BEFORE THE HEARING PANEL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of Proposed Plan Change 29 to the Nelson Resource Management Plan

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STATEMENT OF EVIDENCE OF TOBY FELIX KAY

Dated June 2024

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1. INTRODUCTION

1.1 My full name is Toby Felix Kay and I am the Activity Engineer – Stormwater and Flood Protection, at Nelson City Council ("Council"). I have held this position for over five years.

1.2 My role at Council covers asset management and strategic planning of stormwater and flood protection infrastructure, project management of flood assessments and mapping undertaken by consultants, and provision of technical advice in relation to flood risk and stormwater drainage for new developments through participation in consenting processes.

1.3 I hold a Masters of Science degree in Water Resource Systems Engineering from the University of Newcastle Upon Tyne, UK and a Bachelor degree (Honours) in Geography from the University of Sussex, UK.

1.4 I have over 17 years of professional experience in river management and drainage systems including five years in this role, nine years as a natural hazards advisor/ rivers engineer at the Northland Regional Council, and prior to that, three years with the National Rivers Authority, Anglian Region, in the UK. Additionally, I have 10 years of experience as a water supply engineer and project manager in disaster and conflict affected regions overseas.

1.5 Council tasked me as the Activity Engineer to provide technical advice on the Natural Hazards topic, specifically Council's approach to managing flood risk associated with stormwater, stream and river flood overflows for Proposed Plan Change 29 ("PC29").

2. CODE OF CONDUCT

2.1 I have read the Environment Court Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2023 and agree to comply with it. I confirm that the opinions expressed in this statement are within my area of expertise except where I state that I have relied on the evidence of other persons. I have not omitted to consider materials or facts known to me that might alter or detract from the opinions I have expressed.

3. SCOPE OF EVIDENCE

3.1 This evidence responds to matters raised in submissions on PC29 about flood risk management within the extent of the plan change, including:

(a) The approach taken to manage flood risk for new development.

(b) Planning for flood risk mitigation associated with stormwater, stream and river overflows in areas of existing development, including areas of intensification enabled by PC29; and

(c) Management of future coastal flood risk for the area of The Wood, and how this has been addressed by PC 29.

3.2 Council's ability to provide 3 Waters infrastructure to service growth and the requirement for new developments to attenuate stormwater flows is provided in the evidence of Mr Alec Louverdis.

3.3 An overview of flood modelling and coastal hazards assessments undertaken for Nelson, and explanations in relation to site specific flood mapping issues raised by submitters, is provided in the evidence of Mr Damian Velluppillai.

4. EXECUTIVE SUMMARY

4.1 Council's approach to managing flood risk within the city is multi-faceted, encompassing flood mapping to identify areas potentially at risk, land use planning and engineering standards requiring new development to be built up above future flood levels, and consenting processes that seek to ensure new developments avoid or mitigate flooding effects on existing development. Effective implementation of these processes will ensure that new development facilitated by PC29 is both flood resilient and does not exacerbate existing flood risk. No significant challenges are foreseen to implementing these processes within the areas proposed to be rezoned for more intensive development under PC29.

4.2 Infrastructure upgrades to increase stormwater, stream and river channel conveyance capacity have the potential to progressively reduce flood risk over time. The priorities for capital investment in flood risk reduction are to mitigate existing flood risks, but new stormwater and flood protection upgrade projects generally provide capacity for future climate change adjusted flows where this is appropriate. Catchment Management Plans and Stormwater Strategies are being progressed to identify and prioritise projects based on catchment-scale investigations and modelling. The capital works programmes are regularly reviewed and updated as information changes and as part of the three yearly Nelson City Council Long Term Plan process.

4.3 Council's assessment of flood risk will continue to evolve as new data and information is acquired to refine flood modelling. The flood overlays included in PC29 primarily relate to river and stream overflows and further work is needed to incorporate other flood overlays within the Nelson Resource Management Plan (NRMP), including coastal inundation

and stormwater overland flowpaths[1]. Completion of this work is expected to improve Council's ability to ensure new development is flood resilient, as well as more effectively plan for stormwater and flood management.

