Submission to RC14513L application

- My name is Doug Longdill. I have a background in science and technology, and more latterly in employment relations.
- Our family have had a long association with Waihi Beach, dating back to the 1950's when we holidayed here.
- In the early 1970's my parents purchased a Bach in Ayr Street
- In the late 1970's my wife and I purchased our property in Island View on Seaforth Road.
- Since that time, our family have enjoyed swimming, surfing, fishing and running and walking on the beach.
- I have two sons and one daughter. They became involved in surf lifesaving when in the Nippers. They all developed their skills and became patrolling lifeguards in the 1990's. They also actively competed in Surf lifesaving events at Regional and National level.
- Suffice to say, the long-term health of the beach, and the amenity value it provides, has become a very important issue for us.
- Since 2015, I have lived at Waihi Beach in the family Bach. I am active in many community volunteer activities including predator control, guiding walks at our annual Walking festival, as well as actively participating in Coast Care planting and weeding projects.
- I am, fundamentally opposed to the concept of building the types of hard structures that the applicants are proposing.
- Coastal dune systems operate in a very dynamic manner, and the notion that you can somehow control nature by imposing hard structures is, in my view, fundamentally flawed.
- On that basis, I have therefore chosen not to go into a great level of detail about the application.
- Turning now to my submissions

THIS REPORT HAS YET TO BE FULLY CONSIDERED BY COUNCIL

COASTAL EROSION, SETBACK DETERMINATION, AND RECOMMENDATIONS FOR MANAGEMENT OF THE WAIHI-BOWENTOWN AND PUKEHINA BEACH AND DUNES.

A REPORT TO THE WESTERN BAY OF PLENTY DISTRICT COUNCIL

by

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(iii) *Excavation from off the sea floor.* It would be possible to dredge the material from the sea floor in water depths of 15-20 meters. The best location for this, depending on tests of the suitability of the shelf sediment for re-nourishment, would be offshore from the adjacent cliffed coast to the north of Waihi Beach. The basis for this is that the active beach profile extends a considerable distance below the sea level, and out to a distance offshore to which there might be active sediment exchange. Thus it is not appropriate to extract sand out of the active beach profile that is to be nourished. However extraction from offshore of a cliffed zone would not likely be part of the beach profile. Research from Bradshaw (1991) and Bradshaw et al. (1991) from sparse side-scan sonar surveys and sampling indicates sufficient sand of the appropriate size grading would be available. Indicative costings using the *Pelican* are \$2.6 - \$3 per m^3 for transporting the material from 3 km to the north of Waihi Beach.

13.3 Engineered Shore Protection Structures

The National Research Council (1990, p.13) concludes that there are "examples of properly planned, designed, constructed, and maintained detached breakwaters and groin fields that have been effective in the local control of coastal erosion; however, impacts on downdrift beaches must be considered". Beach nourishment is now the method of choice for beach preservation in many coastal communities. For the case of northern Waihi Beach, engineered structures that may be considered to mitigate the coastal erosion, protect the properties, and retain the beach, include seawalls, groins, and offshore breakwaters.

(i) Groins

Groins are structures built perpendicular to the shore for the purpose of reducing longshore sediment transport, and thus sediment loss from the beach. Groins have often been used improperly, for example the gabion groins emplaced at Buffalo Beach, Whitianga, in the early 1970s have been totally useless for trapping sand or for protecting the riprap seawall behind them. T-Groins have been used effectively in the Kiel Bay in northern Germany to protect dykes and retain compartmentalised beaches. Thus while the National Research Council (1990) notes that groins used with care have the potential to stabilise artificially emplaced beach fills, Silvester (1990, p1074), who reviews the theory and efficacy of groins, concludes "it can be seen that groins achieve very little in stabilising the coast in an erosive situation". Because northern Waihi Beach is in a long term erosive situation, groins are not recommended.

(ii) Seawalls

There is considerable debate in the literature concerning the efficacy of seawalls (Kraus, 1988). The main point of the sea wall is to protect the properties behind it rather than to maintain the beach in front of it, but as Griggs and Fulton-Bennett (1988) emphasise, any protective structure built to withstand direct wave attack will probably fail eventually. Engineers commonly think in terms of a 20-30 year life span for a coastal protection structure, but it is clear that the Waihi Beach sea wall failed within 10 years.

At least in one prior case of a seawall in New Zealand, that at Omaha Beach, the near vertical seawall clearly exacerbated severe erosion rather than preventing it (Healy 1980b).

Seawalls may be constructed as solid structures or as rip-rap, a general term referring to any large rocks used for coastal protection. Advantages of rip-rap include:

- they cost less to install than concrete structures
- they do not require special drainage systems
- they are relatively easily maintained
- they absorb and dissipate wave energy
- they allow less run-up and overtopping than vertical walls.

However rip-rap revetments are subject to failure and continual maintenance, primarily because of scour at the toe and settling, undersized rock and improper placement. Settlement presents the biggest problem, and that has been evident at Waihi Beach. Reports in the literature by Griggs and Fulton-Bennett (1988) recount 5 tonne rocks buoyed up by the waves and completely transported away from the revetment, as has also happened at Waihi Beach. These authors also report relatively high maintenance costs - typically 2-15% of initial costs per year - for rip-rap walls as well as significant property damage also occurs when the walls suffer partial failure.

Concrete seawalls are commonly used in many places internationally to protect weak sediments and foundations of structures against wave attack. Most concrete walls on open coasts suffer from a number of disadvantages including:

- initial capital cost - perhaps $25,000 per lineal metre
- wave reflection and overtopping
- scour at the toe and beach in front of the wall during storms
- outflanking

On the positive side, if the walls are suitably constructed their maintenance costs may be relatively low. For such a wall at Waihi Beach the foundations would need to go to 4-5 m depth below MLWS, and the concrete would need to be some 30 cm thick and engineered to retains its stability and structural integrity eve after major loss of sand in front of the wall.

Silvester (1990, p1070) concludes that "the original erosion will continue after the construction of the seawall and will be expedited by its presence". Overall, construction of a seawall primarily to protect private properties is not recommended as an appropriate beach management practice.

(iii) Offshore or detached breakwaters

Offshore or detached breakwaters typically are constructed from rock or armour units and protect the shoreline by reducing wave energy reaching it. They promote sediment deposition in the shape of a cuspate foreland in the lee of the structure, and may even form a tombolo. The major advantage of the segmented detached breakwater is that they provide substantial protection to the shoreline without completely stopping the littoral drift, essentially by working with nature rather than against it. Unlike seawalls or revetments, the detached breakwaters aid in the retention of the beach because they reduce the concentration of wave energy arriving at the beach by wave energy reflection and diffraction. A major disadvantage is that they are expensive to construct. Research continues on the design for structures which have a crest height at about mean water level, as this reduces construction costs, as well as wave forces acting on the breakwater in a storm, because they are submerged in the storm surge.

Herbich (1990) presents the theory of segmented detached breakwaters, and concludes that they have been successful in stopping beach erosion. In cases of low sand supply, sand artificially emplaced on the beaches in the shadow of the breakwater will generally remain in place and form beach salients in the lee of the segmented breakwaters. The effectiveness of such structures depends on their design and construction in relation to the understanding off the beach wave energies and sediment dynamics.

Design considerations for such features are still largely empirical (Herbich 1990) and include the unit breakwater length(B), gap distance between units (G), and distance from the shoreline (X). Tombolos will generally form when (X/B) < 1; salients will generally form when (X/B) > 1 (Fig. 13); and segmented breakwaters are generally ineffective when (X/B) > 2.