

Storm damage and coastal protection

Alan Holiday

A case study of Chesil Cove

Last winter's storms repeatedly battered the Dorset coast. In this photo-essay Alan Holiday examines how the coastal defences at Chesil held up

Storm damage along the Dorset coast is not new. Hurricane-force winds famously battered the coast in 1824 and more recently, in the autumn and winter of 1978–79, there were two serious storm events. These caused considerable damage and led to a major coast protection scheme that was completed in 1988 (see Further research).

Chesil Beach is a barrier beach and **tombolo** (a beach which links an island to the mainland, Figure 1). The beach rises to around 14 m above sea level at the Portland end and gradually reduces in height northwestwards towards West Bay. It is made of shingle which varies in size from pea grit (0.5–1 cm diameter) at West Bay to cobbles (>6 cm diameter) at Portland. The beach is a fossil feature and there is no new source of shingle feeding it. This means that any permanent loss of shingle is a significant problem, particularly since the

beach is a critical part of coastal protection in south Dorset.

Beach protection at Chesil

The coastal protection scheme built in the 1980s (Photograph 1) included:

- protecting the crest of the southeast end of Chesil Beach with gabions and a gabion mattress (steel cages filled with stone)
- improving the sea wall along Chesil Cove
- providing a storm drain to remove flood water that overtopped the beach or percolated through it

Prior to the protection work the only road from Portland to the mainland was frequently flooded. This road was raised and the drainage improved to reduce flood risk.

GeographyReviewExtras

A document containing live links to all the websites in this issue can be downloaded from GeographyReviewExtras (see back page).

In combination these measures proved effective over the last 25 years, until the storms of last winter.

Extreme storm events in January and February 2014 took their toll on Chesil beach (Photographs 2 and 3) and despite the efforts of the Environment Agency the beach was over-topped. This led to flooding and some damage to property but it was not nearly as severe as the events in November 1978 and February 1979.

What caused the recent storms?

In January and February 2014 the jet stream was particularly vigorous, and was also

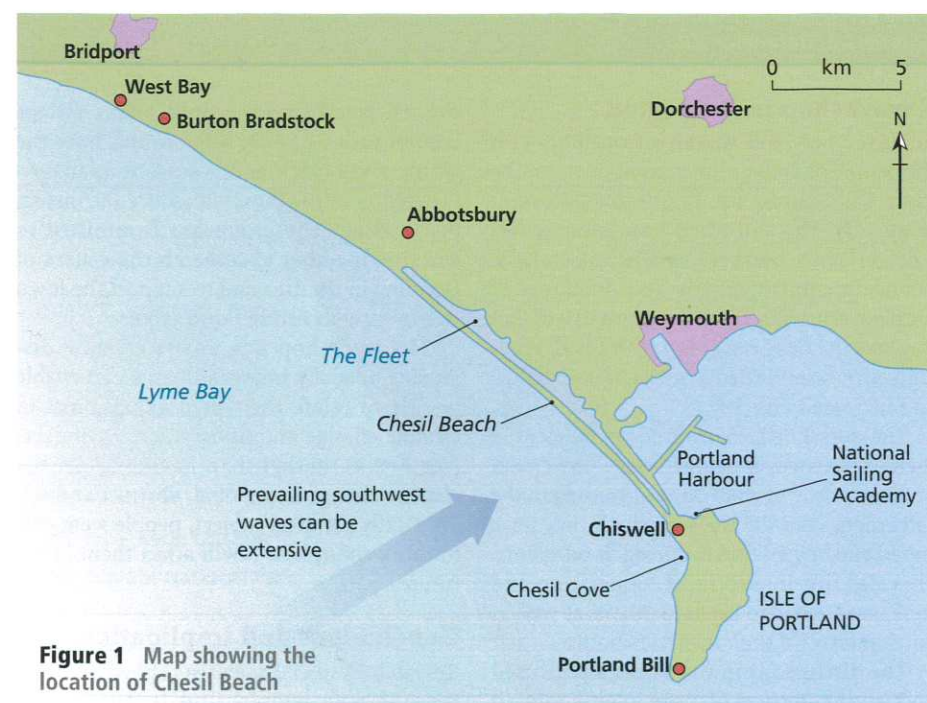


Figure 1 Map showing the location of Chesil Beach

Further research

Case study of the Chesil defence scheme completed in 1988:
www.tinyurl.com/qgd4rqc

GEOGRAPHY REVIEW article on the same scheme: Frampton, S. (1997) 'Managing the Wessex Coast: The Chesil sea defence scheme', GEOGRAPHY REVIEW Vol. 10, No. 4, pp. 8–10.

