


SHORT FORM DESIGN STATEMENT

 ARCADIS Design & Consultancy for natural and built assets	Project Name	Number and Activity code
	Isles of Scilly – Porth Mellon	UA008878-ARC-XX-XX-RP-CE-0363-P1

Brief Description:

Porth Mellon is located on the western coast of St. Marys. The bay measures approximately 240m and is flanked by rocky outcrops. Access to the beach is via a slipway.

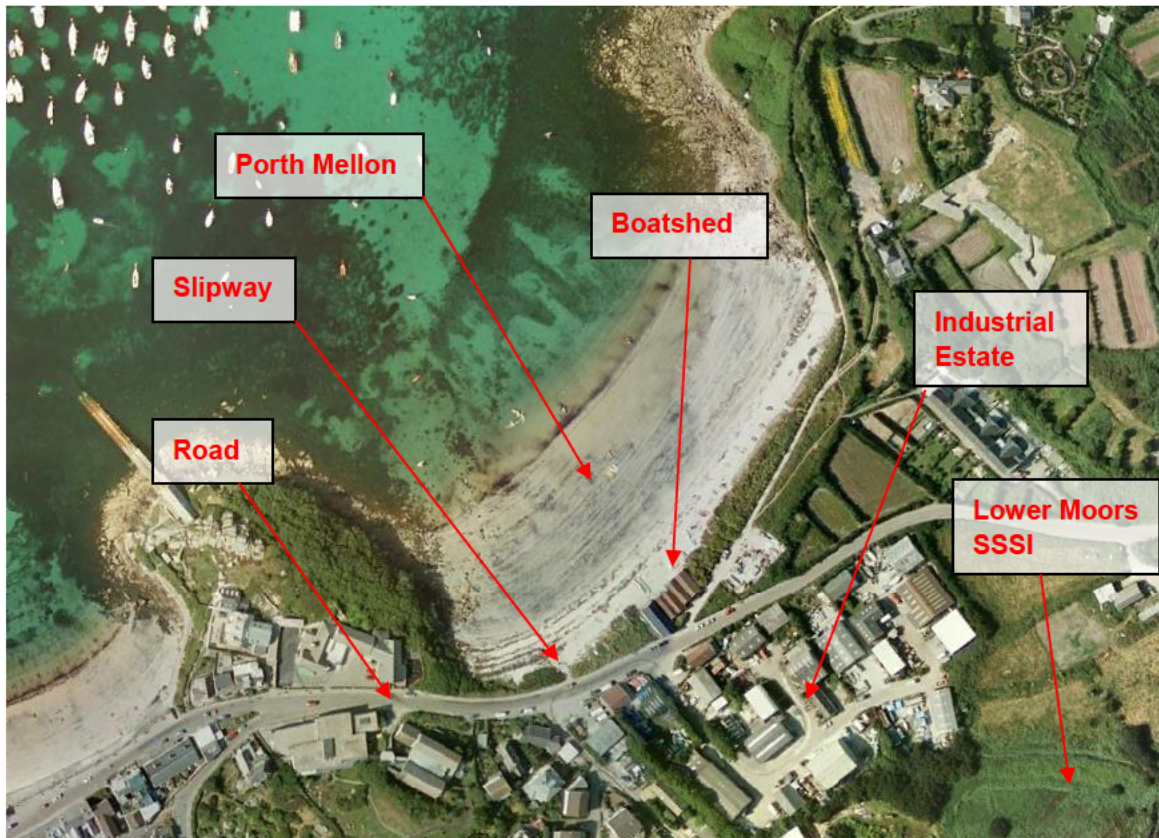


Figure 1: Porth Mellon beach

The aim of the scheme is to reduce the vulnerability of Telegraph Road from undermining and increase resilience of key infrastructure from coastal flooding. This will principally be achieved by the construction a rock revetment to dissipate wave forces and to reduce overtopping. The revetment will also afford increase protection to the Industrial Estate, Recycling Centre, Substation and the Lower Moors SSSI located behind the beach by reducing overtopping flows.

At the northern end of the beach there is a small stone retaining wall and a set of stairs that provides access from the coastal path. The dunes located behind the beach are of sufficient depth to offer protection to the properties from coastal flooding.

