GCSE Lesson 2

Coastal Management at Dawlish Warren

There are four approaches to coastal management:

- Hold the Line – to maintain or upgrade existing defences to retain the coastline at its current position
- Advance the Line – build new defences to move the coastline seaward
- Managed Realignment – controlled realignment (retreat or advance) in balance with natural coastal processes
- No active intervention – leaving the coast to develop naturally

1. **The diagram below illustrates one of the four approaches.**

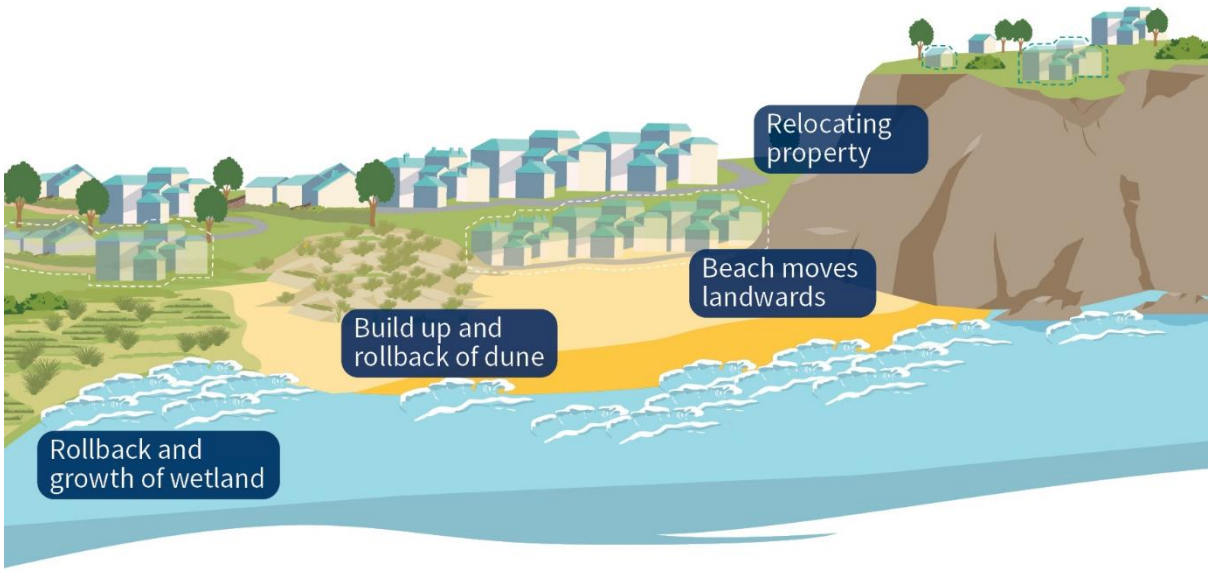


(a) Which approach is illustrated by the diagram? Hold the Line

(b) Explain your answer. These are hard engineering measures designed to prevent natural processes from eroding the coast or causing flooding. They form barriers to the sea.

(c) Suggest why this approach may not be considered as sustainable. It is expensive to install and maintain hard engineering defences. Construction uses energy and raw materials (unsustainable). They often work against or interfere with natural coastal processes preventing the coastline from developing naturally and sustainably.

2. **The diagram below illustrates a sustainable approach to coastal management.**



(a) What is the name of this approach to coastal management? Managed realignment

(b) Explain why it is sustainable. Managed realignment works with natural processes to allow the coast to adapt and develop more naturally. It does not use hard engineering structures which have a high carbon footprint.

3. The maps below show the location of the spit at Dawlish Warren.





(a) Describe the location of Dawlish Warren spit. Dawlish (Warren) is located on the south coast (Devon), to the south of Exeter. The spit just out from the western side of the (River Exe) estuary towards Exmouth.

