WATER QUANTITY AND MEASUREMENT EVIDENCE OF ANDREW DARK FOR THE WINEGROWERS

1. My evidence addresses water quantity and measurement issues in PPC9 relevant to viticulture in Hawke's Bay. In particular, my evidence focuses on how PPC9 allocates water for irrigation.

Actual and Reasonable

2. My evidence focuses on the allocation of water in accordance with "Actual and Reasonable" use. PPC9 proposes to allocate water for irrigation takes based on the "least of either" actual historical data over a ten year period or the IrriCalc water demand model (or a suitable equivalent approved by Council) that utilises crop type, soil type and climatic conditions to determine efficient water allocations for irrigation uses.

3. In my opinion, this approach to allocating water is suitable, provided that the methodology for determining "Actual and Reasonable" is robust and fair. As outlined in my evidence, I have concerns about the robustness of the proposed definition of "Actual and Reasonable", particularly around the use of averages, the "least of either" condition, and the likely implications for setting reasonable use volumes.

4. I note that the definition of "Actual and Reasonable" is intended to provide users with 95% supply reliability. Supply reliability is not defined within PPC9 but should ideally be assessed from both a supply (water availability) and demand (water need) perspective. In my evidence, I have assumed that 95% supply reliability refers to the 95th percentile annual demand from the IrriCalc online tool, meaning that sufficient water is allocated to meet crop water demands in 19 out of 20 years on average. I consider this is the more appropriate metric to use when considering reasonable water use.

5. Overall, I consider that using the current online IrriCalc tool to calculate "Actual and Reasonable" use volumes is useful as a default or start-point for resource consent applications, and may be able to be relied on fully for a vineyard that is set up and managed in a relatively "standard" way (i.e. where the assumed model parameters match the actual vineyard set-up). However, it is important to understand the limitations of this approach. For example, as I discuss in my evidence:

   (a) A number of factors, including vine variety and how the vineyard is planted and the vine canopy is managed, may mean that the crop coefficients used in the model (which underpins the tool) do not exactly represent the water use of vines in a particular vineyard. In my view, further research is required to quantify the effects of these factors on the crop coefficients for grape vines and the implications for water use requirements.

   (b) In addition, the accuracy of the results given by the IrriCalc online tool could be improved by improving the input datasets. The climate inputs could be improved considerably by using interpolated climate data with a finer spatial resolution, for example, a 500 m grid rather than the existing 5 km grid spacing, and the soils data could be updated.

   (c) For examples that I considered for my evidence, the actual use, based on water meter data, is reasonably consistent with the volumes calculated from the IrriCalc online tool, but this will not always be the case. Consent-holders should be able to present water use data, supported by soil moisture data or other contextual information, in support of an annual volume that is higher than the IrriCalc volume.

6. I do not agree with suggestions in the Section 42A Hearing Report that IrriCalc tends to overestimate water needs for irrigation. While this may be the case in some circumstances where there are fine textured soils with a high-water table, I am confident that for free draining soils with a deeper water table (typically occupied by viticulture), the IrriCalc outputs a robust assessment of reasonable use.

7. The proposed "least of either" approach to determining "Actual and Reasonable" use in combination with the proposed reliance on average water use data over the 2010 – 2020 period is likely to have a major impact on the annual volume limits that will be placed on consents when they are reviewed or renewed. As I discuss in my evidence, an average over a 10 year period is not necessarily a valid comparison with a 95% reliability number from long-term modelling.

8. Therefore, in my view:

   (a) There is a need to continue to refine the online IrriCalc tool to improve its accuracy and increase the level of confidence that growers have in its results.

   (b) As neither measured water use data or IrriCalc can be relied on to accurately represent reasonable use in all circumstances, it would be appropriate for the policy framework in PPC9 to recognise that, while IrriCalc is a useful method of undertaking reasonable use calculations, some flexibility may be needed in instances where "Actual and Reasonable" use allocation does not deliver enough water all year round for vineyard operations. The PPC9 provisions should enable additional site-specific information to be considered and should not preclude alternatives where growers are able to show that the volumes from IrriCalc are insufficient for their circumstances (for example, based on site specific soil and rainfall data).

   (c) The proposed "least of either" approach precludes the use of water meter data to show that the IrriCalc volume is insufficient for a vineyard. It risks equity and fairness issues.

   (d) Average measured water use data over the 10 year period preceding May 2020 should not be relied on to determine "Actual and Reasonable" use as this results in irrigation take volumes that are insufficient for water demand in dry years.

9. I note that the Addendum Report to the section 42A Hearing Report, dated 19 May 2021 ("**Addendum Report**"), has reinstated reference to the 'maximum' annual take within the definition of "Actual and Reasonable". I agree with this change. Mathematically, taking an average of values over a period will always result in a lower number than the maximum over that period. Further, the analysis completed for my evidence[1] shows that the inclusion of the additional drought years water monitoring through to May 2020 (but with a change to the average of that amount) is not equivalent to the demand for water at 95% supply reliability. The average water use over the 10-year period up to May 2020 is 68% of the 95th percentile value. If water had been allocated on this basis, water users would have insufficient water to meet full vineyard demand approximately four years out of ten. Ms Taylor's evidence addresses the effects of water stress on viticulture.

10. I am aware that evidence filed on behalf of Ngāti Kahungunu Iwi Incorporated suggests that "Actual and Reasonable" use should be defined by reference to the lowest annual take in the 10 years prior to 2 May 2020. In my view, the 'maximum' approach proposed in PPC9 is much more likely to be representative of the long-term actual and reasonable water use at a 95% reliability level, provided that the measurements are representative of the vineyards long term water use.

[1] My evidence contains an analysis of water use data from a number of vineyards. This analysis (from paragraph 63 onwards) supports the conclusions I have summarised above.

11. The Addendum Report has not addressed my concerns regarding the “least of either” provision in the “Actual and Reasonable” definition. While this approach safeguards against annual volume based on measured water use that reflects inefficient irrigation, there is a risk that without being able to fully account for the context of the measured water use, the data may not be representative of a vineyard’s long-term water use, even when inter-annual variability due to climate is accounted for. Potential reasons for this were included in my evidence, including:

    (a) Establishment / re-development, where parts of the vineyard may be fallow or contain young vines with different water requirements to fully established vines.

    (b) Low-flow restrictions that prevent water being taken, even though there is a demand for it. Where measured water use has been reduced due to low flow restrictions, in my opinion, this is not a true reflection of ‘Actual and Reasonable’ use, and should not be compared with IrriCalc numbers, which are based on water being available whenever required.

    (c) Irrigation systems that contain storage where stored water may have been taken in a different hydrological year to when it is used.

    (d) Under-irrigation or over-irrigation, which may occur due to lack of soil moisture monitoring.

    (e) The ‘Actual and Reasonable’ definition refers to “insufficient or no accurate data”. The terms “insufficient” and “accurate” are not defined, but are likely to refer to the water use records being gap-free, and the flow meter being installed and maintained in compliance with HBRC’s Technical Specifications and Installation Requirements for Flow Meters document. Without further context about how the water is being used, however, I do not consider this to address whether the data actually reflects reasonable use.

VITICULTURE EVIDENCE OF EMMA TAYLOR FOR THE WINEGROWERS

1. My evidence addresses how PPC9 allocates water for irrigation. It has particular relevance to viticultural activities that rely on irrigation to produce grapes.

Viticulture Background

2. In my evidence, I provide an overview of the importance of irrigation for viticulture in Hawke's Bay. Specifically:

   (a) Approximately 97% of the wine sector water use is for irrigation/frost protection. Of the vineyards using irrigation, about 95% of water is applied by the most efficient drip method.

   (b) Viticulture is a responsible water user because over-irrigation of grapevines has a negative impact on wine quality. Grape growers are careful to irrigate the vines only when they need it and to put only enough water to continue fruit development and ripening, but not enough to harm the crop or slow ripening. This means that in a wetter year, irrigation use on vineyards is reduced.

   (c) Most vineyards in New Zealand use drip irrigation to make efficient use of water and reduce evaporative losses. Drip irrigation is suited to vineyards as it does not introduce extra humidity into the canopy – reducing the chance of fungal disease occurring. Irrigation is primarily scheduled using soil moisture probes or vine water status monitoring to ensure water is only put on when the vines require it. In the 2019/2020 season, figures from the SWNZ scorecard show that 91% of irrigated vineyard land in Hawke's Bay utilise soil moisture monitoring to control their water use.[1]

   (d) Most subregions in Hawke's Bay are reliant on irrigation. Water is required to ensure vine canopies are maintained and grown (when appropriate). Vine canopies allow the plant to photosynthesise to ripen grapes and store carbohydrates for the following season. In Hawke's Bay, the dry climate means that irrigation is used to supplement rainfall, especially during the hot summer months.

   (e) Strict limits on water allocation for irrigation will reduce the ability of the vine to photosynthesise correctly and result in decreased canopy growth and yield, impacting overall quality. In severe situations, a lack of water could stress the vine, resulting in complete defoliation. Without leaves, vines cannot ripen their fruit, and the grapes will shrivel before reaching maturity. The grapes would be un-harvestable and, in extreme circumstances, would not recover, leading to vine death.

   (f) These factors would mean that viticulture in the Gimblett Gravels and Bridge Pa Triangle, in particular, which are on lighter soils with minimal water holding capacity, would not be economically viable without sufficient water due to dramatically reduced yield capacity, fruit quality, and potential vine death.

3. Viticulture's experience of the 2019-2020 and 2012-2013 droughts reinforce the critical importance of ongoing access to freshwater for crop protection purposes and to protect the viability of vineyards.

[1] 1 SWNZ Scorecard 2019/2020.

Water Allocation under Proposed Plan Change 9

4. PPC9's same sinking lid approach is applied uniformly across all agricultural activities. It does not account for specific agricultural activities that are already efficient water users, such as viticulture.

5. My evidence explains that viticulture is a low water user/nutrient leaching activity comparative to other land uses that have naturally high water use and leaching or have lagged in implementing good practice. The sinking lid approach has the flow-on effect of limiting viticulture to its current water use, which prevents expansion within property boundaries (through intensification) and the change of land use to meet market demand, climate change or scientific improvements in growing grapes.

6. I address the definition of Actual and Reasonable proposed within PPC9 in evidence, with a view to explaining some of the practical limitations and consequences.

7. As formulated at the time of writing my evidence, the Actual and Reasonable definition would not allocate enough water to winegrowers to irrigate their crops, particularly in times of drought. This has significant effects on vine productivity and could ultimately damage vines. Vineyards would also have insufficient water to replant vines (which require more water) when considering a proposed "average" water use over ten years.

8. I am aware that Council Officers ("**Officers**") have recommended through an addendum to the section 42A Hearing Report ("**Addendum Report**") that the definition of Actual and Reasonable be reinstated to a maximum water use, rather than average, over the ten years preceding 2 May 2020. The definition also reflects a date change (to 2020, from 2017) following the submission process. I support these changes for the reasons set out in my evidence.

9. In my opinion, however, viticulture operations will likely continue to be adversely impacted due to the "least of either" component of the Actual and Reasonable definition (where irrigation allocations will be the lower of an average seasonal use or an IRRICALC modelled amount). As explained in my evidence, this approach effectively allocates water to viticulture at 'the lowest of the lows'.

10. In my opinion, the average seasonal use and the IRRICALC modelled amount are both likely to be below what vineyards require in times of drought. These factors mean that viticulture will be required to comply with an Actual and Reasonable water allocation that is either lower than its actual peak use by being held to an average or indeed a maximum (for example, in times of drought), or based on a modelled irrigated use that may not reflect the local environment.

11. This is despite vineyards using approximately 1/3rd of the irrigation per area of land compared to other irrigated crops and have the lowest diffuse discharge profile of any intensive land-use activity.[2]

12. The need for viticulture operations to have flexibility in circumstances where "Actual and Reasonable" water allocation does not deliver enough water all year round for vineyard operations is recognised through the evidence of Dr Dark. Specifically, the "least of either" rule is particularly restrictive in circumstances where both options allocate water below vineyards' actual needs.

[2] Clothier et al 2017.

13. I continue to support the evidence of Dr Dark and the planning recommendations of Mr St Clair with a view to addressing these limitations in PPC9.

14. My evidence records that the definition of "Actual and Reasonable" proposed within the section 42A Hearing Report permits the use of an alternative water demand model but does not clarify when and how the water demand model will be considered an adequate substitute. Where users are being expected to comply with lower water allocations (and potentially an allocation lower than their actual need), it would be my preference that vineyards have an option of using a water demand model that can accurately model water use. I support the planning recommendation of Mr St Clair in response.

Achieving Reductions

15. Already being efficient users of water, it is now difficult for viticulture to reduce water use further to comply with PPC9 limits when, in effect, the industry has already been doing so for an extended period of time. To add to this, year-to-year fluctuating environmental conditions where water use one year may be significantly higher than another increases the difficulty to meet the reductions. There is a need for the flexibility proposed by Dr Dark and Mr St Clair by removing the "lesser than" approach.

Future of Viticulture as Land Use

16. I acknowledge that a purpose of PPC9 is to reduce water use and allocation limits and, as a general rule, intensification conflicts with that purpose. In my view, however, viticulture can be intensified consistently with PPC9 objectives and sustainable management.

17. Intensifying viticulture does not necessarily mean increasing the area of land allocated for grape growing. Viticulture can be intensified by increasing the density of vine rows, which has several positive effects, including increased yield per area of land, meaning the land is used more efficiently, and the ability to take up technology advances around narrower planting with related environmental gains (reduced chemical application, soil compaction, etc.).

18. I also have concerns about land-use change from viticulture (low nitrogen loss) to other uses (higher nitrogen loss) being restricted and disincentivised through the water limits imposed on viticulture, thereby potentially reducing environmental gains arising from land-use change to viticulture.

Zone 1

19. My evidence addresses the timing issue around the introduction of replenishment schemes (now deferred) and operators in Zone 1 needing to be a party to a scheme in order to avoid a cease take. The Addendum Report has not addressed this issue, as also noted in the summary of Mr St Clair.

WATER QUANTITY AND MEASUREMENT EVIDENCE OF MARK ST. CLAIR FOR THE WINEGROWERS

1. My evidence addresses provisions of PPC9 relevant to viticulture in Hawke's Bay.

Relevant Planning Instruments

2. In relation to the relevant planning instruments, I generally concur with the assessment of Council officers ("**Officers**") as to the National Policy Statement Freshwater 2020 ("**NPSFM 2020**") and the Regional Policy Statement ("**RPS**"), with the exception of some details, primarily in relation to water allocation.

3. I do not wholly agree with the Officers' approach to water allocation, and some other matters, noting the objectives and policies of the RPS Chapter 3.1A applicable to winegrowing industry including, OBJ LW1 6. and 9. and POL LW1 i) and j) and the requirement for a section 32 evaluation. In my view, Policy 11 of the NPSFM 2020 does not necessitate a uniform cap on water allocation across all users at the status quo. Policy 11 phases out over allocation by having regard to how water is allocated and used efficiently. In my view, Officers should have assessed efficiency amongst water users. Introduction of blanket cap based on historical levels, regardless of the type and nature of activity and its ability to operate sustainably over the longer term, does not give effect to this.

4. PPC9's approach to water allocation must be evaluated through section 32 of the RMA to assess the appropriateness of objectives and provisions. In this case, the section 32 analysis has not assessed the different historical use of various water users, such as viticulture. Viticulture is a very efficient water user but under PPC9 water use will be further limited as a result of the uniform reductions across all users by PPC9 – which seeks to improve the efficiency of water users' operations uniformly without regard to historical use. There is little room, if any, to change or adjust viticulture operations on existing sites, with potentially negative impacts on long term efficiency and viability, as described in the evidence of Ms Taylor and Mr Yukich for the Winegrowers.

Water Allocation Framework

5. In my evidence, I raised concerns with the water allocation policy framework regarding "Actual and Reasonable" use and the Heretaunga Aquifer and surface water allocation regime. Part of my assessment included a critique of the Officers' section 32 report regarding changes to the definition of "Actual and Reasonable" (in relation to "maximum" and "average") and the "least of either" approach. I concluded that the original analysis by Officers was too broad, with insufficient regard given to the cost and benefits to viticulture.

6. I note that the Addendum Report to the section 42A Hearing Report, dated 19 May 2021 ("**Addendum Report**") has reinstated the reference to the 'maximum' annual take within the definition of "Actual and Reasonable". This is appropriate in my view, for the reasons explained in my evidence.

7. My evidence supports the date change (from ten years preceding 1 August 2017 to ten years preceding 2 May 2020) within the definition of "Actual and Reasonable" for reasons traversed in submissions for Winegrowers.

8. I note the Addendum Report does not address the "least of either" structure of the definition of "Actual and Reasonable", which refers to either of the annual average of the previous 10 years of actual use or the quantity for the crop calculated using the IRRICALC water demand model. My evidence recommended changes to address this approach, which according to Dr Dark and Ms Taylor will result in reduced volumes of water relative to the volume needed by vineyards in the TANK catchments. The "least of either" structure would result in viticulture's existing and future operations being constrained, with environmental (viticulture is a sustainable land use), economic and social impacts.

Other Matters

9. I have agreed with the changes proposed by Officers with respect to Schedule 28, which has been amended to make it clear that production land in Source Protection Zones requires a Freshwater Farm Plan as a high priority – namely to be prepared within three (3) years of the proposed plan becoming operative. This ensures that drinking water implications for land use are addressed within the farm plan regime, as opposed to the rule framework. I also agree that an assessment of adverse effects on Registered Drinking Water Supplies arising from discharge activities (as opposed to land use) is appropriate.

10. My evidence generally supports the changes proposed to Schedule 30 in the section 42A Hearing Report with regard to Freshwater Farm Plans, Industry Programmes and Catchment Collectives, with Schedule 30 now better reflecting what is required for these regulatory tools within the region. Although the changes, in my view, do not go as far as to ensure cost effectiveness in use of industry programmes as identified in Dr Massey's evidence. Greater detail about how national industry programmes could be utilised for the purposes of PPC9 will better ensure efficiencies amongst industry sectors, and particularly viticulture, given the investment in and success of SWINZ (Sustainable Winegrowing New Zealand) – an existing national programme utilised by many of the Winegrowers.

11. I support the changes proposed to Schedule 29, which includes grapes at the same level as other horticultural crops. However, critically, the limiting factor for winegrowers contemplating land use change would be access to water. A change from grapes to pip-fruit (apples) would, I understand, require more water than grapes. Therefore, it is the limit set by the actual and reasonable use of water that would constrain any such change.

Proposed Amendments

12. I proposed a number of amendments to the provisions proposed by Officers in the section 42A report. The amended provisions are set out throughout my evidence, including:

    (a) Rewording of OBJ TANK 9 to ensure it is an outcome statement (at paragraph 47).

(b) Specific reference to viticulture in OBJ TANK 16 to address different uses of the terms "versatile soils" and "versatile land" within the Plan as a whole (at paragraph 62).

(c) Exclusion of the cease take provisions to Zone 1 groundwater abstractors (now classified as surface water abstractors) until a stream flow maintenance and habitat enhancement scheme is in place (at paragraph 73).

(d) Amendment of the "Actual and Reasonable" definition (at paragraph 102).

(e) The inclusion of controlled release of stored water in OBJ TANK 18 (at paragraph 108).

(f) The exclusion of takes for frost protection from total allocation limits (at paragraph 113).

13. Only the changes at a), b), c) and f) have been carried through into recommendations in the Addendum Report. I remain of the opinion that all the changes proposed in my evidence will ensure that PPC9 better meets the purpose of the plan change, the purpose of the Act, and the relevant Hawke's Bay Regional Resource Management Plan ("**RRMP**") objectives, than the operative RRMP or Addendum Report version of PPC9.

BEFORE THE HEARINGS PANEL

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	Proposed Plan Change 9 – Tūtaekurī, Ahuriri, Ngaruroro and Karamū Catchments (TANK)
BETWEEN	**HAWKE'S BAY WINEGROWERS ASSOCIATION LIMITED; GIMBLETT GRAVELS WINEGROWERS ASSOCIATION; VILLA MARIA ESTATE LIMITED; PERNOD RICARD WINEMAKERS NEW ZEALAND LIMITED** (**collectively** "**THE WINEGROWERS**")
AND	**HAWKE'S BAY REGIONAL COUNCIL**

STATEMENT OF EVIDENCE OF ANDREW LAUGHTON DARK

ON BEHALF OF THE WINEGROWERS

WATER QUANTITY MEASUREMENT AND MODELLING

11 MAY 2021

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A. INTRODUCTION

1. My full name is Andrew Laughton Dark.

2. I am currently employed as a senior water resource engineer at Aqualinc Research Limited ("**Aqualinc**") in Christchurch. I have been employed by Aqualinc since 2005. I am the Business Manager of Aqualinc's Research and Development Group.

3. My qualifications are a PhD (awarded 2017), Masters of Engineering (awarded 2005), and a Bachelor of Engineering with first class honours (awarded 2004). These degrees are all in Civil Engineering and are from the University of Canterbury. I am a Chartered Professional Engineer, and a Chartered Member of Engineering New Zealand (formerly IPENZ). I am a member of the New Zealand Hydrological Society. The topics of both my PhD and Masters theses were related to numerical and experimental modelling of water flows, in a water resources context. The focus of my PhD research was numerical modelling of groundwater – surface water interactions.

4. I have significant experience in analysing and modelling water supply and demand for irrigation. This experience includes regional and catchment-scale studies in Canterbury, Marlborough, Otago and Wairarapa, and national-scale studies. I was a lead author of Stages 2 and 4 of the Canterbury Strategic Water Study, a precursor to the Canterbury Water Management Strategy. I have modelled irrigation supply and demand to investigate irrigation development feasibility, the effects of changing allocation rules on water supply reliability, and the projected impacts of climate change on water resources.

5. A large proportion of my work at Aqualinc has included assessments of irrigation water demands. These assessments have typically been done with IrriCalc, Aqualinc's in-house soil moisture balance and irrigation simulation software. As a result, I am familiar with the theoretical basis, assumptions and inputs for the IrriCalc model.

6. My evidence supports the submission by Hawke's Bay Winegrowers' ("**HBWG**"), Gimblett Gravels Winegrowers Association ("**GGWA**"), Villa Maria Estate Limited ("**Villa Maria**") and Pernod Ricard Winemakers New Zealand Limited ("**PRW**") to give evidence concerning their submissions on Proposed Plan Change 9 ("**PPC9**") - Tūtaekurī, Ahuriri, Ngaruroro and Karamū Catchments (TANK). HBWA, GGWA, Villa Maria, and PRW are collectively referred to as the "**Winegrowers**" in this evidence.

