Hard Engineering: Lyme Regis

By The British Geographer

Situation

Lyme Regis, with a population of 4400 is located in the centre of the Heritage Jurassic Coast in Dorset, South England. It is exposed to the southwesterly waves of the Atlantic and the stormy conditions of the English Channel.

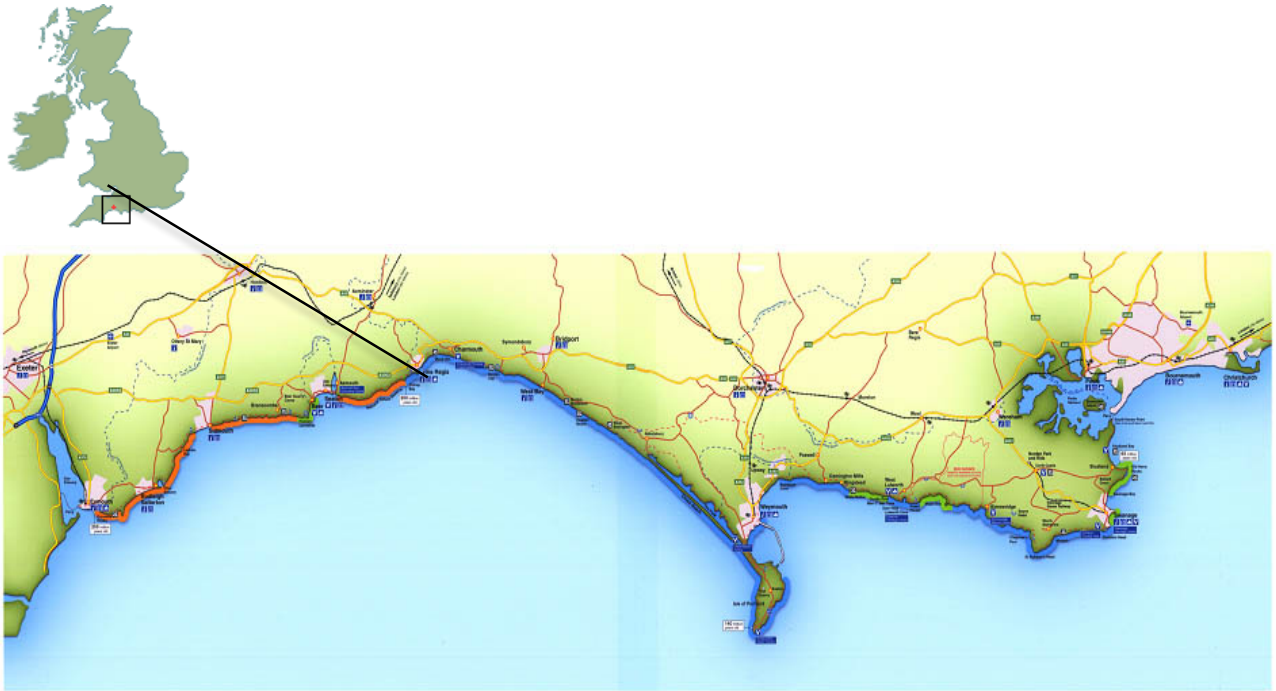

Figure 1

Lyme Regis stands upon some of the most unstable cliffs in the UK. There are a number of factors contributing to this instability. Figure 2 describes them. The rock deep below the town is solid shale and limestone (1); this bedrock is stable. However, above this stable rock lie slippery clays and green sand (2); these are unstable. These clays and sands are prone to landslides over the limestone. In addition, the bedding planes of the shale and limestone slope downward to the sea, further encouraging mass movements (3). The sea erodes these landslides from the beach and also undermines the base of the cliff. This removes a layer of support from the cliff, which further encourages mass movements.

