

COASTAL PROTECTION AT WEST BAY

ROCKWATCH FIELD TRIP SERIES

ALAN HOLIDAY

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BACKGROUND GEOLOGY

West Bay is a small harbour town situated in West Dorset, England. It's part of the UNESCO World Heritage Site, the Jurassic Coast, famed for its limestone formations and fossils.

The rock succession at West Bay consists of Lower Jurassic Bridport Sand forming East Cliff and Middle Jurassic Frome Clay and Forest Marble forming most of West Cliff (Watton).

A major fault brings the Middle Jurassic down to be next to the older Lower Jurassic rocks.

Question:

• What is Forest Marble?



VIEWS OF THE CLIFFS - EAST CLIFF...





...AND WEST CLIFF





IN BETWEEN IS LOW LYING LAND WITH THE VALLEY OF THE RIVER BRIT AND WEST BAY INCLUDING THE HARBOUR





WEST BAY HAS BEEN PRONE TO FLOODING

The controlling factors are:

- I. The coast is aligned NW/SE and so faces the prevailing south westerly winds often associated with occasional storm conditions.
- 2. The land in the valley of the River Brit is very low lying, much of it less than 5 metres above sea level.
- 3. Large waves can break on the coast due to the very long fetch to the nearest land in South America, 7,200 km away.

Questions:

- What is a fetch?
- Can you find out what is the nearest land in South America?

RECKWAYCHT IN THE PAST THE COAST VIEW LOOKED LIKE THIS

Before 2004 the harbour breakwaters pointed South West and storm waves could easily enter the harbour.

Question:

• What do you think the solution was?



THE BREAKWATERS WERE REALIGNED TO A MORE SOUTHERLY DIRECTION







THE BEACH IS A NATURAL COASTAL DEFENCE

The beach between the harbour and East Cliff is the far North West end of Chesil Beach and is a valuable protection for the low lying area behind the beach which includes many commercial outlets related to tourism.

This required regular maintenance by the Environment Agency.

This picture was taken in February 2014 after a series of major storms.



DESPITE THESE MEASURES FLOODING STILL OCCURRED



Environment Agency picture of flooding on the promenade on west side of the harbour including holiday properties.



DAMAGE RESULTING FROM STORM IN FEBRUARY 2014



Waves breaking on the sea wall washed beach shingle onto the promenade west of the harbour.



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IN 2019 A MAJOR SCHEME TO PROTECT WEST BAY FROM STORM EVENTS WAS CONSTRUCTED AT A COST OF £9 MILLION

A rock core was constructed in the beach east of the harbour wrapped in geotextile so water could not flow through the beach.

Question:

What is geotextile and how does this help with coastal protection?



ROCK WAS IMPORTED FROM THE WEST OF SCOTLAND





Grano-diorite from Glensanda.

Barge delivering rock to the beach from the bulk carrier offshore.

THE BEACH WAS RETURNED TO ITS ORIGINAL STATE!



Later the rock core was covered with beach shingle so it can't be seen.



ON THE WEST SIDE OF THE HARBOUR ROCK GROYNES WERE CONSTRUCTED



The rock groynes protect the beach from some of the effects of storm events.



BEACH SHINGLE WAS IMPORTED





ON THE LANDWARD SIDE OF THE PROMENADE A FLOOD WALL WAS BUILT





IN AUGUST 2020 THERE WERE TWO NAMED STORMS ELLEN AND FRANCIS



The beach was eroded but the rock core remains intact. The beach shingle was washed offshore but it is likely to be returned by wave action.



QUESTION:

Can you remember all of the different types of coastal defenses at West Bay?



ANSWER TO QUESTIONS

- Forest Marble and this is a shelly limestone that can be cut and polished and so the quarrymen called it a marble but that is not the case as a geologist. A geologist calls it a marble when it has been affected by metamorphism and becomes crystalline due to heat or pressure. Another example is Purbeck Marble which is also a shelly limestone that can be cut and polished and is used as an ornamental stone.
- The fetch is the distance over which wind can blow to generate waves.
- The nearest land in South America from West Bay is Guyana and Surinam between Venezuela and Brazil.
- The solution to help prevent storm waters from entering the harbour was to the realign the harbour breakwaters to a more Southerly direction.
- Geotextiles are special fabrics used to line the ground which is then covered with soil, sand or rocks. Geotextiles help with coastal defences because they separate, filter, reinforce and protect the materials used to strengthen coastal areas, and as they are permeable they allow water to drain away.
- Types of coastal defences at West Bay: the beach, rocks, breakwaters, geotextiles, stone groynes, beach shingle, and storm wall.



ABOUT THE AUTHOR ALAN HOLIDAY

Professionally, Alan Holiday was a geography and geology teacher in the Weymouth area for many years and also had a year in the oil industry as a mud logger.

Alan enjoys an active role in local geological groups and is a regular Rockwatch Field Trip Ambassador, including our Annual Residential to Dorset.

His favourite fossil type is a trilobite. This example of Wenlock Limestone has a trilobite pygidium, collected at Ironbridge when Alan was a child.







CREDITS

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