

Feature Spotting at Freshwater!

Welcome to Freshwater...

Freshwater Bay is a small cove on the south coast of the Isle of Wight. You are going to be finding out about:

- ✓ The **physical geography** of Freshwater Bay: headlands and bays, and the formation of caves, arches and stacks
- ✓ **Human geography** of Freshwater Bay: the need for coastal management.

For starters...

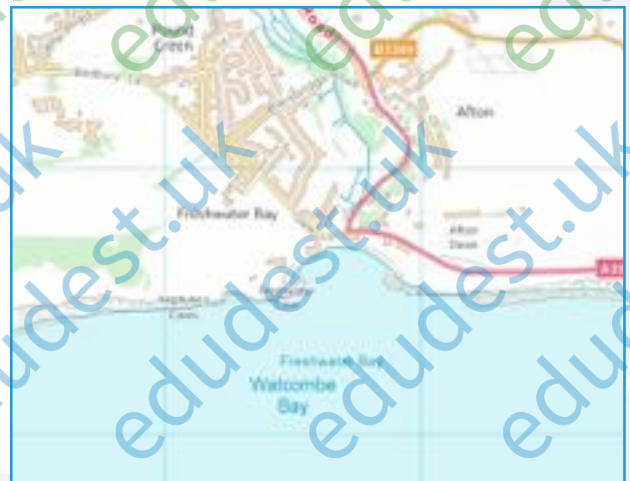
Study the images below, which show different views of Freshwater Bay, and an OS map extract. Label each image to indicate the main physical and human features of the Bay.

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Forming Freshwater

The formation of bays and headlands is linked to geology and, put simply, to the differences in the resistance of rocks to erosion. Often, bays form where a band of less resistant rock lies between bands of more resistant rock, as shown in the diagram below:



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Freshwater Bay is a little more complicated though.

It is a small low-lying semi-circular bay or cove, which is surrounded by *high chalk cliffs* forming *resistant headlands*. It is likely that a combination of coastal erosion and fluvial (river) erosion have led to the development of this bay.

Activity: Processes of coastal erosion act on the chalk cliffs. Match up the following sentences to explain the processes:

Hydraulic action

Fragments of eroded material are thrown against the cliffs by waves, causing it to be worn down/bits to be broken off.

Abrasion (corrosion)

Certain types of rock (especially chalk and limestone) can be dissolved by water.

Corrosion (solution)

The load carried in the water is knocked together and gradually broken down into smaller pieces.

Attrition

The force of the water as it hits the cliffs and forces air into cracks.

Which processes do you think have been most significant in the creation of the bay?

So, at Freshwater Bay, weaknesses in the chalk that extends along this stretch of coast have been exploited by the sea and erosion over a very long period of time has created a bay. However, as mentioned before, the river here also has something to do with it...



Question: Study the map – what do you notice about the (western) River Yar?

There are only 3 main rivers on the Isle of Wight and the western Yar is one of them. At only 3km long, it almost cuts the Island in two at the western end, running from just inland of Freshwater Bay, to its mouth at Yarmouth on the other side.

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It has contributed to the present-day character of Freshwater Bay by cutting its own valley into the rock. However, coastal erosion at the headwaters has truncated (cut short) the river and coastal defences at Freshwater (the sea wall) have stopped water flowing into the river, and it is now a small river at the Freshwater end, with a large estuary at the mouth in Yarmouth.

A stack story...

You will also notice the stacks, off the headland to the east end of the bay. Headlands are exposed to the full force of erosion by the sea. Erosion attacks and widens **cracks** in the rock to form small **caves**. These caves would gradually enlarge and cut all the way through to the other side of the headland to form an **arch**. Over time, the roof of the arch becomes weaker and weaker and eventually collapses, and all that is left is an isolated pillar of rock – a **stack**!

Stag Rock is the stack to the right, and Mermaid Rock lies to the left. Between them, at low tide, you can see the two 'platforms' of an arch (Arch Rock) which collapsed in October 1992. At very low tide, a wave-cut-platform can also be seen at the base of the chalk cliffs/stacks.



Activity: Find a good location to sit.

On a blank piece of paper draw a field sketch of the bay, and annotate it to summarise all that you have learnt about the physical geography.

A Risky Location!

This location is highly vulnerable to the prevailing south-west winds. The waves can be extremely powerful and storms regularly throw shingle up onto the promenade. The low-lying river valley behind the bay is at risk of coastal flooding.

Activity: Looking around you, what existing coastal defences can you identify, and how do you think they are aiming to protect Freshwater Bay from erosion and flooding? The photos will help you...



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Examining the need for protection

Study the table below, which shows the likely erosion rates as well as the anticipated erosion and flooding damages that would occur if no protection was in place.

Criteria	0-20 years	20-50 years	50-100 years
Erosion rates (m/year)	0.35	0.46	0.53 - 0.58
Projected erosion damages (if no protection)	No damage anticipated	1 commercial property damaged	11 residential, and 4 commercial properties damaged
Projected flood risk (if no protection)	169 properties at risk from flooding	245 properties at risk from flooding	357 properties at risk from flooding

(Data adapted from the Shoreline Management Plan)

Activity: Summarise why coastal management is needed in this location. You should use the data in the table above, but also use your own observations, e.g. by naming specific land-uses/buildings that could be damaged...