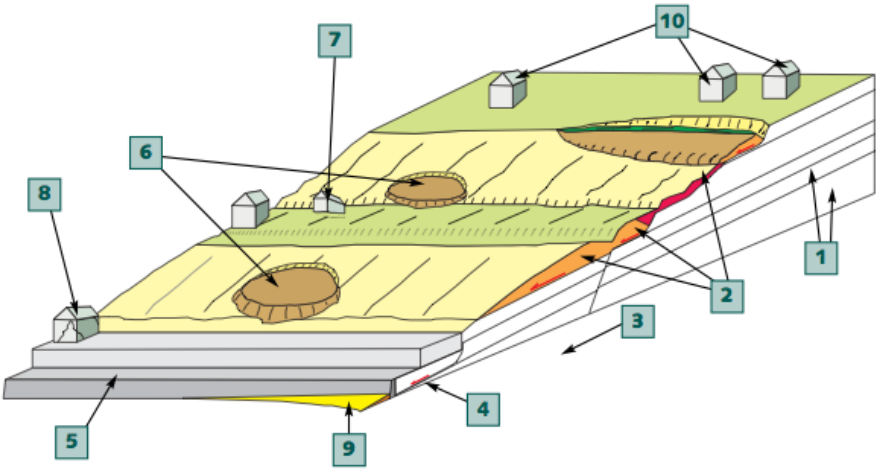

Figure 2

Physical Evidence of the Problems

Lyme Regis suffers frequent landslides and slippages. Evidence of which can be seen in the photos below:

Buildings have subsided

Windows and doors at an angle

Landslide

Leaning gravestones

Figure 3

Hard Engineering

Lyme Regis is an important tourist town. Tourism is Dorset's predominant industry, providing over 38,000 jobs in the county and generating a total annual income of over £830 million. The coastal zone is undoubtedly one of the principal attractions. The coastal zone attracts in the region of 16.5 million visitors each year, with approximately 1 million that come from overseas - a growth of 17% since 1989. Lyme Regis is an important coastal attraction located in the centre of The Jurassic Coast. The Jurassic Coast is a natural World Heritage Site and is internationally important for its rocks, fossils and coastal landforms.

For both economic and environmental reasons it is important to invest in protecting the town from future landslide events. With World Heritage Site status it is important that any defenses are sympathetic to the environmental needs of the coast, but at the same limit human interference with natural processes that supply the fossils.

The Phased Approach

A phased approach was adopted for Lyme Regis, which would allow for budget allocation to be spread out as well as limiting the disruption to the tourist seasons. Figure 4, shows the phased approach:

