ROCKWATCH

COASTAL PROTECTION AT SWANAGE

ROCKWATCH FIELD TRIP SERIES

ALAN HOLIDAY

BACKGROUND GEOLOGY

Swanage is a small seaside town situated in the south east of Dorset, England.

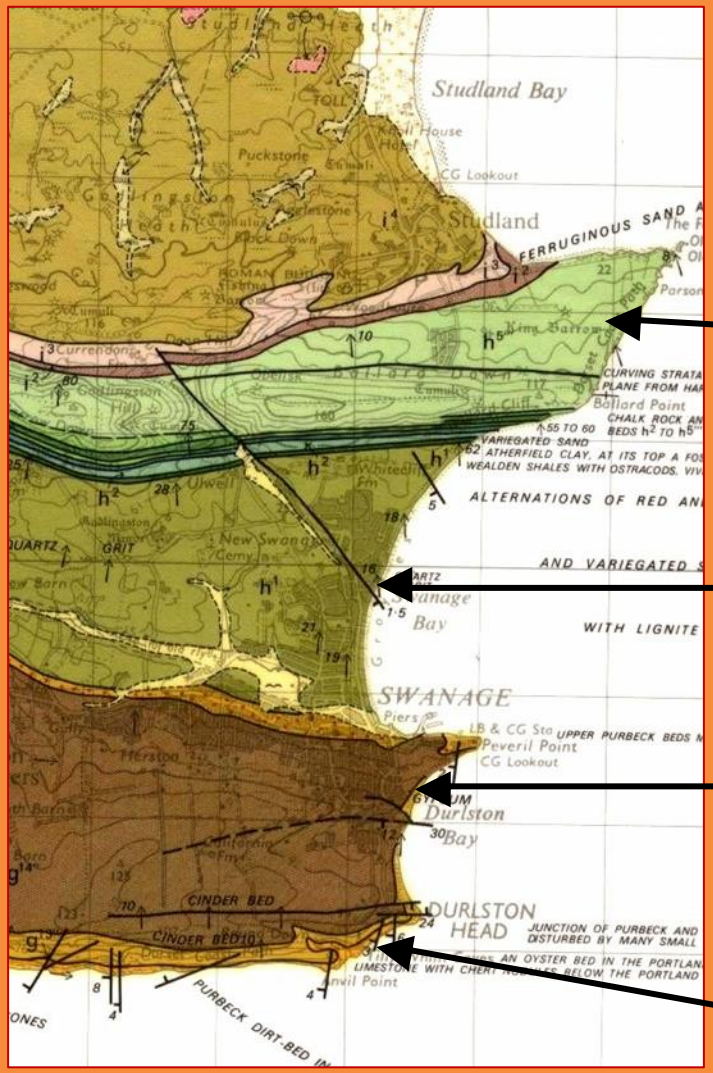
It's part of the UNESCO World Heritage Site, the Jurassic Coast, famed for its limestone formations and fossils.

The rock succession at Swanage is made up of the younger part of the Mesozoic, late Jurassic and Cretaceous (140 – 65 million years old).

The strata dip to the north.

Portland Limestone is exposed at Durlston Head with Purbeck Beds in Durlston Bay, Wealden Beds and Lower Greensand, Gault Clay and Upper Greensand in Swanage Bay with the Chalk forming Ballard Down to the north.

BACKGROUND GEOLOGY IN MAP FORM



This map extract is part of a BGS map showing the area's rock succession.

