BEFORE AN INDEPENDENT HEARING PANEL

IN THE MATTER	Of the Resource Management Act 1991
AND IN THE MATTER	Of applications to Hawke's Bay Regional Council for resource consents to take and use Tranche 2 groundwater

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EVIDENCE OF HILARY LOUGH
ON BEHALF OF HAWKE'S BAY REGIONAL COUNCIL

OVERVIEW OF WATER QUANTITY AND QUALITY EFFECTS

8 AUGUST 2022

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1. QUALIFICATIONS AND EXPERIENCE

1.1 My full name is Hilary Kay Lough.

1.2 I am employed as an environmental engineer and am a Technical Director with the environmental engineering and science company Pattle Delamore Partners Ltd (PDP). I have been working at PDP since October 2004 on a wide range of environmental engineering and water resources projects, with a specialist focus on groundwater and surface water resources and groundwater-surface water interaction.

1.3 I hold the qualifications of Bachelor of Engineering (Honours) in Civil Engineering and a Master of Engineering in Civil Engineering, both from the University of Canterbury (NZ). My master's project was focused on groundwater-surface water interaction and carried out in collaboration with Environment Canterbury and PDP. I am a Chartered Professional Engineer (CPEng), a Professional Member of Engineering New Zealand (CMEngNZ) and a member of the New Zealand Hydrological Society.

1.4 I have authored research papers for international publications on groundwater-surface water interaction and act as a reviewer of other papers submitted for various national and international publications. My research on groundwater-surface water interaction, including analytical stream depletion solutions, is applied in New Zealand and worldwide.

1.5 My project experience covers a range of activities including agricultural, land drainage, managed aquifer recharge, landfill, quarry/mining, energy, wastewater, stormwater and water supply projects. My particular work experience relevant to these applications includes providing technical advice on groundwater and surface water to a range of clients including various regional councils, applicants and submitters; predictive hydrogeological modelling; contaminant transport modelling and the analysis and interpretation of field data related to groundwater- surface water interaction.

1.6 I have been providing technical advice to the Hawke's Bay Regional Council on a range of consent applications since 2012, including a number of applications to

take and use groundwater for irrigation in the Ruataniwha Basin. I have also been involved in a number of wastewater discharge consent applications in the Ruataniwha Basin, which have involved consideration of cumulative nutrient impacts on groundwater and surface water. In 2018 I managed a review of aquifer test information from bores across the Ruataniwha Basin for HBRC, which was undertaken to obtain additional information on the aquifer properties.

1.7 I have read the Code of Conduct for Expert Witnesses as contained in the Environment Court Practice Note 2014 and have complied with it in preparing this evidence. I confirm that the issues addressed in this evidence are within my area of expertise and I have not omitted material facts known to me that might alter or detract from my evidence.

2. SCOPE OF INVOLVEMENT

2.1 I have been engaged by HBRC since 2014 to review and advise on the technical material provided in relation to consent applications lodged for the abstraction of Tranche 2 groundwater, as defined in the decision on Plan Change 6 for the HBRC Regional Plan, from bores in the Ruataniwha Basin. The technical advice sought by HBRC relates to water quantity and quality effects. Subsequently, I have been engaged to review and advise on the technical material provided in support of the eight revised applications to take and use Tranche 2 groundwater received in August 2021 and the further information received since that time.

2.2 I have project managed the technical review undertaken by PDP, which has involved technical review from three other key PDP staff:

(a) Mr Neil Thomas – review of groundwater modelling and groundwater effects assessments for the take and use applications, including stream depletion and well interference effects.

(b) Ms Laura Drummond – review of surface water quality and ecology effects for the take and use applications, including effects on wetlands, streams and rivers as a result of the groundwater level drawdown and flow depletion.

(c) Ms Katherine McCusker – review of water demand assessments for the take and use applications, and potential contaminant changes

(including nutrient, sediment and microbes) associated with changed land use under irrigation with the Tranche 2 water, which is covered in the separate land use consent applications required.

2.3 The key documents provided by the applicants that I and the others have reviewed in preparing the evidence include:

(a) The AEE:

(i) Sage Planning HB Ltd, Aqualinc Research Ltd and Bay Geological Services Ltd. Revised Applications for Take, Use and Discharge of Tranche 2 Groundwater Ruataniwha Basin. 19 August 2021.

