Coastal erosion

Our coastline is in a constant state of flux and change through natural processes. The sea shapes the coastal landscape and Guernsey's coastline is vulnerable to damage from the sea.

There are many areas around the coast where there are signs of erosion and it can sometimes be seen when beach levels have dropped to reveal undermining at the base of sea walls.

Coastal erosion is the wearing away and breaking up of rock along the coastline, causing erosion in several ways:

Hydraulic action	Air may become trapped in joints and cracks on the coastline. When a wave breaks, the trapped air is compressed which causes erosion.
Abrasion	Bits of rock and sand in waves grind down surfaces like sandpaper.
Attrition	Waves smash rocks and pebbles on the shore into each other, and they break and become smoother.
Solution	Acids contained in sea water will dissolve some types of rock such as chalk or limestone.

This document explains some of the main factors contributing to coastal erosion.

'Over topping'

One of the main considerations in coastal defence design is often the prevention or reduction of wave overtopping (water coming over the top of the defence). There are also natural ways of taking out the energy of the sea before it hits a seawall, for example, eel grass can reduce energy impact during storms.

The size and energy of a wave is influenced by:

- How long the wind has been blowing

- The strength of the wind; and
- How far the wave has travelled (the ‘fetch’)

Damage to coastal structures and surrounding properties from wave overtopping in extreme events is expected to be exacerbated in future years as global sea levels continue to rise and the frequency of extreme meteorological events and storm surges increases. Approaches for protecting our coastal areas have traditionally relied on the development and ongoing maintenance of 'hard' defences, such as walls.

Movement of material (coastal transportation and deposition)

Because waves can approach the coast at an angle (because of the direction of the prevailing wind), but always retreat to the sea in a straight line, materials carried in the sea (sand, pebbles, rocks etc.) can also be carried sideways along the coastline and away from their original location. This movement of material is called transportation.

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

Deposition is likely to occur when:

- Waves enter an area of shallow water;
- Waves enter a sheltered area, e.g. a cove or bay;
- There is little wind; and
- There is a good supply of material.

There are four ways that waves and tidal currents transport sediment. These can then contribute to the movement of sediment by longshore drift.

Process	Description
Solution	**Minerals are dissolved in sea water and carried in solution. The load is not visible. Load can come from cliffs made from chalk or limestone, and calcium carbonate is carried along in solution.**
Suspension	**Small particles are carried in water, eg silts and clays, which can make the water look cloudy. Currents pick up large amounts of sediment in suspension during a storm, when strong winds generate high energy waves.**
Saltation	**Load is bounced along the seabed, e.g. small pieces of shingle or large sand grains. Currents cannot keep the larger and heavier sediment afloat for long periods.**
Traction	**Large rocks, pebbles and larger sediment are rolled along the sea bed.**

Other factors which can cause erosion

Weather

Around the coast of Guernsey there are areas of soft cliff and weathered rock. These sections of steep faces are susceptible to slipping, especially when Guernsey experiences exceptional hot dry periods, exceptionally wet periods or a combination of the two. Soils expand in wet weather and contract in dry weather, so long periods of wet winter weather and long periods of dry summer weather cause fluctuations. Suitable vegetation can help mitigate this effect, however, very dry soils and very wet soils are more prone to slip.

People

People can help reduce erosion in low lying areas by always using coastal features such as slipways, steps or designated paths to get onto the beach. Informal access points will eventually form 'desire lines' through sand dunes or over soft clay surfaces. As these unofficial access areas become more worn they can accelerate erosion by the sea.

For more information contact coastaldefences@gov.gg.