

Relief of the UK

Relief of the UK can be divided into uplands and lowlands. Each have their own characteristics.

Key

- Lowlands
- Uplands

Areas +600m: Peaks and ridges cold, misty and snow common. i.e. Scotland

Areas - 200m: Flat or rolling hills. Warmer weather. i.e. Fens

Types of Erosion

The break down and transport of rocks – smooth, round and sorted.	
Attrition	Rocks that bash together to become smooth/smaller.
Solution	A chemical reaction that dissolves rocks.
Abrasion	Rocks hurled at the base of a cliff to break pieces apart.
Hydraulic Action	Water enters cracks in the cliff, air compresses, causing the crack to expand.

Types of Transportation

A natural process by which eroded material is carried/transported.	
Solution	Minerals dissolve in water and are carried along.
Suspension	Sediment is carried along in the flow of the water.
Saltation	Pebbles that bounce along the sea/river bed.
Traction	Boulders that roll along a river/sea bed by the force of the flowing water.

Mass Movement

A large movement of soil and rock debris that moves down slopes in response to the pull of gravity in a vertical direction.

1	Rain saturates the permeable rock above the impermeable rock making it heavy.
2	Waves or a river will erode the base of the slope making it unstable.
3	Eventually the weight of the permeable rock above the impermeable rock weakens and collapses.
4	The debris at the base of the cliff is then removed and transported by waves or river.

Formation of Coastal Spits - Deposition

Example: Spurn Head, Holderness Coast.

Material moved along beach in zig-zag way. Coastline changes direction. Material deposited in shallow, calm water, to form a spit. Prevailing winds bring waves in at an angle. Spit curved with change of wind direction.

Types of Weathering

Weathering is the breakdown of rocks where they are.

Carbonation	Breakdown of rock by changing its chemical composition.
Mechanical	Breakdown of rock without changing its chemical composition.

What is Deposition?

When the sea or river loses energy, it drops the sand, rock particles and pebbles it has been carrying. This is called deposition.



- 1) Swash moves up the beach at the angle of the prevailing wind.
- 2) Backwash moves down the beach at 90° to coastline, due to gravity.
- 3) Zigzag movement (Longshore Drift) transports material along beach.
- 4) Deposition causes beach to extend, until reaching a river estuary.
- 5) Change in prevailing wind direction forms a hook.
- 6) Sheltered area behind spit encourages deposition, salt marsh forms.

Formation of Bays and Headlands

Bay (Soft rock), **Headland** (Hard rock).

- 1) Waves attack the coastline.
- 2) Softer rock is eroded by the sea quicker forming a bay, calm area causes deposition.
- 3) More resistant rock is left jutting out into the sea. This is a headland and is now more vulnerable to erosion.

Unit 1c Coasts Physical Landscapes in the UK

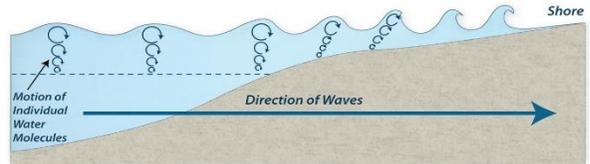
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How do waves form?

Waves are created by wind blowing over the surface of the sea. As the wind blows over the sea, friction is created - producing a swell in the water.

Why do waves break?

- 1) Waves start out at sea.
- 2) As waves approaches the shore, friction slows the base.
- 3) This causes the orbit to become elliptical.
- 4) Until the top of the wave breaks over.



Mechanical Weathering Example: Freeze-thaw weathering

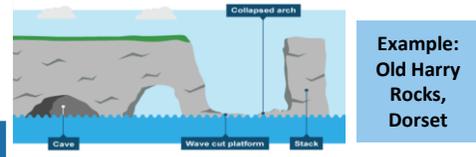
Stage One	Water seeps into cracks and fractures in the rock.		Stage Two	When the water freezes, it expands about 9%. This wedges apart the rock.		Stage Three	With repeated freeze-thaw cycles, the rock breaks off.	
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Size of waves

Types of Waves

Constructive Waves	Destructive Waves
This wave has a swash that is stronger than the backwash. This therefore builds up the coast.	This wave has a backwash that is stronger than the swash. This therefore erodes the coast.