B. CODE OF CONDUCT

7. I confirm that I have read and agree to comply with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014. I confirm that I have considered all the material facts that I am aware of that might alter or detract from the opinions that I express and that, except where I state I am relying on information provided by another party, the content of this evidence is within my area of expertise.

C. SCOPE OF EVIDENCE

8. This evidence addresses the following matters:

   (a) Viticulture water use and requirements;

   (b) Proposed allocations methods in PPC9;

   (c) The implications of the PPC9 provisions concerning water allocation and use;

   (d) Alternative approaches to water allocation and use in the PPC9.

9. In preparing my evidence I have read the draft evidence prepared by Ms Taylor and Mr St.Clair. The information I rely on with respect to **water usage** was provided to me by the Winegrowers**.** Model outputs that I refer to have been prepared by my colleague Dr Birendra KC, a water resource engineer at Aqualinc, under my supervision.

D. EXECUTIVE SUMMARY

10. PPC9 proposes to allocate water for irrigation so that it is allocated and used efficiently by ensuring that the allocation of water for irrigation end-uses is based on soil, climate and plant needs.[1] It proposes to use the IrriCalc water demand model (or a suitable equivalent approved by Council) that utilises crop type, soil type and climatic conditions to determine efficient water allocations for irrigation uses.[2] PPC9 also looks to phase out overallocation by preventing new water allocations and allocating water according to 'Actual and Reasonable' use when consenting water takes in the region.[3]

[1] POL TANK 47(a).
[2] POL TANK 47(b).
[3] POL TANK 52(b); RULE TANK 9 and 10.

11. In my view, this approach to allocating water is suitable, providing that the methodology for determining 'Actual and Reasonable' use is robust and fair. As outlined in my evidence, I have concerns about the robustness of the proposed definition of 'Actual and Reasonable', particularly around the use of averages and the "lesser of" condition, and the likely implications for setting reasonable use volumes.

12. The IrriCalc model is a piece of in-house software developed by Aqualinc. It calculates the soil moisture balance on a daily basis, using input timeseries of rainfall and potential evapotranspiration (PET). The crop type is specified in the model via a 'crop coefficient' (or 'crop factor'), which incorporates the effects of plant transpiration and evaporation from the soil, and describes the evapotranspiration of the crop relative to that of a reference crop.

13. It is important to distinguish the model from the online IrriCalc tool, which (unlike the Aquatic model) is available to the public via www.mycatchment.info. The online tool does not actually run the model, but is a means of accessing the results of many IrriCalc model runs that have been done for combinations of climate inputs (accounting for spatial variability), soils, land-use, and irrigator type (where applicable).

14. Overall, I consider that using the current online IrriCalc tool to calculate 'Actual and Reasonable' use volumes is useful as a default or start-point for resource consent applications, and may be able to be relied on fully for a vineyard that is set up and managed in a relatively "standard" way (i.e. where the assumed model parameters match the actual vineyard set-up). However, it is important to understand the limitations of this approach. For example, as I discuss in my evidence:

    (a) A number of factors, including vine variety and how the vineyard is planted and the vine canopy is managed, may mean that the crop coefficients used in the model (which underpins the tool) do not exactly represent the water use of vines in a particular vineyard. In my view, further research is required to quantify the effects of these factors on the crop coefficients for grape vines, and the implications for water use requirements.

    (b) In addition, the accuracy of the results given by the IrriCalc online tool could be improved by improving the input datasets. The climate inputs could be improved considerably by using interpolated climate data with a finer spatial

resolution, for example, a 500 m grid rather than the existing 5 km grid spacing, and the soils data could be updated.

(c) For examples that I have considered, the actual use, based on water meter data, is reasonably consistent with the volumes calculated from the IrriCalc online tool, but this will not always be the case. Consent-holders should be able to present water use data, supported by soil moisture data or other contextual information, in support of an annual volume that is higher than the IrriCalc volume.

15. The proposed "least of either" approach to determining 'Actual and Reasonable' use in combination with the proposed reliance on average water use data over the 2010 – 2020 period is likely to have a major impact on the annual volume limits that will be placed on consents when they are reviewed or renewed. As I discuss in my evidence, an average over a 10 year period is not necessarily a valid comparison with a 95% reliability number from long-term modelling.

16. Therefore, in my view:

(a) There is a need to continue to refine the online IrriCalc tool to improve its accuracy and increase the level of confidence that growers have in its results.

(b) The PPC9 provisions should enable additional site-specific information to be considered and should not preclude alternatives where growers are able to show that the volumes from IrriCalc are insufficient for their circumstances (for example, based on site specific soil and rainfall data). The proposed "least of either" approach precludes use of water meter data to show that the IrriCalc volume is insufficient for a particular vineyard.

17. Average measured water use data over the 10 year period preceding May 2020 should not be relied on to determine 'Actual and Reasonable' use, as this results in volumes that are insufficient for irrigation in dry years.

E. HAWKE'S BAY WINEGROWERS CURRENT WATER ALLOCATION AND USE

18. The Winegrowers operate a number of irrigated vineyards across the TANK catchments. Ms Taylor's evidence for the Winegrowers provides background information on the irrigation methods, consented rates and volumes, and typical water demands.

F. WATER ALLOCATION IN THE PPC9

19. In terms of initial water allocation, the PPC9 provisions contemplates that water will be allocated according to 'Actual and Reasonable' use, which will be the lesser of:[4]

    (a) The average[5] annual amount as measured by accurate water meter data in the ten years preceding 2 May 2020, if accurate water meter data is available; and

    (b) The quantity required to meet the modelled crop water demand for the irrigated area as specified by the IRRICALC water demand model (if it is available for the crop and otherwise with an equivalent method).[6]

20. The definition of 'Actual and Reasonable'[7] refers to 95% supply reliability. I note that there is no further definition of "supply reliability" given. In my experience, there are a number of ways of defining supply reliability, usually considering both the supply (i.e. water availability) and demand. In the context of 'Actual and Reasonable' use, reliability only considers the demand side. In the analysis that I have presented below, I have assumed that the "95% supply reliability" referred to in the definition corresponds to the 95th percentile annual demand from the IrriCalc online tool. In other words, that sufficient water is allocated to meet crop water demands in 19 out of 20 years on average. I consider this a more appropriate metric to use when considering reasonable water use.

21. Broadly, there are two issues with the proposed 'Actual and Reasonable' use approach:

    (a) Is the average measured water use from the 10 years preceding 2 May 2020 comparable to the 95th percentile value from IrriCalc?

    (b) Is the use of measured water-use data a reasonable approach for setting 'Actual and Reasonable' water use limits on resource consents?

22. In their submissions, the Winegrowers opposed the approach of taking the maximum measured water use from the 10 year period preceding August 2017 on the basis that it would unfairly penalise consent-holders that did not have water meter data

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[4] As above.
[5] Note the consequential change from 'maximum' to 'average'.
[6] The specific requirements concerning the efficiency of application and reliability of supply of the irrigated area are contained in the definition of 'Actual and Reasonable'.
[7] In Chapter 9, Glossary of Terms Used.

extending back to the 2012 drought. The submissions preferred a 10 year period that included the 2019-2020 drought, for which vineyards had accurate water data available. While extending the timeframe over which water data is collected (through to May 2020), the Section 42A Hearing Report also recommends modifying the approach to the **average** (from the maximum) over the 2010 – 2020 period.

23. Mathematically, taking an average of values that vary over time will always result in a lower number than the maximum over that period. The difference between the maximum over one period and the average over a different (but overlapping) period is less clear-cut, however.

24. To understand how the average of the 2010 – 2020 period compares to the maximum of the 2007 – 2017 period (as originally proposed), and how it fits in the context of longer-term supply reliability, I have analysed the annual water demands calculated from running the IrriCalc model (i.e. Aqualinc's in-house software, which gives more detailed results than the online tool) from 1960 through to present day. I have assumed that the model results are representative of actual water use on a fully developed vineyard with well-managed irrigation, i.e. the time-series of model outputs is a proxy for measured water use in my analysis.

25. To generate these results, the IrriCalc model was set up to model demand for grapes, with soil and irrigation system parameters representative of the vineyards in the TANK catchments. I did not attempt to exactly replicate the results of the IrriCalc online tool, as the focus was on the variability over time; however, the results were a reasonably close match in terms of the summary statistics such as the 95th percentile and median. Differences between the results that I have used, and the results given by the online tool are not unexpected: although they are from the same model the parameters and inputs are not necessarily exactly the same. Because both my analysis and the results used in the IrriCalc online tool are based on a long time-series of data, I am confident that where I draw conclusions about the 95th percentile, this can be related to the 95th percentile (or 95% supply reliability) result from the IrriCalc online tool.

26. For 1960 – 2018[8] the climate inputs for the IrriCalc model were from previous work by Aqualinc, in which long-term climate time-series at locations with shorter climate

[8] Note that where I refer to a year or an irrigation season, it is based on the hydrological year - i.e. the 2018 hydrological year is the period from 1 July 2018 - 30 June 2019.

records have been generated based on developing statistical relationships with longer climate records from nearby climate stations. To bring the analysis up to present day, measured climate data were downloaded from NIWA's Cliflo database (rainfall from Hastings and PET from Whakatu). IrriCalc was run with this dataset from July 2010 through to May 2021 (i.e. capturing through to the end of the 2020 – 2021 irrigation season). In the overlapping period, there were differences in the results from the two climate datasets; however, these were minor and the variability in response to climate was similar. I was therefore able to normalise the two sets of model results by the mean over their overlapping period, and combine them into a record of modelled irrigation demand from 1960 – 2020.

27. My conclusions from this analysis are as follows:

(a) In the period from 2007 to 2020, the 2012-2013 irrigation season had the highest modelled annual water demand. Demand in this season was equivalent to the long-term 95th percentile; it was the fourth-highest annual demand in the 1960 – 2020 modelled record. Taking the maximum water use over a period that encompasses this year would therefore be equivalent to allocating based on the 95th percentile results from the online IrriCalc tool www.mycatchment.info.

(b) The modelled demand in the 2019 – 2020 irrigation season was lower than the 2012-2013 season, and was equivalent to the 92nd percentile. Paragraph 2064 of the Section 42A Hearing Report notes that the 2019-2020 drought was longer and had lower rainfall than the 2012-2013 event. If the "tail end" of the drought was after grape harvest, a more severe drought will not necessarily result in a higher irrigation demand. Conversely, a milder drought during key stages of grape growth could result in higher irrigation demand.

(c) The average water use over the 10 year period ending in May 2020 is approximately 4% higher than the long-term average. This shows that the inclusion of two drought years is not sufficient to bring the average up to a level that is anywhere near 95% supply reliability.

(d) The average water use over the 10 year period is 68% of the 95th percentile value. It is equivalent to the 58th percentile of the long-term record. If water

was allocated on this basis, water users would have insufficient water to meet their full vineyard demand in approximately 4 years out of 10.

(e) I have also analysed the effect of the averaging approach on shorter periods of data. This is relevant because not all water-users had water meters installed in 2010. The Section 42A Hearing Report (para 1371) notes that all takes above 5 l/s should be able to provide at least three years of data. A water-use record beginning in 2013 (after the end of the 2012-2013 drought) would result in average annual water use equivalent to the 52nd percentile, while the minimum assumed period of three years results in the 60th percentile.

(f) In the absence of another water source or means of meeting the shortfall between supply and demand, a volumetric allocation that provides insufficient water in dry years will result in lower grape production than would be achieved with full irrigation. Ms Taylor's evidence addresses the effects of water stress on fruit quality and disease resistance.

(g) In my opinion, an approach that takes the maximum of the measured water use over the 2010 – 2020 period is much more likely to be representative of long-term 'Actual and Reasonable' water use at a 95% reliability level**, provided that the measurements are representative of the vineyard's long-term water use**. I will address the issue of representativeness below.

(h) The "least of either" provision in the 'Actual and Reasonable' use definition safeguards against annual volume based on measured water use that reflects inefficient irrigation. However, there is a risk that without being able to fully account for the context of the measured water use, the data may not be representative of a vineyard's long-term water use, even when inter-annual variability due to climate is accounted for. Potential reasons for this include:

i. Establishment / re-development, where parts of the vineyard may be fallow or contain young vines with different water requirements to fully established vines.

ii. Low-flow restrictions that prevent water being taken, even though there is a demand for it. While low river flows are often correlated with high water demand, this is not always the case. Where measured water use

has been reduced due to low flow restrictions, in my opinion this is not a true reflection of 'Actual and Reasonable' use, and should not be compared with IrriCalc numbers, which are based on water being available whenever required.

iii. Irrigation systems that contain storage, where stored water may have been taken in a different hydrological year to when it is used.

iv. Under-irrigation or over-irrigation, which may occur due to lack of soil moisture monitoring.

v. The definition of 'Actual and Reasonable' use refers to "insufficient or no accurate data" The terms "insufficient" and "accurate" are not defined further, but in my opinion these are likely to refer to the water use records being gap-free, and the flow meter being installed and maintained in compliance with HBRC's *Technical Specifications and Installation Requirements for Flow Meters* document. Without further context about how the water is being used, however, this does not address whether the data actually reflects reasonable use.

28. One other concern relating to the use of historic data to determine the 'Actual and Reasonable' water demand is that it does not account for climate change. Potential evapotranspiration deficits (i.e. the difference between rainfall and evapotranspiration that needs to be replaced by irrigation to maintain crop growth) are projected to increase in Hawke's Bay Region over the next century. This will potentially result in allocations set based on historic data being insufficient to meet demand in the future. I have discussed a potential solution to this in paragraph 58 of my evidence.

G. IRRICALC - MODEL VS TOOL

29. In order to understand the implications of "IrriCalc" as an option relied on within PPC9, I provide some background information on the IrriCalc model (and online tool) below.

30. The IrriCalc model is a piece of in-house software developed by Aqualinc. It is based on a model originally developed by Dr John Bright as part of his PhD research, and has been further developed since then by Aqualinc for use in consulting and research projects. The IrriCalc model itself is not available to the public.

31. The IrriCalc model simulates irrigation water use. It calculates the soil moisture balance on a daily basis, using input time-series of rainfall and potential evaporation (PET). The climate inputs can be daily values recorded from climate stations, or modelled values such as spatial interpolations to cover areas without climate stations, or outputs from climate change model scenarios. The soil's Plant Available Water ('PAW', i.e. the amount of water that can be stored by the soil and accessed by plants, also referred to as the water holding capacity) is specified as one of the model inputs, based on database values or site-specific information.

32. The crop type is specified in the model via a 'crop coefficient' (which may also be referred to as a 'crop factor'), which incorporates the effects of plant transpiration and evaporation from the soil, and describes the evapotranspiration of the crop relative to that of a reference crop (usually well-watered pasture with constant canopy characteristics). The crop coefficients differ for each agricultural or horticultural crop - e.g. the crop factors for pasture are different to those for grape vines. The crop coefficient can represent changes to the plants' structure of the plant over the growing season and is therefore specified as a time-series.

33. Values for the crop coefficient can be obtained from literature[9] or from research. Literature values are for "standard" crops under typical growing conditions, while values obtained from research reflect the conditions at the trial site used.

34. Based on discussions with John Bright (Aqualinc), Steve Green (Plant and Food Research), my understanding is that the crop coefficient[10] for grapes used in the online IrriCalc tool (which is discussed below) was originally derived from field research carried out on Sauvignon Blanc vines in Marlborough by Plant and Food Research. It has then been modified based on more recent research carried out by Plant and Food Research in Hawke's Bay. The monthly values of crop coefficient that were derived from the research results have allowed for some flexibility in terms of canopy management by holding the crop coefficient higher for longer than indicated by Plant and Food's research results, from mid-January onwards.

35. A number of factors, including vine variety, and how the vineyard is planted and the vine canopy is managed, may mean that the crop coefficients used in the model do not

[9] For example, Allen, RG et al (1998). Crop evapotranspiration – Guidelines for computing crop water requirements. Irrigation and Drainage Paper 56, Food and Agriculture Organisation of the United Nations, Rome.
[10] Strictly speaking this is a set of crop coefficients, as it is a time series that varies over the season.

exactly represent the water use of vines in a particular vineyard. In my view, further research is required to quantify the effects of these factors on the crop coefficients for grape vines, and the implications for water use requirements.

36. Irrigation can be modelled in IrriCalc either by specifying irrigation management rules (for example, the soil moisture level that is used as a trigger point to start irrigating), or by providing an input time-series of irrigation application depths (i.e. the amount of water that is applied, averaged over the irrigated area, in each irrigation event). Specified irrigation management rules, which determine when and how much irrigation occurs, are used to determine reasonable use volumes, or to test the effects on water use and drainage of varying the irrigation parameters. Running the model with a pre-determined irrigation time-series is a way of analysing the water-use efficiency and drainage through the soil profile under a known irrigation regime.

37. Where irrigation management rules are specified in the model, a number of options are available to determine when to irrigate, and how much water to apply. The 'decision' to irrigate (i.e. when irrigation occurs in the model, based on implementation of the irrigation rules) can be based on a return period (i.e. water is applied every X days) and / or a soil moisture trigger level. When a trigger level is used in combination with a return period, the model checks whether the number of days since the last irrigation event is greater than or equal to the return period.

38. The modelled irrigation depth can either be a fixed depth (reflecting the characteristics of the irrigation system), or a variable depth to return the soil moisture to a specified level.

39. The system capacity of the irrigation system (i.e. how much water can be applied in a given timeframe, typically specified as millimetres per day or litres per second per hectare) is specified in the model through the combination of the application depth and minimum return period.

40. The raw outputs of an IrriCalc model simulation are:

    (a) daily time-series of irrigation water applied (i.e. the irrigation demand);

(b) "actual evapotranspiration";[11]

(c) soil moisture;

(d) drainage below the root zone;

(e) cumulative irrigation water use; and

(f) a check-sum value (typically zero) that indicates whether mass has been conserved by the model.

41. The daily values of the model outputs (irrigation, drainage, etc) can then be aggregated to give monthly, seasonal or annual totals of these outputs.

H. IRRICALC ONLINE TOOL

42. It is necessary to distinguish the IrriCalc model (software) from the online IrriCalc tool that is available at http://mycatchment.info/.

43. The online tool available on the 'mycatchment.info' website is a means of accessing the results of many IrriCalc model runs that have been done for combinations of climate inputs (accounting for spatial variability), soils, land-use, and irrigator type (where applicable). Although the online tool contains results for a range of land-uses, most of my comments relate to vineyard irrigation.

44. The 'mycatchment.info' website was developed by Aqualinc Research under a project instigated by Irrigation NZ, and supported by Ministry of Primary Industries Sustainable Farming Fund and several local authorities. As far I am aware, the most recent updates to the databases used by the website were done in 2020, by Aqualinc. This update was to refine some of the crop and irrigation parameters, including giving the option for two different vineyard row spacings (2.1 m and 2.4 m), and did not include an update of the climate inputs.

45. Using the online tool does not actually run the IrriCalc model; it accesses a database containing the results of modelling that has been done previously. The user selects a location from a map interface, and a crop type, and an irrigation method. The website determines the closest climate station. The user can choose to use the mapped soil

[11] As modelled, using the crop factor and other variables.

water holding capacity (PAW) at the selected location or specify a Plant Available Water value based on property-specific information. The mapped soil Plant Available Water values are from the Fundamental Soils Layer, which was produced by Landcare Research. For irrigation of pasture the user can select a centre pivot, or a notional "80% efficient irrigator". For grapes there are no alternative options available with respect to the irrigation system (it is assumed to be 'micro/drip').

46. The outputs of running the online tool are daily volumes, monthly volumes, and annual (July – June) volumes for reasonable irrigation water use based on different percentiles of the long-term time-series, all expressed in cubic metres per hectare. The nine out of ten-year annual volume is the 90th percentile of the series of annual water use from the 42-year period (1972 – 2014) that was modelled in IrriCalc. The 90th percentile monthly volumes are the 90th percentile of the series of modelled water use for that month, from all the years that have been modelled. The 90th percentile monthly values do not necessarily sum to the 90th percentile annual value. Note that PPC9 refers to 95% supply reliability, which I have interpreted as being the 95th percentile value from IrriCalc: the value that is sufficient 19 out of 20 years on average.

47. Under the irrigation rules that have been applied in model runs underpinning the online tool, the daily volume of water applied is determined by the model inputs, rather than being a result of the simulation. This represents the system capacity of the irrigation system – i.e. how much water can be delivered to the irrigated area in a day. In most cases for grapes this is 24 m^3/ha/day, which can also be expressed as 2.4 mm/day or 0.28 l/s/ha. Other land uses have higher daily volume requirements. For example, pasture on a light soil is allocated up to 58 m^3/ha.

48. In the online tool, it is not possible to vary the model parameters such as the system capacity, crop factor (beyond choosing between say "grapes" and "pasture"), or soil moisture trigger level.

49. The parameters in the online tool have been set up in a way that attempts to broadly represent vineyard irrigation practices in Hawkes Bays. A number of factors, including irrigation system designs, vineyard layout (i.e. planting density and row spacing), decisions on when and how much to irrigate, and vine canopy management (e.g. when and the degree to which vines are pruned), vary in practice. All these factors affect water use (although the degree to which each is important is not well understood at

present), and cannot be varied in the online tool, apart from the choice between 2.1 m and 2.4 m row spacing.

50. Accordingly, the online tool will not necessarily provide the most accurate water allocation for any particular vineyard. In my opinion, site specific information might suggest that a higher or lower allocation is appropriate. The "least of either" approach taken in PPC9 will not allow this to happen adequately.

I. ACCURACY OF THE ONLINE IRRICALC TOOL IN ASCERTAINING 'REASONABLE USE'

51. The Section 42A Hearing Report (para. 2065) notes that "IrriCalc has been found to have a tendency to over-estimate water needs for irrigation." I disagree with this statement. There are some circumstances in which IrriCalc will over-estimate water use, in particular where there are fine-textured soils and a high water-table (<1 m below the bottom of the root zone). In this case other methods are more appropriate. However I am confident that for free-draining soils and a deeper water table, the IrriCalc outputs are a robust assessment of reasonable use.

52. The rainfall and potential evapotranspiration datasets that were used in the modelling that underpins the online tool are from NIWA's Virtual Climate Station Network ("**VCSN**"). This is a product produced by NIWA that provides daily estimates of climate variables at an approximately 5 km grid spacing, based on spatial interpolation of measured data from actual climate stations. The scale on which the spatial interpolation is done potentially affects the accuracy of the data. At present, the IrriCalc results are based on a climate dataset that does not go beyond 2014. While the dataset goes back far enough in time to capture climate variability (wet and dry years), it is a static dataset and is therefore unable to pick up any emerging climate change effects.

