

16 July 2025

Attention: Bevan Hudson

Dear Bevan

Glen Isla Reserve Coastal Protection Structure
Coastal Engineering Review

Introduction

Beca Ltd has been engaged by the Western Bay of Plenty District Council (WBOPDC) to review and provide comments on the Engineering Design Report and Assessment of Coastal Processes Report prepared by Davis Coastal Consultants on behalf of Coastal Protection Project for Glen Isla Protection Society (GIPS), for a proposed 200m long rock revetment seawall at Waihi Beach.

The review is structured around the key sections of the proposals with relevant parts reviewed under the respective heading in the sections below. Specific aspects of the assessment that require further clarification or supplementary information to support its findings are presented and discussed.

A site visit was conducted on 30th October 2024 to gain an appreciation of the subject site and surrounding landscape. The visit aimed to better understand the extents and footprint of the proposed sea wall, as well as the access to the site for construction.



Figure 1, Proposed layout, including the 2 distinct sections as referenced in the submittals

Review Findings

Coastal Processes

A key feature of the geomorphology affecting the frontage and the coastal processes is the presence of the Three Mile Creek and the associated groynes.

The Coastal Processes Report states that typically, the location that a watercourse exits through a dune system is associated with greater dune fluctuation and, on average, a retreated shoreline. There is often significant loss of the adjacent dunes due to channel wander and beach lowering of the outlet channel. The wander is caused by wave driven beach sediment transport dominating the stream transport at most flow regimes. The wandering channel can directly erode the dunes on either side. In addition, lowered beach level associated with the channel, allows larger waves closer to the dune line and less dissipation of swash, and these factors exacerbate dune erosion adjacent to the watercourse. The flowing watercourse then provides a ready mechanism to transport eroded material from the base of dune. At Three Mile Creek, this recess in the dune line is clear.

The report goes on to describe how the water course is an artificial man made and artificially maintained stormwater outlet through the dunes. One of the most obvious indicators of this, is that even with the increased piped flow to the outlet through the establishment of urban infrastructure, it still requires groynes and manual clearing (typically monthly and after storm events) to maintain flow. If the groynes and manual clearing of the channel did not occur the channel would block and become closed.

Although the recess within the dunes and shoreline is indeed clear at the location of the outlet, it is also clear from the figures in the report that since the groynes and training walls were installed, the frontage in front of Glen Isla Reserve has in fact been accreting.

This accretion is as would be expected with the channel training walls preventing the meandering of the channel, the groynes trapping the beach sediment, and the frequent clearing of the channel topping up the beach profile in front of the properties.

Therefore, the key statement made in the Coastal Processes Report, justifying the need for the proposed protection structure, that the area around the outlet has a higher risk of erosion than the surrounding beach frontage, is not supported within the evidence provided since the existing control structures were constructed. The surrounding beach frontages are further seaward with a lesser extent of beach profile fronting the dunes, and as such, since the addition of the channel training walls and groynes, the adjacent beach frontages are much more at risk of erosion and reactive to storm events than the area adjacent to the outlet. This is also clear within the figures and photos presented within the report.

The Coastal Processes Report also references the Tonkin & Taylor, 2015, Coastal Protection Areas Re-assessment Stage Two Report, which sets out the Coastal Erosion Hazard Zone (CEHZ) definitions for the full frontage of Waihi Beach. Within this report the probability distributions are plotted to present the risk of erosion and realigned coastline over the 50 year and 100 year timescales. The plots presented suggest the Glen Isla Reserve properties as being at a primary risk of erosion within the 50 year time period. However, the Tonkin & Taylor report goes on to caveat the results that they have not considered the presence of the manmade control structures within the Three Mile Creek outlet. Therefore it is considered that for this specific location, the Coastal Erosion Hazard Zone definition is not a valid assessment for the risk associated with these properties as the existing defences are ignored.

The above point can then be extended to section 3.11 of the Coastal Processes report wherein the Future Beach Position in relation to the proposed structure is presented. In the assessment the beach profile was assumed to translate horizontally at a uniform rate between present day and the design CEHZ lines, but as described above, the CEHZ lines are not applicable given the presence and effects of the existing outlet structures, and therefore this analysis and forecasted beach retreat is not supported..

Therefore the existing training walls, groynes and channel clearing are already providing a level of protection to this frontage in the vicinity of the outlet (See Type 2 section in Figure 1), meaning the justification for the full extent of the proposed wall is not supported as long as the existing structures are maintained. The Three Mile Creek acts as a drain to the low land behind the beach, and must be actively managed and maintained to prevent flooding to the properties. Currently the control structures only have a consent until 2032, however it is difficult to imagine that after this date the maintenance and management of this creek will cease given the potential flooding implications of such a decision.

The applicant cites the risk of the control structures not being maintained beyond the 2032 consent expiry as rationale for the extensive placement of rock armour along the “Type 2 nearly permanently Buried” frontage.