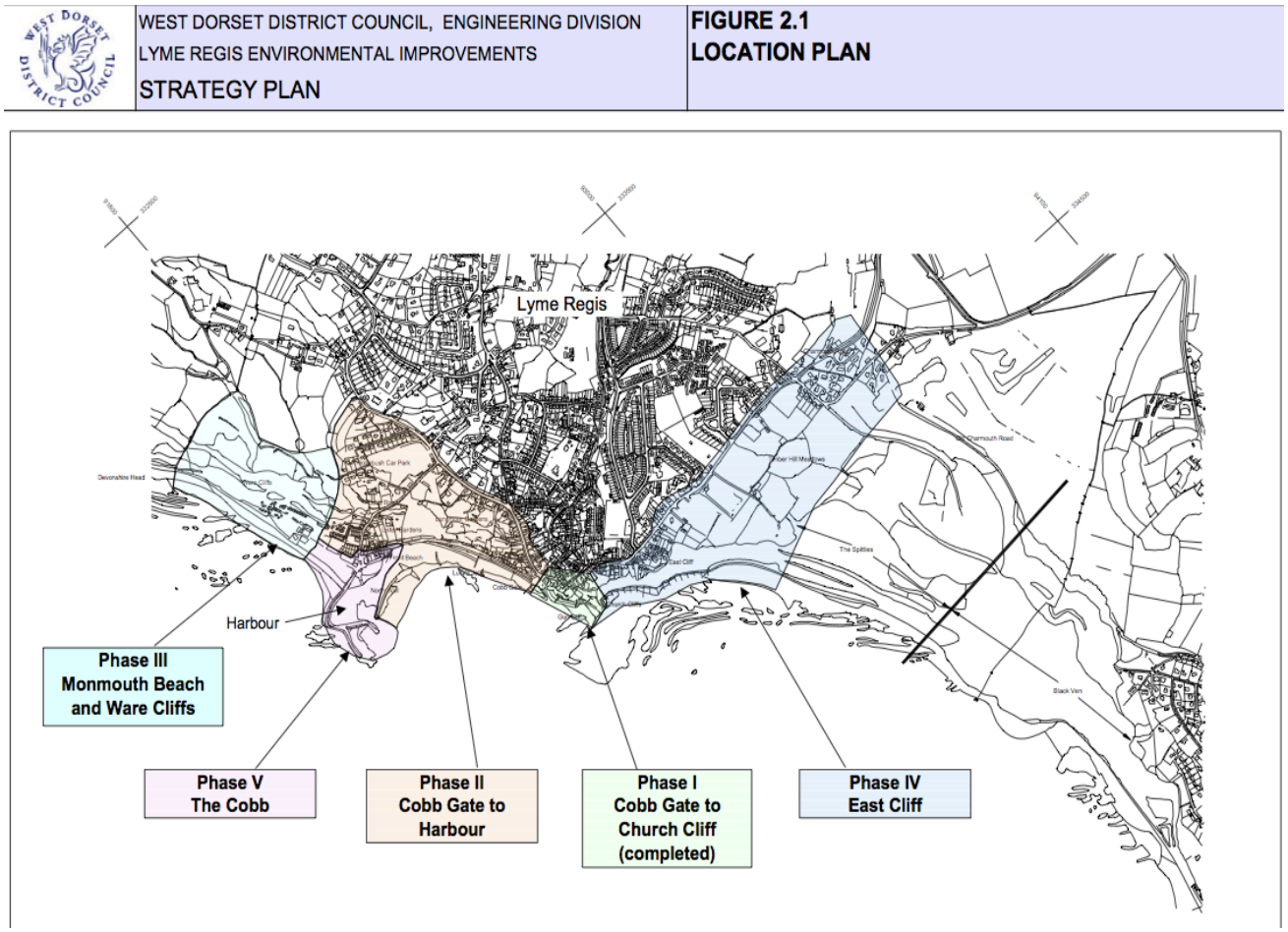

Figure 4

The Lyme Regis Coast Protection Scheme was initiated by West Dorset District Council in the early 1990s. It aims to provide long-term coast protection for the town and to reduce damage and disruption caused by landslides, through a long-term programme of engineering works

Phase I of the scheme, which includes a new sea wall and promenade next to the mouth of the River Lim, was completed in 1995. It was awarded the Secretary of State's Special Commendation for Environmental Excellence at the British Construction Industry awards. The works also won a 1997 Civic Trust Award for Outstanding Contribution to the Quality and Appearance of the Environment and helped the district council gain beacon status in 2004. As part of the scheme a multipurpose promenade was built. This promenade is illustrated in figure 5 below. It shows, the sea wall with rock armour apron to prevent it being undermined. In addition, within its cavity it holds space for vital services. In the final design new sewage drainage and large public waste units were integrated. In this way they gained a useful economy of scale.

