Clacton and Holland-on-Sea Coastal Defences – Project Appraisal Report (PAR)

Introduction

Tendring District Council and Mott MacDonald are working together to come up with a coastal defence scheme for the Clacton and Holland-on-Sea frontage.

The aim of the scheme is **to combat the continued long term loss of sediment causing lowering of beach levels and risk of erosion to the frontage**. The scheme will also focus on reinstating the area as a tourist destination to support regeneration.

The timeline below shows the previous studies on coastal protection for Clacton that have occurred in the last decade.

- Recommendations from the shoreline management plans is to implement a **hold the line policy**, which at Clacton means **replacement or improvement** of existing defences.
- The recent Strategy report recommends implementing **rock groynes** along the frontage with **beach recharge**, and the PAR looks at these options in greater detail.
- The next stages are **gaining funding approval** followed by **detailed design** and then **phased construction**.
- The schemes within the PAR range from **£20 million to £30 million.**

TIMELINE OF STUDIES FOR THE CLACTON AND HOLLAND-ON-SEA FRONTAGE

ONGOING EMERGENCY MAINTENANCE WORKS

2003	2010	2010-2013	2012-2013	September 2013	2014	February 2015
Coastal Protection Scheme Strategy Plan Clacton-on-Sea	Essex and South Suffolk Shoreline Management Plan	The Clacton and Holland-on-Sea Flood and Erosion Strategy	Clacton and Holland-on-Sea Coastal Defences Project Appraisal Report	Approval from the Environment Agency	Detailed design	Construction works commence