(b) Further information provided in November 2021:

(i) Keesing, V., 2021. Tranche 2 groundwater application – Ruataniwha basin, Central Hawke's Bay. Memorandum. Boffa Miskell Ltd. 9 November 2021.

(ii) Weir, J., 2021. Ruataniwha Basin Tranche 2 Groundwater Modelling – Response to PDP's 3rd Review. Aqualinc. 3 November 2022.

(iii) Weir, J., 2021. Ruataniwha Basin Tranche 2 Groundwater Modelling. Aqualinc. 3 November 2022.

(iv) Various reports on land use information for individual applications.

(c) Further information provided in July 2022:

(i) Weir, J., 2022. Ruataniwha Basin Tranche 2 Groundwater Modelling (Revised). Aqualinc. 30 June 2022.

(ii) Durney, P., 2022. Independent Review of Aqualinc's Ruataniwha Groundwater model Used in Support of Tranche 2 Takes. Lincoln Agritech Ltd. 30 May 2022.

(iii) Rabbitte, S., 2022. Final Addendum – Letter Report: Review and Update of Ruataniwha Basin Tranche 2 Consent Application - Assessment of Well Interference Effects. 11 July 2022.

(iv) Allen, J. 2022 Applications for take, use and discharge of Tranche 2 groundwater: combined assessment of environmental and economic impacts. AgFirst Waikato Ltd.

(v) Keesing, V., 2022. Ruataniwha Small streams & wetlands. Ecological assessment of potential effects related to deep water harvesting. 1 July 2022.

(vi) The applicant's proposed conditions of water use and water take consents (dated 22 July 2022).

2.4 Prior to 2020, we reviewed information that was provided for the individual applications. We subsequently reviewed drafts of the technical reports prepared to support the updated combined AEE and provided comments on these in memorandums dated 15 December 2020 and 21 July 2021. Our review of the final 19 August 2021 AEE report was provided in a memorandum dated 29 September 2021.

2.5 The application was publicly notified in December 2021 and a number of submissions were received opposing the application, with one in support. Since that time further information relating to the potential effects of the application has been provided (as detailed in paragraph 2.3 above).

2.6 We reviewed the additional information provided in November 2021, together with the submissions received, and prepared a memorandum detailing the review of the additional information dated 5 May 2022.

2.7 In this evidence I provide an overview of the effects on water quantity and quality that could arise from the proposed activities, concerns on these effects from the information reviewed, and comment on the submissions received and proposed consent conditions. My overview includes:

(a) a summary of the effects of the take and use of water for the Tranche 2 applications, which is covered in detail in the evidence of Mr Thomas and Ms Drummond and

(b) a summary of the review of the water demand assessments for the take and use of water and the likely effects associated with the

required land use consent applications, which is covered in detail in the evidence of Ms McCusker.

3. BACKGROUND TO PROPOSAL AND EFFECTS

3.1 In the subsequent section of my evidence, I identify key water quantity and quality issues that could arise with the applications to take and use Tranche 2 groundwater. In this section, I first provide some background to the augmentation proposed for the Tranche 2 takes.

3.2 Stream depletion is the reduction in surface water flow caused by the abstraction of groundwater that is connected with surface water. In a closed basin such as the Ruataniwha Basin where virtually all groundwater is connected to and naturally exits the basin via rivers, all groundwater abstraction will ultimately result in a reduction in surface water flow of an equal volume, less any water returned to groundwater (via irrigation recharge for example).

3.3 As outlined in the evidence of Mr Neil Thomas, abstraction from shallow bores can result in a rapid depletion effect on nearby surface waterways. The magnitude of the depletion effect can be similar to the peak abstraction rate for some takes. Abstraction from deep bores typically results in a slower depletion effect on surface waterways, which can build up slowly and affect waterways over a wide area. The total magnitude of stream depletion effect from some deep takes can be similar to their long term average abstraction rate.