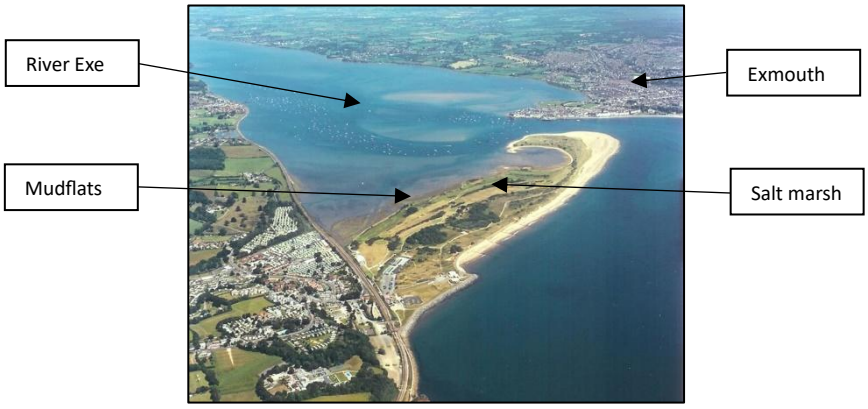
(b) In what direction has the spit grown out from the land? NE

(c) Calculate the length of the spit. Approx 2 km

(d) Is the spit made from sand or shingle? sand

(e) On the map, locate and label the salt marsh on the northern edge of the spit.

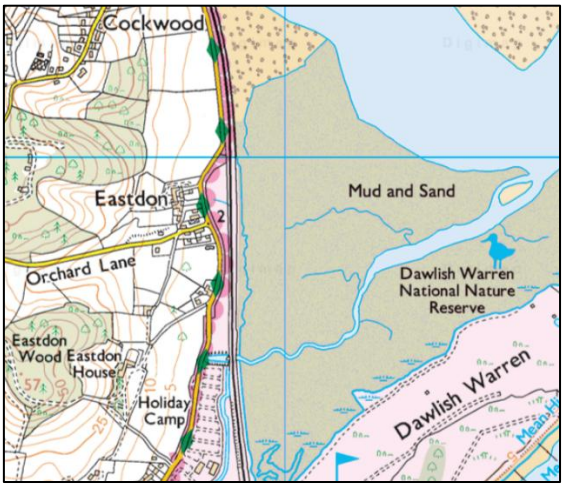
4. The aerial photo shows Dawlish Warren spit.



(a) In what direction is the photo looking? N/NE
(b) Locate and label the following: the River Exe; Exmouth; salt marsh; mudflats
(c) Give 3 reasons why the spit at Dawlish Warren has been protected. Reasons might include: protect from flooding the mainline railway, Dawlish Warren settlement, holiday and tourism developments on the spit and in Dawlish Warren. Protecting the agricultural land currently sheltered by the spit. Also protecting birds and marshland.

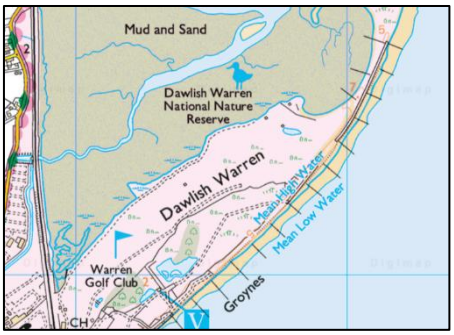
The long-term policy (to 2105) for managing the spit itself is that of 'No Active Intervention'. This will enable the spit to develop naturally and sustainably. Neighbouring stretches of coastline are likely to be afforded a higher level of protection to prevent the high economic and social costs of flooding as sea levels rise.

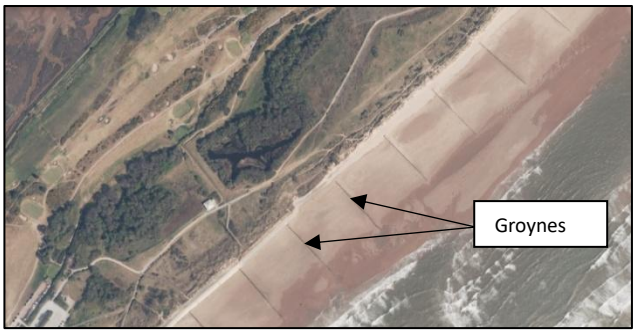
5. The OS 1:25,000 map below shows the coastal management unit from Cockwood to The Warren.



Using evidence from the map, suggest why a 'Hold the Line' approach has been adopted for this stretch of coast. To protect the coastal developments from flooding, such as the Holiday Camp, the mainline railway, housing at Eastdon and the main road.