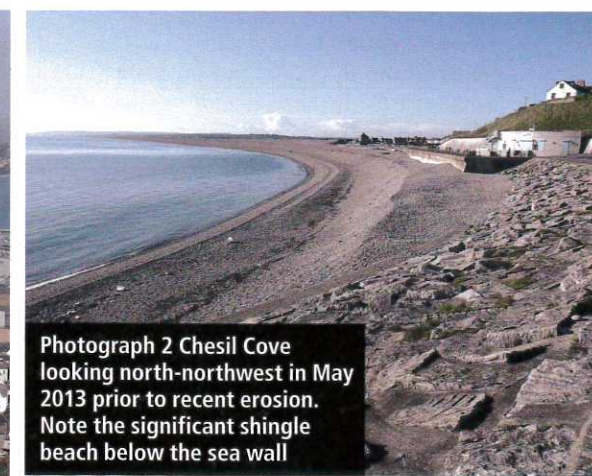
Short Met Office article explaining the jet stream: www.tinyurl.com/oqomple

Spectacular video footage of waves hitting Chesil Beach, 5 February 2014:
<http://youtu.be/rRYbDtqusX4>

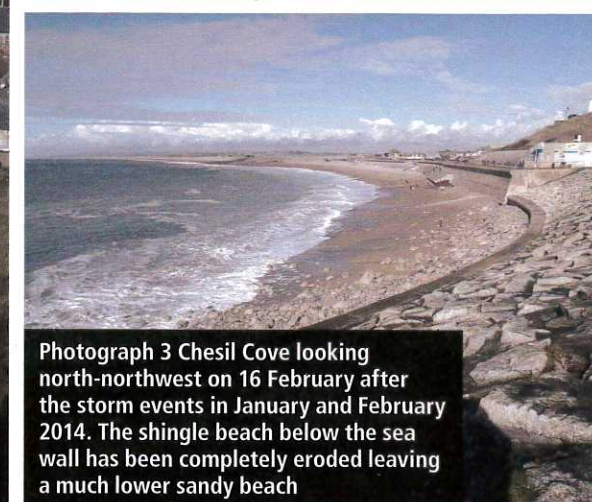
Further information from Southampton University about Chesil Beach and the background to the issues in this article:
www.tinyurl.com/pbr9oo4



Photograph 1 Annotated photo of southern end of Chesil Beach showing the features mentioned in the text



Photograph 2 Chesil Cove looking north-northwest in May 2013 prior to recent erosion. Note the significant shingle beach below the sea wall



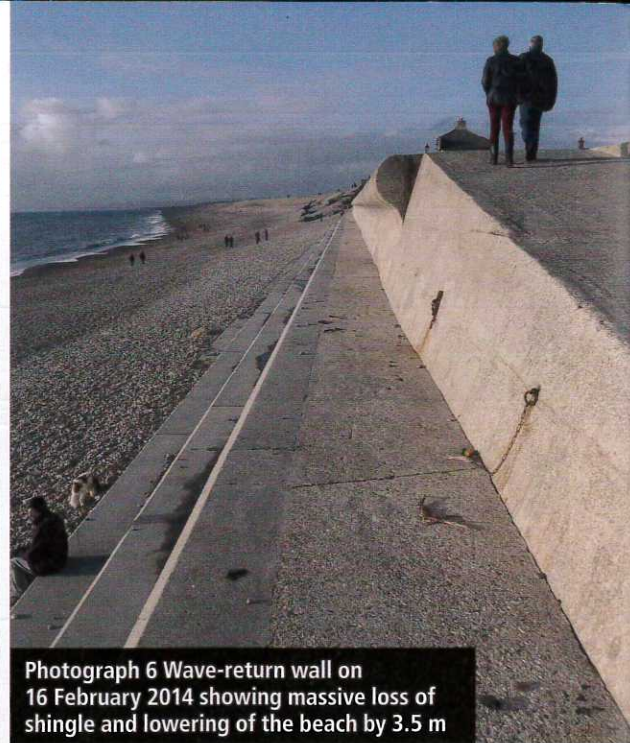
Photograph 3 Chesil Cove looking north-northwest on 16 February 2014 after the storm events in January and February 2014. The shingle beach below the sea wall has been completely eroded leaving a much lower sandy beach