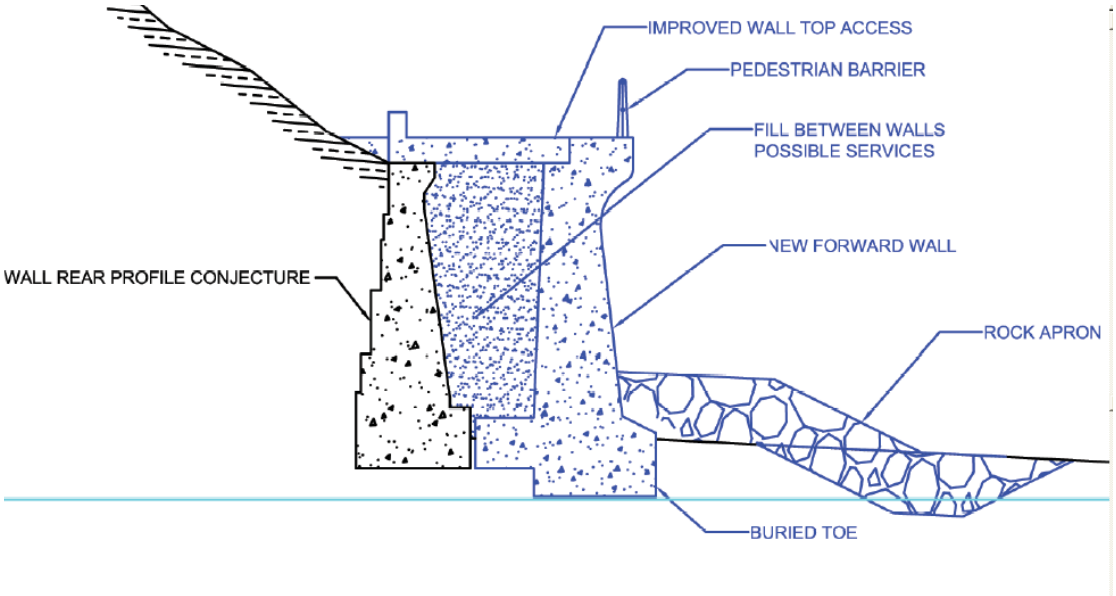

Figure 5

Phase II was completed in 2007 to protect the area from Cobb Gate to the harbour from landslides and coastal erosion. The details of which can be seen in Figure 6:

