

Buffalo Beach Homeowners Association
c/- Planners Plus
PO Box 218
Whitianga 3542

Attention: Dave Lamason, Paul Dimock and Jim Nolan

Dear Dave

Homeowners Seawall, Resource Consent Design

Further to our meeting on 24 April 2018, and as requested, we have prepared the attached Resource Consent Drawings for the proposed upgrade of the existing seawall in front of the Homeowners' Properties at the northern end of Buffalo Beach, Whitianga. This letter briefly summaries the key details of the revised seawall design, and also discusses specific questions in Waikato Regional Councils section 92 request letter dated 17 May 2017.

1 Seawall Design

The seawall concept has been modified from the concept sketches previously enclosed in our letter report dated 7 September 2016. The revised seawall concept provides a more robust seawall than the existing seawall, which includes areas of small rock both above and below the Massbloc wall, and which we understand has required additional toe rock to be placed at various times following storm events. A description of the existing seawall and details (including construction photographs) is included in our September 2016 report.

The new seawall has been designed for the 100 year return period storm event. The design allows for the following coastal design parameters (as discussed in detail in Appendix D of our September 2016 report):

- An estimated 1% AEP Storm surge water level of 1.64m AVD46 (Auckland Vertical Datum 1946);
- An estimated water level wave set-up of 0.6m;
- An allowance for predicted sea level rise of 0.38m advised by MfE for the time period up to approximately 2050 to 2059 (i.e. a period consistent with the proposed 35 year Resource Consent period),

The resulting estimated depth limited design significant wave height (H_s) is 1.5m, and has been determined assuming the beach has been eroded to its lowest historic levels of approximately -0.5m AVD46 (as determined from Council's beach cross-section monitoring profile CCS25 results).

2 Beach Footprint

To reduce any potential loss of beach area and limit the footprint of the new seawall to a similar footprint occupied by the existing seawall, the seawall slope has been steepened, to a proposed

slope of 1.5H:1V. This has resulted in the need for larger rock sizes and a thicker rock layer to compensate for the steeper slope. We note that while the rock size has increased, it is similar to the size recently used for the Council seawall toward the southern end of Buffalo Beach.

In addition, the top course of Massbloccs, will be removed from the existing seawall to allow the seawall crest to be constructed further landward. These two design changes have the result that the new seawall will occupy approximately the same amount of beach that the existing seawall does, based on the beach sand levels determined from the survey by RMS Surveyors.

The new seawall toe is proposed to extend down to a level of -1.0m AVD46, i.e. about 0.5m below the deepest estimated historic beach scour levels, to reduce the risk of seawall undermining during extreme storms. This is approximately 0.8m below the assumed level of existing toe rock, which we understand has been placed at various times in the past in response to previous storm erosion events.

Drawing 851872-04 shows the proposed seawall cross-section overlaid on the existing seawall cross-section. From this it can be seen that the proposed seawall rock should be buried beneath the sand at approximately the same location as the existing rock is, depending on the actual level of the beach at the time.. The new seawall toe will extend approximately a meter further seaward than the existing toe, but will only be exposed following significant storm events that erode the beach. For the majority of the time the seawall toe is expected to remain buried.

3 Realignment of Southern Section of Seawall

The southern approximately 50m of the existing seawall protrudes further out into the beach face than the northern and central sections do. In addition the southern 18m section of the existing wall is oriented in plan form in a direction so that any reflected wave energy from a shore normal wave striking the wall, will be reflected in a southerly direction and is likely to contribute to scour and/or transportation of sand further away from the end of the wall and to the south.

The alignment of this section of existing wall also allows wave energy from waves striking the beach from a direction north of shore-normal, to run along this section of the seawall and focus on the unprotected area of beach dune immediately to the south of the existing seawall. This unprotected area of beach dune does appear to be suffering from more erosion than the general dune line to the south, and is likely suffering the end effects of the existing seawall alignment.

To reduce the existing end effects at the southern end of the existing seawall, the southern 60m of the existing seawall will be removed in entirety, and the new seawall will form a straighter alignment aligned more shore parallel, to reduce both of the above end effects of the existing seawall. The point where the realignment will occur has been selected to allow the new seawall crest to pass close to the large existing Pohutakawa tree, without the need to remove the tree. The seawall crest rock will need to be carefully placed around the tree root structure, to preserve the tree.

The end of the new seawall will be turned sharply at a 90 degree angle and buried into the dune at least 8 metres at the southern end. We understand that TCDC propose to continue to maintain the dune with sand push-ups and dune planting at this location, as allowed under their existing Resource Consent. If dune maintenance activities were to cease in the future, and the dune eroded at this location, there may be a need to extend the seawall back further into the reserve area, or to extend it to the south to protect the full extent of the Reserve and to join onto the seawall around the property on the southern side of the Reserve.

