

Tweed River Entrance Sand Bypassing Project
Permanent Bypassing System

**Environmental Impact Statement/Impact Assessment Study
June 1997**

Extracts: Chapter 7 "The Environmental Impacts"

"The potential environmental impacts of the implementation and operation of a permanent bypass system..."

Section 7.2.3.3 "Southern Gold Coast Beaches"

Rainbow Bay

The shape and condition of the beach at Rainbow Bay is largely dependent on the condition of the offshore shoals around Snapper Rocks. With the bypassing plant operational, it is likely that the offshore shoals around Snapper and Marley Rocks will be consistently full, ensuring a strong persistent sand supply to this area.

This will represent a return to the natural condition existing prior to training wall extension, characterised by:

- Strong and persistent development of the nearshore shoal extending directly past Rainbow Bay from Marley Rocks to Greenmount Hill
- Strong and persistent longshore sand transport along this shoal to Greenmount
- The common occurrence of a nearshore lagoon between the shoal and the main public beach, in which wave action and currents are relatively calm
- Increased occurrence of a wider recreational beach
- Separation of areas of general beach and surf use from areas used by surfboard riders
- Increased nearshore sand buffer against excessive beach erosion during storm events.

Despite this, the beach will behave dynamically, with beach width and nearshore shoal bathymetry varying considerably over the short to medium term associated with natural variability of wave conditions and storm erosion events.

Greenmount

The condition of the beach at Greenmount is largely dependent on the flow of sand around Greenmount Hill and the transport away from the beach past Kirra Point. The supply of sand to this area will be improved as a consequence of the improved supply to and past Rainbow Bay and the effects of the Stage 1 dredging in restoring the nearshore profile bathymetry.

As at Rainbow Bay, the behaviour of Greenmount Beach will return to that which characterised the area prior to training wall extension. This includes persistent occurrence of a wide recreational beach and frequent strong sand supply in the form of a spit-like shoal extending past Greenmount Hill. This shoal may or may not be attached the beach area towards Coolangatta, but typically will create a lagoon between it and the main recreational beach.

The shoal bathymetry will be highly variable in response to varying wave conditions. It will provide a sand buffer which will help to minimise storm erosion of the recreational beach. Nevertheless, the beach width will vary significantly in the short to medium term, and storm erosion will continue to occur from time to time.

Similarly, Coolangatta will receive a more persistent littoral sand supply which will move past Kirra Point under the natural wave/current action. The Kirra Groyne Point creates a different beach and sand transport pattern from that existing prior to the training wall extensions. It has the effect of stabilising Coolangatta Beach with greater width than before, and may alter the beach/bar alignment in such a way that the sand supply past Kirra Point is somewhat more variable than was originally the case.

Kirra

The condition of the beach at Kirra is dependent on the nearshore profile bathymetry, the associated wave refraction patterns, and the transport of sand past Kirra Point. The Kirra Point and Miles Street groynes influence the sand transport patterns and beach conditions.

Stage 1A dredging has not yet restored the natural nearshore profile bathymetry in this area. Sand deposited in the deeper water and outside the Kirra Reef Exclusion Zone has not yet been redistributed by the waves and currents to the longer term equilibrium condition. Such condition is characterised by greater sand volume in the area out to about the 6 metre contour than presently exists and correspondingly less in the sand deposition area further offshore.

A consequence of the recovery of the bathymetry offshore from Kirra back to the pre 1960s situation will be a reduction in the presently exposed extent of Kirra Reef. This would occur by sand transport along the bed rather than by depositional smothering.

Kirra Beach and the beaches further north are fed by sand moving along the shoreline and sand moving through the reef area in longshore and cross-shore directions. Essentially, the area in the vicinity of the reefs is a rocky substrate of which most is covered by sand, with that part not covered by and constituting the reef. Historically, Kirra and Kirra Central beaches have fluctuated about their mean position and, for Kirra Central the landward extent of fluctuation has been seaward of its recent position.

A preliminary analysis of past extent of reef and Kirra and Kirra Central beaches show:

- Reef area has been historically small
- Reef area enlarged due to erosion in the 1960s
- Upper beach also eroded
- Reef area is largest in the late 1980s and early 1990s
- Upper beach erosion worst in late 1980s
- There is strong correlation between good beach width and smaller reef size associated with the amount of sand in the beach system in that area.

Thus reduction in the exposed extent of the reef will be an inherent consequence of the restoration of sand supply and improvement of Kirra Central beach resulting from the project.

Thus nearshore depths and wave propagation patterns are not expected to be yet as they are needed for beach recovery or medium term stability. It may take some years before equilibrium is restored.

The beneficial impact of the bypassing project at Kirra will be the restoration of the full littoral sand supply. This is of importance for Kirra (Central) which is located at the downdrift end of the series of natural headlands and artificial groyne structures. These controlling features help stabilise the beaches immediately updrift and, in so doing, tend to focus the erosion effect of any sand supply deficient in the area west of the Miles Street groyne.

Nevertheless, despite restoration of the long term average sand supply to the required 500,000 cubic metres per year along these beaches, Kirra beach will continue to be subject to sand supply variability cause by those features. Resulting beach width variability can be

moderated within the Deed of Agreement provisions by direct placement of (average) 75,000 cubic metres of sand per year as required.

Thus, it is considered most likely that, over time, Kirra Beach and Kirra Central west of the Miles Street groyne will be restored to conditions with the general shoreline position seaward of that presently existing, similar to that which existed prior to training wall extension, subject to the additional influences of:

- The Kirra Point and Miles Street groynes, which tend to create increased beach variability
- Frequency of discharge relating to the bypassing system's operational strategy
- Direct placement of sand from time to time, which will tend to moderate beach variability.

With effective delivery of the full littoral sand supply and management of the sand placement strategy, a useable beach will be restored to the west of the Miles Street groyne; with infrequent storm erosion extending back to the rock seawall.

Coolangatta Creek/North Kirra

The beach at Coolangatta Creek and past North Kirra is presently relatively wide as a result of the past beach replenishment works. The beach and nearshore system in this area is continuing to adjust slowly to those works under the influence of the prevailing wave, current and wind conditions.

The precise nature of the final equilibrium state of this beach area is uncertain, but it is likely to eventually replicate that of the early 1960s. Thus continuing evolution of the beach there is likely to include:

- Little change in the location of high water mark from the present location
- Development of a wind formed dune system at the back of the beach.

The stormwater outlet to Coolangatta Creek will be largely contained within the beach berm except following storm erosion. However, it is expected that the discharge should continue to be clear of sand and function effectively. This should be monitored to assess any need for remedial action over time.

There will be a need for dune management in the form of vegetation protection and control fencing as the dune develops and extends east along the back of the beach towards Kirra.