6. The 1:25,000 OS map and aerial photo show the central management unit at Dawlish Warren. Use the pattern of the footpaths to locate the photo on the map.
   (a) On the photo, locate and label groynes.
   (b) What is the evidence on the map and on the photo alongside that the groynes are no longer very effective. On both the map and the photo, there is little evidence that the groynes are interrupting the longshore drift of sediment from west to east



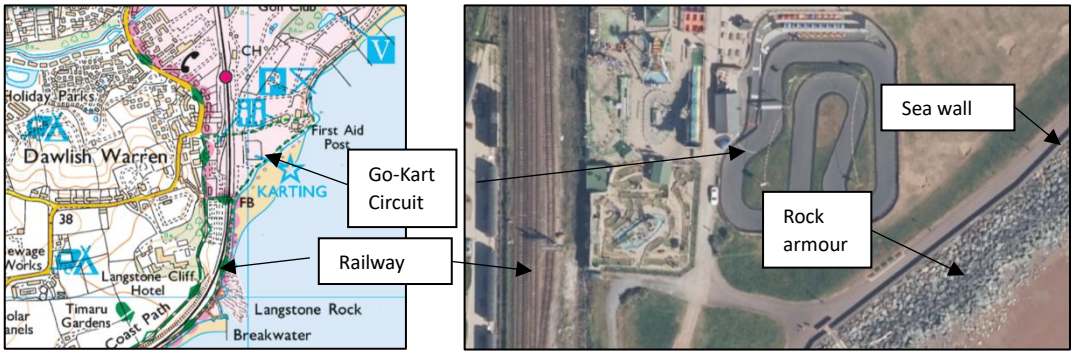


7. **The photo below shows a measure of coastal protection.**



   (a) Name the type of coastal protection shown in the photo. Gabions
   (b) Using evidence from the photo, describe the purpose of this type of coastal defence. Gabions are cages filled with rocks that can be arranged to form a low ramp. They force waves to break early and therefore (by absorbing the energy of the waves) help to protect the coast from erosion.
   (c) Using evidence from the photo, suggest why this coastal defence is no longer very effective. In the foreground, the cages appear to have been damaged, with some of the rocks removed by erosion.

8. The 1:50,000 OS map shows the management unit Dawlish Warren (west). The aerial photo shows coast near the go-kart circuit.



(a) On the photo, locate and label the railway and the Go-Kart circuit

(b) On the photo, locate and label the sea wall and the rock armour.

(c) Using evidence from the map and the photo, suggest why this stretch of coastline has been defended to 'Hold the Line'. There are important lines of communication, including the mainline railway and a road. There are tourism developments, such as the Go-Kart circuit, and there are commercial and industrial buildings (alongside the railway in the photo). There is also housing in Dawlish Warren.

9. In 2017, the Environment Agency and Teignbridge District Council completed a £12m scheme to protect the spit and enhance the amenity value of the beach.

- Timber groynes were replaced or modified
- Construction of a new revetment between groynes 2 and 3
- At the 'neck' of the spit - where it narrows before the recurved tip - the burial of 450m long 'geotube' filled with sand to provide extra stability during storms.
- Offshore dredging and beach nourishment pumped over 250,000 cubic metres of sand onto the beach
- Removal of gabions to enable sand dunes to develop naturally

10. Look at the photo below which summarises the management scheme (2017).



(a) Locate and draw a circle around the 'neck' of the spit. Student activity

(b) Suggest why it was decided to improve defences at the 'neck' of the spit. This is the narrowest part of the spit, most vulnerable to being breached and resulting in flooding of land.

(c) The photo below shows the geotube. Use annotated labels to describe the characteristics and purpose of the geotube.



(d) Using evidence from the photo above, describe how beach nourishment is being used to strengthen the defences at the 'neck' of the spit. Beach nourishment involves sand, dredged from the seabed and dumped on the beach where it is moved and profiled by diggers. It is widening and raising the height of the beach to help protect it from erosion and overtopping.

(e) Gabions have been removed from the beach. Suggest two advantages and disadvantages of this management action.

Advantages	Disadvantages
• Allows the beach to develop naturally and sustainably • Beach looks more natural, as gabions are unsightly	• The beach and face of the sand dunes is now less well protected from erosion • Faster erosion may damage natural habitats, for example sites for nesting birds

(f) To what extent can the management scheme (2017) be considered a success? Students should be encouraged to state an opinion and then support it with evidence. Students might be expected to say that, whilst it appears to have been successful so far (no major floods or erosion), there have been some minor issues such as the geotube being exposed and damaged by erosion. Some people continue to object to the scheme causing conflict. However, the new and improved hard structures (groynes and revetment) seem to be effective.'