53. The accuracy of the results given by the IrriCalc online tool could be improved by improving the input datasets. The climate inputs could be improved considerably by using interpolated climate data with a finer spatial resolution. More recent climate data could be incorporated into the modelling, to account for the emergence of climate change effects. The soils data could be improved by basing the soil Plant Available Water value on the more recent S-Map data,[12] rather than the Fundamental Soils Layer.

[12] https://smap.landcareresearch.co.nz/

J. SOLUTIONS/RECOMMENDATIONS

54. Although in theory further flexibility could be provided in the online IrriCalc tool (i.e. by enabling additional information to be entered by the person using it), it is likely to be impractical to incorporate the full range of possible parameter values, and combinations of these parameters. The "parameter space" is potentially very large if a range of irrigation strategies, grape varieties and canopy management styles needs to be accounted for. For each combination of parameters, the full range of soil types would need to be modelled in each VCSN grid square. It is also not clear whether canopy management and irrigation strategies are able to be adequately categorised, or whether they vary on a broad continuum according to the preferences of each grower.

55. In my opinion, there is a need to continue to refine the online IrriCalc tool to improve its accuracy and increase the level of confidence that growers have in its results. Reasonable use volumes from the current online IrriCalc tool are useful as a default or start-point, however Council policies should not preclude alternatives where growers are able to show that the volumes from IrriCalc are insufficient for their circumstances (for example, based on site specific soil and rainfall data). This is precluded by the "lesser of' approach in PPC9.

56. It is necessary to bear in mind that no model is 100% accurate in all circumstances, and there are further practical limitations associated with making the results of the model available to the public via the IrriCalc online tool.

Other approaches

57. PPC9 allows 'Actual and Reasonable' use to be determined based on measured historic water use data. However, my opinion is that this needs to be considered in conjunction with soil moisture measurements to provide evidence that the historic use of water has been efficient.

58. In isolation, measured water use data does not show whether the historic use of water has been reasonable and efficient. Ideally, it should be accompanied by soil moisture data to show that irrigation has been applied efficiently, i.e. that a specified proportion of the irrigation water has remained in the root zone to be accessed by the crop, and has not resulted in drainage below the root zone.

59. As the collection of water use data was not made mandatory until relatively recently, most vineyards' historic use records are likely to be too short to represent a wide range of climate variability, particularly if the proposed averaging approach is used. In order to derive a 'ten-year' reasonable use volume from measured water use, the data would need to be considered alongside a longer dataset of climate or modelled water use data. For example, if recent annual measured values were consistently 10% higher than the recent annual values from an IrriCalc model run covering 40 years of climate data, and soil moisture measurements indicated that water was being used efficiently, it would be reasonable in my opinion to base a reasonable use volume on the IrriCalc value plus 10%.

60. The Section 42A Hearing Report[13] recommends a change to POL TANK 47(b) to make it clearer that the policy allows for a suitable equivalent model, approved by Council, "that utilises crop type, soil type and climatic conditions." In my opinion, these criteria should be expanded to ensure that alternative models are able to represent the characteristics and operation of the irrigation system adequately. I am aware of examples of soil moisture balance models where the irrigation regime is over-simplified. Other computer simulation models exist that calculate the soil moisture balance in a similar way to IrriCalc. Some have more sophisticated representations of the soil, incorporating multiple layers. Any other model that is used for determining reasonable water use requirements should be able to represent the irrigation management regime in a way that is comparable to IrriCalc. The model inputs need to be robust, and the model should be set up and run, and the results analysed by a suitably qualified and experienced person.

61. The use of any model to calculate water requirements does not guarantee that the modelled water use is efficient. The modelled water use over an irrigation season can be very sensitive to the model inputs and parameters that are used, and if a model is set up inappropriately the modelled irrigation water use may not represent reasonable and efficient use of water. If other models are used, an efficiency standard should be set to ensure that the irrigation regime that is modelled would result in efficient water use. One way of setting this standard would be to specify the proportion of applied irrigation water that remains in the root zone (as opposed to draining below the root

[13] Para. 1580.

zone). I note that an efficiency standard of this nature is not an input to the model; it is a check that is performed on the model results.

62. Where local climate records exist that differ from the spatially interpolated data used in the IrriCalc online tool, PPC9 should specifically allow this to be used as a model input (to IrriCalc or another model). However, the online IrriCalc tool does not allow users to change the climate data.

K. IMPLICATIONS OF THE PPC9 WATER ALLOCATION PROVISIONS FOR HBWG

63. Currently Hawke's Bay Winegrowers resource consents have daily volume limits, expressed as m^3/day (cubic metres per day). In general, the daily volume limit will relate to the flowrate (in litres per second) required to operate the irrigation system, assuming that the system operates 24 hours per day. My understanding, from information provided by Mr St. Clair and some of the Winegrowers, is that most of the consents also have monthly and annual volume limits.

64. Under PPC9 all of Hawke's Bay Winegrowers vineyards will be subject to annual volumes limits (when the resource consents are next reviewed, renewed or replaced), which will restrict the volume of water that can be used on an annual basis.

65. I have been provided with water use data from the Winegrowers for a number of vineyards. Due to time constraints, I have not been able to consider all of the available data in time to include in this evidence. I have considered a total of six examples. For each, I have been provided with context such as the total irrigated area, the water sources and consent conditions. Due to commercial sensitivity I have referred to the vineyards as "Example A" - "Example F".

66. I have separated the water use data into two sub-sets. Example A and Example B have data covering the 2012 – 2019 irrigation seasons (i.e. through to May 2020), and are for groundwater supplies with no restrictions tied to river flows. Example C – Example F have varying lengths of data, and water sources that are tied to low-flow restrictions (direct surface water takes or hydraulically-connected groundwater). Some also have storage.

67. The measured and modelled annual water use values for Example A and Example B are compared in the figures below. In Figure 1 I have plotted the annual water use in

millimetres, and in Figure 2 I have normalised the annual water use by the mean of each dataset over the 2012 – 2019 period covered by the measured data.

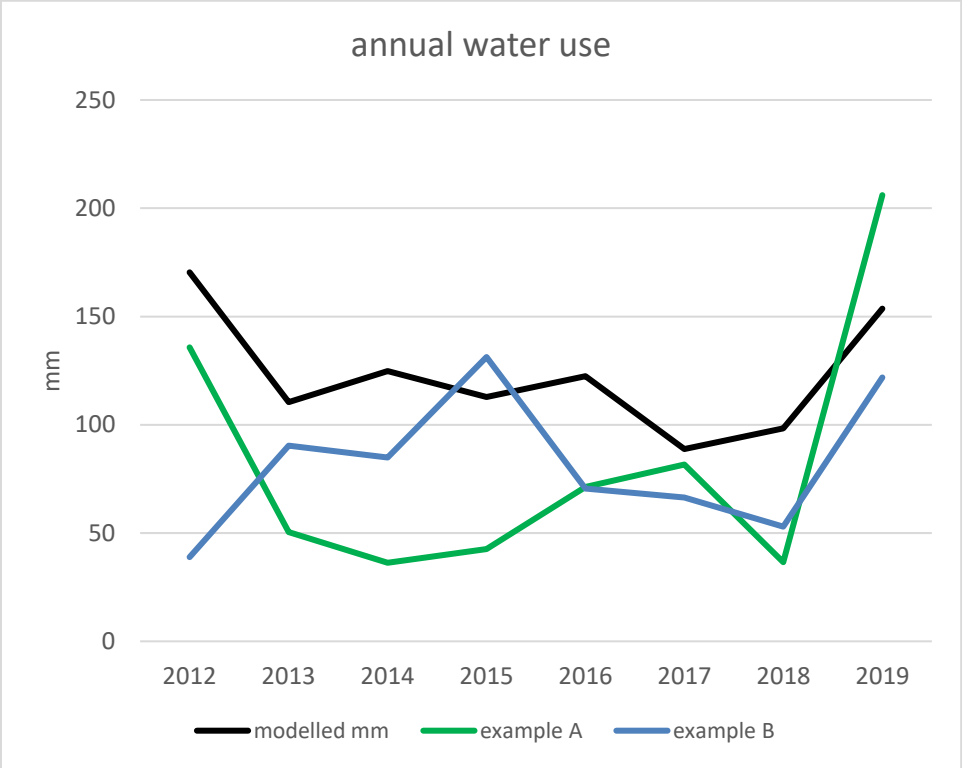

Figure 1 Measured and modelled annual water use in millimetres, groundwater supplies with no low-flow restrictions.

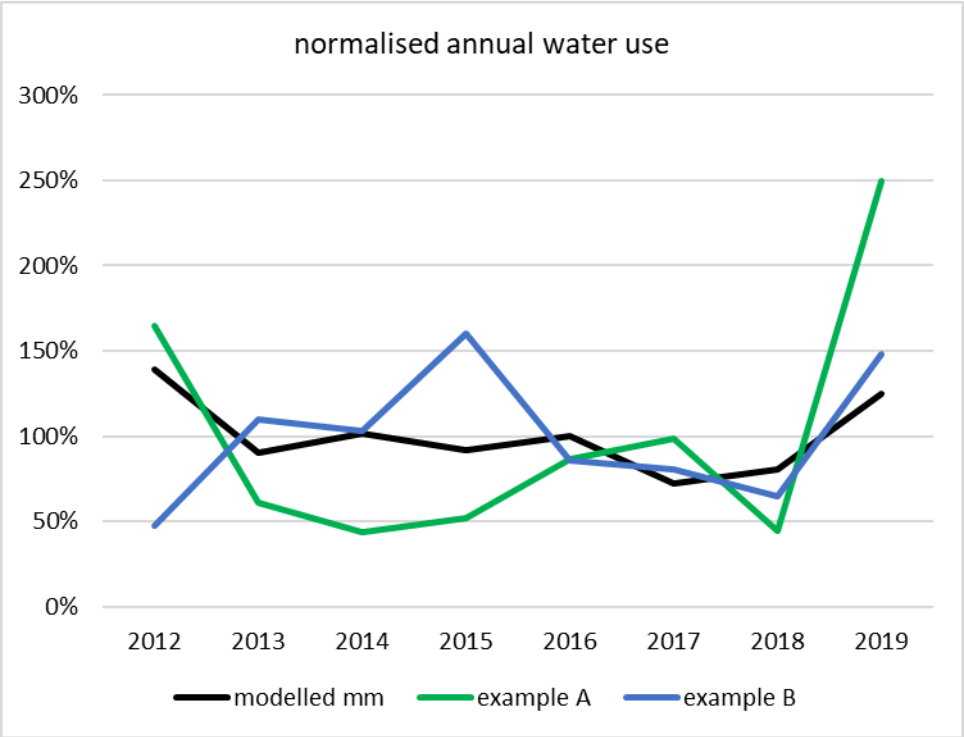

Figure 2 measured and modelled water use, normalised by the 2012 - 2019 mean of each dataset; , groundwater supplies with no low-flow restrictions.

68. Neither of the measured data examples for unrestricted groundwater supplies are consistently higher or lower than the modelled dataset. Figure 2 shows more clearly how the measured and modelled water use responds reasonably consistently to wetter and drier years. It is unclear why the measured water use for Example B is particularly low in the 2012-2013 drought year because the vineyard was fully developed at this point. The measured water use for Example A was particularly high in the 2019 – 2020 drought year; it exceeded the IrriCalc 95th percentile value for the property. Both of these anomalies highlight that without further context, for example expert interpretation of soil moisture records, or information from the vineyard staff about how irrigation was being managed, it is possible for measured water use data to give an incomplete or inaccurate picture of 'Actual and Reasonable' water use.

69. For both examples, the average based on measured water use is less than half of the 95th percentile value calculated for each vineyard from the online IrriCalc tool (46% for Example A, and 47% for example B). The values from the online IrriCalc tool are consistent with the annual time-series values that I have analysed from the IrriCalc model.

70. Based on the long-term modelling discussed earlier, an annual volume based on 95% reliability would have been sufficient to fully meet vineyard irrigation demands in the 2012 – 2019 period. If, however, the two examples that I have considered (A and B) had been constrained by an annual volume based on the average measured use over that period, Example A would have been short of water in 2 years out of 8, and Example B would have been short of water 4 years out of 8. For comparison, the modelled annual demand exceeds the average in 3 years out of 8 over the same period.

71. For the remaining examples, the water sources and other relevant details that potentially affect the water use data are as follows:

(a) Example C: Water storage filled from the Ngaruroro River.

(b) Example D: Initially supplied from the Ngaruroro River; dual supply with additional groundwater (not subject to low-flow restrictions) from 2015 onwards.

(c) Example E: Groundwater, subject to low-flow restrictions. Vineyard was under development in the first year of water use data (2015-2016).

(d) Example F: Groundwater (subject to low-flow restrictions) and water storage.

72. The measured and modelled annual water use values, in millimetres, for Example C - Example F are compared in Figure 3 below. For these examples I have not normalised by the mean, as the mean values are influenced by restrictions. Data from 2012 for Example F was discarded as it was unrealistically high (too high to be explained by inefficient water use). An anomalous data "spike" was also removed from 2017 for this example.

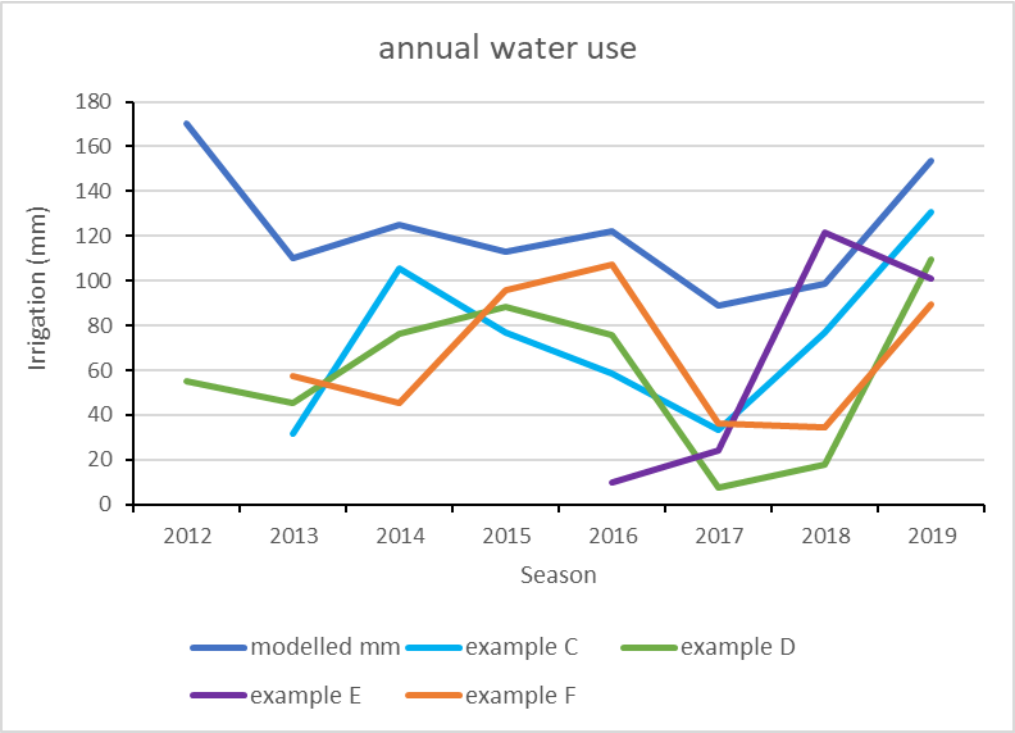

Figure 3 Measured and modelled annual water use in millimetres, supplies with low-flow restrictions

73. I have sourced data on low-flow restrictions from HBRC's website[14] for the Ngaruroro River at the Fernhill water level recorder site. The website summarises the number number of days in each ban period for consent-holders that are restricted from taking water when the river flow is less than 2,400 litres per second. Note that the consent-holders with water storage have additional consent conditions that restrict the rates / volumes of take when the flow at the Whanawhana water level recorder site is less than 12,800 l/s. I have not analysed the effects of storage refill and drawdown on the water use data.

74. For the period over which I have analysed the water use data, the irrigation seasons affected by low-flow restrictions are:

(a) 2012 – 2013: 5 days in early February; 33 days mid-February – mid March; further restrictions late March – mid April may have occurred after harvest.

[14] https://www.hbrc.govt.nz/environment/low-flows/

(b) 2013 – 2014: no water available until 6th November at the start of the irrigation season.

(c) 2014 – 2015: intermittent restrictions (14 days total) from mid-February to late March.

(d) 2016 – 2017: five days on restriction in mid-February.

(e) 2019 – 2020: 47 days in total on restriction from early February – late March.

75. Although the measured data for Examples C – F is generally lower than the modelled demand, this is at least in part due to the effects of the low-flow restrictions. The effect of the 2012 restrictions on Example D is particularly pronounced. For Examples C, D and F, the effects of the restrictions in the 2019 – 2020 irrigation season would have been mitigated by the use of stored water or a secondary supply. However, for Example E the water use in 2019 – 2020 was lower than the previous year. Note that the early data for example E was low due to vineyard development.

76. The effect of low-flow restrictions, and other issues such as vineyard development, have implications for the proposed averaging method: these artificially lower the average below what would be expected for an unrestricted supply.

77. I have calculated the averages of the measured data for Example C – Example F, and analysed the number of times over the period of measured data the average was been exceeded. For Example C and D, the average would have been exceeded four times (out of seven and eight years of data, respectively) – i.e. if an annual volume limit based on the average had been in place, these vineyards would not have had sufficient water in at least half of the irrigation seasons considered. For Example E, the average was exceeded twice in four years of data, and in Example F, the average was exceeded in three years out of seven.

78. As I have noted above, because neither measured water use data or IrriCalc can be relied on to accurately represent reasonable use in all circumstances, it would be appropriate for the policy framework in the PPC9 to recognise that while IrriCalc is a useful method of undertaking reasonable use calculations, some flexibility may be needed in instances where 'Actual and Reasonable' use allocation does not deliver

enough water all year round for vineyard operations. Where flexibility is provided, care needs to be taken to ensure that the water allocation is calculated in an accurate way.

L. Interim Allocation limit

79. In my opinion there is a high level of uncertainty around how the 90 Mm3 interim allocation limit was derived, and whether this is an appropriate value for the interim limit.

80. The Appendix 11 Technical Water Quantity memo (pg 18) refers to the "dry climate" scenario that was run with the Heretaunga Aquifer Groundwater Model. In this scenario, climate conditions and pumping that are representative of the 2012 – 2013 irrigation season were repeated every year for the next hundred years. This is a conservative scenario, as it assumes that water use is high every year, rather than varying from year to year.

81. The groundwater pumping volume for the dry climate scenario was estimated at 90 Mm3, based on demand modelling that was completed as part of the groundwater model development. The demand modelling used information available at the time about irrigated areas and land-use to derive the 90 Mm3 volume.[15]

82. The results of the "dry climate" scenario were that groundwater levels remained low, but there was no long-term decline.

83. While it is not explicitly stated, it appears that HBRC have relied on this scenario result as the basis for setting the interim allocation limit at 90 Mm3.

84. It is possible, in my opinion, that the same or similar model outputs could have been generated by using a higher maximum annual water use, but allowing it to vary naturally from year to year.

85. I note that In Figure 12 of the Appendix 11 memo, water use for the 2019 – 2020 irrigation season (a drought year) has been estimated at around 105 Mm3. The memo states that irrigation water use for this season was based on model results. No further details are provided, however, on how the updated volumes in this figure were derived.

[15] HBRC, 2018; Rajanayaka and Fisk, 2018.

86. Given that the proposed method for determining 'Actual and Reasonable' use volumes considers data up to the 2019 – 2020 irrigation season, it may be more consistent to use a 2019 – 2020 water use volume as the basis of the interim allocation limit.

M. SECTION 42A HEARING REPORT RECOMMENDATIONS

87. I have reviewed the responses in the Section 42A Hearing Report to HBWG and other winegrower submissions, and the recommendations that have been made on these points. To some extent I have picked up on the comments in the Section 42A Hearing Report already, as relevant to the discussion above.

N. CONCLUSION

88. I consider that the methodology proposed in PPC9 for determining 'Actual and Reasonable' uses volumes for irrigation, including the consequential amendment recommended in the Section 42A Hearing Report, will result in volume limits that are substantially lower than that required to give 95% reliability, and will not provide sufficient water in dry years. I have identified a number of respects where refinements can be made, and I support the changes to the provisions proposed in Mr St Clair's evidence for the reasons set out in my evidence above.

Andrew Dark

11 May 2021

O. APPENDICES A AND B

Appendix A – Long-term modelled data

The following table shows the outputs of a long-term IrriCalc model run. The annual demands have been normalized by the mean, i.e. each year is shown as a proportion of the long-term average. Colour shading has been used to highlight low and high demand years.

Irrigation Season	Modelled annual irrigation demand normalised by mean
1960	0.81
1961	1.23
1962	1.11
1963	1.29
1964	
1965	0.66
1966	0.45
1967	1.23
1968	0.42
1969	1.2
1970	0.99
1971	1.02
1972	1.11
1973	0.9
1974	0.81
1975	0.84
1976	0.66
1977	1.08
1978	1.23
1979	1.05
1980	0.57
1981	1.29
1982	1.98
1983	0.69
1984	0.93
1985	0.75
1986	1.17
1987	1.02
1988	1.17
1989	1.02
1990	1.68
1991	0.66
1992	0.39
1993	0.54
1994	1.38
1995	0.81
1996	0.87

Irrigation Season	Modelled annual irrigation demand normalised by mean
1997	2.01
1998	0.93
1999	0.78
2000	0.75
2001	0.54
2002	0.99
2003	0.9
2004	1.29
2005	1.17
2006	0.78
2007	1.05
2008	1.11
2009	1.08
2010	1.14
2011	0.69
2012	1.53
2013	0.99
2014	0.99
2015	0.75
2016	1.11
2017	0.96
2018	0.84
2019	1.36

Appendix B – Example measured use data

- **Table 1 Examples for groundwater supplies with no low-flow restrictions**

Irrigation season	**Example A** annual measured water use (mm)	**Example B** annual measured water use (mm)	*Modelled annual water use (mm)*
2012	136	39	*170*
2013	50	90	*110*
2014	36	85	*125*
2015	43	131	*113*
2016	71	71	*122*
2017	82	66	*89*
2018	37	53	*98*
2019	206	122	*154*
average	**83**	**82**	***123***

- **Table 2 Examples for supplies with low-flow restrictions**

Irrigation season	**Example C** annual measured water use (mm)	**Example D** annual measured water use (mm)	**Example E** annual measured water use (mm)	**Example F** annual measured water use (mm)	*Modelled annual water use (mm)*
2012		55			*170*
2013	32	45		58	*110*
2014	106	76		45	*125*
2015	77	88		96	*113*
2016	59	76	10	107	*122*
2017	34	8	24	36	*89*
2018	77	18	121	35	*98*
2019	131	110	101	89	*154*
average	**73**	**59**	**64**	**67**	***123***

BEFORE THE HEARINGS PANEL

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	Proposed Plan Change 9 – Tūtaekurī, Ahuriri, Ngaruroro and Karamū Catchments (TANK)
BETWEEN	**HAWKE'S BAY WINEGROWERS ASSOCIATION LIMITED; GIMBLETT GRAVELS WINEGROWERS ASSOCIATION; VILLA MARIA ESTATE LIMITED; PERNOD RICARD WINEMAKERS NEW ZEALAND LIMITED** (**collectively** "**THE WINEGROWERS**")
AND	**HAWKE'S BAY REGIONAL COUNCIL**

STATEMENT OF EVIDENCE OF EDWIN JOHN MASSEY ON BEHALF OF THE WINEGROWERS

WINE INDUSTRY SUSTAINABILITY PROGRAMME

11 MAY 2021

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TABLE OF CONTENTS

A. INTRODUCTION

1. My full name is Edwin John Massey. I am currently employed as General Manager Sustainability at New Zealand Winegrowers ("**NZW"**). I have been in that position since September 2019. Prior to that, I was the Biosecurity and Emergency Response Manager at NZW, a position I commenced in January 2016.

