BEFORE THE WESTERN BAY OF PLENTY DISTRICT COUNCIL

IN THE MATTER OF	of the Resource Management Act 1991
AND	of a resource consent application by Glen Isla Protection Society Inc. under section 88 of the Resource Management Act 1991 for the activities associated with the construction and use of a coastal protection structure

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STATEMENT OF EVIDENCE BY CRAIG DAVIS

25 JULY 2025

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1. INTRODUCTION

1.1 My full name is Craig Jonathan Davis.

1.2 I have a Bachelor of Civil Engineering Degree from the University of Canterbury (1984).

1.3 I am a Chartered Member of Engineers New Zealand (CMEngNZ) and registered as a Chartered Professional Engineer (CPEng) under the Chartered Professional Engineers of New Zealand Act 2002. I am on the New Zealand register of the International Professional Engineers (IntPE(NZ)) and I am a member of the New Zealand Coastal Society.

1.4 My previous work experience includes 35 years post graduate experience in civil, structural and coastal engineering.

1.5 I am currently employed as Principal Coastal Engineer with Davis Coastal Consultants, a specialist coastal engineering and planning practice founded in 2002.

1.6 I have assessed coastal processes, designed, obtained Resource Consent and monitored construction of well over 50 seawalls. I have designed seawalls and monitored construction of sea walls in most materials including rock rip rap, concrete, timber, stabilised sediment, sheet piles, rock and concrete masonry. I have been involved in the repair and replacement of gabion basket seawalls and used this product within non-coastal environments.

1.7 I have been involved in dune renourishment, drafting the Orewa Beach renourishment management plan and overseeing beach renourishment at Orewa, St Heliers, Mission Bay and Kohimarama.

1.8 I have designed and monitored construction on numerous dune rehabilitation and reinstatement projects including at Omaha Beach, Orewa Beach and many dune replanting projects on the Hibiscus Coast.

1.9 I have previously designed and had construction supervision in the provision of rock and rock revetment seawalls buried with sand and replanted with dune plants. In particular I was involved with, and have monitored over decades, a buried rock revetment backstop wall at Arundel Reserve at Orewa Beach.

1.10 More recently I have designed and monitored construction of backstop walls to nourished beaches at Shelly Beach on the Kaipara and within the Whangateau Harbour.

1.11 I have previously appeared in Resource Consent Hearings and the Environment Court to provide expert evidence.

2. CODE OF CONDUCT

2.1 I confirm that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023. I have complied with the Code of Conduct in preparing this evidence and agree to comply with it while giving oral evidence before the Hearings Panel.

2.2 I confirm that the issues addressed in this brief of evidence are within my area of expertise, except where I state that I have relied on the evidence of other persons. I have not omitted to consider material facts known to me that might alter or detract from the opinions I have expressed.

3. SCOPE OF EVIDENCE

3.1 My evidence provides an assessment of the coastal processes and engineering aspects of the application.

3.2 My evidence should be read in conjunction with and includes the following:

3.2.1 Coastal Protection Structure for Glen Isla Protection Society – Engineering Design Report Revision B dated October 2024 (The Design Report)

3.2.2 Coastal Protection Structure for Glen Isla Protection Society – Assessment of Coastal Processes, Revision B dated October 2024 (The Coastal Process Assessment)

3.2.3 Coastal Protection Structure for Glen Isla Dune Waihi Beach – Construction Methodology Statement Revision C dated November 2024 (The Construction Methodology)

3.2.4 Memorandum – Section 92 RC14513, Coastal Engineering Aspects Dated 15 May 2025 to Mitchell Daysh (The Section 92 Memorandum)

3.2.5 Drawings entitled Coastal Protection Project, Glen Isla Dune, Waihi Beach and Numbered 23028 Sheets 01- 04 Rev -

3.3 My Evidence is structured as follows:

(i) Description of the Site

(ii) Description of Beach Monitoring at the Site

(iii) Description of Coastal Processes

(iv) Extent of Beach Fluctuations

(v) Definition of the Erosion Issue to be addressed

(vi) Description and Design of the Proposed Protection, including options considered

(vii) Description of the Proposed Construction Methodology

(viii) Discussion of Effects of the Proposal

(ix) Comments on Submissions

(x) Comments on the Council's s42A report and supporting assessments

(xi) Responses to Mr Clarke's peer review

(xii) Conclusions

4. SITE DESCRIPTION

4.1 The site is described and coastal processes are set out in detail in the Coastal Processes Assessment.

4.2 Waihi Beach is an approximately 10km long, open-coast Holocene barrier beach orientated north-east. Small fore dune systems characterise the shoreline where there is no development.

4.3 Waihi Beach Township has been constructed primarily along the northern three kilometres of the barrier, with residential development most seaward between one and three kilometres from the northern end. Housing is seaward of the most seaward road through this section.

4.4 This built development is within the active range of typical dune fluctuation during large storm events and at periods of low foreshore levels.

4.5 The site is at the southern extent of this seaward residential development, and is immediately south of Three Mile Creek, a watercourse discharging onto the beach.

4.6 The site is characterised by a gently sloping intertidal area (approximately 1:17) which rises slowly to an unarmoured, narrow, vegetated bank.

4.7 The seven beachfront residential properties owned by the Applicants (the GIPS properties) are located landward of the narrow frontal dune, at an elevation of approximately Relative Level (**RL**) 4.0-4.5m. All levels referred to as Relative Levels are in terms of New Zealand Vertical Datum 2016.

4.8 The current vegetated extent of the back dune system at the site is approximately 20m wide at the northern end and narrows to approximately 4m wide in front of 12 and 14 Glen Isla Place.

4.9 At the northern end of the site, the dune slopes from RL4.5 at the bank crest to the foreshore at RL3 at approximately 1:16. At the southern extent of the site, the dune is comprised of a recovering storm scarp and slopes more steeply at 1:4 from RL4.5 to RL3 towards a sandy beach which is approximately 100m wide at low tide.

4.10 Ground level falls landward of these properties to approximately RL2.5 at the houses at the rear of the subdivision. Glen Isla Place is at approximately RL2.2 and Seaforth Road RL2.5.

4.11 A bund extends along Three Mile Creek at approximately RL3.0 except for a gap of approximately 6m adjacent to the road, where ground level drops to RL2.4

4.12 Three Mile Creek comprises the northern extent of the site. The Creek discharges via twin geotextile training groynes across the upper intertidal area and foreshore. The banks of the creek are armoured up past the site for approximately 120m to the road bridge.

4.13 At Waihi Beach, four "creeks" or stormwater courses discharge through the dune system onto the coast, the largest being Two Mile Creek and Three Mile Creek.

4.14 The line of the vegetated backshore dunes is recessed at all creek outlets, consistent with the expected morphology of watercourse outlets or creek mouths.

4.15 The groynes at Three Mile Creek have allowed the recess in the dune line to improve but as can be seen in Figure 1, below, the shoreline remains recessed at this location.

4.16 Immediately to the south of the site is over one kilometre of reserve land. Adjacent to the site , the reserve is over 170m wide between the roadand shoreline, without significant built development.

4.17 This width of undeveloped backshore is such that normal dune fluctuation can occur and not pose a threat to development.

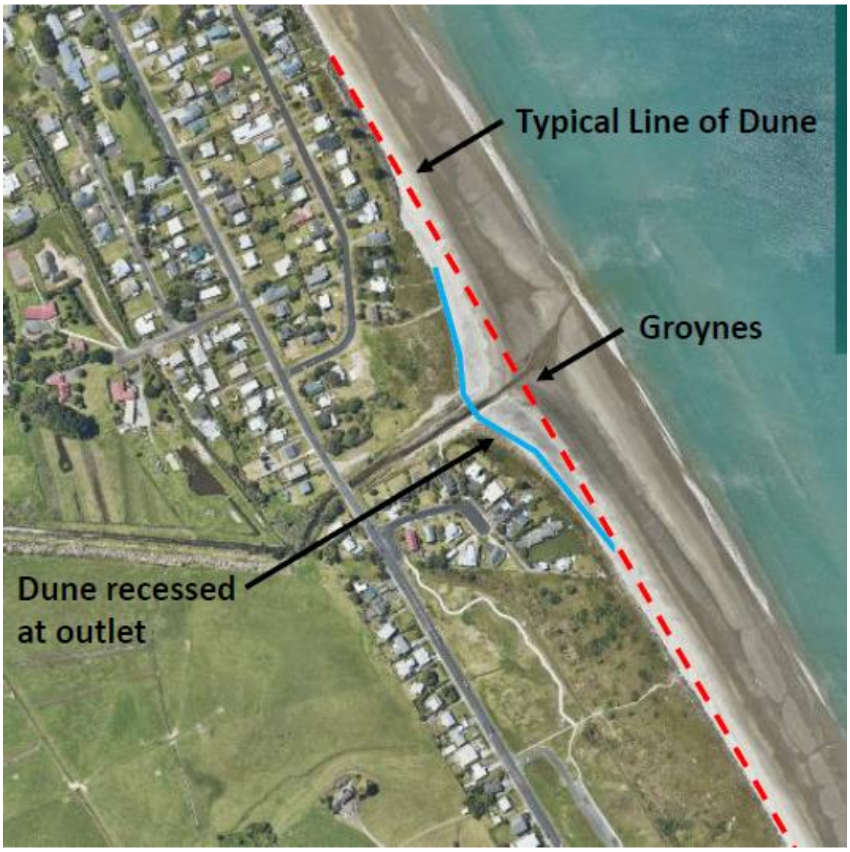

Figure 1 – Recessed shoreline at site

4.18 Over one kilometre of the dune front, north of Three Mile Creek, is armoured with a Consented rock rip rap revetment that was constructed in 2010 and 2011. A number of these properties had less engineered armouring before this time.