3.4 Ultimately, while both deep and shallow abstractions impact surface water flow, the effects are usually managed differently due to the timing of effects. Restricting shallow takes during low flows in nearby streams or rivers can result in a rapid recovery of flow, while for deeper takes the recovery in flow can be much slower. For this reason, while cumulative effects from deeper abstractions can be significant, deeper abstractions are usually better managed via allocation limits designed to protect those longer term depletion effects on surface water flows rather than minimum flow restrictions. The limit needs to be set based on a careful evaluation of the amount of depletion that could be acceptable for the connected surface waterways.

3.5 In the case of the Ruataniwha Basin, groundwater abstractions from deeper bores with a top screen depth of 50 m or greater are excluded from being subject to minimum flow restrictions or from being included in surface water allocation limits under Policy TT11[1] of Plan Change 6 to the Hawke's Bay Regional Plan (PC6).

3.6 The Tranche 2 groundwater allocation limit does not have a depth limit, meaning the limit does not solely relate to deep groundwater. However, with the intention of providing some mitigation of stream depletion effects, PC6 does specify via Policy TT8 that Tranche 2 groundwater can only be allocated if the consent holder augments surface water flows.

3.7 The source of the augmentation is not defined in PC6 (for example stored surface water or groundwater). Depending on the setting, groundwater abstracted for augmentation to offset effects from other groundwater abstraction can effectively mitigate stream depletion effects during periods of low flow, but generally if the augmentation is only required for short periods. This is because the pumping from an augmentation bore creates its own stream depletion effect. If augmentation is required frequently, the stream depletion effect from the augmentation bore can become a significant percentage of the abstraction from the augmentation bore and there may be no net increase in stream flow (because the stream depletion effect cancels out the augmentation effect).

3.8 Policy TT8(1)(ca) of PC6 specifies that water can only be abstracted if river flows are augmented as follows:

"Enabling additional groundwater to be abstracted as a discretionary activity (Table 5.9.5 Tranche 2) provided that river flows are augmented to maintain the relevant minimum flows specified in Table 5.9.3 commensurate to the scale of effect of the Tranche 2 groundwater take."

3.9 Table 5.9.5 of PC6 referred to in the above policy provides an allocation limit of 15,000,000 m^3/year for this Tranche 2 water. This is an increase of 53% over and above the 28,501,000 m^3/year limit for Tranche 1 water, which has already been fully allocated. The Tranche 1 and Tranche 2 limits equate to annual average flow

[1] Policy TT11 does not require a cessation of all shallower takes during minimum flow periods, for example irrigation takes are able to continue to take up to 50% of the daily volume as specified in their consent conditions for the period when flows are at or below the minimum flow.

rates of 904 L/s and 476 L/s respectively. For comparison, the surface water allocation limit for the Tukituki River and its tributaries are set-out in Table 5.9.4, reproduced from PC6 below. This shows that the Tranche 2 allocation limit is significant compared to the total allocation limits for the Waipawa and Tukituki Rivers that exit the Ruataniwha Basin. If all Tranche 2 water is regularly used in the Ruataniwha Basin, there will be an average 476 L/s reduction in surface water flows distributed between the tributaries and mainstems of the Waipawa and Tukituki Rivers, although there will be a small component of irrigation return water. The combined peak abstraction rate of Tranche 2 groundwater sought by the applicants in the proposed consent conditions dated 22 July 2022 totals 1,620 L/s.

Table 5.9.4: Surface Water Allocation Limits

Surface Water Allocation Zones (Schedule XVI)	Direct Take Allocation Limit (L/sec)	Surface Water Depletion Allocation Limit (L/s)	Total Allocation Limit (L/sec)
Zone 1 - Lower Tukituki River	519	412	931
Zone 2 - Waipawa River and Tributaries above RDS/SH2	643	269	912
Zone 3 - Tukituki River and Tributaries above Tapairu Road	763	716	1,479
Sub- catchment allocation of allocation limit for Zone 3:			
Zone 3 - Kahahakuri Stream	176	174	350
Zone 3 – Makaretu Stream	32	8	40
Zone 3 - Tukipo River	152	84	236
Total catchment	1,925	1,397	3,322

3.10 As outlined in the evidence of Mr Thomas (Figure 1), the actual use of Tranche 1 water is much less than what has been allocated, meaning a significant increase in groundwater abstraction, and subsequent increase in stream depletion and other effects, could occur in the absence of the Tranche 2 takes, if actual use increases. We have provided technical advice on a number of applications to transfer and otherwise increase access to Tranche 1 water, which may result in an increase in actual use.