2. My role involves the implementation of the NZW Environment Strategy through overseeing and coordinating the delivery of three key programmes:

   (a) Sustainable Winegrowing New Zealand ("**SWNZ**");

   (b) Biosecurity – to mitigate the impact of new pests and disease on the wine industry; and

   (c) Sustainability Guardians – to promote sustainability innovation in the wine industry through peer-to-peer learning.

3. I report to the NZW Environment Committee, a sub-committee of the Board chaired by the Board Deputy Chair.

4. I hold the following degrees from the University of Auckland:

   (a) PhD in Geography – conferred in 2006.

   (b) MSc in Geography – conferred in 2002.

   (c) BA/BSc – conferred in 2000.

5. My evidence supports and gives further evidence on the submissions of Hawkes Bay Winegrowers Association ("**HBWA**"), Gimblett Gravels Winegrowers Association ("**GGWA**"), Villa Maria Estate Limited ("**Villa Maria**") and Pernod Ricard Winemakers New Zealand Limited ("**PRW**") concerning Proposed Plan Change 9 ("**PPC9**") - Tūtaekurī, Ahuriri, Ngaruroro and Karamū Catchments (TANK). HBWA, GGWA, Villa Maria, and PRW are collectively referred to as the "**Winegrowers**" in this evidence.

6. My evidence addresses the role of the national wine industry's sustainability programme, SWNZ in the context of PPC9, including Schedule 30 and the role of Farm Plans, Industry Programmes, and Catchment Collectives.[1]

7. I am providing evidence on behalf of NZW, based on my experience in my role as General Manager Sustainability, with responsibility for implementing SWNZ within NZW. I am authorised to provide this evidence on behalf of NZW, which is intended to provide context and background to SWNZ and its role in farm environmental management in Hawke's Bay and nationally.

B. SCOPE OF EVIDENCE

8. In this brief of evidence, I address the following matters:

   (a) The role of SWNZ;

   (b) Benefits of SWNZ;

   (c) Vineyard and Winery water use;

   (d) Sustainable land use; and

   (e) Farm Freshwater Plans.

9. In preparing this evidence, I have read and considered the section 42A report prepared in response to submissions on the PPC9 provisions and relevant appendices and their reports. I have also read the relevant section 32 reports.

C. EXECUTIVE SUMMARY

10. Sustainability is a crucial component of the New Zealand wine industry, with SWNZ having been set up to establish and implement sustainable wine production. SWNZ has been the New Zealand wine industry's flagship sustainability programme for over 25 years.

11. SWNZ sets standards and gives guidance on best practice across different aspects of the entire wine production chain. Its members submit information annually to NZW and are subject to independent verification. SWNZ has a very high participation rate, with

[1] Relating to POL TANK 23, Rules TANK 1 and 2 and Schedule 30.

96% of the national vineyard area and over 90% of wine produced in a SWNZ certified facility. SWNZ demonstrates the viticulture industry's commitment to protecting the people and places that make our famous wines.

12. Water management is a crucial aspect of sustainability. NZW and HBRC have closely aligned goals on the utilisation and management of freshwater resources. There is potential for SWNZ to be the industry programme that enables members to meet Hawke's Bay Regional Council's ("**HBRC**") freshwater objectives at minimum transaction costs. There is a need for continued engagement between HNRC and NZW to ensure that this potential use for SWNZ can be realised. There is otherwise a risk that decisions made in the Hawke's Bay will jeopardise NZW's ability to use SWNZ as a vehicle to meet the needs and objectives of other regional authorities.

13. The drivers behind HBRC's recent endeavours to ensure the highest standards of freshwater management in the region are acknowledged. However, care is required to ensure that PPC9 does not prevent or unduly limit SWNZ and the (best) opportunity it provides for its members and industry to meet HBRC's standards in a cost-efficient way. Generally, SWNZ also demonstrates the wine industry's vision of sustainability of winegrowing and as an environmentally conscious primary sector land use.

D. WINE INDUSTRY SUSTAINABILITY PROGRAMME

14. The New Zealand wine industry is recognised internationally for global leadership in sustainability. NZW is the national industry body that represents all commercial grape growers and winemakers in New Zealand. NZW has a vital role as a custodian to protect and enhance New Zealand's reputation for sustainability.

15. The NZW Environment Strategy outlines the key industry goals in this area across six different focus areas: *Water, waste, pest and disease, soil, climate change and people*. These goals are based on the United Nations Sustainable Development Goals.

16. In relation to water, our industry goal is to "*Be a world leader in efficient water use and the protection of water quality"*. This goal recognises that water is critically important to the wine industry, whether that be for irrigation, frost protection or general winemaking activities. Our businesses must minimise water use and protect the purity of waterways to ensure wine supply remains clean and sustainable for the future.

17. SWNZ is the flagship sustainability programme for viticulture, which is used to track progress towards the goals set out in NZW's Environment Strategy. SWNZ originated in 1995. Twenty-six years later, 96% of the total New Zealand vineyard area and over 90% of the wine produced in New Zealand is SWNZ certified. SWNZ has approximately 2000 members.

18. SWNZ's goal is to raise the profile of the New Zealand wine industry's sustainability and be globally recognised as a leader in this area. To achieve this, SWNZ has the following objectives:

    (a) Provide standards and guidance for members to ensure stewardship across key focus areas of sustainability.

    (b) Provide members with a regular set of benchmarks, enabling them to make informed business decisions across key focus areas with the aim of continuous improvement.

    (c) Protect and enhance the reputation of the New Zealand wine industry nationally and abroad by ensuring the industry's social license to operate.

19. SWNZ is a voluntary, externally audited programme based on continuous improvement and adherence to standards and guidelines issued by NZW. These standards represent best agricultural practice for the wine industry and encapsulate the six key focus areas of the NZW Environment Strategy.

20. Each year SWNZ members fill out questionnaires regarding their practices across these six focus areas to ensure that they are consistent with standards set by SWNZ. This information is submitted to NZW, who then certify that the relevant vineyard, winery, or wine brand are sustainable for the following year. To verify the information submitted by members is accurate, each member is audited by an independent auditor every three years. Auditors can issue corrective actions if members do not meet SWNZ requirements. If these corrective actions are not met, they can ultimately lead to deregistration.

E. BENEFITS OF SWNZ

21. SWNZ provides benefits to both individual members and the entire industry. Recent research conducted by AERU at Lincoln University (2017 and 2018) highlighted that

SWNZ is a key contributor to the New Zealand wine industry's reputation for sustainability. This reputation contributed to a willingness for consumers to pay a higher bottle price. SWNZ also helps to protect the industry's social license, reducing production costs.

22. Critical benefits for members include market access, guidance regarding maximum residue limits enabling members to target their spray regimes to the highest value market, and in-season benchmarking reports. Due to the very high participation rates, growers do not receive a specific premium for sustainably produced grapes. Instead, they benefit from the price premium wineries enjoy in the market or simply from market access.

23. The benefits of the SWNZ programme are relevant when considering the current and future needs of the Hawke's Bay wine industry and the economic and environmental objectives of HBRC. Because:

    (a) SWNZ has the potential to be an effective vehicle to collect information required by HBRC about wine industry water use in the region.

    (b) SWNZ has almost universal membership amongst Hawke's Bay wine industry members who account for approx. 4700 hectares of agricultural land use.

    (c) SWNZ members are used to providing information on their practices each year to NZW, who could share them with HBRC if members consent.

    (d) SWNZ members are currently subject to verification checks via SWNZ audits every three years.

    (e) SWNZ produces benchmarking reports on water use. These can be shared amongst members to help promote best practice.

24. Taken together, there appears to be a considerable degree of alignment between SWNZ's and HBRC's objectives for water management, water use and sustainable economic development. The ideal outcome would therefore be for members to be able to use SWNZ as the Industry Programme (under Schedule 30, Section C) to generate the information required by HBRC in the relevant PPC9 planning provisions. If SWNZ is an accepted Industry Programme, SWNZ can provide the information on behalf of winegrowers at an economy of scale that reduces compliance cost for individual

winegrowers and lifts consenting costs and pressures from HBRC. Whether this is a viable proposition depends on the nature and detail of information required by HBRC, and compliance costs, such as around audit requirements, remaining reasonable for NZW to be able to meet through a levy on members at a national scale. I discuss these matters in further detail later in my evidence.

F. VINEYARD AND WINERY WATER USE

25. Each year SWNZ produces a National Water Use Report, compiled by independent consultants from the latest annual information submitted by SWNZ members. This provides a useful snapshot of vineyard and winery water usage, nationally and on a region-by-region basis.

26. In 2020, SWNZ reviewed the questionnaire to ensure more comprehensive information on water use is available. For the 2020/2021 growing season, it was mandatory for all vineyards nationally to report total water use for irrigation and frost protection. These results will be available in August 2021.

27. Nationally, total industry water use for the 2020 vintage was estimated to be 44,898,300 m^3, 98% of which was used for irrigation—other uses such as frost fighting and in-winery use were much lower.

28. For the 2019/2020 growing season, all SWNZ members were asked about their irrigation optimisation techniques. It was not a compulsory question, but 1,025 vineyards responded. 68% of irrigated vineyard respondents indicated that they currently use soil moisture monitoring. 67% of irrigated vineyard respondents stated that they metered and recorded water use, consistent with 68% reported in 2018/2019. These figures are higher than the 34% who provided their water use records through the SWNZ questionnaire (40% of the irrigated area), indicating that not all vineyards with water use data are providing it to SWNZ.

29. In the Hawke's Bay, water use reporting increased from 49% of all vineyards in 2013/2014 to 63% of all vineyards in 2019/2020. This lack of comprehensive information in 2013/2014 was a crucial factor in SWNZ's changes in subsequent questionnaires to focus on water use.

30. The 2019/20 growing season, vineyard water use from SWNZ records in Hawke's Bay is set out in Table 1:

Table 1: Irrigated area, water use, planting density and rainfall in Hawkes Bay 2019/20

	Irrigation area (ha)	Irrigated area	Irrigated area with recorded water use (ha)	Scorecard recorded use (m3)	Water use (mm)	Water use (litres/vine	Planting density(vines/ha)	Total rainfall (mm)
Hawke's Bay	3577	67%	2,263	3,380,618	149	509	2,390	293

31. NZW holds regional total irrigation water use estimates from the Hawke's Bay dating back to 2013/2014. Over that time, the mean estimated total regional water use for irrigation has been 3.776 million m^3 per annum. For the 2019/2020 growing season, the estimated total was 5.318 million m^3. In my experience, relative to other primary sector land uses, wine production uses relatively little water in this regard.

32. Typically, a vineyard's irrigation varies dependent on seasonal rainfall. However, in specific seasons it is the timing of rainfall, rather than the total amount, which is a more important driver of the total irrigation volume. For example, in 2019/20, irrigation was 56% higher than the 10-year average, despite rainfall staying at a level close to the average. The very high rainfall in October 2019 distorts the average figure, hiding the extremely low rainfall for the rest of the season. This lack of rain during the main growth period is what drove the large increases in irrigation that season and demonstrates the caution needed when looking at seasonal averages. Ms Taylor discusses the limitations involved with an 'averaging' approach to water use data over any identified time span.

G. SUSTAINABLE LAND USE

33. As outlined above, the New Zealand wine industry has a world-leading reputation for sustainability. We consider sustainability to represent the nexus of environmental, economic, and social wellbeing. NZW uses SWNZ to manage and mitigate the impacts of our production practices across these different categories. Through SWNZ, NZW has,

for over a quarter-century, set standards that have enabled members to measure themselves against others in their regions so that they can make informed business decisions on how to improve the sustainability of their business.

34. In my experience SWNZ provides strong evidence suggesting the sustainability of wine production as an agricultural land use. It is very challenging to consider one element of sustainability as mutually exclusive from another. The sustainability of wine production as a land-use has implications beyond the scope of water management.

35. For example, recent research conducted by Toitu Envirocare highlights that the GHG emission metrics from vineyard operations were estimated to be 3000 kgCO2e/hectare, 270 kgCO2e/tonne grapes, 0.15 kgCO2e/$grapes and 0.07 kgCO2e/$export revenue. Across these same metrics, vineyard emissions were favourable compared to dairy. The wine industry has far lower GHG emissions per $ export revenue earned than dairy.

36. Land use changes are to be expected as New Zealand transitions to a low emissions economy. In many ways it makes sense for emissions-intensive land users to transition to viticulture in areas suitable for quality wine production; this will help to reduce New Zealand's emissions overall.

37. The Hawke's Bay is an area that contains land suitable for wine production. There is potential for land conversion to occur in several areas, such as the elevated terraces on both banks of the Ngaruroro River around Crownthorpe and Kereru. These areas are cool enough and have appropriate soil, slope, and river proximity to support high-quality viticulture.

38. However, any shift to increase or intensify the planted vineyard area in the Hawke's Bay to achieve a positive land-use change in terms of greenhouse gas emissions will not occur if constrained by regulations that render winegrowing uneconomic. For this reason, a broad view of what sustainable land use means is necessary, and in my view, HBRC would benefit from working more closely with NZW and SWNZ, on behalf of its members, to ensure the most sustainable land use outcome for the Hawke's Bay region.

H. FARM FRESHWATER PLANS

39. NZW is generally supportive of the outcomes that Farm Freshwater Plans (or Farm Environment Management Plans) ("**FFPs**") seek to achieve. As I have outlined above,

these outcomes are consistent with those NZW seek as an industry as part of our Environment Strategy. FFPs themselves have the potential to help ensure efficient water use and minimise the potential for downstream pollution.

40. However, I am concerned that FFPs will be applied as a blunt instrument within PPC9 in a manner that ignores the potential for solutions that achieve the same outcomes with fewer transaction costs. While I appreciate that PPC9 allows for catchment collectives and industry programmes, these do not appear to accommodate the SWNZ programme presently being run by NZW. In particular, I note:

(a) FFPs do not consider NZW's potential to use the SWNZ programme to collect, report on and verify relevant information from members on their water use. SWNZ and HBRC have aligned goals regarding the sustainability of water use. It would be more streamlined and cost-effective for winegrowers if they only need to report information once: to the national industry body (through SWNZ) who in turn would share this information with HBRC. Creating an additional reporting requirement for very similar information seems unnecessary when there is the potential to work together to achieve the same end.

(b) While SWNZ is a national programme, it is possible to seek specific information from members in particular regions or catchments, depending on the information required by regulators. There is excellent potential for HBRC to use SWNZ as equivalent to a FFP so that NZW members can fulfil their requirements and demonstrate their commitment to sustainable water use. Equivalence would be where SWNZ effectively delivers what (and instead of) a FFP. Enhancing SWNZ also helps ensure that the programme remains relevant to members. In my view, it is very much a "win-win".

(c) Through equivalence, HBRC can demonstrate leadership in recognising Industry Programmes and highlighting what is possible to other regions around the country. NZW will be engaging with other Regional Councils in key winegrowing regions on the potential to use SWNZ to fulfil regionally specific requirements to ensure sustainable water use. The Hawke's Bay is New Zealand's second largest wine region, and there is an excellent opportunity for a partnership that will benefit both environmental and economic outcomes. At the very least, the Winegrower's submissions focus on the need for PPC9 to not create a regulatory

environment that prevents or unduly limits the work NZW is doing nationally to ensure sustainable water use in other regions.

(d) Equivalence with SWNZ is favourable over a strict FFP approach. FFPs have been designed primarily to manage practices associated with pastoral farming and do not work particularly well with viticulture. SWNZ would ensure that there was a more tailored approach for the reporting and regulation of viticulture, while still meeting the requirements and outcomes of PPC9.

(e) It appears that SWNZ meets many of the governance and management criteria set out in Section C of Schedule 30. The SWNZ questionnaire could be adapted to collect data across the water and soil focus areas to enable our members to meet many, but not all, of the requirements set out in the Catchment Collective Freshwater Plan Requirements. At present, SWNZ cannot meet the auditing requirements due to the cost of annual audits (currently, SWNZ audits are every three years as opposed to annual audits as required by Schedule 30). I consider that requiring our members, who conduct a relatively low impact land use, to be subject to annual audits is a particularly onerous regulatory burden. Instead, the audit requirements should be scaled consistently with the level of risk that a particular land use poses to water quality. Annual audits for vineyards, which are low water users and contaminant leachers, is in my view a strict requirement.

(f) To ensure equivalence with planning requirements, NZW supports working with HBRC to make regionally specific adjustments to SWNZ so that our members can fulfil requirements through equivalence. It is not clear from Schedule 30 whether there is sufficient flexibility for these adjustments to be made or recognised.

(g) There is also residual uncertainty over whether SWNZ will qualify in the first instance, with a question mark over the defined “programme area” the Regional Council needs to approve before industry programmes are implemented. NZW would prefer these types of matters to be resolved with the Regional Council at the earliest possible opportunity, with a view to avoiding uncertainty and delay.

41. The section 42A report considers that existing industry programs do not have sufficient direction to landowners about contaminant loss, mitigation measures and timeframes that contribute to local water quality issues. As outlined above, should HBRC consider

SWNZ as an equivalent programme, I see no impediment to NZW engaging with HBRC to ensure the outcomes of these measures can be achieved. I note:

(a) It is relatively common for NZW to add requirements into SWNZ. For example, the 2021 season is the first time SWNZ will collect information on industry fertiliser use. Until now, the industry use of fertiliser has been considered a lower priority for SWNZ since we use relatively little fertiliser compared with other primary sectors. Typically, in the Hawke's Bay, wine industry fertiliser use will be targeted at younger vines during the establishment phase, with only occasional applications after that in specific circumstances.

(b) Nonetheless, industry fertiliser use is becoming increasingly topical due to its potential impact on water quality and climate change. Due to our low level of fertiliser use, it is unlikely that our members will be able to make the same level of reductions as other primary sectors. Using a tailored approach like SWNZ to highlight the low volume of leaching from fertiliser use appears to be a better way to illustrate the sustainable use of water resources.

42. There is a concern that the section 42A report underestimates the transaction costs for all parties (landowners and HBRC) of establishing, verifying and maintaining the information flow required by HBRC to meet its objectives. In my experience, it is a lot easier to design reporting regimes to achieve designated outcomes. The difficulty is in implementing and obtaining widespread participation in implementing the regime. The way to do it is to make it cost-effective and capable of producing productive outcomes for participants. In my view, aligning SWNZ and Schedule 30 would better achieve this.

43. Industry programmes can help reduce or externalise these transaction costs for the benefit of all parties. Working with NZW to ensure SWNZ equivalence would provide HBRC with the potential to succinctly collect relevant information from all SWNZ members in the region and ensure its verification at minimum cost. I am confident that using SWNZ as the vehicle to collect information from our members will help to prove that sustainable winegrowing can deliver economic benefit to the Hawke's Bay without compromising HBRC's objectives for water quality and ecosystem health.

44. The key benefit of industry programmes like SWNZ is that they collect information on behalf of many members and internalise the transaction costs of information collection while protecting the privacy of individuals. These benefits are threatened by regulatory

regimes which require increasingly specific information from individual members based on their particular location at a sub-catchment level. It is considerably easier for NZW to use SWNZ to represent the interests of all our Hawke's Bay members as a collective to meet water regulations than it is for NZW to represent the interests of members if these regulations differ on a catchment-by-catchment level or even lower level of granularity.

45. In conclusion, sustainable water use is a key goal for both HBRC and NZW. NZW consider that it has, through SWNZ, an effective means for its members to meet the outcomes required by HBRC. It is well accepted by industry that sustainable water use is essential, not only to NZW members' financial interests and the Hawke's Bay economy, but also to the industry's social license to operate and the wellbeing of the Hawke's Bay community. There needs to be sufficient flexibility within PPC9 to ensure that the Winegrowers (through its industry groups) can work with HBRC to ensure that SWNZ can be aligned to meet PPC9 outcomes and demonstrate the wine industry's commitment to being a world leader in sustainable viticulture practices.

Dr Edwin Massey

11 May 2021

BEFORE THE HEARINGS PANEL

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	Proposed Plan Change 9 – Tūtaekurī, Ahuriri, Ngaruroro and Karamū Catchments (TANK)
BETWEEN	**HAWKE'S BAY WINEGROWERS ASSOCIATION LIMITED; GIMBLETT GRAVELS WINEGROWERS ASSOCIATION; VILLA MARIA ESTATE LIMITED; PERNOD RICARD WINEMAKERS NEW ZEALAND LIMITED** (**collectively** "**THE WINEGROWERS**")
AND	**HAWKE'S BAY REGIONAL COUNCIL**

STATEMENT OF EVIDENCE OF EMMA LOUISE TAYLOR ON BEHALF OF THE WINEGROWERS

VITICULTURE IN HAWKE'S BAY

11 May 2021

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TABLE OF CONTENTS

A. INTRODUCTION

1. My full name is Emma Louise Taylor. I am an independent viticultural consultant with over 20 years of viticulture experience in Hawke's Bay. One of my clients is Villa Maria Estate ("**Villa Maria**"). I am a board member of New Zealand Winegrowers ("**NZW**") and represent the Hawke's Bay Winegrowers Association ("**HBWA**") and the Gimblett Gravels Winegrowers Association ("**GGWA**").

2. Villa Maria is the largest landowner in the Gimblett Gravels and is actively involved with HBWA and GGWA. My evidence supports the submission by HBWA (submitter 29), GGWA (submitter 238), Villa Maria (submitter 208), and Pernod Ricard Winemakers New Zealand Limited ("**PRW**") (submitter 208). HBWA, GGWA, Villa Maria and PRW are collectively referred to as the "**Winegrowers**" in this evidence.