Chalk

Wealden Beds

Purbeck Beds

Portland Limestone

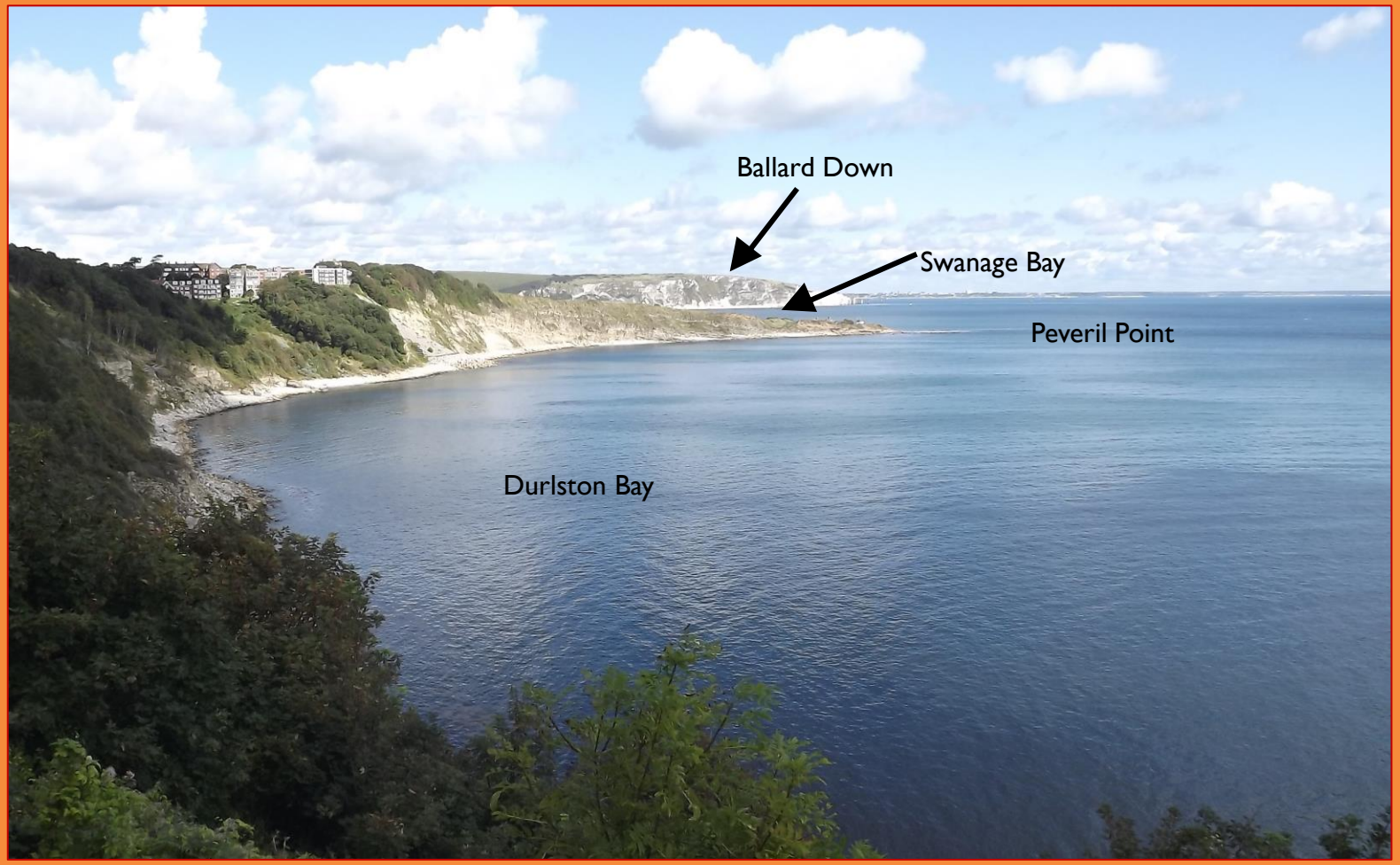
WHAT DO YOU NOTICE ABOUT THE COASTLINE?

The coastline is described as a **headland and bay coastline**.

Why do you think this occurs?

The rocks exposed along the coastline have different strengths, some are stronger, relatively harder and more resistant to erosion, and some are weaker, relatively softer and are more easily eroded.

