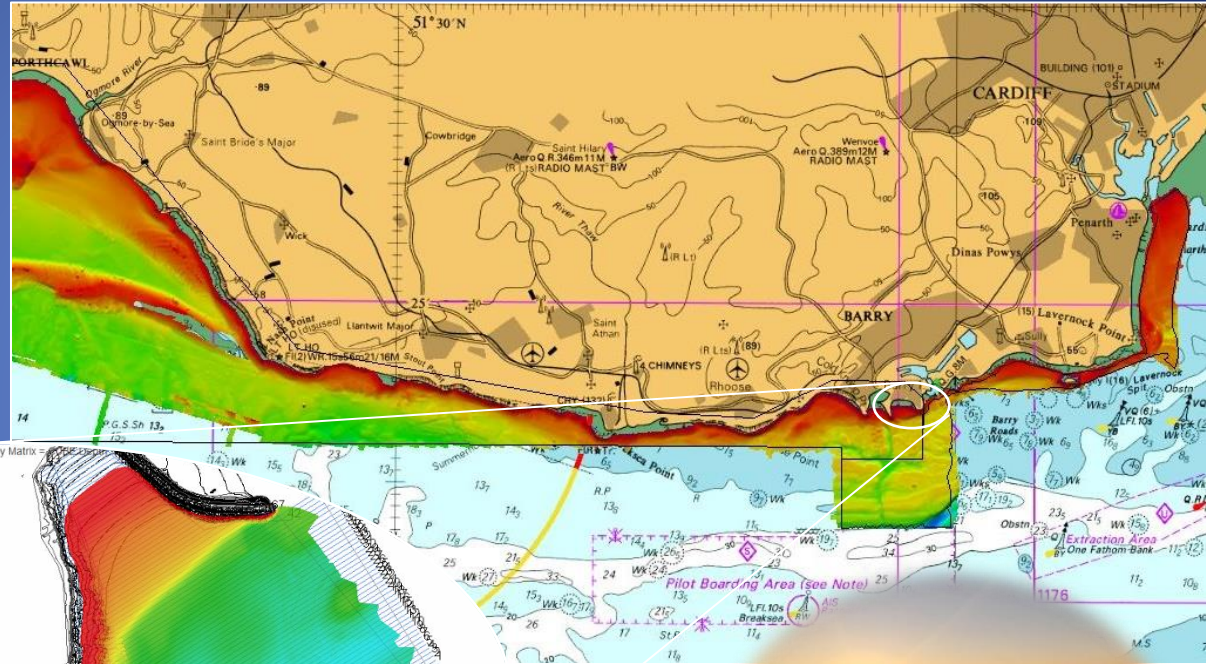


The screenshot displays the Coastal Monitoring website interface. At the top, there is a navigation bar with the following elements: a circular logo with 'NARCAMP' and a map of Wales; a 'Realtime Data' button with a waveform icon; a 'Map Viewer & Catalogue' button with a map icon; a 'Reports' button with a document icon; a 'Gallery' button with a camera icon; a 'Resources' button with a wrench icon; and a search bar with 'Regions' and 'Search' dropdowns. Below the navigation bar, the text 'NATIONAL NETWORK OF REGIONAL COASTAL MONITORING PROGRAMMES' is displayed. A secondary navigation bar contains a link to 'Go directly to table data: Waves · Tides · Met · GPS data' and three buttons: 'Show Wave buoys', 'Show Tide gauges', and 'Show Met stations'. The main content area features a map of the South Wales coast with several monitoring stations marked: Newport, Cardiff, Penarth, Barry, and Weston-Super-Mare. A legend on the right side of the map provides details on data sources and status: 'Arrow colour: temperature' with color-coded arrows for ranges (< 5°C, 5 - 10°C, 10 - 15°C, 15 - 20°C, > 20°C); 'Delayed data' with symbols for Active (green circle), > 24 hours delay (grey circle), and > 3 hours delay (blue circle); and 'Other data sources' with symbols for GPS (red square) and External (grey triangle). Two inset graphs are overlaid on the map. The top-left inset is a line graph showing 'Maximum Wave Height' (black line), 'Significant Wave Height' (green line), and a 'Storm alert threshold' (red horizontal line) from 16/10/24 to 12/11/24. The y-axis is labeled 'Metres' and ranges from 0.0 to 1.5. The bottom-left inset is a line graph showing 'Elevation (CD)' from 09/11/24 19:00 to 11/11/24 19:00, displaying a regular tidal cycle with a purple line for observed elevation and a red line for a model fit.