3. My evidence supports and provides further evidence on the submissions of HBWA, GGWA, Villa Maria and PRW concerning Proposed Plan Change 9 ("**PPC9**") - Tūtaekurī, Ahuriri, Ngaruroro and Karamū Catchments (TANK).

4. I hold a Masters in Science (1999) in Physical Geography. My thesis specifically related to the accumulation of copper in vineyard soils as a result of spray application. This thesis was funded by a research grant from New Zealand Winegrowers.

5. I have worked as a Viticulturist for 21 years. Since 2000 I have been employed by Villa Maria in various roles, including:

   (a) Viticulture Cadet;

   (b) National Research Viticulturist;

   (c) Company Viticulturist;

   (d) Hawke's Bay Company Vineyards Manager;

   (e) Viticulture Project Manager;

   (f) Nursery Viticulturist; and

   (g) General Manager (Nursery).

6. In 2007, I was the New Zealand and Hawke's Bay Young Viticulturist of the Year and the New Zealand Young Horticulturist of the Year.

7. I have held, or hold, the following relevant Committee and Board Memberships:

   (a) 2017 – 2019: GGWA TANK representative;

   (b) 2020 – Present: Chair, NZW Research Advisory Committee

   (c) 2017 – Present: Member, NZW Environment Committee;

   (d) 2014 – Present: Member New Zealand Viticulture Nursery Association (ViNA);

   (e) 2015 – Present: Chair, ViNA;

   (f) 2017 – 2018: NZW Member, Regional Research Institute Industry Advisory Committee;

   (g) 2015 – Present: NZW Vineyard Ecosystems – Project Management Team;

   (h) 2015 – 2017: NZW Vinefax – Project Management Team;

   (i) 2010 – 2014: NZW Grapevine Wood Disease – Project Management Team;

   (j) 2008 – 2014: NZW Virus Elimination Project – Project Management Team;

   (k) 2008 – 2014: National Co-ordinator, Young Viticulturist of the Year;

   (l) 2008 – 2012: Member, EIT Wine Science and Viticulture Advisory Board;

   (m) 2008 – 2014: Member, New Zealand Winegrowers Research Committee;

   (n) 2005 – 2014: Member, HBWA Focus Vineyard Group;

   (o) 2008 – 2011: Chair, HBWA Focus Vineyard Group.

B. CODE OF CONDUCT

8. I confirm that I have read and agree to comply with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014. I confirm that I have considered all the material facts that I am aware of that might alter or detract from the

opinions that I express and that, except where I state I am relying on information provided by another party, the content of this evidence is within my area of expertise.

C. SCOPE OF EVIDENCE

9. This evidence addresses the following matters:

   (a) Background to the HWBG and its position on PPC9.

   (b) Viticulture in the Hawke's Bay.

   (c) Effects of water shortage/limitations.

   (d) How the PPC9 provisions impact on viticulture operations.

   (e) Future of viticulture as land use.

   (f) Land use change.

   (g) Zone 1.

10. In preparing this evidence, I have read and considered the section 42A report prepared in response to submissions on the PPC9 provisions, and the relevant appendices and their reports. I have also read the relevant section 32 reports.

D. EXECUTIVE SUMMARY

11. Irrigation is critical for viticulture in Hawke's Bay.

12. Approximately 97% of wine sector water use is for irrigation/frost protection. Of the vineyards using irrigation, about 95% is applied by the most efficient drip method.

13. 91% of the irrigated viticulture land area in Hawke's Bay uses soil moisture monitoring to determine when to irrigate.[1] Viticulture is a responsible water user, because over-irrigation of grapevines has a negative impact on wine quality. So, in a wetter year, irrigation use on vineyards is reduced.

14. Most subregions in the Hawke's Bay are reliant on irrigation. Water is required to ensure vine canopies can retain their ability to photosynthesise sufficiently to ripen

[1] SWNZ Scorecard 2019/2020.

grapes and store carbohydrates for the following season. In the Hawke's Bay, the dry climate means that irrigation is used to supplement rainfall, especially during the hot summer months. Unrealistic limits on water allocation for irrigation will reduce the ability of the vine to photosynthesise correctly and result in decreased canopy growth and yield, impacting overall quality. In severe situations, a lack of water could stress the vine, resulting in complete defoliation of the vine. Without leaves, vines cannot ripen their fruit and the grapes will shrivel before reaching maturity. The grapes would be un-harvestable and, in extreme circumstances, would not recover, leading to vine death.

15. These factors would mean that viticulture in the Gimblett Gravels and Bridge Pa Triangle in particular, which are on lighter soils with minimal water holding capacity, would not be economically viable due to dramatically reduced yield capacity, fruit quality, and potential vine death.

16. The definition of Actual and Reasonable proposed within PPC9 will not allocate enough water to winegrowers to irrigate their crops, particularly in times of drought, which has significant effects on vine productivity and could ultimately damage vines. As discussed in my evidence, the "least of either" rule (where irrigation allocations will be the lower of an average seasonal use or an IRRICALC modelled amount) effectively allocates 'the lowest of the lows'. The average seasonal use and the IRRICALC modelled amount are both below what vineyards require in times of drought. Vineyards use approximately 1/3rd of the irrigation per area of land compared to other irrigated crops and have the lowest diffuse discharge profile of any intensive land-use activity.[2] They are a sustainable land-use option. However, vineyards are being unduly restricted by the proposed policies within PPC9. Not only does the proposed plan change limit viticulture without justification, but it also disincentivises others to invest and convert to a sustainable land-use option.

E. BACKGROUND

17. HBWA is the industry representative body for grape growers and winemakers in the Hawke's Bay. All growers and wineries receive automatic membership through payment of industry levies. HBWA is affiliated with New Zealand winegrowers and has

[2] Clothier et al 2017.

a local membership of 183 growers and wineries – accounting for 10% (by tonnage) of the national total.

18. HBWA has been an active participant in regional planning process over several years. HBWA was a submitter to the Ngaruroro Water Conservation Order, where it supported the WCO on the upper reaches of the river and reached an agreement outside of the Environment Court with the applicants regarding a WCO on the lower reaches of the river. HBWA has been involved in the Tukituki Plan Change 6 working group, TANK, HBRC Horticulture Sector Group, and HDC primary producers round table.

19. At a general level, HBWA and its various members (including those submitters supporting the HBWA evidence before the Hearing Panel) are concerned with policies and methods within PPC9, including the rules that put water allocation limits in place and restrict land-use change within the TANK catchments.

F. VITICULTURE IN HAWKE'S BAY

20. The wine industry is dependent on having a sufficient and reliable supply of water.

21. 77% of vineyards in the Hawke's Bay (approx. 3,577Ha[3]) are irrigated, including all the vineyards in the economically important Gimblett Gravels and the Bridge Pa Triangle subregions. Water is also required in the winery for cleaning, with hygiene critical to winemaking processes.

22. In short, without a sufficient and reliable water supply, grapes do not grow, and wine cannot be made to meet local, national and international demand.

Why is water essential?

23. All plants, including grapevines, carry out photosynthesis. Photosynthesis uses water and CO2 as inputs and produces sugars/carbohydrates and oxygen. Oxygen is a by-product that is released into the atmosphere and carbohydrates are used for plant growth. The more water available to a plant, the more it will grow.

24. The amount of water a vine will need to ripen grapes depends on several factors, including the variety of grape, rootstock, climate, soil, and crop load. In some New Zealand regions, such as Gisborne, seasonal rain and clay soils allow vines to survive

[3] SWNZ Scorecard 2019/2020.

and produce a crop without supplemental irrigation. However, vineyards in New Zealand are generally planted in much drier areas and in soils that have less water holding capacity. This principle also applies in the Hawke's Bay.

25. The vast majority of New Zealand vineyards require supplemental irrigation to maintain vine health and productivity. Many wine varieties grown in the Hawke's Bay (for example, the high-end red wines produced in the Gimblett Gravels) come from poor soils that hold very little water. These soils would otherwise have very low productive use, which improves land-use sustainability (as I discuss later in my evidence).

26. High draining soils that do not hold water are perfect for grape growing because it enables growers to precisely limit water to the vines. Limiting a vine's water is beneficial for grape production because excessive irrigation encourages continual growth of the canopy, requiring constant trimming of vine shoots and mowing the interrow, driving up farming costs. In addition, while a canopy is necessary for photosynthesis to occur and generate carbohydrates for grape production, an overly dense canopy (caused by excessive irrigation) also creates an unfavourable microclimate for developing fruit by limiting sun exposure, increasing humidity, and restricting air circulation and spray penetration. Excessive water lowers fruit quality and increases fungal disease.[4] Through viticultural research, it is well accepted that excessive irrigation of grapes leads to higher farming costs, increased disease pressure, and reduces overall grape quality.[5]

27. Applying water to vines is a careful balancing act between allowing the vines to grow – but not too much to compete with grapes. As such, vineyards are one of the most responsible water users in the primary industry sector. Grape growers are careful only to irrigate the vines when they need it and to put only enough water to continue fruit development and ripening, but not enough to harm the crop or slow ripening. Most vineyards in New Zealand use drip irrigation to make efficient use of water and reduce evaporative losses. Drip irrigation is suited to vineyards as it doesn't introduce extra humidity into the canopy – reducing the chance of fungal disease occurring. Irrigation is primarily scheduled using soil moisture probes or vine water status monitoring to ensure water is only put on when the vines require it. In the 2019/2020 season, figures

[4] Austin and Wilcox, 2010.
[5] Myburgh, 2006.

from the SWNZ scorecard show that 91% of irrigated vineyard land in Hawke's Bay utilise soil moisture monitoring to determine their water use.[6]

28. In my opinion, the wine industry is already a very efficient water user. Notwithstanding this, the industry continues to actively conduct research and improve practices to increase water savings without compromising quality or vine health and productivity.

How vines use water

29. Vines are a living plant and, as such, require the basics of soil, light and water to survive. Because vines are usually grown where there is minimal rainfall, careful irrigation management is crucial to a vine's ability to develop a canopy, set good fruit levels, ripen the fruit, and then prepare the vine for the following season as it enters dormancy.

30. Plant and fruit growth in any stage is driven by water uptake expanding cells.[7] Critical events happen in each stage that affects the current season's productivity, the following season's productivity, or both.

31. In **Appendix A**, I have set out a well-accepted industry explanation of the seasonal process of growing grapes. This simple summary explains, in general terms, that there are differing water needs throughout the year depending on when priority is given to developing the canopy and producing grapes. It also illustrates that water is a vital input for vineyards' productivity and long-term sustainability.

Hawke's Bay viticultural water use

32. As I have already noted, 77% of vineyards in the Hawke's Bay require irrigation at some point in the season to maintain vine activity and successfully ripen the fruit.[8]

33. In some New Zealand regions, enough rain falls in the winter and is stored in the soil to support reasonable canopy development in the early stages of vine growth. There are, however, specific challenges within the Hawke's Bay region. There are areas with high draining soils, such as the Gimblett Gravels, where supplemental irrigation may be necessary early in the season (the canopy development stage) to generate enough leaf area to ripen an economically sustainable crop. Alternatively, in some soils, like those

[6] SWNZ Scorecard 2019/2020.
[7] Shultz and Matthews, 1993.
[8] SWNZ, 2018.

of the Bridge Pa Triangle, enough water is usually stored in the soil to develop a good canopy, but there is not enough water in the soil to sustain that canopy in spring for the full season, necessitating supplemental irrigation over the course of the season.

34. Therefore, most vineyards, especially those in the economically important Gimblett Gravels and Bridge Pa Triangle regions, require irrigation throughout the entire season, especially in the summer heat when soil reserves have been depleted, and fruit development and ripening are occurring.

35. A research project funded by Hawke's Bay Winegrowers and NZ Winegrowers, and conducted by Mark Krasnow, '*Thoughtful Viticulture across the 2017-2018 and 2018-2019 seasons*' (the "**Optimisation of Irrigation Project**"),[9] was aimed at optimising water usage in Hawke's Bay vineyards and investigating the bare minimum of water needed to maximise quality and maintain economically sustainable yield. Vines were frequently monitored for water potential and were only irrigated when their water potential fell below a threshold value. Irrigation threshold values were chosen that were specific for each variety and changed based on the developmental stage of the vine.

36. The Optimisation of Irrigation Project looked at the 2017-18 season, a more or less average season in terms of rainfall, with 423.5 mm falling from September through April. The 30-year long term average for Hawke's Bay is 455.2 mm.[10] The study showed that the water needs for all vineyards were especially pressing during ripening in the December-February window, with most vineyards requiring water early in this window. Obviously, in a drought year, the vines would dry out much faster, and the irrigation amounts to sustain them would need to be greater. Even in this best-case scenario, it was evident from the study that the vines in the Hawke's Bay acted similarly to vines all over the world: they still required irrigation to ripen the fruit and replenish reserves.

37. In addition, the culmination of three years monitoring of soil water use in vineyards in both Hawke's Bay and wider New Zealand by Clothier et al,[11] showed that because of managed water use at vineyards, vineyards were net positive land users, returning more than 100 mm of water to the aquifer than it extracted for irrigation. As I discuss below, the efficiency of viticulture in terms of its water use is a double-edged sword,

[9] Krasnow et al (2020).
[10] Vinefacts, 2018.
[11] Clothier et al 2020.

with the allocation limits proposed under PPC9 now effectively locking in water use levels to the "lowest of the low", thereby discouraging growth and investment in the wine industry.

Soil Types

38. While vineyards have a low overall environmental footprint, the wine sector stands to be one of the most affected by controls on water quality and quality, as vineyards generally occupy the lightest soils closest to rivers, including the Ngaruroro.

39. The lighter soils are often the most suitable for grape growing. The light alluvial soils have little water holding capacity and are incredibly free draining. This prevents any water from sitting around the roots of vines, and irrigation is key to providing just enough water to the vines to ensure that they survive. These soils support a land-use which uses approximately 1/3rd the water of other irrigated crops**.** However, by virtue of its location, these land-uses are the most likely to be affected by controls concerning rivers and groundwater connectivity rules.

40. In addition, viticulture is not only an efficient water user – it has also been shown that in the context of the nitrogen (N) and phosphorous (P) leaching numbers, viticulture is at the very low end of the spectrum for intensive horticulture and comparable or better than the low end of extensive agriculture.

41. In 2017, Brent Clothier modelled nitrogen leaching of 87% of New Zealand vineyards and found that leaching level to be 8 kg N-NO3/ha/y and 0.25kg-P/Ha/y.[12] Further, between 2017 and 2020, Brent Clothier and his team monitored vineyard soils in Hawke's Bay and Marlborough and showed that the vineyards preserved the natural soil capital of major stocks, with minimal to no change in total nitrogen levels. Clothier concluded that viticulture, through its very low levels of nitrate leaching, parsimonious use of water for irrigation, and net positive recharge of groundwater, had very strong eco-credentials.[13]

[12] Clothier and Green (2017).
[13] Clothier et al. (2020).

42. Both pieces of research led by Brent Clothier prove that when evaluating a sustainable land use option for the Heretaunga Plains, there would be not many other industries that can provide an economic return, while having such strong eco-credentials.

G. EFFECTS OF WATER SHORTAGE/LIMITATIONS

43. Water is absolutely necessary for all stages of grape production. Limitations in water lead to the slow growth of photosynthetic tissues, meaning the vine can only make limited carbohydrates from photosynthesis during the season. Moreover, in-season water limitations cause leaves to close their stomata, meaning little or no photosynthesis, impacting the vines' canopy, yield, and ability to ripen fruit. A 2016 trial looking at Maximising Irrigation Savings in Grapevines in MLB showed that a reduction in water of 80% reduced yield by 45%. In addition, wine made from the reduced irrigation trial areas resulted in winemaker evaluations concluding that the overall wine composition had been detrimentally affected.[14]

44. In extreme cases, or prolonged drought, complete defoliation of the vine can occur. Figure 1 and 2 set out below are illustrative of vine defoliation. Figure 1 highlights a vine displaying water stress and the start of defoliation. You can see the bunches still green on the vine. These bunches did not ripen as there were no leaves to provide energy to the bunches to complete ripening. Figure 2 shows an entire vineyard that has lost its canopy and bunches as a result of water stress. Both examples were in vineyards that were planted in Zone 1 areas in Hawke's Bay.

Figure 1: A vine in defoliation

[14] Mercer et al (2016).

Figure 2: a vineyard that has completed defoliation as a result of water stress

45. Without a steady supply of carbohydrates from photosynthesis, a vine's productivity will drop below what is economically sustainable through reduced fertility, smaller berry size, insufficient ripening of fruit for winemaking, or a combination of these. Chronic, severe water stress will eventually kill grapevines.

46. The effects of drought or water shortage on vineyards (particularly those with low water retaining soils) is substantial. It makes it harder to operate to standard levels and it could cause a crop to be lost, or permanent damage to vines. Viticulture's experience of the 2019-2020 and 2012-2013 droughts reinforces the critical importance of ongoing access to freshwater for crop protection purposes, and to protect the viability of vineyards.

H. PROPOSED PLAN CHANGE 9 (PPC9)

47. I have been involved in the PPC9 process from an early stage. I became the GGWA representative on the TANK stakeholders group in 2017. It was around this time that the Heretaunga Plains aquifer water models were made available. Once the modelling was available, it was evident that stakeholders needed to work together to reduce water take from the Heretaunga Plains aquifer while enabling good practice to be adopted (for water management) to allow horticulture to continue on the plains.

48. PPC9 has imposed the same sinking lid approach to viticulture as every other agricultural activity without regard to viticulture's status as an efficient water user already. Viticulture is a low water user/nutrient leaching activity, comparative to other users who have naturally high water use and leaching or have lagged in implementing

good practice. I explain this in further detail below.[15] It has the flow-on effect of limiting viticulture to its current water use, which prevents expansion within property boundaries (through intensification) and the change of land use to meet market demand, climate change or scientific improvements in growing.

49. Vineyards have been planted in Hawke's Bay since the 1800s. Some of the oldest viticulture land in New Zealand is in Hawke's Bay. Over time, viticulture in New Zealand has progressed and advanced with innovations and technologies being adopted to enhance the quality of the fruit harvested and the viability of the vineyard. One of the more recent trends (in the last 20 years) is the adoption of higher density planting of vineyards. Vineyard density in New Zealand was traditionally dictated by tractor width; with the development of newer, lighter, narrower, more fuel-efficient tractors, vineyards are able to plant our vineyards at a closer planting density per hectare. This means that vineyards can increase productivity and return within existing land footprints, thus ensuring vineyards can continue to be financially viable.

50. In 2003, a study by Steve Green showed that an increase in plant density by 24% from 1860 vines per hectare to 2315 vines per hectare requires an extra 10% in water for irrigation.[16] The study concluded that winegrowers would not need to worry about extra water for their increased plantings, as there was plenty of flexibility within their current consents to allow for this extra water. These conclusions are undone by PPC9. Under PPC9 there would not be enough water for the existing vineyard to continue, let alone any development of higher density, and therefore more efficient, plantings.

51. Vineyards in New Zealand have a life span on average of 25-30 years. At the conclusion of their life span, they succumb to wood disease and viruses, resulting in a loss of productivity and economic viability. NZW have invested heavily in research aimed at understanding and combatting these life shortening issues. However, at the moment, vineyards are set for replanting at some stage between the 20 and 30 year age mark. A significant portion of vineyards in Hawke's Bay were planted in the early 2000s, which means that a similarly large portion of vineyards in Hawke's Bay will be replanted within the lifespan of PPC9. Even if a vineyard was replanted to the same density and specifications as the vineyard it was replacing, it requires more water than a mature vineyard. Young vines are at greater risk during drought because of their small and

[15] See paragraphs 61-66.
[16] Green et al (2003).

shallow root system.[17] If a vine does not have enough water at planting, it will never recover. This is particularly evident for younger vines. New vines that do not receive enough water during early growth will are more likely to continue to under perform in terms of quality and yield than vines that received enough water during this period. Under PPC9, the reduction in water allocation to vineyards based on their average water use for the 10 years preceding 2020, does not allow sufficient water for any replanting of vineyards to occur.

Actual and reasonable for irrigation takes - the "least of either" rule

52. PPC9 will phase out over-allocation by allocating water according to Actual and Reasonable use. The definition of Actual and Reasonable for irrigation takes is "the least of either" an amount determined by accurate water meter data or IRRICALC.[18]

53. I have concerns about winegrowers being required to adopt a water allocation limit based on the lesser of these two options. There are three main concerns:

    (a) **First,** the option to be allocated water use based on water meter data currently measures the water use by an average annual amount, rather than (as previously the case, prior to the section 42A report) by reference to a maximum over the ten-year period. I discuss this in further detail later in my evidence but note at this point that the approach underestimates viticulture's actual use of water, particularly in drought years**.**

    (b) Vineyards have different water needs year-to-year, with some years requiring higher takes than others. In my experience of 2019 – 2020 (a drought year), the demand for water was higher than the previous several years.[19] If the average rule were applied to 2019 – 2020, vineyards would not have had enough water allocated to meet their actual needs. This would have had consequential effects on grape production and potentially long-term ramifications to vine health caused by reduced photosynthesis and, in extreme cases, defoliation (as I have referred to earlier in this evidence). History shows that there will be droughts and fluctuating water demand in the future, and in my opinion, PPC9 needs to

[17] Shortt (2020).
[18] See definition of 'Actual and Reasonable' in the section 42A Report, at Appendix 1A.
[19] See Appendix A to the Brief of Evidence of Andrew Dark.

provide a mechanism to manage these realities/constraints in a way that does not unduly restrict viticulture.

(c) It is important to note that although vineyards will have some years where water need is higher, there are other years where water need will be low. In low years, where there is sufficient rain, vineyards do not irrigate their crop to hit their water allocation. As explained previously, over irrigation is detrimental to vine health and wine quality. A TBG project on the Gimblett Gravels in 2000 stated that in a dry year (1997-1998), vineyards will use as much as 307% more water than they would use in a wet season (1995-1996).[20] This illustrates the disparity.

(d) Using an averaging approach, the Council will underrepresent the true actual and reasonable use that a vineyard requires for 4 years out of 10 – potentially by catastrophic amounts. Dr Dark addresses 'averaging' in his evidence.

(e) PPC9 is also structured in a manner which rewards poor agricultural practice. It rewards today's profligate users and restricts the future options for wise users of water. We have adapted our water management strategies over time to maximise efficiency, but water allocation needs to reflect the requirements for viticulture based on maximum usage. The overall allocation limits should be based on 'peak usage', aligned to the peak limit of 9,000,000m^3 which would happen in a dry year. By including the water use from a wet year when determining average use (as is the case with PPC9) – there is the likely chance that water will be under-allocated, which might appear to be an ideal goal, however, it will come with significantly economic repercussions.

