Climate Adaptation Scilly

Porthmellon Enterprise Centre

St Mary's

Isles of Scilly TR21 0LW

Department of Planning

Council of the Isles of Scilly

Town Hall

St Mary's TR21

1 June 2023

Dear Lisa

Information on the materials present in the Periglis embankment, St Agnes

In their letter of 5 May 2023 maintaining their objection to the coastal sea defence work proposed on St Agnes, Natural England noted that the proposal does not contain enough information and/or certainty to justify the assessment conclusion that the proposal will not result in adverse effects on the Special Protected Area and/or Special Area of Conservation.

Natural England note that a high level of certainty is required as to the impacts of a proposal on a European Site before planning permission can be granted.

Previously, uncertainty existed about the extent and nature of materials present in the embankment at Periglis because it is a) an artificial construction containing both engineered materials from works in the 1990s and 2015 and b) potentially contained waste left in the embankment over many decades.

To provide a high level of certainty on the materials present in the embankment, the project obtained Assent from Natural England to excavate up to 8 cross sections through the embankment. On 26 April 2023 4 cross sections were dug with a backhoe and the materials excavated were examined by me.

I am a geomorphologist by education and training. I hold an MA in Geography from the University of Oxford, where I specialised in geomorphology, hydrology and Quaternary science. I have a PhD in climate change during the Late Glacial. I have qualified as a Chartered Geographer (Geomorphology). I have over 30 years' experience in undertaking sedimentological and geomorphological investigations, and I have acted as an expert witness on geomorphology and hydrology in the Land and Environment Court of New South Wales (Australia), and before the Environment Court, planning tribunals and a national enquiry in New Zealand.

A large number of photographs of the Periglis embankment during its original construction in 1994 and reconstruction in 2015 were made available by St Agnes residents or were obtained from Council records. These photographs illustrate the mix of local and imported materials used in the embankment, from cross sections and construction sequences in the embankment.

These photographs provided a high level of certainty of what was used in the construction of the embankment, but they did not contain substantial information on the presence of waste, nor the natural materials likely to be found deeper than the excavation undertaken in 1996.

Conversations with St Agnes residents revealed that they were aware that inert waste had been placed in low points in the Periglis embankment over time. Residents advised that building rubble, vehicle parts and other materials might be present. However, they were unclear on what volume of material was likely to be present, nor the proportions of those materials.

The investigation of April 2023 was intended to provide information on the composition of natural materials and the proportion and type of waste possibly present.

The investigation trenches were placed at four locations likely to be representative of the types of material in the embankment (Figure 1).

Figure 1: Location of investigation trenches at Periglis, St Agnes

The locations of the trenches were chosen on the expectation that Trench 2 would probably intercept waste, because it was closest to the accessible end of the embankment.

Discussion with residents suggested Trench 1 might also intercept waste, but Trench 3 and Trench 4 were unlikely to contain waste.

The gap between Trench 1 and Trench 2 visible in the figure is because the dispersal field for the sewage system associated with the Island Hall is in this location.

The trenches were dug orthogonal to the sea, so they pass from the rear of the embankment to within 1 m of the embankment crest.

Each trench was between 5 m and 13 m long, dug with a 600 mm wide bucket attachment to a depth of up to 3 m.

The stratigraphy of each trench was described at the embankment crest and at the toe at the eastern end of each trench adjacent to the low area of the SSSI. In the northernmost Trench 4, only a crest description was provided, since the trench was relatively short.

The trenches are illustrated in figures 2-5.

