21 May 2025
Job No: 1098025.0000

Far North District Council
Private Bag 752
Memorial Avenue
Kaikohe 0400

Attention: James Witham

Dear James

Far North Proposed District Plan
Technical advice on coastal and flood submissions

Far North District Council (FNDC) commissioned Tonkin & Taylor Ltd (T+T) to provide technical advice on Proposed District Plan (PDP) change submissions related to coastal erosion, coastal inundation and flooding. Technical advice from T+T is presented as a response comment added to the submission tables provided by FNDC (blue shading is used for T+T comments). This is presented in a set of tables appended to this cover letter.

Submissions related primarily to **coastal erosion** are presented in **Appendix A**. The coastal hazard assessments referred to in the submissions are based on Northland Regional Council mapping and refer to the following layers:

- CEHZ1: 66% likelihood of erosion with by 2080 with RCP5.8M.
- CEHZ2: 5% likelihood of erosion with by 2130 with RCP5.8M.
- CEHZ3: 5% likelihood of erosion with by 2130 with RCP5.8H+.
- CEHZ0: Potential erosion area immediately after failure of a consented coastal protection structure.

Submissions related primarily to **coastal flood hazards** are presented in **Appendix B**. The coastal flood hazard zones (CFHZs)referred to in the submissions are based on Northland Regional Council mapping and refer to the following layers:

- CFHZ0 - 1% Annual Exceedance Probability (AEP) for 2020 water levels.
- CFHZ1 - 2% AEP for 2080 with RCP5.8M.
- CFHZ2 - 1% AEP for 2130 with RCP5.8M.
- CFHZ3 – 1% AEP for 2130 with RCP5.8H+.

Submissions related primarily to catchment flooding are presented in **Appendix C**. The flooding assessments referred to in the submissions are based on Northland Regional Council mapping that are composed of various catchment models. The relevant models and reports are referred to in response to each submission.

Tonkin & Taylor Ltd | 1 Fanshawe St, Auckland Central, Auckland 1010, New Zealand
PO Box 5271, Victoria Street West, Auckland 1142 P +64-9-355 6000 F +64-9-307 0265 E akl@tonkintaylor.co.nz

1 Applicability

This report has been prepared for the exclusive use of our client Far North District Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that this report will be used by Far North District Council in undertaking its regulatory functions in connection with the Proposed District Plan Change.

Tonkin & Taylor Ltd

Report prepared by:

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Dr Eddie Beetham
Senior Coastal Geomorphologist

Authorised for Tonkin & Taylor Ltd by:

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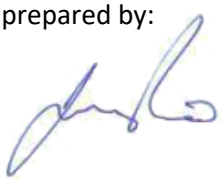
Sarah McCarter
Project Director

Report prepared by:



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Jon Rix
Principal Flood Risk Consultant
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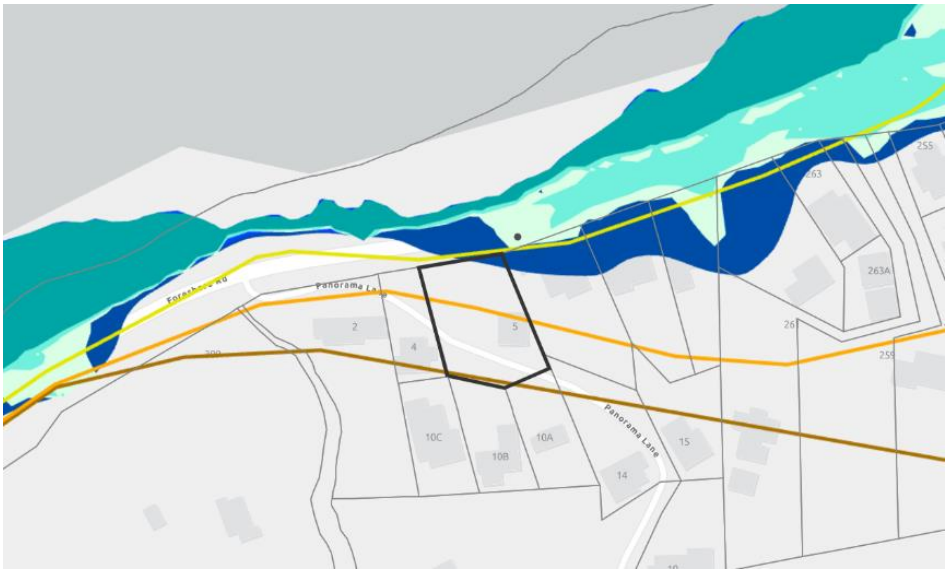
Appendix A Coastal erosion submissions

1.1 Submissions S358.038 and S357.031

Submission	S358.038
Submitter	Leah Frieling
Location / area	275 Foreshore Road, Ahipara
Legal description	Lot 1 DP 431209
Decision requested	Amend the Coastal Erosion hazard 2 line adjacent to 275 Foreshore Road, Ahipara (Lot 1 DP 431209).
Reasons	Change the mapping of the Coastal Erosion hazard 2 zone adjacent to 275 Foreshore Road, Ahipara (Lot 1 DP 431209) to be reflective of geology, as it is clear that different substrates erode at different rates, and also that the site contains gabion baskets that have lifted the site well above the surrounding properties, and has been established by a geotechnical engineer – PK engineering, in June 2017. A generic approach has been taken, instead of looking at the geology of the site, and therefore if it will erode or not. The report from PK engineering specifically has considered potential erosion of the sub-strate, and it is clear that blue rock will not erode such as sand or other sedimentary rock may do so.
Aerial Imagery	

Notified Hazard Mapping


Submission	S357.031
Submitter	Sean Frieling
Location / area	275 Foreshore Road, Ahipara
Legal description	Lot 1 DP 431209
Decision requested	Amend the coastal erosion hazard 2 line where it runs past this site to reflect the PK engineering assessment that was also provided to Toby Kay at NRC when the coastal hazard mapping was done by NRC (13.6.17).
Reasons	Largely same as above.
Aerial Imagery	
See above.	
Notified Hazard Mapping	
See above.	
T+T response	The submission relates to an assessment of Areas Susceptible to Coastal Erosion and Instability (ASCIE) that was undertaken for Northland Regional Council (NRC) by Tonkin & Taylor Ltd (T+T). Ahipara is ASCIE site 30 in the regional assessment and was initially assessed in 2017 then updated in 2020 based on new sea level rise information. The Ahipara ASCIE assessment for NRC split the coastline into 11 cells based on differences in exposure, coastal processes, and underlying geology. **Underlying Geology:** The property at 275 Foreshore Road, Ahipara appears to be at a transition between Ahipara Cell D (basalt geology) and Cell E (sand dune). The sand dune environment is more susceptible to erosion, which is why erosion distances in Cell E are larger than Cell D. The underlying geology was informed by 1:250 scale geological maps and visible rock outcrops. The mapping process transitions the ASCIE lines from Cell D to Cell E and the submitters properties appears to be in this transition between assessment cells.

	Therefore, the ASCIE lines may be over-predicting the erosion hazard if the underlying geology at the site is rock, then the distances from Cell D could be applied. The submitter has mentioned site specific information on the sub-surface geology at the property that was not available or appropriate for including at the scale of assessment undertaken by Northland Regional Council to inform coastal erosion hazards at Ahipara. The transition between basalt and dune in the erosion maps were therefore appropriate for the scale of assessment being undertaken by Northland Regional Council. The site-specific information mentioned by the submitter identifies that the property has a basalt geology, not sand dune. This property specific information could be used to inform a site-specific coastal erosion hazard assessment. The submitter mentions a report by PK engineering from 2017. This has not been seen by T+T. **Gabion Wall:** Regarding the gabion basket wall, these structures appear to be designed for slope stabilization, not to arrest coastal erosion. Unless the foundation depth is suitably designed (e.g. below sea level), a gabion basked wall is susceptible to undermining by hydraulic action due to erosion at the toe. Private property coastal protection structures are not considered when undertaking a regional assessment of coastal erosion hazards. Only formal coastal protection structures identified by Northland Regional Council are considered appropriate for reducing the erosion hazard to CEHZ0. **Other site-specific factors:** This site is complex in terms of coastal setting and hazards. Coastal processes adjacent the property are visibly causing an erosion issue at the coastal edge, with a rock revetment structure present to protect the road from undermining. FNDC could also consider the long-term plan for Foreshore Road and whether the rock revetment is going to be maintained and upgraded to protect the road from coastal hazards. This could be part of a coastal adaptation plan for the Ahipara community.
Recommendation	If the underlying geology at these properties is rock, not sand dune, then erosion distances in Cell 30D could be applied. However, there is insufficient information to re-draw the ASCIE lines without completing a site specific ASCIE assessment.