(f) **Second,** there are limitations around IRRICALC's ability to correctly model viticulture irrigation. The Section 42A report says that IRRICALC tends to overestimate water needs for irrigation.[21] In my experience, contrary to the Section 42A report, IRRICALC does not accurately model viticulture's water usage. If the IRRICALC model is applied to the 2019 – 2020 year, most vineyards would not have had enough water to meet their needs. The evidence of Dr Dark discusses this issue. Again, having accurate water allocation is critically

[20] Caspari et al (1998).
[21] Section 42A Report, paragraph 2065.

important when considering the effects of drought on vine health and vineyard productivity.

(g) **Third,** the proposed PPC9 rule allocates water based on the lower of the average take and the IRRICALC model. This "least of either" rule is particularly restrictive in circumstances where both options allocate water below vineyards' actual needs. Effectively, the rule is allocating water for its lowest productive user (vineyards) at 'the lowest of the lows'.

54. These factors mean that viticulture will be required to comply with an Actual and Reasonable allocation that is either lower than its actual peak use by being held to an average (for example, in times of drought) or based on a modelled irrigated use that may not reflect the local environment. Dr Dark addresses these matters in his evidence.

55. Having worked in viticulture for many years, I am concerned that the average allocation method proposed by PPC9 will simply not be enough. The change from the "maximum" to the "average" has come out of the blue as part of the section 42A report and does not, in my opinion, account for the practicalities of viticulture operations. Specifically:

(a) Averaging the annual usage will under allocate water for irrigation. As I have noted above, the year-to-year highs and lows play a significant role in determining vineyards' actual need. In years of drought, there is an actual need for that water, so low usage years should not be accounted for in measuring actual usage.

(b) The definition requires "accurate water meter data". However, it is not clear what constitutes accurate water meter data for the Council's purposes. In my view, some clarity should be provided to users so that they have certainty that their ongoing data collection will be satisfactory. While almost all vineyards have metered wells, not every vineyard has kept long term records of water use from season to season. With the increased move to telemetry, the digital storage of these records increases the length of time the records are kept, and will provide a good basis for accurate water use going forward. This, however, does not address the gaps in data for historical record use that some vineyards will have.

(c) The calculation of average annual usage penalises irrigators who have been using best practice and rewards slow adopters. This is particularly impactful on viticulture, which has invested in low water use and has a biological incentive to reduce water.

(d) It is unclear whether the 2 May 2020 cut-off date includes the entire 2019 – 2020 water year, which does not finish until 30 June 2020.

56. I note that the definition of 'Actual and Reasonable use' proposed within the section 42A Hearing Report permits the use of an alternative water demand model but does not clarify when and how the water demand model will be considered an adequate substitute. Where users are being expected to comply with lower water allocations (and potentially an allocation lower than their actual need), it would be my preference that vineyards have an option of using a water demand model that can accurately model water use. This could be addressed through an amendment to the defined term in PPC9.

Actual and Reasonable (90million m^3 interim limits)

57. In managing the allocation and use of groundwater in the Heretaunga Plains Groundwater Quantity Area, PPC9 adopts an interim allocation limit of 90,000,000 m^3 based on the "actual and reasonable water use".[22]

58. I am concerned that the interim limit does not account for water use post-2017 through to 2020. It also appears that the change in the definition of Actual and Reasonable to account for the average, and not the maximum demand of water, is an attempt by Council officers to shoehorn the allocated amounts into the 90,000,000m^3 interim limit without regard to what is actually occurring on the ground. I agree with the reservations expressed in the submissions of various winegrowers, including HBWA, that the "interim limit" is a modelled estimate and not a true reflection of water needs amongst the industry.

Can Hawke's Bay Winegrowers achieve reductions?

59. PPC9 adopts a sinking lid approach to water allocation. As I have explained above, viticulture is a low water user, having already reduced its water use to optimise grape

[22] POL TANK 37(a).

growing. However, having reached low water use, it is now difficult for viticulture to reduce water use further to comply with sinking lid limits when in effect it has already been doing so for an extended period of time.

60. To add to this, year-to-year fluctuating environmental conditions, where water use one year may be significantly higher than another, increases the difficulty to meet the reductions. As demonstrated in the 2019 droughts, there are years where viticulture requires water use above its average. If it is unable to take water above the average, there will be significant impacts on viticulture production during drought years.

I. FUTURE OF VITICULTURE AS LAND USE

61. The sinking lid approach proposed by PPC9 impacts the intensification of land use. While this may be an intended effect of PPC9, I do not endorse the blanket approach proposed by Council.

62. The effect is particularly acute for low water users, such as viticulture, who have a low water allocation from which to intensify. The current provisions inappropriately restrict an increase in crop density, the re-establishment of vines, and growth of new vines (which require higher water usage, refer paragraph 50 and 51). It places very real limitations on the ability of winegrowers to expand/grow their businesses. This has implications for the longer term ability of winemakers to meet demand, but also creates flow-on effects for the sustainability of some businesses in circumstances where costs of operation are increasing (for example the minimum wage increases). In other words, the opportunities to intensify and meet those costs are being limited through regulation. It is not obvious to me that the Regional Council has considered these factors as part of any cost/benefit analysis.

63. I acknowledge that a purpose of PPC9 is to reduce water use and allocation limits, and that as a general rule, intensification conflicts with that purpose. In my view, however, viticulture can be intensified consistently with PPC9 objectives and sustainable management.

64. Intensifying viticulture does not necessarily mean increasing the area of land allocated for grape growing. Viticulture can be intensified by increasing the density of vine rows, which has several positive effects. Firstly, the yield per area of land increases, meaning that land is used more efficiently. Secondly, with advances in technology designed

around narrower planting, higher density vineyard planting allows for the adoption of more specialised mechanical management options such as over row tractors and sprayers, which can apply targeted spray to multiple rows, thereby reducing both chemical application and soil compaction. Narrow row vineyard tractors can be used, which are more fit for purpose than wider farm tractors. These smaller tractors can also reduce fuel usage on the vineyard. Intensification of planting can reduce vine vigour slightly, as a result of increased vine competition, and this impact can be elevated with narrow interrow posts; this, in turn, will create narrower rows that are less dense, thus reducing disease pressure and the need for chemical intervention.

65. It is my opinion that viticulture is one of the most sustainable of all primary industry land uses. This view is shared by Dr Massey in his evidence regarding the sustainability of the wine industry in New Zealand. Comparatively, intensifying viticulture where vines are planted at between 3000 and 5000 vines per hectare compared with the traditional 1800 vines per hectare is much more sustainable than other primary industry land uses in terms of water use and leaching (viticulture is a low N and P leacher[23]).

66. Therefore, there is alignment between the intensification of viticulture (and the recognition of the economy within sustainable management) and the water quality objectives of PPC 9, as well as higher order directives of central government. Mr St Clair discusses this in further detail in his planning evidence before the Hearing Panel.

J. LAND USE CHANGE

67. PPC 9 seeks to manage the adverse effects of land-use change in relation to nitrogen loss and water use, which arose out of concerns about the lack of control over land use change creating additional risk to meeting water quality objectives.

68. As notified, I was concerned that PPC9 would restrict use of viticultural land, which already has negligible contaminant losses and would be unable to achieve the material reduction of contaminant loss at either an individual or industry level. In particular, I have concerns about land-use change from viticulture (low nitrogen loss) to other uses (higher nitrogen loss) being restricted and disincentivised, thereby potentially reducing the environmental gains which may arise from land-use change to viticulture.

[23] Paragraphs 40-42.

69. I understand that the section 42A report has recommended a change to Schedule 29 to include grape growing within the ambit of horticulture. The land-use types were previously separate, so that any increase in leaching would be from grapes to separate types of horticulture such as pip-fruit. The effect of the change to Schedule 29 from a land-use change perspective is that a change in use from irrigated vineyard to irrigated horticulture (excluding commercial vegetable growing) would not require consent as a change of land use. I support this change to PPC9.

70. The limiting factor to land-use change would then remain the actual and reasonable use of water (as I have described earlier in this evidence). A change from grapes to pip-fruit (for example, apples) would, I understand, require more water.

71. The sinking lid approach affects low water users by preventing such uses from obtaining more water than currently allocated. This effectively 'locks-in' low water users to their current use and prevents them from changing land use to meet operational needs or meet market demand. Not only does it affect low water users' ability to explore profitable alternative markets, but it also has a significant effect on the capital value of land (which can be tied to water allocations). It benefits users who have current high uses (either by the nature of their industry or poor water usage) while unduly restricting land uses with existing low water usage.

72. Current high water users would continue to have a high volume of water allocation and will more readily and easily be able to switch land uses or crops, whereas low users will be restricted in changing land use. This is an equity issue because it may have an undesirable consequence of locking in current low water users, potentially reducing the usability and value of their land. To provide an example, Villa Maria Estate recently looked to sell a parcel of land adjacent to, but not on the Gimblett Gravels. The land had previously been a stonefruit orchard in the 1990s but was converted to Organic Viticulture in the early 2000s. Villa Maria had farmed it as a vineyard for 20 years but had decided that it was not producing wines with the desired flavour profile. The decision was made to sell the land as there was value in the land being productive for other horticulture crops. However, Villa Maria was disadvantaged in sale negotiations due to several parties wanting to guarantee the original consent volume of water, despite actual use being more reflective of the viticulture land use. This is an example of how the current allocation method proposed in PPC9 may reduce land value and encourage water trading by default.

K. ZONE 1

73. PPC9 creates Zone 1 areas where groundwater takes are to be managed as if they are direct surface water takes. I understand that this is because the proximity of the zones to surface water means that they are assumed to be hydrologically connected to the river network. As a consequence, groundwater takes in Zone 1 are subject to the same or similar policies and rules as surface water takes.

74. There are some areas in the Gimblett Gravels which have been newly classified as Zone 1. The exact area is hard to determine as the maps provided are not in enough detail. There are also several vineyards that exist in pre-determined Zone 1 areas. The implications of being in Zone 1 is that vineyards in these areas do not have security of water. In the 2019/2020 season, as a result of drought, Pernod Ricard winemakers report that they had access to their bore water for only 15 days out of the 91 days between veraison and harvest. I understand that they supplemented their irrigation with water from an onsite dam. As detailed in Appendix A, vines require water during this time to expand the berries and accumulate sugar (ripen). Without alternative water use within this time the fruit would fail to ripen. Several of the newly created Zone 1 vineyards do not have the ability to create infrastructure on their vineyard to mitigate the impact of a cease take. They will be looking to join the replenishment scheme.

75. As discussed in Mark St Clair's planning evidence,[24] there is a disconnect in the approach to cease orders between surface water takes and groundwater takes within Zone 1. Groundwater takes within Zone 1 are not subject to a cease order where the user is part of a replenishment scheme. Ostensibly, this is similar to surface water takes where a cease order cannot be made against someone part of a replenishment scheme. However, a moratorium applies to cease orders for surface water takes until the replenishment scheme has been put in place. There is no corresponding moratorium for groundwater takes within Zone 1, meaning Zone 1 groundwater takes are treated more strictly than surface water takes; it is not an equivalent.

76. However, I understand that stream replenishment programmes will now be developed over time by Council and in consultation with key parties. This change (recommended

[24] Brief of Evidence of Mark St Clair at paragraphs 64 to 76.

as part of the section 42A report) is, in my opinion, positive and an outcome that HBWA and other winegrower submitters sought in submissions.

77. The exception is for those properties newly classified within Zone 1, which rely on the introduction of a stream replenishment stream to avoid a cease take. With no line of sight on when these schemes will be introduced (and what they look like), I am concerned that those vineyard operators in Zone 1 are left with a large amount of uncertainty over whether cease orders will apply and the potential implications for the future of their businesses and livelihood. I support the recommendations of Mr St Clair in evidence to address this issue.

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Emma Taylor

11 May 2021

M. APPENDIX A - summary of seasonal vine growth[25]

Canopy growth (October to mid-November): The energy for this stage is generated almost entirely by the usage of carbohydrates made the previous season and stored in the permanent structures of the vine (trunks, cordons, and roots). The amount of reserves available to fuel this stage depends on the photosynthesis done the previous season, and thus water limitations in one season carry over to the next. This stage is when the canopy develops, as shoots elongate, and leaves are made and expand. The size of the canopy directly affects the amount of light intercepted, and thus the amount of photosynthesis the vines are capable of doing. All of the cell expansion in the stem and leaves is driven by water uptake by cells. Water limitation at this stage will lead to stunted shoot growth with little leaf area, capable of ripening a limited amount of fruit, if any at all.[26] However, the larger the canopy created, the more water will be necessary to sustain it throughout the season.

Flowering to set (Mid November to December): This is probably the most critical period in the season, in that it largely determines productivity not only for the current season, but for the following one as well.[27] During this short period, pollination of the flowers occurs. These pollinated flowers develop into the grapes. Bunch initiation for the following season happens in the buds during this time, which determines the number and size of next season's potential bunches.[28] The energy to drive both of these processes is provided by photosynthesis from the now-developed canopy.

Set to veraison (December and January): During this stage, the fruit undergoes many rounds of cell division, an energetically intensive process. The sugars made from photosynthesis are used to fuel these divisions. The number of cell divisions determines the potential berry size, which in turn greatly affects yield. Cells in the fruit also expand during this stage, and their expansion is due to water influx into the berry cells.

Veraison to harvest (February through mid-April): This is the stage where the grape berries ripen. Sugar is rapidly accumulated, and in red grapes, anthocyanin pigments are made in the skin. The cells in the fruit expand from water influx, driven by the rapid accumulation of sugars. Again, photosynthesis produces the sugars that accumulated

[25] Goldammer, T. (2018).
[26] Shultz and Matthews, 1993.
[27] Vasconcelos et al., 2009, Matthews and Anderson, 1989.
[28] Vasconcelos et al., 2009.

in the fruit. Photosynthetic rates greatly increase at the onset of veraison, requiring more water to keep stomata open to gather carbon dioxide to sustain this raid burst of photosynthesis.[29]

Harvest to leaf fall (Mid-April through June): Once the fruit is harvested, the photosynthate made by the leaves is stored in the permanent structures of the vine. This carbohydrate will fuel the following season's budburst and early canopy growth. This storage process carries on until the leaves eventually senesce and fall off the vine, which then enters dormancy for the winter.

[29] Petrie et al., 2000.

BEFORE THE HEARINGS PANEL

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	Proposed Plan Change 9 – Tūtaekurī, Ahuriri, Ngaruroro and Karamū Catchments (TANK)
BETWEEN	**HAWKE'S BAY WINEGROWERS ASSOCIATION LIMITED; GIMBLETT GRAVELS WINEGROWERS ASSOCIATION; VILLA MARIA ESTATE LIMITED; PERNOD RICARD WINEMAKERS NEW ZEALAND LIMITED** (**collectively** "**THE WINEGROWERS**")
AND	**HAWKE'S BAY REGIONAL COUNCIL**

STATEMENT OF EVIDENCE OF FABIAN GEORGE YUKICH ON BEHALF OF THE WINEGROWERS

VITICULTURE INDUSTRY - BACKGROUND

11 MAY 2021

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A. INTRODUCTION

1. My name is Fabian George Yukich.

2. I am the Director of a wine industry consultancy business (Planina Advisory Limited), Director of Terra Vitae Vineyards, Director and Deputy Chair of New Zealand Winegrowers, Chair of the New Zealand Winegrowers Environment Committee, consultant and past director for Villa Maria Estate Limited. One of my responsibilities as Deputy Chair of New Zealand Winegrowers is engagement with the regions and involvement, where appropriate, in regional issues.

3. I have a Roseworthy Agricultural College Diploma in Wine.

4. My family have been involved in grape-growing and winemaking in New Zealand since the 1930s and were the founding family behind Montana Wines, planting the first modern day commercial vineyard in Marlborough in the 1970s. I started work in the vineyard at an early age and gained experience in all aspects of the domestic wine business by my 20s, when I enrolled in the wine diploma course at Roseworthy College in South Australia.

5. After working in the Barossa Valley Australia, I moved to a project management, then a winemaking role for Penfolds Wines in Gisborne. In 1998 I joined Villa Maria Estate to project-manage the build of their new Marlborough and Auckland Wineries. I was appointed to the Villa Maria board in 2006 and was heavily involved in all operational aspects of the business, including vineyards, wineries, and export sales. During my time at Villa Maria I have championed a progressive approach to sustainable practices, including our organic vineyard developments from 1999 and Carbon Emissions accounting from 2009.

6. In 2010, I won the Sustainable Business Network Champion Award and in 2012 Villa Maria was the overall supreme winner at both the Sustainable Business Network Awards and New Zealand Green Ribbon Awards. In 2017, I led the team that built the new Villa Maria Hawke's Bay Winery at State Highway 50, in the middle of Villa Maria's extensive (over 220 hectares) Gimblett Gravels vineyard holdings.

7. I was first elected to the board of New Zealand Winegrowers in 2012 and am now serving a sixth successive term, being elected Deputy Chair in 2020. At New Zealand Winegrowers, I have served on the advocacy, sustainability and marketing committees,

am a past chair of the marketing committee and chair of the Environment Committee since 2016.

8. My evidence provides further evidence to and supports the submissions of Hawke's Bay Winegrowers Association ("**HBWA**"), Gimblett Gravels Winegrowers Association ("**GGWA**"), Villa Maria Estate Limited ("**Villa Maria**") and Pernod Ricard Winemakers New Zealand Limited ("**PRW**") concerning Proposed Plan Change 9 ("**PPC9**") - Tūtaekurī, Ahuriri, Ngaruroro and Karamū Catchments ("**TANK"**). HBWA, GGWA, Villa Maria, and PRW are collectively referred to as the "**Winegrowers**" in this evidence.

B. SCOPE OF EVIDENCE

9. In this evidence I address the following matters:

   (a) The importance of Hawke's Bay as a winegrowing region in the regional, national and international setting;

   (b) Future opportunities for Hawke's Bay as a winegrowing region.

10. In preparing this evidence I have read and considered the section 42A report prepared in response to submissions on the PPC9 provisions, as well as relevant appendices and their reports. I have also read the relevant section 32 reports

C. EXECUTIVE SUMMARY

11. The importance of Hawke's Bay as a wine region has been recognised since the 1890s, and there has been considerable effort expended over the last 120 years in ensuring that that future potential of viticulture in the region over the long term is protected.

12. Hawke's Bay will have a critical role in serving the future needs for the wine industry, because it is able to ripen a wider range of grape varieties than anywhere else in New Zealand. The combination of topography, soils and climate in Hawke's Bay makes it unique as a wine growing region.

13. If PPC9 does not enable winegrowers to operate their vineyards with sufficient water to maintain and increase intensity, the expected result will be the decline of the existing wine industry through the attrition of vineyards through lack of water in dry years, and as the vines require redevelopment. This will lead to the loss of vineyard jobs and downstream employment in winemaking, packaging and wine tourism. There will also be loss of opportunity for land-use change to reduce catchment contaminant load, and

for climate change adaptation. These factors are critical matters for PPC9 to account for.

14. In my opinion, any regulatory environment must allow appropriate growth to occur so that the wine industry (and the communities that it supports) can take a long term view and plan for that investment in a sustainable way.

D. PROPOSED PLAN CHANGE 9 – TANK CATCHMENT

15. The grower and winery members of HBWA have a significant investment in land, vineyard and winery infrastructure, and share PPC9's objectives of providing a sustainable economic return whilst protecting water for future generations.

16. Current grape-growing practices mean vineyards are comparatively low water users and low N and P leachers. However, improvements made over the last decades equally means that vineyards have minimal room for further water use reductions if they are to remain viable or even survive through dry summers. In particular, the Gimblett Gravels, which has an international reputation for the quality of its red wines, will see vines die if they do not get sufficient water over the summer.

17. PPC9 provides some significant challenges for the viticulture industry, with reduced access to water, risk to production and vine health, reduced flexibility in delivery of its operations (including growth and adoption of new practices and technologies) and increased difficulty and cost of consenting existing viticulture within the region.

E. THE HAWKE'S BAY WINE INDUSTRY

18. Hawke's Bay is one of the ancestral homes of the New Zealand Wine Industry, and New Zealand's oldest wineries are located here.

19. New Zealand's first vines were planted in Hawke's Bay in 1851 by French missionaries who established the vineyard and winery known as Mission Estate. By the early 20th century Mission Estate, Te Mata Estate (1896), Vidal Estate (1905), McDonalds Winery (1897 – Church Road) and Glenvale Winery (1933 – Esk Valley Winery) had been established, cementing Hawke's Bay as a pioneering, innovative wine region.

20. In 1895, the Premier of New Zealand, Richard Seddon, invited Romeo Bragato, now widely regarded as the Prophet of the New Zealand Wine Industry, to report on the country's potential for winemaking. Bragato's report "Prospects for Viticulture in New

Zealand" was written after six months of intensive touring and is still valued as playing a pre-eminent role in the foundation of New Zealand's wine industry. Bragato declared that "*The Hawke's Bay Province is, in my opinion, the most suitable for growing vines I have visited*".

21. The central importance of Hawke's Bay to the New Zealand wine industry is that the region can produce unique world-class wines that are different to all the other New Zealand wine regions. It has a temperate climate, consistent sunshine, and an array of unique soils (the legacy of four major rivers' historic meanderings), which encourage diverse viticulture and wine styles. Hawke's Bay is known for its red blends and Chardonnay, but it also produces outstanding aromatic whites and excellent Syrah.

Vineyard locations

22. The vineyards of Hawke's Bay are located in five broad types of area: the coastal areas, hillsides, alluvial plains, river valleys, and central Hawke's Bay. Each area has unique soils and sub-climates, which enable a range of grapes to be grown.

