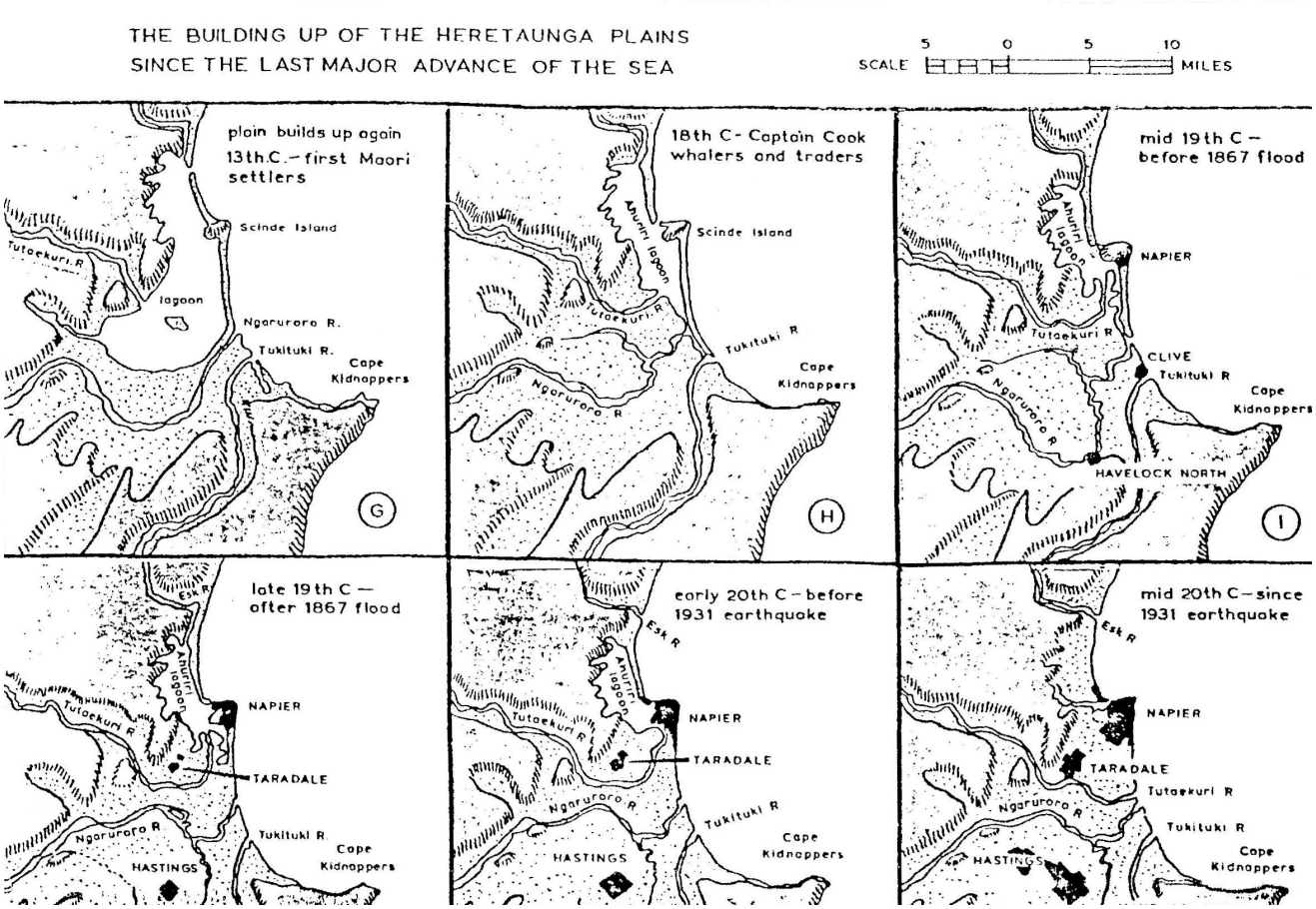
Westshore Beach --- Past, Present and Future