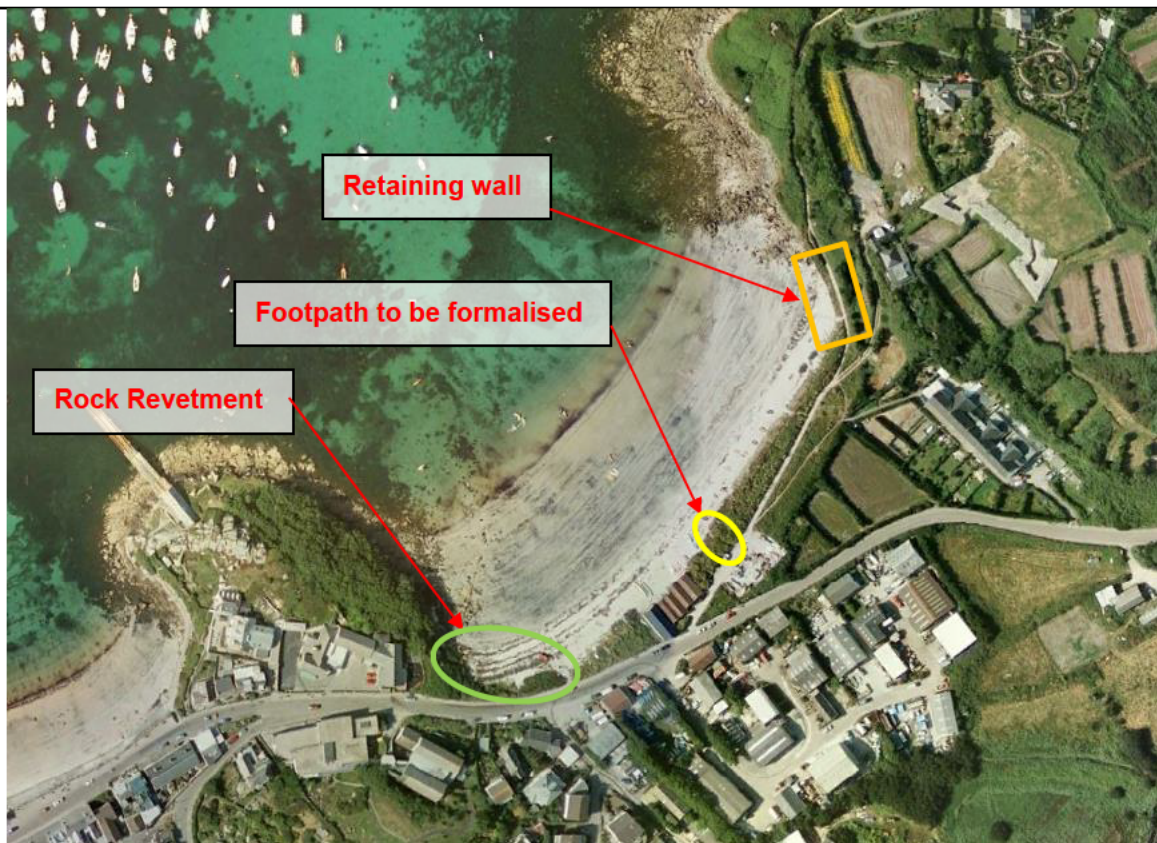


Figure 2: Porth Mellon beach – Proposed works

The focus of the design is on the following three elements:

1. Repairs to the existing retaining wall:

This is proposed at the north end of the beach highlighted by the orange rectangle in Figure 2. The face of the wall has voids where mortar and stones have washed out. The wall shall be repaired using locally sourced granite stones and cobbles and secured with rapid set mortar. The toe of the wall shall be exposed along its full length to assess the repairs required.

2. Installation of a boardwalk to formalise a path across the dune:

The section highlighted by the small yellow oval in Figure 2 is situated just to the north of the boatshed, and is primarily used by members of the public to access the beach. This is causing the dune to erode locally raising the potential for a breach during storm events. It is proposed to that a timber/recycled plastic boardwalk is installed that would act as a flexible path surface to follow the dune profile. This should alleviate further deterioration of the dune from the pedestrian induced erosion.

3. Installing a Rock Revetment:

A new rock revetment shall be installed in the area highlighted by the green ellipse in the southern corner. The revetment will provide increased protection to Telegraph Road from continued erosion as well as protection to the industrial estate to the rear of the beach. The revetment crest will be set to a minimum crest level of 6.19m ODN. The rounded flanks of the revetment will be constructed with a slope of 1:3. The centre section will be constructed to match the end sections and therefore the revetment slope may vary. The toe will have a foundation level of 0.5m ODN to prevent scour holes forming. The structure will be underlain with a geotextile that will be wrapped around leading stones in the toe of the revetment to form a "Dutch toe". The geotextile will act as the underlayer for the revetment, and act as a filter between the cliff and the beach to prevent the smaller material from leeching out through the main armour layer. A layer of site won rock shall be placed between the western exposed face of the revetment and the cliff to match the alignment of the cliff face. This will offer some protection to the cliff toe and give an aesthetic consistency although it will not be integral to the performance to the underlying revetment.

Assumptions:

- Though the beach is tidal, the proposed work is located above the MHWS tide mark, however, the construction area could still be effected by rising tide levels and storm events.
- Existing water levels:

	Local CD	Equivalent Local OD
HAT	6.3	3.39
MHWS	5.7	2.79
MHWN	4.3	1.39
MLWN	2.0	- 0.91
MLWS	0.7	- 2.21

- Numerical modelling using MIKE21 software was undertaken to identify the design parameters for the site. The design was undertaken using a 1:200yr joint probability wave and water level event with allowance for climate change, assuming a 50yr design life.
- It is assumed that the existing ground is suitable and accessible for the construction of the new rock armour revetment.
- It is assumed the earth bank between the beach and Telegraph road is stable and will not collapse as the rock armour revetment is built up.
- It is assumed that ground conditions as witnessed in the Trial Pits on the foreshore are suitable for placing rock armour without resulting in any significant settlement.
- It is assumed that the revetment will tie into the existing cliff and rocks on the beach in the south and an existing retaining wall adjacent to the slipway.

Design Basis/ design method:

Design water and wave conditions:

SWL (mAOD)	Hs (m)	Tm (s)	Comments
4.24	1.01	12.51	1:200yr joint probability

Designer's Risk Assessment: *incl. Hazards that cannot be designed out – A full summary can be found in the Designers Hazard Record*

- A. Works adjacent to water
- B. Soft ground
- C. Deep excavations
- D. Public beach
- E. Services
- F. Trimming of Geotextile
- G.** Unstable Rocks during initial placement.

References: incl.

- CIRIA, CUR, CETMEF (2007). The Rock Manual. The use of rock in hydraulic engineering (2nd edition). C683, CIRIA, London
- Eurotop: Wave Overtopping of Sea Defences and Related Structures: Assessment Manual (2007)
- Reeve, D et al (2004). Coastal Engineering: Processes, theory, and design practice. UK: Spon Press
- Kirsty McConnell (1998). Revetment systems against wave attack - A design manual. London: Thomas Telford Publishing.
- Geofabrics - Coastal and River Defence Systems: Design Guidance High Performance Square

Signed

Review

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