4.19 The revetments at these properties have been constructed at or seaward of the hightide line. This results in them being very visible and there being little or no dry sand in front of these walls at high tide.

5. BEACH MONITORING

5.1 Beach monitoring in the form of cross-section level surveys has been undertaken at the beach for many years, with a record from 1978 and more regular monitoring from 1990. There are long term sites immediately north and south of Glen Isla Place and profiles were surveyed at three sites at Glen Isla for a period of six years.

Figure 2 – Beach Monitoring Sites

5.2 Comment on work done assessing monitoring data is addressed in the Coastal Process Assessment.

5.3 The data records the extent of typical beach fluctuation over a long period. It has been used to provide guidance on placement of structure and dunes such that they are unlikely to be affected by short to medium term fluctuations in beach position.

6. COASTAL PROCESSES

6.1 Mean High Water Springs at the site (MHWS) was determined (Davis Coastal Consultants Memorandum – Location of Mean High-Water Springs, 28 March 2024) to be at RL1.0.

6.2 The physical location of MHWS varies with beach level but is located seaward of the dune scarp and vegetation. The proposed works, including the sea wall and dune rehabilitation, are all landward of MHWS.

6.3 During storm events water levels become higher due to lower atmospheric pressure and the effect of onshore wind energy "pushing" water towards the coast in an effect called storm surge.

6.4 Storm tides can be defined as tides that include the effects of storm surge and these represent the highest range of water levels experienced in coastal regions in decadal time scales.

6.5 Storm tide levels have been modelled by NIWA for the Bay of Plenty Regional Council and, to one decimal place, are as set out in Table 1 below.

	1% AEP	**2% AEP**
Storm Tide Level	**RL2.0**	**RL1.8**

Table 1 – Storm tide levels for the site

6.6 Offshore maximum deepwater significant wave height has been modelled by NIWA in 2013 and Royal HaskoningDHV in 2021 and was found to be 5.3m high with an 11.3 second period.

6.7 The deep-water wave is reduced by breaking before acting on the shoreline and becomes a function of water depth. At current maximum water levels, wave height is in the order of 1.7m.

6.8 However, with sea level rise the incident wave height will increase as set out in Table 2. The table includes an allowance for "Set-Up" which refers to wave set up which is the increase of water level resulting from onshore wave action.

Summary Breaking Depth and Wave Height				
2024 Shoreline		WL	d_b (T=11)	Hb_S Stive
		Water Level	Depth of Breaking 11sec wave period	Breaking Wave Height
$WL_{current}$		2	1.1	0.9
WL_{50yr}		2.5	1.8	1.5
WL_{100yr}		3.1	2.6	2.1
$WL_{current}$ +Setup		2.7	2.1	1.7
WL_{50yr} +Set Up		3.2	2.7	2.2
WL_{100yr} + Set up		3.8	3.4	2.8
2065 Shoreline				
WL_{50yr}		2.5	3.3	2.7
WL_{100yr}		3.1	4	3.3
WL_{50yr} +Set Up		3.2	4.1	3.4
WL_{100yr} + Set up		3.8	4.8	4

Table 2- Depth Limited Wave Height

6.9 Sea level rise and associated coastal retreat has been assessed for, and values for shoreline retreat adopted by, the Western Bay of Plenty District Council (Tonkin & Taylor 2015). They result in Coastal Erosion Hazard Zones (CEHZ) being defined, a likely (66% chance of exceedance) for 2065 and a conservative maximum (5% chance of exceedance). The plotted hazard zones shown in Figure 3 below show that all the GIPS properties are within the Coastal Hazard Area likely to be exceeded by 2065.

6.10 Advice and governmental guidance on provisions for sea level rise have been updated several times since 2015.

6.11 The most recent guidance "Coastal Hazards and Climate Change Guidance MfE 2024 provides likely increases in sea level for five scenarios for future climate management. These values have been incorporated into the online NZ Sea Rise portal along with effects of (VLM) vertical land movement.

6.12 Comparison of that guidance with the numbers adopted by the WBOPDC shows that the most conservative long-term rates adopted are very similar to the average or most likely outcomes shown on the Takiwa tool.

6.13 Given the uncertainty of the sea level rise values and resultant retreat extent, the existing values adopted by WBOPDC are considered current.

Figure 3 – Coastal Erosion Hazard Zones WBOPDC

6.14 In assessing the site and the proposal over the next 100 years, the beach has been assumed to retreat uniformly over time from a current alignment to the location predicted in 100 years by the CEHZ line.

6.15 This is a conservative assessment for coming decades. Sea level rise is occurring at an increasing rate and using a uniform approximation over predicts the initial rate of sea level rise. With reference to Figure 4, below, a uniform rise assumption (blackline) predicts a 450mm rise in 35 years (2060) compared with the actual predicted rise (red line) not reaching this level until 12-15 years later.

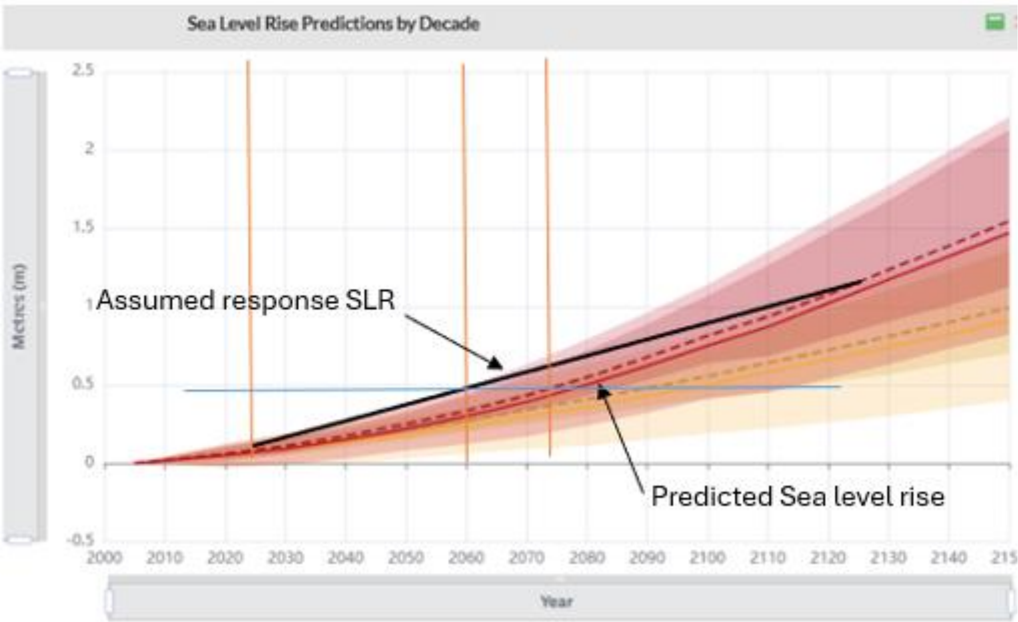

Figure 4 – Comparison of Uniform SLR Assumption against predicted

6.16 The assumptions around sea level rise are based on emission scenarios that are accepted in the MfE guidance and internationally as being in excess of the current path, and unlikely.

6.17 However, these assumptions are appropriate when using a precautionary approach for developing planning documents such as developing Hazard Zones.

6.18 Predictions of wall exposure within the Engineering Design Report are based on the defined hazard extents with the additional conservatism of the uniform retreat rate assumption.

6.19 These assumptions are therefore conservative which is appropriate for the engineering design which should allow for a worst case scenario.

6.20 However, when assessing the actual and potential future effects the predicted exposures should be considered unlikely and over predictive of negative exposure.

6.21 Table 3 below sets out the wall exposure as predicted within the Engineering Design Report with the timeframes given there, which are the best estimate of timeframes if shoreline retreat occurs in accordance with assumptions of the defined Coastal Hazard Assessment lines. In addition, an assessment of more likely timeframes has been provided based on a more likely emissions scenario RCP4.5 and comparison of historic response of the beach. The timeframes in the "Realistic " Time frames are overlapping indicating the progressive and uncertain nature of the beach retret and consequent wall exposure.

Conservative Timeframe	**"Realistic" Time Frame**	**Wall Exposure (Southern End)**
0-10 years	20-30 years	Wall buried. 1-2 possible exposures of upper 1-1.5m. Structure reburied by natural processes.
10-20 years	25-35 years	Top of 1m wall exposed for long periods. During storms upper 1.5-2.0m exposed but all but upper 1m covers back up.
20-30 years	30-40 years	Upper 2-3m of face of wall exposed at all times. High tide

		may reach structure in large storm events.
30-40 years	35-45years	MHWS at base of wall. Access in front may become limited for 1-2hr around high tide.
40-50 years	40-60 years	High tide at wall. Scouring during storm events may threaten toe and remedial works to toe may be required. Over topping may require raising wall crest.
50 -100 years	50 -100 years	With beach retreat and sea level rise as predicted, significant upgrade may be required on the wall including increase in outer armour size which could be overlayed on the outer face. Foundation would need to be lowered or improved. Over topping may require raising wall crest.

