

PROPOSED KĀPITI COAST DISTRICT PLAN 2012

COASTAL MATTERS - PANEL OF EXPERTS ASSISTING IN RELATION TO SECTION 42A OF THE RMA

REMARKS OF JOAN ALLIN

Introduction

1. My name is Joan Allin. My partner, Rob Crozier, and I live on the beachfront on Rodney Ave at Te Horo Beach. The Mangaone Stream is at the northern end of Rodney Ave and our house is well south of Sea Road.
2. It is a great comfort to us, and many others, that the Panel has been appointed. We are grateful to the Council for appointing the Panel and grateful to the Panel for your work.
3. For the past 25 years, our family trusts have owned various Kapiti properties on an almost continuous basis. For the past 15 years, we have lived part-time (5 years) and then full-time (10 years) on the beachfront at Te Horo Beach. I have lived in New Zealand for almost 35 years and am both a Canadian and a New Zealand citizen.
4. I have been:
 - a senior lecturer in law at Victoria University of Wellington;
 - a resource management partner at Chapman Tripp (a large New Zealand law firm);
 - an independent hearings commissioner for resource management matters; and
 - a judge of the Environment Court - the Principal Environment Judge and then an alternate Environment Judge.
5. I am retired now. My degrees are BA (Hons), LLB and LLM.
6. When we received the letter dated 25 August 2012 from the Council about the Coastal Systems Limited (CSL) coastal erosion hazard report and the “likely” coastal hazard issues, we thought “So be it”.

7. The map included with the letter showed that we are not badly affected and, consequently, we were not concerned for ourselves, although we were concerned for friends and others who are more badly affected (Attachment 1).
8. In terms of the Proposed District Plan (PDP), we are also not badly affected. Our house is landward of the 100-year urban relocatable line and our deck seaward of the house is in the 100-year relocatable area. No part of the land is in the 50 year no-build area (Attachment 2).
9. The Council's letter dated 25 August 2012 said that the coastal hazard assessment:

“... predicts where the shoreline *is likely to be* along [Kapiti] Coast within 50 and 100 years.”

“Around 1,800 properties - including most beachfront properties in the district - *are at likely risk of significant erosion or inundation* (flooding) within 100 years. Up to 1,000 of these may be affected within 50 years.”

“... under the Resource Management Act, councils must try to avoid new buildings and developments occurring *in areas of high risk* from natural hazards.” (all emphases added)¹
10. We assumed that the coastal hazard assessment was valid and appropriately conducted and that what the letter said was correct. I know, or know of, some of the coastal experts referred to in the CSL 2012 Update report and respect their expertise, so did not even intend to read the report.
11. However, because of the controversy that developed, I eventually decided to read the 2012 Update report.
12. During my career, I have read many scientific and technical reports and evidence, and evaluated their validity. I have also encountered numerous well-meaning, but ultimately misguided, “concerned citizens”. I expected to discover that the report was a satisfactory basis for the coastal erosion hazard lines and that concerns being expressed by some local people were misguided.
13. I did not find that.
14. My initial reaction on reading the 2012 Update was that I was intrigued by the number of times the report referred to the precautionary approach or a conservative approach. It struck me as unusual for a technical report. The one page “Overview comments by reviewer Dr Mike Shepherd” in Appendix H also refers to the results being “conservative (precautionary)”.
15. It also seemed apparent to me that the scientists had misunderstood or misinterpreted the law.

¹ The PDP says the “work undertaken considered the *likely* impact of future sea level rise” (page 4-9, emphasis added).

16. For me, there were a variety of things in the report that were like a flashing red light saying “Investigate further”.
17. For example, it is apparent that long-term natural dynamic fluctuations of erosion and accretion are among the relevant factors to be had regard to (Policy 24(1)(b) New Zealand Coastal Policy Statement 2010) and the model includes longer-term shoreline change.
18. What struck me as odd is that where the longer-term shoreline change is erosion, the relevant number is included in the model. But where the longer-term shoreline change is progradation or accretion, the relevant number is not included; the number included is 0 ie LT=0.
19. That applies to much of the northern Kapiti coast².
20. And this is done even when the report says that progradation is “expected”³.
21. I wondered:
 - why the input to the model would be LT=0 where progradation or accretion is expected; and
 - what effect that assumption would have on the results.
22. The more I looked into various matters, the 2008 reports, and other documents including “Summary of Peer Reviewer comments on the KCDC Open Coast Erosion Hazard Report” (February 2007), the more my concerns increased.
23. It now transpires that the 25 August 2012 letter from the Council was not correct. Equally, the PDP’s reference to the “work undertaken considered the *likely* impact of future sea level rise” (page 4-9, emphasis added) is also not correct.
24. The Council’s letter dated 18 January 2013⁴ to property owners says that the hazard assessment is:

“... based on a worst case scenario”.
25. That letter confirmed my view that the scientists had misunderstood the law, and their role in the legal process, and reinforced my concerns that there were other problems with the assessment.
26. Having now read the reports by coastal experts Mr Angus Gordon and Dr Willem de Lange, I have realised that the concerns I identified as a coastal lay person, although I’m experienced in considering technical reports, were merely a drop in the ocean.

² See 2012 Update, Appendix D, pages 81-86, the values for LT_50 and LT_100.

³ See 2012 Update, page 22, the paras about the 50 yr unmanaged LT results and the 100 yr unmanaged LT results and the two references to zeros occurring where “progradation is expected”.

⁴ In its Attachment One, Note 2 on the first page.

27. However, in these remarks I focus on the matters of concern that I noticed as a coastal lay person. To the extent that my concerns are ill-founded because of lack of coastal expertise, I apologise in advance.
28. However, in regard to my concerns about some coastal experts misunderstanding the law and their role in the legal process, I have expertise and coastal experts do not.
29. Finally, I understand that the Panel has received “The Science and The Law” paper, which I drafted. It was reviewed and approved by the Council’s lawyers, Simpson Grierson. The paper sets out the legal framework and the role of a coastal scientist within that framework.
30. In short, I consider that the CSL reports are fundamentally and fatally flawed, including from a legal perspective, and do not provide a valid basis for the objectives, policies, rules and Coastal Hazard Management Areas in the PDP. The CSL reports are not fit for purpose.
31. In this document I deal with the following issues:
- the CSL reports are based on a misunderstanding of the law and the role of a coastal scientist;
 - there has been inadequate peer review;
 - the Inlets assessment peer review is particularly inadequate;
 - longer-term shoreline change - LT+CU means that an accreting coast has been turned into an eroding one;
 - why did the reports assume LT=0 in accreting areas and what is the effect?;
 - numerous other precautionary assumptions are not apparent in the CU number;
 - 50 year open coast lines are so conservative they could last for 100 years - and well in excess of 50 years;
 - the inlets methodology raises a number of issues including:
 - a biased instruction for the inlets assessment between 2008 and 2012;
 - the same approach is used for accreting and eroding areas;
 - the methodology seems to ignore both accretion that has *actually* occurred and future accretion that is *expected* to occur;
 - what is the effect of merging the inlet lines?;
 - CU and non-quantified assumptions raise even more issues;
 - what is the effect for an inlet in the accreting part of the Kapiti coast?
 - more specific matters relating to the Mangaone inlet including:
 - it is in the accreting part of the Kapiti coast;
 - there is a unique sand/gravel beach with gravel dunes;
 - the standard inlets assessment approach was not used for the Mangaone inlet assessment;
 - previous shorelines shown for 1948 to 1966 are dry land;
 - there is a significant distance now between the property boundaries and the sea;
 - identification of the shoreline cannot rely on the vegetation line;
 - there are no control structures on the Mangaone Stream and no need for any;
 - there is Mangaone Stream mouth straightening by the Greater

- Wellington Regional Council, but no managed scenario was done in the CSL reports;
- the lack of a managed scenario for the Mangaone inlet is particularly problematic for people affected by the 50 year urban no-build line in the PDP;
 - what is the effect of merging the lines with the open coast lines (and the channel landward of the inlet throat)?
 - the biased instruction and its effect on the Mangaone inlet conclusions;
- the CSL assessment does not assess probability; and
 - the list of questions for the Panel that was attached to our further submissions.