1.2 Submissions S541.012, S519.013, S485.013, S543.012 and S464.012

Submission	S547.012
Submitter	LJ King Limited
Location / area	2 Panorama Lane, 4 Panorama Lane, 5 Panorama Lane, Ahipara
Legal description	Lot 2 DP 110673 Lot 2 DP 426060 Lot 1 DP 431209
Decision requested	Amend Coastal Erosion Zone 2 Line to be reflective of geology at 2 Panorama Lane, 4 Panorama Lane and 5 Panorama Lane, Ahipara (as per engineering assessment in submission).
Reasons	The coastal Erosion Hazard 2 line maps are not drawn and established relative to the gabion basket heights.
Submission	S541.012
Submitter	Elbury Holdings

Location / area	2 Panorama Lane, 4 Panorama Lane, 5 Panorama Lane, Ahipara
Legal description	Lot 2 DP 110673 Lot 2 DP 426060 Lot 1 DP 431209
Decision requested	Amend Coastal Erosion Zone 2 Line to be reflective of geology at 2 Panorama Lane, 4 Panorama Lane and 5 Panorama Lane, Ahipara (as per engineering assessment in submission).
Reasons	The coastal Erosion Hazard 2 line maps are not drawn and established relative to the gabion basket heights.
Submission	S519.013
Submitter	Elbury Holdings
Location/area	2 Panorama Lane, 4 Panorama Lane, 5 Panorama Lane, Ahipara
Legal description	Lot 2 DP 110673 Lot 2 DP 426060 Lot 1 DP 431209
Decision requested	Amend Coastal Erosion Zone 2 Line to be reflective of geology at 2 Panorama Lane, 4 Panorama Lane and 5 Panorama Lane, Ahipara (as per engineering assessment in submission).
Reasons	The coastal Erosion Hazard 2 line maps are not drawn and established relative to the gabion basket heights.
Submission	S485.013
Submitter	Elbury Holdings
Location/area	2 Panorama Lane, 4 Panorama Lane, 5 Panorama Lane, Ahipara
Legal description	Lot 2 DP 110673 Lot 2 DP 426060 Lot 1 DP 431209
Decision requested	Amend Coastal Erosion Zone 2 Line to be reflective of geology at 2 Panorama Lane, 4 Panorama Lane and 5 Panorama Lane, Ahipara (as per engineering assessment in submission).
Reasons	The coastal Erosion Hazard 2 line maps are not drawn and established relative to the gabion basket heights.
Submission	S543.012
Submitter	LJ King Limited
Location/area	2 Panorama Lane, 4 Panorama Lane,

	5 Panorama Lane, Ahipara
Legal description	Lot 2 DP 110673 Lot 2 DP 426060 Lot 1 DP 431209
Decision requested	Amend Coastal Erosion Zone 2 Line to be reflective of geology at 2 Panorama Lane, 4 Panorama Lane and 5 Panorama Lane, Ahipara (as per engineering assessment in submission).
Reasons	The coastal Erosion Hazard 2 line maps are not drawn and established relative to the gabion basket heights.
Submission	S464.012
Submitter	LJ King Limited
Location/area	2 Panorama Lane, 4 Panorama Lane, 5 Panorama Lane, Ahipara
Legal description	Lot 2 DP 110673 Lot 2 DP 426060 Lot 1 DP 431209
Decision requested	Amend the Coastal Erosion Zone 2 line as it applies to 2, 4 and 5 Panorama Lane, Ahipara to reflect the geology of the area.
Reasons	The coastal Erosion Hazard 2 line maps are not drawn and established relative to the gabion basket heights.
T+T response	Same response as above for Submissions S358.038 and S357.031 'engineering assessment in submission' has not been seen by T+T.
Recommendation	If the underlying geology at these properties is rock, not sand dune then erosion distances in Cell 30D could be applied. However, there is insufficient information to re-draw the ASCIE lines without completing a site specific ASCIE assessment.

Appendix B Coastal flood hazard zone submissions

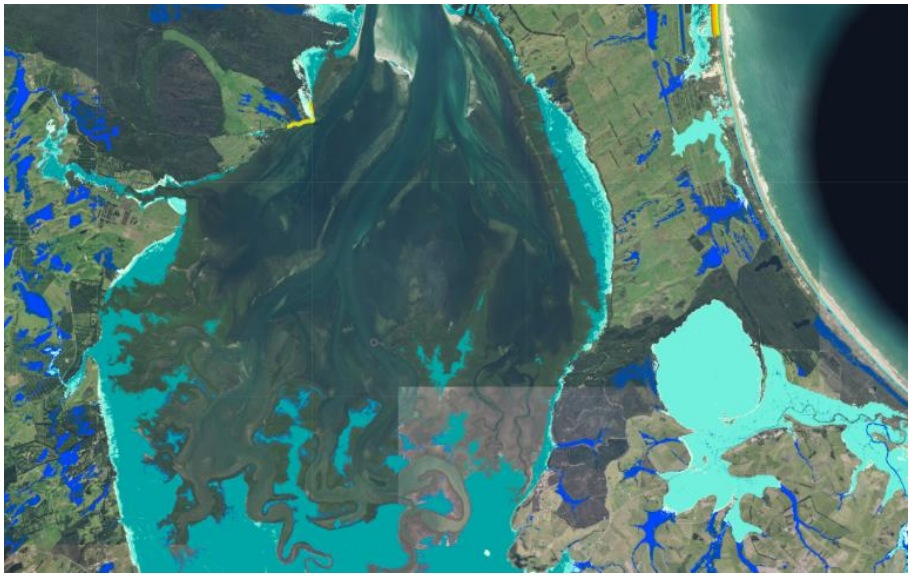
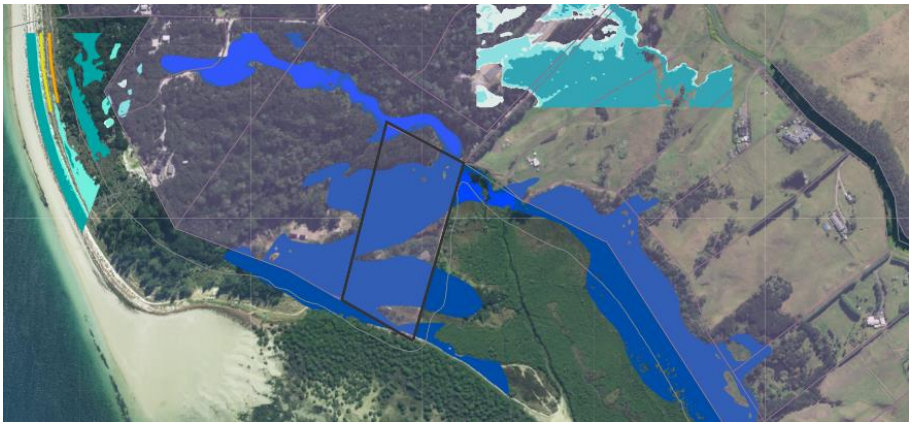
1.3 Submission S599.001

Submission	S599.001
Submitter	Zoe Maginn
Location / area	Rangaunu Harbour 409A Rangiputa Road, Karikari Peninsula
Legal description	Lot 1 DP 108093
Decision requested	Delete (or do not update) the Coastal Flood Hazard Zone / Layer and River FloodHazard Zone / Layers at Rangaunu Harbour. To amend the Coastal Flood Hazard Zone / Layer and River Flood Hazard Zone / Layer on land at 409A Rangiputa Road, Karikari Peninsula. To review actual flooding incidences and sea levels (real data) and compare them to the modelled data. To amend models and hazard zones based on actual data and events, in a structured and periodic manner. This may be yearly, for example. So that hazard zones remain relevant and current. To review modelling accuracy to ensure based on likely scenarios (and not extreme or unlikely scenarios) - as required by New Zealand law.
Reasons	These zones have been modelled using 'extremes' and may not be 'likely' effects, as required in New Zealand Law. The hazard maps and zones must remain correct and current. This can only be done by monitoring and reviewing their accuracy in line with real data and events. The models may be shown to be inaccurate when compared to actual data, and therefore irrelevant. Future effects of this plan, and decisions based on it, could be totally wrong if based on old modelling and data. The hazard maps and zones must be accurate for each property, rather than applied in a blanket fashion as they have far reaching consequences for each individual property. We are concerned that these hazard layers are based on predicted and modelled scenarios. We do not believe that these scenarios are backed up by actual evidence of inundation and sea level rise on the ground. Has there been a detailed verification of the modelled scenarios using historical information from the area? The assumptions on which the modelling and the coastal hazard assessments are based must be based on likely effect of climate change (as required by NZ law) and not on unlikely or improbable scenarios. We are aware of the community on the Kapiti Coast that have recently engaged their own Coastal Hazard assessment which has found significant issues in the work done by the Councils consultant (in this instance Jacobs). It found that basing their assumptions on MFE guidelines resulted in improbable and even implausible scenarios. Council must ensure that work done by consultants and the underlying assumptions do not fall significantly short as they have in the case of Kapiti District Council's consultant's work, before new hazard layers are included in the Plan. We are extremely concerned that the Coastal Hazard Layers you are proposing to add will have significant implications on property LIMs, values, uses, ability to insure and to