VIEW LOOKING NORTH FROM DURLSTON HEAD



AERIAL VIEW OF BALLARD DOWN FROM THE NORTH EAST

The Chalk is relatively harder so forming a headland with the Old Harry Rocks in the foreground.

EROSION OF THE COASTLINE OCCURS IN VARIOUS WAYS

The controlling factors are:

1. The geology
2. Gravity
3. The presence of water
4. Wave attack by the sea

On the coast, erosion by the waves cause steep cliffs which slump down through gravity and especially in the winter when it is wet.

LANDSLIDE IN SWANAGE BAY IN 2013

The landslide occurred due to wet winter conditions and specifically due to the geology, gravity and presence of water. The sea was not the cause due to the presence of a sea wall.

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DIFFERENT PROBLEMS OF EROSION

This section of coast shows different approaches to the problem of erosion.

Durlston Bay, for instance, is being eroded by wave action and mass-movement (or landslides).

In coastal management this is an area of *no active intervention* to a large extent as it is part of the Jurassic Coast World Heritage Site.

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ONE EXCEPTION!

This is the site of a major landslip in 1984 and hard engineering was put in place in 1989 to protect the apartment block on the cliff top.

However, this is an eyesore and probably wouldn't have got planning permission after the World Heritage status was gained in 2001.

ANOTHER EXAMPLE OF EROSION IN DURLSTON BAY

As a result of a wet winter in 2000-2001 there was a major landslide south of the one seen in the previous slide. Housing was marginally less at risk but gardens were lost.

IN SWANAGE BAY A SEA WALL PROTECTS THE TOWN

This is an example of 'hold the line' in terms of coastal protection, when property has great value.

FURTHER NORTH THERE ARE MORE PROBLEMS

Here the cliff face is higher and the weak Wealden Bed, consisting of sandstone and clay are more liable to be affected by landslides.

You can see remains of earlier attempts to protect the cliffs.