The CSL reports are based on a misunderstanding of the law and the role of a coastal scientist

32. During my career, I have encountered lay people (including experts in disciplines other than law) confidently, but mistakenly, asserting what the law is.
33. It seems to me that Dr Shand (and, seemingly, some other coastal scientists and perhaps other people) have misunderstood the Resource Management Act 1991, the New Zealand Coastal Policy Statement, the precautionary approach and the role of a coastal scientist. The reasons are explained in more detail in our submission⁵ and further submissions⁶ and “The Science and The Law” paper.
34. In summary, the CSL reports:
- incorrectly treat the precautionary approach as if it is the most important legal factor upon which the reports should be based (eg “precautionarity (required by statute)”, page 4, 2012 Update), which it is not;
 - add precautionary assumption, to precautionary assumption, to precautionary assumption when making the assumptions for the model; with the result that
 - the cumulative effect is an assessment that is well beyond any reasonable application of any precautionary approach (to the extent that a precautionary approach is required at all, which is a decision to be made by the Council, or ultimately the Environment Court, not the coastal scientist).
35. Some of these precautionary assumptions then also have a “measurement error” (used in the combined uncertainty (CU) equation), making the precautionary assumption even more precautionary (discussed below under the heading “Longer-term shoreline change - LT+CU = accreting coast turned into an eroding one”).

⁵ Second submission of Rob Crozier and Joan Allin.

⁶ Further submissions (eg in relation to the Greater Wellington Regional Council submission) of the Crozier Family Trust, Allin Family Trust, Rob Crozier and Joan Allin.

36. Furthermore, the assessment also makes numerous other precautionary assumptions where the margin of error or safety margin is unquantifiable and therefore not included in the CU equation (discussed below under the heading “Numerous other precautionary assumptions are not apparent in the CU number”).
37. So one cannot just look at the CU number to ascertain the margin of error or the safety margin - or the actual combined uncertainty - in the modelling.
38. There were significant changes between the New Zealand Coastal Policy Statement 1994 and the New Zealand Coastal Policy Statement 2010. It is not surprising that lay people, and others, are still feeling their way in relation to its meaning.
39. The New Zealand Coastal Policy Statement 2010 (NZPCS) states (page 7):
- “This NZCPS is to be applied as required by the [RMA] by persons exercising functions and powers under the [RMA].”
40. So, the NZCPS, including all of its objectives and policies, is to be applied:
- “as required by the [RMA]” which means that all the relevant objectives and policies are considered by the Council (or the Environment Court) as part of the RMA decision-making process - selected extracts from selected policies are not to be used out of context by others; and
 - “by persons exercising functions and powers under the [RMA]” ie Councils and the Environment Court, not coastal scientists.
41. By way of example, Policy 3 of the NZCPS, which refers to a precautionary approach, states:
- “Policy 3 Precautionary approach**
- (1) Adopt a precautionary approach towards *proposed activities* whose effects on the coastal environment are uncertain, unknown, or little understood, but potentially significantly adverse.
 - (2) In particular, adopt a precautionary approach to *use and management of coastal resources* potentially vulnerable to effects from climate change, so that:
 - (a) *avoidable social and economic loss and harm to communities does not occur;*
 - (b) natural adjustments for coastal processes, natural defences, ecosystems, habitat and species are allowed to occur; and
 - (c) the natural character, public access, amenity and other values of the coastal environment meet the needs of future generations.”
42. That policy relates to “proposed activities” and “use and management of coastal resources”. Those are functions of the Council and, ultimately, the Environment Court.

43. The policy also refers to avoidable social and economic loss and harm to communities. That applies both ways ie be precautionary enough to avoid social and economic loss but do not be so precautionary that avoidable social and economic loss does occur. Again, that decision is the function of the Council and, ultimately, the Environment Court.
44. The important points are that:
- a coastal scientist cannot just pick up the reference to “precautionary approach” in Policy 3 and apply it outside the context of the provision in which it occurs; and
 - all the objectives and policies in the NZCPS, including Policies 3, 25 - 27 and whatever provisions the decision-maker decides to include in a district plan in relation to identification of coastal hazards under Policy 24, are to be decided by the decision-maker ie the Council or the Environment Court. That decision is made in the wider context of the RMA, with a wide range of factors (including the Regional Policy Statement) to be considered. The functions in Policy 3 are not functions of a coastal scientist.
45. In summary, it is not for the *coastal scientist* to be deciding that a precautionary approach should be adopted at each step of the process, or that a worst case should be applied.
46. It is for the coastal scientist to provide an appropriate level and range of objective, scientific material to enable *others* to participate in, and make decisions in, the process.
47. The RMA is not a no-risk statute. The sustainable management s 5 purpose of the RMA is the overriding factor ie
- “to promote the sustainable management of natural and physical resources”.
48. Sustainable management (s 5(2)):
- “means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while -
- (a) sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and
 - (b) safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and
 - (c) avoiding, remedying, or mitigating any adverse effects of activities on the environment.”

49. So, sustainable management means:
- managing the use, development, and protection;
 - of natural and physical resources (a defined term);
 - in a way, or at a rate;
 - which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety;
 - while sustaining the matters in (a), safeguarding the matters in (b) and avoiding, remedying, or mitigating the matters in (c).
50. A precautionary approach is *not* the overriding factor.
51. It is for the Council and, ultimately, the Environment Court (not the coastal scientist) to decide to what extent, if at all, any precautionary approach should be applied, after considering all of the relevant matters, including all of the relevant objectives and policies of the NZCPS and the Regional Policy Statement, and all of the relevant provisions of the RMA.
52. As noted in “The Science and The Law” paper, the district plan must give effect to the NZCPS and the Regional Policy Statement. In the RMA decision-making process for a proposed district plan, a wide range of matters are considered by the Council (or the Environment Court).
53. Policy 24 states:

“Policy 24 Identification of coastal hazards

- (1) Identify areas in the coastal environment that are potentially affected by coastal hazards (including tsunami), giving priority to the identification of areas at high risk of being affected. Hazard risks, over at least 100 years, are to be assessed having regard to:
- (a) physical drivers and processes that cause coastal change including sea level rise;
 - (b) short-term and long-term natural dynamic fluctuations of erosion and accretion;
 - (c) geomorphological character;
 - (d) the potential for inundation of the coastal environment, taking into account potential sources, inundation pathways and overland extent;
 - (e) cumulative effects of sea level rise, storm surge and wave height under storm conditions;
 - (f) influences that humans have had or are having on the coast;
 - (g) the extent and permanence of built development; and
 - (h) the effects of climate change on:
 - (i) matters (a) to (g) above;
 - (ii) storm frequency, intensity and surges; and
 - (iii) coastal sediment dynamics;
- taking into account national guidance and the best available information on the likely effects of climate change on the region or district.”

