

BEFORE THE PROPOSED NATURAL RESOURCES PLAN HEARINGS PANEL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of Water allocation

AND

IN THE MATTER of the submissions and further
submissions set out in the S42A
Officer Report

**SUPPLEMENTARY EVIDENCE OF MR BRYDON HUGHES
ON BEHALF OF WELLINGTON REGIONAL COUNCIL**

**TECHNICAL – WATER ALLOCATION: FORM AND CONTENT OF THE PROPOSED
CONJUNCTIVE MANAGEMENT FRAMEWORK**

8 December 2017

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1. INTRODUCTION

- 1.1 My name is Brydon Nicholas Hughes. My qualifications and experience were detailed in our statement of primary evidence for Water Allocation dated 7 August 2017.
- 1.2 Greater Wellington Regional Council have requested that I provide further evidence to this hearing relating to the form and content of the GWRC conjunctive water allocation framework for the Wellington Region, subsequent to expert conferencing.

2. CODE OF CONDUCT

- 2.1 I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note and that we agree to comply with the code. The evidence in this statement is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

3. SCOPE

- 3.1 The scope of my evidence covers the form and content of the proposed Conjunctive Water Management Framework, particularly with respect to suggested amendments that have been developed via expert conference that occurred subsequent to the initial and reconvened hearings for Stream 3 of the Resources Plan for the Wellington Region.

4. OVERVIEW OF THE CONJUNCTIVE MANAGEMENT FRAMEWORK

- 4.1 As detailed in my primary evidence, lakes, rivers, streams, wetlands and aquifers form part of a complex, interconnected hydrological system across the Wellington Region. Given the interconnected nature of water resources, effective management of water quantity requires development and application of an integrated management approach to ensure effects of groundwater abstraction on surface water flows and levels are appropriately managed.
- 4.2 The conjunctive management framework identifies two fundamental categories of groundwater takes for managing the individual and cumulative effects of groundwater abstraction on surface water:
- Groundwater takes that result in direct or immediate depletion effect on surface water where effects on surface water flows can be effectively managed by application of pumping controls based on minimum flows established for hydraulically connected surface waterways; and
 - Groundwater takes which result in an indirect effect on surface water baseflow at a catchment scale. Effects of such abstraction cannot be effectively managed in a temporal sense, but the overall magnitude of

cumulative effects on surface water can be managed by specification of a fixed allocation volume for groundwater abstraction from a spatially defined groundwater management zone.

- 4.3 The conjunctive management framework proposes three hydraulic connection categories, which effectively resolve to the two management categories outlined above.
- 4.4 In areas of the hydrogeological system where there is clear evidence for a high degree of hydraulic connection (identified as *Category A*), it is proposed that groundwater abstraction will effectively be managed as equivalent surface water abstraction (in terms of allocation and application of minimum flow cutoffs).
- 4.5 In those areas where there is clearly a moderate to low degree of hydraulic connection to surface water (*Category C*), groundwater abstraction will be managed in terms of an annual groundwater allocation volume established to limit the maximum cumulative depletion of baseflow at a catchment scale.
- 4.6 For remaining areas (*Category B*), where there is uncertainty regarding the exact nature of hydraulic connectivity, groundwater abstraction will be managed in terms of either surface water allocation and minimum flows or groundwater allocation, depending on the outcome of hydrogeological assessment.
- 4.7 Following the outcome of expert conferencing, the proposed Table 4.1 identifies management criteria for groundwater takes that are located within each hydraulic connection category. The table specifies a methodology for identifying if individual takes within Category B areas are most appropriately managed in terms of surface water allocation and minimum flows or alternatively, cumulative groundwater allocation volumes.
- 4.8 The spatial framework for the hydraulic connectivity classification is defined in maps contained in the respective Whaitua chapters of the Proposed Plan. Each map shows the spatial and depth distribution of the three hydraulic connection categories. Tables within each chapter specify maximum allocation amounts for surface water and hydraulically connected groundwater takes (i.e. Category A takes and the calculated effect from Category B takes), and groundwater allocation amounts for the remaining abstraction volume (i.e. total groundwater allocation minus calculated effects on surface water).