Past

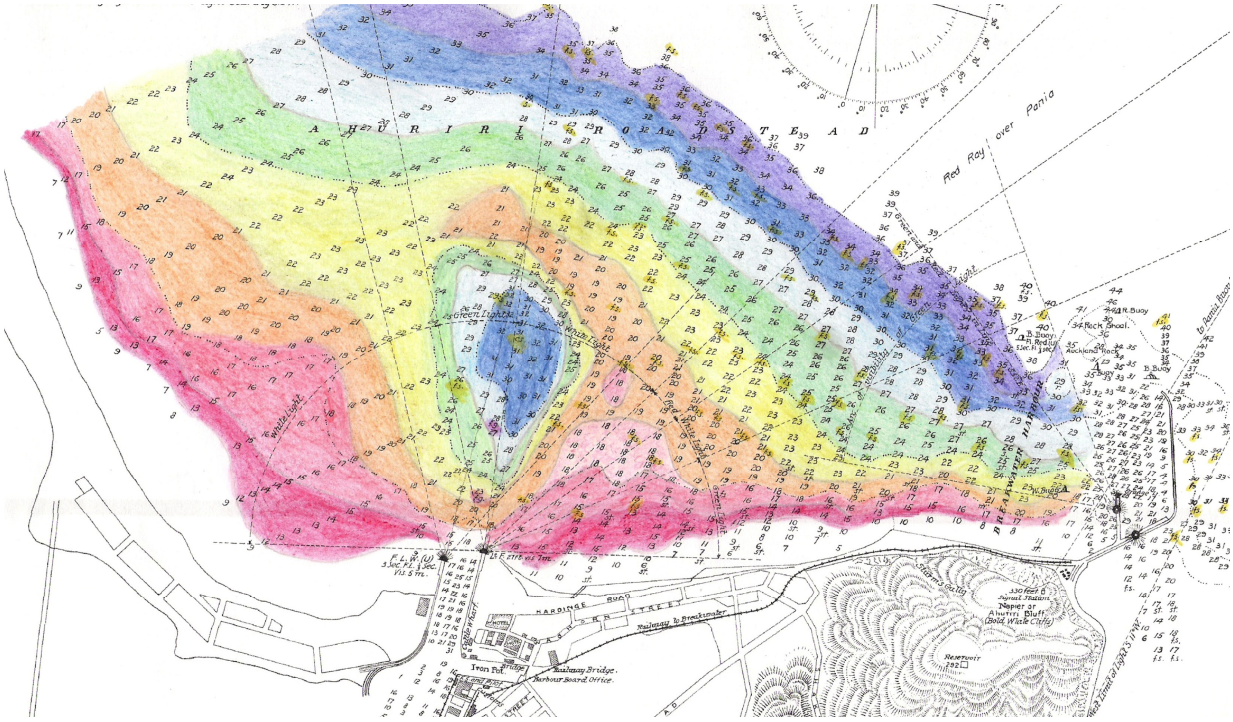
Prior to the 1931 earthquake, there was a massive lagoon behind the Westshore spit. The map below shows how the area has evolved in the last 700 years. This map was drawn about 60 years ago. The source is unknown because it was retrieved from a bundle of documents in a deceased estate. It looks like something drawn by someone with a good understanding of the geology of the area.



The opening in the spit at Ahuriri was created by a group of maori travellers led by Tu Ahuriri, sometime between 1769 and 1824. For the next 100 years, the Ahuriri entrance was gradually transformed in to a wide, navigable passage.

The tide would run in and out of the entrance like a fast flowing river. The outgoing, or ebb tide, carried huge quantities of fine sand and sediment, which eventually fell out of suspension and formed an expansive half donut shaped sand bar, called an ebb tidal delta. This delta of fine sand extended for over 1,000m, out from the Ahuriri entrance.

The following page shows a map of the ebb tidal delta, 4 years before the earthquake in 1927.



The colour scale follows a rainbow, where red represents the shallowest areas and violet is the deepest area. The distance from the entrance to the outer plateau of the delta (orange part) is about 1,150m. The blue bit in the middle is the deep scouring from the fast flowing ebb tide. Each change in colour represents 3 ft, which is about a metre, so the big hollow in the middle is about 3m deeper than the plateau of sand around it.

When the 1931 earthquake struck, the sea bed rose about 2m relative to the sea level, and a gradual transformation began. The huge body of water behind the spit emptied in to the sea, for the last time, and the fast flowing ebb tide stopped forever.

The huge volume of sand contained in the ebb tidal delta was no longer being supplied with sediment, so it started getting gnawed away by the waves and ocean currents. This sand then spent the next 50 years, or so, migrating to the southern end of Westshore beach, where it created a beautiful flat, sandy and safe beach. These photos were taken in summer 1957/58.