54. Policy 29 of the Regional Policy Statement requires district plans to:
- “(a) identify areas at high risk from natural hazards; and
 - (b) include polices [sic] and rules to avoid inappropriate subdivision and development in those areas.”
55. Finally, I suspect that some coastal scientists are also misunderstanding the effect of some Environment Court cases. If, during the experts’ caucusing days, coastal experts assert their view of the meaning of the precautionary approach in Policy 3 or what certain Environment Court cases mean, it is my view that you should stop that discussion. That is beyond the role of, and expertise of, coastal scientists and is a matter for the Council and the Environment Court (having heard all the evidence and legal submissions). The experts’ days should be focussed on science.

Inadequate peer review

56. Many concerns have been expressed about the lack of an appropriate, independent, peer review of the CSL reports. One might reasonably expect a peer review commensurate with the \$1.6 billion of property affected by the CSL reports.
57. The peer review document ie “Summary of Peer Reviewer comments on the KCDC Open Coast Erosion Hazard Report” (February 2007) refers to comments made between January 2006 and January 2007 – well before even the 2008 reports.
58. This document is not what I would consider to be an appropriate, independent peer review report. If you have not already done so, you may wish to have a look at it yourself to consider if it is the type of peer review report that you would expect to see with \$1.6 billion of affected properties.
59. In addition, the “chatty” nature of Dr Shepherd’s comments seems to reinforce his lack of independence from Dr Shand eg “Had a hard weekend tramping on the Ruahine tops and was not good for much yesterday.” (page 3) What is such a comment doing in a peer review document?
60. There are a number of errors in the CSL reports that even a lay person can identify (see, eg, pages 12-13 of our further submission in relation to Greater Wellington Regional Council).
61. One wonders about the care taken in the reports and the peer review when obvious errors appear.
62. We did not mention in the further submission that I have found it confusing to identify what sites are used for what purposes, particularly in light of the differences between the 2008 and 2012 reports.
63. Figure 1 of the 2008 Open Coast report (page 9) identifies various sites.

64. The caption of Figure 1 says (page 9):
- “... References across the top of [sic] map locate *coastal measurement sites* with the prefix **C** referring to sites used to provide data for determining erosion hazard **C**omponent values, references beginning with the prefix **X** referring to sites used to provide **eX**tra data for more detailed hazard assessment or for modelling the 2008 reference shoreline used for locating hazard lines...” (underlining added).
65. But in the equivalent Figure 2.1 in the 2012 Update (page 14) the underlined words are not there and it says:
- “... references beginning with the prefix **X** referring to sites used to provide **eX**tra data for more detailed hazard intermediate assessment”.
66. In the 2012 Update, section 2.3.1 “Expanded shoreline data-base” (page 13) seems confusing about C sites and the extra sites. It also seems to include errors in site references eg:
- C10.64 does not appear to have been used in the 2008 assessment (Figure 1 in 2008 Open Coast) so is presumably an error;
 - C11.42 also does not appear to have been used in the 2008 assessment (Figure 1 in 2008 Open Coast) so is presumably an error;
 - there is reference to C11.88 and X11.88 - it is not clear to me if that makes sense;
 - C10.91 is referred to on page 13 and Appendix B of the 2012 Update but Figure 2.1 on page 14 of the 2012 Update refers to C10.90.
67. Perhaps it is clear to coastal experts what sites have been used for what purposes, but it seems confusing to me.
68. Page 13 of the 2012 Update says:
- “The expanded data-set and its analysis to locate the 50 and 100 yr erosion prediction lines are detailed in the Data-Base spreadsheets (see Section 5).”
69. Page 21 of the 2012 Update says:
- “Several of the resulting time-series are plotted in the 2010 MPR report (Figure 7B) and all [sic] plotted in the 2012 Updated Data-Base.”
70. Page 59 of the 2012 Update says:
- “The [Updated] Data-Base is presented as two spreadsheets, one for *measurement-site information* and the other for *component derivations*. These spreadsheets contain all previous materials (from the 2008 Data Base) plus the 2012 updated data. The main modification/additions in the 2012 Updated Data-Base relate to inclusion of a 100 yr scenario and additional measurement sites and

shoreline samples for the north Raumati-south Paraparaumu section of coast.”

71. However, despite section 5 of the 2012 Update, entitled “Updated Data Base”, and the entire section 5 being dedicated to explaining the updated Data-Base (or Data Base), it does not actually exist.
72. I kept asking the Council for it, but was having trouble getting it. Eventually, I received a copy of a letter dated 18 December 2012 that Dr Shand wrote to the Council. What I took from the letter is, basically, that he couldn’t be bothered to prepare the updated data-base (despite section 5 of the 2012 Update explaining this updated data-base, or data base, in detail).
73. So the information about the additional measurement sites and the 100 year information is not available to be viewed in the updated data-base. That was not helpful.
74. As a lay person, I wonder what other problems there are that are not apparent unless one is an expert who considers carefully what was done in the modelling.
75. The reports of Mr Gordon and Dr de Lange seem to raise numerous issues of concern. The submission of Simon Arnold raises a number of statistical issues. Dr Shand’s own reassessment of the Waimeha inlet raises a number of issues of concern, not just in relation to that inlet.
76. I cannot help but wonder about how much diligence was applied in the peer review process.

Inlets assessment peer review is particularly inadequate

77. The 2012 Update would seem to be somewhat misleading as to what peer review has occurred in relation to the “novel”⁷ inlets assessment.
78. The 2012 Update says (page 4):

“... the CSL erosion hazard assessments have been peer reviewed, either in part or in full, by several experts (see Acknowledgements), and reviewer Dr Mike Shepherd’s overview comments on the present Update Assessment are included as the final appendix (H).”
79. The comments of some of the experts referred to in the Acknowledgements appear in “Summary of Peer Reviewer comments on the KCDC Open Coast Erosion Hazard Report” (February 2007). As the title to the document confirms, those comments relate to the *open coast* assessment, not the inlets - and predate even the 2008 report.
80. Apart from the one page overview comments by Dr Shepherd in Appendix H to the 2012 Update, the peer review of the Inlets assessment is 3 pages prepared by Dr Shepherd in Appendix A to the 2008 Inlets report.
81. In Te Horo Beach alone, the inlets assessment affects millions of dollars of property.

⁷ At page 66 of the 2008 Inlets report, Dr Shepherd says the method is “novel”.

82. In relation to the three page “peer review” of the inlets assessment in the 2008 Inlets report (pages 66-68), the list of issues that we asked the Council to get the Panel to address included the questions below. I have added underlining to emphasise the issues that we would like the Panel to consider:
- “18. It seems that Dr Shand’s standard inlet approach was not used for the Mangaone inlet. He refers to it being unreasonable to allow the early erosion embayments to control the inlet migration curve (page 27, 2008 Inlets). So, the dominant undulations were “*averaged out*”, a “*modified*” inlet migration curve was produced (but not shown) and the inlet migration defined by this “*smoothing*” process was adjusted landward (page 28, 2008 Inlets, all emphases original). Please consider the appropriateness of the entire approach to the Mangaone inlet. ...
 - 28. Dr Shepherd says that the “model’s generality is demonstrated by its successful application to the contrasting range of inlet types found along the Kapiti Coast...” (page 66, 2008 Inlets). How is this “successful application” demonstrated?
 - 29. Dr Shepherd says that “tying [the lines for natural and managed inlets] into the open-coast hazard line ... is a very useful innovation that will help council and communities in decision making and future planning” (page 67, 2008 Inlets). We don’t see it that way. Doesn’t tying the lines into the open coast measurement site .72km to the south of [the] inlet extend the effect of the inlet’s evaluation well beyond the actual effect of the inlet, overstating the effect of the inlet to the disadvantage of properties further away from the inlet?
 - 30. Dr Shepherd says “However, if allowance is made for any possible tsunami hazard along this coast, the hazard lines proposed in this report should not be regarded as too conservative” (page 67, 2008 Inlets). Isn’t this an indication that even Dr Shepherd considers that the results of this coastal erosion (not tsunami) assessment are too conservative?”
83. The recent CSL reassessment of the Waimeha inlet is troubling in a number of respects including:
- the failure to detect a storm water pipe outlet and its relevance to the location of the vegetation front (section 3.0, page 3);
 - the poor quality of the 1973 and 1988 aerial photo-based inlet shorelines used for the previous assessments (section 4.0, page 6);
 - what seems to be an odd, seaward protrusion, or “blip”, in front of a particular property, in stark contrast to the smooth lines along all the rest of the coast and the inlets.