Table 3- Wall Exposure

7. EXTENT OF BEACH FLUCTUATION

7.1 The width and location of the sand beach at Waihi Beach fluctuates over time. Short term variations are associated with prevailing wave conditions. Typically, the sand is lost from the upper foreshore and the frontal dunes are eroded during onshore wave events with sand deposited further seaward. Some transport along the beach can also occur in these events depending on the direction of wave approach.

7.2 During calmer periods the foreshore then rebuilds and sand is also supplied to the foredunes. The rebuilding of the dunes is at least in part aeolian, and the process is facilitated by dune binding vegetation and backshore wind protection, typically vegetation.

7.3 At Glen Isla the presence of the Three Mile Creek outlet results in the dune line more retreated. This is the result of a number of factors but primarily a deeper scoured intertidal and lower tidal area, especially at storm events, resulting in increased wave height in this location. These stream mouth effects make the shoreline and properties adjacent to the beach more susceptible to erosion.

7.4 With reference to paragraph 4.14 above he groynes help mitigate these effects but the shoreline is still recessed at this location.

7.5 Conversely, the placement of sand dredged from the mouth of Three Mile Creek aids in the speed of recovery of this area following storm events.

7.6 The extent of the erosion of the dune is determined by both the severity and duration of the storms but also the existing condition of the beach at the time of the event. Large retreats of dune systems tend to be associated with periods of stormy weather rather than single events.

7.7 The retreat of the dune at Glen Isla associated with the recent Cyclone Gabrielle and Hale storm sequence resulted in the most retreated dune face on a 35-year record at the nearest (650m) monitoring site south of Glen Isla.

7.8 However, as set out in the Section 92 Memorandum, there is approximately a 70% chance that the 1 in 100 year storm has not occurred during the 35 years of monitoring.

7.9 The Section 92 Memorandum also notes that previous studies at the beach have determined that ... "*the maximum storm cut dune line erosion ranges from 30-35 metres (50-year likely return period erosion and 35-40m (100-year return period erosion).*" (Eco Nomos 2003)

7.10 A Western Bay of Plenty District Council (WBOPDC) report (T&T 2015) assessed the short-term retreat bound as 20m. A more recent WBOPDC report (T&T 2025) has assessed that a 5-35m storm cut has a 5% chance of occurring within the next 10 years and confirms that this aligns with the Eco Nomos report.

7.11 The report defines greater storm cut for the more southern beach with a maximum adopted short term storm cut at Glen Isla of 18m. That is, there is a 5% chance of an 18m storm cut occurring in the next 10 years. There is a 22% or over 1 in 5 chance of such an event occurring over the next 50 years

7.12 The typical design life of a building to the New Zealand Building Code is fifty years and a 22% chance of failure within the design life is unacceptable. Therefore, whilst the 18m allowance represents the best estimate currently available for the site for a 10 year period, and it is appropriate as a component within a long term hazard assessment. It represents a considerably greater likelihood of failure than is acceptable for design of a building.

7.13 A 2-5% chance of failure over 50-years would be more in line with the typical risks acceptable in building design.

7.14 The predictions for each beach cell are based on statistical relationships of storm cut derived for the monitoring data. Because intense storms are rare there is little data on these and so the data may be skewed by the smaller storm events that tend to be from the prevailing wave direction. Very large cyclone-based storm events may not be well represented by the data to date. On this basis care needs to be taken in being too definitive with predictions.

7.15 The monitoring data for the adjacent site (CCS49) shows a variation of the dune line, as represented by the RL3.0 contour, of 13m over the 34-year record. This includes longer term events as well as storm cut however, provides a useful context for accepting a maximum retreat.

7.16 An approximation of the scale of the effect of storm cut is shown in figure 5, derived by taking the cadastral boundary, which sits at or about the vegetation line, and offsetting it 35-40m. A storm cut of 18m would clearly be approximately half this set back.

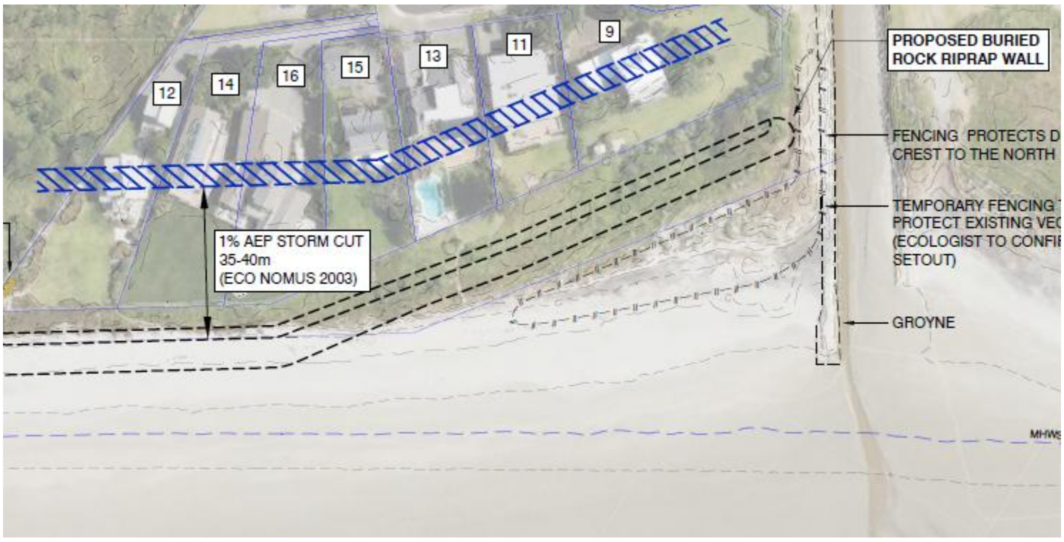

Figure 5 – Approximation of Scale of 1% AEP Storm Cut

8. EROSION ISSUE

8.1 The erosion of the backshore creating the need for protection of the backshore area can be considered in two parts:

8.1.1 Protection from large event short term storm cut erosion

8.1.2 Enduring protection as the shoreline retreats due to climate change driven sea level rise. Sea Level rise will be associated with a net retreat of the shore line and corresponding increase in frequency in threatening storm cut events.

8.2 Figure 5 above amply shows the risk to beach front properties due to predicted maximum storm cut erosion.

8.3 Storm cut erosion of the backshore during the Gabrielle event occurred primarily over a single tide. This illustrates the speed with which this process may take place and the difficulty of trying to address it at the time. Remedial measures require planning and consent and cannot be reactively enacted in time to prevent the damage of a potential storm on adjacent property.

8.4 Following a potential storm cut event for which the wall protects the backshore, based on previous monitoring data, it is likely to then be decades before a further event occurs, allowing time for dune reestablishment.

8.5 Conversely, the progressive retreat of the shoreline due to sea level rise will occur gradually.

8.6 The quantum of sea level rise and the quantum of resulting shoreline retreat are imprecisely known. Under all provided scenarios of the most recent guidance documents the sea level rise by 2060 (35 years from present) will be 150-300mm.

8.7 This will introduce little additional risk to the back shore. As discussed, a large storm cut event at any stage may require the armouring and this rise may result in events that impact the upper wall occurring more regularly than present.

8.8 However, further in the future, the wall will become increasingly necessary to protect the backshore. Events that are currently very rare and may not have occurred in recent history will become more frequent as sea levels rise, allowing larger waves near the shore and a typically more landward shoreline.

8.9 In the future, the full extent of the armoured wall (i.e. across the full length of the dune) is likely to be increasingly necessary and the natural function of the dune in front less effective.

9. DESIGN OF THE PROTECTION

9.1 The Engineering Report sets out consideration of options divided into three types.

- Do Nothing
- Soft Engineering (Renourishment and Planting)
- Seawalls/Structures of various materials

9.2 The residential development is within the likely maximum storm cut at present and will become more at-risk overtime. Therefore, the do nothing option does not protect the properties.

9.3 Soft Engineering alone has been tried at the site. Considerable capital was expended in 2011 on dune replenishment and planting and it is reported these works were lost within “a few weeks” . No remanent of this work is evident on site.

9.4 From consideration of the design drawings and in the knowledge of the outcome, the soft engineering of 2011 may have had design flaws. Additional sand appears to have been placed and planted within the active foreshore or very lower foredune area. Sand regularly covered by the tide on the foreshore will be redistributed by the incident wave climate.

9.5 Soft options also include regular additions of sand as nourishment of the upper beach. Such a practice requires addition of a buffer of sand that is removed by natural processes overtime. Renourishment of a short section on a long planar beach is unlikely to be successful as sand will become distributed to the adjacent stretches.

9.6 Renourishment is most effective when either,

a. The beach end conditions can be altered to retain the sand. This has been accomplished at beaches like Kohimarama and St Heliers, or

b. Very large volumes are added to the beach face at regular intervals to maintain a berm. This is typical of beaches on the west and southern coast of the United States of America.