In 1974 there was a massive storm, with huge swells, that caused considerable damage along the coast. Waves rushed up the Marine Parade beach and smashed windows in the lower level of the War Memorial building, but Westshore was hardly damaged.

The Daily Telegraph

Saturday 17th August 1974

NAPIER, HAWKE'S BAY, NEW ZEALAND, SATURDAY, AUGUST 17 1974

STATE OF EMERGENCY IN THREE HB TOWNSHIPS

A state of emergency was declared in the Clive, Haumoana and Te Awanga areas this afternoon as giant seas continued to batter the Hawke's Bay coast.

Residents were preparing to evacuate their homes, for the third time in two months, with the arrival of high tide at 4.57 p.m.

Huge waves pounded the East Coast from Kaikoura, in the South Island, to Gisborne, 300 miles north, but serious trouble was reported only in the Hawke's Bay area.

The might of the sea was first felt at high tide about 4 p.m. yesterday and again at 4 a.m.

were called to move elderly people, but only one man was taken to hospital when the sea crashed through the French windows.

"The flooding was worse than ... but the damage this time will amount to more because ... He was slightly injured of the salty water," the assessor said.

Late this morning, Mr Ryan was still unable to reach his house and the water was seven feet deep in parts.

At Te Awanga, several miles south of Haumoana, the situation was almost as bad.

The sea had caused even

At Westshore, there was only a bit of gnawing away at the edge of the grassed reserve and some minor flooding in the car parks. Today, you can see the asphalt from one of these car parks sticking out of the seaward side of the shingle bank, opposite the school. It's worth having a look if you have the time. Just park in the shingle carpark opposite the school entrance, and walk up the shingle bank, then down the wooden staircase to the beach.

You can then compare what you see at the beach, to this photo taken in 1988, after cyclone Bola had passed by. The car is in the said carpark, and the phoenix palms on the left are the ones you will see beside the wooden staircase.

Back in those days, when the beach had a decent amount of sand in the nearshore region, the beach was resilient to storms. Since about the mid seventies, the nearshore area seaward of low tide, that you never see because it is always underwater, has slowly eroded away, taking with it the shingle and sand that make up the foreshore. This is the area between the car and the sea, in the photo above.

Present

Over the past few years a Coastal Hazard Strategy Joint Committee comprising people from all three local councils, key agencies, mana whenua and residents, worked through the issues associated with sea level rise, in the next 100 years. After considerable investigation and discussion, they came up with the following recommendation for Westshore beach.

8.4.1 Pathway Concept Plan

8.4.2 Pathway Notes

- Combination of gravel renourishment and offshore sand bar in the short term (Gravel – Land based replenishment at key areas. Sand – Material placed offshore, using marine plant, and allowed to naturally migrate northwards and towards the beach raising foreshore levels).
- Note supplementary recommendations regarding cultural concerns with renourishment.
- Control structures may be groynes or offshore breakwater and will be required in the medium term. Gravel nourishment (no sand) will occur at this time.
- Consideration given to retreating defence line to raised gravel bank behind gravel barrier.
- A seawall may be required to protect exposed assets at the Eastern end.
- Structures raised and lengthened over long term, with additional beach renourishment, in order to offset effects of sea level rise.

