BEFORE THE INDEPENDENT HEARINGS PANELS APPOINTED TO HEAR AND MAKE RECOMMENDATIONS ON SUBMISSIONS AND FURTHER SUBMISSIONS ON PROPOSED PLAN CHANGE 1 TO THE NATURAL RESOURCES PLAN FOR THE WELLINGTON REGION

UNDER	the Resource Management Act 1991 (the Act)
AND	
IN THE MATTER	of Hearing of Submissions and Further Submissions on Proposed Plan Change 1 to the Natural Resources Plan for the Wellington Region under Schedule 1 of the Act

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STATEMENT OF EVIDENCE OF JAMES MITCHELL BLYTH

ON BEHALF OF GREATER WELLINGTON REGIONAL COUNCIL

PC1 CONTAMINANT LOAD MODEL AND SCENARIOS – TECHNICAL EVIDENCE

HEARING STREAM 3 – RURAL LAND USE ACTIVITIES, FORESTRY INCLUDING VEGETATION CLEARANCE AND EARTHWORKS

15 APRIL 2025

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INTRODUCTION

1 My full name is James Mitchell Blyth. I am a Director and Water Scientist at Collaborations.

2 I have undertaken a high-level review of submissions relevant to Hearing Stream 3 (HS3); Rural land use activities, Forestry including vegetation clearance and Earthworks.

3 I have prepared this statement of evidence on behalf of Greater Wellington Regional Council (**the Council**) in respect of technical matters arising from the submissions and further submissions Proposed Change 1 to the Natural Resources Plan for the Wellington Region (**PC1**). I was also involved in, and provided evidence in respect of the matters addressed in Hearing Stream 2.

4 Specifically, this statement of evidence relates to the matters in the Section 42A Report – Rural Land Use.

QUALIFICATIONS

5 I hold a Master of Science degree (**MSc**) with first class honours from the University of Waikato.

6 I am a Certified Environmental Practitioner (**CEnvP**) under the Environmental Institute of Australia and New Zealand (**EIANZ**).

7 I am a member of New Zealand Freshwater Sciences Society.

8 I have 15 years' experience at roles within regional councils, industry (mining) and consulting, and have worked internationally. My experience covers a range of water sciences, including sediment and erosion, water quality, water resources, hydrology, hydraulics and wetlands. Throughout my career I have been involved in numerous water balance and catchment hydrological and water quality models. While working overseas in environmental and mine water management, I was a technical consulting lead in hydrological and water balance modelling, and worked on models and trained staff in Africa, Canada, Laos, Thailand and Australia. Prior to joining Collaborations, I was the New Zealand lead for integrated catchment modelling at Jacobs New Zealand.

9 I have been involved in all four Whaitua processes the Council has run to date, and most recently was a technical advisor as part of the Council's project team for Te Whanganui-a-Tara (**TWT**) Whaitua. I was involved in co-developing the catchment water quality models

in Ruamāhanga Whaitua, and project managing Te Awarua-o-Porirua (**TAoP**) Whaitua catchment water quality modelling. These detailed models attempted to represent the current landuse, catchments, historical climate and streamflow in order to predict the movement of contaminants from source (i.e headwaters) to sink (rivers, lakes or the coast), and how effective landuse mitigations could be on these contaminants at scale.

10 My experience includes preparing evidence for the High Court, expert conferencing, and evidence at Council-level hearings and Environment Court cases.

CODE OF CONDUCT

11 I have read the Code of Conduct for Expert Witnesses set out in the Environment Court's Practice Note 2023 (Part 9). I have complied with the Code of Conduct in preparing this evidence. My experience and qualifications are set out above. Except where I state I rely on the evidence of another person, I confirm that the issues addressed in this evidence are within my area of expertise, and I have not omitted to consider material facts known to me that might alter or detract from my expressed opinions.

SCOPE OF EVIDENCE

12 My evidence presents an annual average load model of sediment and metals (copper and zinc) developed to assess PC1 provisions as notified and two provisional sediment scenarios based on recommendations in the HS3 S42A Rural Land Use report.

PC1 CONTAMINANT LOAD MODEL (CLM) OVERVIEW

13 Extensive modelling was completed for TAoP and TWT Whaitua, as described in Blyth (2025b)[1]. These processes considered water quality changes under specific scenario packages[1] which assessed increasing amounts of landuse change and mitigation implementation on rural and urban landuses. However, the scenarios did not model the provisions notified as part of PC1 which were drafted after the completion of both Whaituas.

14 Subsequently, Collaborations was asked by the Council in late 2024 to develop a model that assessed the PC1 provisions (reflecting specific rules and policies seeking to achieve target attribute states or **TAS**), which could then be considered against the s32 analysis

[1] Scenarios modelled in the TAoP 'Source Model' and assessed by the TWT Expert Panel were Business as Usual (BAU), Improved (IMP) and Water Sensitive (WS).

that was undertaken to predict what the provisions may achieve (Greer 2023)[2] and support hearings streams three and four (HS3 and HS4).

15 This was undertaken through the merging of two contaminant load models (**CLM**) that were developed in each Whaitua process into a single PC1-CLM. CLM is a spreadsheet-based annual average load model that applies literature derived yields (i.e. 0.605 g/m^2/year of zinc from commercial roofs) of different landuses to a highly detailed mapped area in GIS, that subsequently allows the predictions of loads at different reporting points. Point sources of contaminants are not included in the modelling.

16 The PC1-CLM only models three contaminants; total metals (copper and zinc) and sediment. A customised annual average sediment model was developed as part of the PC1-CLM, and utilised outputs from the calibrated TAoP dSedNet modelling[1] to predict total loads from surficial, streambank and landsliding erosion.