3.11 Condition (c) of Rule TT4 of PC6 provides some guidance on augmentation sites as follows:

"No new groundwater takes from Groundwater Allocation Zones 2 and 3 utilising Tranche 2 groundwater may be exercised under this rule unless and until augmentation flows are discharged that are commensurate to the scale of effect of

the proposed take, during the same irrigation season as the Tranche 2 groundwater takes are exercised, to each of the Waipawa River and the Upper Tukituki River or one or more of their respective tributaries at a rate of up to 715 l/s to each river catchment at the highest practicable elevation as required to maintain the relevant downstream minimum flows specified in Table 5.9.3.

3.12 Table 5.9.3 specifies minimum flows at seven flow management sites, six[2] of which may be impacted by the abstraction of Tranche 2 groundwater. The location of these together with the proposed augmentation sites are shown in Figure 13 below, reproduced from the Aqualinc modelling report (30 June 2022). While the proposed augmentation sites are not at the highest elevation with respect to reaches that may experience a depletion effect, there is at least one site located above the following flow management sites (with their respective relevant minimum flows from 2018/2023):

(a) Waipawa River at RDS/SH2 (2,500 L/s)

(b) Mangaonuku Stream U/S Waipawa (1,170 L/s)

(c) Tukituki River at Tapairu Road (2,300 L/s)

(d) Tukituki River at Red Bridge (all augmentation sites are above this flow site) (5,200 L/s)

3.13 There are no proposed augmentation sites above the following flow management sites (although it appears Figure 13 from Weir (2022), which is reproduced below, may contain an error showing Tukituki Awa's augmentation site on a tributary of the Tukipo River, when the report describes and Figure 16 of that report shows discharge to the Tukituki River):

(a) Tukipo River at SH50 (150 L/s)

(b) Tukipo River Ashcott Road (1,043 L/s)

