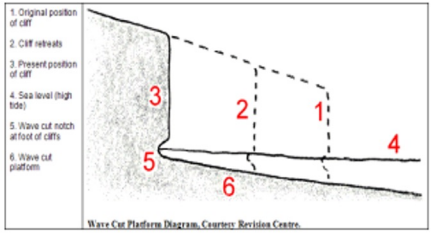
## 2.1 GCSE Geography Coasts Knowledge Organiser

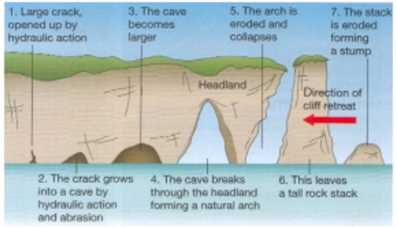
| Key Terminology | Definition |
|---|---|
| **Weathering** | The process of rocks been broken down by the weather, plants and animals. |
| **Freeze thaw** | Repeated freezing and thawing, expands and breaks the rock. |
| **Onion skin/exfoliation** | Repeated expansion and contraction due to heating and cooling breaks the rock. |
| **Chemical weathering** | Acid in rainwater dissolves the rock. |
| **Erosion** | The wearing away, transportation and deposition of material. |
| **Hydraulic Action** | Force of the waves break cliff apart. |
| **Abrasion** | Waves smash rocks against the cliff. |
| **Corrosion** | Seawater slowly dissolves cliffs. |
| **Attrition** | Material carried by wave's smashes against each other. |
| **Transportation** | Movement of eroded material. |
| **Longshore Drift** | Beach material is moved along the coast by the waves. |
| **Swash** | The flow of water up the beach |
| **Backwash** | The flow of water back into the sea |
| **Intertidal zone** | The part of the shoreline that is between the high tide and the low tide |
| **Postglacial rebound** | The Earth's crust was depressed by the mass of ice lying on it during the ice age. Since the last glacial period it has slowly been rising back to its original level. This pushes Scotland up and London down. |
| **Mass movement** | The movement of surface material caused by gravity |
| **Estuary** | Where the river meets the sea. The river here is tidal. |
| **SIDS** | Small Island Developing States e.g. the Maldives. |

### Coastal Features

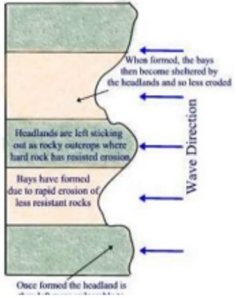
Wave-cut Platform



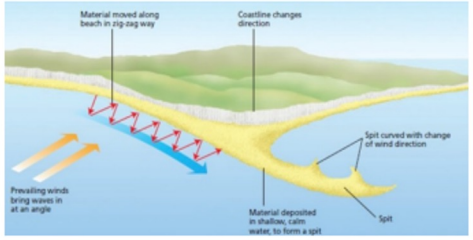

Arches, Stacks, Stumps




Headlands and Bays




Spits and Estuaries




### Factors affecting coastal processes

- Weather patterns/extreme events UK e.g. Storm Surge December 2013
- Geology Rock type e.g. most resistant and less resistant rocks
- Human activity e.g. footpath erosion, building and industry, tourism, sea defences

### Shoreline Manage

**Hard engineering** e
walls, revetment
**Soft engineering** e.
salt marshes (wetlc
stabilisation.

Hold the line
Retreat the line – n
realignment
Advance the Line
Do Nothing

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### IIC

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line – TE2100 Plan
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## Unit 2 Coastal Landscapes-Knowledge Organsier (Figures and photos on blog)

### A- Coastal Processes

**Wave terminology**

| | |
|---|---|
| Wave length | is the average distance between successive wave crests. |
| Wave height | is the vertical distance between a wave trough and a wave crest. |
| Swash | When waves break, water rushes up the beach due to the energy from the wave. |
| Backwash | When the water has lost its energy further up the beach, it runs down again, under gravity. |

**Differences between the two types of waves**

| | Destructive waves (Plunging) | Constructive waves |
|---|---|---|
| Wave height | High > 1m | Low < 1 m |
| Wave energy | High | Low |
| Wave frequency | High > 10 per minute | Low < than 10 per minute |
| Swash-Backwash | Backwash > Swash | Swash > Backwash |
| Main process | Erosion | Deposition |

| Explain the impact of waves on beach profiles. | Constructive waves | Destructive waves |
|---|---|---|
| Process | Greater swash than backwash. Sand and shingle moved up the beach = deposition | Greater backwash than swash. Most material is carried downward by the backwash= erosion |
| Impact on beach profile | Sediment is being added to the beach which the backwash cannot entirely remove, producing a gentle build-up of beach material. This will increase the gradient of the beach in its lower section. (swash zone) | Due to erosion, beach profile becomes gentler in its lower section. (swash zone) |

