Nelson City Council
te kaunihera o whakatū

File Ref:

When calling
please ask for: Paul Fisher
Direct Dial Phone: 0272944493
Email: paul.fisher@ncc.govt.nz

21 May 2022

Memo To: Gina Sweetman

Memo From: Dr Paul Fisher
Water Quality Scientist

Subject: ADDENDUM PRIVATE PLAN CHANGE 28 MAITAHI BAYVIEW SEC 42A TECHNICAL REVIEW WATER QUALITY

INTRODUCTION:

1 My full name is Paul Richard Fisher. I am employed as a Water Quality Scientist.

2 I have prepared this addendum on water quality in response to matters arising from the applicants statements on Water Sensitive Design [EV13] and Freshwater Ecology [EV8] provided on 16 June 2022 for the Private Plan Change 28 (PPC28) Private Plan Change 28 - Maitahi Bayview | Shape Nelson .

Code of conduct

3 I have read the Code of Conduct for Expert Witnesses set out in the Environment Court's Practice Note 2014. I have complied with the Code of Conduct in preparing my review and will continue to comply with it while giving oral evidence before the hearing.

Response on water quality matters

4 **Natural Character**

5 Maintaining natural character (for waterways and landform) is a key component of the National Policy Statement for Freshwater Management (NPS-FM) 2020 objectives contributing to ecosystem health, and water sensitive design principles: to minimise the impact of development on the natural environment; work with the natural landform as closely as possible; and minimise pollution of the land and waterways.

6 The current proposal includes infilling a section of the flood plain and realigning the Kākā stream, which does enable positive urban design outcomes to be achieved. However, the realignment of the stream is not required to enable the use of constructed wetlands or

bioretention devices or to mimic natural systems and processes for stormwater management.

7 The Environment Institute for Australia and New Zealand (EIANZ) provide guidance and a recognised framework for undertaking ecological assessments for terrestrial and freshwater environments, which provides a scientifically defensible approach to ecosystem management in the context of development. This framework is one approach used to inform and guide the design of subdivisions *at the planning stage*, to ensure optimal ecological outcomes are achieved, where desired.

8 The applicant's advice on ecological and water sensitive design for improving the water quality and ecological outcomes has all been based on the premise that Kākā stream will be 'realigned', requiring additional earthworks and infrastructure to that proposed for housing, roading and utilities. This approach has negated the assessment of developing the catchment around the existing stream corridor [i.e. an alternative option] and utilising existing landform to potentially reduce the scale of earthworks, changes and impacts on catchment geomorphology and hydrology; which may have greater certainty in outcomes and similar or better ecological benefits to what is proposed.

9 This approach has therefore not effectively assessed alternative options at the Plan stage, at any level of detail, that the preferred option provides the optimal environmental outcomes with ecological outcomes at least neutral or positive, compared to alternative design options.

10 There is agreement amongst the experts (JWS Ecology, 13 May 2022, s3.6) that Kākā stream is "highly modified and degraded" though characterised by the land use and modification to the stream channel, mainly in the lower reaches. The existing stream corridor has been present since at least the 1940's based on aerial maps (www.topofthesouthmaps.co.nz) and the nature of the stream and land managed for sheep grazing. Removal of riparian and hill vegetation for open paddocks, particularly in the mid and lower catchment has contributed to incised and erodible banks, sedimentation of the channel and lack of instream habitat, including woody debris and shade. This environment, whilst degraded in natural character, compared to a natural reference state for lowland coastal stream and wetland, has natural features with propensity for ecological enhancement; and is not impacted to the same extent as "highly modified" and engineered urban streams, which have limited opportunities for restoration toward its natural reference state.

11 The Water Sensitive Design (EV13) and Freshwater Ecology (EV9) applicant reports both refer to water quality monitoring data that has inherent sampling variability and does not strictly adhere to the respective standard environmental monitoring protocols for reporting; and should in my opinion be considered with those caveats. The water quality and ecology data provided by the applicant provide insights, though are not at the level of detail that I would consider appropriate for informing the design at the planning stage for such a complex proposal. The specific paragraph statements are provided in *italics* for reference.

