

**BEFORE THE INDEPENDENT HEARINGS PANELS APPOINTED TO HEAR AND MAKE  
RECOMMENDATIONS ON SUBMISSIONS AND FURTHER SUBMISSIONS ON PROPOSED CHANGE 1 TO  
THE REGIONAL POLICY STATEMENT FOR THE WELLINGTON REGION**

**UNDER** Schedule 1 of the Resource Management Act  
1991 (the Act)

**IN THE MATTER OF** Hearing Submissions and Further  
Submissions on Proposed Change 1 to the  
Regional Policy Statement for the Wellington  
Region

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**STATEMENT OF REBUTTAL EVIDENCE OF STUART JAMES EDGAR  
FARRANT**

**ON BEHALF OF WELLINGTON REGIONAL COUNCIL**

**HEARING STREAM 5 – FRESHWATER AND TE MANA O TE WAI**

**13<sup>th</sup> November 2023**

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**TABLE OF CONTENTS**

INTRODUCTION ..... 3

QUALIFICATIONS AND EXPERIENCE ..... 3

RESPONSES TO EXPERT EVIDENCE ..... 3

## INTRODUCTION

- 1 My full name is Stuart James Edgar Farrant. I am a Principal Ecological Engineer and Water Sensitive Design practice lead at Morphum Environmental Ltd.
- 2 I have read the respective evidence of:
  - 2.1 Charlotte Amy Lockyer (on behalf of Wellington Water Ltd)
  - 2.2 Caroline Horrox (on behalf of Wellington Water Ltd)
  - 2.3 Joe Jeffries and Maggie Cook (on behalf of Wellington City Council)

## QUALIFICATIONS AND EXPERIENCE

- 3 My qualifications and experience are set out in paragraphs 5-11 of my evidence dated 30 October 2023. I repeat the confirmation given in that report that I have read and agree to comply with the Code of Conduct for Expert Witnesses.

## RESPONSES TO EXPERT EVIDENCE

### **Charlotte Amy Lockyer (on behalf of Wellington Water Ltd)**

- 4 Ms Lockyer raised questions regarding the specificity of event magnitudes for hydraulic neutrality (paragraph 17) and proposed that the definition of Hydraulic Neutrality is updated to include direct reference to the 1% and 10% events in line with current Wellington Water Guidelines. Ms Lockyer also notes that there are different event magnitudes currently applied in Kāpiti (paragraph 15) and Wairarapa (paragraph 16). I agree that the specification of an event size is important to avoid ambiguity but recognise the need to reflect local variability between Territorial Authorities. I therefore recommend that the definition of hydraulic neutrality is amended to state *"..... in the 10% AEP and 1% AEP modelled design rainfall events including the predicted impacts of climate change as a minimum"*.
- 5 Ms Lockyer raised concern with the reference to volume in the definition of 'hydraulic neutrality' (paragraphs 18-24) and proposes amendments to remove the term 'volume'. I agree with this change for the reasons provided by Ms Lockyer.
- 6 Ms Lockyer raised concerns with the definition of 'undeveloped state' in relation to how it applies to greenfield developments (paragraphs 29 and 30). Ms Lockyer noted that in many instances the predeveloped state might be scrub or forest rather than pastoral landcover as

proposed in policy wording. Ms Lockyer correctly notes that this will influence the predeveloped hydrology due to variability with interception and evapotranspiration.

- 7 As noted in my previous evidence, the quantification of interception and evapotranspiration is difficult with very limited data available in New Zealand. In recommending the addition of a definition for 'undeveloped state' through Ms Pascall's section 42A report, we considered it prudent to not overly complicate the requirements due to the complexity that more refined modelling of landcover would introduce. We therefore proposed that the undeveloped state is taken as pastoral, given this constitutes the majority of land that is developed for greenfield subdivision. In practice it is anticipated that the technical guidance recommended to support the calculation of pre-development hydrology will provide further clarity on the specific infiltration and evapotranspiration assumptions that inform the calculation methodology. On this basis I maintain that the definition as recommended by Ms Pascall is justified to support implementation of the proposed policy.
- 8 Ms Lockyer provides clear support for the intent and importance of hydrological control to support freshwater outcomes (paragraphs 32 and 33) but raises concern with the reference to continuous flow modelling and the policy wording. These concerns are discussed separately below.
- 9 With regards to Auckland Council, Ms Locker references the requirement to provide 5mm retention and considers this is appropriate to avoid the need for continuous flow modelling. Auckland Unitary Plan Table E10.6.3.3.3 Hydrology mitigation requirements states a requirement to *"provide retention (volume reduction) of at least 5mm runoff depth for the impervious area for which hydrology mitigation is required"*. Whilst the intent of this policy is comparable to the hydrological control policy recommended by Ms Pascall, the wording does not specify whether this is 5mm of all rainfall events (given that multiple events may occur in the same day or a single event may span multiple days) and how it may be demonstrated that this retention is achieved prior to a subsequent event. In theory it is easy to achieve a simple static retention depth where good infiltration enables you to capture and infiltrate in a period of say 6-12 hours but where this is not achievable, you need to consider an extended time series and consider the size of temporary storage required to hold rainfall prior to supplying appropriate non potable demands. These demands may be less than the specified 5 mm depth on a daily timestep, but over an extended timeframe can achieve the same outcome in terms of retention, due to extended periods of no or little rainfall interspersed with occasional larger events.