Photograph 4 View from above Quiddles Café on 15 February 2014. Large plunging waves such as these were common throughout the winter and caused significant erosion of the shingle beach (photo: Mark Godden)



Photograph 5 Wave-return wall and beach near the Cove Inn on 3 February 2014 showing limited shingle loss



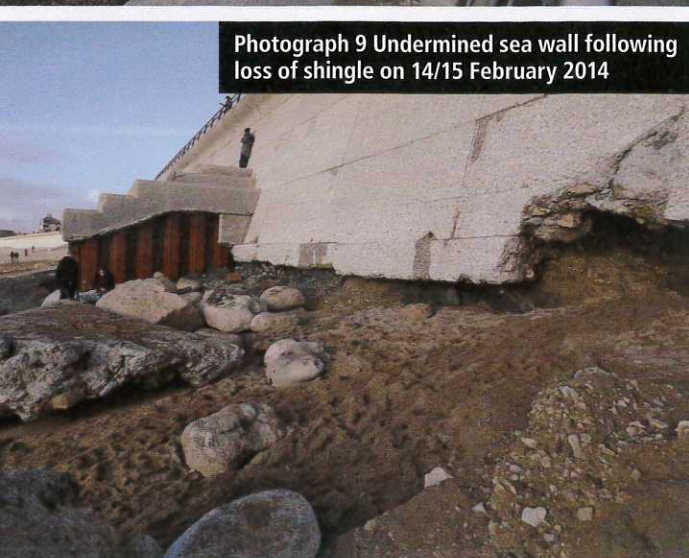
Photograph 6 Wave-return wall on 16 February 2014 showing massive loss of shingle and lowering of the beach by 3.5 m



Photograph 7 Evidence of beach lowering, looking northwest on 3 February 2014



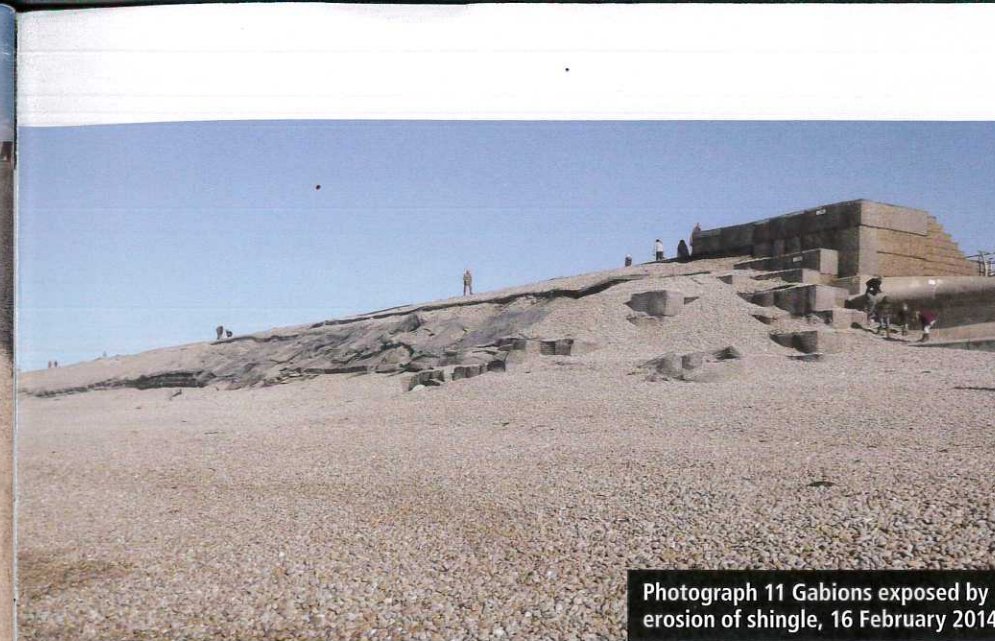
Photograph 8 Evidence of beach lowering on 16 February 2014 after storms on 5 and 14/15 February. Massive erosion of shingle from the beach has exposed several more concrete steps below the sea wall. Large parts of the beach have been stripped back to a sand cover



