RC14513 / COASTAL PROTECTION STRUCTURE AND ASSOCIATED ACTIVITIES REPLY STATEMENT OF CRAIG DAVIS (COASTAL ENGINEERING AND PROCESSES)

I set out below a response to queries raised by the Commissioners and address some points raised by the Council and their Expert in their submissions.

Commissioner Query - Difference in Exposure time for 1.5m vs 5m ex boundary

1. The Commissioners queried the difference to the time of exposure for the southern (Type1) wall placed 1.5m from the boundary and that of a wall placed 5m from the boundary as assessed in the Coastal Process Assessment.

2. The analysis within the Engineering Design Report is based on a 100-year retreat as defined by the adopted coastal hazard lines from the Tonkin and Taylor 2015 report. The overall retreat over those 100 years is approximately 100 m, suggesting a retreat rate of approximately 1m per annum. As discussed in my evidence, allowing a linear retreat is a conservative assumption when assessing how the effects of retreat may affect the sea wall. However, over-predicting the retreat rate underestimates the benefits in the initial period of placing the wall 3.5m further landward.

   In order to keep the analysis consistent with the overall retreat set out in the Coastal Process Assessment but avoid the underestimation, I have proportioned the short-term retreat using the most recent sea level rise curves. Accelerated beach retreat is proportional to sea level rise (SLR) and so I have used the sea level rise curves on the NZ Sea Rise website and proportioned the extent of retreat with the proportion of SLR over the same timeframe. I have mapped the retreat under both the SSP2 – 4.5 and SSP5 - 8.5 scenarios in table 1 below. Given the flatter curve the SSP 4.5 gives rise to a faster rate of retreat over the first decade even though it gives rise to lesser overall retreat over the 100-year scenario. On the basis of these figures, locating the wall 3.5m further landward would result in up 6–7-year delay in equivalent exposure of the wall.

3. As discussed in my evidence (Para 3 and 4 of Summary Statement) there have been a number of subsequent reports and updates to both Government Guidance and District Wide hazard analysis since the CPA. The WBOPDC have recently adopted a 2024 Hazard report by Tonkin and Taylor. I have reviewed the rates within this framework to ensure the robustness of the analysis in the CPA.

4. The T&T 2024 report provides estimates of overall retreat for the Waihi Beach coast that have generally increased over those in the 2015 report. However, for the subject site the relevant retreat has decreased from that assumed in the CPA. This is because the 2015 report made relatively unconservative assumptions at the sites adjacent Three Mile Creek (TMC) and so the analysis in the CPA was based on the more conservative assumptions at the monitoring site south of TMC. The current report has addressed the unconservative assumptions and looked more closely at TMC, basing retreat there on the adjacent beach. The detailed analysis determines a retreat over 50 and 100 years less than that assumed in the CPA analysis.

5. Utilising the retreat set out in the T&T 2024 (Table 1 Appendix A) and the latest NZ Sea Rise curves, as before, I have calculated the short-term retreat is 0.3-0.4m per annum. This would result in the difference in exposure of the two positions of the wall being 9-11 years.

6. Based on this analysis the exposure could be delayed by between 6-11 years by moving the wall back 3.5m.

7. The averaging of long-term retreat figures becomes less appropriate over short timescales. So the accuracy of these short-term timeframe estimates should be taken only as an indicative of scale. Large storms or medium-term beach effects and longer-term weather trends such as the Southern Oscillation Index may overlay the long-term shore trends and render the estimate invalid. There is therefore little real difference between an estimate of 6 years and 11 years.

	Per CPA				**Per WBOPDC 2024**			
	SSP2 – 8.5		SSP5 – 4.5		SSP2 – 8.5		SSP5 – 4.5	
	Year	SLR (m)	Year	SLR (m)	Year	SLR (m)	Year	SLR (m)
	2030	0.11	2030	0.09	2030	0.11	2030	0.09
	2040	0.17	2040	0.13	2040	0.17	2040	0.13
	2130	1.23	2130	0.74	2130	1.23	2130	0.74
Retreat Rate								
	10yr	5.4	10yr	6.2	10yr	3.9	10yr	3.2
	100yr	100	100yr	100	100yr	73	100yr	57
	1yr	0.5m p.a.	1yr	0.6m p.a.	1yr	0.4m p.a.	1yr	0.3m p.a.
Difference								
		7yrs		6yrs		9yrs		11yrs

Table 1. Retreat Rate Calculation

Mr Davidson Evidence "structure exposure in 2 years" – Summary Statement Paragraph 9