17 An annual average load model was chosen to simulate the PC1 provisions (where possible) due to time constraints to build and calibrate a daily hydrological and water quality Source Model for TWT Whaitua, and the ability to use the PC1-CLM to run revised provision scenarios in short timeframes throughout the PC1 process.

18 The baseline PC1-CLM was developed from GIS landuse configurations approximately representative of 2012, aligning where possible with previous data inputs used in TAoP Source Modelling[1] and the TWT CLM[3]. A scenario model was then developed that represented the PC1-CLM in a future development state (PC1-FDS), which added in historical urban growth (from 2012 to 2024) and predicted infill and greenfield growth (to 2053), with the implementation of the notified PC1 provisions in full effect, where applicable.

19 A technical memorandum (Easton, Nation and Blyth 2025)[4] describes the PC1-CLM baseline and PC1-FDS scenario, and the predicted change in annual average loads at different TAS catchments and the Porirua Harbour. This has been presented in **Appendix A** and should be read in full to understand the assumptions, limitations and results of this modelling approach. The following paragraphs only summarise the intent of the PC1-CLM.

20 The modelling is intended to:

20.1 Provide an estimate about the relative (%) change in annual average loads of total copper, zinc and suspended sediment to Porirua Harbour and various TAS

locations under the notified PC1 provisions, while accounting for an estimate of urban growth to 2053. This is through comparison to a baseline model that reflects loads possible in 2012.

20.2 Be used as a high-level guide about potential water quality load changes and the effectiveness of provisions in the long-term, through a simple, and relatively rapid modelling platform that can consider revised provisions throughout the hearing process.

21 The modelling does not:

21.1 Predict concentrations (i.e. median or 95th percentile) of contaminants nor model any hydrological changes that can occur through different mitigations or landuse change. Potential changes in hydrology and concentration under each of the modelled scenarios (but not specifically the PC1 notified provisions) are detailed extensively in Jacobs (2019)[5] TAoP Source Modelling, with the Appendices of that report outlining predicted changes in concentrations, flow and loads at various catchments.

21.2 Replace previous modelling exercises such as the Source Modelling or Expert Panels, and is intended to be used as an additional line of evidence to support decision making processes.

22 Additional to the notified PC1-FDS modelling memorandum[4] in **Appendix A**, two provisional scenarios were requested by the S42a author to understand the potential effectiveness of revised provisions relating to rural land use. These two scenarios are presented in **Appendix B** and can generally be described as:

22.1 Provisional Scenario 1: PC1-FEP's: hypothetical sediment load reductions (10-40%) achieved through Farm Environment Plans (FEP's) applied on pastoral properties >20 ha that were identified as having 'potential erosion risk' land.

22.1.1 In Easton *et al.* 2023[6] the 'potential erosion risk' land is referred to as 'highest-risk in pasture'. Potential erosion risk land was re-defined in the S42a Rural Land Use report and is the top 10% of pastoral land by modelled surficial erosion rate that is also at potential risk of shallow land-slides.

22.2 Provisional Scenario 2: PC1-CFL: Extrapolation of the Wellington Region's Erosion Control Initiative (WRECI) programme that retires/plants ~130 ha of land per year through to 2040[7] and fencing >1m streams in Mākara catchment.

SUMMARY

23 To support the PC1 process, particularly HS3 and HS4, an annual average contaminant load model (CLM) was developed for total copper, zinc and sediment for approximately the 2012 'baseline' landuse configuration for TAoP and TWT Whaituas. This baseline model was then extended into a notified PC1-CLM, which included the future development state accounting for historical growth between 2012 and 2024, and predicted urban development to 2053.

24 The PC1-FDS assessed the notified provisions, where applicable, against the baseline model to consider the relative changes (%) in annual average loads in TAS catchments and to Porirua Harbour.

25 Two additional scenarios were then developed from the PC1-FDS scenario (to compare against the baseline), reflecting revised sediment provisions considered by HS3 S42a reports on the adoption of FEPs on >20 ha properties with potential erosion risk land, and the continued roll out of the Council's WRECI project to 2040 (~15 years).

DATE: 15 APRIL 2025

JAMES MITCHELL BLYTH

DIRECTOR AND WATER SCIENTIST AT COLLABORATIONS

APPENDIX A – PC1 NOTIFIED CLM REPORT

APPENDIX B – PC1 CLM REVISED PROVISION SCENARIOS

[1] Blyth, J.M. 2025b. Statement of technical evidence HS2 – Overview of water quality modelling. Prepared for GWRC for PC1.
[2] Greer, M. 2023. Assessment of alignment between the regulatory provisions and target attribute states in proposed Plan Change 1 to the Natural Resources Plan – Whaitua Te Whanganui-a-Tara. Report No. 2023-008. Torlesse Environmental Limited.
[3] Easton, S. & Hopkinson, O. 2022. Contaminant Load Model Development. Whaitua te Whanganui-a-Tara. Prepared for GWRC. IZ130500. https://www.gw.govt.nz/assets/Documents/2022/05/CLM-technical-memo-FINAL.pdf
[4] Easton, S., Nation, T. and Blyth, J.M. 2025. PC1 Annual Load Contaminant Modelling. Prepared for GWRC to support the PC1 process.
[5] Jacobs. 2019b. Porirua Whaitua Collaborative Modelling Project Scenario Modelling Technical Report. Project IZ080700. Prepared for Greater Wellington Regional Council
[6] Easton, S., Nation, T. and Blyth, J.M. 2023. Erosion Risk Mapping for Te-Awarua-o-Porirua and Te-Whanganui-a-Tara Rev 2. September. Prepared for Greater Wellington Regional Council.
[7] Peryer, J. 2025. Statement of Technical Evidence for HS3 – Environmental Restoration. Prepared for GWRC for PC1.