4.4 There are areas within the PC29 extent where it is proposed to retain existing zoning as they are not considered to be appropriate for intensification at this time due to existing or future flood risk. These include future coastal inundation areas projected to 2130, and certain areas assessed as having high river or stream flood hazard in present day or future events. The approach in relation to these areas is covered in Part 2 of the Section 32 report on Natural Hazards.

5. FLOOD RISK MANAGEMENT TO SUPPORT INTENSIFICATION

5.1 Sections 6 and 7 of the evidence respond to concerns expressed by submitters about the proposed re-zoning of land to support intensification in areas located within PC29 flood overlays by outlining:

(a) The current approach to managing flood risk to new development within the PC29 flood overlays.

(b) Planning for Infrastructure upgrades to mitigate river and stream flood risk in areas of existing development, including areas of intensification enabled by PC29.

6. Flood risk to new development in areas proposed for intensification

6.1 The existence of flood risk in any given area of the city does not preclude new development from occurring. The approach taken with regard to new development in floodplains is detailed in the Inundation Practice

[1] Stormwater overland flowpaths are the predicted routes that overland flows will take as a result of runoff or when the capacity of the piped network is exceeded following intense rainfall.

Note (IPN). This Practice Note[2] explains the methodology to determine minimum ground and/or floor levels for subdivision, new buildings and major alterations in areas identified as being subject to seawater and/or freshwater inundation within the Nelson and Tasman districts.

6.2 The purpose of the IPN is to provide guidance to support Nelson City Council and Tasman District Council's administration of the Building Act 2004 and New Zealand Building Code, the natural hazards provisions in the Councils' resource management plans and the Nelson Tasman Land Development Manual.[3]

6.3 The IPN promotes a 100 year planning horizon (2120+) for the assessment of suitable ground and/or floor levels for new developments. This is included in the design criteria for both freshwater and tidal inundation in Table 1 of the Practice Note. A 100 year time frame has also been adopted for PC29 future 2130 flood overlays, including the Flood Hazard Overlay and the High Flood Hazard overlay.

6.4 Section 2.11 of the IPN provides the following options to mitigate flood risk to new development:

(a) Promote development in areas with no or low flood hazard exposure through Council resource management plans and resource consent processes.

(b) seek options to reduce and mitigate the likelihood and magnitude of inundation hazard to land and buildings where these activities do not significantly increase the inundation hazard to other properties.

(c) In locations where there is or maybe an inundation hazard, any new property titles created through subdivision should provide

[2] Web link: https://tasman.govt.nz/document/serve/Inundation%20Practice%20Note.pdf?DocID=24866

[3] Web link: http://www.nelson.govt.nz/environment/nelson-resource-management-plan/nelson-resource-management-plan-2/view-the-nrmp/nelson-tasman-land-development-manual/

functional land where a building platform can be established that is free from inundation.

Submissions:

6.5 A number of submissions raised concerns about flood risk for specific areas within the PC29 extent and questioned whether rezoning for density development was appropriate in these areas.

6.6 One of the submissions is from T Bayley (FS20.017) who states *'the two blocks between Nile and Hardy and Domett and Alton.... must be removed from the high density zones as NCC Planners have done for the blocks north of Hardy due to flood overlays being shown in these areas.'* A specific assessment for this submission has been addressed in the evidence of Mr Damian Velluppillai. The Tonkin + Taylor stormwater assessment Mr Bayley refers to for 107 Nile Street established that ground and floor levels could be raised to mitigate future flood risk, with no significant off-site effects. Additionally it was assessed that the potential flood risk in this area was not associated with present day extreme flows in the Brook Stream, but as a result of increased future flows projected with climate change. If further assessment of flood risk in this catchment confirms there is a wider area that will be exposed to flood risk within this block, it is expected that other sites can be raised in a similar manner to that proposed for 107 Nile Street as they are re-developed. Council can also consider options to reduce the risk of Brook Stream flooding in future, for instance it may be viable to construct a headwall at the culvert intake, install an additional culvert, or upsize the existing culvert to reduce the risk of stream overflow onto Nile Street.