8.4.3 Rationale supporting the recommendation

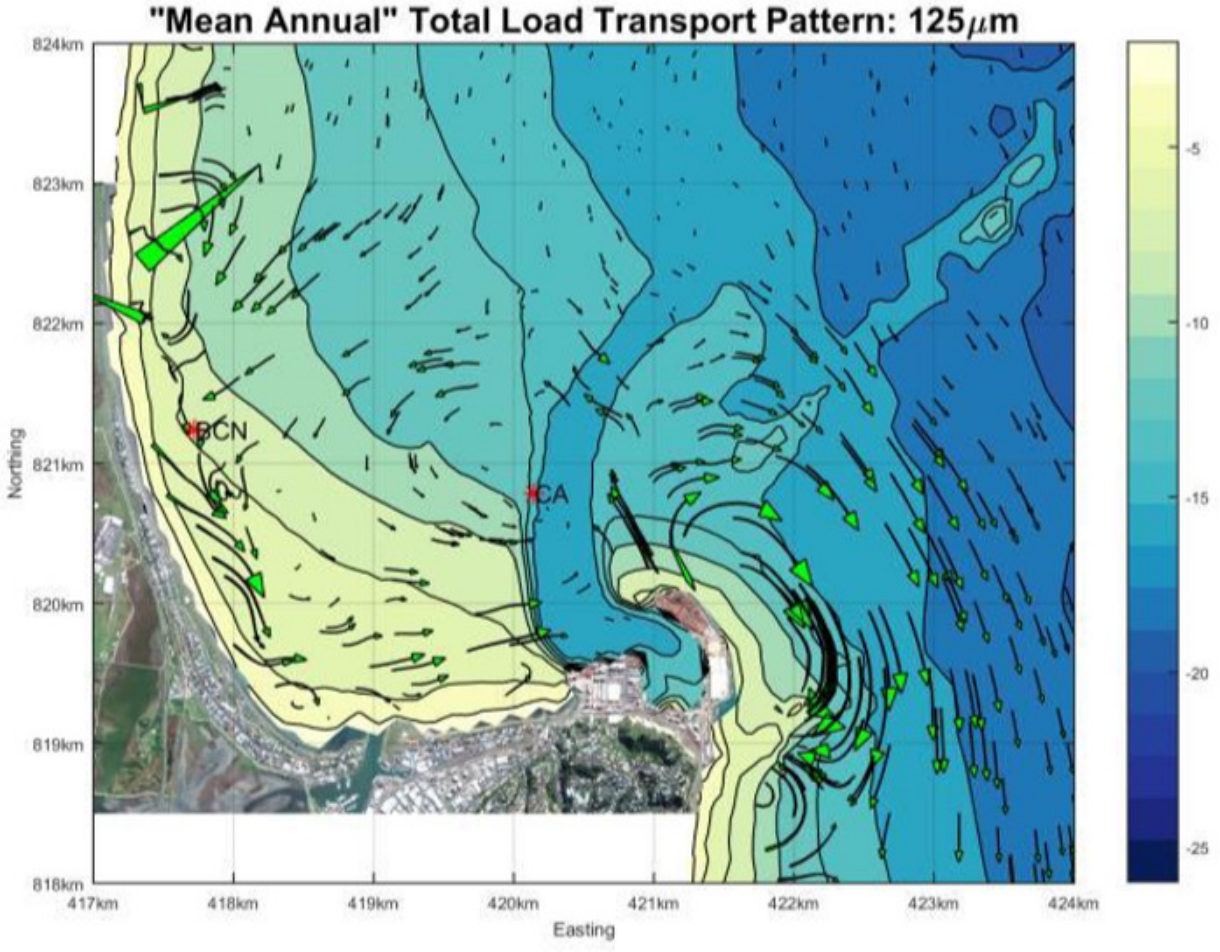
- 4th equal score under Multi-Criteria Decision Analysis ("MCDA") undertaken by the Panel.
- Preferred pathway under economic analysis undertaken by an independent economist.
- Considered to be the preferred pathway overall, taking into account the MCDA score and economic analysis.

The goal here is to replicate what the migration of the ebb tidal delta did many decades ago, by putting sand in to the nearshore system at the southern end of the beach, probably just on the western side of where the ebb tidal delta used to be. We know the sand will migrate to shore from this location, based on all the historic photos, as well as the recommendations of five different coastal experts (Mead, Black, McComb, Gibb, Komar)

The HBRC and NCC have approved seed funding, to start the process of obtaining a Coastal Permit to undertake this sand transfer activity, and as this process gathers momentum you will be asked for input in working out what things need to be considered when moving sand from one part of Westshore Bay, to the nearshore area at the southern end of the beach.

We got a taste of the benefits of putting sand near the beach last October, when the Port deposited, near the beach, about 130 loads of fine sand from the shipping channel. The nearshore opposite the Surf Club has grown and become sandier, and is more resilient to heavy swells. Regular beach profile measurements and satellite photos show the bulge in the beach in front of the surf club is still there, 10 months after deposition. There is no question about the suitability of the sand uplifted from the shipping channel and deposited at Westshore by the dredge. It is totally compatible with the nearshore sand.