	secure loans for properties. This being the case we believe it is absolutely essential that these maps are based on actual and probable scenarios not on extreme or improbable scenarios. The coastal flood hazard and river flood hazard layers cover approximately 90% of our property, which may make it impossible to build on the property. We should have the right to build on our property, and the council may make it impossible to do that by imposing these hazard zones. I don't believe the council should be able to potentially remove that right based on modelling using extreme scenarios that are imposed and not monitored. We have owned the property for over 13 years, and there has been no major flooding that reflects the hazard maps in any way. The previous owner has confirmed there was no flooding in the previous 27 years that his family owned it. That is no flooding that reflects the hazard maps in any way in the last 40 years. We therefore strongly object to these Coastal Hazard Maps being added, unless they are reviewed, corrected and applied accurately based on real data, that is reviewed and updated.
Aerial Imagery	

Figure Appendix B.1: Rangaunu Harbour.

Figure Appendix B.2: 409A Rangaunu Harbour.

Notified Hazard Mapping	
 *Figure Appendix B.3: Rangaunu Harbour.*  *Figure Appendix B.4: 409A Rangaunu Harbour.*	
T+T response	**Coastal:** The submission relates to the NRC coastal flood hazard assessment that mapped coastal inundation for the region. The coastal flood hazard assessment was undertaken by T+T (2021), including analysis of extreme sea levels and future sea level projections. Inundation mapping for this site was undertaken using a hydrodynamic model by eCoast (2021). The property at 409A Rangiputa Road is overlaid by the four coastal flood zones, including CFZ0 for present day. The property elevation is low lying and extends to the harbour edge. The cleared section sits between the 2 – 3 m (NZVD16) contours. The submitter raises several points relating to the scope of a coastal hazard assessment in terms of assessment timeframe and event probability. These are best answered from a planning perspective. However, from a technical perspective the coastal flood hazard scenarios mapped for Northland are consistent with methods and scenarios applied across New Zealand and are consistent with Ministry for Environment (2024) guidance on coastal hazard risk. The submitter notes that this site has not flooded in the last 40 years. The coastal flood assessment considers extreme events with a 1% and 2% probability of occurrence in a year. These scenarios are based on building code and natural hazard planning

	requirements. The present day 1% AEP sea level for the site (CFHZ0) is 1.7 m NZVD16. These values were calculated using site specific tide gauge monitoring data from Rangaunu Harbour, at Ben Gun Wharf, with data from 20004 – 2020 processed by NIWA to inform storm tide and extreme coastal water levels. Flooding to this level may not have occurred while occupants were observing, which is reasonable. The exposure of the site to coastal flooding for CFH zones 1-3 would not be possible to observe as these are based on future sea level rise scenarios. The submitters comment on monitoring is recognised. Having local data and observations does improve the calibration and quality of information used by regional and district councils to manage natural hazards. Since a tide station already exists in the harbour, monitoring by the community could include taking georeferenced and timestamped photos of the shoreline during extreme tide events. In the absence of such site-specific information, the models and assessment methods applied are based on the best available site specific data. In summary, the coastal flood hazard maps are reasonable for informing hazard exposure at this site. **River flood hazard zone:** The flood mapping in the area is derived from the Oruru Catchment model (M9), (Water Technology, 2021) developed for NRC as part of their regionwide flood modelling. The Oruru catchment model has not been locally calibrated, instead relying on learnings from the calibration carried out in catchments M03 (Waipoua), M06 (Kaeo) and M07 (Bay of Islands Coast). Despite not being locally calibrated, we consider that the River Flood Hazard Zone 3 (100 year ARI rainfall with allowance for climate change) is likely reasonable because flooding in the area appears to be dominated by the coastal water level used to define the river flood hazard zone. Even if the rainfall depths were lower, the flooding appears to be strongly influenced by the 2 year ARI tide level at Veronica Channel with a further 1.2 m sea level rise added. For more information the submitter is referred to the catchment report (Water Technology, 2021). It appears that a bridge or culvert structure underneath the accessway to 409A may not be represented in the regionwide model, which is to be expected for regionwide-scale modelling. In this case, this may allow more floodwaters to be conveyed through 409A and therefore the 10 year ARI and 50 year ARI flood extents may be underestimates of the actual floodplain. Many of the disclaimers provided by NRC regarding their regionwide modelling programme cover the topics raised by the submitter, including: “The river flood hazard zones have been created using an assessment of best current available information, engaging national and international experts in the field, using national standards and guidelines and has been peer reviewed. This will provide a good indication of the areas at potential risk of flooding from a regional perspective. However, flood mapping is a complex process which involves some approximation of the natural features and processes associated with flooding.” We consider it likely, that even with refined modelling, the floodplain for the 100 year ARI (Average Recurrence Interval) floodplain with climate change is unlikely to change significantly, and that the floodplain for the 10 year ARI and 50 year ARI floodplain may increase.
Recommendation	Coastal flood hazard zone: The coastal flood hazard layers are suitable for this site. River flood hazard zone: There is currently insufficient evidence to remove the floodplain from this property.

1.4 Submission S604.001

Submission	S604.001
Submitter	Rangiputa Community Incorporated
Location / area	Rangaunu Harbour
Legal description	N/A
Decision requested	Delete or amend coastal flood hazard layer in relation to Rangaunu Harbour until Council has gone through a thorough process including (1) Calibrating scenarios against actual historical evidence of sea level rise in the area (2) Taking the learning from the Kapiti situation and applying these, and (3) Working with the affected community and determining exactly the impacts on individuals affected.
Reasons	We are concerned about Plan Variation 1 and the addition of the Coastal Flood Hazard layers specifically in relation to Rangaunu Harbour and surrounding areas, particularly Karikari Peninsula. We are concerned that these hazard layers are based on predicted and modelled scenarios and do not believe they are backed up by actual evidence of inundation and seal level rise on the ground. This being the case we believe it is absolutely essential that these maps are based on actual and probable scenarios not on improbable scenarios. We are concerned the Coastal Hazard Layers will have significant implications on people LIMs, their property values and uses and abilities to insure and secure loans for their properties.
Aerial imagery	

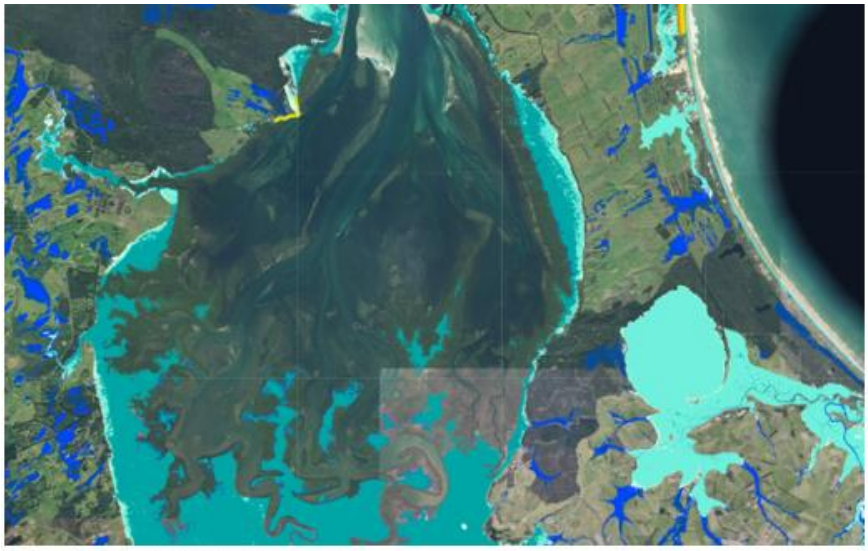
Notified Hazard Mapping	
	
T+T comment	The submission relates to a coastal flood hazard assessment from NRC that mapped coastal inundation for the region. The coastal inundation assessment was undertaken by T+T (2021), including analysis of extreme sea levels and future sea level projections. Coastal flood hazard mapping for Rangaunu Harbour was undertaken using a hydrodynamic model by eCoast (2021). Coastal flood hazard values for Rangaunu Harbour were calculated using site specific tide gauge monitoring data at Ben Gun Wharf, with data from 2004 – 2020 processed by NIWA to inform storm tide and coastal inundation levels. Therefore, the best available site-specific information was used in to create the coastal inundation models and hazard maps. Regarding the comment that a model is used and not observed flood events, councils plan for extreme events and future sea level conditions that have not occurred in the recent past or present day. Therefore, the only plausible method for assessing coastal inundation is to use models, and consider site specific data for model calibration to present day before projecting into high sea level situations.
Recommendation	The coastal flood hazard models and analysis are appropriate for informing coastal hazard maps in Rangaunu Harbour and Karikari Peninsula.