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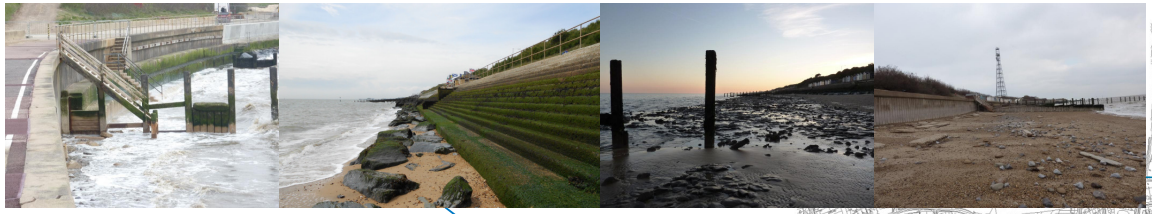
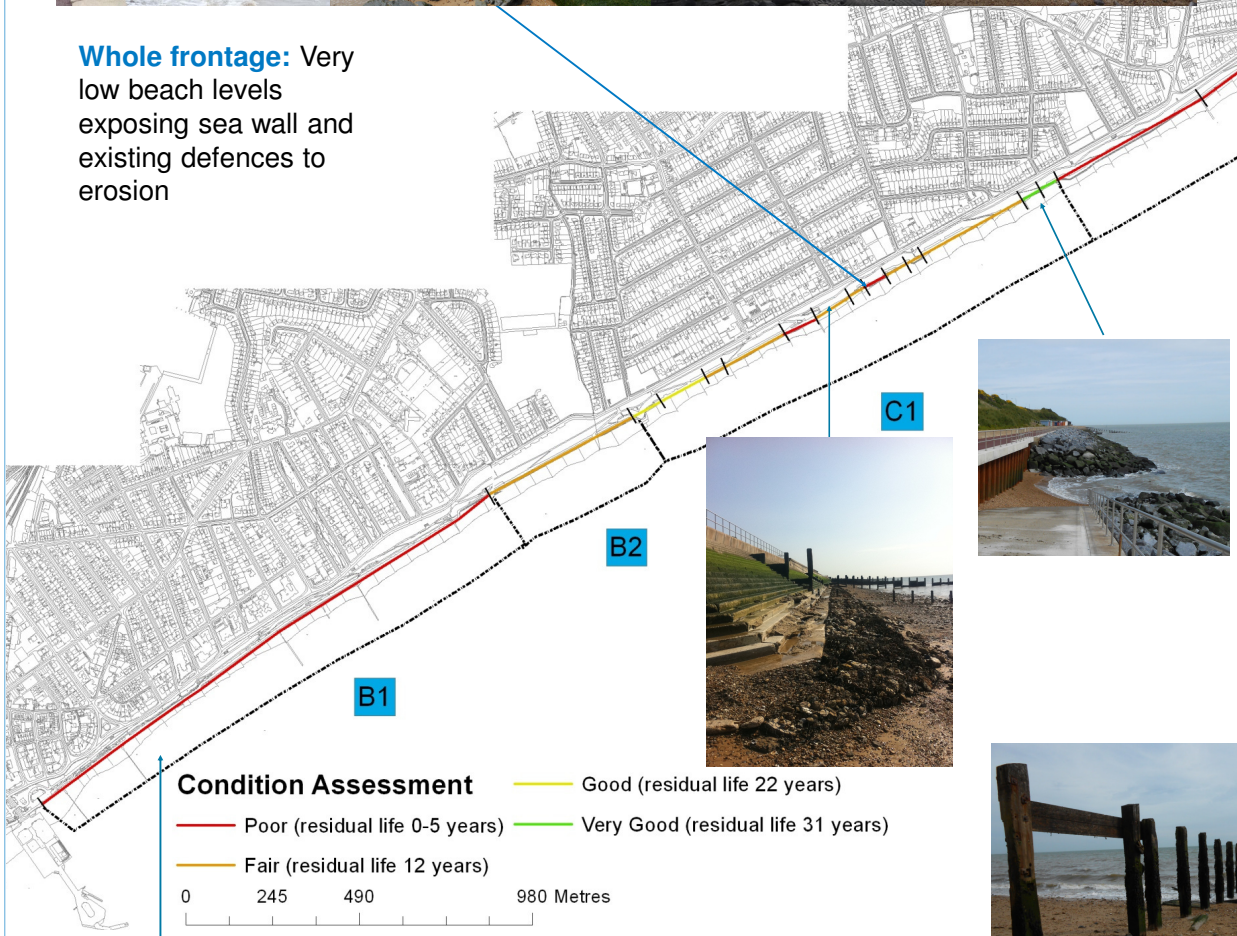
Key issues for the frontage

Mott MacDonald carried out a site survey of the frontage and assessed the condition of the existing defences.

- This helped identify the **key issues** for the frontage, as well as identifying the areas **most in need of improvements**.
- From the site survey, each section of defences were given a **condition rating** and a **residual life** (which is the number of years before the defence is expected to be in a condition where it is likely to fail).
- Based on these results the **first phase** of works will concentrate on **Unit C2**, **second phase** of works on **Unit B1** with the **third phase** of works on **Units B2/C1**.



Whole frontage: Very low beach levels exposing sea wall and existing defences to erosion



Very Poor Condition: Zone C2 is in a very poor condition and this is where the first phase of works will commence

Failure of defences: Localised areas of failure have required emergency works.

Causes of long team beach lowering include:

- Sediment used to be supplied from eroded cliff material however majority of **cliffs nearby are now protected by coastal defences**
- Sediment is often transported alongshore during **storm events** – largely in a south westerly direction but can also be transported north easterly along the frontage.
- Lowering of **clay levels** along the whole frontage
- The **angle** of the frontage in relation to the surrounding coastline makes it more **sensitive to storm events**

Wavewalkers by the pier: Poor concrete condition causing cracking at the toe – if the toe fails the whole defence could fail

Whole frontage: Timber groynes along the length of the frontage in very poor condition and are failing – no longer effective at maintaining the beach.