84. The reassessment raises serious issues in relation to other inlets (and the open coast), including:
- What things has the assessment failed to notice elsewhere, including at other inlets?
 - What is the quality of the aerial photographs used for all the other inlets and the open coast?
 - In light of the unusual seaward protrusion or “blip” in front of one property, what is the effect elsewhere in the open coast and other inlets assessments of the “smoothing” and “merging” that has happened elsewhere? To what extent have properties (or parts of properties) been identified as within hazard areas due to smoothing or merging, rather than assessment of an actual hazard?
85. In relation to the report by Mr Gordon, that refers to the Waikanae inlet, if there have been issues at the Waikanae inlet, what issues have occurred at other inlets?
86. Finally, the report by Dr de Lange raises a number of problems with the inlets assessment that one might have expected a peer reviewer to address.
87. In summary, the peer review of the inlets assessment seems to be particularly inadequate.

Longer-term shoreline change - LT+CU = accreting coast turned into an eroding one

88. You will be aware that an element of the equations applying to the open coast and inlets assessment is LT, longer-term shoreline change.
89. I have already referred to the fact that the model applies LT=0 where there is longer-term shoreline progradation and where the 2012 Update itself says that progradation is *expected* (page 22).
90. And LT=0 applies from day one ie 2007-2008.
91. It is inappropriate that the hazard assessment ignores that Kapiti coast accretion in its assumptions and predictions.
92. But, to add insult to injury, there is also a “measurement error” of 3.7 m landward for 50 years and 7.4 m landward for 100 years (page 23, 2012 Update) as input to the combined uncertainty, CU equation.
93. Why there is a measurement error for LT=0, which is based not on measurement but on assumption, is not clear.
94. I am not a coastal scientist, or any good at math. But just using logic it seems that the effective result for the accreting northern Kapiti coast of LT=0 + CU (with its landward “measurement error” component) would seem to be not 0 at all, but a negative, landward figure.

95. Rather than *identifying* coastal hazards, the assessment seems to have *created* coastal hazards (the extent to which remains unclear because of the non-quantified CU factors). It seems that the model has turned an accreting coast into an eroding one, simply by virtue of its assumptions.
96. In addition, the 2008 Open Coast report refers to “other non-quantified uncertainty factors” relating to LT, including (page 26):
- “setting positive rates of shoreline change to zero”.
97. So, in addition to the accreting coast having been turned into an eroding one due to the “measurement errors” in CU, the extent of the precautionary effect of setting positive rates of shoreline change to zero has not been quantified at all in CU.

Why did the reports assume LT=0 in accreting areas and what is the effect?

98. When I first read the 2012 Update, I wondered why the report would assume LT=0 in accreting areas. (I had not at that stage realised the further landward effect of the CU calculation).
99. I looked at the “Summary of Peer Reviewer comments on the KCDC Open Coast Erosion Hazard Report” (February 2007) and saw that Dr Shand said to Dr Gibb:

“The reason for my relatively small hazard distances along the north coast resulted from this area’s long-term progradation offsetting erosive processes such as that associated with SRL [sic].

In an effort to simplify the computation method - thereby *facilitating hazard update by future council staff*, the method of combining hazard components has now been modified. All positive (accretionary) [sic] long-term rates of change have been set to 0. This practice is becoming more common in hazard assessment. The approach also remove [sic] the models [sic] reliance on trend continuity. This approach has effectively doubled the hazard distances along the north coast” (italics emphasis added, underlining original, page 23)

100. It was disturbing to find this reference and compare it with the reasons given in the 2008⁸ and 2012 reports⁹ and to compare the reason in the 2012 Update with Policy 24(1)(b) of the NZCPS.
101. While simplifying the method to facilitate hazard update by future Council staff might be an acceptable approach when there is not much at stake, it is an unacceptable approach in the context of the use of the hazard assessment in the PDP with rules affecting property worth \$1.6 billion.

⁸ Page 24, 2008 Open Coast.

⁹ Pages 16-17, 2012 Update.

102. In addition, Policy 24 of the NZCPS, which came into effect in 2010, refers to assessing hazard risks having regard to many factors. Policy 24(1)(b) refers to having regard to:
- “(b) short-term and *long-term* natural dynamic fluctuations of erosion and *accretion*” (emphasis added).
103. Simply carrying on with the approach of ignoring accretion that had been previously adopted for the 2008 reports was not appropriate.
104. The reason given in the 2012 Update for ignoring accretion was (pages 16-17)”
- “Where positive rates occur, LT is set at zero, this being a precautionary measure used by the industry in recognition of the uncertainly [sic] inherent in predicting sustained seaward shoreline migration over prolonged periods of time where the underlying process is not well understood.”
105. There was no reference to Policy 24(1)(b), no reference to this “precautionary measure used by the industry” being inconsistent with Policy 24(1)(b), and no assessment as to whether the underlying process for accretion along the Kapiti coast is well understood or not.
106. In my opinion, the over-zealous, and legally misguided, quest to adopt a precautionary approach has been most unhelpful and causes problems for the Council.
107. As “The Science and The Law” paper points out, the RMA (s 75(3)) states that a district plan must give effect to:
- any New Zealand coastal policy statement; and
 - any regional policy statement.
108. So, as a matter of law, the Council is required to give effect to the NZCPS and the Regional Policy Statement in its district plan.
109. Policy 24(1)(b) of the NZCPS says that hazard risks are to be assessed having regard to “... long-term natural dynamic fluctuations of ... accretion”.
110. But because the CSL reports did not do that, the Council cannot comply with Policy 24 and have regard to long-term natural dynamic fluctuations of accretion. The Council does not have an appropriate scientific basis for deciding, after taking all relevant factors into account, what areas should be identified in the district plan. And that is only considering the accretion issue - leaving aside all the other problems that have been caused by the inappropriate, and repeated, application of a precautionary approach.

111. For the CSL assessment to ignore accretion, which to use Dr Shand's own words results in an approach that "has effectively doubled the hazard distances along the north coast"¹⁰ (underlining original) is unhelpful, both to submitters and decision-makers in the RMA legal process.
112. It is also interesting that no number was included in the CU equation for ignoring accretion and that "setting positive rates of shoreline change to zero" (ie ignoring accretion) was treated as one of the "non-quantified uncertainty factors" (page 26, 2008 Open Coast).
113. Furthermore, this problem is exacerbated because of the precautionary or conservative approach taken at every step in the modelling. The problem is not limited to just failing to include long-term accretion.

