

# Longshore drift: Coastal processes on the Gold Coast

Beaches are dynamic. Sand is moved by wind and currents, which are created by wave or tidal energy. The key function performed by the beach is to absorb this energy. As waves approach the coastline their energy brings the sand into suspension and the associated currents transport the sand. The sand on the seabed is mobilised by every wave passing over it. Under calm conditions the sand may shift just a millimetre or so and during an extreme storm event beaches can change rapidly as sand is moved distances offshore. Extreme events, such as storms, are usually well remembered, and slow gradual changes often go unseen. An avid beach observer will notice the constant changing and reshaping of the beach.

A comprehensive assessment of sand movement on the Gold Coast was undertaken after the major erosion events in 1967 left the beaches eroded and vulnerable to further wave attack (see *Management that shaped our coastline* information sheet).

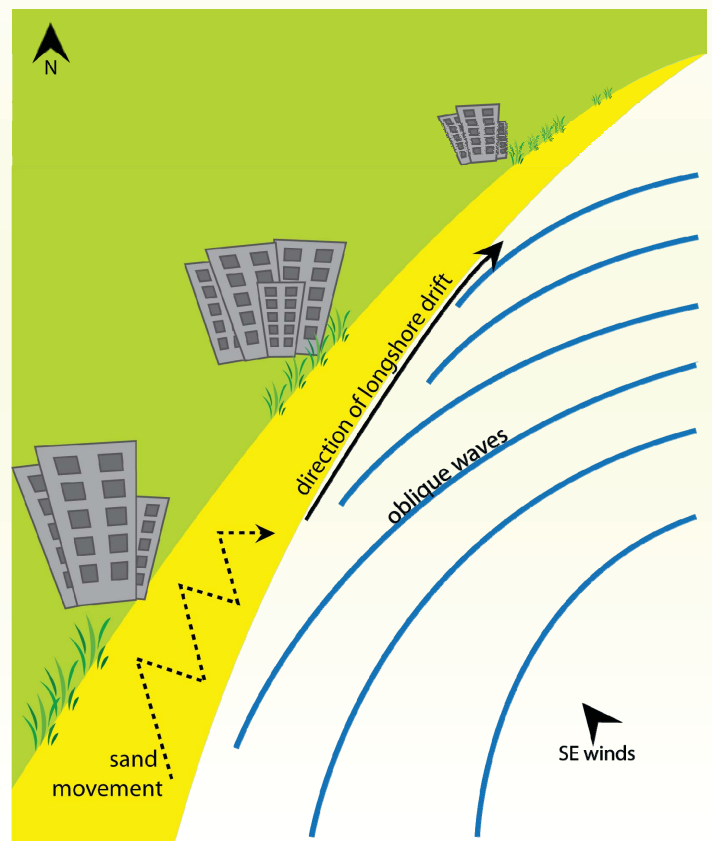
This study, known as the Delft Report, recognised that the movement of sand within the nearshore zone of the Gold Coast is influenced by two major coastal processes: longshore drift and alternate erosion and accretion (see *Beach erosion: coastal processes on the Gold Coast* information sheet).

## Longshore drift

Longshore drift is the movement of sand along the coastline. This movement of sand is influenced by the surf zone currents created by waves and the predominant wave direction.

Under these conditions, waves break at an angle to the shoreline (forming oblique waves) and the sand is moved along the beach in the surf zone.

The direction the sand moves in depends on the dominant wave direction.



South-easterly conditions result in oblique waves and sand transport along the coastline.

A wave rose (Figure 1) describes the long-term distribution of wave height and period for the Gold Coast from 2003–04 (reading the diagram like a compass). The figure shows the predominant direction is from the south-east (the larger pie-shaped portion) and that the wave direction is very rarely from the north. This data is collected from the Wave Rider buoy at Point Lookout, managed by the Department of Environment and Resource Management (DERM).

When waves originate from the east and south-east, sand is moved along the coast in a northerly manner (up coast). Alternatively, the sand moves south (down coast) when the waves come from the north-east. The overall movement of sand on the Gold Coast is to the north and a net rate is estimated at 500,000m<sup>3</sup> per year.

Evidence of the northerly transport of sand on the Gold Coast can be seen with sand building up on the southern side of the engineered structures (such as groynes) as the structures interrupt this natural transport (see Figure 2, below).

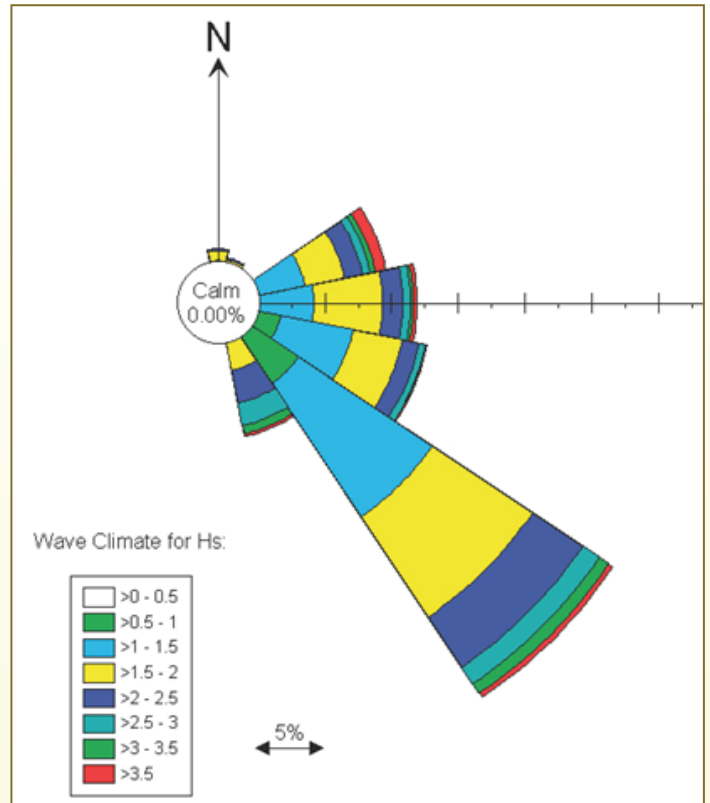


Figure 2. Wave rose showing average wave height and direction at Pt Danger from 2003-2004 (DERM).



Figure 2. Groyne at Kirra Beach during the 1990s: sand builds up on the southern side of the groyne as longshore drift is interrupted. Note the erosion on the northern side of the groyne where the boulder wall is exposed.

**Nearshore zone** The area from the low water level seaward to beyond the breaking waves.

**Wave height** The distance (height) between the trough (bottom) and the crest (top) of the wave.

**Wave period** The time interval (in seconds) between two waves passing a specific point.

Delft Hydraulics Laboratory (1970) Coastal Erosion and Related Problems. Vol. 1. Gold Coast, Queensland, Australia. Delft, The Netherlands.

Smith, S. (1987) The perception of people to beach permanence. Gold Coast Beach Replenishment Program: Report no. 98. Gold Coast City Council. Coastal Processes and Research.



Centre for Coastal Management

Discover more of our city's coast at [www.goldcoastcity.com.au/coast](http://www.goldcoastcity.com.au/coast).

This information is proudly produced in partnership with the Griffith Centre for Coastal Management's CoastEd program. For more information, visit [www.griffith.edu.au/coastal-management](http://www.griffith.edu.au/coastal-management).