[2] Excluding Papanui Stream at Middle Road

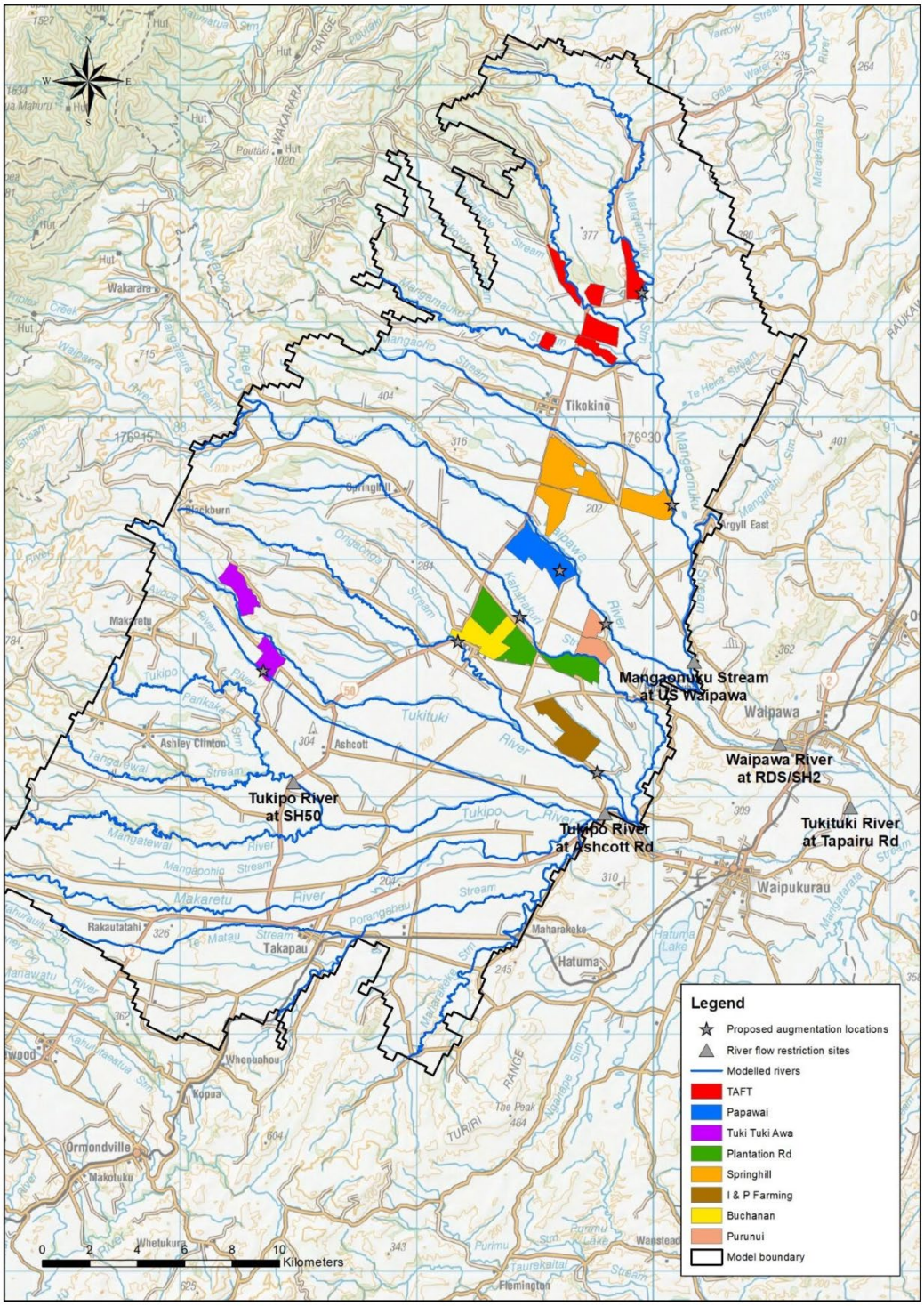

Figure 13: Tranche 2 applicants' farm locations, proposed augmentation discharge locations and key river flow monitoring sites

4. SUMMARY OF WATER QUANTITY AND QUALITY EFFECTS

4.1 In this section of my evidence I provide a summary of the key water quantity and quality effects related to the proposed take and use of Tranche 2 water. Further detail of these effects is presented in the evidence of Mr Thomas, Ms Drummond and Ms McCusker.

Effects on flows in the major rivers that discharge from the basin

4.2 As outlined above, the abstraction of groundwater will reduce flows in the major rivers exiting the basin. The applicants have allowed for the stream depletion effect caused by the augmentation bores pumping in the groundwater flow modelling that has been undertaken. This is in addition to the depletion effect caused by the proposed irrigation abstraction. As shown in Table 31 of Weir (2022), the volume of augmentation required to mitigate the combined depletion effects during periods of low flows at the flow management sites in the main rivers has been calculated to be a large proportion of the overall takes (up to 42% of the overall proposed abstraction volume). The large volume required is influenced by the number of days the management sites experience flows below the minimum flow thresholds proposed and the stream depletion effects caused by the augmentation pumping.

4.3 Based on the review of the information provided, the following issues related to the effects on flows in the major rivers that discharge from the basin have been identified:

(a) **Issue – augmentation volumes in dry years:** Both the irrigation and augmentation volumes are based on 90th percentiles. As outlined in the Aqualinc report (30 June 2022) *"it is possible that in extreme dry years (e.g. 1 year in 10), low flows could still be triggered after irrigation and augmentation volumes have been exhausted."* The applicants appear to consider that the surface waterways can be offered the same level of protection as irrigators, with mitigation being sufficient in at least 9 years out of 10. As outlined in the evidence of Ms Drummond, no justification has been provided of the ecological acceptability of the insufficient augmentation volumes in drier years. Neither has the resulting effect on the existing surface water users been assessed, including drinking water suppliers, as a result of the

exacerbation of low flows during dry years. This is an outstanding issue with the proposal, and further assessment, including allowance for climate change is required.

(b) **Issue - staging of the augmentation:** As outlined in the evidence of Mr Thomas, the modelling carried out by the applicants is based on all the abstractions occurring together and all the augmentation discharges occurring simultaneously. However, the augmentation volumes for each applicant do not appear to be set to offset each individual's stream depletion effect but instead are set to offset the combined stream depletion effect of the takes. Therefore, there is some further uncertainty in how the augmentation will work in practice as the irrigation development will be staged and further consideration is required.