9.7 Neither of these options are practicable at the Glen Isla stretch of Waihi Beach.

9.8 However, there is sufficient room within the foredune area on most beach states, as defined by the historical monitoring record, to incorporate a soft engineering solution as part of the broader design approach.

9.9 An excursion plot of beach monitoring data shows the distance of a chosen contour or level from (a datum point on) the shore over time. As the plot gets larger the contour is moving away from the shore and the shore is accreting and as it drops the shoreline is eroding. The excursion plot of the 3m contour at the monitoring site immediately south of the site (Figure 6) indicates that the beach state was markedly more retreated at the Gabrielle/Hale storm sequence than any other time in the 35 years of monitoring.

9.10 The 3m contour is consistent with the vegetated bank at the rear of the beach

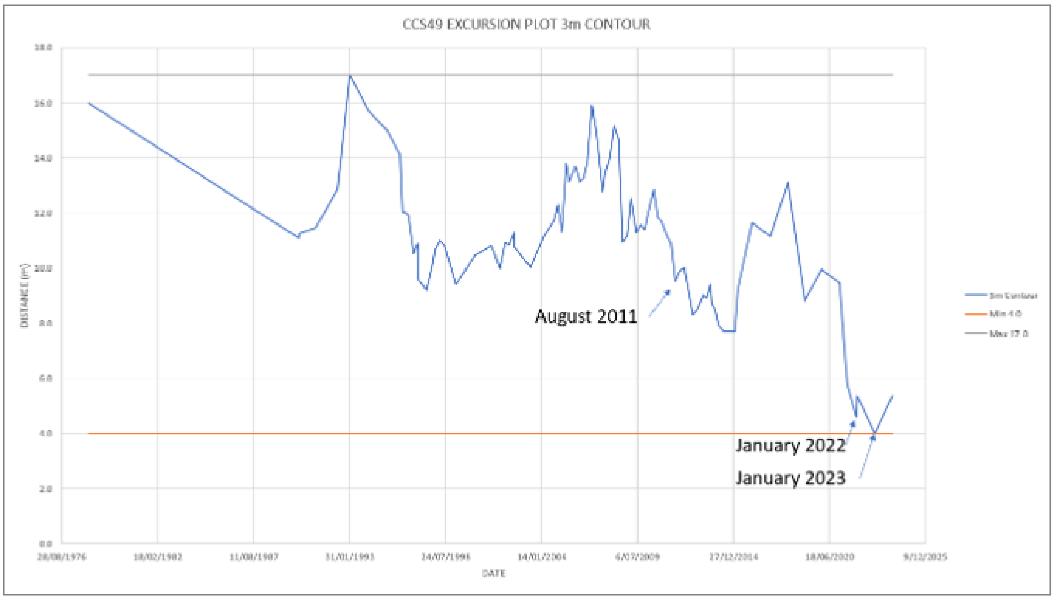

Figure 6 – Excursion Plot indicating particularly retreated beach in 2022/23

9.11 The intention is to construct a soft engineering dune such that, while the beach is in all states except for its most retreated, a natural dune can function. That is a planted dune will tend to move the backshore line seaward and fluctuate naturally in response to erosive events in all but the most severe storms.

9.12 The dune will be constructed as far back on the beach profile as practicable, covering the rock wall by nominally 500 mm. Once the dune establishes it will naturally prograde to a fluctuating equilibrium position on the shoreline.

9.13 The northern extent of the seawall already has a foredune reestablished post Gabrielle. This area is to be protected during construction and will continue to act as incipient foredune.

9.14 The benefit of this is that any provision made to protect from the extreme storm cut event will only be exposed on rare occasions.

9.15 Between those times the beach will naturally recover as a dune system does. Sand will return to the foredune and rebuild on the back shore. This process can be observed at the Glen Isla sites at present as the beach builds from the 2022/23 storms.

9.16 The provision of natural dune planting, remnants of which remain in the backshore, will aid the reestablishment of the natural dune after a storm event.

9.17 The soft engineering solution alone however, will not address erosion such as the Gabrielle /Hale events and those with more significant storm cut as defined in paragraphs 7.8 – 7.16 above. At historic beach levels, such significant storm cuts are rare but have the potential to threaten the backshore development.

9.18 The Engineering report considers the use of an armoured solution to be buried within the dune to address the major storm events in some detail.

9.19 Given the existence of over a kilometre of rock revetment immediately adjacent to the site, the availability and known technology of this form of solution, an alternative would require particular advantages to be preferred.

9.20 In this case the engineered rock revetment is the most appropriate solution. In particular as it lends itself well to a buried wall solution. Sand readily fills the interstices and plant roots grow around the rocks.

9.21 Assuming ongoing sea level rise, the design must also allow for a future scenario where the wall becomes increasingly loaded, overtopped and ultimately undermined.

9.22 The rock solution designed is capable of deformation and settlement without permanent damage. It can be more readily maintained and upgraded to be made taller or deeper or have heavier armour than any other solution.

9.23 The design parameters and assumptions for the wall are set out in the Engineering Design Report.

9.24 The riprap wall is a standard detail set out in accepted texts (CIRIA 683) comprised of:

- Double layer of underlayer on geotextile
- Double layer of Armour
- Three rocks wide at the crest
- Front slope of 1:2 (Type 1) or 1:5 (Type 2)

9.25 Armour rock has been sized for the prevailing wave conditions, accepting an increasing level of maintenance after 50-100 years.

9.26 Rock armour was sized by comparison of various equations by Hudson, Van Gent and Van DeMeer and recognizing the limited peak storm duration associated with depth limited waves subject to the tidal water level fluctuations.

9.27 Assuming beach retreat in accordance with adopted CEHZ after 50 years additional foundation or toe armour may be required and potentially an additional layer or layers of larger armour rock.

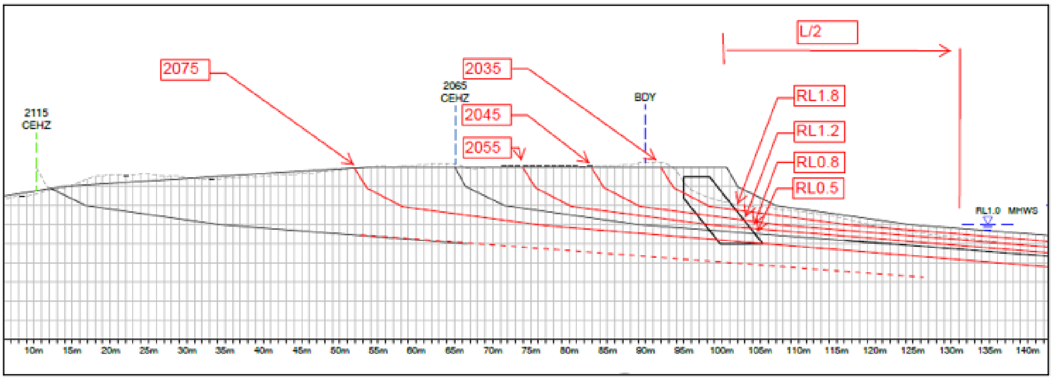

Figure 7 – Assumptions for foreshore lowering.

10. CONSTRUCTION METHODOLOGY

10.1 The Construction Methodology Statement provides a detailed description of the proposed construction methods.

10.2 Existing vegetation to remain and area outside the site will be fenced prior to start of excavation and rock delivery.

10.3 The rock will be imported from a local quarry on a rubber-tired trailer through the reserve at 100 Seaforth Road. They will cross Three Mile Creek on the foreshore and deposit rock at the site on a temporary heavy geotextile.

10.4 Machinery including a 23.5 tonne excavator will access the site by the same method. I am advised by the likely contactor, Beach Contractors, that all equipment being utilised has previously been used regularly on dredging works within Three Mile Creek, and has been used by them constructing rock walls in Two Mile Creek and Three Mile Creek.

10.5 Rock will be moved and placed on site by a 23.5 tonne excavator with a “thumb” or grapple.

10.6 The same machinery will be used to excavate the trench prior to rock placement.

10.7 Work will be undertaken sequentially to minimise the extent of trench open at any time.

10.8 On completion of the rock wall, sand will be placed on the rock and washed through into voids with a water truck.

10.9 Planting will be undertaken as described by, Mr Keesing.

10.10 Low wind fences will be placed as required to limit wind-blown sand to the adjacent properties and shelter the plants to improve growing conditions.

10.11 Access to site was investigated from an entrance to the south at Mako Avenue. Significant modification of the beach access and existing dune vegetation would have been required. Access then would have required a 750m route along the intertidal or area or upper beach. The route would have potentially involved considerable interaction with pedestrians and beach fauna. It is likely that this route would have been limited by tide and wave action in some sea states. The route is not practicable.

10.12 I was advised there was a further access option further south along the beach where beach access was obtained for the recovery operation on the Rena. However, given the issues with access from the closer Mako Avenue access this was not considered further.

11. POTENTIAL WALL EFFECTS

11.1 The potential effects of the seawall are addressed within The Coastal Process Assessment.

11.2 Based on the historical monitoring data the wall is only likely to be exposed once or twice during the next 30-50 years. During the balance of this time there will be no effects.