Options Assessment

As discussed above within the coastal processes section, the existing structures, and sediment inputs from the Three Mile Creek in this location mean that the conditions in this location differ from elsewhere along the Waihi Beach frontage.

In this proposal, there are two distinct sections, (see Type 1 and Type 2 in Figure 1) the level of risk and exposure between these two sections is different, and therefore the management solution for each section should be considerate of this.

Type 2 Section

The Type 2 section, where the proposed structure will be ‘near permanently buried’, has an accreting shoreline, supported by the existing groynes, and fed by a sediment supply boosted by the frequent channel clearing works. This has led to the development of a new dune system, which can clearly be seen in the historical imagery and shoreline positions as infilling the recess that was created at Three Mile Creek prior to the control structures being installed. This development could be supported and boosted with management and planting to help further increase dune levels and establish a more resilient dune system to better accommodate future climate and sea level change. The Options Assessment discusses the difficulties of creating a soft engineering solution that creates a more seaward average dune position, relative to the adjacent shoreline, and this is accepted, however in the case of the Type 2 section, this softer engineering approach can be applied without extending the dune line forward of the wider Waihi Beach shore line as currently this section is recessed.

Type 1 Section

The Type 1 section (see figure 1) is further seaward and more exposed and at risk from fluctuations in the beach profiles due to storm response, which is much more representative of the issues discussed in the options assessment of the Design Report. (However this length of frontage reflects only one third of the frontage covered by the proposal). The design and form of structure for the Type 1 frontage is appropriate for the setting and environment, however its alignment creates questions that we consider needs further justification for us to be able to support. Currently there is a 5-6m offset between the property boundary, and the revetement structure. The applicant has stated that this offset provides a corridor for pedestrian access behind the defence at times in the future when high water and low beach levels prevent access along the beach. This is in contraction to the objective of planting and management of the dune system that is proposed to be reinstated over the structure as foot traffic is very damaging to typical dune grasses, and would require the property owners to accept a public right of way along their boundary.

Furthermore, by locating the structure 5-6m further seaward to achieve this corridor results in the structure being exposed more quickly in the design life of the structure and for longer periods. Once the front face of the rock structure is exposed it is unlikely that the dune environment on top of the structure will be sustainable as the sand will be more exposed to the wind, and will be able to collapse down into the voids

within the rock armour that will have been washed out during the exposure. The wind blown sand that would normally feed the dune system will also be isolated from the dunes on the top of the structure by the height differential, further reducing the ability for the system to be sustained, regardless of the corridor behind.

By locating the rock structure further back along the property boundary, the performance as a line of defence for the property is maintained, however the time taken for the structure to become exposed will be extended. This reduces the impact of the structure on the coastal processes, allowing the dunes and sand in front of the structure to absorb and naturally recover from storm events for a longer period before sea level rise reduces this capability, and reducing the 'end effects' expected at the southern end of the structure.

In summary we do not agree that the options assessment provides an optimal solution for both sections of the frontage covered by the application. Particularly when the construction impacts to the existing reserve area and dune system are considered. However, the likelihood that the proposed Type 2 structure will be permanently buried means that post construction, the impact that it has on the coastal processes will be negligible, and as we are not here to comment upon the cost/benefit of the proposal, this element of the proposal could be accepted.

New Zealand Coastal Policy Statement 2010

The New Zealand Coastal Policy Statement 2010 (NZCPS) guides councils in their day-to-day management of the coastal environment. The below policy extracts are presented as being relevant to the project, and require due consideration;

Policy 26 Natural defences against coastal hazards

- (1) Provide where appropriate for the protection, restoration or enhancement of natural defences that protect coastal land uses, or sites of significant biodiversity, cultural or historic heritage or geological value, from coastal hazards.*
- (2) Recognise that such natural defences include beaches, estuaries, wetlands, intertidal areas, coastal vegetation, dunes and barrier islands.*

The for the Type 2 frontage, it is not considered that the above clauses have been adequately considered as the support and management of the existing dune system to provide the coastal defence has not been considered for this recessed section of frontage.

Policy 27 Strategies for protecting significant existing development from coastal hazard risk

- (3) Where hard protection structures are considered to be necessary, ensure that the form and location of any structures are designed to minimise adverse effects on the coastal environment.*
- (4) Hard protection structures, where considered necessary to protect private assets, should not be located on public land if there is no significant public or environmental benefit in doing so*

The hard structures being proposed are not considered to be minimized in the current proposals due to the landward extent of the Type 2 frontage that passes through the reserve area.

Given that the structures will be 'near permanently buried', they could be significantly, if not wholly , located below the back yard of the properties. This would provide much less impact on the coastal beach processes as the structure would be further landward and exposed less than in the currently proposed location. It would reduce the disruption to the natural environment of the reserve area, whilst providing the same "backstop" line of defence. Under this scenario, with the structure being exposed much less than the existing position, the type of structure could be revisited to consider a structure with a smaller footprint, such as a vertical

structure, or a stabilized sand wall (as currently proposed for the southern return wall) as it would only be exposed temporarily under extreme conditions in the future, rather than becoming a permanently visible feature along the coastal edge.

