



## SHORT FORM DESIGN STATEMENT

 <b>ARCADIS</b> <small>Design &amp; Consultancy for natural and built assets</small>	Project Name	Number and Activity code
	Isles of Scilly – Porth Hellick	UA008878-ARC-XX- XX-MS-CE-0561-P2
<p><b>Brief Description:</b></p> <p>Porth Hellick is located on the south-east coast of St. Marys. The 250-m wide bay is flanked on both ends by rocky outcrops.</p> <p>The backshore dune is made of coarse sand (4-10 mm particle size) and vegetation is well established along its crest including <i>Fascicularia Bicolour</i> &amp; <i>Hottentot Fig</i> (<i>C.edulis</i>). There are gaps and low points due to the action of storm events during the past decade. It has been reported though that the dune is not particularly mobile.</p> <p>The eastern end of the dune suffers from severe human-induced erosion due to the action of boat launching. Additionally, the construction of the existing outfall required the excavation of dune which was not reinstated to match the existing dune levels.</p> <p>These low spots are potential paths for saline intrusion into the Higher Moors Pool, the main fresh water resource for St. Mary's, hence the sand dune defence needs improvement to continue to protect this natural resource.</p>		
		
<p>Figure 1: Aerial photograph of Porth Hellick. Image orientated north (Channel Coastal Observatory, 2016)</p>		

### Assumptions:

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

	Local CD	Equivalent AOD
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

- It is assumed that the existing ground is suitable and accessible for the works to raise the dune crest.
- It is assumed that, based on the existing data collated by the Channel Coastal Observatory through the South West Regional Monitoring Programme, the potential sediment transport in Porth Hellick is negligible (<1% change in sediment volume in the period 2007-2015).
- It is assumed that the existing plant species located on the crest of the existing dune is suitable to revegetate the existing gaps and the newly raised dune.
- It has been agreed with the client to raise the crest of the dune to +5.00 m ODN.
- It has been agreed with the client not to provide any clearance between the toe of the newly raised dune and the existing shed on the east end of the beach.
- It is understood that the client has in discussions with Dutchy and it no longer the intention of Dutchy that boats will be launched from the beach .
- It has been agreed with the client that the ramp will be used as an access track to the beach to undertake maintenance works on the existing beach outfall.

