



Tweed River Entrance Sand Bypassing Project (TRESBP)

www.tweedsandbypass.nsw.gov.au

HOW TWEED SAND BYPASSING WORKS

Fact sheet 2, of 2.

TRESBP jetty

The 450-metre long TRESBP jetty and adjacent control centre are central to the sand bypassing system. The jetty is located on Letitia Spit, south of the Tweed River mouth. At the jetty, sand is drawn in by submerged jet pumps along the jetty pylons; this northwards drifting ocean sand is intercepted before it accumulates at the Tweed River entrance. The jetty can only draw in the amount of sand that waves and ocean currents bring to the jetty.

The sand is then piped to the landward end of the jetty and 'delivered' through underground pipes back to the ocean north of the river. Here, waves and currents distribute the sand to the beaches of the southern Gold Coast, where the sand is needed.



TRESBP jetty, 250 metres south of Tweed River entrance training walls, northern NSW.

TRESBP pipe network

A 4-kilometre pipe network transports the sand from the TRESBP jetty to the primary sand outlet at Snapper Rocks East. Sand is carried as slurry, a sand and water mixture, through the 40-centimetre-diameter steel pipes. The pipes are underground, taking the sand under the Tweed River and under local streets north of the river. From the outlet at Snapper Rocks East, the sand drifts north in the ocean to replenish beaches. Most ocean sand 'delivered' by TRESBP takes this route: drawn in at the jetty at Letitia Spit and piped back to the ocean at Snapper Rocks East. Additional outlets at West Snapper Rocks and Kirra Point operate only occasionally.

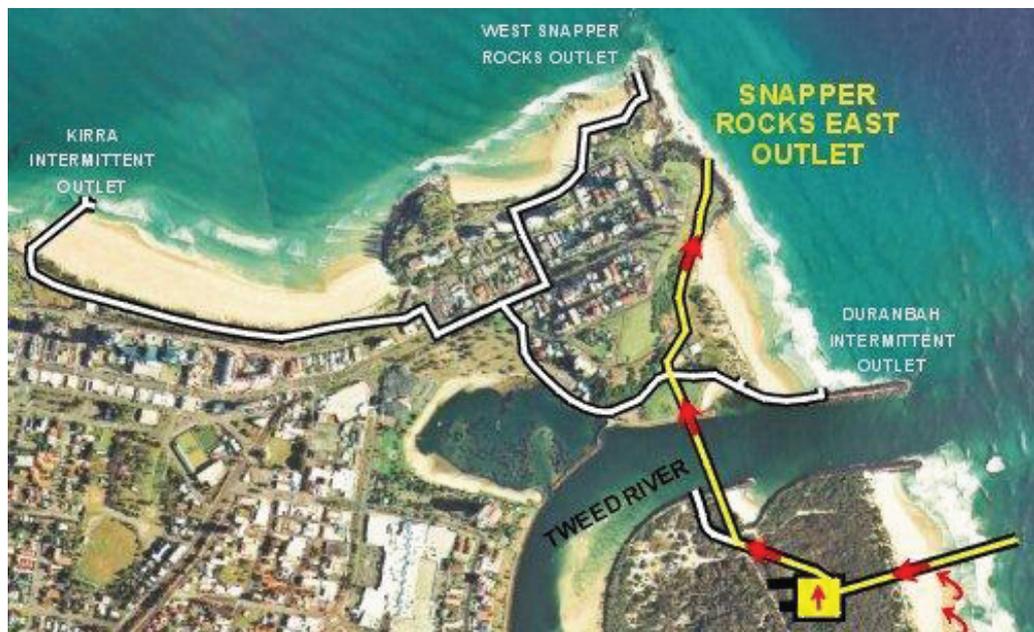


TRESBP jetty (left), and sand returning to the ocean at Snapper Rocks East outlet.

Longshore drift and seasonal variation

The natural drift of sand along the east coast, known as longshore drift, averages 500,000 cubic metres a year. Tweed sand bypassing's pipe system carries drifting ocean sand from the south to the north of the Tweed river—sand that, decades earlier, would have arrived through longshore drift. However, the annual longshore drift volume is only an average; there will be variations from year to year.

Variations also occur on a seasonal basis with waves and ocean currents changing. February to May are typically high natural sand supply months due to predominantly large waves from the south-east. The calmest time of year is from September to December, with north-easterly waves.



TRESBP pipe network with the main sand bypassing route shown in yellow.

Duranbah Beach

Just south of the TRESBP pipe outlet at Snapper Rocks East is Duranbah Beach, highly regarded for surfing (see aerial image on page one showing these locations). Duranbah, being south of the outlet, does not receive the benefit of the ocean sand that flows through the pipe network and into the ocean to drift north from Snapper Rocks. Part of the TRESBP agreement between New South Wales and Queensland outlines that twice a year, and as needed after storm erosion, sand is piped onto Duranbah Beach through temporary pipes, erected for the purpose, to maintain beach and surfing conditions.