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Option 1: Do nothing

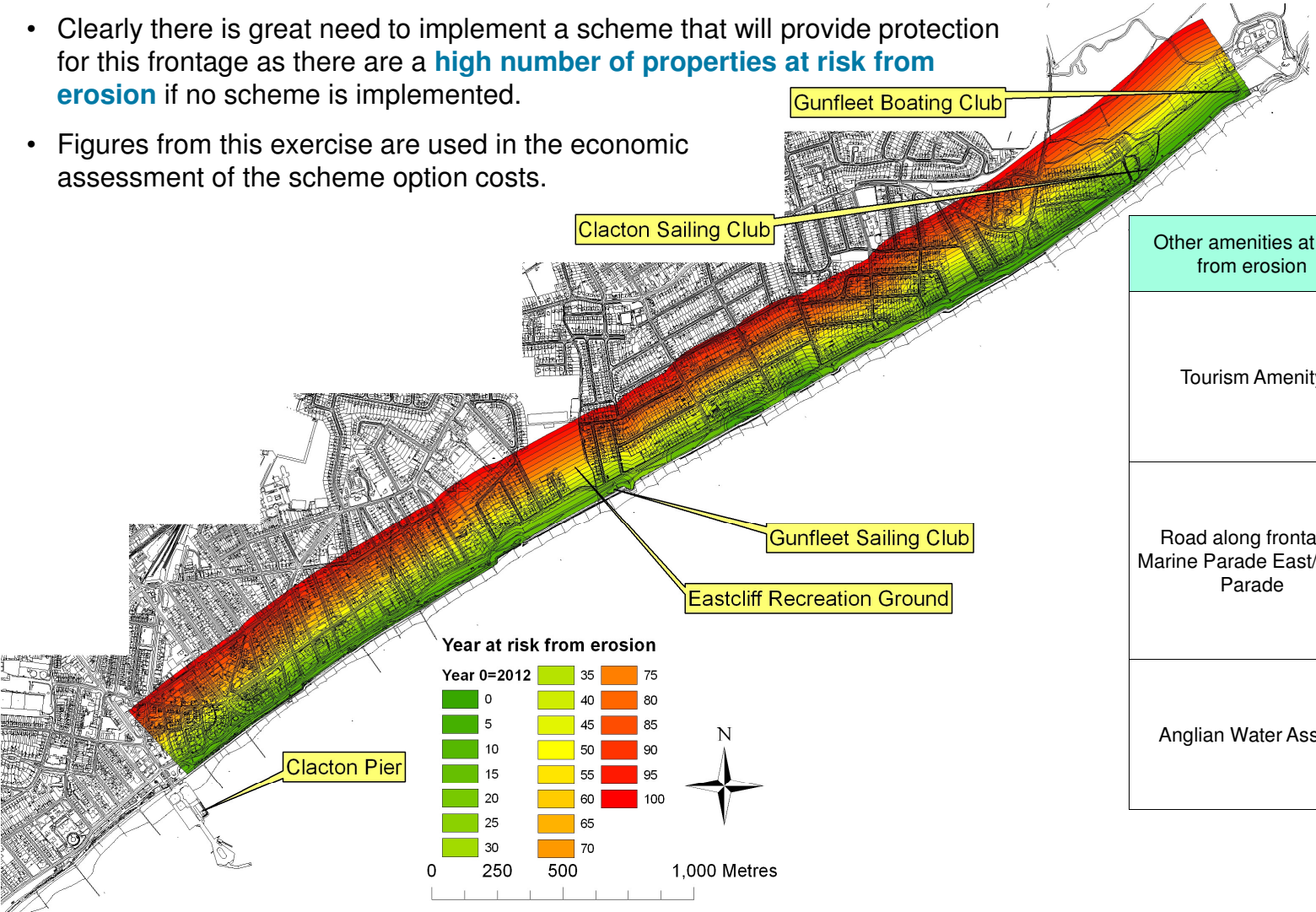
Risk of Erosion:

An option where no maintenance or capital works are carried out is always used to create a baseline against which the proposed options are assessed.