By realigning this southern section of the seawall, the new seawall will occupy a footprint further landward than the existing seawall does (see Drawings 851872-01 and 02). At the location of the existing seawall change in direction, it is estimated that approximately 6m of additional beach area will be provided by realigning the seawall.

4 Northern End of Seawall

The most northern beach front property (Lot 8, DPS 7101), is neither part of the Homeowners group nor part of this Resource Consent application. The existing seawall fronting this property does not include a Massbloc wall section, but appears to be a conventional rock revetment seawall. The northern end of the Homeowners' seawall will be constructed to marry into the adjacent property's seawall, ensuring the two seawalls are integrated and continuous, and neither has a detrimental effect on the other.

5 Stair Access to the Beach

No private access stairs to the beach are proposed. The seawall will be constructed as a continuous rock seawall with no breaks or change in form, in order to provide a consistent degree of coastal protection.

There are two public access-ways between the Homeowners' properties, one approximately opposite the end of Kawakawa Road, and the other some 180m further south. At the seaward end of these public access ways there are existing steps that will be removed to construct a continuous seawall, and new public timber stairs will be constructed over the new seawall as shown on Drawing 851872-05. By constructing the timber stairs over the seawall (as has been done at a number of locations at the southern end of Buffalo Beach, the stairs will not result in greater wave overtopping of the seawall, that would occur if the stairs were concrete or were set down into the rock seawall. Full structural details of the stairs will be designed after the issue of the seawall Resource Consent, and can be forwarded to Council at that time.

6 Public Footpaths Northern and Southern Reserve Land

From the beach access opposite Kawakawa Road, and heading north to Macrocarpa Reserve, the minimum width of Council Reserve land between the rear of the proposed seawall crest rock armour and the front of the property boundaries has been estimated to be 1.65m. There appears therefore to be sufficient width for the construction of a nominal 1.5m wide public footpath in this location, and this could take the form of a concrete footpath constructed hard against the back of the seawall crest rock, and include a small concrete downturn at the back of the rock wall to provide improved erosion protection behind the seawall crest. This footpath could be constructed at any time, but would be more easily integrated into the crest armour if it were constructed at the same time as the seawall works. The location of this footpath is shown on Drawing 851872-02.

From the southern beach access heading south, Council have a considerably width of reserve between the back of the seawall and the front of adjacent property boundaries. Given the greater expanse of space, and the presence of two large Pohutakawa trees close to the back of the seawall, Council may choose to construct a path further back in the reserve as part of a reserve landscaping project.

7 Public Footpath Central Area

Through the central section of properties (between the two public beach access walkways), there is insufficient room between the rear of the rock seawall crest and property boundaries to construct a footpath behind the seawall without encroaching on private property. Consideration has been given to alternative footpath construction options that don't encroach landward of the rock crest as follows:

- Constructing a concrete footpath on top of the seawall rock armour is not recommended, as during significant storm events, the rock armour on the seawall will be moved by wave action, and is likely to settle somewhat. This would result in any concrete footpath on the crest armour losing support, and cracking due to differential settlement of the armour rock. In extreme storm events wave action is predicted to reach and overtop the crest rock, so any

concrete footpath constructed on the crest would suffer from wave uplift forces through the underlying armour rock.

- A piled timber boardwalk across the crest of the seawall is also not recommended, as the large number of piles required to support the walkway would result in a large number of penetrations through the underlying geotextile, significantly increasing the risk that some penetrations through the geotextile would not securely prevent the underlying sand from being eroded. If this occurred there is a risk of local loss of support for the seawall, resulting in local collapse of the seawall. A timber boardwalk constructed above the crest would also require a handrail on the seaward edge to protect against falling, which would significantly change the visual appearance of the seawall from both the beach and the adjoining properties.

Neither of the above options are recommended. All other forms of footpath constructed behind the seawall, or integrally with the seawall crest, are likely to encroach further into private property, and would require agreement of all property owners affected.

8 Section 92 request for further information

In a letter dated 17 May 2017, Waikato Regional Council requested further information relating to a number of matters regarding the original consent application. Several of the areas in question are addressed in the above points and are further discussed below, (numbering below is consistent with the Section 92 letter numbering):

Item 1) Plans

We have attached Drawings showing the revised design for the proposed seawall. Drawing 851872-01 and 03 show a plan and cross-section of the existing Massbloc and rock seawall. Drawings 851872-02 and 4 show the Plan and cross-section of the proposed revised seawall design. Note the southern section of existing seawall (where there are currently no Massbloc units) will be completely re-built in a new landward location as discussed above.