(c) **Issue - Red Bridge flow site trigger:** The recent set of proposed conditions provided (dated 22 July 2022) does not propose Tukituki at Red Bridge as a flow management site. As outlined in the evidence of Mr Thomas, all other takes are tied to Red Bridge in addition to their more local site. At times when flows are below the minimum flow at Red Bridge and not below minimum flows at the other sites, the flows at Red Bridge would be lower than if the Tranche 2 takes were not occurring without augmentation, which could have resulting effects on other users and ecology. This site should therefore be included.

(d) **Issue – augmentation site effectiveness:** As outlined in the evidence of Mr Thomas, there is insufficient information provided to demonstrate that the two groundwater recharge locations proposed will be effective in augmenting river flows. In addition, a number of streams and rivers are dry at times throughout the basin. For example, information provided by the applicants indicates that Ongaonga Stream goes dry at times (after the applicants' site inspection in March 2021). There is a proposed augmentation discharge on this stream. If this and other streams are dry below the discharge point, the augmentation would not be effective in mitigating effects on minimum flows at the downstream flow sites. The lower

Waipawa also loses large amounts of water to groundwater and dries during drought conditions, with recorded lengths of the drying reach approaching eight kilometres (Johnson, 2011). If the augmentation discharges are occurring above reaches in rivers and streams that are dry or lose large amounts of water, the discharge will not be effective at mitigating the Tranche 2 depletion effects on flows at the flow management sites. This is an outstanding issue with the proposal.

Effects on smaller streams, rivers and wetlands that occur within the basin

4.4 There are a large number of surface waterways that will experience flow depletion but will not receive augmentation water. In addition, reaches of streams and rivers upstream of the augmentation sites will experience depletion of flows. The augmentation sites proposed in Figure 13 (reproduced above) are all located near the applicants' properties.

4.5 Based on the review of the information provided, the following issues related to the effects on flows in the smaller streams and rivers that occur within the basin have been identified:

(a) **Issue – augmentation extent:** The augmentation site locations proposed in Figure 13 do not provide for any mitigation of depletion effects upstream of the discharge points or on other streams, rivers and wetlands. This may result in ecological impacts, as identified in the evidence of Ms Drummond, including loss of fish spawning habitat, loss of migration pathways for native fish, loss of watercourse connectivity, loss of habitat for fish and invertebrates, reduction in available hyporheic zone, mortality though drying or unsuitable water quality conditions, and degraded water quality as a result of reduced dilution capacity. The applicants have now modelled depletion effects for sites other than the main flow sites and assessed ecological impacts, but as outlined in the evidence of Mr Thomas and Ms Drummond, there are outstanding concerns on both the model uncertainty for depletion effects and the interpreted ecological impacts. I also note that there have been a number of assumptions made including around scaling of the predicted drawdown effects, lag times and perched streams in the ecological assessment (Keesing,

2022). I consider many of these are assumptions have not been justified and are not reasonable based on the information that has been provided. These assumptions are likely to result in an underestimation of effects.

Effects on existing bores

4.6 The proposed 53% increase in groundwater allocated across in the Ruataniwha Basin has the potential to result in adverse effects on existing bores due to drawdown interference.

4.7 Based on the review of the information provided, the following issue related to the effects on existing bores has been identified:

(a) **Issue – well interference assessment approach.** As outlined in the evidence of Mr Thomas, effects on existing bores are uncertain and, in some cases, exceed the thresholds defined by the applicants of 20% of the remaining drawdown after seasonal effects and considering the screened interval in each bore. A more conservative allowance for the cumulative abstraction from Tranche 1, increased use of Tranche 1 water, appropriate consideration of drawdown effects at different depths, the declining trends in a number of wells across the basin and climate change is considered necessary.

Effects on water quantity and quality related to inefficient use of water

4.8 If water is used inefficiently, more water could be abstracted than necessary, leading to an increase in adverse effects. In addition, this could lead to allocation issues if water is allocated but not used. Inefficient use of water can also lead to adverse water quality effects, which has been considered by Ms McCusker in her review of the land use and proposed irrigation.