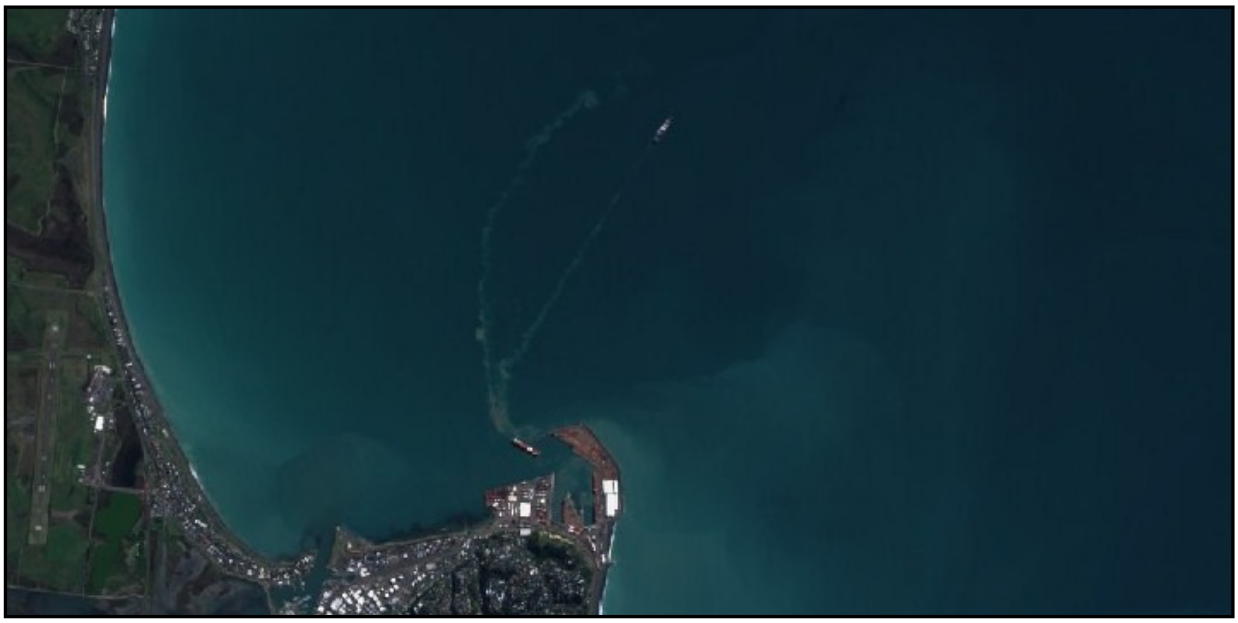
The Port have gone to great lengths to claim that depositing sand off Westshore beach will have an adverse effect on the environment, in particular Pania reef. This claim is based on numerical modelling of the currents between Westshore and Pania reef. The current flow maps they have created show that any fine sediment that travels from south Westshore eastwards, will end up in the deep shipping channel. The sediment does NOT then head off to Pania reef.



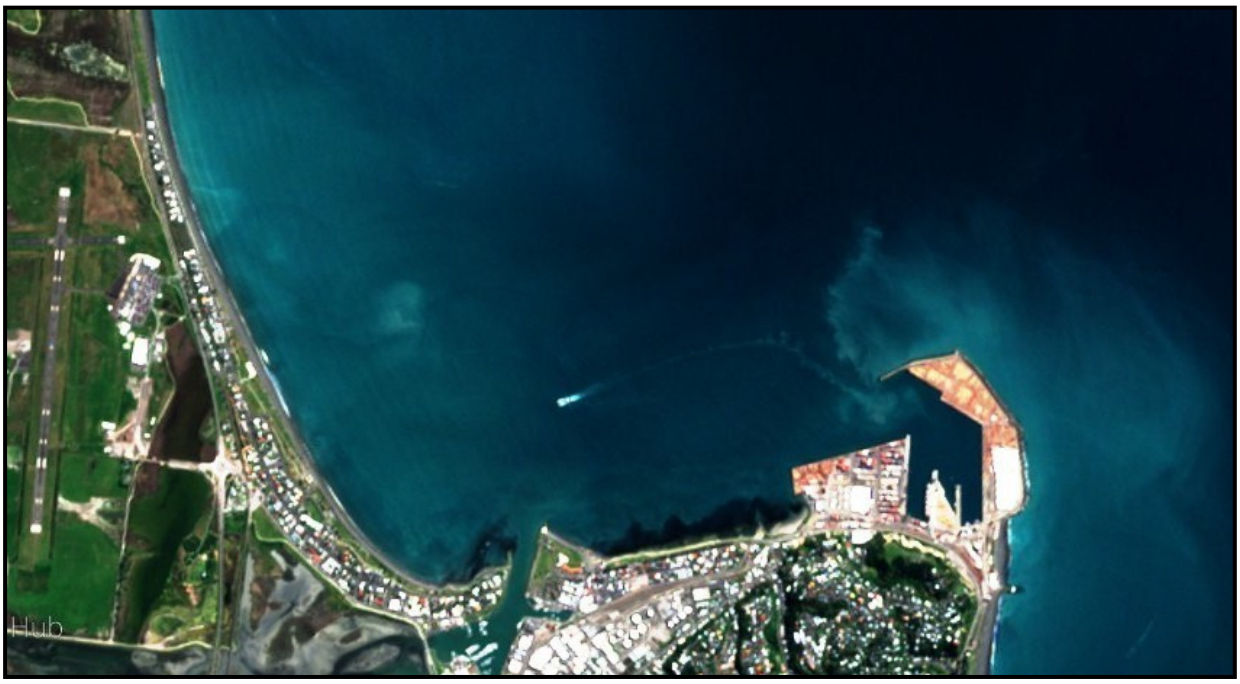
These current flow maps were created by a computer model, using very extreme wind data; so extreme that one of their reports says that these wind conditions ***"have not yet been observed in available wind measurements at Napier, but might happen under a very rare storm event."*** This is not representative of reality at all. It is total fiction.