Numerous other precautionary assumptions are not apparent in the CU number

114. As already noted, the assessment makes numerous other precautionary assumptions where the margin of error or safety margin is unquantifiable and therefore not included in the CU equation. So, one cannot just look at the CU number to ascertain the margin of error or safety margin in the modelling.
115. That is also unhelpful to submitters and decision-makers, because the 6 m CU number for 50 years and 10 m CU number for 100 years (for natural open coasts and all inlets) would seem to give a misleading impression of the *actual* margin of error or safety margin in the modelling.
116. Just by way of example, I set out a few of the non-quantified or unquantified factors below.
117. For LT uncertainty, the 2008 Open Coast report refers to "other non-quantified uncertainty factors" in particular (page 26):
- "cadastral-based shorelines often have a seaward offset compared with aerial-based shorelines and this provides an over-estimate of erosion";
 - "use of a modelling technique that was weighted toward more recent erosion when that recent erosion may only be part of a (medium-term) temporary change, this includes areas undergoing seawall end-effects";
 - "setting positive rates of shoreline change to zero"¹¹; and
 - "selecting a maximum erosional rate of change over several transects [sectors¹²] in the longshore direction, to represent that reach".

¹⁰ Page 23, Summary of Peer Reviewer comments on the KCDC Open Coast Erosion Hazard Report (February 2007).

¹¹ As noted earlier, a landward "measurement error" was included in the CU equation, but as noted here the effect of ignoring accretion is non-quantified.

¹² Page 63 of the 2012 Update uses the term "sectors" rather than transects. It says "In addition, the approach used in the present assessment of applying the upper 95% value for longer-term rates and shorter-term variation derived from several adjacent sectors to all those sectors, may have resulted in an overly large component value being applied to some locations."

118. For ST uncertainty (page 30, 2008 Open Coast):
- “A significant non-quantified uncertainty factor results from the selection [sic] a maximum (95%) fluctuation over several transects [sectors¹³] in the longshore direction to represent that reach”.
119. IMC (inlet migration curve in the 2012 Update, which was IM, inlet migration, in the 2008 Inlets report) replaces ST for the inlets assessment. The 2012 Update says that (page 27):
- “weighting the IMC to the location of maximum shoreward incursions of the envelope ... provides an unquantified margin of safety”
120. For DS uncertainty, “selection of the maximum dune height per sector, together with the minimum stability angle will over-estimate scarp-top retreat in many locations” (page 36, 2008 Open Coast). I could be wrong, but it seems that this uncertainty is not quantified in the “measurement errors”.
121. In discussing combined uncertainty in the 2012 Update, the report states (page 19):
- “In addition, a range of *other factors* (precautionary measures used in data processing) serve to increase the overall safety margin and some of these *other factors* were quantifiable and incorporated when determining the error terms (E_i to E_n). These *other factors* were described in detail in the 2008 Erosion Hazard Assessment and include: ...” (emphases original).
122. It does not seem to be clear which of the “*other factors*” in the list on pages 19-20 of the 2012 Update are quantifiable (and therefore included in the CU calculation) and which are not and which therefore result in precautionary outcomes but without any indication of the extent of the precaution in the CU number.
123. In terms of SLR uncertainty, page 19 of the 2012 Update seems to indicate that the NZ average regional historical SLR of 1.7 mm/yr was not subtracted from the SLR figures used. The 2008 Open Coast report (page 31) had indicated that this could result in double counting (or double dipping). To the extent that there is double counting, I would have thought that it would be a quantifiable matter, not an unquantifiable one.
124. However, I will leave it for the Panel to determine to what extent, if at all, there has been double counting and, if there has, whether it has been dealt with in a quantified or non-quantified manner.
125. In summary, there are numerous non-quantified precautionary or conservative assumptions made in the model that do not find their way into the CU number. The combined effect of all of these non-quantified precautionary assumptions, which cannot be determined, is disturbing.

¹³ See the preceding footnote.

126. The CU number would appear to be a misleading expression of the actual margin of error or margin of safety that is actually associated with the modelling.

50 year open coast lines are so conservative they could last for 100 years - and well in excess of 50 years

127. At page 20 of “Summary of Peer Reviewer comments on the KCDC Open Coast Erosion Hazard Report”, Dr Gibb (a person who “did not carry out a full peer review, but made some general comments”, page 19) had queried the 2008 report dealing only with 50 years, not 100 years.

128. Dr Shand responded (page 20):

“... Given the conservative manner in which all the components have been derived, coupled with the extrapolation uncertainty noted above, it is recommended that the 50 yr values be used be adopted [sic], with an understanding that they are can [sic] be applied to a 50 to 100 yr period if a hazard review is undertaken at 10 yr intervals.” (emphasis added)

129. The “Summary of Peer Reviewer comments on the KCDC Open Coast Erosion Hazard Report” then records that a footnote was included in the revised report to say (page 20):

“... The resulting hazard widths are expected to apply for the next 50 to 100 years.”

130. In fact, the footnote in the 2008 report does not refer to 100 years, but says (pages 8 and 10, 2008 Open Coast):

“... The resulting hazard widths are thus expected to apply for well in excess [sic] 50 yrs.”

131. 50 year lines that are expected to apply for well in excess of 50 years and potentially for 100 years would seem to be rather misleading 50 year lines - and not a helpful, objective, scientific evaluation.

Inlets methodology raises a number of issues

132. The inlets equation is effectively the same as the open coast equation, except that ST (shorter-term shoreline fluctuation) is replaced by IM (inlet migration in 2008) or IMC (inlet migration curve in 2012).

133. I turn now to address a number of issues relating to the inlets methodology.

134. These include:
- a biased instruction for the inlets assessment between 2008 and 2012;
 - the same approach is used for accreting and eroding areas;
 - the methodology seems to ignore both accretion that has *actually* occurred and future accretion that is *expected* to occur;
 - what is the effect of merging the inlet lines?;
 - CU and non-quantified assumptions raise even more issues; and
 - what is the effect for an inlet in the accreting part of the Kapiti coast?
135. **Biased instruction for the inlets assessment between 2008 and 2012:**
On top of all of the overly-conservative and overly-precautionary assumptions already in the 2008 reports, a biased instruction for the inlets assessment was given to CSL for the 2012 Update.
136. CSL was asked to (page 8, 2012 Update):
- “9) Include geomorphological evidence in the vicinity of inlets which indicates the potential for greater erosion than presently assessed.”*
(emphasis original)
137. An unbiased instruction would be to identify evidence that indicates the potential for *greater or lesser* erosion than presently assessed.
138. It therefore seems apparent that the person giving the instruction also misunderstands the RMA, the NZCPS, the Regional Policy Statement, the precautionary approach and the role of a coastal scientist.
139. The result of that instruction was the inclusion of purple lines (“Earlier shorelines from LIDAR and aerial photo stereo analysis”) in the figures for all the inlets in section 4.4 of the 2012 Update.
140. The 2012 Update says (page 27):
- “In addition, earlier shorelines based on geomorphic signatures (see Appendix E) have been identified to indicate the potential for greater erosion than expected using the inlet erosion prediction model (equation 6). This is important as the aerial photo-based shoreline data-set used to derive parameter values in equation 6 was usually inadequate for extrapolating out to 100+yrs.”
141. So, it seems that the original data-set was inadequate. That has apparently been remedied by responding to a biased instruction. And the inclusion of these earlier shorelines has resulted in different conclusions for various inlets from those reached in the 2008 Inlets report. I discuss this in more detail in relation to the Mangaone inlet.