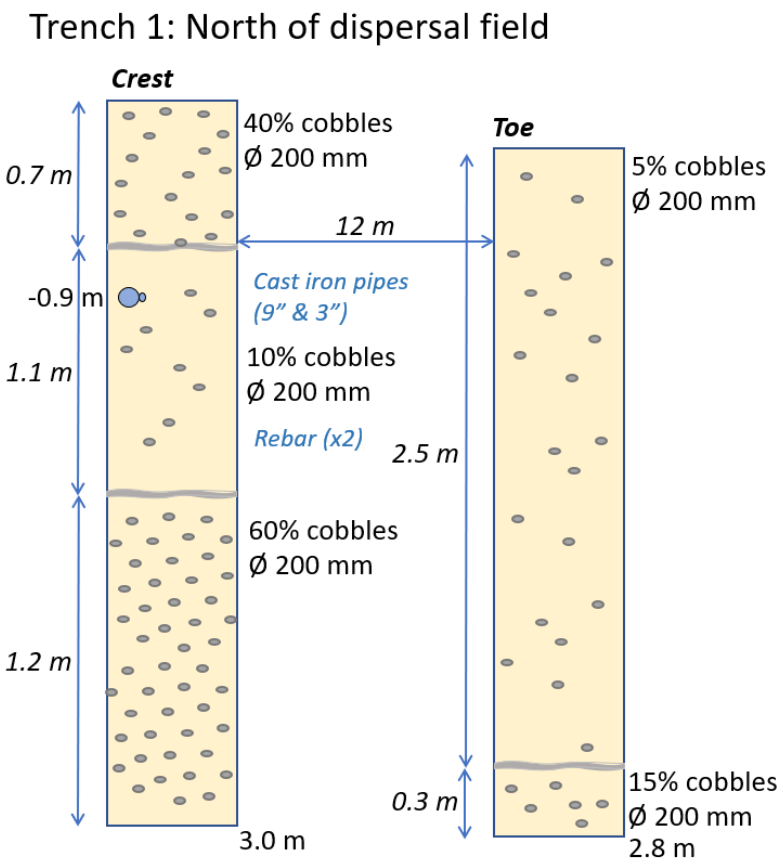
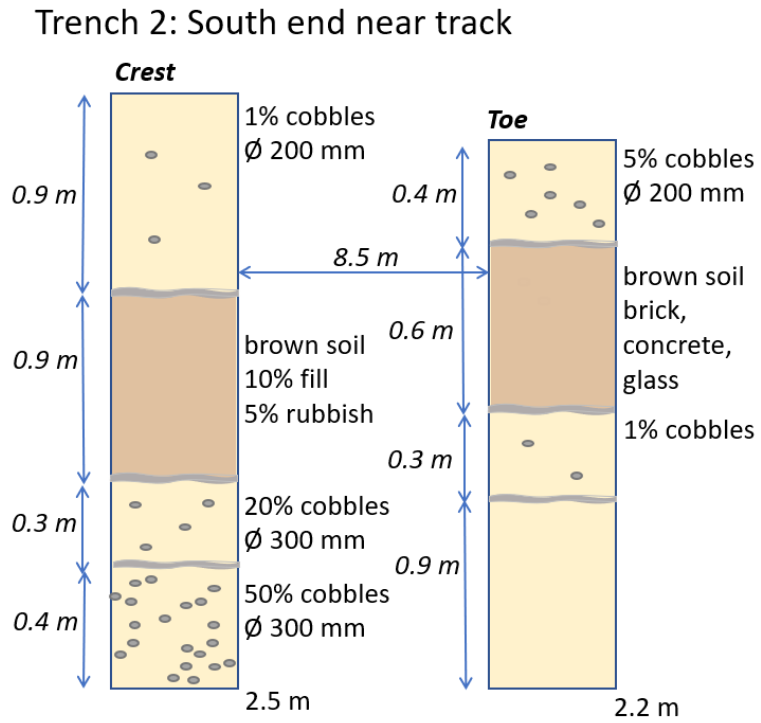


Figure 2: Trench 1 illustration



NB: Yellow materials are sand, forming the balance of all proportions in each column diagram