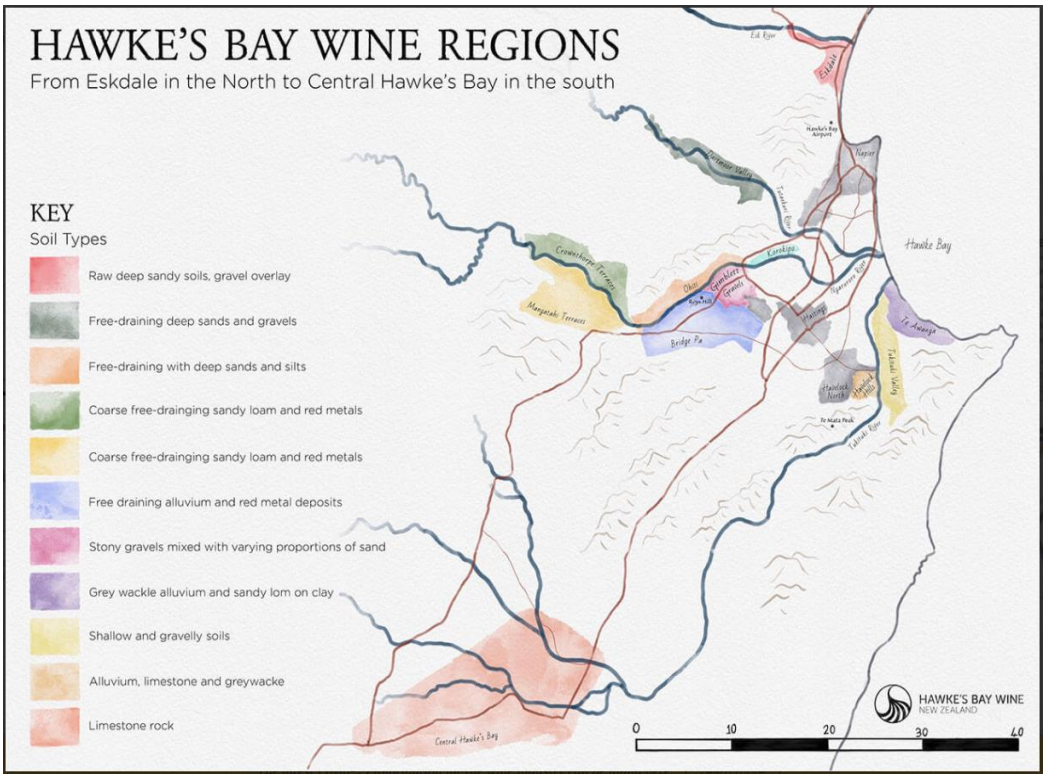

FIGURE 1: HAWKE'S BAY WINE REGIONS[1]

[1] Sourced from Hawke's Bay Wine: https://hawkesbaywine.co.nz/about/.

23. In New Zealand, it is important for a wine region to have the opportunity for growth to reach the scale needed for international success. Not only does Hawkes Bay produce wines of world class quality, given the right regulatory environment there is land available in a variety of locations to enable growth to meet increasing export demand.

Contribution to the economy

24. In the 12 months ending 30 June 2020, New Zealand wine exports totalled $1.92 billion.[2] Wine is New Zealand's sixth-largest export good and has seen substantial growth in the last 10 years, with the total export value increasing by almost $1 billion from 2010.[3] Major factors in New Zealand's export success have been quality, sustainability and regional diversity.

25. There are 100 wineries in Hawke's Bay. There are approximately 57 grape growers, with 4721 ha of land utilised for grape growing. As well as a large number of small boutique wineries, Hawke's Bay is also significantly invested in by five of New Zealand's largest wine companies, who represent 50% of all New Zealand wine exports.

26. In addition to wineries, Hawke's Bay also boasts one of New Zealand's largest wine bottling and logistics operations, with a cluster of wine industry suppliers providing further employment for over 100 people. In total, the Hawke's Bay Wine industry directly employs approximately 1,000 people.

27. The wine industry makes a significant contribution to the New Zealand economy. It provides employment in the primary sector, then adds value to that product by turning grapes into wine, providing further employment. Once bottled, the industry markets the wine, selling 85% of the output to international markets, enhancing our country's reputation and branding, with every bottle carrying a WINE OF NEW ZEALAND identification.

28. In the year ending 30 June 2020, Hawke's Bay produced 43,000 tons of grapes, making it the second largest wine producing region.[4] However, Hawke's Bay is a major producer of certain unique varieties, showing its value to New Zealand's wine industry. The

[2] New Zealand winegrowers Inc, annual report 2020, at page 3.
[3] New Zealand winegrowers, media release 26 November 2020.
[4] New Zealand winegrowers Inc, annual report 2020, at page 35.

following figures show the portion of several wine varieties produced in Hawke's Bay as a percentage of total New Zealand Production:

(a)	Chardonnay	30%
(b)	Merlot	95%
(c)	Cabernet Franc	80%
(d)	Malbec	79%
(e)	Syrah	90%

F. FUTURE OPPORTUNITIES FOR HAWKE'S BAY AS A WINEGROWING REGION

29. Importantly for the future, Hawke's Bay will have a critical role as its vineyards can produce a wider range of grape varieties than anywhere else in New Zealand. The combination of topography, soils and climate in Hawke's Bay makes it unique as a wine-growing region. By way of example, in the late 1980s/early 1990's Fraser Shingle Ltd applied for planning consent to turn a significant part of the Hawke's Bay Gimblett Gravels land into a shingle pit. In the landmark appeal against the Hastings District Council's decision not to grant the planning consent to extract the gravels, Justice Shepperd upheld the Council decision, noting that, "Land having the potential which the subject land possesses is scarce in the Hawke's Bay region; and this potential has particular value because of its significance for the export trade."[5]

30. The Hawke's Bay's focus on different wine styles needs to be seen in the context that 85% of NZ wine exports are Sauvignon Blanc. This is both a sign of success and a significant risk to the wine industry. A successful and thriving Hawke's Bay wine industry is one of the primary tools available to producers to enhance the diversity of the New Zealand wine offering and manage the risk of having all our eggs in one basket. Without Hawke's Bay, where would those varieties/styles come from?

31. The fact that Hawke's Bay can make world-class wines that are recognised internationally is critical to the future of New Zealand wine exports. White and red wines from Hawkes Bay continue to win prestigious national and international awards. In the last 10 years wines from the Gimblett Gravels alone have received 952 Gold

[5] *Fraser Shingle v Hastings District Council* W7/92.

medals and 322 Trophies in International and Domestic award judging. It is important to note that 52 Trophies and 194 gold medals were awarded in international competitions, against the best from the rest of the world.

32. In 2018, the New Zealand Winegrowers organisation commissioned Price Waterhouse Coopers to conduct a strategic review of the industry. The regional diversity of New Zealand's wines was one of the key strategic themes that the report said characterised and enhanced the New Zealand wine industry.

33. As the second largest wine region with a diverse offering, including the internationally recognised Gimblett Gravels sub-region, Hawke's Bay is integral to the New Zealand Wine industry's future success.

34. Wine tourism is an increasing focus of the New Zealand wine industry. Pre-COVID, twenty seven per cent of international tourists visited a winery when in New Zealand, amounting to over 700,000 tourists who spent $3.8 billion per year. Over a third of wineries sell only into the domestic market.

35. In Hawke's Bay, before COVID, there were up to 40 winery cellar doors open to the public (approximately 16% of the NZ total), and there are up to 20 winery restaurants or cafes operating. With Napier being a major port for cruise ships, wine tourism in Hawke's Bay add significant value to tourism within Hawke's Bay and to wine production generally, and should not be underestimated when international tourists return.

36. Confidence in the growth of the Hawke's Bay wine industry has also been evidenced by recent substantial investments in vineyards by Delegats and Apatu, and new wineries built by Villa Maria and Delegats, plus winery and bottling line expansion and cellar door redevelopment at Mission Estate. By way of example:

    (a) Craggy Range Winery has made a major $4 million investment in its wine tourism offering, with plans for a similar investment in winery expansion and recent replantings of 20% of its Gimblett Gravels vineyards. More vineyard redevelopment is proposed, but this is dependent on having sufficient water to support young plants (that require more water in the early stages). Ms Taylor discusses this further in her evidence before the Hearing Panel.

(b) Villa Maria has also recently embarked on a new vineyard development in the Hawke's Bay region that will lead to an expansion of the tank capacity at the new Gimblett Gravels winery.

(c) Further development of 280 hectares of vineyard is being planned by Links Winery, subject to water security. Investment in winery expansion will follow if the proposed vineyard is planted.

37. Another theme of the Price Waterhouse Strategic Review was the issue of land supply constraining future growth of the wine industry. The land supply issue particularly affected Marlborough, where winegrowers have been purchasing and growing grapes on as much productive land possible.

38. Therefore, with its unique viticultural qualities and increasing international reputation for high-quality wines, it is my opinion that Hawke's Bay is poised to be very much at the forefront of the continued export growth of the New Zealand wine industry and contribution to the country's employment and economy.

Constraints on growth

39. Although poised for growth (for reasons set out above), Hawke's Bay's vineyard area has been constrained in recent years by industry economics, lack of available land, lack of available groundwater, the failure of the Ruataniwha water storage scheme, and industry national investment priorities being focused on planting up the last available land in Marlborough.

40. The outcome of PPC9 will be a crucial factor in whether the Hawke's Bay wine industry will survive and grow in the future. If winegrowers needs are appropriately balanced in PPC9, I expect continued growth because the constraints on diffuse discharges should improve the relative attractiveness of grape growing due to the sector's relative water and nutrient use efficiency. Growth will depend on sufficient water being available for day to day vineyard operations all year round, including the dry season. Ms Taylor's evidence discusses water use in vineyards and the known efficiencies already existing within the industry.

41. In addition to its competitive advantage and the use of natural resources, climate change may also increase the attractiveness of grape growing in the cooler elevated

parts of Hawke's Bay. This will provide further impetus for land conversion to grape growing in areas that may otherwise not be productive.

42. Grape growing is a lower water user than other farming activities, however for a wine region such as Hawkes Bay to be truly internationally successful and sustainable as an industry, the area in vineyards needs to be able to expand to support the processing and brand building functions that are needed to achieve scale in export markets.

43. The Marlborough region is the best example of how scale helped the New Zealand wine industry become the sixth largest export earner. As the second largest wine region, Hawke's Bay has the attributes and the opportunity to repeat that success, however, for business to invest in developing grape growing land and winemaking infrastructure there needs to be security of water supply.

44. Winegrowing is also a low carbon land use alternative to pastoral farming, a factor that will become increasingly relevant to the wine industry's future prospects and needs as New Zealand transitions to a low carbon economy.

45. The Sustainable Winegrowing New Zealand ("**SWNZ**") initiative that was launched by New Zealand Winegrowers in 1995 has greatly enhanced our reputation as an environmentally responsible producer to our international customers. SWNZ, which is now based on the United Nations Sustainable Development Goals is a proven tool that winegrowers can use to continuously improve their environmental performance. In particular the SWNZ scorecard will be used to gather and benchmark data on water use and drive the industry to assisting New Zealand meet it low carbon economy targets. Dr Massey has provided evidence for HBWG on PPC9 regarding SWNZ.

46. If PPC9 does not enable winegrowers to operate their vineyards with sufficient water to maintain and increase intensity, the expected result will be the decline of the existing wine industry through the attrition of vineyards through lack of water in dry years, and as the vines require redevelopment. This will lead to the loss of vineyard jobs and downstream employment in winemaking, packaging and wine tourism. There will also be the loss of new entrants bringing innovation and new investment.

More significantly, there will be the loss of opportunity for land-use change to reduce catchment contaminant load and climate change adaptation. In particular, access to new high-flow storage will be a critical limiting factor to future wine industry growth.

Fabian Yukich

11 May 2021

BEFORE THE HEARINGS PANEL

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	Proposed Plan Change 9 – Tūtaekurī, Ahuriri, Ngaruroro and Karamū Catchments (TANK)
BETWEEN	**HAWKE'S BAY WINEGROWERS ASSOCIATION LIMITED; GIMBLETT GRAVELS WINEGROWERS ASSOCIATION; VILLA MARIA ESTATE LIMITED; PERNOD RICARD WINEMAKERS NEW ZEALAND LIMITED** (**collectively** "**THE WINEGROWERS**")
AND	**HAWKE'S BAY REGIONAL COUNCIL**

STATEMENT OF EVIDENCE OF MARK LESLIE ST.CLAIR ON BEHALF OF THE WINEGROWERS

PLANNING

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A. INTRODUCTION

1. My name is Mark Leslie St Clair.

2. I am a director of Hill Young Cooper Ltd, a Planning and Resource Management consultancy firm based in Wellington and Auckland.

3. My evidence is given on behalf of the Hawkes Bay Winegrowers Association ("**HBWG**") (Submission #29), Gimblett Gravels Winegrowers Association ("**GGWA**") (Submission #238), Pernod Ricard Winemakers New Zealand Limited ("**Pernod Ricard**") (Submission #194) and Villa Maria Estate Limited ("**Villa Maria**") (Submission #208). I have collectively referred to these submitters as "**Winegrowers**" throughout my evidence.

4. This evidence focuses on the planning matters arising from the proposed Plan Change 9 ("**PC9**") to the Hawkes Bay Regional Plan for the Tūtaekurī, Ahuriri, Ngaruroro and Karamū ("**TANK**") catchments.

B. QUALIFICATIONS

5. I hold a Bachelor of Resource and Environmental Planning, with first class honours, from Massey University.

6. I have more than 30 years' experience in planning practice in local government (Lower Hutt City Council and Manukau City Council), central government (Ministry for the Environment) and private practice (Connell Wagner, Manukau Consultants Ltd, GHD Ltd and Hill Young Cooper Ltd).

7. I also regularly sit as a commissioner on hearings for resource consents, plan changes and general policy development administered under the Resource Management Act 1991 ("**RMA**") and Local Government Act 2002. In 2020, I was appointed as a Freshwater Commissioner under s66 of the RMA.

8. I have annexed full details of my qualifications and my relevant past experience in **Appendix A** of my evidence.

C. CODE OF CONDUCT

9. I confirm that I have read and agree to comply with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014. I confirm that I have considered all the material facts that I am aware of that might alter or detract from the opinions that I express and that, except where I state I am relying on information provided by another party, the content of this evidence is within my area of expertise.

D. SCOPE OF EVIDENCE

10. The Winegrowers have filed submissions on PC9 – TANK and I have been asked by Winegrowers to provide expert evidence in relation to the planning matters arising.

11. In preparing this evidence I have read and considered the section 42A Hearing Report[1] prepared in response to submissions on the PC9 provisions, as well as relevant appendices and their reports. I have also read the section 32 evaluation report that accompanies the plan change.[2]

12. In this brief of evidence, I address the following matters:

    (a) Consideration of the relevant national planning instruments;

    (b) Provide an independent assessment of Winegrowers' key submission points relative to how those points have been addressed in the Section 42A Report.

13. In preparing my evidence, I have set out those parts of the Section 42A report and the relevant Winegrower submission points that apply.

E. EXECUTIVE SUMMARY

14. The submissions from Winegrowers address a large number of points as may be anticipated with Hawkes Bay being the second largest wine producing region in New Zealand. I have focused my evidence on the main issues raised by Winegrowers.

15. In relation to the relevant planning instruments I generally concur with the assessment of Officers as to the National Policy Statement Freshwater 2020 (NPSFM 2020) and as

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[1] Officer's s42A Hearing Report for PC9, prepared by Kim Anstey, Mary-Anne Baker, Anne Bradbury, Ellen Robotham and Kirsten Tebbutt.

[2] Section 32 Evaluation Report - TANK Catchments Plan Change to Regional Resource Management Plan – Change 9, 28 March 2020, prepared by Mitchell Daysh.

to the Regional Policy Statement (RPS), with the exception of some details, primarily in relation to water allocation.

16. I have addressed particular matters relating to Freshwater Farm Plans (FFP), Source Protection Zones (SPZ), the relationship of viticulture to primary production on versatile soils and the implications of the Zone 1 provisions for groundwater takes that are reclassified as surface water takes.

17. The major component of my evidence is on the policy framework of water allocation in relation to actual and reasonable use, and the Heretaunga Aquifer and surface water allocation regime. My assessment includes a section 32 critique as to changes to the definition of "Actual and Reasonable" in relation to "maximum" and "average", and the "least of either", concluding that the original analysis by Council officers ("**Officers**") was too broad with insufficient regard to the cost and benefits to viticulture.

18. I have proposed a number of amendments to the provisions proposed by Officers in the section 42A report. These changes are intended to address the issues I have raised in evidence. The amended provisions are set out throughout my evidence. In my opinion these changes will ensure that PC9 better meets the purpose of the plan change, the purpose of the Act, and the relevant Hawke's Bay Regional Resource Management Plan (**RRMP**) objectives, than the operative RRMP or PC9.

F. OVERVIEW OF THE WINEGROWERS' SUBMISSION

19. HBGW lodged a submission on PC9, along with a number of winegrowers (vineyards and wineries) within the Hawke's Bay region. A number of these submitters support the HBGW case before the Hearing Panel, with the issues raised by the parties broadly consistent, with differences mostly around matters of detail. I understand that HBGW will present its case to the Hearing Panel, with the support of a number of those individual submitters.

20. The primary issues raised through the submissions are:

    (a) Allocation and Flow Limits

        (i) Actual and Reasonable Use

        (ii) Stream depletion / maintenance requirements

(iii) Zone 1 requirements

(iv) High flow storage

(v) Frost protection

(b) Freshwater Farm Plans

(i) Industry Programmes/Catchment Collectives

(ii) Relationship to section 360 regulations

(c) Land Use Changes

(i) Locked-in to allocation limit (relationship to actual and reasonable use)

(ii) Limitations on land use change

(iii) Equity for efficient water users and users with low contaminant loss

(d) Source Protection Zones

21. Where the submissions remain an issue and/or require further elaboration for the Winegrowers', I discuss these matters in the evidence that follows. A number of submission points have been addressed by Officers in the section 42A Hearing Report and these are not considered further. In relation to any changes to the wording of the PPC 9 provisions I have included those in the body of my evidence. Similarly, I have a section 32AA analysis where I considered it necessary.

G. RELEVANT PLANNING INSTRUMENTS

22. Unless otherwise stated, I agree with the statutory framework described in the section 42A Hearing Report.[3]

National Policy Statement on Freshwater Management

[3] Officer's s42A Hearing Report for PC9, Paras 67 – 84.

23. The National Policy Statement on Freshwater Management was first gazetted in 2011[4]. It was replaced in 2014[5], updated in 2017 (though still referred to as the NPSFM 2014)[6] and again most recently replaced in 2020[7].

24. In terms of related sequencing, PC9 was notified on 2 May 2020, with the submission period closing on 14 August 2020. The NPSFM 2020 was approved by the Governor General on 3 August 2020 and came into force on 3 September 2020. The further submission period opened on 11 November 2020 and closed on 9 December 2020. I note that when PC9 was prepared and the original submission period was open, it was the NPSFM 2014 that was in place.

25. I also observe that, from a planning perspective, a further submission can only support or oppose an original submission[8], and that a further submission may not otherwise extend the relief sought by an original submission.

26. I concur with the assessment of the Officers in the section 42A Hearing Report, that the extent to which PC9 can 'give effect to' the NPSFM 2020, is limited by the scope of the submissions.[9] In this regard I have relied on the relevant case law as set out in the report of the Officers[10] and matters to be addressed in the legal submissions of Ms Johnston. As a result, any recommendations as to changes to PC9 so as to give effect to the NPSFM 2020, must be considered through the lens of the submissions.

27. I also concur with the Officers that PC9 does not need to give full effect to the NPSFM 2020 immediately and that it is for the Council to resolve any conflict between the RRMP and the NSPFM 2020 through the notification of a freshwater planning instrument by 31 December 2024.[11]

28. It is through these later freshwater planning processes that environmental outcomes, limits on resource use, environmental flows and levels and take limits for defined FMUs will be set in accordance with NPSFM 2020. The process prescribed under the NPSFM 2020 requires engagement with tangata whenua and communities, and application of

[4] Effective 1 July 2011.
[5] Effective 1 August 2014.
[6] Effective 7 September 2017.
[7] Effective 3 September 2020.
[8] RMA, First Schedule, Clause 8(2).
[9] Officer's s42A Hearing Report for PC9, Paras 55 – 56 and 123.
[10] ibid, Para 55.
[11] ibid, Paras 56 and 122.

the hierarchy of obligations within the fundamental concept of Te Mana o te Wai. I do not understand this work to have been completed as part of the PC9 process to date.

29. In relation to the Winegrowers' submission points, the particularly relevant matters of the NSPFM 2020 are:

    (a) the objective, which establishes the priorities by reference to which freshwater is to be managed;

    (b) Policy 11 as to efficiency of allocation and use, the phasing out of existing over allocation and the avoidance of future over allocation; and

    (c) Policy 15 that, *"Communities are enabled to provide for their social, economic, and cultural well-being in a way that is consistent with this National Policy Statement."*.

30. That said, in terms of PC9 as a whole, the other policies are relevant to the consideration of the Hearing Panel, as is the obligation to give effect to the NPSFM 2020[12] in making decisions on the submissions[13].

31. I would also note that the hierarchy within the objective of NPSFM 2020, which lists social, economic and cultural wellbeing as the third priority, does not alleviate the statutory obligation on the Regional Council to undertake an evaluation of costs and benefits under section 32 and section 32AA of the Act, and to determine which proposed provisions are the most appropriate on the basis of that evaluation.

Regional Policy Statement

32. The RRMP is a combined Regional Policy Statement (RPS) and regional plan. The RRMP was made operative in August 2006.

33. Plan Change 5[14] inserted chapter 3.1A into part 3 of the RRMP and introduced a number of objectives and policies[15]. The provisions in *Chapter 3.1A: Integrated Land Use and Freshwater Management* require catchment wide approaches for integrated management of freshwater and land use, including giving priority to maintaining or

[12] Section 67(3), Resource Management Act 1991.
[13] Clause 10, Schedule, Resource Management Act 1991.
[14] Operative 24 August 2019.
[15] OBJ LW1, OBJ LW2, OBJ LW3, POL LW1A, POL LW1, POL LW2, POL LW3, POL LW4.

enhancing, where appropriate, the values of the Heretaunga / Ahuriri Catchment Area when preparing regional plans.

34. I generally concur with the assessment of the Officers in the section 42A Hearing Report, that PC9 gives effect to RPS Chapter 3.1A[16]. My area of disagreement lies in the details of the approach to water allocation and some other matters, noting the objectives and policies of the RPS Chapter 3.1A applicable to winegrowing industry including, OBJ LW1 6. and 9. and POL LW1 iE) and j). As I have already noted, the approach to water allocation must also be evaluated through section 32 of the Act in order to assess the appropriateness of objectives and provisions.

35. I also concur with the assessment the Officers in the section 42A Hearing Report, that PC9 gives effect to the other relevant objectives in the RPS including OBJ 21, OBJ 22, OBJ 25, OBJ 27, and OBJ 27A[17].

H. Freshwater Farm Plans

36. Freshwater Farm Plans (FFPs) are addressed in the Section 42A Report at *Section 14.5 Farm Plans, Industry Programme and Catchment Collectives, POL TANK 23 – 27, Rules TANK 1 and 2 and Schedule 30 (pages 120 – 132).*

37. The Winegrower submission points applicable to these provisions are 29.13, 29.14, 29.37, 29.38, 29.49, 29.51, 29.59 – 29.61, 194.8, 194.15, 194.40 – 194.42, 194.78, 194.107 - 194.109.