6.7 J Strange (s601.010) states in relation to the area between Motueka Street and Bishopdale Hill: '*This area has hazards of York Stream going through it, which is open in places and dangerous when in flood… The stormwater system does not adequately function… culverts popping and water spewing down the streets in heavy rain.*' This area of the York

Stream catchment has been impacted by significant flood events previously, including in June 2014 when the Bishopdale York Stream intake overflowed onto Waimea Road. The overland flows affected properties between Waimea Road and the section of the stream adjacent to Kawai Street South. Following this event, work commenced on a stormwater upgrade and in 2018 the York Stream was diverted through a larger culvert along Boundary Road and Kawai Street South. Flood modelling subsequently undertaken by Tonkin + Taylor has demonstrated that this additional capacity has significantly reduced stream flood extents, facilitating the development of sites that were previously in the floodplain, as well as reducing flood risk for existing development in this area.

7. **Flood Management Planning to mitigate flood risk in areas of existing development**

7.1 The future flood maps for the city are generated from models that incorporate projected sea level rise and increases in storm rainfall intensity over the next 100 years. However, no allowance is made for any future upgrades in stormwater, stream and river floodway conveyance capacity resulting from infrastructure investment. Instead, flood risk is re-assessed periodically to take into account changes in the catchment, including completed stormwater and flood protection works.

7.2 Business cases for stormwater and flood protection capital upgrades are generally initiated in response to one or a combination of the following: Urban growth, assets approaching end of life, or an identified capacity issue with existing assets. Business cases will include consideration of a range of options for any specific project based on the outcomes sought and how the project may integrate with the wider network. Any of the three drivers above may result in network capacity upgrades that have potential to reduce flood risk. Council asset datasets are updated once as-built surveys are undertaken following completion of new works and

this data is then available for flood assessments. Through this process, changes in terrain, culvert and channel capacity are reflected in subsequent updates to flood models and associated flood mapping.

7.3 Council is currently progressing Catchment Management Plans and Stormwater Strategies for various areas of the city to improve the impact and prioritisation of flood-related infrastructure investment. These strategic projects will be informed by network modelling and consider a broad range of aspects including flood management, network capacity, asset condition, watercourse habitat, channel bank erosion and gravel management. Areas identified as having significant flood risk for the present day climate are generally excluded from the re-zoning for higher density development proposed in PC29. It is however possible that future flood protection upgrades will reduce flood risk sufficiently in some of these areas to allow such rezoning to be re-considered.

7.4 The following is a summary of projects under the Long Term Plan to improve river and stream flood management and mitigate flood risk in areas of existing development covered by PC29.

Geographical Location within the Urban Area	Description of project/ objectives	Estimated cost	Programmed completion date
Stoke	Saxton Creek Upgrade provides the capacity required to address flooding issues, climate change and service new growth within the catchment	$40 M	September 2024
Annesbrook	Jenkins Creek Improvements to address flooding issues, climate change and reduce flood related disruption at the airport.	$3.9M	June 2032
The Brook	Brook Stream improvements to address flooding issues and climate change	$2.3M	June 2032

Victory	York Stream channel upgrade to increase culvert capacity and reduce overland flow towards the CBD	$0.4M	June 2034 (LTP includes design)
Maitai River	River floodway improvements to address flooding issues, climate change within the Maitai, The Wood and the inner city areas	$12.8M	June 2034
Dodson Valley	Oldham Creek upgrades to address flooding issues and climate change	$2.2M	June 2034
Todds Valley	Todds Valley Stream upgrade to address flooding issues, climate change and service new growth	$2.3M	June 2032

8. **Additional Possible Strategies for Flood Risk Management raised in submissions**

8.1 Several submitters suggested specific strategies to manage flood risk and improve amenity within the PC 29 extent.

8.2 R Hanna (s260.002) states *'To ensure safety in terms of flood risk, underground garaging could serve as a mitigation tool for new builds.'* I do not agree with this submitter's suggestion as underground garaging in flood plains can be problematic due to the risk of water ingress. For Nelson, there were a significant number of underground garages that were inundated during the August 2022 flood, from both riverbank over topping and backflow through stormwater drains. The IPN includes minimum freeboard requirements in Table 3 including for attached and detached garages. Both require garage floor levels to be raised above design inundation levels, which will reduce the risk of damage to private property as well as the risk of contaminants mixing with flood waters.