1.5 Submission S605.001

Submission	S605.001
Submitter	Elbury Holdings, LJ King, Fiona King, LJ King LTD, West Coast Farms, Leah Frieling
Location/area	Rangaunu Harbour
Legal description	N/A
Decision requested	Amend mapping and geotech to improve accuracy before labeling peoples properties at risk if they are not (inferred).
Reasons	Maps are inaccurate, inconsistent and too old. Inundate model only of Rangaunu Harbour and no maps for Taipa or other large rivers. No work has been done on other river catchments to date and only using LIDAR.
Aerial images	

Figure 9: Rangaunu Harbour

Figure 10: Taipa

Notified hazard mapping	
 Figure 11: Rangaunu Harbour  Figure 12: Taipa	
T+T comment	**Rangaunu Harbour:** The coastal flood hazard assessment was undertaken by T+T (2021), including analysis of extreme sea levels and future sea level projections. Inundation mapping for Rangaunu Harbour was undertaken using a hydrodynamic model by eCoast (2021). This assessment utilised site-specific tide gauge data from Rangaunu and applied a hydrodynamic model by eCoast (2021) for the mapping. **Taipa:** For Taipa, an assessment of coastal flood hazards was completed by T+T (2021). The inundation assessment identified the extreme sea levels associated with present day storms of different return periods and physical drivers. The coastal flood hazard assessment included a wave model for Doubtless Bay and historic tide gauge analysis from the closest available locations, Whangaroa Harbour and Awanui. Coastal flooding for Taipa was mapped using a bath-tub method which identifies locations where land is below the calculated extreme sea level. This is appropriate for the region wide assessment commissioned by NRC.
Recommendation	The coastal hazard data and maps are available and suitable for understanding natural hazard exposure at Rangaunu Harbour and Taipa.

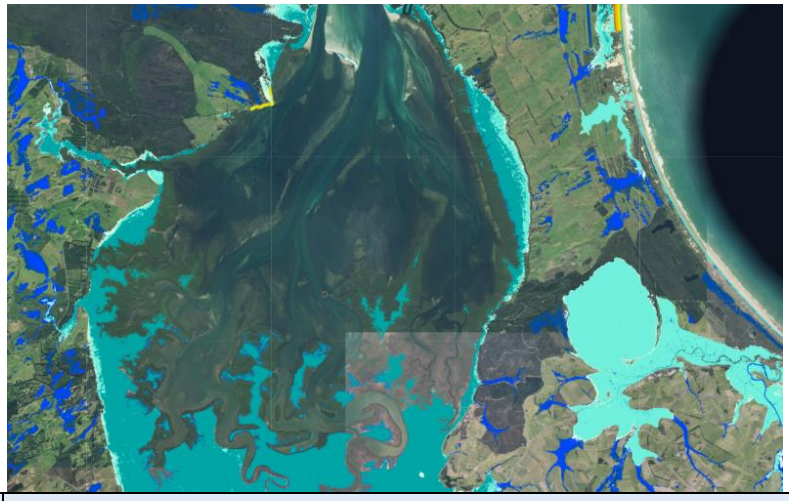
1.6 Submission S605.003

Submission	S605.003
Submitter	Elbury Holdings, LJ King, Fiona King, LJ King LTD, West Coast Farms, Leah Frieling
Location / area	189 State highway 1, Awanui
Legal description	Part Lot 2 DP 100591
PDP map	
Decision requested	Delete the coastal flood hazard layers from 189 State highway 1, Awanui (Inferred).
Reasons	189 State highway 1 is higher than the Awanui main street which isn't within the flood zone mapping, therefore the property shouldn't be within the flood zone (Inferred).
Aerial Imagery	
	
Notified Hazard Mapping	
	
T+T comment	The coastal flood hazard assessment was undertaken by T+T (2021), including analysis of extreme sea levels and future sea level projections. Inundation mapping for Awanui was undertaken using a hydrodynamic model by eCoast (2021). These assessments were commissioned by NRC for natural hazard planning purposes. This property is in the coastal flood hazard zone because the land is below the extreme sea level assessed for present day. The land is connected to the sea via the Awanui River, meaning seawater can flow up the river and over low land to reach the property. The property is variable in terms of elevation contours, and the section closer to the river is identified in the mapping to be exposed to coastal inundation. The coastal flood

	hazard maps do not show coastal inundation reaching the area of the property with buildings, which is consistent with the submitter comment that some of the property is higher than the road level.
Recommendation	The coastal flood hazard maps are suitable for this location.

1.7 Submission S605.004

Submission	S605.004
Submitter	Elbury Holdings, LJ King, Fiona King, LJ King LTD, West Coast Farms, Leah Frieling
Location / area	Rangaunu Harbour
Legal description	N/A
Decision requested	Amend maps to account for new buildings sites, work completed and the stopping banks done by NRC.
Reasons	It appears the coastal hazards were prepared expecting all rivers from the Ranganunu Harbour to rise without consideration for the stopping banking done by NRC recently. The maps are too old and do not take account of the new work completed.
Aerial Imagery	
	
Notified Hazard Mapping	

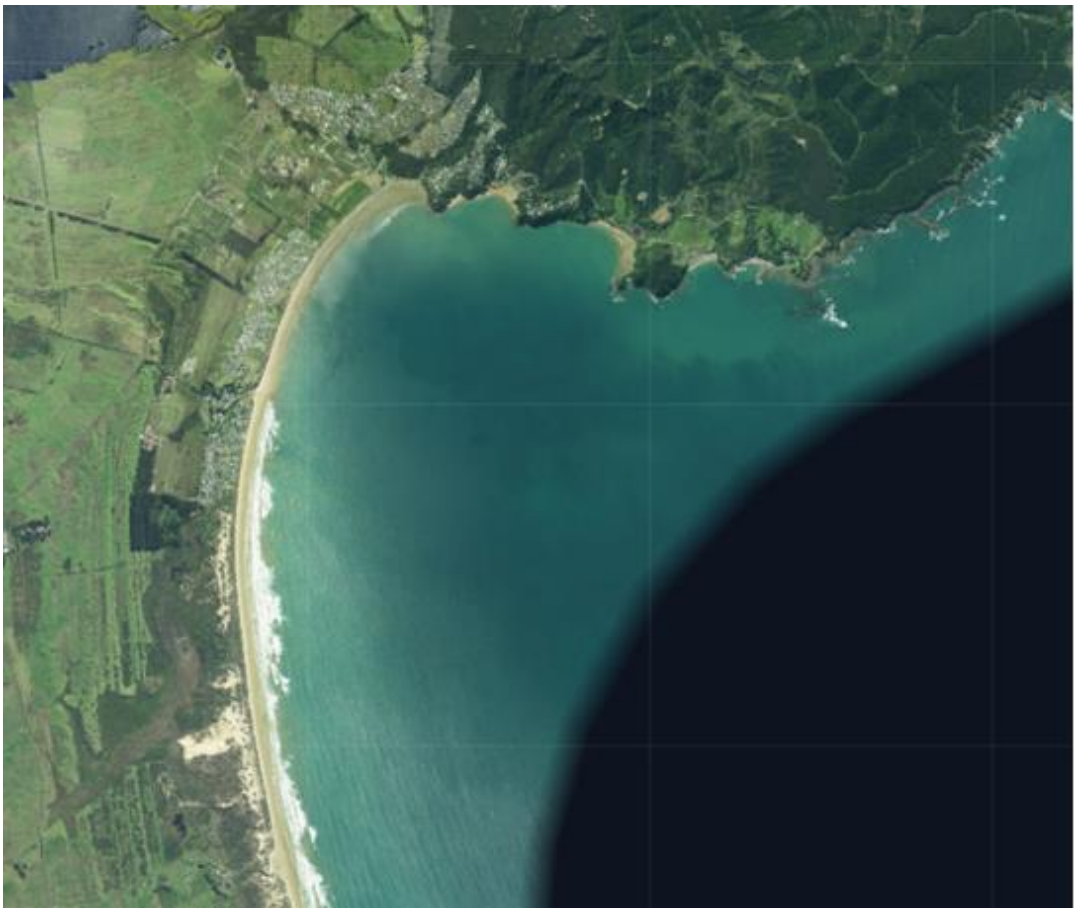
	
T+T comment	The coastal flood hazard assessment was undertaken by T+T (2021), including analysis of extreme sea levels and future sea level projections. Inundation mapping for Rangaunu Harbour was undertaken using a hydrodynamic model by eCoast (2021). This assessment utilised site-specific tide gauge data from Rangaunu. The coastal inundation maps were created using a LiDAR survey from 2020, with data collected between 2018 – 2020. This may not account for changes in terrain since then. The coastal inundation assessment for Rangaunu was based on a hydrodynamic model by eCoast, which did represent stop banks in the terrain as existed at the time of the modeling. If stopbanks and flood schemes have been upgraded, then additional modelling can be undertaken (e.g. by NRC) to identify the risk mitigation area for the design event.
Recommendation	Coastal flood hazard information is likely appropriate, but should be updated after flood reduction schemes are constructed.