12 EV13 [29] *Monthly water quality monitoring has been undertaken by Cawthron for a period of 12 months. As monthly samples (over 1 year only) it is not possible to draw definitive conclusions around trends or statistical averages, but it is noted that; results for E. coli concentrations exceed NPS-FM bottom lines above and below proposed development and breached the NPS-FM 'E' Band following moderate rainfall. Turbidity and Suspended solids exceeded ANZECC trigger values (cool dry low-elevation rivers) both above and below development.*

13 The NPS-FM *E. coli* Human contact attribute (Table 9) requires 60 samples over five years to determine metrics for bands to account for variability and seasonal effects; also noting that it is not unusual for waterways in Nelson (save upper catchment 'reference' sites) to have elevated *E. coli* from various sources, following "moderate" rainfall. Elevated *E. coli* and suspended solids and turbidity could also be an artefact of the site e.g. sampling in low flow channels, exacerbated by re-mobilised fine sediment, though the site sampling details are not provided.

14 The Freshwater Ecology assessment provides commentary describing the qualitative freshwater macroinvertebrate species recorded to genera to illustrate indicators of good and poor water quality. However, there is no reference to a recognised (semi-quantitative) sampling and processing protocol or context to the results, i.e. proportion of habitat types sampled, which would be expected and required to describe the invertebrate community. The species illustrated for "poor" water quality are also typically found in slow flowing and pool habitat and can also be found in "good" water quality habitats

15 EV9 [26]. *Qualitative sampling of the aquatic macroinvertebrate community showed the upper reaches of the Kākā Stream included a number of cased caddisfly (e.g. Pycnocentrodes sp, Hudsonema sp), mayfly (e.g. Deleatidium sp) and black fly larvae (Austrosimulium sp) which are common in faster flowing, cobbled streams with a closed canopy and indicators of good water quality. The opposite trend was observed in the macroinvertebrate community in the lower Kākā Stream which predominantly comprised of water boatmen (Sigara sp), back swimmers (Anisops sp), diving beetles (Dytiscidae sp) and*

non-biting midge (Chironomidae sp). Within p), all of which are indicators of poor water quality. Freshwater crayfish where also present.

16 EV9 [25]. *Sampling of the fish community was completed at multiple survey reaches throughout the entirety of the Kākā Stream within the site. Survey results showed that the fish community was sparse with only shortfin eel (Anguilla australis), unidentified eel (including elver), and an unidentified climbing Galaxiidae sp (most likely kōaro (Galaxias brevipinnisor or banded kokopu (G. fasciatus)).*

17 EV9 [34]. *I consider the fish survey of the Kākā Stream undertaken as part of the ecology report sufficient to inform this process. This information combined with best technical practice has been used to inform the conceptual design of the Kākā Stream and development of specific rules within Schedule X.9 relating to instream design, which will have a positive ecological result for the native fish community.*

18 The applicants casual fish survey sampled habitat through the entirety of the reach, which should detect the presence of common fish species. However, the standard fish survey wadeable protocol required for undertaking a NPS-FM Fish-Index of Biological Integrity (F-IBI) assessment could have been done with similar effort and would provide a measure of fish density and size class, useful for assessing fish passage, recruitment and connectivity of the reaches within the catchment; required for describing the receiving environment and associated freshwater values. A spotlight survey would detect more cryptic or nocturnally active species such as the locally uncommon banded kōkopu. A low-cost passive eDNA survey over 24hrs could have been undertaken to detect and identify all the macroinvertebrate and fish species present for the entire catchment, including more cryptic species such as ammocoetes of the threatened kanakana lamprey, which live on organic material in sediments and undercut banks; typically missed by single-pass electrofish surveys. Brown trout occur in the lower catchment of the Maitai river, which is managed by Fish & Game as a fishery with recreational values; winter spawning may occur in small tributaries with gravel beds when flows are sufficient, also not considered in this survey.

19 The application is pivotal on moving the stream corridor to provide proposed ecological benefits and allow more development on the flood plain, as well as positive urban design outcomes. However, there has been no evidence provided to demonstrate that realignment of the stream would provide: (i) greater ecological improvements than restoring the stream corridor in the existing location [i.e. as part of the design stage, an assessment of alternative options to the proposed plan, informed by the ecologists]; or (ii) most closely adheres to

water sensitive design principles and outcomes, i.e. to work with the existing landform and catchment hydrology and reduce earthworks to a minimum.

20 The proposed engineered infrastructure for utilities will include culverts and scour protection for roads, stormwater and flood conveyancing, and fish passage, which will have some impact on the natural character of the Kākā catchment and wetland features. It is not clear from the water sensitive design plans to what extent the "co-located" water treatment detention dams and wetlands will take up space for ecological enhancement.