<https://coastalmonitoring.org/realtimedata/>

# Recent surveys

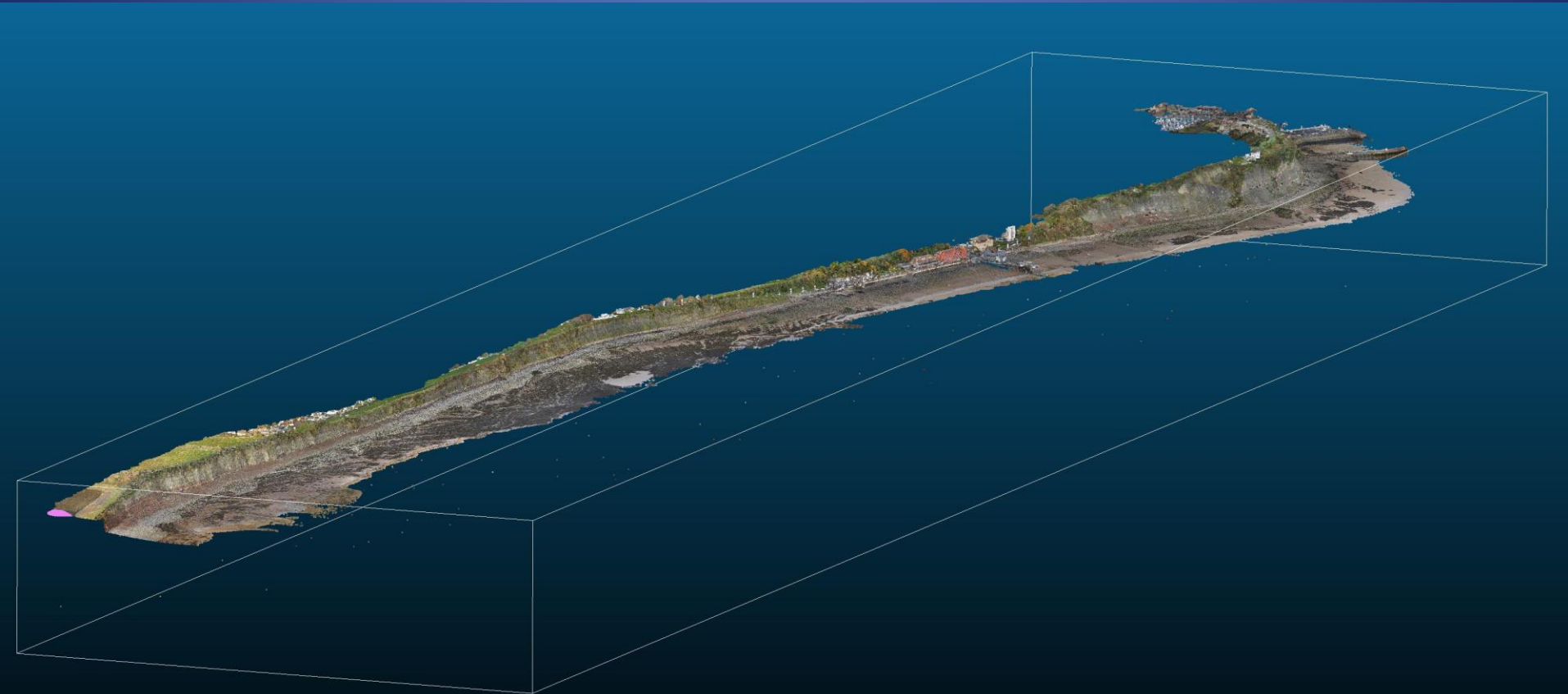
Inshore multi-beam  
bathymetry



Repeat surveys around Barry  
Island and the Knap 2022-23



# Recent surveys

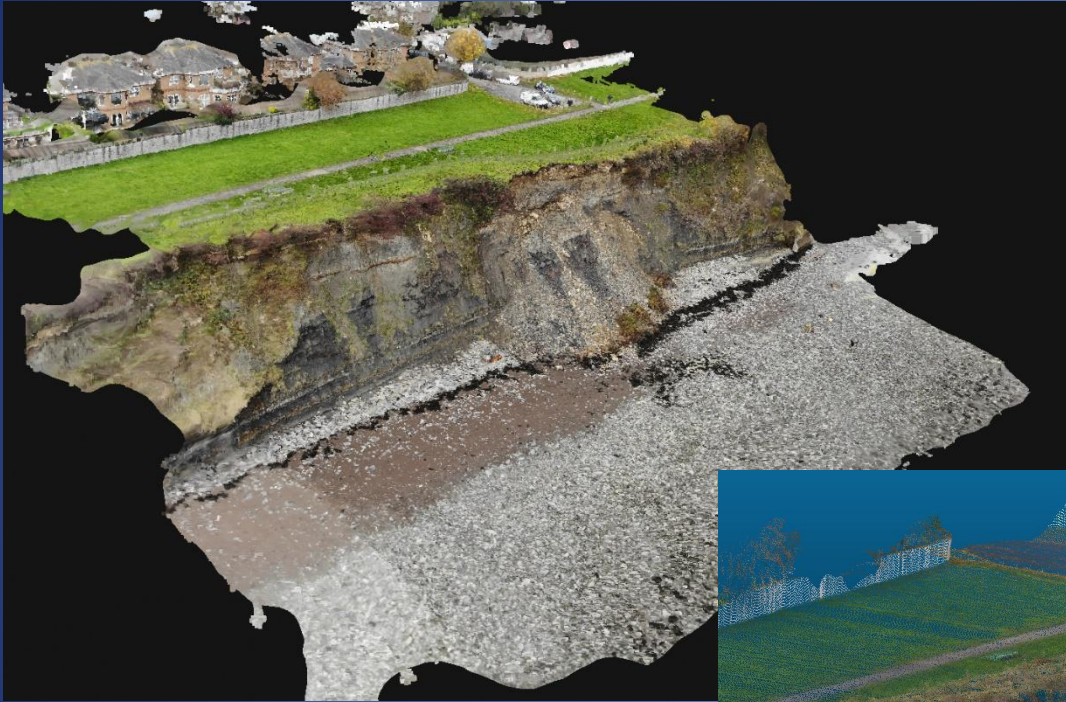


UAV LiDAR survey November 2023 – 261 million coloured points