1.8 Submission S601.001

Submission	S601.001
Submitter	Kingheim Limited
Location / area	N/A – relates to methodology rather than specific properties / areas.
Legal description	N/A
Decision requested	Amend the coastal hazard flood mapping to include Coastal Flood Hazard Zone 0 for design referencing and Coastal Flood Hazard Zone 1 & Coastal Flood Hazard Zone 2 mapping for information only. Coastal Flood Hazard Zone 3 should not be included or referenced in the plan variation or Proposed District Plan (inferred).
Reasons	There is an incompatibility between the modelling plans being used (NRC maps) and the written words of the Coastal Hazard policy NH-P7, which considers the 1% Annual Exceedance Probability flood hazard plus 1 m of sea level rise. If the intent is for NH-P7 to relate the 1% AEP storm flood level plus the stated 1 m, then there is no relevance to defining anything other than the Coastal Flood Hazard Zone 0 in the River Flooding Hazards section, since all other flood elevations cannot be related to the policy requirement (inferred).
T+T comment	The coastal flood hazard maps by NRC are based on specific timeframes of sea level rise and reference the RCP8.5 climate change projection. The mapped scenarios are: • CFHZ0 - 1% Annual Exceedance Probability (AEP) for 2020 (0 m SLR). • CFHZ1 - 2% AEP for 2080 with RCP5.8M (0.6 m SLR).

	• CFHZ2 - 1% AEP for 2130 with RCP5.8M (1.2 m SLR). • CFHZ3 – 1% AEP for 2130 with RCP5.8H+ (1.5 m SLR). If the policy refers to 1m sea level rise, then this is not consistent with the available mapping.
Recommendation	The coastal inundation maps do not show a scenario with SLR = 1 m.

1.9 Submission S605.009

Submission	S605.009
Submitter	Elbury Holdings, LJ King, Fiona King, LJ King LTD, West Coast Farms, Leah Frieling
Location / area	Whatuwhiwhi
Legal description	N/A
Decision requested	Insert the coastal flood layers for the Whatuwhiwhi areas. (inferred)
Reasons	Does the Pukehe hill lakes discharge sometimes under the inland road out to Whatuwhiwhi beach in high water table levels. It is not showing on the maps. I believe Coastal inundation of Pukehe will probably cross the road and flow onto Tokerau Beach.
Aerial Imagery	
	
Notified Hazard Mapping	

T+T comment	The coastal flood hazard zones is modelled to cross northern sections of Tokerau Beach Road. Some sections of the road are exposed at present day (CFHZ0), with increasing exposure due to sea level rise evident in CFHZs 1-4. We have no information on drainage from Pukehe hill lakes.
Recommendation	The coastal flood hazard maps are appropriate for this area.

1.10 Submission S598.001

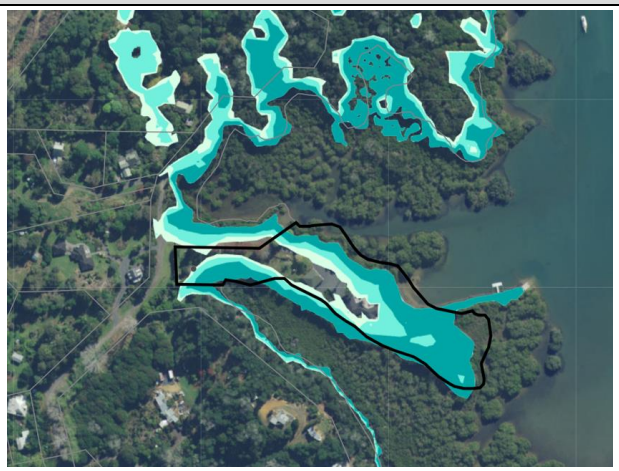
Submission	S598.001
Submitter	Karen Barrow
Location / area	213 McKenzie Road, Kerikeri
Legal description	
Decision requested	Delete the Coastal Flood Hazard layer from the land at 213 McKenzie Road, Kerikeri.
Reasons	Submitter requests that 213 McKenzie Road, Kerikeri is excluded from the Coastal Flood Hazard Layer. The reasons are that I have lived at 213 McKenzie Road, Kerikeri for approximately 50 years. There has been no noticeable change to the high tide mark during this period. The property has never flooded. The submitter notes that the area of the property identified with the Coastal Hazard layer is minor and they would be able to take steps to mitigate / reduce any effect to the area.
Aerial Imagery	

Notified Hazard Mapping

T+T comment	Coastal flood hazard extents at the site were assessed as part of a regional assessment by T+T (2021) for NRC and were mapped using a bath-tub method that identifies land below the calculated inundation level. The following coastal flood hazard levels were calculated for this site: • CFHZ0 = 1.7 m NZVD 1% AEP (no sea level rise; present day). • CFHZ1 = 2.2 m NZVD 2% AEP (RCP8.5M 2080 = 0.6 m SLR). • CFHZ2 = 2.9 m NZVD 1% AEP (RCP8.5M 2130 = 1.2 m SLR). • CFHZ3 = 3.2 m NZVD 1% AEP (RCP8.5H+ 2130 = 1.5 m SLR). The terrain of the site, as mapped by 2018-2020 LiDAR is below these levels in some locations. Therefore, the coastal inundation map is valid for the property. An extreme event at present day may not have reached the assessed 1% AEP level of 1.7 m. Future Sea level rise will still pose a risk to coastal inundation at this location. A site-specific assessment would be required to re-assess coastal flood hazard levels using local data, and to re-map inundation extents based on any changes to the terrain.
Recommendation	The regional coastal flood hazard maps are suitable for informing coastal inundation exposure at this location.