11.3 The most exposed the wall would have been, within the historical beach monitoring record, is during cyclone Gabrielle. Only the upper front rock of the wall at the southern end would have been exposed. With such minor interaction there would have been no appreciable effect of the wall.

11.4 As the beach retreats the wall will interact with waves more. However, in considering typical effects associated with sea walls, it will not impound appreciable volumes of sand as compared to the volumes of sand within the intertidal and subtidal beach. Nor will it act as a groyne due to the shore parallel nature of both the wave climate and structure and the presence of the longer groyne structures at Three Mile Creeks.

11.5 Any effects the wall may have will be effects at the site as there is no physical mechanism for effects to be transferred elsewhere on the coast.

11.6 Broken waves surge up the beach as swash. Where the swash interacts with the wall there is the possibility of localised end effects.

11.7 In the future, once the wall is interacting significantly with wave uprush, there is likely to be some scour at the southern end of the wall associated with turbulence at the wall end and a differential head between the swash in front of and adjacent to the wall.

11.8 The magnitude of this scour is likely to be in the order of 2-5m landward and 5-15m parallel to shore based on observation of similar details following Cyclone Gabriel. This is only likely to occur once the adjacent shore line has retreated behind the crest of the rock wall by 2-5m. The effect is also likely to be limited if the adjacent beach has retreated well (10m-20m) past the wall crest due to sea level rise.

11.9 The scour of the reserve will only occur when there is significant storm damage to the whole dune front to the reserve. There may well be sections that erode to the same extent as the end effects area. The entire dune front, including the scour area will tend to repair by natural processes as part of natural dune building during calmer periods, as has been observed at the site following the 2023 events.

11.10 At the northern end of the seawall the wall bends away at an angle to the beach face aligning more with the natural morphology of the shoreline at a water course outlet.

11.11 At this area swash water is likely to be directed along the wall causing additional scour along the wall. As this wall runs away from the beach, over most of the next few decades when the southern end of the wall interacts with the wave swash end effects will dissipate running along the northern wall. After storm events, some more shoreward scour is likely to occur along this northern section than south of the southern end.

11.12 The angled wall makes an excellent end effects measure for the southern end of the wall.

11.13 As the beach keeps retreating at some stage swash running along the northern section must reach the end of the wall. It will do so with greatly dissipated energy and if the groyne is still place will swirl and eddy in this location to dissipate the remaining energy. Again, the groyne at the end of this area makes an excellent end effects detail.

11.14 By the time it becomes relevant whether the groyne is in place to aid with retaining the end effects in front of the wall at No. 9 Glen Isla the beach will have had to retreat landward in the order of 20-30 m from the location it was at Cyclone Gabriel. This will occur in approximately 20-30 years' time if the worst-case beach retreat scenarios were met. It is more likely to be in 40-50 years.

11.15 It is likely with this much retreat the groynes have either become untenable or have been upgraded. If upgraded, they will provide suitable end detail. If they were to be removed it would be a simple measure to add an end detail to the wall to capture swash and address end effects. Figure 8.

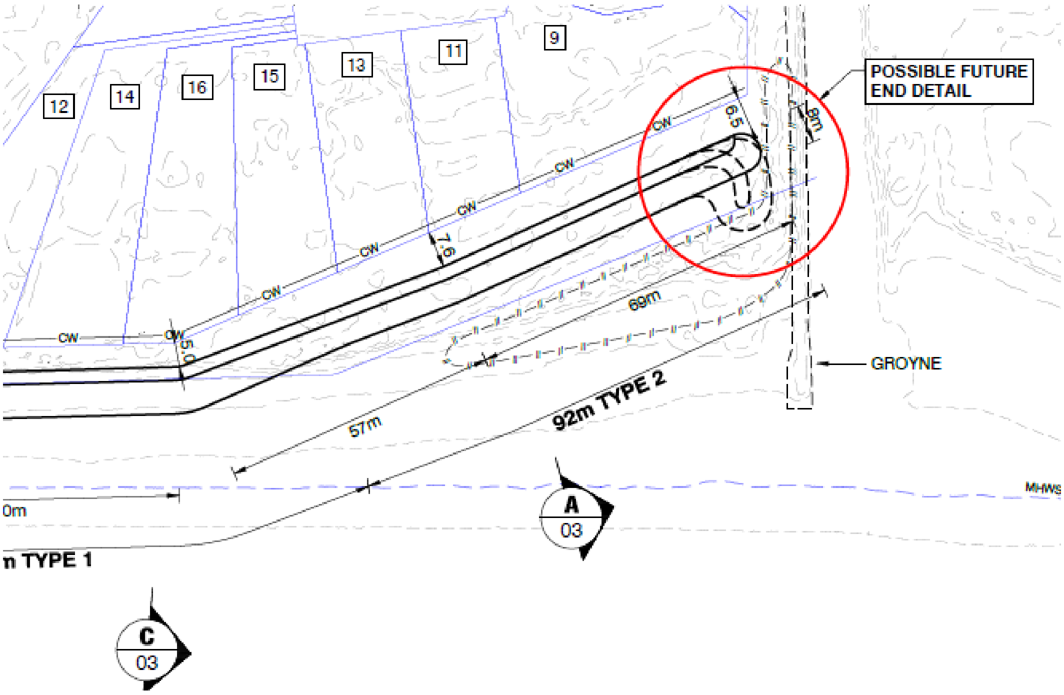

Figure 8 – Possible future end detail

11.16 This detail could be built with the main wall but will not be relevant for decades. There is such uncertainty with regards to beach response to sea level rise and the fact the groynes are currently in place, the detail may never be required.

11.17 Construction at this stage would conflict with preserving the high-quality vegetation on the incipient dune. It is proposed that this can be addressed as maintenance if it becomes an issue at a later time if the groynes are removed.

11.18 If there were no wall end detail or groynes in place, this location would act more like a natural river mouth.

11.19 The morphology of the mouth would change (Figure 9) and become deeper and contours revert back to the underlying shapes of the back shore which are more parallel to the wall. Waves, therefore, would not tend to run along the northern section, but approach in a more perpendicular manner.

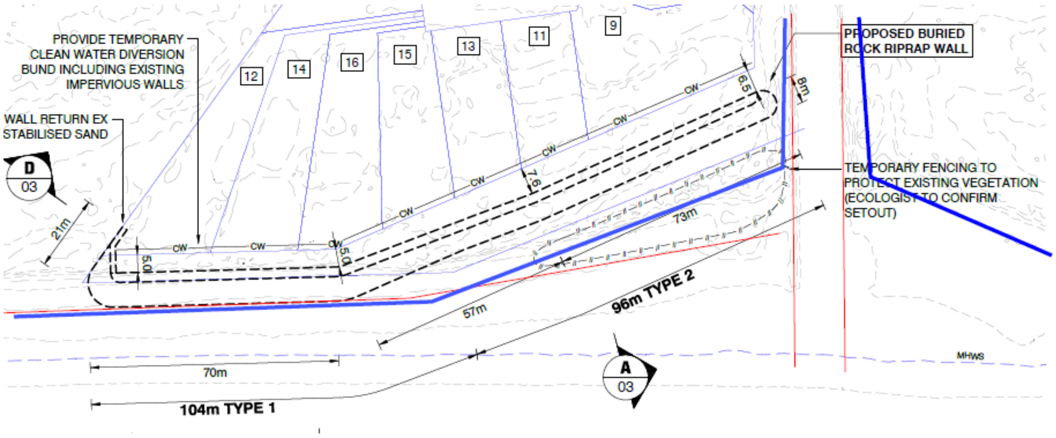

Figure 9 – Changed shoreline morphology (blue) without groynes (red)

12. MATTERS RAISED BY SUBMITTERS

12.1 Submitters have raised various matters relevant to the engineering and coastal process aspects of the project.

Coastal Engineering and Processes Responses		
#	**Submitter**	Relevant Responses
1	Denise Te Tai	A
2	Doug Longdill	A, C, D, E, F
3	Rebecca Marshall	A, B, H
4	Ian Marshall	B, G, H, I
5	Roger Course	A, E, F,J, K, L
6	Russell Harray	C,E, H, I, J, L
7	Barry and Lorraine Gallagher	A, B, H, L, M
8	William Rockham	A, B, K, L
9	Kim Bulder	D, K

10	Lorne Fell	A, B, H, N
11	Helen and Peter Clark	A,D,E, F, L
12	Ross McConnochie	A, L
13	Nigel and Jess Goodhue	L
14	Dot Watch Waihi Beach - Pippa Coombes and Stuart Attwood	A, C, L
15	Reg Goodhue	J, L
16	Waihi Beach Environmental Society - James Cowen	A, E,F,L, K, N
17	Jennifer Thompson	A, E
18	Diana Crossan and Neale Pitches	A, I
19	Mark Moynihan	J
20	Royal Forest and Bird Protection Society - Kate Graeme	A, E, O
21	Alan Campbell	E
22	Stuart Cann	A, E, L
23	Katikati - Waihi Beach Ratepayers Association - Keith Hay	A, B,P
24	Department of Conservation - Kristine Theiss (Manager Operations - Tauranga Region)	A, E, O
25	Robert Gillespie	A, L

26	Janmerilai Wingate	A, J
27	Anthony Thompson	
28	David Fuor	D
29	Helen Meiklejohn	D, J, L

Table 4 – Submitter responses

12.2 I have categorized these as 15 matters (titled A – P) and addressed these below. The items relevant to each submitter are then tabulated in Table 4.