### Design Basis / design method:

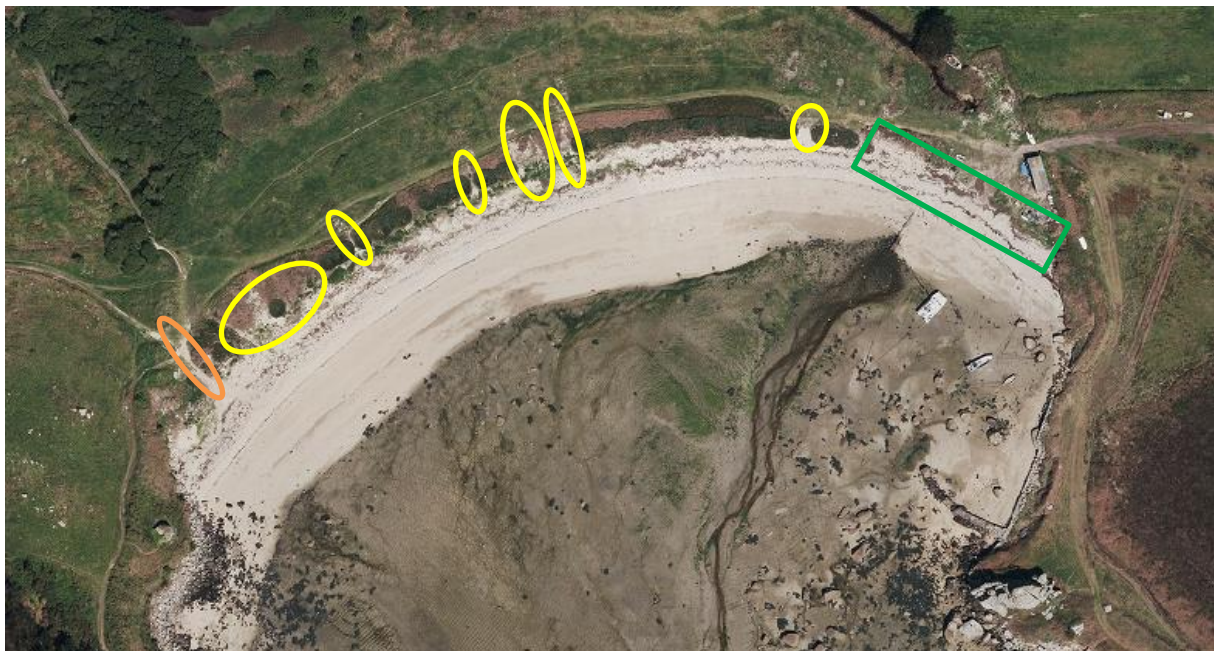


Figure 2. Key elements of the design

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

#### 1. Revegetation of the dune crest:

It can be observed in Figure 2 that the existing vegetation (*Fascicularia Bicolour*) on the crest of the dune has prevented beach material being moved to the rear of it. Therefore, it is proposed that non-vegetated

areas highlighted in yellow are revegetated with the same plant species found growing locally on the crest to provide a consistent and continuous line of defence against wave run-up and dune erosion.

The fascicularia plants are firmly established on the bank and their removal would do irreparable damage to the integrity of the bank's structure. Furthermore, their salt tolerance and development at this site has added a good metre of height to the bank and have helped stabilise and protect the bank during storm events. The Fascicularia are not encroaching on land beyond the bank and the use of the plant in selected areas will not extend its distribution beyond this site. Its use is with the aim to infill sections within the existing distribution and help provide those bare sections in the bank with a degree of protection that the rest of the bank already benefits from.

The Fascicularia plants also provide shelter on the landward side of the bank for other local vegetation. At present, some of these sheltered landward areas have been populated by *C.edulis* (Hottentot fig). None of this species will be transported or propagated at this area. Where possible areas with little or no vegetation on the landward side will be planted with species such as Sea Campion, Sea Holly, Sea Kale and Sea Rocket etc to help prevent the opportunist spread of *C edulis*.

2. Installation of an elevated timber boardwalk:

The section highlighted in orange in Figure 2 at the western end of the site, is primarily used by members of the public to access the beach. This is causing the dune to erode, facilitating a path for sea water to reach the water resource during storm events. In this case, it is proposed to install a timber boardwalk which will be elevated above the underlying beach material (circa 100mm). This should stop further deterioration of the dune from the pedestrian induced erosion.

3. Extending the dune:

The existing dune is to be extended along the section highlighted in green with its crest set to +5.00 ODN. To do so, the existing ground will be cleared to provide a suitable founding surface. The dune will be profiled in two sections, leaving a gap in between for the construction of the ramp. The slopes of the dune will match the existing (1V:6H approximately) and will be stabilised with 100% biodegradable geotextile mats (Coconet 800 or similar approved). The imported material is to be crushed Cornish granite 4-10 mm grading. Following point no.1, the crest will be revegetated with bush found growing locally on the crest. A mix of sapling and mature plants is to be used. The required volume to be imported is ~276 m<sup>3</sup>.

The raised dune will require local profiling around the existing shed on the east end of the beach. An alternative layout of the dune was studied in order to provide clearance around the shed, but this resulted in the dune being bypassed by overtopping flows leading to saline intrusion in the Higher Moors SSSI.

4. Installation of a flexible precast concrete block mattress:


This is to provide access to vehicles to carry out maintenance works on the outfall. The mattress will follow the profile of the newly raised dune onto the beach. It will be anchored at both ends with plain concrete beams and founded on a hardcore comprising 200mm thick Strataweb layers filled with the excavated material. The mattress will be covered with topsoil and seeded with native grasses.


5. Installation of access track to block mattress


This will provide access to the above-mentioned works and will stop damage occurring from vehicles approaching the beach access ramp. The access track shall be a Bodpave 85, or similar approved, filled with 4-15mm aggregate and covered with top soil and seeded with native grasses.

**Designer's Risk Assessment:** *incl. Hazards that cannot be designed out. See Designer's Hazard Record for further information*

- A. Works adjacent to water – Though working above MHWS, the site could be effected by wave conditions and extreme tidal levels.
- B. Soft ground – Risk of machinery over turning
- C. Public beach – Risk public may enter works area.
- D. Services – Existing buried Higher Moors leat outfall pipe.
- E. Environmental sensitive dune designated as SSSI & AONB
- F. Invasive Plant Species - Hottentot Fig (*Carpobrotus Edulis*)

**Signed:** ...Emilio Bolanos...  .....

**Reviewed:** ...Max Clausen.....  .....

**Approved:** ...Ian Cooke.....  .....