Figure 3: Trench 2 illustration

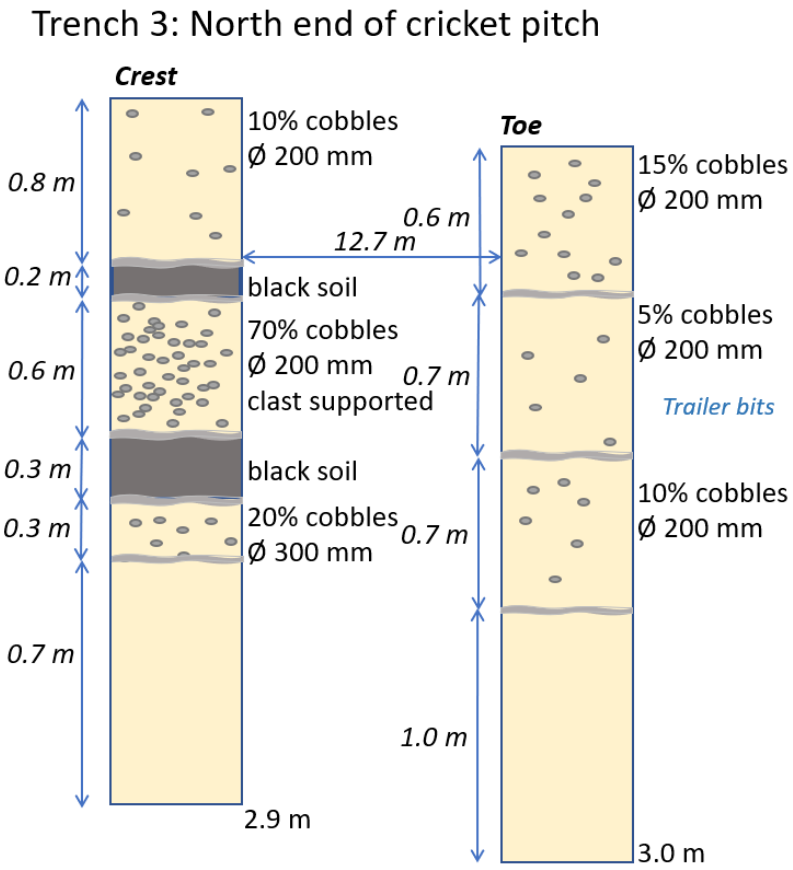


Figure 4: Trench 3 illustration

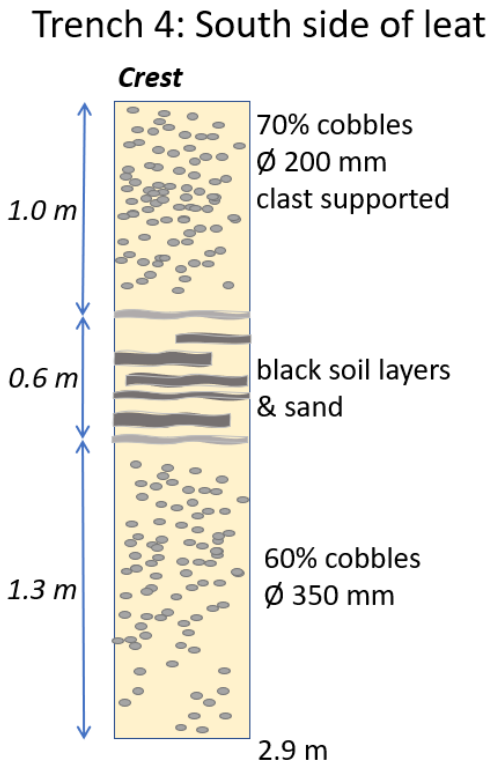


Figure 5: Trench 4 illustration

Interpretation

The general interpretation I make of the materials present in the cross sections, and considering the photographs of works in 2015 and 1996 are:

There is a surface unit on the embankment of materials placed as part of the works in 2015. At the northern end of the embankment, this is a layer of cobbles and sand, taken from the neighbouring beach, which seems to be about 70% cobbles and is matrix supported (ie, the cobbles are touching each other and sometimes have no sand between them).

Elsewhere, this surface layer is thin or non-existent, possibly where the bank height was not made up in the 2015 works because it was at design height already.

At the northern end of the embankment, there are layers of black soil which possibly represent palaeosols (ancient soils), composed of sand and organic material.

At the southern end of the embankment the brown soil present was probably placed where residents were disposing of rubble and other inert materials – there are up to 15% by volume bricks, concrete and glass mixed in with the soil. Residents recall 'filling holes' in the dune, rather than excavating a large volume then filling it again.

At most sites there is a basal unit with more cobbles present, except (notably) the trench north of the cricket pitch. This basal unit possibly represents an older beach unit that was covered by the overlying dune sand. The lack of cobbles at this depth north of the cricket pitch may represent the position of a cobble-poor section of the palaeo-beach as seen typically in present-day mixed cobble-sand beaches on the Isles of Scilly.

The rear of the embankment has fewer cobbles and more sand (except at the leat, which is a very narrow bank). This sandier unit at the rear of the embankment probably represents a wind-blow 'dune' component of the embankment. Aeolian transport of sand to the rear of the embankment occurs today, as seen at the southern end of the cricket pitch. This suggests the palaeo-shoreline has not previously been any further east than the crest of the existing embankment in approximately the last 6,000 years, which is the period that existing sea level has been experienced locally.

In places there is low proportion of general inert building waste such as bricks. Individual pieces of inert waste such as cast-iron pipe and what appeared to be the remains of a trailer were probably used for dune strengthening. Most waste was present at the southern end, closest to the buildings, as might be expected if waste was being deposited the shortest distance from the neighbouring track.

The volume of waste present is less than expected and all waste can be managed by removing it to the waste management facility on St Agnes and disposing of it.

The sand present in the embankment is all the same grain size – similar to the beach sand. The cobbles present range in size from 200 mm to 350 mm median diameter. They mostly are rounded granite beach cobbles.

The proportional mix and volumes present of cobbles and sand observed provides a high level of confidence on what is likely to be present within the rest of the embankment to plan the volume of each that must be imported to construct the proposed sea defences.

Impacts of the proposed works on the European site

The potential for impacts of the proposed works on the European site are now know with a high level of certainty:

1) The waste present in the Periglis embankment is inert
2) The waste is present in small volumes and can be managed by removing it for proper disposal
3) The volume of waste present is small enough that it will not require importation of substantial volumes of additional materials to complete the works as designed
4) The relative proportions of sand and cobbles are known from the excavations so far, and any variation in the proportions actually uncovered during the works can be managed within the proposed methods to undertake the works. For example, using a high proportion of the rounded cobbles present in geobags is feasible. No local materials will remain unused at the end of the works. No unexpected natural materials such as large rocks were found.
5) This means that it is unlikely that the integrity of the European site will be affected by the works, since there are not likely to be any unexpected effects

Although a very high level of certainty about the contents of the embankment could be obtained by digging up more of the embankment, the resulting additional information would not change the approach to managing waste present or material import to the work sites.

The cost of undertaking such an extensive investigation would be out of proportion to the likelihood that the findings would materially affect the integrity of the European site in a way that cannot be managed during the project execution with the information already gained.

Yours sincerely

[redacted]

Stephen Swabey