142. I ask the Panel to consider:
- the adequacy of the original data-set;
 - the appropriateness of the biased instruction;
 - the appropriateness of the inclusion of these earlier shorelines; and
 - the 2012 Update's interpretation of them for the various inlets. We are particularly concerned with the change in tone and conclusion in relation to the Mangaone inlet from the 2008 Inlets report to the 2012 Update.
143. **Same approach for accreting and eroding areas:** The same approach to the inlets assessment was applied in accreting areas and in eroding areas.
144. We trust that the Panel will consider whether that is appropriate.
145. **Methodology seems to ignore both accretion that has *actually* occurred and future accretion that is *expected* to occur:** Again from the perspective of logic, rather than any coastal expertise, the combination of precautionary assumptions for the inlets assessment is troubling and seems to ignore both:
- accretion that has in fact already *actually* occurred up to 2007 (in IM or IMC); and
 - future accretion (in LT) which is expected to occur but which is assumed as LT=0 from day 1, so in fact all accretion from *2007-2008 onwards*.
146. In terms of ignoring accretion that has *actually* occurred up to 2007, it seems that the reports (Figure 3, page 15 and pages 13-16, 2008 Inlets) rely on methodology that ignores all of the accretion that has actually occurred by its approach in creating IM/IMC. As I understand it from the 2008 Inlets report (pages 13-16), the approach is:
- use historical vertical aerial photographs from identified years to abstract shorelines from geo-rectified images (and, from CSL's reassessment of the Waimeha inlet it seems apparent that some of the aerial photographs were of dubious quality). Ground inspection of dune morphology and stereoscopic analysis of the aerial photographs was undertaken;
 - separate the shorelines into natural and managed subsets (but seemingly not for all inlets, if differences could not be detected) and exclude transitional shorelines;
 - then take all of the landwardmost extents of all of the historical shorelines, regardless of whether or not there has been actual accretion during the time of the photographs, as a landwardmost composite shoreline (or shoreline limit line) for natural or managed inlet shorelines;
 - then create the "maximum landward migration shoreline" or "inlet migration curve". That is done by "interpolating between the (local) landwardmost points on the *shoreline limit* line such that the shape of the fitted curve was consistent with the general shape of the set of inlet shorelines" (page 15, 2008 Inlets). That effectively involved drawing a curving line along the most landward parts of the landwardmost composite shoreline. It seems that the effect of this is to include in the inlet migration curve areas that have always been landward of the inlet shorelines and to ignore areas where accretion has occurred.

147. Having then identified this landwardmost curving line, this is IM/IMC in the equation. Effectively, it seems to me, the approach adopted ignores all accretion that has *actually* occurred between the 1930s/1940s and 2007.
148. Then, that landwardmost location IM/IMC line is moved further landward by a distance equal to the sum of the LT, SLR (or RSLR in 2012) and DS from the adjacent open coast site, plus CU for the inlets (page 16, 2008 Inlets) - resulting in the erosion hazard line (I discuss merging that line with the open coast erosion hazard line and with the channel landward of the inlet throat, and also discuss CU, below.)
149. In terms of ignoring “future” accretion ie from 2007-2008 onwards, I have already discussed that in relation to LT=0.
150. In summary, it seems to me that the assessment ignores both accretion that has in fact already *actually* occurred up to 2007 and all accretion that is expected to occur from *2007-2008 onwards*.
151. **What is the effect of merging the inlet lines?:** The erosion hazard line is then “merged with the open coast erosion hazard line and with the channel landward of the inlet throat” (page 16, 2008 Inlets). Page 9 of the 2008 Inlets report says “For the present exercise, the inlet merges with the open coast where the historical set of shorelines become parallel.” Page 11 of the 2008 Inlets report says “Once the inlet erosion hazard line has been identified, it is merged with the adjacent open coast hazard line in a manner which retains the general shape of the shorelines.” Elsewhere, the report says “The hazard lines were then merged with the open coast erosion hazard lines” (eg page 28, 2008 Inlets).
152. It is not entirely clear to me exactly what was done in the merging process. In addition, what effect this “merging” has on areas affected by the merging, rather than the assessment of the effect of the inlet itself, seems unclear. This is discussed in more detail in relation to the Mangaone inlet.
153. **CU and non-quantified assumptions raise even more issues:** And then there is CU:
- with its landward 3.7 m for 50 years and 7.4 m for 100 years, thus turning an accreting coast into an eroding one simply by virtue of assuming LT=0 and the LT “measurement error” in CU;
 - setting positive rates of shoreline change to zero is a non-quantified uncertainty factor relating to LT (page 26, 2008 Open Coast);
 - an IM/IMC “measurement error” of 3.6 m, compared with the ST error of 2.6 m (page 27, 2012 Update);
 - apparently no number in the CU equation for “weighting the IMC to the location of maximum shoreward incursions of the envelope” - that “provides an unquantified margin of safety” (page 27, 2012 Update); and
 - the CU outcome for the natural open coast and all the inlets is the same number (although calculated in different ways) ie 6 m for 50 years and 10 m for 100 years.

154. So, CU and, importantly, all the non-quantified assumptions that are not reflected by any number in the CU equation, raise even more issues. It seems apparent that the actual CU number is misleading and not an accurate indication of the margin of error or safety margin.
155. **What is the effect for an inlet in the accreting part of the Kapiti coast?**
So, for an inlet in the accreting part of the Kapiti coast, just a few of the elements of the assessment that affect it are:
- put the inlet migration curve at the most landward extent that the shoreline has ever been during the historical period (and include areas landward of where the inlet shorelines have ever been) and ignore accretion that has actually occurred up to 2007; and
 - assume zero accretion from 2007-2008 onwards; and
 - assume 3.7 m landward for 50 years and 7.4 m landward for 100 years in CU for LT; and
 - set positive rates of shoreline change to zero - a non-quantified uncertainty factor relating to LT so there is no number in the CU equation to address that (page 26, 2008 Open Coast); and
 - include a “measurement error” number in CU for IM/IMC that is greater than the ST error, but use the same CU number for the natural open coast and all the inlets; and
 - do not include in CU any number for “weighting the IMC to the location of maximum shoreward incursions of the envelope”, which is “an unquantified margin of safety” (page 27, 2012 Update); and
 - merge the line with the open coast line, seemingly blurring which properties are affected by effects from the inlet and which are affected by the merging (it is not clear to me if the blurring also applies in relation to properties adjacent to inlet in relation to merging the line with the channel landward of the inlet throat).
156. And all that is leaving aside the issues of applying the DS factor from the nearest coastal site and SLR (or RSLR) issues.
157. It is most reassuring that the Panel has the expertise to consider the issues.

More specific matters relating to the Mangaone inlet

158. In addition to the range of concerns identified above, including in relation to the inlets assessment generally, I turn now to deal with some matters specific to the Mangaone inlet, including:
- it is in the accreting part of the Kapiti coast;
 - there is a unique sand/gravel beach with gravel dunes;
 - the standard inlets assessment approach was not used for the Mangaone inlet assessment;
 - previous shorelines shown for 1948 to 1966 are dry land;

- there is a significant distance now between the property boundaries and the sea;
 - identification of the shoreline cannot rely on the vegetation line;
 - there are no control structures on the Mangaone Stream and no need for any;
 - there is Mangaone Stream mouth straightening by the Greater Wellington Regional Council, but no managed scenario was done in the CSL reports;
 - the lack of a managed scenario for the Mangaone inlet is particularly problematic for people affected by the 50 year urban no-build line in the PDP;
 - what is the effect of merging the lines with the open coast lines (and the channel landward of the inlet throat)? and
 - the biased instruction and its effect on the Mangaone inlet conclusions.
159. For the Panel’s site visit, I provided a document with numbered notes corresponding to three aerial photos that were attached to the notes as Appendices 1 - 3. I attach the site visit materials as Attachment 3. Where relevant, I refer to the number from those site visit notes.
160. **Accreting part of the Kapiti coast:** The Mangone inlet is part of the northern Kapiti coast that has been accreting for thousands of years. It is inappropriate that the hazard assessment ignores that in its assumptions and predictions.
161. **Unique sand/gravel beach with gravel dunes:** Te Horo Beach is a sand/gravel beach, with gravel dunes. The gravel comes south from the Otaki River and the area, including Te Horo and the Mangaone inlet, is unique along the Kapiti coast.
162. A report for the Council by Wildlands¹⁴ identifies the 4.5 km Te Horo gravel beach at Rodney Ave and Sims Road (the Mangaone inlet is between Rodney Ave and Sims Road).
163. There is a Council sign “Te Horo Stony Ridges” at the Sea Road entrance near the toilets (#11 on the site visit notes). The sign has information about the gravel/stony area of the beach seaward of Rodney Ave and Sims Road. The sign states that taking stones from the beach is not allowed, but people do take stones, including vehicle or trailer loads.
164. **The standard inlets assessment approach was not used for the Mangaone inlet assessment:** As noted before, Dr Shepherd said in his three page peer review that the “model’s generality is demonstrated by its successful application to the contrasting range of inlet types found along the Kapiti Coast...” (page 66, 2008 Inlets). There was no explanation as to how this “successful application” was demonstrated or evaluated.
165. However, it seems that the standard “novel” inlet approach was not used for the Mangaone inlet.