The early years

For the first six years of Tweed sand bypassing operations, which commenced in 2001, large volumes of sand were transferred through the system. These volumes included additional sand, volumes in excess of the natural sand drift rate. This was carried out, following rigorous study, to rebuild the sand depleted beaches of the southern Gold Coast. These beaches had become severely eroded, from the 1960s to the 1990s, as drifting ocean sand to replenish the beaches was blocked by the Tweed River entrance walls.

The additional sand through the bypassing system was to compensate for three decades of 'sand deficit' and to add the buffer that beaches require for the next round of severe seasonal storms. With this large volume of sand through the system in the early 2000s, southern Gold Coast beaches became very wide as far fewer than usual storms hit the Gold Coast during those years. Since 2007, and especially since 2009, there has been an acceleration of sand drifting northwards out of Coolangatta Bay owing to more frequent storms.

SAND PUMPING JETTY AT LETITIA SPIT

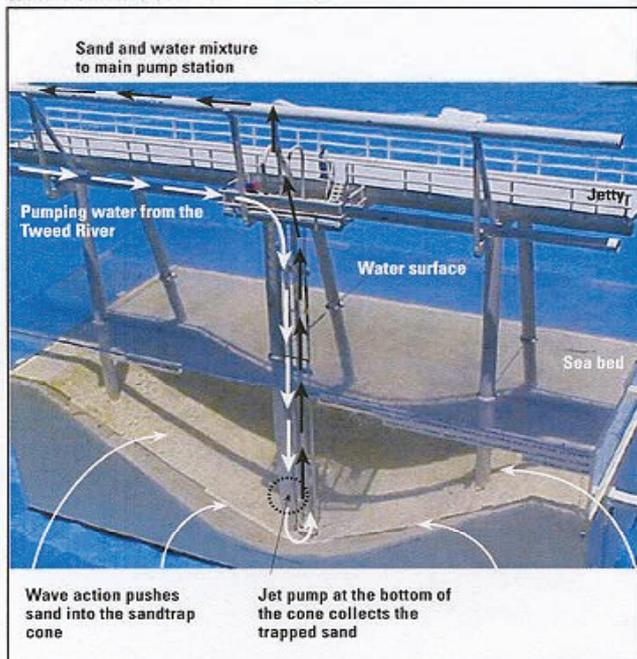


Image courtesy of McConnell Dowell Constructors



The Port Frederick, which periodically dredges the Tweed River entrance.

The dredge

A floating dredge periodically collects sand that drifts past the jetty pumps into the Tweed River entrance. Especially during stormy conditions, the TRESBP jetty can't pick up all natural drift. The ocean-going dredge can be used for this missed sand. This supplementary dredging of the river entrance and nearshore areas adjacent to the South Head beach can help to maintain the navigation channel. It also allows for additional quantities of sand, when needed, to be placed off Point Danger. From here, natural swells deliver the sand to southern Gold Coast beaches

TRESBP activity and sand volumes

The volume of sand carried through the Tweed sand bypassing system varies. Calm conditions usually mean little or no sand to pump; while in higher wave conditions with large amounts of sand moving along the coast, pumping might be continuous.

The current activity—whether pumping or dredging is occurring and why—is posted by TRESBP online, see www.tweedsandbypass.nsw.gov.au/current_activities. The total volume of sand travelling through the system is also important to monitor. This volume, both up-to-date monthly and yearly figures as well as archival records, are also online. See www.tweedsandbypass.nsw.gov.au/sand_delivery

The workings of the jetty

TRESBP jetty intercepts sand that would have been 'trapped' by the rock walls at the Tweed River entrance, and the bypassing system 'delivers' the sand back to the ocean. Pumping at the jetty is year-round and usually at night, drawing in the sand that waves and ocean currents bring to the jetty.

The sand pumping process, works in stages:

- Water from the nearby Tweed River is piped, under very high pressure, along the jetty and down into the ocean (see the downward white arrows).
- There are ten jet pumps powered by water from the Tweed River, and these are spaced along the jetty pylons. These pumps use high pressure water to create a vacuum (Venturi effect) and have no moving parts. Four pumps operate at one time. The jet pumps extract sand from under the jetty, creating cone-shaped hollows in the seabed.
- Clean ocean sand, drifting north, is drawn into this series of hollows. The sand is forced, by the pumps, from the bed of the ocean up to the jetty (the black arrows travelling up).
- Sand and sea water travel to the landward end of the jetty by gravity, as the pipe is slightly angled. Here, a vibrating screen—working like a giant sieve—removes any waste. The slurry, or sand and water mixture, leaves the jetty and pumphouse area and is piped north by underground pipe.