A. End effects - Structure will move erosion impacts to neighbouring land or elsewhere and or create end effects.

End effects are addressed within the Engineering Design Report and in Section 11 above. There is no physical process to create effects away from the structure. Reasons for it not acting as a groyne are provided. The physical extent of effects at the southern end are minor and of a similar order to natural processes. These areas will remain like adjacent natural beach with the natural processes un-altered except for being slightly more landward after occasional storms.

End effects at the northern end will be negligible and dissipate in front of the wall between No.9 and No.15 Glen Isla Place until significant beach retreat occurs. Following some 2-5 decades of beach retreat, the end effects will terminate between the wall and groyne. A simple detail could be constructed to address these if the groyne was unable to cope. If the groyne is removed the morphology of the river mouth will change such that wave approach is no longer planar parallel to the beach but angled from the deeper water at the stormwater course.

B. The Wall will direct water down Three Mile Creek and create Flooding of the rear properties

This is a particular case of the end effects addressed above. There are two cases to consider:

i) Where the groyne or an end detail to the wall is in place

ii) Where there is no groyne in place

With a groyne in place swash will dissipate energy along the wall and then within the basin formed by the intersection of the groyne and wall. Note that ground level will be rising from a point between the toe of the southern wall and the northern end of the wall increasing energy dissipation. However, irrespective of the large degree of dissipation of this swash, the volume of water and of the broken swash is minimal compared to the wave energy passing directly up Three Mile Creek. Swash results from waves breaking and running up over ground, and in this case the face of a rock wall, all of which dissipates energy. The same waves will pass unbroken, or broken and reformed, through deeper water in the Creek mouth run up the creek to break directly on the river banks or road bridge structure. One of the reasons for widening at river mouths is additional erosion of waves entering the river mouth. At the water levels that will be experienced when the end of the northern seawall is exposed, flooding of the back shore will result from overtopping of the riverbanks, which have a crest level 1.5-2m lower than the beach front properties by wave overtopping directly from the sea. Water directed from the seawall will not contribute. It is noted that in the Council Coastal Hazard analysis, Figure 3, the erosion of the properties adjacent to Three Mile Creek is assumed to occur at the same time as the beachfront properties. This is consistent with the effects associated with the river mouth and independent of any armouring of the coastline.

Where there is no groyne in place, as discussed above, the river mouth morphology will alter and the wall will not have end effects in the same way.

C. Wall not a long Term or Sustainable solution

The proposed solution will act primarily as a natural completely sustainable dune system while beach levels remain similar to those captured by monitoring data over the last 35 years. As the effects of sea level rise create beach retreat the wall will be exposed and subjected to storms more often. It has been designed to be suitable for 50 years and with suitable upgrades, function for 100 years. These are long time frames and consistent with the design life of a Building or house. If at any time due to the uncertainty of sea level rise it was decided to remove the wall, all the rock is completely recyclable. On this basis, I consider the proposal both long term and sustainable.

D. Already failed attempts at rock walls

Historically, and indeed in coastal locations today, much rock protection is placed in an ad hoc manner, by interested but inexpert parties. Many of these structures fail. Conversely, there is a very large body of knowledge and experience in constructing Engineered rock walls of this nature. These walls have been built throughout the world and studied extensively with a very successful track record. It is inapt to compare the proposed structure with ad hoc or poorly designed rock protection, or rock protection within the CMA.

E. Soft Engineering Options should be used or tried

Soft engineering options by themselves are by design unable to address the large storm cut dune loss associated with a major storm event. They maintain the beach in a more seaward state and resist and recover from regular events well. The proposal includes planted dune soft engineering for this reason. If soft engineering alone were to work in this case, the wall would never be uncovered.

F. Beach will be lowered in front of wall

Any lowering will only occur after the wall is exposed at beach level and as addressed in the Section 5.2 and 5.3.1 of the Coastal Process

Assessment this will only occur to a limited extent for a short time during the storm event. Pedestrian beach users are unlikely to be present at that time.

G. Dunes next to the creek will be lost and will not to come back in a natural state

Dunes next to the creek will be left untouched. Typically, a formed planted dune can only be differentiated from a natural dune because it tends to be in a better condition.

H. Construction of Rock walls including dumping of rock may damage adjacent housing

Construction of rock walls has also been undertaken on numerous beaches, including Waihi, Whitianga, Cooks Beach and Orewa Beach, in very close proximity to housing without negative effects. All equipment that will be used on the project is regularly involved in operations at Three Mile Creek without causing negative effects to surrounding housing. Testing has been completed by Marshall Day and the results of this are found in the Noise and Vibration Specialist's Report.

I. Public Access along the beach compromised

As addressed Section 5.3.4 of the Coastal Process Assessment, at current beach levels there is ample high tide access along the sandy beach. This is a completely different situation to the impacts on beach use and access by the walls north of Three Mile Creek and at Shaw Road. Those walls were constructed out onto the high tide beach below high tide. The proposed walls will only occasionally interact with the sea during large storms at current sea levels.

MHWS is likely to be near the face of the wall in 30 years. In the event all tide access along the beach is lost due to sea level rise in future decades access could be established along the reserve at the crest of the wall.

Access to the foreshore for the public will remain unchanged with access available along either side of Three Mile Creek and from Island Reserve.

J. Not a Back Stop wall and will not be covered/recovered

As addressed Section 5.3.3 of the Coastal Process Assessment, based on historic monitoring data, the wall will be covered in all but major storms. Following those infrequent storms, beach levels will naturally build again as is demonstrated in the post Gabrielle photographs. The rock walls will cover with sand naturally facilitated by natural dune planting. Following decades of beach retreat associated with sea level rise, the wall will become more exposed as described.

K. Properties are not at risk so the wall is not required

As addressed in paragraphs 44 and 45 above, the properties are at risk from storm cut from a major event at any time at present sea levels and this will worsen with rising sea levels.

L. Comparison with walls North of Three Mile Creek

The proposed walls are of very similar construction but will present and act completely differently to the walls north of Three Mile Creek. At a beach state where those walls are 2-4 m above beach level at the toe, the proposed wall will not even be visible or may at times present as a single line of rocks cresting out of the sand draped in spinifex. The northern walls were constructed below the high tide line (MHWS) for many beach states, so by design there is no dry beach in front of those walls. The proposed walls are located so that at current beach levels a high tide beach will be present at all times except after very severe storms.

M. Alternative Access Points not considered

As addressed above, other access was found unsuitable.

N. Difficulty Planting over a Rock Revetment

Comparison is made with the walls at Shaw and Loop Road where the walls are at or below high tide making sand transient. Planting at the proposed wall will be directly into sand like planting any other dune. It will achieve all the benefits visited on the coast line elsewhere by dune rehabilitation.

O. Potential impact on Flora and Fauna on reserve by end effects

As set out in above, end effects will only occur after significant beach retreat and effect a very localised area..

When end effects occur the entire beach front is eroded leaving a dune scarp with largely untouched vegetation at the top and completely denuded beach in front. These are natural beach processes and unrelated to the end effects. The only additional effect is that the area of erosion adjacent to the end of the wall is located a small distance further landward. If the wall was not present the same effects would still have occurred at the wall end location in question but 2 -5m further seaward, within the context of a 100m wide intertidal area

P. Overtopping Flows not Addressed within Reporting

Overtopping is acknowledged in section 4.2 of The Engineering Design Report which notes that "*the structure has not been designed for over topping or inundation other than to ensure that overtopping would not cause the structure to fail*." It is also referenced in Section 4.9 where the positive effects on loading associated with waves overtopping a structure are noted.

Section 5.1 of the Assessment of Coastal Processes notes the disposal of overtopping water through the rock wall and relatively low volume due to storm duration.

13. COMMENTS ON MATTERS IN THE SECTION 42A REPORT

13.1 Where the Section 42A report comments on Coastal Process and Engineering matters it largely reports the submitters views and relies on the Council's Specialist, Mr Davidson's, report. I have addressed the submitters' comments directly, and I will address the Specialist's report below. I make further comment on additional points or interpretations made in the Section 42A report

13.2 In Paragraph 208 the report states that Mr Davidson does not accept my analysis of the forecast Beach retreat. It is important to note that Mr Davidson believes my analysis is too conservative and I over predict the effects. I will make more comment on this later but note that from the basis of assessing effects, the Council's Specialist is of the opinion that the effects are less than I have set out.

13.3 I conclude in the Coastal Process Assessment that the structure is considered to have less than minor potential effects on coastal processes, As Mr Davidson believes I have been too conservative, there is no dispute between experts that the effects are less than minor

13.4 In Paragraph 220 the report states the dune area in front of the Applicants properties does not provide Public Access given the sensitive habitat. With reference to the Ecology Report by Blue Green Ecology, the back dune area immediately in front of the boundaries is currently largely exotic and will only be turned into high quality sensitive habitat as a result of the proposed works. Public access is currently not provided through this area as there is ample access along the high tide beach. Following significant sea level rise the only potential hightide access along this section of coast will be that protected by a seawall structure such as proposed.