They deliberately chose to use these fictitious wind conditions, to show that their proposed new disposal site, 5 km off Marine Parade, wasn't going to have an adverse effect on Pania reef, even in the most extreme weather conditions. So it is nonsense to then use these theoretical, extreme wind conditions to predict the currents around Westshore, during normal weather conditions.

In reality the currents around south Westshore are all over the place, and in light wind conditions are probably more influenced by the tidal flows in and out of the Ahuriri estuary. The sediment stirred up by the propellers of ships leaving the harbour, produce far more suspended sediment than the tiny amount that might migrate from Westshore, as can be seen in these next two photos. What is more, the ships travel right past Pania reef.



In addition, the satellite photo below was taken during the dredging campaign last October. You can see the dredge heading off towards Westshore. To the left of the dredge, you can see a lighter smudge in the water. This is where the previous load of sand was deposited, about an hour and a half earlier. Notice how it hasn't dispersed into a plume, whereas the trail of overflow sediment from the dredging operation has left a massive plume, drifting off to the east, and around the breakwater. The overflow from the dredge is a far greater source of suspended sediment than the small amount that falls out of the bottom of the dredge when it deposits sand in shallow water.



This photo shows what happens after a heavy rain event when fine sediment from the rivers, flow into the sea.

Note also the amount of sediment washed in to the sea, east of Clifton, where there are no rivers flowing in to the sea.

Future

The Napier community would love nothing more than to improve the amenity of the beach.

The logical thing to do is to replicate what happened after the 1931 earthquake, and provide a source of sand, via a sand bar about 300 - 400m offshore, which can then continuously feed into the beach system at the southern end. If the sand bar is wider at the southern end, as recommended by coastal engineers 17 years ago, the waves will bend (refract) a bit more, and approach the beach straight-on, rather than at an angle. This will significantly reduce the northerly drift, and so the sand will remain in the beach compartment, just like it did from 1931 until the mid-seventies.

It will require a few things to happen to achieve this:

1) establish a Coastal Permit, held by the HBRC and/or the NCC, to bring sand in to the southern end of the beach, to create, and maintain a sand bar.

2) create a shoaled area, out from the southern end of the beach to induce a little more refraction in the waves, and so diminish the northerly drift of sand.

3) the Port to provide sand (anything larger than 63 microns) from both their maintenance and capital dredging programs.

4) the future community sand transfer program to provide sand in the years that the Port are not doing maintenance or capital dredging.

The sand bar would be created using a conventional dredge, to get the process started. Once the desired coastal process is working, a more permanent, cost effective submarine sand transfer system could be implemented that doesn't require the sand to be lifted to the surface, but merely transfers it from A to B, with the minimum of disturbance.

The ultimate, long term goal is to rebuild the resilience of the beach to storms, over future decades, so that the annual, expensive, land-based nourishment, using river shingle trucked in from Hastings can be reduced, and eventually stopped.

If this can be achieved, everyone benefits, including the Port.

I would really appreciate your feedback on this topic, in particular what effect you think the deposition of sand (not mud or silt) about 300-400m from the beach, will have on the nearshore ecology and fish life in the vicinity of Westshore.

Richard Karn 17 July 2018

(Grammar corrected on 12 August, prior to submitting to the HBRC)