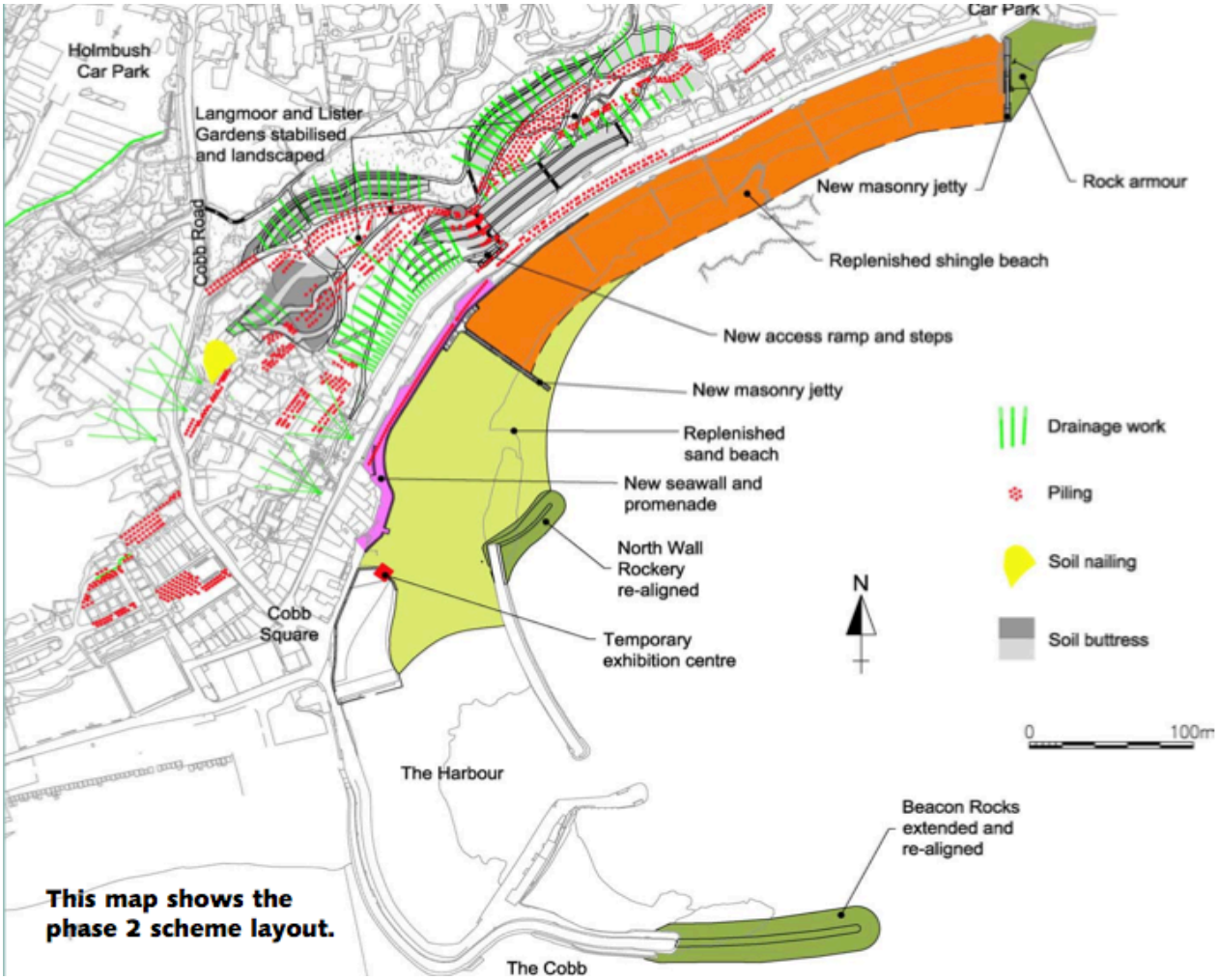

Figure 6

As part of phase II, the following shopping list was required.

Shopping list

Rock armour	36,000 tonnes
Beach shingle	71,000 tonnes
Beach sand	41,000 tonnes
Drainage material	7,500 tonnes
Masonry	400 tonnes
Piles	1,150
Drainage	2,300 metres
Jetties	110 metres
New seawall	250 metres
Planting	7,500 square metres

The final option was made up of three main parts:

1. Stabilising the land behind the beach by fixing unstable slipped land to firmer rocks below.
2. Protecting the foreshore from attack from the sea with a new sea wall and an extended offshore barrier.
3. Replenishing the two areas of the beach with sand and shingle.

1. Stabilising the land

Access to the sea front had to be improved. Cobb Road, which was slipping down the hill, was stabilised, strengthened and widened. The land behind the beach was stabilised to prevent landslides, with over 1,000 deep- bored pins fixing it to the more stable shale and limestone below. New drainage systems were put into the reshaped parkland.

2.Protecting the foreshore

The old rock armour called Beacon Rocks at the end of the Cobb was extended with the use of giant boulders (each weighing 18 tonnes) of a resistant igneous rock from Norway. The main aim was to protect the foreshore from the sea and stop the new sandy beach being washed away. The new sea wall and two new jetties would protect the promenade and also stop the beach from being washed away by longshore drift.

3. Replenishing the Beach

The new sand and shingle beaches have been restocked with material brought from France. The new beach also acts as protection for the new promenade. There are two types of beach. A sandy beach for tourism needs at the Cobb end and a shingle beach toward at the eastern end (orange on map).

Figure 7 shows a full summary of all the works and their design elements. The key benefits and costs are summarized in table 1.

	ECONOMIC Advantage	Disadvantage	SOCIAL Advantage	Disadvantage	ENVIRONMENTAL Advantage	Disadvantage
Hard engineering	In the long term businesses will be protected.	Very expensive	In the long term houses will be protected.	Likely to create short-term problems of lack of access during construction	May improve the visual quality of the coastal zone	May lead to problems elsewhere where there may be no protection
Soft engineering	Local businesses will benefit if more tourists use the new beach	Expensive	Creates better beaches for tourists to use	Some people may not like the changed visual appearance	Improves visual quality of beaches	Another area may be affected by the loss of sand and shingle
Managed retreat	Long-term investment may help future generations	Expensive in the short term	Long-term investment may help future generations	Present generations will not benefit	New natural environments may be created	May create visual problems of an unmanaged coast
Do nothing	Costs nothing	Expensive to pay for new homes and businesses if they are damaged	There are no advantages	Will lead to continued problems; people may lose their homes and businesses	New natural environments may be created	Will create visual problems of an unmanaged coast
Prevent and discourage	Cheap option	Expensive to pay for new homes and businesses if they are damaged	There are no advantages	Will lead to continued problems; people may lose their homes and businesses	New natural environments may be created	Will create visual problems of an unmanaged coast

Table 1