8. Mr Davidson states that *"…unless there is significant natural beach recovery in levels, it will be exposed almost immediately. Based on the graphs submitted using T&T recession rates, exposure (with the structure located 5 metres off the boundary) is predicted within two years…"*. I have not seen the workings of Mr Davidsons calculation, but there appears to be a confusion between short-term beach fluctuations and longer-term retreat. With reference to Figure 3.7 from the ACP (reproduced below) it is evident that the beach is currently the most retreated it has been on the record. Survey subsequent to the last data point on this analysis showed continuing beach recovery. Between 1996 and 2021 the beach has been in a relatively stable position considerably seaward of its current location. Consistent with Mr Davidsons comment I consider it likely we will see "*significant natural beach recovery*" to return the beach from its current position to a similar position to that it was in for the preceding 25 years. My retreat analysis within the CPA, and subsequently, uses a beach profile defined in 2011 which sits within and at the lower end of the range of the "equilibrium" beach level. I note that this is a consistent approach to that in the newly adopted Coastal Hazard report (T&T 2024) which utilises a statistical (average) long term position of the beach from which long-term retreat is calculated.

9. For these reasons, I do not consider the southern end of the wall, located 5 metres off the private boundaries, would be exposed within two years. I consider the time-frames set out in Table 3 of my evidence are a more accurate estimate of the exposure of the wall over time.

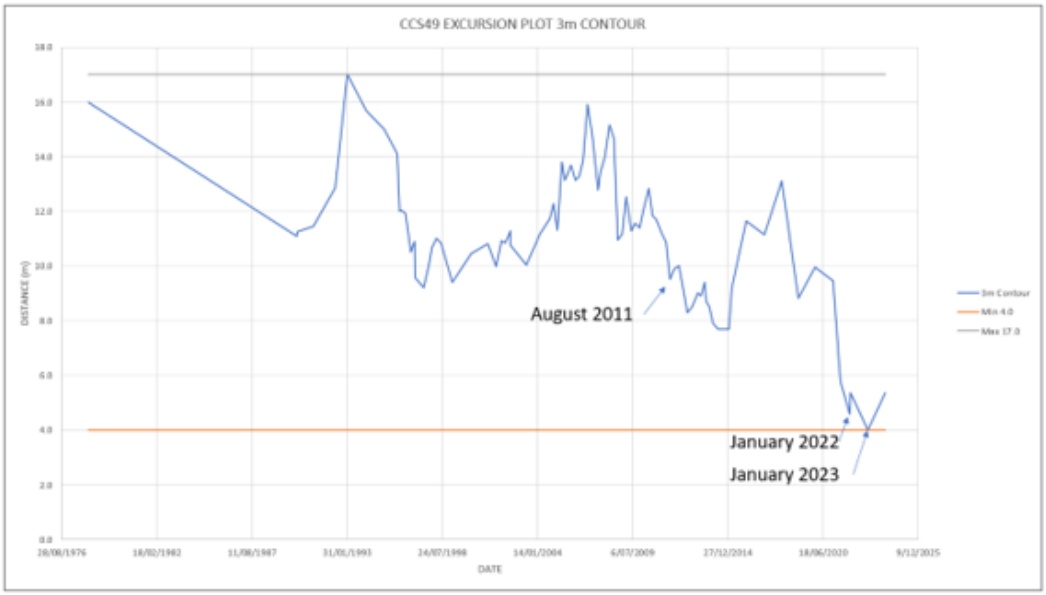

Figure 3.7: RL3.0 Excursion CCS49

Mr Davidson Evidence – The full extent of Type 2 structure is unjustified. (Para 1-4)

10. This matter is dealt with in Paragraphs 14.7-14.10 of my evidence. I note that as discussed following a Commissioner's query in the hearing, it is not practicable to construct part or all of the Type 2 wall at a subsequent time.

11. In order to avoid damage to significant vegetation, the construction methodology is to work along the footprint of the structure, importing materials and machinery from midway along the wall toward the northern end. This is not possible once the southern and central wall is constructed and covered with native vegetation.

12. Mr Davidson indicates that the wall could be ended at the boundary of properties 15 and 13 Glen Isla Place, which is the extent of the Type 1 wall as set out in the Consent Drawings (Dwg 23028 Sheet 02 RevA).

13. I am strongly of the opinion that this is an inadequate structure to address the risks from coastal erosion at this location on four bases:

    a) With a maximum storm cut event larger than that experienced within the monitoring record so far, all sand acting as a buffer in the lee of the groyne will be rapidly removed and the full length of the wall could be required;

    And, for storms of lesser intensity

    b) A substantial portion of the northern length of the wall would be required to manage end effects of the southern length of

the wall, as soon as the southern length begins acting to armour the coast line;

c) With a retreating shoreline over the coming years the full length of the wall in front of 9, 11 and 13 will be required to manage end effects, and then within 10-30 years it will become as subject to storm wave events as the southern end would be today;

d) If the groynes are removed by storm damage or any other reason the full length of wall will be required.