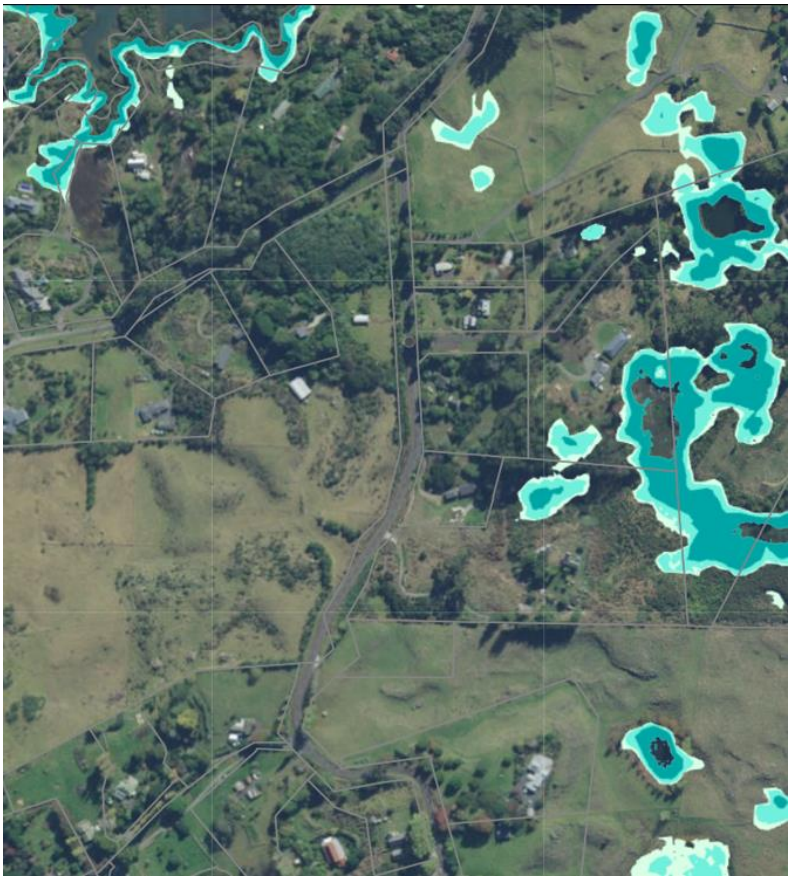
1.11 Submission S589.001

Submission	S589.001
Submitter	Kathy Davies
Location / area	22 Quinces Landing
Legal description	Part Lot 10 DP 87903
Decision requested	Delete the proposed new coastal hazard maps (notified as part of Plan Variation 1) or correct them for the property at 22 Quinces Landing, located at the end of Hauparua Inlet.
Reasons	Te various LINZ and NRC maps used to create the Coastal Hazard maps are not correct for this area of the Hauparua Inlet - possibly why the area is not shown in the Provisions selection. The LINZ maps currently show a lot of our existing property as 'hydro', which is not correct. This has likely been used as a base starting point. The NRC hazard maps (I assume used to generate the updated FNDC maps) are incorrect as very inconsistent with the NZ Searise data and maps - which I assume are a base point for all Councils. If NZ Searise is not the base data set for Coastal Hazard modelling could you please let me know what data has been used? The new maps show all land up to 2 m above sea level as being in Coastal Hazard in the 50 year plan. The NZ Searise data shows the median estimate of sea level rise at 39 m for this property by 2070 and this includes the vertical land level change estimated. At 100 years (2120) the NZ Searise shows the rise at this property at 82 m. The 'sea' / water at this end of the estuary is protected by an extremely narrow entry ('the narrows') to the basin of water. Mountains rising steeply to 50m elevation on Wharau Rd surround the basin providing shelter from wind. Hence it is very protected and there is no 'wave action' to be considered. The flood zone should equate to the sea level rise estimates along with vertical land level changes which equal 39 m at 2070 and 82 m at 2120 on the NZ Searise site. Why then do the maps show hazard zones up to and over 2 m? It is obviously very incorrect to map coastal hazard to this level at 50 years and still actually incorrect at the 100 year projection. I note that the current flood zone assessment on the NRC maps shows some existing flooding hazard where the current district plan shows none. I can confirm that during our ownership we have never seen flooding on the land and this includes time during cyclone Gabriel when winds were at a maximum and a tree was downed on our road. Also no flooding during the tsunami warning a few years ago that saw the evacuation of the area and in which social media notes from people on the Kerikeri Inlet that they noticed high water levels. We noticed none as we watched on our cameras from afar. This submission is in relation to Variation 1 of PDP which says changes are minor and insignificant. The proposed changes are not at all insignificant to this property.

Aerial Imagery	
	
Notified Hazard Mapping	
	
T+T comment	Coastal flood hazards were assessed by T+T (2021) as part of a regional assessment for NRC. Coastal inundation is the combination of different processes. At present day, the mean high water spring level is 1.0 m (NZVD-16 vertical datum). Storm surge during events with low atmospheric pressure and onshore wind can add a storm surge on top of the tide. The 1% AEP storm tide level is 1.5 mNZVD-16 for this location, which is 0.5 m above the MHWS level. Wave breaking at the coast can add a 'setup component' which at this location was assessed to be 0.2 m. Therefore, the present day 1% AEP coastal inundation level for the site is 1.7 m NZVD which is the CFHZ0 level used in mapping. Sea level rise is added to this value to account for climate change. The following coastal flood hazard levels were calculated for this site: • CFHZ0 = 1.7 m NZVD 1% AEP (no sea level rise; present day). • CFHZ1 = 2.2 m NZVD 2% AEP (RCP8.5M 2080 = 0.6 m SLR). • CFHZ2 = 2.9 m NZVD 1% AEP (RCP8.5M 2130 = 1.2 m SLR). • CFHZ3 = 3.2 m NZVD 1% AEP (RCP8.5H+ 2130 = 1.5 m SLR). Cyclone Gabrielle was an extreme event that caused storm surge inundation in some locations. This occurred during neap tides, which limited inundation is some areas. The coastal flood hazard assessment was undertaken by Tonkin + Taylor Ltd in 2021. The technical report is published online and was complete before NZ Sea Rise was published. The sea level rise values used in the Tonkin + Taylor assessment are consistent with NZ Sea Rise data for climate change pathway SSP5-RCP8.5.
Recommendation	The regional assessment for NRC is suitable for informing coastal hazard exposure in this location.

1.12 Submission S595.001

Submission	S595.001
Submitter	Tim Brandon
Location / area	Hauparua Lane
Legal description	N/A
Decision requested	Delete the coastal flood hazard layer from the Hauparua Lane area (inferred).
Reasons	To oppose the new plan variation 1 that proposes to zone the Hauparua Lane area as a flood plain, as it clearly is NOT. There are no rivers in the vicinity and having lived here for 21 years and have experienced significant rainfall over short periods of time, there has never been a flood! There has never been a flood, even in severe downpours. I strongly object to this zone proposal. Requests to speak to the local residents and hear all involved, and rethink this decision.
Aerial Imagery	

Notified Hazard Mapping	
	
T+T comment	Coastal flood hazards were assessed by T+T (2021) as part of a regional assessment for NRC. Coastal inundation is the combination of different processes. At present day, the mean high water spring level is 1.0 m (NZVD-16 vertical datum). Storm surge during events with low atmospheric pressure and onshore wind can add a storm surge on top of the tide. The 1% AEP storm tide level is 1.5 m NZVD-16 for this location, which is 0.5 m above the MHWS level. Wave effects at the coast can add a 'setup component' which at this location was assessed to be 0.2 m. Therefore, the present day 1% AEP coastal inundation level for the site is 1.7 m NZVD-16 which is the CFHZ0 level used in mapping. Sea level rise is added to this value to account for climate change. The following flood hazard levels were calculated for this site: • CFHZ0 = 1.7 m NZVD 1% AEP (no sea level rise; present day). • CFHZ1 = 2.2 m NZVD 2% AEP (RCP8.5M 2080 = 0.6 m SLR). • CFHZ1 = 2.9 m NZVD 1% AEP (RCP8.5M 2130 = 1.2 m SLR). • CFHZ1 = 3.2 m NZVD 1% AEP (RCP8.5H+ 2130 = 1.5 m SLR). Areas of land below these levels are identified as potentially being exposed to coastal inundation. The mapping method considers areas directly connected to the sea with terrain below the inundation sea level. The mapping also considers areas disconnected from the sea that are below the coastal inundation levels. Therefore, terrain below 3.2 m is captured as potentially being exposed to sea level rise in 100 years' time, with sea level rise.
Recommendation	The coastal flood hazard assessment is suitable for informing coastal hazards at this location. A site-specific assessment would be required to update the coastal hazard information and maps.

1.13 Submission S602.001

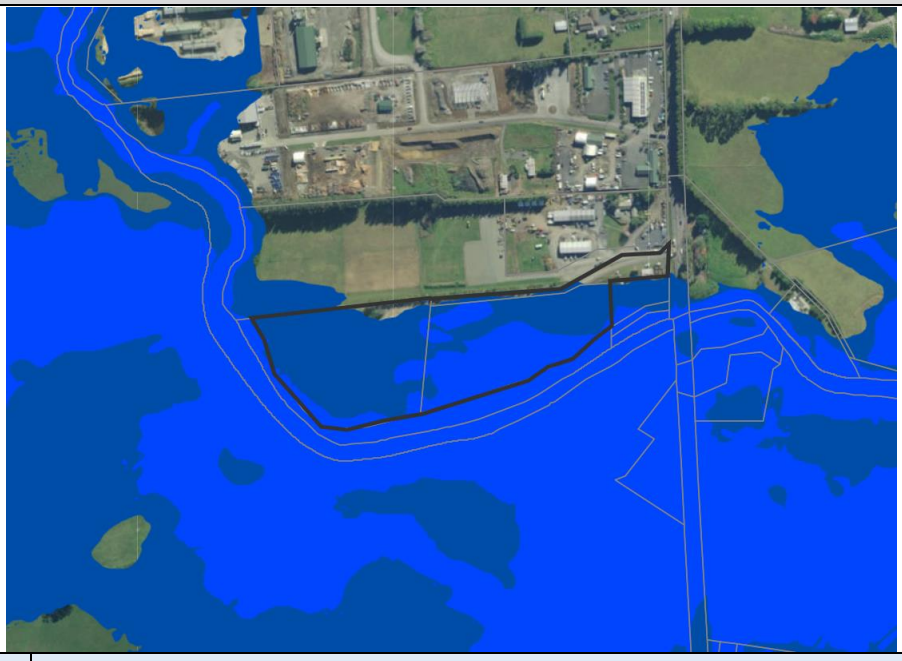
Submission	S602.001
Submitter	Hamish Starr
Location / area	351 Wharau Road Kerikeri
Legal description	Lot 4 DP 383159
Decision requested	Significantly reduce proposed coastal flood hazard layers, including deleting the coastal flood hazard layers from land at 351 Wharau Road, Kerikeri.
Reasons	There has been no significant increase in the sea level nor has flooding occurred of any significance at 351 Wharau Road. The property is in an inlet and isn't exposed to extreme storm impact. The layers are exaggerated and should be revised (inferred).
Aerial Imagery	
	
Notified Hazard Mapping	
	
T+T comment	Coastal flood hazard extents at the site were assessed as part of a regional assessment by T+T (2021) for NRC and were mapped using a bath-tub method that identifies land below the calculated inundation level. The following coastal inundation levels were calculated for this site: • CFHZ0 = 1.7 m NZVD 1% AEP (no sea level rise; present day).