THE PINES HOTEL LANDSLIDE

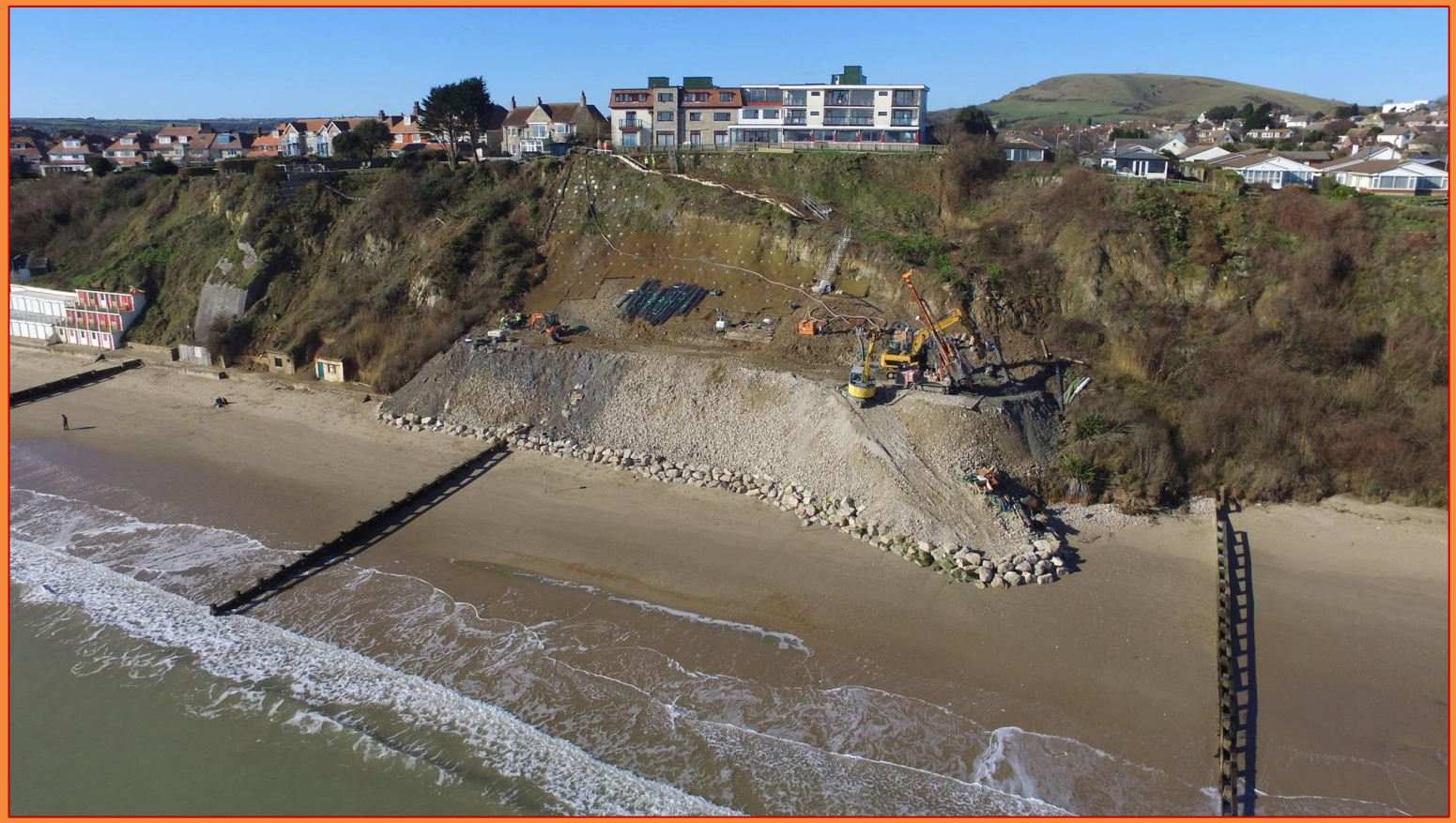
This picture was taken in December 2013 following a major landslide below the Pines Hotel.

Why are there pipes?

The pipes are there to drain the ground because water makes landslides more likely.

OVER A MILLION POUNDS HAS BEEN SPENT PROTECTING THE PINES HOTEL

This involved drainage, building a supporting wall, rock bolts and soil nails to hold the cliff together.



This picture was taken during the construction work to protect the hotel in February 2016.

FURTHER NORTH IN SWANAGE BAY…

No property is at risk so there is little coastal protection

GEOLOGY IS STILL VISIBLE

Evidence of cross-bedding with ripple structures formed on the river bed.

Cross-bedding, due to changes in direction of flow and partial erosion of earlier set by later event.

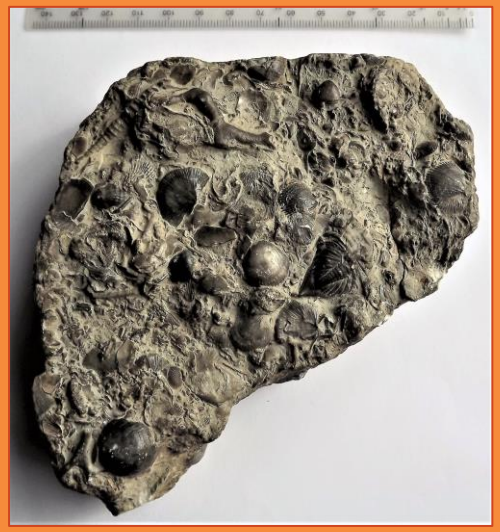
The Wealden Beds and the Greensand are well exposed further north in Swanage Bay and there is much of interest with careful observation for geologists to explore.

ABOUT THE AUTHOR ALAN HOLIDAY

Professionally, Alan Holiday was a geography and geology teacher in the Weymouth area for 37 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 about 45 years ago.



CREDITS

British Geological Survey (slide 3)

All other photos have been taken by the author

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