Design

Beyond the justification for the extent of the layout discussed in the previous sections, the design of the proposed section is sound and inline with best practice for rock structures. Despite this, there are two main impact areas that would be expected to occur around rock armour structures in this environment, both of which are clearly observable elsewhere on Waihi Beach with similar rock structures:

End Effects

End effects are the primary risk whereby the sediment transport feeding the natural dune systems to the South of the structure is interrupted in some conditions (wind and/or storm conditions) causing erosion. The design currently allows for 20m of landward recession at the southern end of the structure. However, the design is only to protect the Glen Isla properties from outflanking of the defences, rather than reducing the recession of the shoreline through soft engineering practices to minimise the impact of the proposed structures on the adjacent shoreline.

Beach Lowering

Later in the design life, with the onset of sea level rise the width of the beach will be reduced and the structure will become exposed with greater frequency. This may mean that the beach will be lowered due to wave energy reflecting from the structure (as can be observed occurring from similar structures elsewhere on Waihi Beach), and once exposed the capability for the dune system to recover is greatly reduced. It is stated in the report that once this occurs, there is no plan or intention to reinstate the dune system.

Public Submission Responses

Below are the summarized key topics of the public submissions on the proposals;

- **Concerns about rock structure impacts on the beach** – The key risks are described in the section above such as can be already witnessed occurring on Wahi Beach.
- **No Consideration of Softer Engineering** – Discussed earlier in this review
- **Flooding risk** – The concern that the structures will increase flood risk to other areas up Three Mile Creek, is not supported. If there is adequate erosion to expose the rock structure, there would be significant cliffing in the same location without the rock structures. Cliffing or rock structures will have the same effect on directing surging water. So whether or not the risk exists under certain conditions is unchanged by these proposals.
- **Damage to Properties during construction** – Valid concerns based on previous damage from similar works on the frontage. Adequate construction risk management plans need to be created including pre and post surveys and responsibilities to be agreed.
- **Compromises access and use of the beach** – Any noticeable impact to the access or use of the beach would only be a result of significant erosion following a very large storm event, or in the 50yr timeframe following increases in sea level rise narrowing the beach profile. Visual impacts of the appearance of the rock armour is valid will happen much more quickly.
- **NZ Coastal Policy Statement 2010** – Discussed earlier in this review.

Conclusion

We consider that the landward extent of the Type 2 structure is unjustified on the basis that the existing groynes and channel training walls remain in place. A significantly shorter hard structure layout between properties 12-15, and then a natural dune management approach for properties 13, 11 & 9 would create much less disturbance to the natural environment during construction, at a lower cost. However, as this ‘type 2’ section will be near permanently buried, its impacts on the coastal processes following construction will be negligible.

For the “type 1” length of the proposed structure, once exposed it will result in negative end effects causing recession to the adjacent reserve. This recession has been acknowledged and accommodated in the design of the protection of the Glen Isla properties, but steps to mitigate this recession and protect the reserve from the adverse effects are lacking in the submission. In addition to the negative end effects, once exposed there would also be localised beach lowering to the zone fronting the exposed structure as a result of wave reflection. Examples of this occurring can already be witnessed from similar exposed rock structures along the Waihi Beach frontage.

We acknowledge that a hard structure is justified for coastal protection along the Type 1 section, and that the structure is appropriately designed. However we consider that its alignment should be adjusted to comply with the NZ Coastal Policy Statement in that hard structures should be designed to “*minimise adverse effects on the coastal environment*”. Locating the structure at least 5m landward to the property boundary would reduce the impact that the hard structure has on the beach, coastal environment, and end effects on the area to the south.

This can be achieved by removing the 5m corridor behind the structure where fronting properties 12, 14 and 16 to align the back of the structure with the property boundary as shown by the red line in the figure below.

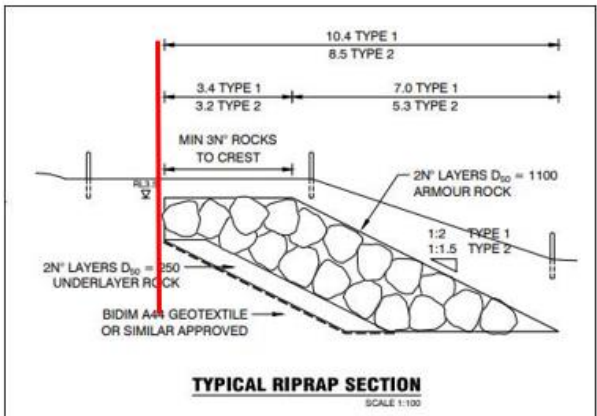


Figure 2, Suggested adjustment to the proposed design to reduce impact of the structure on the coastal environment

Yours sincerely



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on behalf of

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