¹⁴ Wildlands - Assessment of Four Potential Ecological Sites or Extensions, Kapiti Coast District, August 2012.

166. The 2008 Inlets report refers to it being unreasonable to allow the early erosion embayments to control the inlet migration curve (page 27, 2008 Inlets). So, the dominant undulations were “*averaged out*”, a “*modified*” inlet migration curve was produced (but not shown) and the inlet migration defined by this “*smoothing*” process was adjusted landward (page 28, 2008 Inlets, all emphases original).
167. We have little confidence in the methodology for the entire coastal erosion hazard assessment (both open coast and inlets) and ask the Panel to please consider the appropriateness of the entire approach to the Mangaone inlet.
168. **Previous shorelines shown for 1948 to 1966 are dry land (site visit note #1):** The early previous shorelines are now dry land. The lagoon shown in the 1948 to 1966 historical shorelines is gone. Now there are houses, land, vegetation and gravel dunes.
169. While, as noted above, the dominant undulations were “*averaged out*”, a “*modified*” inlet migration curve was produced (but not shown) and the inlet migration defined by this “*smoothing*” process was adjusted landward (page 28, 2008 Inlets, all emphases original), I cannot tell exactly what was done.
170. To rely on such previous shorelines, even in part, to predict future coastal erosion in this gravel area that has accreted and changed significantly over time seems flawed. The inability to see exactly what was done in relation to the assessment of the Mangaone inlet is troubling.
171. **Significant distance now between the property boundaries and the sea (site visit notes #8 and 12):** There is a significant distance now between property boundaries and the sea. The CSL reports do not seem to take appropriate account of that.
172. **Identification of the shoreline cannot rely on the vegetation line:** To the extent that the assessment relies on the vegetation line to identify the shoreline, especially directly to the south of the inlet, it will be incorrect.
173. Along the south side of the inlet, there is a gravel track (the track that is an extension of Te Horo Beach Road, site visit note # 5). At the end of the track, there is a circular area, formed by vehicles (including large camper vans and trucks), that drive and park in this area. Vegetation will never grow there because of the vehicles, but there is a vegetation circle that the vehicles drive around.
174. The site visit note # 6 drew attention to the vegetation circle that the “shoreline envelope” skirts. Note #6 asked the Panel to note that vehicles travel around, and park, seaward of the vegetation circle on the gravel dunes. So using the vegetation line in this area would seem not to reflect the shoreline. The actual shoreline extends north and west (towards the stream and the sea) beyond this vegetation circle.
175. Therefore relying on a vegetation line to the immediate south of the stream will result in a misleading outcome as to the location of the shoreline.

176. Site visit note #9 identified the informal gravel track where vehicles drive through, and along, the gravel dunes (not to be confused with site visit note #10, the previous track now hidden by vegetation). At the northern end, the informal track is closer to the shoreline than further south at the Sea Road end of the informal track.
177. Vegetation will not develop in the areas frequented by vehicles, including the informal gravel track.
178. There is also a much wider gravel area that vehicles drive on, and park on - and all along Te Horo Beach dunes, some people drive on, along and over the dunes. People also remove gravel, although they are not supposed to.
179. In summary, relying on the vegetation line to identify the shoreline has probably already been misleading, and is likely to continue to be misleading, particularly in the area to the south of the Mangaone Stream near the mouth of the stream.
180. **There are no control structures on the Mangaone Stream and no need for any:** In contrast to a number of inlets along the coast, there are no structures to control the Mangaone Stream and no need for any.
181. **Mangaone Stream mouth straightening, but no managed scenario was done in the CSL reports:** The Greater Wellington Regional Council straightens the mouth of the Mangaone Stream if certain parameters are reached. That occurs approximately once a year. While the stream is therefore managed in terms of the meaning of “managed” in the CSL reports, the CSL reports did not include a managed scenario.
182. The PDP (pages 4-8 to 4-9) correctly notes that the Regional Council straightens the channel at the mouth of the Mangaone Stream but incorrectly says that the hazard assessment conducted a managed scenario and an unmanaged scenario.
183. The lack of a managed scenario for the Mangaone inlet has been brought to the attention of the Council numerous times, with requests that a managed scenario be done. Most recently, I emailed the Chief Executive on 30 October 2013 asking that a managed scenario be done before the Panel convened so that any issues with the managed scenario could be addressed now. Still no managed scenario has been completed.
184. It seems from the Council’s response that the CSL methodology is unable to discern the effect of management at the Mangaone inlet.
185. Logically, one would have thought that the Regional Council’s making stream mouth cuts within certain parameters would limit the extent to which the stream mouth will migrate.
186. The CSL reassessment of the Waimeha inlet (13 September 2013) states that the Regional Council record shows that, since 2000, there have been 10 stream mouth cuts at the Mangaone inlet (page 4).
187. Either the Regional Council is wasting its time making stream cuts as they have no effect or the CSL methodology cannot distinguish between managed and unmanaged potential coastal erosion effects at inlets.

188. If it is the latter, it would seem that the CSL methodology is not fit for purpose.
189. **The lack of a managed scenario for the Mangaone inlet is particularly problematic for people affected by the 50 year urban no-build line in the PDP:** The lack of a managed scenario for the Mangaone inlet is particularly problematic because the 50 year urban no-build line in the PDP is based on the CSL *managed* scenario lines (Policy 4.12, page 4-14 PDP).
190. But because the CSL reports did not include a managed scenario for the Mangaone inlet, the PDP's 50 year urban no-build line for Te Horo Beach is the *unmanaged* line.
191. Te Horo Beach people affected by the 50 year no-build line in the PDP are therefore significantly more badly affected than people at any other inlet along the coast. And that has occurred because the CSL reports do not include a managed scenario for the Mangaone inlet. That is an unacceptable outcome.
192. **What is the effect of merging the lines with the open coast lines (and the channel landward of the inlet throat):** I have already mentioned the issue of the "merging" that the inlets assessment does and the inability to discover what areas are affected by the inlets assessment and what areas are affected not by the inlet, but by CSL's "merging" approach.
193. It is not clear what resource management expertise Dr Shepherd is relying on to assert that "tying [the lines for natural and managed inlets] into the open-coast hazard line ... is a very useful innovation that will help council and communities in decision making and future planning" (page 67, 2008 Inlets).
194. It seems to me to be relevant to know if a property is affected by the inlet or by the merging.
195. It is not clear to me exactly how the merging is done. As noted earlier, the 2008 Inlets report says:
- the erosion hazard line is then "merged with the open coast erosion hazard line and with the channel landward of the inlet throat" (page 16, 2008 Inlets);
 - "For the present exercise, the inlet merges with the open coast where the historical set of shorelines become parallel." (page 9, 2008 Inlets);
 - "Once the inlet erosion hazard line has been identified, it is merged with the adjacent open coast hazard line in a manner which retains the general shape of the shorelines." (page 11, 2008 Inlets);
 - "The hazard lines were then merged with the open coast erosion hazard lines" (eg page 28, 2008 Inlets).
196. It is not clear to me if the Mangaone inlet has been merged with open coast measurement site C26.58 or where the historical set of shorelines become parallel or in some other manner.
197. From Figure 9 in the 2008 Inlets report (page 30), it looks like the merging has been done to connect with site C26.58. (The equivalent Figure 4.6 in the 2012 Update (page 37) does not identify site C26.58.)