- The **economic benefit** of protecting this frontage for **100 years** is the sum of the properties and amenities that are being protected (see the tables to the right).
- Clearly there is great need to implement a scheme that will provide protection for this frontage as there are a **high number of properties at risk from erosion** if no scheme is implemented.
- Figures from this exercise are used in the economic assessment of the scheme option costs.

Year	Residential Properties (number at risk)	Commercial Properties (number at risk)
0-20	371	13
21-50	1054	36
51-100	1417	128

If no further works on the frontage are carried out, over the next 100 years a total of **3019** residential and commercial properties are at risk from erosion.



Other amenities at risk from erosion	Year	Description
Tourism Amenity	From Year 0	If beach levels continue to lower and promenades fail, tourist visitor numbers are likely to reduce.
Road along frontage: Marine Parade East/Kings Parade	From Year 5	Damage to this road would require diversion along the B1032. At Year 35 the B1032/Kings Parade roundabout is at risk from erosion and would require a new section of road to be built.
Anglian Water Assets	From Year 5	Anglian Water assets that serve the wider Clacton area are situated along the frontage and would need to be re-routed if this area was eroded.

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Options 2 and 3: Rock groynes and beach recharge

Rock Groynes: Alongside beach nourishment, rock groynes will be needed to **hold the beach material and limit movement** of the material along the shore by wave action.

The exact spacing and dimensions will be refined during the detailed design phase.

Type of Rock Groynes: These two options differ in the type of rock groyne used. The shape of the rock groyne will influence the coastal processes and each one has its own advantages:

Straight: This is a less expensive option and has been more widely used therefore we have more detailed knowledge of how they work.

Fishtail: These groynes narrow the gap for offshore transport and increase wave diffraction at the ends potentially increasing deposition. In addition the spacing between the groynes is greater and therefore fewer structures are likely to be required.

Recently Recharged Beach at Felixstowe

Beach Recharge: The **low levels** of beaches along the frontage is a key issue. There is **little sediment supply** from erosion of cliffs which are now all protected by coastal defences. Therefore beach recharge will be needed to input more sediment into the system.

There are two types of beaches along the frontage: **sand beaches** in section B1 and **shingle beaches** in section B2 to C2. The recharge material will match what material is already there to avoid changing the environment as much as possible.

Although beach recharge will require some additional recharge in the future, it has the advantage of **improving the amenity** of the frontage as well as providing **defence against erosion** of the sea wall/promenade.

The beach would be recharged to just below the level of the promenade (0.5-1m).

Option 2: Straight Rock Groynes and Beach Recharge

Straight rock groynes at Felixstowe

Fishtail rock groynes at Jaywick

Option 3: Fishtail Rock Groynes and Beach Recharge

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Options 4 and 5: Combination schemes

Combination of rock groynes:

The advantage of using a combination of fishtail and straight rock groynes is that the shape of groyne which bests suits the beach material can be used. It is less likely that the fishtail groynes will work as effectively in the shingle recharge section as the material is coarser and therefore less likely to be held in suspension. However they are much more suited to **sand** which is a **finer material** and **refraction** around the ends of the fishtail groynes should encourage **deposition**.

Rock Revetment:

A rock revetment **protects and supports** the sea wall behind by using large rock boulders to **reduced the energy** of the approaching waves and therefore reduces the erosion.

The advantage of a rock revetment along this section is that it provides an opportunity to **widen the promenade** to create areas for **regeneration** initiatives. However, this would **limit any area for a beach** even at low tide and it is likely over time no beach would be present in this area.

Option 4: Straight Rock Groynes, Fishtail Rock Groynes and Beach Recharge

Option 5: Straight Rock Groynes, Fishtail Rock Groynes, Rock Revetment and Beach Recharge

Rock revetment at Felixstowe

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