

Session 3

● How are Hunstanton cliffs and the surrounding area affected by geomorphic processes?

There are a number of geomorphic processes which affect cliffs and coastal landscapes.

Geomorphic processes are responsible for shaping landscapes. They include weathering, mass movement, sub-aerial processes, erosion, transportation and deposition.

The NW Norfolk coast is located in East Anglia, in the East of England. It is mostly low-lying, and has a range of habitats, which include cliffs, sand dunes, salt marshes and some broad sandy beaches. Each of these habitats is subject to change over different timescales.

The cliffs at Hunstanton, and the area immediately above them, both lie within the erosion zone. The erosion zone is defined by the Environment Agency as being:

“the area of land predicted to be at risk from coastal erosion over a defined period of time – not the area that will definitely be lost”

Predictions of future erosion rates and their impact on the position of cliffs, are made based on historical evidence, ongoing monitoring and other data to estimate where the shoreline position will be in a certain time. The Environment Agency has produced Coastal Erosion maps to show these data and allow them to be interrogated.

Task 1

Go to <http://apps.environment-agency.gov.uk/wiyby/134831.aspx> and enter Hunstanton in the name box on the right hand side of the screen. A map will appear.

What are the current risks of erosion in the area of the cliffs?

You could watch the drone footage again, or look at the gallery of images – can you see evidence of erosion?
How are the cliffs being affected? Are there any slumps or slides or are they experiencing block collapse?

Offshore gradient

One of the defining aspects of the Norfolk coast is the shallow offshore gradient. What impact will this have on the nature of the waves which hit the beach, and possibly the base of the cliffs?

Wave Energy

This is the greatest source of energy in the coastal area, and is behind a number of processes that progressively weaken the cliff, and create the conditions for blocks to detach and fall onto the beach at the base of the cliff. These blocks will act as temporary defences before they are broken down into smaller pieces by attrition. Much of the sediment on the beach will be derived from this source, but there will also be material from rivers, and also brought across by ice sheets during previous periods of ice advance.

What kinds of waves do you think will be arriving at Hunstanton beach given its fetch, shallow offshore gradient, and fairly flat beach profile?

Use a map to calculate the fetch when the wind is blowing from the main compass directions. Remember that the prevailing wind in the UK is from the W / SW.

Watch the BBC Bitesize Coasts section which has been created for this part of the specification <https://www.bbc.co.uk/education/topics/zs3ptyc>

You may also want to explore the videos which have been shared free of charge by Time for Geography.

https://timeforgeography.co.uk/videos_list/coasts/

Coasts Knowledge Boosters



Erosional processes and landforms introduction

Coasts



Types of waves

Coasts



Subaerial erosion processes

Coasts



Marine erosion processes

Coasts



Large-scale erosional landforms

Coasts



Formation of a wave-cut platform

Coasts

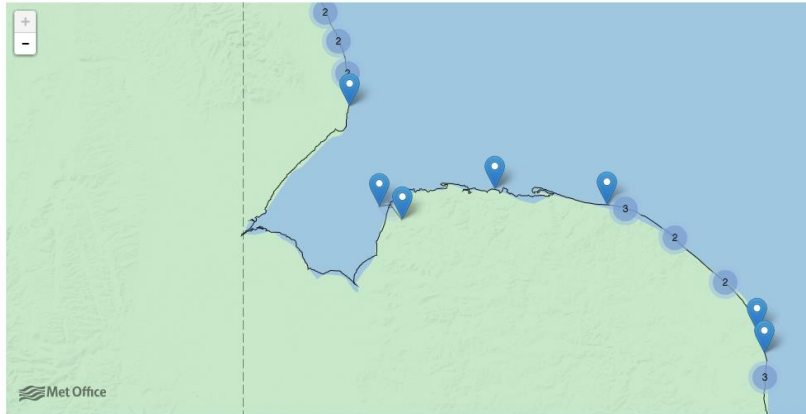


Formation of a sea stack

Coasts

Tides

Look at the drone footage again and remind yourself of the make-up of the beach in front of the cliffs. How often do you think the cliffs at Hunstanton are hit by waves, and therefore subject to the full range of coastal erosion processes? Does this happen at every high tide?



Tide timetables show the spring tides (the highest tides) which are the most likely to hit the base of the cliff. They are available from: <https://www.metoffice.gov.uk/public/weather/tide-times/u12m5hb4s>

What evidence is there of **biological** weathering on the cliffs?

There are some nesting birds (fulmars) on the cliffs at Hunstanton. There is also some small degree of biological weathering from fossil hunters, who go to the area to hunt for fossils. A fossil guide to the cliffs has been produced, and is available from the Tourist Information centre (TIC) in the town.

Keep an eye out in Session 5, as you will be introduced to 'Rocky'.

Discussion Point

Are the processes which cause the cliffs to collapse being speeded up by recent weather extremes (higher temperatures, and more extreme rainfall) – compare this with other cliff collapses in other parts of the coast e.g. Devon, South Coast during 2017. What evidence is there that this might happen?

As there are two types of chalk at Hunstanton cliffs, there would be some degree of **solution**, as sea water is slightly acidic, and there are also salts and other minerals which may grow in cracks in the cliffs, if sea water evaporates there.

Label an image of the cliffs to explain where weathering and erosion will be taking place, and how it would affect the cliffs.

The cracks in the rocks would also allow for freeze-thaw weathering to take place on the cliffs over a longer time scale. Explain this process.

A Shoreline Management Plan (SMP) policy describes how each stretch of shoreline is most likely to be managed to address flooding and/or erosion – although this is subject to conditions. Stretches of coast are divided into 'management units'.

Shining a light on erosion

One building which is particularly at risk is the famous white lighthouse at the northern end of the cliffs. It's a self-catering holiday cottage: <http://www.norfolkcoastholidaycottages.co.uk/the-lighthouse-old-hunstanton>

The description on the website talks about the position as one of the great benefits of the property, but it also makes it vulnerable.

Other similar lighthouses have been moved back from the edge. The Belle Tout lighthouse was moved back from the edge of Beachy Head in 1999

http://www.sussex.ac.uk/geography/researchprojects/coastview/Belle_Tout/belle_tout.htm