14. End effects are a difficult thing to calculate exactly, especially without accurate knowledge of the possible design storm and knowing that storm events will change over time as the beach retreats. Good engineering practice is to provide conservative allowance such that the wall will not be outflanked and so can be designed for more readily modelled conditions on the wall face.

15. The results of a large storm event at the TMC outlet have not been modelled in any study to date I am aware of. However, it would be normal that in a large wave event eroding the coast, additional damage would occur adjacent to the stormwater outlet. The hazard maps within the WBOPDP recognise this with hazard lines.

16. I have considered the option of constructing part of the proposed structure and completing it at a later stage when the beach has retreated further and it is more evident or urgent that it is required. I have previously commented on the construction impracticalities. In addition, I do not consider this scenario is consistent with the nature of coastal erosion. The erosion is episodic and changes in the beach can occur within hours. A construction project to increase the wall length, assuming it had necessary consents and permissions, would take many months. Work to commission source materials and contractor, consult and meet conditions takes considerable time. The project would involve organizing seven neighbouring parties to agree, coordinate and fund a response. This is clearly a different timescale to the potential erosion threat. Emergency responses to erosion historically lead to poor solutions and that risk is unnecessary in this case,

17. For completeness I note, we cannot rely on the presence of the groynes in our design, , on an engineering basis, as these most seaward structures are most likely to be first and most frequently affected by a retreating shoreline.

Consent Term

18. The Consent Authority has suggested draft conditions that include a Consent Duration of 25-30 years.

19. Davis Coastal Consultants have obtained Resource Consents for 18 seawalls since September 2023 (ref Table 2 below). Fifteen of those seawalls were in the Coastal Marine Area (CMA) and required a Consent duration under Section 123 (c) for a period not exceeding 35 years. All of those seawalls were granted a Resource Consent for 35 years.

20. Three of the seawalls were outside the CMA and a duration was not required by the Act. None of those three Consents have a duration.

21. It is my experience, based on the applications referred to in Table 1, that the starting point for a Resource Consent for a seawall inside the CMA, because of its stable nature and long design life, is 35 years unless there is particular reason to reduce that duration.

22. The subject walls are outside the CMA and are likely to be effectively outside the CMA for 30-40 years (ref Table 3 Statement of Evidence).

	Date	Job Number	Location	Consent Number	Consent Duration 35 yrs (Y/N)
1	15.08.2025	1837	Tindalls Bay	LUC60444051, CST60444052 & CST60444215	Y
2	25.09.2024	20031	Waiheke	BUN60381308: LUC60381410, CST60381309, CST60426054 and DIS60437356	Y
3	28.04.2023	20039	Red Beach	LUC60413026/CST60413028	Y
4	17.07.2024	21011	Beachlands	BUN60415523	Y
5	17.07.2024	21011	Beachlands	BUN60416869	Y
6	09.06.2022	21012	Westmere	BUN60383789	Y
7	21.03.2023	21031	Beachlands	BUN60407202	Y
8	19.08.2022	21069	North Cove	BUN60398487	Y
9	19.12.2024	22055	Stanley Point	BUN60433513	Y
10	30.07.2024	23020	Orewa	BUN60429031	Y
11	10.09.2024	23063	Hikurangi	LU2400042 P1706	Land-use (no duration)
12	11.04.2025	23110	Panmure	BUN60438256	Y
13	18.06.2025	24037	Waiheke	LUC60443284	Land-use (no duration)
14	30.11.2023	23056	Whangarei	AUT.045393.01.01	Y
15	13.08.2024	23100	Manly	LUC60432423	Land-use (no duration)
16	27.06.2023	22007	Herne Bay	BUN60408239	Y
17	15.11.2023	22013	Mahurangi	BUN60422055	Y
18	29.09.2023	22054	Beachlands	BUN60409206	Y

Table 2. Duration of Seawall Consents ex DCC

Locating the Wall on Private Properties.

23. It was suggested by submitters that a wall could be constructed within the Applicants properties. This option would not protect any of the esplanade and the values there already addressed.

24. The construction of a wall in this location would necessitate work within a narrow corridor at considerable depth adjacent to housing. The typical solution in this circumstance, and the solution I would recommend for Glen Isla to meet site constraints, would be construction of a vertical structure; most likely a concrete palisade wall.

25. A palisade wall is a series of interconnected large diameter vertical concrete piles. Because the walls are placed against earth the face of the structure when exposed by storm events or a retreating coast is of very low amenity and impacts negatively with natural landscape values at a coastal environment. The photograph below shows a palisade wall exposed by erosion.

Photograph 1 Exposed Palisade wall

26. The vertical structure provides a strong visual and physical separation between the foreshore and backshore and is less desirable on a sandy coastal beach, especially one currently characterised by rock armouring.