# Recent surveys

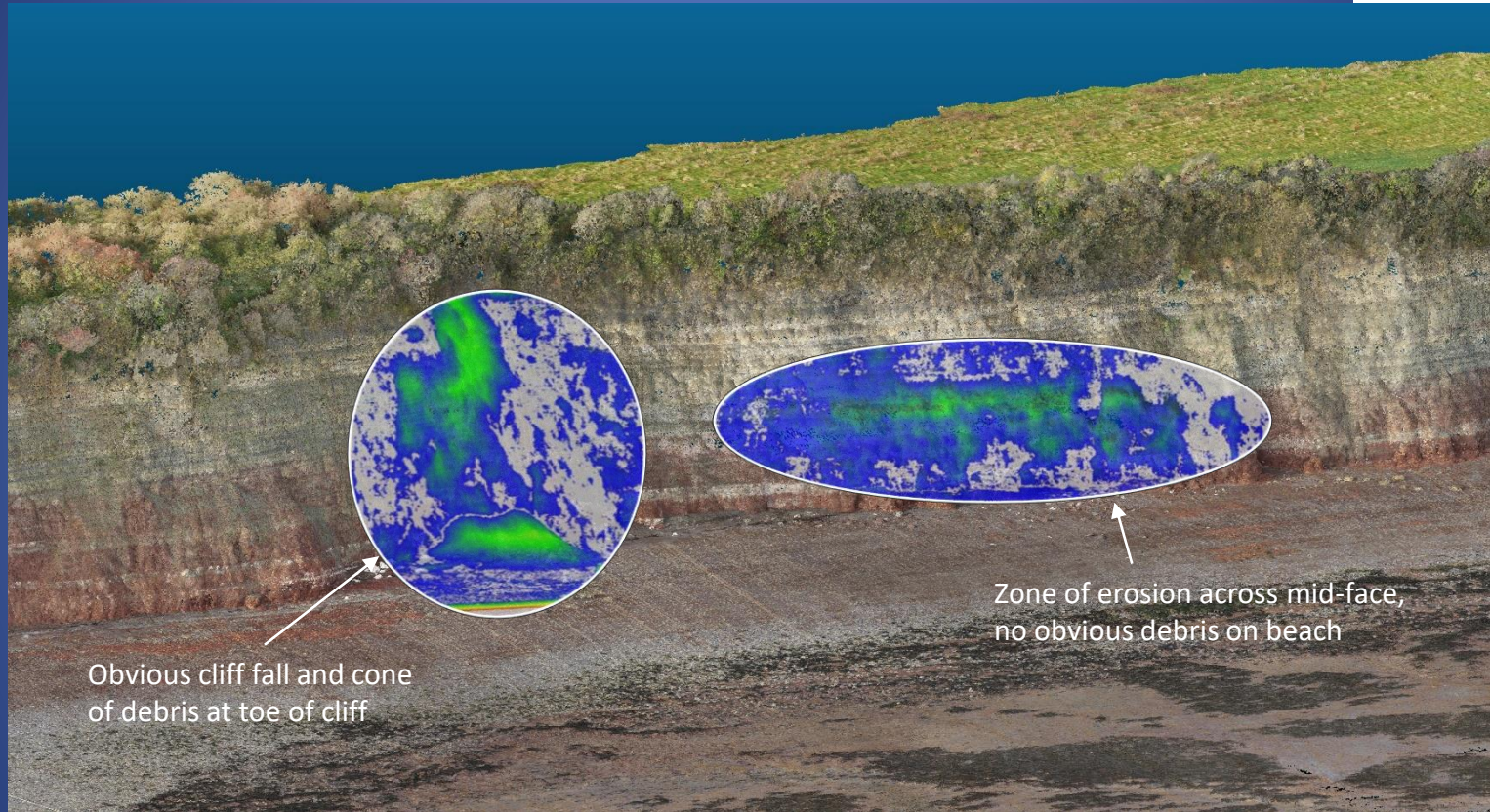


Forest Road, Penarth;  
13<sup>th</sup> November 2019



Forest Road, Penarth;  
27<sup>th</sup> November 2023

# Recent analysis

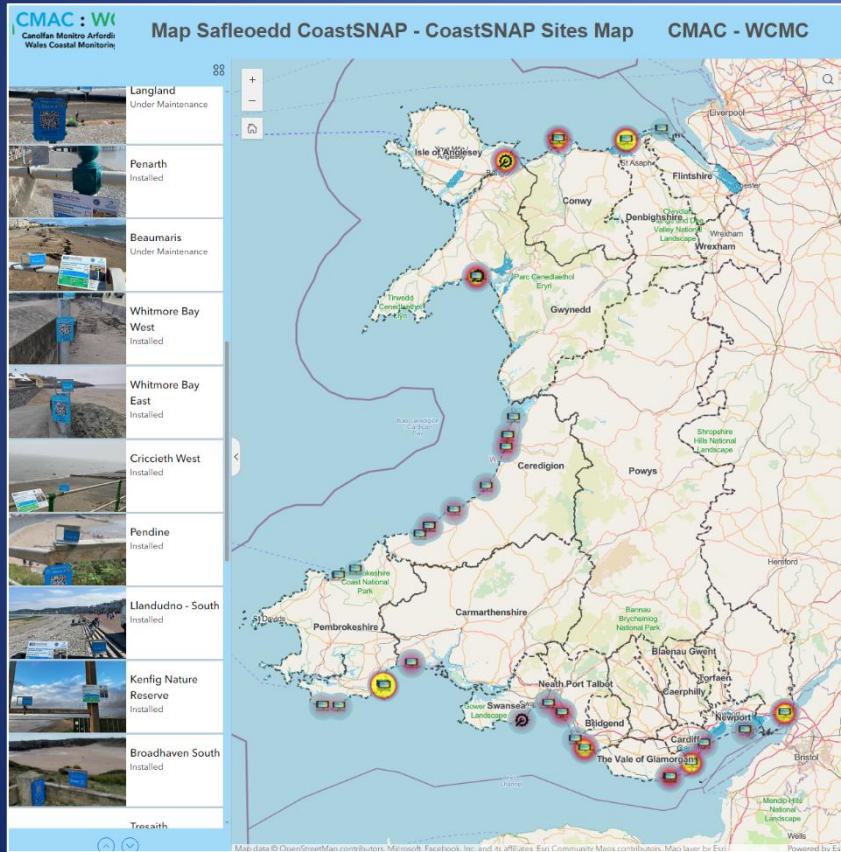


Cosmeston cliffs, comparison of cliff scans

# CoastSnap Monitoring



**CoastSnap**  
community beach monitoring



# Coastal Asset Monitoring



The screenshot displays the AMX Asset Database interface for the asset 'Whitmore Bay West East Central Access Ramp (0035b)'. The interface includes a navigation menu on the left with options like 'Photo', 'Map', and 'Show Local Assets'. The main content area shows a photograph of the asset and a detailed data form.