198. If the merging is not done to site C26.58, then the rest of what I write in this sub-heading is irrelevant.
199. The historical effect of the Mangaone Stream is “almost 300 m to the north and about 400 m to the south” (page 27, 2008 Inlets). The Mangaone Stream is at 27.3 km (see, eg, page 82 of Appendix D, 2012 Update, but note that the location of the stream is incorrectly identified on page 84, 2012 Update). The northern measurement site C27.63 is .33 km north of the stream, but the southern measurement site C26.58 is .72km to the south. The gap between them is 1.05 km.
200. It is not clear why:
- for a historical effect of 300 m to the north of the stream, a measurement site .33 km north from the stream is satisfactory; but
 - for a historical effect of about 400m to the south of the stream, a measurement site .72 km to the south is satisfactory (especially when Part 3: Data-Base identifies Horizons profile BM26 which is 294 m north of C26.58).
201. However, we are most concerned about the .72 km gap between the Mangaone Stream and the southern open coast measurement site C26.58.
202. The historical photos seem to show the southern effect of the Mangaone Stream stopping north of Sea Road.
203. So, a measurement site .72 km away from the stream and well south of Sea Road could mean that properties like ours, considerably south of Sea Road, may not be affected by the inlet but by the “merging” line. It seems to me that we are entitled to know which it is.
204. So, from our perspective, the “merging” approach of the assessment is neither useful nor helpful, if the merging has occurred to link the stream with measurement site C26.58.
205. Finally, we wonder if merging the line with the channel landward of the inlet throat adversely affects properties near the stream and if that effect is blurred by the merging.
206. We trust that the Panel will consider what effect, if any, the merging has to the detriment of any properties affected by the merging.
207. **Biased instruction and its effect on the Mangaone inlet conclusions:** I have already referred to the biased instruction given to Dr Shand for the 2012 Update to (page 8, 2012 Update):
- “9) Include geomorphological evidence in the vicinity of inlets which indicates the potential for greater erosion than presently assessed.”*
(emphasis original)

208. In contrast to the 2008 approach for the Mangaone inlet, the 2012 Update includes a statement in relation to the Mangaone inlet that these purple “earlier shorelines” (see pages 36-37, 2012 Update):
- “indicate erosion has occurred in the vicinity and landward of the 100 yr natural IEPL, thus suggesting the predictions may be under-estimated.”
209. The difference in tone and conclusions between the 2008 and 2012 reports in relation to the Mangaone inlet (and some other inlets) as a result of the instruction is troubling.
210. We ask that the Panel address the issue as to whether these purple “earlier shorelines” are:
- evidence of earlier shorelines on a systematically prograding coast; or
 - a suggestion that the predictions for the Mangaone inlet (and some other inlets) may be under-estimated.

CSL assessment does not assess probability

211. I turn now to address the issue of risk and the failure of the CSL reports to assess probability. The NZCPS, Regional Policy Statement and the PDP all refer to, and define, risk.
212. All of the definitions incorporate the concept of likelihood or probability of the occurrence and the consequences.
213. The 2012 Update asserts that:
- “An erosion hazard assessment such as this is a detailed scientific study which predicts potential hazard (magnitude *and probability*) over different prediction periods.” (emphasis added, page 4)
214. However, the hazard assessment does not assess the likelihood or probability of the occurrence. It simply adds precautionary assumption, to precautionary assumption to precautionary assumption. In my view, the resulting assessment is not even logical, let alone scientific. Many of the precautionary assumptions are non-quantified, so one cannot even tell how precautionary they actually are. The CSL reports seem to have been prepared based on a fundamental misunderstanding of the law, the NZCPS, and of the role of a coastal scientist in the RMA process.
215. All of that is most unsatisfactory and has unfortunately resulted in reports that are not fit for purpose.

The list of questions for the Panel that was attached to our further submissions

216. Our further submissions (eg the one in relation to the Greater Wellington Regional Council) included a list of questions that we wanted the Panel to address.
217. That list is attached as Attachment 4.

Conclusion

218. In conclusion, the CSL reports are not of assistance to a decision-maker (or submitters) in the RMA process when they:
- ignore accretion that has *actually* occurred;
 - ignore accretion that is *expected* to occur;
 - make precautionary or conservative assumptions at every step;
 - include numerous non-quantified precautionary or conservative assumptions so that the extent of the margin or error or safety margin in the modelling cannot actually be ascertained; and
 - do not assess probability.
219. Indeed, the reports are positively misleading to the Council or the Environment Court in their role to identify the areas potentially affected or at high risk of being affected by coastal erosion hazards from the likely effects of climate change - within the framework of the RMA.
220. It seems apparent that, in its over-zealous quest to apply the precautionary approach, the CSL reports have identified areas that are not potentially affected, let alone at high risk of being affected, by the likely effects of climate change within the 50 and 100 year periods.
221. What the scientist should be providing is proper, objective, scientific information, and the relevant probabilities and uncertainties, to enable submitters to participate in, and the Council or the Environment Court to make decisions in, the RMA process.
222. That information can then be relied upon by people to see if their properties are at risk or not. It can also be relied on by the Council to identify with reasonable confidence what areas are at risk, where attention should be focussed, what mitigation measures might reduce the risk, the costs and benefits of various options, what areas should be identified in the district plan and what objectives, policies and rules should apply to those areas.
223. The CSL reports are also counter-productive, just from a practical perspective - leaving aside all the legal and other issues. Because of the flaws, people aren't taking the reports seriously. And time and money are being spent in an unproductive manner when time and money should be spent dealing with issues associated with the areas that are at risk.
224. The RMA is not a no-risk statute, so a quest by a scientist for a worst case combination of assumptions is misguided and most unhelpful. In the RMA decision-making process, a wide range of factors are considered, including the s 5 purpose of the RMA. From a practical perspective, common sense, judgement, and reasonableness in all the circumstances of the case also come into the mix.
225. The CSL reports are fundamentally and fatally flawed, including from a legal perspective, and do not provide a valid basis for the objectives, policies, rules and Coastal Hazard Management Areas in the PDP. The CSL reports are not fit for purpose.

226. In *Bay of Plenty Regional Council and Waihi Beach Protection Society v Western Bay of Plenty District Council* (2002) 8 ELRNZ 97 (at para [7]), the Environment Court said:

“Given the discipline’s difficult and inexact nature, any assessment of coastal hazards requires application of careful and informed judgement, founded upon well-compiled data.”

227. In terms of the way forward, and any additional work that the Panel may consider needs to be done, we regrettably have no confidence in CSL’s ability to apply “careful and informed judgement” or to carry out any additional work in an appropriate manner.
228. If the Panel recommends that additional work be undertaken, the Panel may wish to recommend the process by which careful and informed judgement should be applied, and with what input by experts overseeing any additional work and the judgement being applied, to ensure that the further work is objective and scientific.