13.5 In Paragraph 226 the report suggests the proposal will generate adverse effects on the reserve and public access of reduced amenity and landscape values and loss of public access along the foreshore in the medium to long term due to sea level rise. With reference to the report by Isthmus Group, at current sea levels the landscape and amenity of the coast line will be enhanced through dune revegetation and nourishment. With sea level rise there will be a progressive loss of the dune system in front of private property. Public access will be lost due to sea level rise and not due to structures. Once the shoreline retreats to the private boundary hightide public access is lost. At that stage only at locations where public reserve is protected from erosion by structure will all tide access remain. In this location the wall is a matter of metres from the boundary such that time between the wall being exposed and the total loss of public access is likely to be in the order of a decade. The decision becomes a comparison of interim interruption of hightide foreshore access (but landward hightide access available) against the permanent loss of high tide access.

13.6 In Paragraph 233 the report states that future public access along the top of the wall is unlikely as it “goes against” dune care and restoration values. However, in many dune locations where there is a high demand for public access, these competing demands are readily managed. Boardwalks, sand ladders and defined roped off path ways are all access measures common though urban dune systems with access demands. Esplanade Reserves have twin competing purposes of shoreline access and conservation, both defined as matters of national importance in Section 6 of the Act. In trying to envision the requirements of this piece of the Reserve following unprecedented sea level rise it is unwise to ignore possible future access lightly.

14. COUNCIL’S COASTAL SPECIALIST REPORT

14.1 Mr Davidson of Beca Limited has provided a review of the Engineering Design and Coastal processes Report.

14.2 Mr Davidson focuses on the section of wall closest to Three Mile Creek, where Type 2 wall is specified. He notes that this area has undergone accretion since the groynes were built. He also asserts that the Coastal Erosion Hazard Zone lines adopted by the WBOPDC based on the 2015 District wide Hazard Analysis and reporting of Tonkin and Taylor should not be considered as an appropriate estimate of likely beach retreat.

14.3 I agree that the area near the groynes has accreted and this is dealt with in Section 3.4 of the Assessment of Coastal Processes (ACP). I would differ from Mr Davidson in as much as he asserts that this area is still "accreting".

14.4 The area has accreted since the placement of the groyne but as set out in the ACP in the most recent 2024 aerials the coastline is still clearly recessed at this location. The area has accreted and is now fluctuating due to typical dune system drivers and is at a more landward location than the adjacent shoreline because of Three Mile Creek.

14.5 Mr Davidson asserts that the CEHZ zones do not allow for the groynes as stated in the relevant 2015 report. This is in accordance with section 3.8 of the ACP. However, the analysis in my reports for exposure of the wall and beach retreat was based around the more exposed part of the structure, the southern end. Mr Davidson does not appear to question the findings of my analysis in this area, which suggests that my analysis of exposure of the critical part of the wall can be adopted.

14.6 Mr Davidson asserts that a "key statement" in the ACP is that the reason erosion protection is required is that the risk of erosion is greater at the outlet. Section 3.8 of the ACP sets out the future erosion hazard due to long term coastline retreat. We set out in the Engineering Design Report and again reiterated in the Section 1.2 of the Section 92 Memorandum addressing Mr Adamsons queries that the " *purpose of the armouring is to allow the normal function of an enhanced (vegetated) dune under most conditions but provide protection from the risk of coastal erosion due to storm events and long -term retreat of the shoreline*."

14.7 I agree with Mr Davidson that while the groynes are in place the most northern part of the wall is unlikely to be exposed. By the time that section of the wall becomes subject to wave action I would expect the outer part of the groyne at very least to have been lost or significantly reworked.

14.8 However, in the case of a very large storm cut event the shoreline will retreat in a shore parallel manner irrespective of the groyne. This was amply demonstrated in Cyclone Gabriell erosion where erosion occurred adjacent to the groyne. Waves incident on the angled northern part of eh wall will tend to run along this stretch and have the potential to outflank this wall if it is terminated too soon. Under the predicted 18m of storm cut that has a 22% chance of occurring over the next 50 years the entire wall is likely to be required.

14.9 I disagree with Mr Davidson that it is a sensible approach in determining the future coastal management of the GIPS properties to rely on the groyne being in place. Irrespective of the risk of relying on structure that it is subject to a relatively short duration consent, public funding and in a location that will be subject to increasingly strong coastal actions, it is normal practice not to rely on a structure subject to a future consent process.

14.10 I agree with Mr Davidson's finding that the effects on coastal processes of the Type 2 wall is negligible. Mr Davidson also concurs that some length of the Type 2 wall would be required but he does not specify what length is required.

14.11 Mr Davidson's comment that planting and increasing dune levels could be utilised especially in front of the Type 2 Wall. I agree and note that planting and revegetation of this area is being proposed. Where revegetation is a valid solution this will remain the form of the coastline. However, if storm cut or retreating coast line threaten the back shore the armoured part of the structure will function.

14.12 Mr Davidson confirms that the design and form of the Type 1 section is appropriate. He suggests that the future highwater access behind the wall is at odds with the planting and ecological objectives. There is an important temporal perspective in this consideration. While there is ample high tide beach the dune area along the top of wall and dune in front of the wall will form important high quality dune habitat. At the stage that the entire esplanade Reserve has been eroded back to private property boundaries there is likely to be no access and no dune habitat. The current proposal addresses this by protecting a width of back shore that can remain planted. At that future time there may also be a need for greater public access and this could potentially also be provided.

14.13 Mr Davidsons comments that "*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*" At sea levels over the next decades the wall will only be exposed in large occasional storm events. Exposure is likely to be only the upper rocks. Sand will return to the shore line in front just like it does to all the of the vertical cut dune faces of the beach to the south. Spinifex will grow back over the interface progressively trapping sand. These are normal dune processes and can be witnessed at many lower energy beaches where rocks are uncovered at the rear of the beach during large storms to become covered. Where sand supply is sufficient beaches can prograde large distances covering all rock and structure. For example, at Whatipu at the north head of the Manakau Harbour the beach has prograded over 1km. Whilst this is an extreme case, it is in a wave environment much greater than Waihi and is indicative that it is not the structure that is the issue but the location on the beach relative to sand supply.

14.14 Mr Davidson suggests the southern part of the wall could be sited closer to the boundary to minimise effects. I agree that a more recessed structure would interact less with beach process in the short term. There is a trade off of siting the wall further back and protecting less of the backshore area. The values of this area is set out within Mr Keesing's and Mr Coombs' evidence. I also understand the District Council Reserve staff place value on this land as "strategic asset".

14.15 From an engineering perspective the ability to maintain a naturally planted area at the top of the wall will enhance the ability of the dune, soft engineering, to recover after storm events. Dune binding plants at the crest of the wall will hang over the wall providing a physical source of revegetation to a returning incipient dune. Further the presence of remaining dune vegetation at the crest will provide an aeolian buffer lifter wind and so reducing wind at the sand plant interface and also trapping wind-blown sand for re-deposition on the dunes.

14.16 In response, to Mr Davidsons concerns I have examined decreasing the distance seaward of the southern section of the wall. I have prepared an alternate layout with the wall just 1.5m from the property boundaries. This would set the southern wall back 3.5 m and allow it to interact less with coastal processes for a longer time. I include relevant images from the revised plans as Figures 10 and 11 below and append a copy of the Plan (23028 Sheet 4 Revision A) to my evidence.