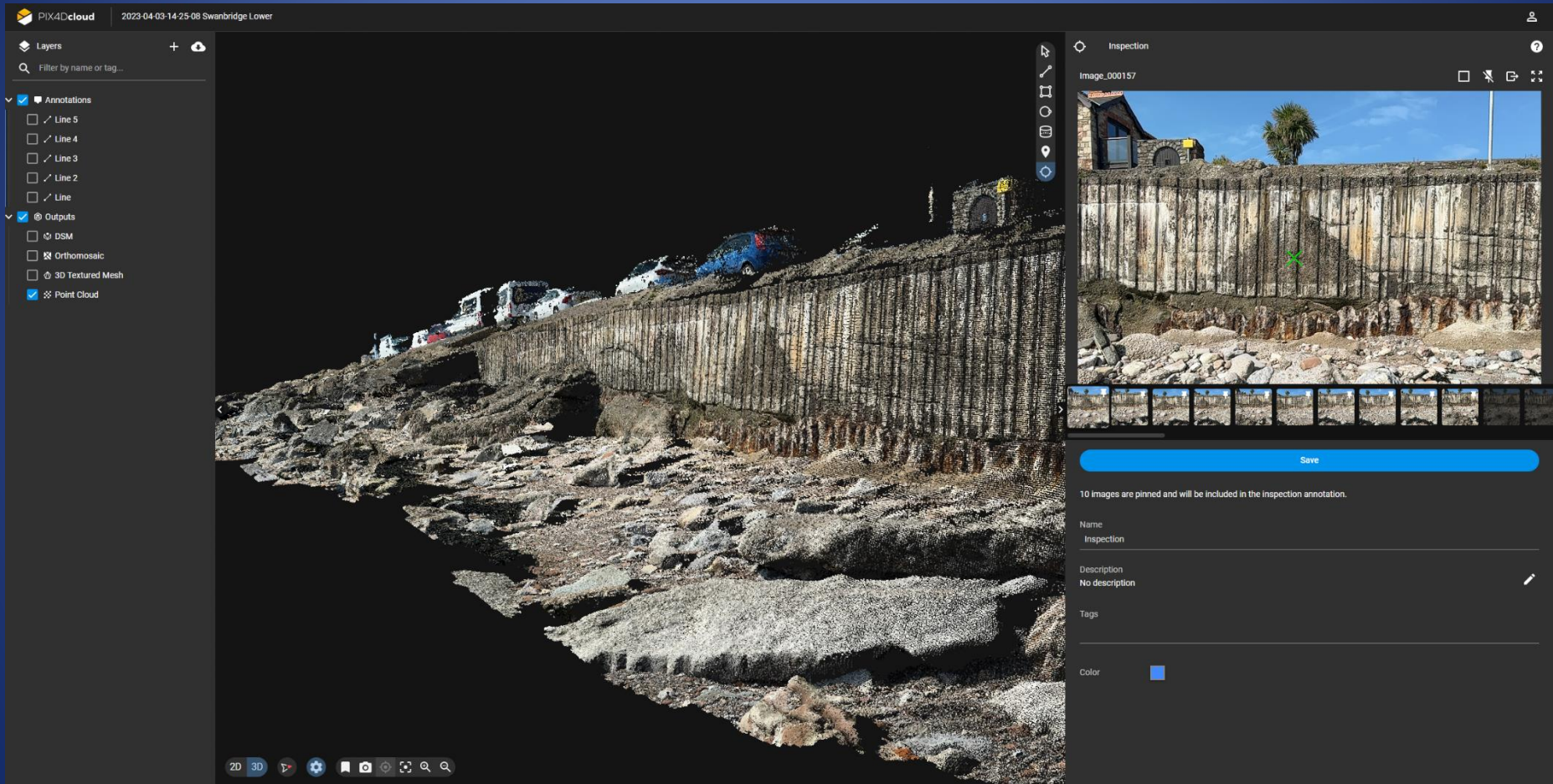
| Main                  | Health and Safety  | Responsibilities | Elements           | Relationships | Targets | Location            | Photos         | National Data Set |
|-----------------------|--|------------------|--------------------|---------------|---------|---------------------|----------------|-------------------|
| Name:                 | Whitmore Bay West East Central Access Ramp                         |                  | AMX ID:            | 0035b         |         | Historic Reference: | 4720           |                   |
| Type:                 | Beach Structure  |                  | Sub Type:          | Ramp          |         | Sub Cat:            | Coastal Assets |                   |
| Primary Purpose:      | Coastal Defence  |                  | Secondary Purposes |               |         |                     |                |                   |
| Beach Structure Type: | Access   |                  |                    |               |         |                     |                |                   |
| Protection Type:      | Coastal  |                  |                    |               |         |                     |                |                   |
| Description:          | squared mass masonry wall  |                  |                    |               |         |                     |                |                   |
| Location Description: | Barry Island   |                  |                    |               |         |                     |                |                   |
| Target Condition:     | 1 - Very Good  |                  | Current Condition: | 3 - Fair      |         |                     |                |                   |
| Last Action:          |  |                  | Next Action:       |               |         |                     |                |                   |
| Comments:             | Provides access at eastern end of wall adjacent to eastern shelter |                  |                    |               |         |                     |                |                   |

Barry Island, imagery derived scan

AMX Asset Database



# Coastal Asset Monitoring



Swanbridge coastal defences, Pix4DCatch (mobile phone-based) survey trial 3<sup>rd</sup> April 2023

# Future Monitoring Aims



- Establish a consistent and routine monitoring regime around coastline
- Inform risk-based approach to managing coastal interests
- Continued support for the WCMC
- Collaboration with academia

Diolch

Thank you