**Three processes of erosion work at the foot of the cliff and one process affects sediment.**

| | |
|---|---|
| Hydraulic action | As the water gets into cracks in the rock face, it compresses the air in the cracks; this puts even more pressure on the cracks and pieces of rock may break off. |
| Corrasion [abrasion] | Sand and pebbles carried within waves are thrown against the cliff face and particles of rocks are broken off. |
| Corrosion [solution]: | Chemical reaction between rocks made of calcium carbonate and salt and other acids in seawater. |
| Attrition | As the boulders in the sea continually roll around, they chip away at each, become smaller, smoother and more rounded. Final material: sand. |
| Factors which affect rates of erosion/coastal recession | **1- Wave fetch can cause different rates of coastal recession.** Fetch: The length of water the wind blows over. Longer distance waves have more energy, more power to erode, increasing hydraulic action/abrasion.<br>**2- The type of rock (geology) and structure can affect the rate of coastal erosion:** Rock type - if the cliffs are made from resistant rock, like granite, they will erode more slowly than cliffs made from less resistant rock, such as clay. Rock structure - the rock's structure can also have an effect on the rate of erosion. Rocks that are well jointed or with many faults, such as limestone, will erode more quickly as the waves exploit these lines of weakness.<br>**3- Sub-aerial processes** |

**Sub-aerial processes work on the cliff face, affect the rate of coastal recession and the formation of landforms.**

**1-Weathering is the breaking or the decomposition of rocks in situ. Three types of weathering on the cliff face.**

| | |
|---|---|
| Physical | Freeze thaw – diurnal changes in temperature around 0 degrees. Water in crack widened due to freezing, 9% volume increase, thawing leaves crack prized open. Process repeats. Fragments of rock break off. |
| Chemical | Weak acids in rainwater react with calcium carbonate in rocks rocks break up or dissolve. |
| Biological | Plants grow in cracks, roots break up rocks, may cause cliff collapse. |

**2- Mass movement is When material moves down a slope due to the pull of gravity. Two types of mass movement**

| | |
|---|---|
| Soil creep | very slow movement, very little impact on landform formation<br>1-Gravity pulls the water that is contained in the soil down a slope. 2-The soil moves downhill with the water. 3-The slope appears rippled. 4- These ripples are known as terracettes. |
| Slumping | Large impact on clay cliffs<br>Involves a large area of land moving down a slope. Very common on clay cliffs. Clay dries and cracks in summer. When it rains, water runs into cracks absorbs by clay which becomes saturated. Clay slips down. Landslides can cause rapid removal of coastal material / loss of land. |

**Hard and soft engineering methods**

**Hard engineering (5 methods)**
Method of coastal management which involves major construction work: groynes, sea walls, off-shore reefs, riprap, revetments.
***Gabions are included in textbook but not in Edexcel syllabus.***

**1-Sea wall:** A long concrete barrier built at the base of a cliff. The modern ones have a recurved face.
**Advantages:** It protects the base of the cliff against erosion as it reflects and absorbs wave energy. Effective for many years.
**Disadvantages:** Expensive to build and to maintain. Restricts access to the beach.

**2-Groynes:** Wooden, rock or concrete 'fences' built across the beach, perpendicular to the coastline
**Advantages:** Prevents the movement of beach material along the coast by longshore drift. Sand builds up on one side of the groyne and the beach builds up as a natural defence against erosion and as an attraction for tourists.
**Disadvantages:** Look ugly and do not last very long when they are made of wood as it rots. Sand is prevented from moving along the coast, and places elsewhere may lose their beach and the natural defence it provides

**3- Off-shore reefs:** Rock or concrete barriers built on the sea a short distance from the coastline.
**Advantages:** Waves break on the barrier before reaching the coast. This reduces erosion. They allow the build-up of sand along the coast and allow a wide beach to develop as wave energy is reduced.
**Disadvantages:** Very expensive to build. May be removed by heavy storms.

