

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.

Unit 1c Physical Landscapes in the UK

AQA

Formation of Bays and Headlands

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

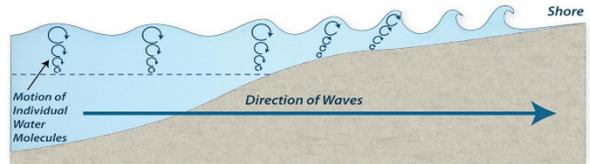
- 1) Waves attack the coastline.
- 2) Softer rock is eroded by the sea quicker forming a bay, calm area cases deposition.
- 3) More resistant rock is left jutting out into the sea. This is a headland and is now more vulnerable to erosion.

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

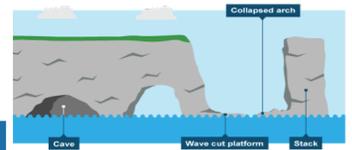
Stage One	Water seeps into cracks and fractures in the rock.		Stage Two	When the water freezes, it expands about 9%. This wedges apart the rock.		Stage Three	With repeated freeze-thaw cycles, the rock breaks off.	
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Size of waves

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



Example: Old Harry Rocks, Dorset

- 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.

Hard Engineering

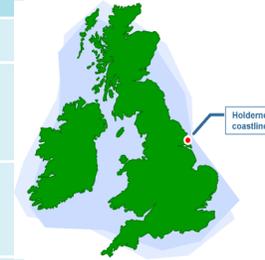
Strategy		Benefits	Costs
Sea wall – concrete structure at top of beach acts as a barrier to sea		<ul style="list-style-type: none"> V effective Can develop top for walking, stalls etc 	<ul style="list-style-type: none"> £5000 - £10000 / metre V expensive Ugly
Rock Armour – large boulders at foot of cliff to reduce force of waves		<ul style="list-style-type: none"> Relatively effective at reducing force of waves Relatively cheap 	<ul style="list-style-type: none"> £2000 000 / 100 metres Ugly Can be dangerous to public
Gabions – wire cages filled with rocks. Permeable so improve cliff drainage		<ul style="list-style-type: none"> Flexible Cheaper £50 000 / 100 metres Quick to construct 	<ul style="list-style-type: none"> Not attractive Cages can break Need replacing every 10 years
Groynes – wooden or stone fences built at right angles to coast to stop longshore drift		<ul style="list-style-type: none"> Create wider beaches Cheap 	<ul style="list-style-type: none"> Starve beaches further down the coast making them narrower and so more likely to erode Need some maintenance

Soft Engineering

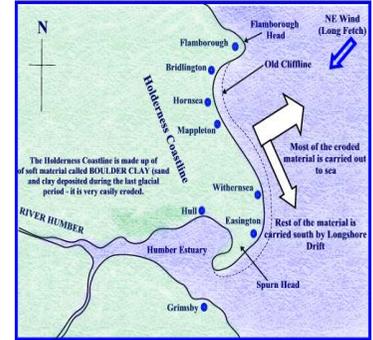
Beach nourishment / reprofiling. Adding sand to a beach or changing its shape eg high ridges		<ul style="list-style-type: none"> Looks natural Creates amenity for tourism Cheap 	<ul style="list-style-type: none"> £50 000 / 100 metres but can vary Needs constant maintenance Less effective than hard engineering
Dune Regeneration		<ul style="list-style-type: none"> Considered natural Creates area for picnics etc May increase biodiversity 	<ul style="list-style-type: none"> £2000 per 100 metres. Time consuming to plant and maintain Easily damaged by storms Not particularly effective.

Managed Retreat

Doing nothing. Allow sea to move into area		<ul style="list-style-type: none"> Long term solution with low maintenance A natural buffer New ecosystem created Biodiversity improves, eg bird watching More attractive 	<ul style="list-style-type: none"> Low value land is lost to sea Local people have to move so need to be compensated Some ecosystems may be lost
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The Holderness Coastline: Coastal Erosion and Defence



What is the problem?

- Erosion is causing cliffs to collapse. Cliffs are made of soft, easily eroded boulder clay
- Prevailing winds mean material is moved south through LSD
- About 1.8m of land is lost each year. Farms and businesses are threatened
- Over 11km of coast is managed using hard engineering to protect the towns of Hornsea, Withernsea and Mableton as well as roads and the gas terminal at Easington that supplies 25% of the UK's gas and is right on the cliff.

Management strategies	Problems
<ul style="list-style-type: none"> Rock armour used. 450 m of coast line protected by 61 000 tonnes of rocks at a cost of £2million. Rocks absorb the power of the waves 2 rock groynes trap sand and create a beach to protect the cliffs Hornsea has a sea wall and some groynes and at Withernsea there is a sea wall, groynes and rock armour 	<ul style="list-style-type: none"> Mableton is protected but groynes prevent sediment moving south leading to increased erosion south of Mableton Farms and a caravan park have been lost south of Mableton The Lifeguard station at Great Cowden is under threat as the spit does not get sediment Spurn Head spit is being washed away Protecting the gas terminal at Easington cost £6.6 million