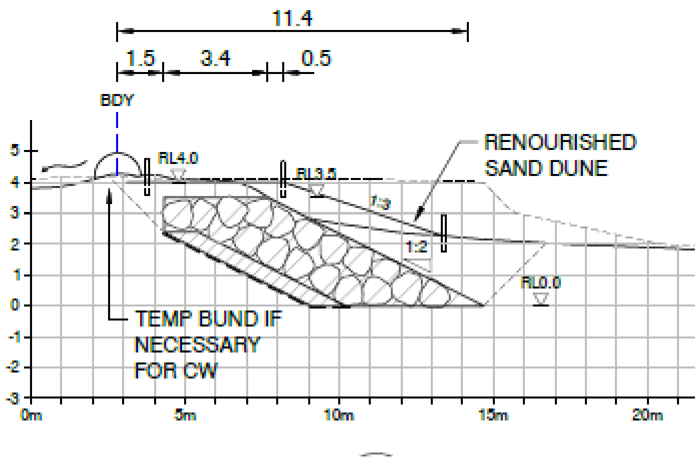

Figure 10 – Amended Cross-section Southern Wall 1.5m from Boundary

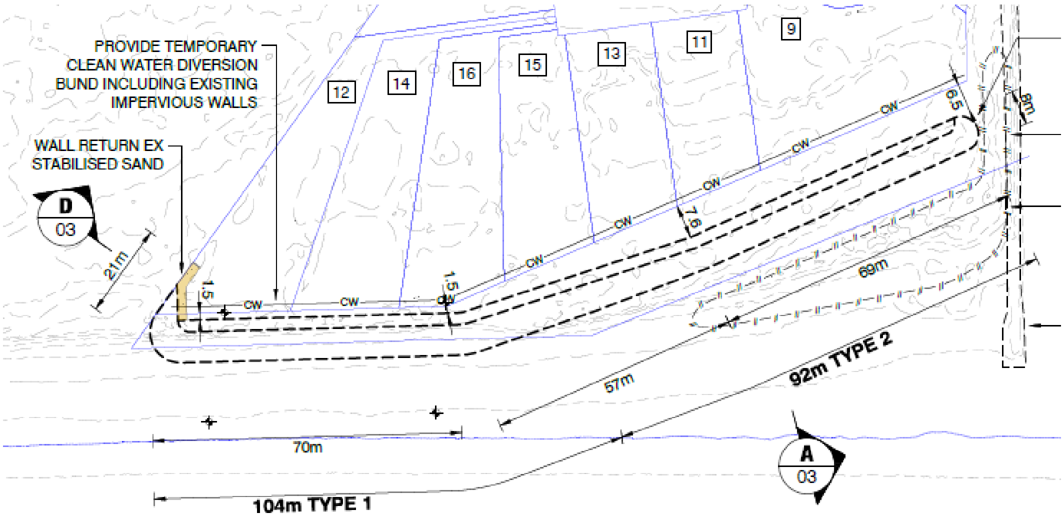

Figure 11 – Amended Layout Southern Wall 1.5m from Boundary

14.17 In setting a distance of 1.5m I have allowed a sufficient minimum distance to allow a notional width of backshore planting and/or possibly future access. At this reduced width, the conflict between having the dune planting and the provision for future access becomes more difficult. The final resolution of which can be resolved at that time. In addition. the 1.5m provides a minimum of construction access between the boundary and the extent of works. A rock revetment structure is not rectilinear in nature and comprised of large, very heavy, somewhat random shaped armour rock and as such there will be some variation in the precise extent of structure. The 1.5m also gives space for natural variability of the rear edge.

14.18 I consider the balance struck by aligning the rear of the wall at 5m from the boundary provides a minimum of effects to the seaward beach while protecting a meaningful and useable space of back shore. In particular it provides more options for use including incorporating both access and backshore dune environment. Whilst the wall could be positioned anywhere in the zone between 1.5 and 5m from the boundary I consider the 5m offset is preferable.

14.19 Mr Davidson discusses End effects and Beach Lowering associated with the wall and these are addressed in the Coastal Process Assessment in some detail. As set out there I do not think there will be appreciable end effects due to interruption of sediment transport and Mr Davidson provides no particular analysis of this. Further, Mr Davidson asserts that the beach will be lowered due to wave reflection. A number of studies are referenced in the CPA that conclude long term beach lowering due to reflection does not occur. It is likely that similar beach lowering occurs in storm conditions irrespective of the presence of a wall. The lowering may occur more quickly due to the reflection of the wall. Beach lowering will occur in the long term but this will be due to sea level rise and will be consistent over the entire beach whether a wall is in place or not. Reference to similar rock structures on Waihi Beach needs care, given the entirely different siting and therefore effects of these structures

15. PEER REVIEW

15.1 The Applicant has obtained a Peer Review of the Coastal Process and Engineering . Mr Jonathan Clarke of Nu Wave Coastal Engineering and Science has produced a report entitled Waihi Beach – Glen Isla Protection Society Peer Review dated 24 July 2025. I understand that Mr Clarke has entered this report under his brief of evidence.

15.2 Mr Clarke generally supports the findings of the CPA and Engineering Report.

15.3 He notes that the erosion risk assessment used as a basis for the report to assess likely retreat rates has been updated in 2024 and although not yet adopted has been recently released on the WBOPDC web site. He notes that the new report has slightly greater set backs.

The new report is based on sea level rise guidance provided by the MfE in 2017. Section 3.9 of the CPA considers that the 2015 study was based on the current guidance of that time and that updated guidance had been released since that time. The predictions were compared with the latest

2024 guidance. The variation in levels is considered to be within the accuracy of the assumptions being made. The 2024 guidance introduces a new “high level scenario (SSP3-7.0) which is less than the “high” scenario SSP5-8.5 previously used. The guidance advises the SSP% - 8.5 and 8.5+ is used to stress test rather than as a planning outcome. A number of sea-level rise scenarios are canvassed in the latest WBOPDC report but the report states that “CEHA values for 2130 1.25m SLR P66% scenario have been included.... .... This scenario has also been compared as this is the scenario typically used for RMA processes.” This compares with the 1.1m maximum sea level rise by 2115 adopted in the 2015 report. The difference in sea level rise over the first 50-70 years for these scenarios will be negligible. On top of this conservative assumptions have been made in my analysis as addressed above. Accordingly, I am confident that the predictions are consistent with the latest science.

15.4 Mr Clarke notes in section 4.2 that given the uncertainty of the training wall (groyne) the full extent of the wall in front of the GIPS properties should be constructed.

15.5 In review of the design elements Mr Clarke supports the proposal but recommends testing of the rock to be used as a matter of Quality Control. It is anticipated that this will be undertaken in due course before a contract is awarded. However, given the rock has been used extensively on Waihi Beach previously there is a high degree of comfort that testing will prove the rock suitable.

15.6 Mr Clarke also suggests the level of the Geotextile within the wall is increased above RL 2.0 primarily to address overtopping. This is a detailed design matter. Atypically the wall is being designed for a gradually worsening wave environment up to the stage additional work will need to be done. On this basis I agree with Mr Clarke that a detail for increased provision for overtopping is sensible. This matter will be resolved in detailed design however, a typical detail has been developed and agreed with Mr Clarke. Figure 12 below

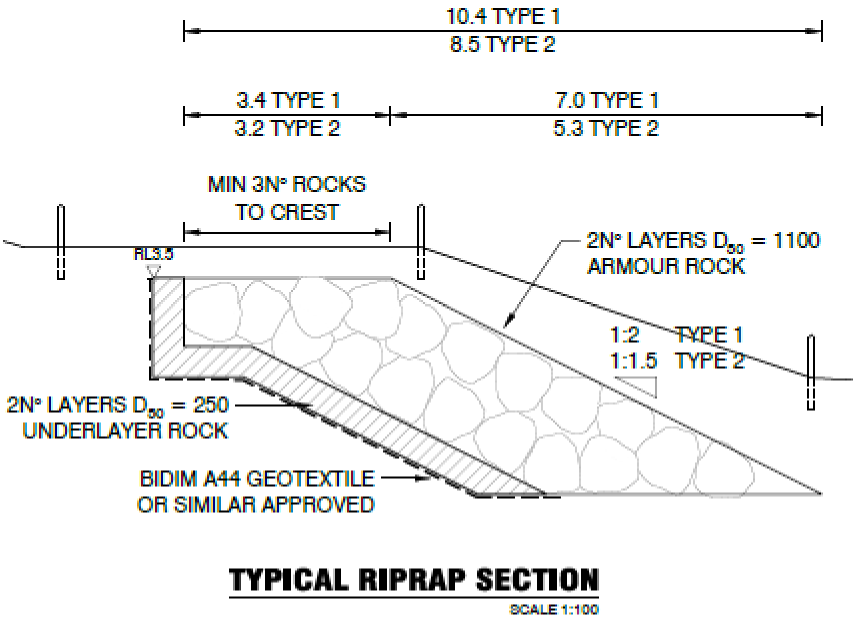

Figure 12 – Cross Section with Geotextile to RL3.5

16. CONCLUSION

16.1 The solution for shoreline protection at Glen Isla Place has been designed cognisant of the high value of the dune beach and character at Waihi Beach. It has been designed to address concerns of storm cut erosion from a large storm event and designed and detailed having regard to likely climate change driven sea level rise in future decades.

16.2 The solution is to provide a backstop wall buried in the dune to the extent possible and enhance and plant the dunes in front and over the top of that wall

16.3 It is easy, but misleading, to compare the walls with the wall north of Three Mile Creek as those walls have been built below hightide, whereas the proposed walls are above the reach of wave erosion in all but the largest storms.

16.4 The hybrid nature of the solution is different to those previously used at Waihi Beach which have typically been either a soft engineering planted solution or a hard-edge rock solution.

16.5 The solution is consistent with Policies to minimise the impact of hard engineered structures while pragmatically dealing with the reality that historic land development is within the active dune envelope.

16.6 There is no debate by Council's Specialist over the engineering or the assessed processes.

16.7 There is some concern from the Council's Specialist that effects have not been minimised at the northern end, such that although there are negligible effects there is no need for an unspecified length of the wall. This opinion relies on the ongoing Consent of and operation of the groynes a structure for which Consent is soon to lapse.

16.8 Given the lack of the certainty over the groynes and agreed lack of effects of the northern extent of the wall, completing this part of the wall is the sensible answer.

16.9 Most of the submitter's concerns appear to stem primarily from issues about seawalls that are apparent in the walls to the north and/or general concerns about seawalls on sand beaches. These concerns are unfounded with the proposal for a vegetated beach in front of the wall and most importantly the wall well retreated up the beach profile.

16.10 Management of the coastline in these times of sea level rise will require changing solutions. The proposal seeks to provide the surety of protection required for high quality beachfront residential property while enhancing the public dune front through dune rehabilitation work.

16.11 It represents a considered solution for the reality of a dynamic natural beach front and an adjacent static residential area developed as a result of planning decisions made many years ago.