8.3 S Phillips (s597.024) suggests an alternative proposal to *'jack up existing houses on piles to 10m max height if the site has 100% permeability at ground level. By lifting the house off the ground with the residence elevated on piles – think Fiji Bure (1-3m as required with the ability to continue to jack up over time – as flood risk increases)'*. The IPN does allow for houses to be raised on piles in the manner suggested by S Phillips. Figure 5 in the Practice Notes gives options for this, intended for buildings in floodplains and seawater inundation locations where filling to form a raised building platform has more than minor adverse effects off-site. I do not consider this submitter' proposed approach is suitable for subdivision though, as the aim is to ensure new property titles provide functional land where a building platform can be established that is free from inundation. This will reduce the risk of flooding to ground level assets, including parked vehicles.

8.4 Dr A Kwan (s623.025) requests consideration be given to *'Re-open The buried rivers, and develop them as intervention nuclei for the inner city's leisure space and commercial reinvigoration. As a model, consider the Canal St-Martin in Paris, and the Cheonggyecheon in Seoul. This could be at the lower end of St Vincent and Vanguard Streets.'* I agree with Dr Kwan that daylighting streams provides opportunities for improved amenity as well as environmental benefits such as enhanced habitat. The main challenge in areas like the lower end of St Vincent and Vanguard Streets is that the culverted streams are located beneath the road carriageway. Implementing such a strategy in this area would require either relocation of the road, or purchase of private property in order to re-align and daylight the stream. In both cases the cost would likely be prohibitively high, but there are likely to be other areas of the city with green space available where costs would be lower. It is also possible that future climate change adaptation planning presents opportunities for land acquisition and creation of new green spaces in low lying areas of the city where this proposal could be more viable.

9. Management of Coastal Flood Risk and how this has been addressed by PC29

Background

9.1 A number of submitters (numerous) raised concerns over The Wood being excluded from high density development, and requested clarification on the approach to flood risk management and the direction planned for this area. There were also submitters who proposed that The Wood should be protected from climate change.

Submissions

9.2 R Brudvik-Lindner (S460.020) states *'We cannot make The Wood a development free zone. It should be built up where needed (as per some developments there already) and should be protected from climate change, at the 3-4 storey level'.* I disagree with the first part of this statement as it is not proposed to make the Wood a development free zone. The approach taken in PC29 is to not re-zone residential areas within the 2130 coastal inundation extent to facilitate intensification and growth. This does not preclude new development from occurring, but allows time for climate change adaptation planning to be completed. I consider this approach is consistent with the Coastal Hazards and Climate Change guidance issued by the Ministry for the Environment. Protecting areas like The Wood from climate change and sea level rise over the long term is likely to be challenging. This is due to the nature of flood risk, especially the basin area North of Grove Street, which is exposed to risk of flood overflows from the Maitai River as well as coastal inundation. Flood risk in this area used to be a regular issue for residents and was substantially alleviated with the construction of The Wood Stormwater pumping station at Neale Park in 2001.

9.3 Within the current Long Term Plan, funding has been allocated to raising the riverbank at The Hathaway Terrace car park to reduce coastal

inundation risk, and to initiate investigations and design for an extension of The Wood stormwater pumping station catchment to cover the part of the basin area located West of Collingwood Street. Council is investigating how future flood risk in the lower basin area of The Wood can be mitigated over the long-term. If sea level rise projections eventuate, it is likely that substantial investment would be required to mitigate flood risk beyond the 30 year time frame of the Infrastructure Strategy. Flood Protection will need to be considered further along with other options for this area through the framework of climate change adaptation planning.

9.4 L Wood (Resilienz Ltd) (S625.006) states *'The climate change strategies of PC29 (as far as they go) come ahead of, and so can only be poorly informed by, the Dynamic Adaptive Pathways Planning and the climate change risk and vulnerability assessments, which are currently termed as Council 'currently developing' and 'underway' respectively (p39). These are critical future proofing studies and PC29 is far too substantial to proceed without such considerations.'* I agree with this submitter that climate change adaptation planning would be useful to inform land use planning for flood susceptible areas of the city, however in my view, PC29 can appropriately proceed in advance of climate change adaptation planning, as the residential areas which are at highest risk of future flooding are not being considered for re-zoning to support higher density development. I anticipate that if the outcome of adaptation planning is that high density developments are appropriate in these areas, including parts of The Wood, then this can potentially be achieved through future plan changes to the NRMP.

Toby Felix Kay
Dated: June 2024