Formation of Coastal Stack



- 1) Hydraulic action widens cracks in the cliff face over time.
- 2) Abrasion forms a wave cut notch between HT and LT.
- 3) Further abrasion widens the wave cut notch to form a cave.
- 4) Caves from both sides of the headland break through to form an arch.
- 5) Weather above/erosion below –arch collapses leaving stack.
- 6) Further weathering and erosion eaves a stump.

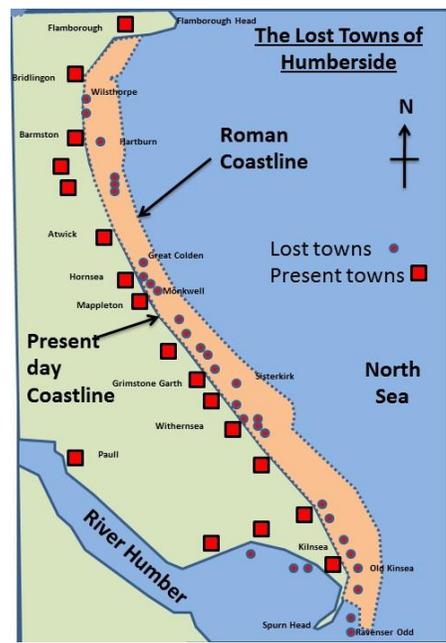
Coastal Defences

Hard Engineering Defences

Groynes	Wood barriers prevent longshore drift, so the beach can build up.	<ul style="list-style-type: none"> ✓ Beach still accessible. ✗ No deposition further down coast = erodes faster.
Sea Walls	Concrete walls break up the energy of the wave. Has a lip to stop waves going over.	<ul style="list-style-type: none"> ✓ Long life span ✓ Protects from flooding ✗ Curved shape encourages erosion of beach deposits.
Gabions or Rip Rap	Cages of rocks/boulders absorb the waves energy, protecting the cliff behind.	<ul style="list-style-type: none"> ✓ Cheap ✓ Local material can be used to look less strange. ✗ Will need replacing.

Soft Engineering Defences

Beach Nourishment	Beaches built up with sand, so waves have to travel further before eroding cliffs.	<ul style="list-style-type: none"> ✓ Cheap ✓ Beach for tourists. ✗ Storms = need replacing. ✗ Offshore dredging damages seabed.
Managed Retreat	Low value areas of the coast are left to flood & erode.	<ul style="list-style-type: none"> ✓ Reduce flood risk ✓ Creates wildlife habitats. ✗ Compensation for land.



Case Study: Holderness coast, East riding Yorkshire England - From Flamborough head (Chalk) in the north to Spurn head (Sand spit) in the South.

. Location and Background

Located on the North-East coast of England. The Coastline has one of the fastest rates of erosion in Europe (1-2m per year) . The geology is made of soft and unconsolidated boulder clay which is undermined easily by waves. This material is washed away in suspension and hence there are no wide beaches to protect the cliffs.

Geomorphic Processes

- The coastline is dominated by flat low lying relief (10-20m ASL). Chalk cliffs, headlands and wave cut platforms (erosional landforms) occur in the north at Flamborough head, and a sand spit to the south at Spurn head, Humber estuary (depositional landforms). Longshore currents(LSD) transport eroded material south towards the Humber estuary helping to build the sand spit at Spurn head (a wild life reserve).

Management

-Holderness coast is protected by several sea defense strategies. The main population settlements of Hornsea (Sea wall and groynes), Withensea(Sea wall Groynes and rock armour) and at Mappleton (rock armour and groynes). Easington gas terminal is protected by rock armour (major economic benefits here)

Conflicts: the challenge for Holderness is while protecting population centres or sites like Easington is beneficial, it starves areas further down the coastline of sediment. This means they erode faster and homes and businesses have been lost to the sea. Spurn head is under threat. This provides protection for the Humber estuary from flooding.

Spurn Head

A coastal spit under threat from coastal erosion. It is an important SSSI but also acts as a natural sea defense for the Humber estuary

Mappleton and Hornsea

Coastal erosion is rapid here and has led to many challenges for people and the economy of the this stretch of coastline