4.9 Based on the review of the information provided, as detailed in her evidence, Ms McCusker considers that the water use efficiency for all eight applicants appears to be within the range expected for irrigated mixed cropping and pastural farms. She considers that, if the applicants follow good management irrigation practices, the water could be used efficiently. She notes that it will be important that

measures in FEMPs and consent conditions are in place to help ensure this, but this conclusion is relevant to the overall evaluation of the use of Tranche 2 water that has been applied for.

Effects on water quality related to subsequent land use changes

4.10 As outlined in HBRC's 1 October 2021 Section 92 request, concerns were raised over the impacts on water quality from farm system changes as a result of irrigation. A number of the properties are located in catchments where the instream nitrogen target is already significantly exceeded. HBRC noted that land use consent is already required for these properties and would not likely be granted to allow for any increase in nitrogen loss. HBRC also noted that for dairy farms wishing to expand irrigation, land use and discharge consents are required under the NES FW and that a consent cannot be granted unless they are able to demonstrate that expansion will not lead to any increase in load or concentrations of contaminants in the catchment.

4.11 In response, the applicants provided information on nutrient losses related to production land use consents required for the properties. On 27 July 2022, AgFirst also provided a report *'Applications for take, use and discharge of Tranche 2 groundwater: combined assessment of environmental and economic impacts'* for the eight parties that have applied for a groundwater take consent (referred to herein as the AgFirst Report). This information indicates there will be no expansion of irrigated dairy.

4.12 Based on the review of the information provided, as detailed in her evidence, Ms McCusker considers that the proposed land use with irrigation could be managed to result in either a decrease or at least no increase in the discharge of nitrogen, phosphorus, sediment and *E. coli* through Farm Environment Plans (FEMPs), farmer/farm manager training, good record keeping and good nutrient management practices. Further details and the careful development of consent conditions will be necessary for each individual production land use consent, but this conclusion is relevant to the overall evaluation of the use of Tranche 2 water that has been applied for.

4.13 I note that an overall decrease in nutrients is required across the Tukituki River and its tributaries in order for the water quality targets in PC6 to be met by 2030.

Effects on water quality related to augmentation discharge

4.14 The augmentation discharge has been considered to be a permitted activity by the applicants under Rule 31 of the Hawke's Bay Regional Resource Management Plan (RRMP), subject to meeting specific conditions (flooding of property, erosion and temperature change). The applicants have noted that erosion protection (e.g. establishment of rip rap) will be provided at the point of discharge where necessary, to avoid scouring or erosion of any land or watercourse beyond the point of discharge. While no discharge consent has been applied for, as identified in the Section 42A Officer's Report prepared by Mr Paul Barrett, the different water chemistry between the deep groundwater and the receiving waterways means that a consent to discharge contaminants may also be required (this is not permitted under Rule 47 of Plan Change 6).

4.15 Based on existing water quality data available from HBRC, the following issue related to the effects of the augmentation discharges has been identified:

(a) **Issue – surface water quality changes due to differences in deep groundwater chemistry.** Ms Drummond provides additional information related to surface water quality and ecology effects associated with the augmentation discharge in her evidence and Mr Thomas provides information on effects on drinking water supplies. They note that deep groundwater quality, and the potential effects of its discharge to surface water was not assessed in the application. Review of this groundwater quality data (including that in Morgenstern et al. (2012), HBRC (2019)) shows nitrate-nitrogen, ammoniacal-nitrogen, dissolved reactive phosphorus, dissolved oxygen and metals concentrations could cause adverse effects to smaller streams receiving augmentation water and some parameters may impact any drinking water supplies. An assessment of the effects of the augmentation discharge should be provided by the applicants as part of any consent application for the discharge.

5. COMMENTS ON SUBMISSIONS

5.1 Concerns on the issues raised in our technical reviews and summarised above are raised in many of the submissions. Submitters report bores drying at various locations, which is consistent with the groundwater level declines observed in a number of the SOE bores. A number of submitters also provide information that indicates streams have reduced in flow or are becoming dry or drying more frequently. HBRC does not have flow monitoring sites on all streams to compare the observations to, but given the connection between groundwater and surface water, this is also in line with the groundwater level declines observed in a number of the SOE bores.