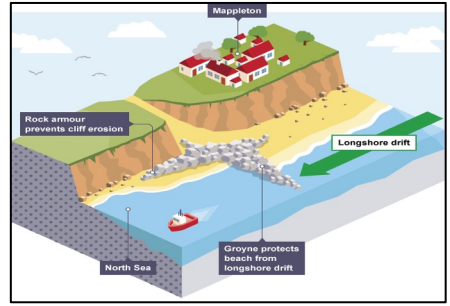
**4- Riprap :** Large boulders of resistant rock placed in front of the cliff.
**Advantages:** These absorb wave energy and protect the cliff behind from erosion. Effective for many years.
**Disadvantages:** Can make the beach inaccessible to tourists.As they stil let some wave energy through, they are not effective in storm conditions.

**5- Revetments:** Slatted wooden structures built at the base of the cliff.
**Advantages:** These absorb and spread wave energy through slats. They do not interfere with longshore drift.
**Disadvantages:** Regular maintenance is needed. Not effective in storm conditions.

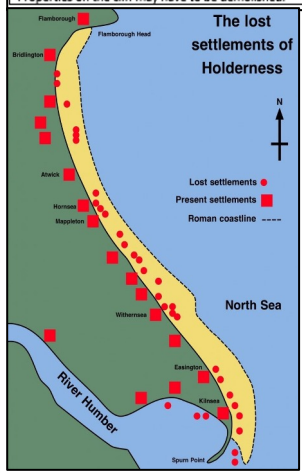
**Soft engineering: (3 methods)**
Method of coastal management which works with natural processes at work on the coastline and to be unobstructive (unnoticeable) visually. It does not involve major construction: beach replenishment, managed retreat and cliff regrading.

**1-Beach replenishment:** Adding sand and pebbles on a beach.
**Advantages:** Looks natural. Provides a beach for tourists. The beach absorbs wave energy and protects the land or buildings behind.
**Disadvantages:** The sea keeps on eroding it away. So it has to be replaced constantly. Disruption for home-owners as large noisy lorries full of sand regularly replenish the beach.

**2- Cliff regarding:** Making the cliff face longer so that it has a gentle slope to stop it slumping.
**Advantages:** This method is relatively cheap. May be covered in ecomatting to encourage vegetation growth.
**Disadvantages:** Not effective alone. Other methods need to be used at the base of the cliff to stop it being eroded.
Properties on the cliff may have to be demolished.




Bridlington is protected by a 4.7 km long sea wall.
Hornsea is protected by a sea wall, groynes and rock armour.
Coastal management at Withersea has tried to make the beach wider by using groynes, and also uses a seawall to protect the coast.
Mappleton is protected by rock groynes.
Spurn Head is protected with groynes and rock armour.
Conflicts
There has been an increase in erosion at Great Cowden because of the groynes used in Mappleton. This has led to farms being destroyed by the erosion and the loss of 100 chalets at the Golden Sands Holiday Park.
Some people disagree with where the sea defences are located, especially if it means the land in their community is not protected.
Some sea defences negatively impact tourism and reduce the amount of money coming in to the area.




**Holderness Case Study**

The Holderness Coastline is one of Europe's fastest eroding at an average annual rate of around 2 metres per year. This is around 2 million tonnes of material every year. Approximately 3 miles (5kms) of land has been lost since Roman times including 23 towns/villages. These are shown on the map below.

**WHAT IS THE GEOLOGY OF THE HOLDERNESS COAST?**
Underlying the Holderness Coast is bedrock made up of Cretaceous Chalk. However, in most places, this is covered by glacial till deposited over 18,000 years ago. It is this soft boulder clay that is being rapidly eroded.

There are two main reasons why this area of coast is eroding so rapidly. The first is the result of the strong prevailing winds creating longshore drift that moves material south along the coastline. The second is that the cliffs are made of soft boulder clay which erodes rapidly when saturated.

**HOLDERNESS COAST CASE STUDY**
The Holderness Coast is a great case study to use when examining coastal processes and the features associated with them. This is because the area contains 'textbook' examples of coastal erosion and deposition. The exposed chalk of Flamborough provides examples of erosion, features such as caves, arches and stacks. Coastal management at Hornsea and Withernsea are examples of hard engineering solutions to coastal erosion. Erosion at Skipsea illustrates the human impact of erosion in areas where coastlines are not being defended. Mappleton is an excellent case study of an attempt at coastal management which has a negative impact further along the coast.

Spurn Point provides evidence of longshore drift on the Holderness Coast. It is an excellent example of a spit. Around 3% of the material eroded from the Holderness Coast is deposited here each year.