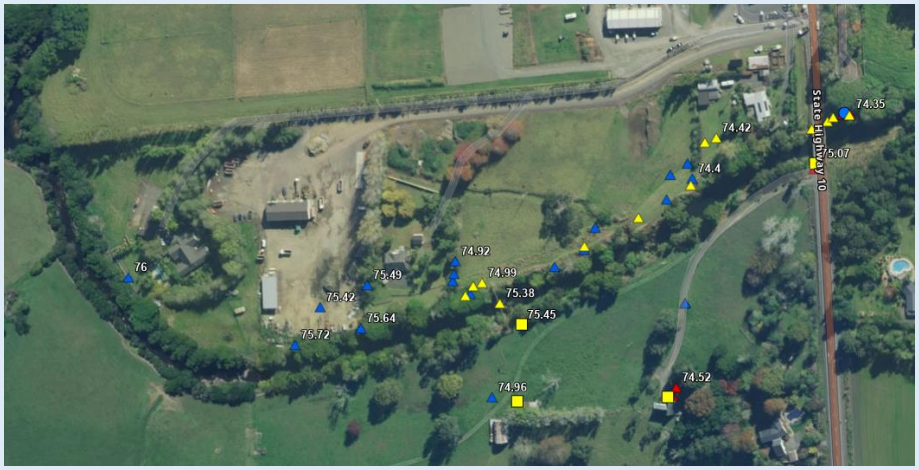
	• CFHZ1 = 2.2 m NZVD 2% AEP (RCP8.5M 2080 = 0.6 m SLR). • CFHZ1 = 2.9 m NZVD 1% AEP (RCP8.5M 2130 = 1.2 m SLR). • CFHZ1 = 3.2 m NZVD 1% AEP (RCP8.5H+ 2130 = 1.5 m SLR). Areas of land below these levels are identified as potentially being exposed to coastal flooding. The present-day coastal inundation level of 1.7 m is 0.7 m above the mean high water spring level, which considers a potential extreme storm surge and small locally wind generated waves. This is a standard approach and is suitable for the partly sheltered location. The coastal flood hazard overlay does not appear to reach the main dwelling on the property but does impact a section of forested valley and a partly developed coastal plain (looks to be a grassed sand spit). The submitter could consider a site-specific coastal hazard assessment to re-evaluate the inundation levels and inform exposure of existing or planned development.
Recommendation	The coastal flood hazard assessment is suitable for informing coastal hazard risk at this location. A site-specific assessment would be required to update the inundation hazard information and maps.

Appendix C Flood submissions

1.14 Submission S140.002

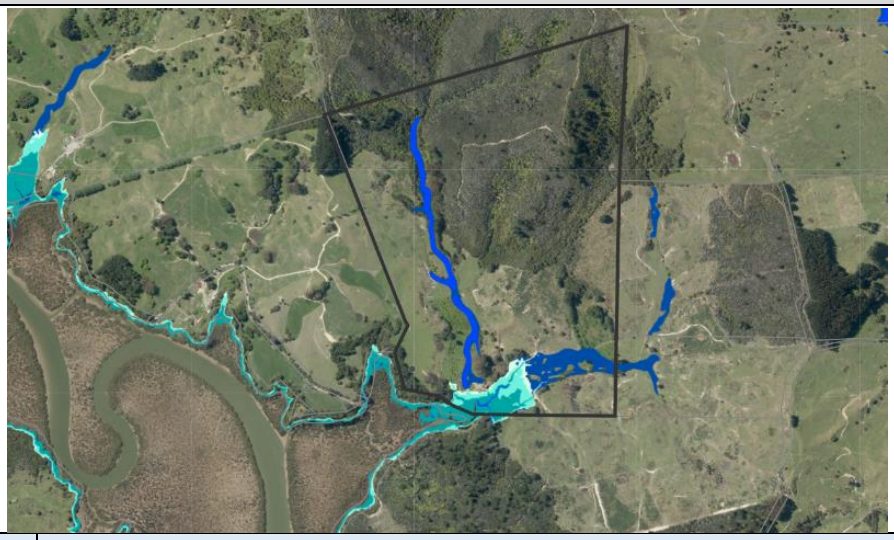
Submission	S140.002
Submitter	Mark and Emma Klinac
Location/area	1897 State Highway 10, Kerikeri 0295 1897 State Highway 10, Kerikeri 0295 1897B State Highway 10, Kerikeri 0470 1897 State Highway 10, Kerikeri 0295
Legal description	Lot 2 DP 321759 Lot 3 DP 321759 Lot 1 DP 321759 Lot 3 DP 321759
Decision requested	Delete the flood hazard zoning of Lot 2 DP 321759 & Lot 3 DP 321759 (1/2 share); and Lot 1 DP 321759 & Lot 3 DP 321759 (1/2 share).
Reasons	The submitter opposes the zoning of Lot 2 DP 321759 & Lot 3 DP 321759 (1/2 share); and Lot 1 DP 321759 & Lot 3 DP 321759 (1/2 share) as Flood Hazard (10 Year ARI Event & 100 Year ARI Event) Zone as the site has only been subjected to flooding on one occasion, during Cyclone Bola. Since then, flood protection has occurred throughout the Kerikeri / Waipapa Region resulting in less flooding effects to the region.
Aerial Imagery	

Notified Hazard Mapping	
	
Response to points raised in submission	Northland Regional Council's Priority Rivers modelling has been adopted to derive the District Plan floodplain at this property, and the surrounding the catchment. The Priority Rivers floodplain was first derived in 2011 (GHD) and was subsequently revised and updated in 2017 (DHI, 2016). The property was shown to flood in 10 year ARI, 50 year ARI and 100 year ARI design storm scenarios from the modelling. It is noted that the submitter refers to flood protection upgrades reducing flooding in the area although we have no information about the upgrades. Due to the extent of the floodplain in the area, it is considered likely that extensive and significant flood protection works would be required to meaningfully reduce the floodplain in the area. More information regarding the flood protection works that the submitter is referring to could assist. Historical flooding on the property has also been recorded by NRC for the following events: • 2012 March • 2014 July Nearby flooding was also recorded at the State Highway bridge in March 1981 and January 2011 that were approximately 200 mm and 700 mm higher than the March 2012 event. Flood level survey locations are shown on the figure below (source: NRC Natural Hazards portal): Overall, we consider it likely that a floodplain exists on the property.

	
Recommendation	There is currently insufficient evidence to remove the floodplain from this property.

1.15 Submission S259.002

Submission	S259.002
Submitter	Nicole Wooster
Location/area	384 Orira Road, Umawera 0476 (from submission address)
Legal description	Part Section 11 Block VII Mangamuka SD
Decision requested	Amend river flood hazards maps in consultation with submitter to correct and take into account existing drainage and other flood mitigation infrastructure.
Reasons	The flood hazard maps incorrectly identify a river flood hazard next to the submitter's house that was built in1970s and at most this is an overland flow path in heavy rain which is very shallow and disappears immediately. The property has been in the family since 1902 and is not affected by river flooding. The mapping identifies much larger areas of flooding than what actually occurs. It is over representing the flood areas. The orchard areas do not flood for example, nor does much of the farmland due to the drainage networks in place even in extreme weather events.

