Storm surges

What are storm surges?
Storm surges are an additional rise in sea level above the expected astronomical tide as a result of strong onshore winds and/or low atmospheric pressure systems. The severity of a storm surge depends on whether it coincides with a low or high tide. If a storm surge arrives during a high tide, coastal and low-lying areas may become vulnerable to inundation and exposed to strong wave action, creating dangerous conditions in our waterways as well as on our beaches, see Figure 1.

How are they formed?
Low pressure systems push on the ocean surface causing a bulge to form in the water level, creating a higher than normal rise in sea level. This ‘bulge’ is then blown landward by a strong onshore wind, forming a storm surge. To better understand this phenomenon, try the demonstration in Box 1.

What happens if a storm surge reaches the coast?
Since over 350,000 people live in areas less than 10m above the sea level on the Gold Coast, storm surges must be taken seriously. When they come ashore, storm surges can increase in magnitude as they rise over shallow nearshore sea beds along the coastline. As a result, they can affect not just seaward properties but also those along canals and rivers that experience tidal variation in water levels.

Erosion impacts at Palm Beach (April 2010)

Figure 1. The difference between a normal high tide and a storm surge; spot the increased vulnerability with the storm surge. (Source: Bureau of Meteorology, 2010)

Box 1.

Demonstration
Take a glass of water and blow across the water and see the water rise against one side of the glass. Blow down into the glass, see the water push down in the centre and rise around the rim of the glass.
Examples of storm surges on the Gold Coast

Not all storm surges are major events. In fact, frequently the Gold Coast experiences surges that go unnoticed by the community, because they occur during low-tide. Occasionally though, a storm event brings with it a storm surge that has an erosive or inundating effect on our coast. For example, high water levels accompanied by large waves during the storms of May 2009 and October 2010 left dangerous dune escarpments up to 5m high on many beaches; see images below. (For more information on the 2009 event, refer to Beach Erosion Events in 2009 - How did our beaches cope? information sheet).

How big?
Depending on the extent of atmospheric energy within the weather system, storm surges may last for 24 hours or more and affect kilometres of coastline. These events may result in the closure of beaches and waterways for public safety and the activation of Gold Coast City Council’s Disaster Management response team. The Queensland Government manages a network of tide gauges that record the height of storm surges during these events. On the Gold Coast there are tidal gauges in the Broadwater and Tweed River.

Who gives out the warnings?
As part of the Gold Coast City Council Disaster Management Plan, Council and the State Emergency Services lead storm surge warnings.

What is the Gold Coast doing to prepare for storm surges?
♦ Beachfront residents are required to build and maintain a certified boulder wall
♦ Beachfront residents are encouraged to plant native dune species. This helps to build up large stable sand dunes, creating a buffer zone between properties and the ocean
♦ Council’s Disaster Management committee and local State Emergency Services volunteers are on standby

To find out how you can prepare for a storm surge, visit goldcoastcity.com.au/disaster

Leech, J (1982) Cyclones and Their Effects on Beaches, Beach Conservation, Issue No. 46

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