- 10 Therefore, in locations where infiltration is not reliable, designers need to adopt a continuous modelling approach to optimise the size of required storage (tanks) to achieve the intended 5 mm retention depth without over extracting stream baseflow. In the Wellington region there are genuine challenges with infiltration (due to geotechnical concerns and low infiltration rates) meaning that alternative means of retention (such as rainwater reuse) are required. This means that, should a similar policy wording to that currently used in Auckland be adopted, the same level of continuous modelling would be required to demonstrate that the overall outcome achieves the stated hydrology outcome. This would also need to consider the seasonal variability with infiltration and evapotranspiration rates which will naturally be reduced in mid-winter and in periods of sustained rainfall events.
- 11 In my opinion, it is less ambiguous and more robust to have policy and rules for hydrologic controls which are based on the outcome being sought which are then able to be supported either by technical guidelines or through consultants' computational modelling. Continuous simulation modelling is readily able to be undertaken which can demonstrate compliance with the opportunity to optimise infrastructure requirements based on the size of impervious areas, intended means of retention and variable size of storage needed where infiltration is not possible. This modelling is easily undertaken for typical development scenarios and would not add significant cost to projects. I suggest that computational modelling could be easily and cost effectively undertaken to inform deemed to comply solutions similar the approach previously adopted by Wellington Water for the Hydraulic Neutrality approved solutions. This would enable clear technical guidance for developers and their agents but enable alternative schemes to be considered based on the need to match the pre-developed annual water balance.
- 12 Ms Lockyer notes in paragraph 33.2 that in nearly all instances the continuous flow models would be uncalibrated with a high degree of uncertainty in model results. Whilst this is correct (due to a lack of continuous flow monitoring across the region) this is no different to the alternative of a static required retention depth which is itself an uncalibrated depth that is reasoned to provide appropriate protection of freshwater values across a range of topographies, bio physical conditions and microclimates.
- 13 Ms Lockyer raised some mis-understanding with the proposed policies reference to the modelled mean annual runoff volume (paragraphs 33.4 and 33.5). The policy wording refers to the annual water balance with an expectation that continuous modelling would be

undertaken over multiple years. Water balance modelling is typically run over a 10-year timeseries with the mean annual volume for each component of the water balance therefore being the mean of the cumulative total from the years modelled. Proprietary modelling packages will generally provide this mean value but it would equally be easily determined in a more rudimentary spreadsheet based model. This allows for the variability of wet and dry years and is considered appropriate for the policy.

- 14 Ms Lockyer questioned the reference to the 1 in 2 year ARI (paragraph 33.6) and proposed to adopt an AEP instead. I agree with this change in reference but suggest that it adopts the same calculation method adopted in the NIWA High Intensity Rainfall Design System (HIRDS V4) which provides an AEP of 0.5 for the inferred 1 in 2 year ARI. This will enable the policy to align with the industry standard reference document for rainfall depths and intensities.
- 15 Ms Lockyer questioned the need to reference the terms 'channel forming flow' or 'bankfull flow' in policy (paragraph 33.7). I agree that these could be omitted from policy wording and rather, incorporated into explanation as they provide the basis for the policy rather than needing to explicitly be re-stated in the policy itself.
- 16 Ms Lockyer noted that the proposed policy would be required to be met when discharging into highly modified streams and suggested that it should be amended to also apply to instances where the discharge is to the stormwater network that discharges to a stream (paragraphs 33.9 and 33.10). I agree with this amendment to include discharge to stormwater networks that discharge to streams as it is acknowledged as critical that we ensure future development does not further diminish Te Mana o Te Wai in our waterways regardless of current condition.
- 17 It is unclear what Ms Lockyer is inferring in paragraph 36.1 and whether she is suggesting amendments. I agree that in most instances lot scale devices will be preferable to land developers due to the simplicity with modelling and opportunity to adopt a deemed to comply solution toolkit (as Wellington Water already does for Hydraulic Neutrality) but I would recommend that there should still be the ability for larger centralised solutions (such as stormwater harvesting which are increasingly adopted internationally) and shared solutions (such as for higher density and commercial developments) which will require more innovative solutions. This is better supported by providing policy based on the outcomes sought rather than a static retention depth as proposed by Ms Lockyer.