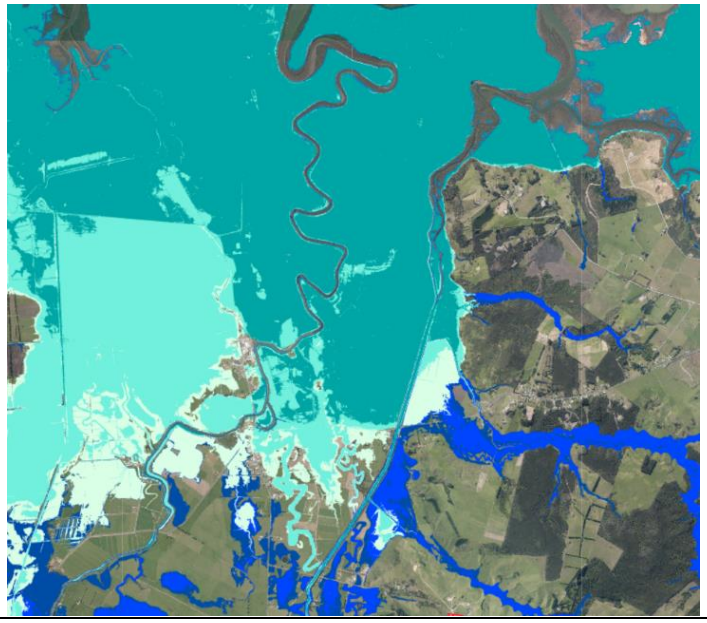
Aerial Imagery	
	
Notified Hazard Mapping	
	
Response to points raised in submission	The flood mapping in the area is derived from Omapere Catchment model (Water Technology, 2021), developed for NRC as part of their regionwide flood modelling. The flood modelling in the area does not take into account the drainage networks referred to by the submitter and therefore the flood extents could be overestimated. Without a detailed assessment that includes the effect of the drainage, the floodplain cannot be refined. The submitters acknowledgement of an overland flowpath is validating for the regionwide-scale flood modelling approach in the area. Given the size of the catchment (~0.5 km^2), there will be significant runoff. The FNDC District Plan defines the "Flood Hazard Area" but does not define overland flowpaths, therefore significant overland flowpaths will also be identified as "Flood hazard areas". There appear to be three buildings located on the property (highlighted in red boxes in the image underneath) although it is unclear from the submission which the submitters' house is. We consider it likely, that even with refined modelling, the floodplain for the 100 year ARI (Average Recurrence Interval) floodplain with climate change is unlikely to change significantly. This is because the influence of local drainage is likely minimal for extreme events and the area appears to be in a location that is likely influenced by downstream coastal water levels and the rainfall-induced floodplain. The 100 year ARI river flood

	hazard zone has been derived using a 2 year Average Recurrence Interval (ARI) "tide level" at Pouto Point (MWH, 2010) and 1.2 m sea level rise at the downstream end of the model. Under the climate change scenario, rainfall depths were adopted from a high emissions global scenario (referred to as RCP8.5). These represent increases in rainfall depths of 35%, 30%, 26% and 22% for the 1 hour, 6 hour, 12 hour and 24 hour duration events respectively. For more information the submitter is referred to the catchment report (Water Technology, 2021). 
Recommendation	There is currently insufficient evidence to remove the floodplain from this property.

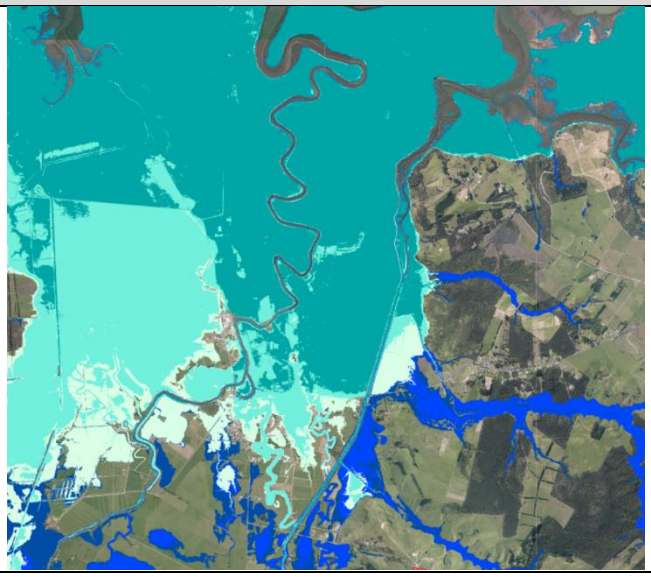
1.16 Submission S605.005 & S605.006

Combined because they cover the same topic, with same recommendation.

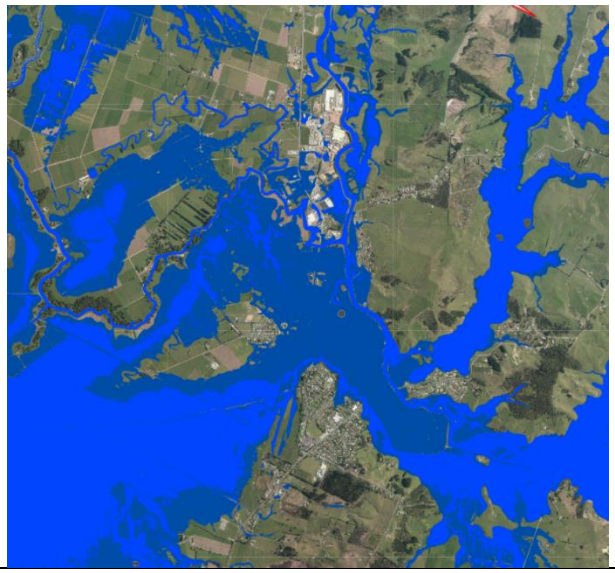
Submission	S605.005
Submitter	Elbury Holdings, LJ King, Fiona King, LJ King LTD, West Coast Farms, Leah Frieling
Location / area	Whangatane Spillway – Kumi Road/Pairatahi River
Legal description	N/A

Decision requested	Amend the maps at Whangatane spillway to show flooding in this area. (inferred)
Reasons	The Whangatane spillway - Kumi Road / Pairatahi river that is below state highway 10 does not show flooding in this area, only coastal flood hazard.
Aerial Imagery	
	
Notified Hazard Mapping	
	
Submission	S605.006
Submitter	Elbury Holdings, LJ King, Fiona King, LJ King LTD, West Coast Farms, Leah Frieling
Location / area	Kaitaia
Legal description	N/A
Decision requested	Amend the flood hazard modelling to reflect the drainage work. (Inferred)
Reasons	It appears that no consideration has been given to the Kaitaia drainage scheme channels and drains rated for by FNDC, or the improvements they have had on drainage. Please correct in the modelling.

Aerial Imagery	
	
Notified Hazard Mapping	
	
Response to points raised in submission	The flood mapping for the District Plan is based on a combination of Regionwide modelling and the Priority Rivers model, both of which were carried out prior to the Awanui River Flood Scheme Upgrade. The Awanui Flood Scheme upgrade is due for completion in 2026. Once the scheme has been completed, there will likely be a significant change to the floodplain and flood depths. For areas that benefit from the flood scheme, the floodplain is likely overestimated for the next 12 - 18month period (whilst the scheme is built) because there are allowances for climate change in the floodplain predictions. Despite this, the existing models still provide the best current estimates of the floodplain.
Recommendation:	Retain the existing floodmaps for this Plan Change.

Submitter	Elbury Holdings, LJ King, Fiona King, LJ King LTD, West Coast Farms, Leah Frieling
Location/area	Whangatane Spillway – Kumi Road / Pairatahi River
Legal description	N/A
Decision requested	Amend the maps at Whangatane spillway to show flooding in this area. (inferred)
Reasons	The Whangatane spillway - Kumi Road / Pairatahi river that is below state highway 10 does not show flooding in this area, only coastal flood hazard.
Aerial Imagery	
	
Notified Hazard Mapping	
	

Notified Hazard Mapping



Submission	S605.006
Submitter	Elbury Holdings, LJ King, Fiona King, LJ King LTD, West Coast Farms, Leah Frieling
Location/area	Kaitaia
Legal description	N/A
Decision requested	Amend the flood hazard modelling to reflect the drainage work. (Inferred)
Reasons	It appears that no consideration has been given to the Kaitaia drainage scheme channels and drains rated for by FNDC, or the improvements they have had on drainage. Please correct in the modelling.
Submission	S605.006

Response to points raised in submission	The flood mapping for the District Plan is based on a combination of Regionwide modelling and the Priority Rivers model, both of which were carried out prior to the Awanui River Flood Scheme Upgrade. The Awanui Flood Scheme upgrade is due for completion in 2026. Once the scheme has been completed, there will likely be a significant change to the floodplain and flood depths. For areas that benefit from the flood scheme, the floodplain is likely overestimated for the next 12 - 18month period (whilst the scheme is built) because there are allowances for climate change in the floodplain predictions. Despite this, the existing models still provide the best current estimates of the floodplain.
Recommendation	Retain the existing flood maps for this Plan Change.