21 The design for the structure plan did not include design impacts on the receiving environment, including the Maitai river and Haven estuary, from the proposed significant earthworks in such a complex catchment. No information has been provided on the construction phase of the development to demonstrate the feasibility of maintaining the integrity of the water sensitive design, the management of sediment loads and ongoing stormwater treatment during years of construction working on erodible slopes and stabilising mobile alluvial bed material on the flood plain.

22 **Flood modelling and infill of the flood plain**

23 The development is proposing infill of the lower flood plain. The ecological function of floodplains can be expected to decline when hydrological connectivity to them (e.g. the frequency and extent of flooding) is reduced by infill. This is because floodplain inundation increases retention of particles and dissolved nutrients by increasing ponding and contact time with riparian vegetation and soil, reducing contaminant loadings downstream. Overall improving water quality and ecosystem health.

24 **Sediment and stormwater contaminants**

25 The Water Sensitive Design [EV13] has noted that the existing regional rules and guidance are not considered to provide an optimal level of environmental protection. The existing Nelson Regional Management Plan objectives and rules does not incorporate the national policy objectives for freshwater and estuaries (included within the NPS-FM) with appropriate rules for managing effects and controls to discharge, to mitigate potential cumulative adverse effects from discharges of stormwater contaminants to the CMA. The existing proposal, utilising water sensitive design, will incorporate stormwater treatment for the Kākā catchment, consistent with providing an optimal level of protection.

26 *EV13* [26] *The stormwater management plan has considered the existing best practice guidance in the Nelson Tasman Land Development Manual 2020 (NTLDM) (including GD04) and the objectives and policies within the Nelson Resource Management Plan*

(NRMP) but it is noted that these existing documents are not considered to provide an optimal level of environmental protection. The proposed PPC28 will therefore exceed these existing local guidance documents to deliver more integrated outcomes.

27 The proposed provisions, the existing provisions in the NRMP and requirements of the NTLDM together may not be sufficient to address the effects of development, especially the catchment-scale and cumulative effects, and also where existing controls (e.g. flood overlays) may not correctly reflect the future developed form, high intensity rainfall events, erosion and flood extent. However, there is uncertainty whether stormwater treatment will be provided to discharges to the Nelson Haven, and whether optimal environmental protection will be achieved for the Bayview ridge line development; dependent on the final subdivision layout. Stormwater treatment should be integrated in the design if optimal environmental outcomes are desired.

28 *EV[33] Stormwater treatment is not required or currently proposed for runoff from roads within the Walters Bluff/Brooklands catchment. This is consistent with recent developments in the northern Atawhai hillslopes area, discharging into the Nelson Haven, and is also very difficult to implement due to the steep nature of the topography. Depending on the final subdivision layout, there may be opportunity to implement treatment measures along the ridgeline road and this will be reviewed at subsequent stages of the development. It is my opinion that the quality of stormwater discharge from the PPC28 area will as a minimum, be treated to the best practical standards, and where possible exceed these standards.*

29 The Maitai River and Nelson Haven are vulnerable to any additional fine sediment inputs from the catchment. In particular, the risk of larger scale episodic inputs from land disturbance activities such as subdivisions, roading or forest harvesting need to be carefully managed at a catchment scale to avoid increasing sediment loads to the estuary.

30 The applicant has not provided any high-level details regarding the construction phase: how development will be staged at a scale to avoid significant sediment loads to reduce impacts on water sensitive design infrastructure, including stormwater treatment wetlands and downstream effects to recreation and ecological values.

31 The proposed provisions, the existing provisions in the NRMP and requirements of the NTLDM together may not be sufficient to address the effects of development, especially the catchment-scale and cumulative effects, and also where existing controls (e.g. flood overlays) may not correctly reflect the future developed form, high intensity rainfall events, erosion and flood extent.

CONCLUSION

32 It is my opinion that the water sensitive design and ecology technical assessments have not adequately considered the alternative options for stream realignment.

33 The feasibility assessment of the development should be undertaken as part of the plan change to consider impacts from staged construction on water sensitive and environmental design, to provide assurance that the Plan Change provisions provide the desired optimal environmental outcomes.

34 This information is required for master planning at a catchment-scale to ultimately quantify future risks and uncertainties and to support a consent application.