18 In response to Ms Lockyer's comments in paragraph 36.2 I refer to my comments in my paragraph 12 above noting that in most instances either method adopted is to some extent based on limited calibration. I note that previous hydrological modelling undertaken to support the Te Awarua-o-Porirua Whaitua process was based on limited calibration of the Whenua Tapu rain gauge and flows in a tributary of Taupō Stream modelling pastoral landuse with an acceptable level of correlation. It is also noted that definitive calibration of hydrological models for small frequent rainfall events is significantly more complex than for larger flood events due to the influence of climatic factors such as wind and bio physical factors such as slope, soils, vegetation form and aspect.

**Caroline Horrox (on behalf of Wellington Water Ltd)**

19 I have read Ms Horrox's commentary on clarity of responsibilities (paragraphs 9 – 18) but do not provide formal rebuttal. I would however state that in my opinion there is a need for consistency between both regional and territorial plans and if this means there is duplication this is preferable to omissions to ensure that there are policy triggers for improved practice. It is noted that in the case of smaller development sites (such as urban infill and intensification) there is limited triggers for regional consents but considerable risk of increased adverse effects on receiving environments. I would therefore consider it important that territorial authorities ensure that through district plan mechanisms the same level of environmental mitigation is required as by the regional planning framework.

20 Ms Horrox refers in paragraph 29 to Ms Lockyer's evidence regarding the need for continuous flow modelling to demonstrate that policy intent is met. As outlined in my response to Ms Lockyer's evidence I suggest that flow modelling is required even where a static target (such as specified retention depth) is adopted in most instances due to the need to appropriately size storage where rapid infiltration is not viable. This modelling is not considered onerous or complex and in my opinion, it is easier to demonstrate alignment with a water balance outcome (i.e. meeting objective for a volume) rather than trying to demonstrate that over the variability of annual fluctuations the explicit retention depth has been achieved in all instances. In my opinion the proposed policy wording removes ambiguity seen in other jurisdictions such as Auckland, Waikato and elsewhere.

**Joe Jeffries and Maggie Cook (on behalf of Wellington City Council)**

21 Mr Jeffries and Ms Cook discussed the difference between hydraulic neutrality and hydrological control in paragraph 22 with a table provided for comparison. It is unclear what

the purpose of the comparison is but I note that the assertion that both hydraulic neutrality and hydrological controls are only provided on-site is incorrect, with many instances where either will be more efficiently provided through consolidated stormwater management devices or landforms.

- 22 Mr Jeffries and Ms Cook have inferred that consideration has not been given to building consent requirements associated with hydrological controls (paragraph 23). Any requirements for building consents are independent to the proposed policy and are standard industry practice for measures such as rainwater reuse tanks. It is unclear what further consideration would be required given the extensive use of rainwater tanks across many parts of New Zealand.
- 23 Mr Jeffries and Ms Cook have discussed Consenting Authority responsibilities in paragraph 24. It is noted that they infer that stormwater quality measures through water sensitive urban design are the sole responsibility of territorial authorities. I note that currently Wellington Regional Council assess operational stormwater discharge as part of earthworks consents (for earthwork extents greater than 3,000m<sup>2</sup>) with the shared process of approval resulting in increasing alignment between the parties and an increased capability of industry over recent years.
- 24 Mr Jeffries and Ms Cook have questioned the definition of hydrological control in paragraph 27 and provided amended wording in Appendix A. In my opinion the proposed amendments make it uncertain as to what is required from the proposed hydrological controls and would likely contribute to uncertainty from both regulators and applicants. In my opinion, that outcome would be unhelpful to the intent to improve freshwater outcomes across the region.

**DATE:**

**13<sup>th</sup> November 2023**

**Stuart Farrant**

**Principal Ecological Engineer, Morphem  
Environmental**