5.2 The absence of long term groundwater level in some areas makes it difficult to understand trends in all locations. Inglis Bush Community Trust have raised concerns on piezometers becoming dry in the area, although there are no SOE bores nearby to compare the information to. Further monitoring in areas around sensitive features such as wetlands is advised, particularly if these applications are granted.

6. PROPOSED CONSENT CONDITIONS

6.1 The applicant has proposed conditions of consent for the water take consent dated 22 July 2022. I comment on these as follows:

(a) Condition 1 provides for a large degree of flexibility in well locations. Moving the locations would alter the well interference and stream depletion effects from those modelled to date.

(b) The final volumes sought need to be confirmed by the applicant for Condition 2 and be reasonable and consistent with the information provided and assessed.

(c) Concerns on Condition 5, including the adequacy of the number of bores and the practicality of the mitigation, are outlined in the evidence of Mr Neil Thomas.

(d) As outlined by Mr Thomas, Condition 6 proposed requires a pumping test on new bores drilled and a well interference assessment, but it is not clear what will occur if the results of the assessment are

inconsistent with the assessment that has been presented. It also only covers bores within 2 km of the pumped bore which is a relatively small radius considering the magnitude of these takes and that the model indicates effects will occur across the basin. The process for determining measures to manage effects on neighbour abstractors is also unclear from the condition (part d).

(e) The monitoring and reporting under Condition 8 solely relates to the water abstracted. There is no monitoring or reporting proposed for effects that the consent could cause or contribute to, such as groundwater levels, wetland levels or stream flows.

6.2 The applicant has also proposed conditions of consent for the use of water dated 22 July 2022. I comment on these as follows:

(a) Conditions 1 and 2 propose separate volume limits. I recommend a volume limit should apply for the irrigation volume, but that no specific augmentation volume should be imposed to allow for more water to be used for augmentation when required, provided the specified combined volume for augmentation and irrigation is not exceeded. It would make sense therefore for the year periods to match (1 October to 30 September).

(b) It is reasonable to provide for some scaling of the augmentation for staged development, as per Condition 3, but as outlined in this evidence and the evidence of Mr Thomas, the staging requires further consideration on how it can work in practice and how effects will be mitigated across waterways if development of some properties is delayed.

(c) The Red Bridge flow site should be added to Condition 4, with an appropriate increased flow threshold to allow for the Tranche 2 effects.

(d) Ms Drummond raises concerns in her evidence on the effectiveness of Conditions 18 and 19 and existing requirements under other regulations.

(e) Further to Condition 20, as outlined in the evidence of Ms McCusker, a maximum irrigated area should be considered. Ms McCusker raises that not having an irrigated area restriction poses a risk that catchment loads could increase. She recommends that, for the

production land use consents or the water use consent, the maximum area of irrigation as applied for and the maximum area of high nitrogen loss crops, including irrigated vegetable and seed crop production and winter forage, is included. She recommends there is also a requirement for soil moisture monitoring or an alternative approved by the Hawke's Bay Regional Council.

(f) There is no monitoring or reporting proposed for effects that the consent could cause or contribute to, such as effects on flows, levels or quality in groundwater or surface water.

6.3 Based on the water quality information, the discharge of the augmentation water may require consent. Any conditions of consent should include maximum discharge rates, locations, erosion/flooding protection, monitoring and mitigation measures for water quality, in line with the water quality information presented in the evidence of Ms Drummond and Mr Thomas.

6.4 The production land use consent applications, which are being evaluated separately to the take and use applications, will require a number of conditions of consent to ensure that contaminants (including nutrients, sediment and microbes) either decrease or, at a minimum, do not increase in the catchments as a result of the land use change, as outlined in the evidence of Ms McCusker.

7. CONCLUSIONS

7.1 The applications seek a significant increase in groundwater abstraction across the Ruataniwha Basin and to use this water for irrigation and augmentation. There are a number of potential adverse effects on water quantity and quality that have been raised in the review of the technical information undertaken by PDP, many of which are considered significant. It is not considered that all of these effects have been adequately addressed in the information provided.

Hilary Lough

8 August 2022

References

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