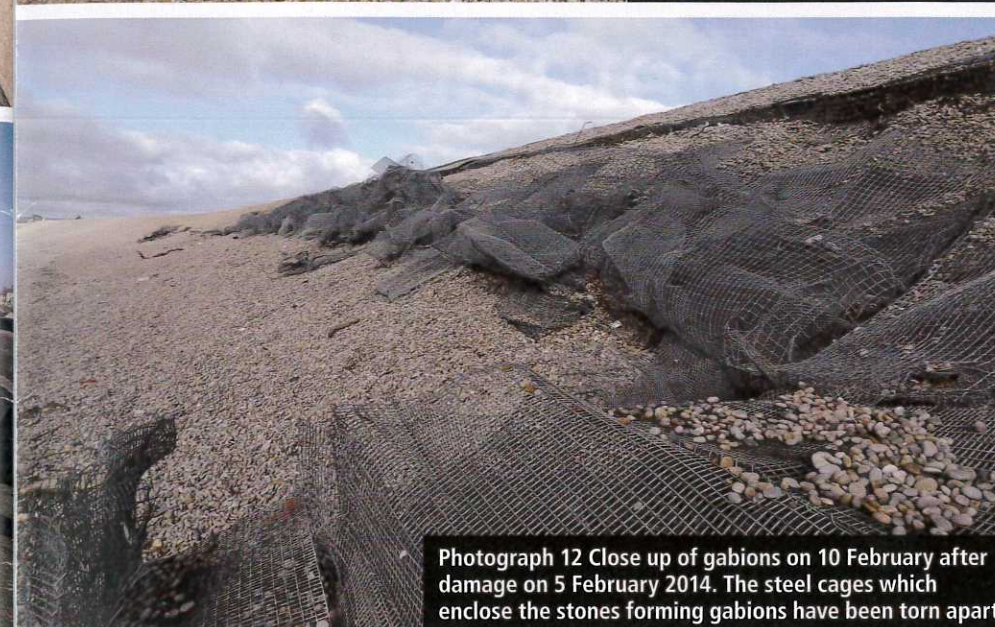
Photograph 9 Undermined sea wall following loss of shingle on 14/15 February 2014



Photograph 10 Environment Agency staff building up the beach profile to protect Chiswell and Victoria Square 3 February 2014



Photograph 11 Gabions exposed by erosion of shingle, 16 February 2014



Photograph 12 Close up of gabions on 10 February after damage on 5 February 2014. The steel cages which enclose the stones forming gabions have been torn apart



Photograph 13 Digger driving new steel piling into the beach as part of the repairs to the sea wall

positioned unusually far south over southern England (see Further research and this issue's Centre piece on pp. 20–21). It produced a series of deep depressions which brought strong winds and heavy rain to the Dorset coast. The high winds resulted in a prolonged period of destructive plunging wave activity (Photograph 4 and the YouTube link in Further research) which had significant impacts on the shingle beach.

Storm damage at Chesil

The constant pounding of storm waves, especially on 5 and 14/15 February 2014, moved shingle from Chesil Beach offshore, reducing the ability of the beach to absorb the energy of the waves and act as a natural means of coastal protection (Photographs 5–8). Erosion was so severe that the shingle was completely removed in Chesil Cove and the Kimmeridge clay bedrock was exposed. This is very unusual and last occurred in 1989.

■ The sea wall was found to have been undermined although it is not clear if this was due to the storm on 14/15 February or a historic event re-exposed (Photograph 9).

■ Over a period of around 6 weeks the beach was lowered by 3.5 metres as depression after depression affected the coast. During brief respites storm ridges built up and this material was used by the Environment Agency to re-grade the beach profile and to provide some protection (Photograph 10).

■ During the storm on 5 February the gabions by the Cove Inn were damaged as the shingle protection was removed. The gabion mattress protecting the beach crest was also slightly damaged (Photographs 11–12). The storm was so severe that waves broke over the top of the Cove Inn on the Esplanade in Chesil Cove (see the YouTube video in Further reading).

One of the major impacts of these events was the risk of closure of the only road (A354) linking the Isle of Portland to the mainland at Weymouth. Portland has a population of over 12,000 and many of its inhabitants work on the mainland, in Weymouth or further afield. There are many businesses in the area behind Chesil Beach, as well as the National Sailing Academy, so any closure has a significant economic impact.

Following the February storms the sea wall was strengthened with new sheet piling to protect the part which had been undermined (Photograph 13). While this was taking place some rock armour (Portland limestone) was placed on the beach to provide extra protection and absorb some of the wave energy.

Alan Holiday is a retired teacher who lives in Weymouth.