5. SPATIAL DELINEATION OF HYDRAULIC CONNECTION CATEGORIES

- 5.1 The spatial and depth distribution of hydraulic connectivity categories are mapped for the Wairarapa Valley, Hutt Valley and the Kapiti Coast in the relevant Whaitua chapters of the pNRP.
- 5.2 The mapping of hydraulic connectivity zones in the pNRP is intended to provide

surety for consent applicants (in terms of potential water availability and likely management controls), reduce requirements for hydrogeological assessment and simplify the resource consent process (given only takes in Category B areas are required to undertake hydrogeological assessment).

5.3 The spatial extent of the hydraulic connectivity classification was mapped using multiples lines of evidence and represents the best understanding of the physical characteristics of the groundwater resource at the time the Plan was developed. Criteria utilised in the mapping process include:

- The spatial extent of various geological units defined in the QMap coverage;
- Compilation of information available to characterise aquifer hydraulic properties;
- Analysis of temporal variation in river stage and groundwater levels;
- Observed gains and losses in stream flow;
- The occurrence of springs and spring-fed streams;
- Groundwater quality and hydrochemistry.

6. RECLASSIFICATION OF THE LOWER RUAMAHANGA ZONE

6.1 As a result of expert conference following submissions to the initial hearing, considerable work was undertaken to re-evaluate the hydraulic connectivity classification assigned to the Lower Ruamahanga zone.

6.2 As described in the Joint Witness Statement – Hydrology, it is recommended that the zone from Waihenga south be reclassified as Category B, rather than Category A as originally proposed. It is also recommended that the southern boundary with the Lake zone is amended to extend further north to include the southernmost section of the of the Lower Ruamahanga zone (as originally defined).

6.3 As outlined in the Joint Witness Statement - Table 4.1, Reclassification Schedule and Allocation Amounts, the effects of this reclassification include:

- Reclassification of groundwater takes from Category A to Category B south of Waihenga (with a recommendation that these takes are not subject to minimum flow restrictions);
- A reduction in the calculated depletion effect in the lower reaches of the Ruamahanga River and consequent changes to surface water allocation volumes and naturalised minimum flows (although this section of the river effectively remains fully allocated);

- An increase in the volume of groundwater allocation from the Lake zone (this zone effectively becomes over-allocated);
- Development of a separate allocation volume for groundwater takes in the Lower Ruamahanga zone (this zone effectively becomes fully allocated).

6.4 The recommended amendments to the originally assigned hydraulic connectivity classification in the southern portion of the Lower Ruamahanga zone reflects the complex geological and hydrogeological setting in this area. Although analysis utilising updated geological and hydrogeological information still identified the potential for significant depletion effects on the Ruamahanga River upstream of Waihenga to result from groundwater abstraction in this area, the efficacy of applying minimum flow cut-offs to groundwater takes in this area was determined to be lower than originally assumed.

6.5 With regard to the proposed reclassification, I consider that the physical characteristics of the Ruamahanga zone present a relatively unique set of circumstances that are unlikely to occur elsewhere across the region. For example, a similar transition from unconfined to confined conditions with limited change in geology or aquifer hydraulic properties is not observed elsewhere in the Wairarapa Valley.

6.6 In addition, spatial delineation of the hydraulic connectivity classification across the wider Region is strongly correlated with the mapped extent of geological units and informed by multiples lines of evidence including spatial variations in aquifer hydraulic properties and observed losses and gains to surface water. In contrast, the reclassification of the hydraulic connectivity was influenced by the modelled response of the groundwater system to stresses imposed by pumping rather than spatial or depth variation in physical properties.

7. PROVISION FOR RECLASSIFICATION OF INDIVIDUAL GROUNDWATER TAKES

7.1 I consider reclassification of a significant portion of an individual groundwater management zone (similar to that recommended for the Lower Ruamahanga zone) unlikely to be justified in other parts of the Region for the reasons discussed in paragraphs 6.6 and 6.6 above. However, there may be instances where reclassification of individual groundwater takes is appropriate.

7.2 The potential for reclassification to reflect the natural heterogeneity of the hydrogeological environment is recognised in the new schedule (un-numbered) outlined in the Joint Witness Statement - Table 4.1, Reclassification Schedule and Allocation Amounts. The proposed schedule provides details of information and data requirements require to support a reclassification of an individual take, along with assessment criteria and guidance for the assessment of stream

depletion effects.

- 7.3 I consider that the proposed schedule will provide valuable guidance to assist both consent applicants and Council staff with reclassification of the hydraulic connectivity classification for individual groundwater takes.