Item 2) Beach Encroachment Effects

The revised seawall design reduces beach encroachment as discussed in Section 2 and 3 above. The realignment of the southern section of 60 m of seawall will also result in returning some area occupied by the existing seawall to the beach, with improved high tide access in front of this section of seawall.

Item 3) Coastal Process Effects

The proposed seawall and particularly the orientation and location of the southern 60 m of seawall has been realigned landward and straightened to be more beach parallel, in order to reduce the seawall end effects at the southern end of the seawall. This is discussed in detail in Section 3 above.

Item 4) Public Access Effects

Seawall encroachment onto the beach area has been reduced (see Section 2 above), and public access on the beach in front of the southern 60 m of new seawall will be enhanced by the realignment of this section up to 6 m landward of the existing seawall location.

New timber stairs are proposed at the seaward end of the two public access walkways to the beach. These stairs will be constructed above and over the seawall so as not to reduce the effectiveness of the new seawall.

Item 6) Backstop Wall Protection

The existing seawall is inadequate to survive the design storm without damage. It contains many areas of smaller rock, particularly in the section above the Massbloc wall, which is unlikely to provide adequate protection in a design storm, and may result in undersized rock being pulled out by wave action onto the beach face. The land behind would not then be adequately protected. A backstop wall was not considered, due to the need to reconstruct the existing seawall to reduce the risk of storm damage.

Item 7) Stairs

All existing private access stairs are to be removed and only two sets of public access timber stairs are proposed to be constructed over the seawall.

Item 13) Construction Effects

Construction of the new seawall will require a detailed construction methodology, determined in association with the preferred Contractor. Key components will include working around the tide, site access, stockpile areas, access to the beach, site fencing and protection of the public, health and safety and quality control. While this detail needs to be determined in conjunction with the Contractor, at this stage the proposed construction methodology is envisaged as follows:

- Site access for machinery and materials delivery is likely to be via the southern public accessway to the Council Reserve at the southern end of site, and from Macrocarpa Reserve at the northern end of the works. Both reserves are likely to be used for stockpiling materials and storing plant and machinery when it is not working on the beach.
- Contractor's areas on both reserves will be agreed with TCDC, and all damage to reserve and accessways will be reinstated to the satisfaction of TCDC.
- Machinery in the form of large excavators and front end loaders or similar, will work from the beach to progressively construct the new seawall.
- Construction on the beach will take place at low tide on days when that coincides with working hours and the area of the works will be fenced off with temporary fencing to protect the public.
- All sand excavated from the footprint of the seawall will be placed on the beach, and will be replaced over the constructed section of seawall toe following construction of each section.
- Access to the beach from the Reserve areas will be using temporary rock and sand ramps from the reserve ground level to the beach. For the southern Reserve area, the ramp will be constructed within the area where the seawall will be buried back into the dune system, as this area will be disturbed to construct the seawall return. Access to the beach from Macrocarpa Reserve will be using a temporary sand ramp.
- Construction will take place progressively along the seawall, with small sections anticipated to be up to 20 m in length being reconstructed at a time. If storms are predicted, any areas of existing work should be complete prior to the storms hitting, and the Contractor will be responsible for protecting all completed work from storm damage.
- The top section of the seawall works will require a smaller excavator working from the top of the seawall, excavating existing undersized rock and preparing the top section of the seawall in advance of placing the new rock. Access for these works will be from adjacent private property, or public reserve land where appropriate.

- Any existing rock which complies with the size specification for the new seawall, should be sorted and mixed with additional imported rock and included in the construction where practical.
- All unsuitable rock excavated from the existing seawall, will be removed from the foreshore and disposed off-site.
- At the end of each day's work on the beach, all completed work areas will be covered by beach sand and the area where beach sand is reinstated over the new toe rock, will be fenced off with construction tape until the beach sand becomes firm enough to walk on. This is expected to require two high tides after each section is constructed.

The construction of the upgraded seawall and new public access stairs is expected to take approximately five months to complete, and the most significant construction effect during this time will be a restriction on public access to the area of the beach where the works are taking place. The works area will be fenced off and beach users will need to walk past the works site, lower down the beach slope, when the works are taking place. There will be times when the level of the tide and the Contractor's extent of area fenced off for public safety will result in the public not having access past the works site.

As the works site consists entirely of beach sand, and all excavation is envisaged as being in beach sand, no loss in water quality from silt or clay contamination is anticipated.

Yours sincerely,



Grant Pearce
Senior Coastal Engineer

18-Jul-18

t:\tauranga\projects\851872\workingmaterial\180710gwp.letter.docx