38. In my view the Officers have set out fulsome assessment of the relevant provisions (as listed in paragraph 36 above) in terms of national direction on FFPs, industry programmes, catchment collectives and the farm size to which any rules should apply. From a planning perspective, it is my view that regulation as to FFPs needs;

    (a) to address the specific water quality objectives for the local environment in which the farming operation is located;

    (b) to align with the new national regulations[18] for the purpose of consistency and to reduce confusion for plan users;

[16] Officer's s42A Hearing Report for PC9, Paras 78-80.
[17] Officer's s42A Hearing Report for PC9, Para 81.
[18] Part 9A Resource Management Act 1991

(c) to provide for industry programmes to be developed to meet the outcomes sought by PC9, so as to provide a cost-effective approach for industry sectors;

(d) to apply appropriate time frames for the development and implementation of industry programmes, catchment collectives, and individual FFPs, as to priorities within various catchments.

39. The section 42A Hearing Report addresses the majority of matters in (a) through (d) above, but in my view, it does not go far enough with respect of matter (c) to address the cost effectiveness of an industry programme as identified in Dr Massey's evidence.[19] That said, in relation to matter (d) above, the amendments recommended by Officers do provide some flexibility for discussions/work between the Regional Council and NZW over the industry's needs[20] given the 3 year timeframe for implementation of Industry Programmes, Catchment Collectives and FFPs[21].

40. In the preparation of PC9, the Council has also prepared a draft implementation plan that sits outside the Plan Change itself. In my view this implementation plan is important in signalling how the Council's approach to address the identified significant resource management issues in the TANK catchments will be addressed.

41. The Officers, through recommended amendments to the policies, rules and schedules have set out, in my view a collaborative, flexible and effective approach as to mechanisms outside of rules, to address local water quality issues, that provide the opportunity for engagement with the winegrowing industry. I would also add that the more detail that can be agreed at an early stage the better, given the investment being sought in terms of FFPs, and the value that can be added through use of existing national programmes.

I. Source Protection Zones (SZP)

42. Source Protection Zones (SZPs) are addressed in the Section 42A Report at Section 17 Source Protection Zones, OBJ TANK 9, POL TANK 6 - 9, Rules 1 – 5, 7, 12, 14 -16, 37, 48 49 and the Source proception Zone Maps and Schedule 35. (pages 272 – 294).

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[19] Evidence in Chief (EIC), Dr E Massey, Para 40, 42-43.
[20] EIC, Dr E Massey, Para 44.
[21] Officer's s42A Hearing Report for PC9, Appendix 1A, Recommended Changes to PPC – Schedule 28.

43. The Winegrower submission points applicable to these provisions are 29.10, 29.39, 29.44, 29.56, 194.16, 194.22, 194.111, 208.07, 208.14, 208.17, 238.7, 238.14, and 238.19.

44. OBJ TANK 9 as recommended to be changed in Appendix 1 of Section 42A Report states:

> **OBJ TANK 9** Activities in source protection areas for Registered Drinking Water Supplies are managed to ensure that they do not cause source [203.4] water in these zones to become unsuitable for human consumption, and that risks to the supply of safe drinking water are appropriately managed.

45. In the Section 42A Report at paragraph 2230, Page 272, submission point 194.22 (along with other submission points) is recommended to be accepted:

> "… because these submission points support TANK OBJ 9 which helps achieve:
> l. section 5(2)(a)(b) and (c) of the RMA;
> m. the National Policy Statement for Freshwater Management; and
> n. the National Environment Standards for Sources of Human Drinking Water Regulations (2008)."

46. Submission point 194.22, states, "OBJ TANK 9 should be revised so that it is expressed as an outcome statement that responds to an identified resource management issue."

47. In my view, OBJ TANK 9, is not written as an outcome statement.[22] Rather, it is expressed as a policy, in that it directs how the activities in a SZP for Registered Drinking Water Supplies and risks to the supply of safe drinking water are to be managed. To address this matter, OBJ TANK 9 could be reworded as an outcome statement as follows:

> **OBJ TANK 9** Activities in source protection areas for Registered Drinking Water Supplies ~~are managed to ensure that they~~ do not cause source [203.4] water in these ~~zones~~ areas to become unsuitable for human consumption.~~, and that risks to the supply of safe drinking water are appropriately managed.~~

48. The final part of the objective relating to risk management is already addressed in POL TANK 6 b) (ii) and POL TANK 8 f) iv – vi[23] and does not need to be repeated in the

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[22] *Ngāti Kahungunu Iwi Inc v Hawkes Bay Regional Council* [2015] NZEnvC 50, at [42].

[23] I observe that in Appendix 1 to the Section 42A the sub parts of Report POL TANK 8 are labelled e) and f), whereas they should be labelled a) and b).

objective itself as risk management approach is for the purpose of achieving the objective. I recommend removing the word "zone" and replacing it with the word "area" for consistency of terminology within the objective. In recommending this amendment I have relied on Submission point 194.22.

49. POL TANK 8 sets out the matters to which Council will have consideration for applications for discharge of contaminants or to carry out a land use, or water use activities. This policy has been implemented by Rules relating to bores, feedlots, animal effluent and in relation to water takes.

50. In relation to vineyards, relying on the evidence of Mr Yukich[24] and Ms Taylor[25], FFPs would be an effective tool in managing land use activities where the discharge of contaminants (leaching) is of relatively low risk. FFPs for discharges and land uses, is an appropriate tool to demonstrate risk minimisation as part of the assessment. I note that Officers have recommended amendments to Schedule 28 which has been amended to make it clear that production land in a SPZ requires a FFP as high priority, namely to be prepared with three (3) years of the proposed plan becoming operative.[26]

51. In relation to water takes, RULES TANK 9 and 10 require the assessment of potential adverse effects on Registered Drinking Water Supplies arising from discharge activities (as opposed to land use). In my view, such provisions are appropriate.

J. Primary production on Versatile Soils

52. Primary production on versatile soils is addressed in the Section 42A Report at Section 15.2.2, OBJ TANK 16 (pages 170 – 172). The term "versatile land" is used in POL TANK 48 and 56. These provisions are addressed in the Section 42A Report at 15.4.8 (page 205 – 207) and at 15.5.5 (page 222-224). POL TANK 48 relates to water use or transfers and POL TANK 56 relates to water storage and augmentation. As such the use of the term "versatile land" in those provisions is not as relevant as it is to OBJ TANK 16 which is about priority order.

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[24] EIC, Mr F Yukich, Para 16.
[25] EIC, Ms E Taylor, Paras 41-42.
[26] Officer's s42A Hearing Report for PC9, Appendix 1A, Recommended Changes to PPC – Schedule 28 – Priority Catchments.

53. The Winegrower submission points applicable to these provisions are 29.7, 194.16, 194.28, 208.6, and 238.6.

54. OBJ TANK 16 as amended by the Officers' recommendation states:

OBJ TANK 16 ~~Subject to limits, targets and flow regimes established to meet the needs of the values for the water body, water quantity allocation management and processes ensure water allocation~~ Ground and surface water in the TANK Catchment is allocated, subject to limits, targets and flow regimes which provide for the values of each water body, [210.2, 132.83] in the following priority order:

a) ~~Water for~~ the ~~essential~~ reasonable domestic needs of people, livestock drinking and fire-fighting supply [13.8, 35.76, 195.28]~~;~~

b) ~~The allocation and reservation of water for~~ existing and future demand for domestic supply including marae and papakāinga, and municipal uses ~~supply~~ as described in HPUDS (2017) ~~can be met within the specified limits~~;

c) Primary production on versatile soils;

d) Other primary production~~,~~ [30.1] food processing, industrial and commercial end uses;

e) Other non-commercial end uses.

55. As I understand it, the issue for Winegrowers relates to uncertainty around the inclusion of viticulture in "c) Primary production on versatile soils".

56. The Section 42A Report, at paragraph 1277, states:

> 1277. 33 submission points are identical and request that 16(c) be amended to accord viticulture soils the same priority as versatile soils, and that 16(e) be amended to specify water bottling in the lowest priority use category. One submission point also makes a similar submission about versatile soils. I recommend rejecting these points and do not recommend any amendments to the objective. The definition of versatile soils in the RRMP glossary already includes highly productive viticulture soils. It is impractical to specify water bottling as lower priority due to difficulties defining the activity or identifying distinct adverse effects of water bottling from other beverage bottling activities.
>
> (Emphasis added)

57. I agree with the Officers that the RRMP glossary includes reference to viticulture, however, that reference is in the definition of "versatile land" and not a definition of "versatile soils". The definition for "versatile land" in the RRMP states:

> 9.254A **Versatile Land**

In relation to the Heretaunga Plains sub-region, means contiguous, flat to undulating terrain within the Heretaunga Plains sub-region that acts collectively to support regionally (and nationally) significant primary production and associated secondary services on the Heretaunga Plains, based around[4A]:

a) an exceptionally high proportion of versatile Class 1-3 soils (comprising almost 90%);

b) Class 7 soils that are internationally recognised as having very high value for viticultural production (comprising almost 7%);

c) its proximity to a cluster of national and international processing industries and associated qualified labour force; and

d) its proximity to the Port of Napier and other strategic transport networks providing efficient transport of produce.

(Footnote excluded)

58. In the RPS section of the RRMP, the term "versatile land" only appears in the provisions around urban sprawl containment in ISS UD2, OBJ UD1 – POL UD 1, POL UD 2, POL UD 3, MET UD1, MET UD3, AER UD1, AER UD5 and AER UD. The term "versatile land" or "versatile soil" does not appear in Regional Plan section of the RRMP.

59. In PC9 itself, the term "versatile land" only appears in POL TANK 48 c) and in POL TANK 56 c), as follows:

POL TANK 48 When considering any application to change the water use specified by a water permit, or to transfer a point of take to another point of take, ~~to consider~~ the Council will take into account:

a) changes to the nature, location, scale and intensity of effects on:

(i) total water use

(ii) specified minimum flows and levels or other water users' access to water

(iii) the water body values listed in Schedule 25 and in the objectives of this Plan

(iv) the patterns of water use over time, including changes from seasonal use to water use occurring throughout the year or changes from season to season

(v) water quality[132.77, 132.109, 195.69]

and will consider declining applications:

b) ~~declining applications~~ where the transfer is to another water quantity area ~~management zone~~ unless;

(i) new information provides more accurate specification of applicable zone boundaries;

(ii) where the lowland tributaries of the Karamū River are over-allocated, whether the transfer of water take from surface to groundwater provides a net beneficial effect on surface water flows;

c) ~~to~~ change/transfer water away from irrigation of the versatile land of the Heretaunga Plains for primary production especially food production, except where a change of use and/or transfer is for;

(i) a flow enhancement or ecosystem improvement scheme, subject to clause (a); or

(ii) the efficient delivery of water supplies and to meet the communities' human health needs for water supply, including for marae and papakāinga, subject to clause (a)[3.19]

d) ~~in~~ over-allocated quantity areas, to transfer allocated but unused water

e) ~~for~~ a change of use from frost protection to any other end use.
210.69

~~a) effects on specified minimum flows and levels or other water users' access to water resulting from any changes to the rates or volume of take;~~

~~b) any alteration to the nature, scale and location of adverse effects on the water body values listed in Schedule 25 and in the objectives of this Plan;~~

~~c) effects of the alteration to the patterns of water use over time, including changes from seasonal use to water use occurring throughout the year or changes from season to season;~~

~~d) except where a change of use and/or transfer is for the purpose of a flow enhancement or ecosystem improvement scheme, declining applications to transfer water away from irrigation end uses in order to protect water availability for the irrigation of the versatile land of the Heretaunga Plains for primary production especially the production of food;~~

~~e) in Water Quality Management Units that are over-allocated, ensuring that transfers do not result in increased water use and to prevent the transfer of allocated but unused water;~~

~~f) declining applications for a change of use from frost protection to any other end use;~~

~~g) enabling the transfer of a point of take and change of water use to municipal water supplies, including for marae and papakāinga , (not including transfer to industrial uses above 15m3/day) from any other use for the efficient delivery of water supplies and to meet the~~

~~communities' human health needs for water supply, subject to clause (b).~~

POL TANK 56 The Council will recognise beneficial effects of water storage and augmentation schemes, including water reticulation in the TANK catchments and out-of-stream- storage, and when considering applications for resource consent will take into account the nature and scale of the following criteria;

a) benefits for aquatic organisms and other values in Schedule 25 or in relation to the objectives of this plan in affected water bodies;
b) whether water availability is improved or the level to which the security of supply for water users isenhanced;
c) whether the proposal provides for the productive potential of un-irrigated land or addresses the adverse effects of water allocation limits on land and water users, especially in relation to primary production on versatile land;
d) whether the proposal provides benefits to downstream water bodies at times of low flows provided through releases from storage or the dam;
e) the nature and scale of potential ecosystem benefits provided by the design and management of the water storage structure, its margins and any associated wetlands;
f) benefits for other water users including recreational and cultural uses and any public health benefits;
g) other community benefits including improving community resilience to climate change;
h) whether the proposal provides for renewable electricity generation.

(emphasis added)

60. Whereas the term "versatile soil" only appears in OBJ TANK 16 c), as set out above.

61. As I understand the view of the reporting officers, the reason for their recommendation to reject the associated submission is that the matter is already addressed in the RRMP, rather than that viticulture is not, as a matter of principle, included in primary production on versatile soils. In my view, without the specific reference to viticulture, confusion around their inclusion remains due to the different uses of the terms "versatile soils" and "versatile land" within the Plan as a whole, including in PC9.

62. In order to address this matter, I recommend that Objective 16 be amended in the following manner (amendment shown in blue):

OBJ TANK 16 ~~Subject to limits, targets and flow regimes established to meet the needs of the values for the water body, water quantity allocation~~

~~management and processes ensure water allocation~~ Ground and surface water in the TANK Catchment is allocated, subject to limits, targets and flow regimes which provide for the values of each water body, [210.2, 132.83] in the following priority order:

a) ~~Water for~~ the ~~essential~~ reasonable domestic needs of people, livestock drinking and fire-fighting supply [13.8, 35.76, 195.28];
b) ~~The allocation and reservation of water for~~ existing and future demand for domestic supply including marae and papakāinga, and municipal uses ~~supply~~ as described in HPUDS (2017) ~~can be met within the specified limits~~;
c) Primary production on versatile soils and viticulture on other soils;
d) Other primary production, [30.1] food processing, industrial and commercial end uses;
e) Other non-commercial end uses.

63. In my view, this amendment would not affect the use of the term "versatile land" throughout the remainder of the RRMP and would clarify that viticulture is included within the c) priority order of OBJ TANK 16. I note that the Officer considered that viticultural land was included within the definition of "versatile land" in the RRMP and as such, I do not consider that any further analysis beyond the s32 report as at notification is required.

K. Water Allocation – Zone 1 – Policies and Rules

64. Zone 1 is an area on the PC9 maps (e.g. Ngaruroro Water Quantity Area – Schedule 31C map) where groundwater takes have been classified in the same manner as surface water takes due to the hydraulic connectivity between the groundwater take and the effect on the surface water body.[27] Zone 1 is referenced in POL TANK 43 b) and g), POL TANK 45 d), Rule TANK 10 and Schedule 31. A related policy to Zone 1 is POL TANK 39 regarding flow maintenance. These provisions are addressed in the Section 42A Hearing Report at paragraphs 1424 – 1444 (POL TANK 39), paragraphs 1497 – 1512 (POL TANK 43), paragraphs 1548 – 1561 (POL TANK 45) and paragraphs 1513 – 1532 (Schedule 31).

65. The Winegrower submission points applicable to these provisions are 29.25, 29.28, and 238.11.

[27] Officer's s42A Hearing Report for PC9, Para 1501.

66. As I understand it, Winegrowers concerns around the implication of Zone 1 provisions, is that those growers with groundwater takes in Zone 1[28] will now be classified as surface water takes and will be subject to cease takes during low flows in the adjacent water body, unless the winegrower is part of stream enhancement programme (POL TANK 45 d)).

67. I note that it is POL TANK 39 that would make provision for the mitigation of stream depletion effects and that this policy has been recommended to be amended by Officers in order to address the practical implementation of any such programme and in order to achieve OBJ TANK 17.[29] I concur with the assessment as to POL TANK 39.

68. However, the effect of POL TANK 45 d) means that growers with groundwater takes in Zone 1, are subject to cease takes without the ability to rely on the exemption provided by membership of a stream enhancement scheme. However, there are presently no stream enhancement schemes in existence, with the exception of the Twyford irrigators scheme. Ms Taylor has discussed the implications of this approach in her evidence[30] as it would apply to growers in the Gimblett Gravels area.

69. Ms Taylor refers to a number of winegrowers who would, on replacement of consents be, subject to RULE TANK 10 and stream depletion calculation and flow enhancement programmes within the Gimblett Gravels area.[31]

70. I understand that the existing water take and use consents for vineyards in the Gimblett Gravels area affected by Zone 1, expired on 31 May 2019. Those vineyards have applied for replacement consents and the processing of those applications is currently on hold. As such, when those applications are considered by the Council, the PC9 provisions will apply, namely TANK RULE 10. The consequence of this rule is that any replacement permit granted before a stream flow maintenance and habitat enhancement scheme was in place, would mean that those consent holders would be subject to cease take conditions.

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[28] Zone 1 covers existing takes which are subject to cease takes under POL33 of the RRMP where the takes are within 400m of a river. These are not covered by the HBWG and GGWA submissions. Rather it is only those takes beyond 400m of the river and now subject to Zone 1 provisions.
[29] Officer's s42A Hearing Report for PC9, Paras 1424 – 1444.
[30] EIC, Ms E Taylor, Para 74.
[31] EIC, Ms E Taylor, Para 75.

71. In order to address this matter, an amendment to RULE TANK 9 and 10 should be made to specify the cease take provisions would not apply to Zone 1 groundwater abstractors now classified as surface water abstractors until a stream flow maintenance and habitat enhancement scheme is in place. This would ensure that these rules reflected the changes, which I support, proposed by Officers around development and implementation of the schemes, in consultation with stakeholders and the community.

72. TANK RULES 9 and 10, in the matters of control/discretion, item 15 it states that; "*For takes from Zone 1 in the Ngaruroro and Tūtaekurī Water Quantity Areas review of permit and new conditions to be imposed in respect of contribution to a stream flow maintenance and habitat enhancement scheme, when applicable.*" (Recommended by Officers with tracked changes removed). The applicability referred to, is, as I understand it, at the time of that any replacement consent application is considered. As such if there was no stream flow maintenance and habitat enhancement scheme in place at that time, then the consent holder would be subject to any cease take when low flow limits are reached.

73. In order to address this issue, the policy could be amended in the following manner (relying on Submission 29.28)(amendment shown in blue):

POL TANK 45 When assessing applications to take water the Council will;

a) provide that the taking and use ~~abstraction~~ of water that has been taken and impounded or stored at times of high flow ~~and stored~~ and released for subsequent use, is not subject to allocation limits; [58.26]

b) require water meters to be installed for all water takes authorised by a water permit and water use to be recorded and reported via telemetry provided that telemetry will not normally be required where the consented rate of take is less than 5l/sec ~~or where there are technical limitations to its installation~~; [123.80, 203.19]

c) ensure water allocation from tributaries is accounted for within the total allocation limit for the relevant zone and that the total abstraction from any tributary does not exceed 30% of the MALF for that tributary unless otherwise specified in Schedule 31;

d) offset the stream depletion effects of any groundwater takes in Zone 1, that were not previously considered stream depleting, by managing them as if they were in the Heretaunga Plains Groundwater Quantity Area ~~Water Management Unit~~; and

(i) require contributions to an applicable lowland stream enhancement programme at a rate equivalent to the stream depletion effect consistent with ~~Policy~~ POL TANK 39 once such programmes are established and in effect;

or

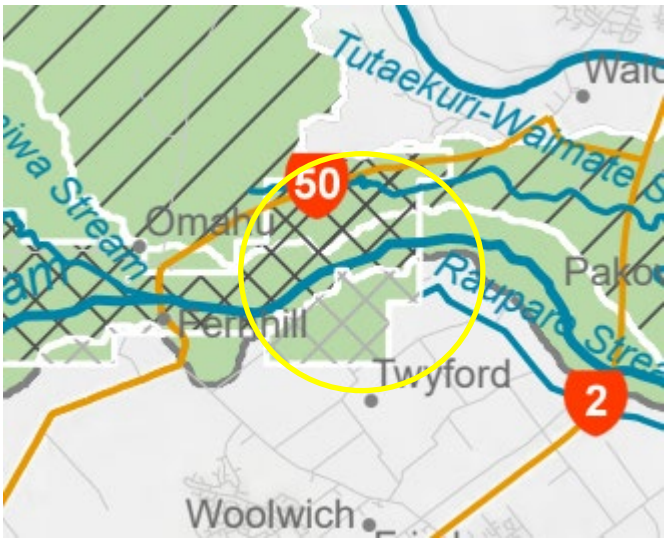
(ii) require the water take to cease when the minimum flow for the affected river is reached if a permit holder does not contribute under clause (i) where there is an applicable lowland streamenhancement; and

(iii) allow further technical assessments to determine the extent of stream depletion effect.

74. Amendments to rules RULE TANK 9 and 10 would not, in my view, be required. The current wording in the matters of control/discretion, item 15 states that; "*For takes from Zone 1 in the Ngaruroro and Tūtaekurī Water Quantity Areas review of permit and new conditions to be imposed in respect of contribution to a stream flow maintenance and habitat enhancement scheme, when applicable.*" In this case *"when applicable"* would mean when a stream flow maintenance and habitat enhancement scheme exists. Similar wording has been used by Officers in the additional wording for RULE TANK 9 and 10 in relation to written approval from affected persons and notification.[32]

75. In relation to the Ngaruroro Water Quantity Area – Schedule 31C Map I observe that there appears to be two (2) shades of hatching denoting the Zone 1 as shown in the excerpt of the map below.

[32] Officer's s42A Hearing Report for PC9, Appendix 1A Recommended Changes to Proposed Plan Change 9, Pages 46-52.



76. It is my understanding that the hatching should be the same to indicate Zone 1. This may have been a mapping issue in moving Zone 1 from Schedule 31E Map to Schedule 31C Map and could be addressed by Officers when settling the provisions.

L. Water Allocation – Actual and Reasonable and, Heretaunga Aquifer and Surface Water Allocations

77. The definition of "Actual and Reasonable" as it applies to water takes is central to the policy framework by establishing a sinking lid approach to controlling the allocation of water in the Heretaunga Plains aquifer and the various surface water bodies in the TANK plan change area. The Heretaunga Plains Groundwater Levels and Allocation limits are addressed in the Section 42A Report Section 15.3 (Pages 175 – 194) and the Surface Water flow management is addressed in Section 15.4 (Pages 194 – 217). The applicable rules are, RULE TANK 9 and 10 in Section 15.6.2 (Page 230- 234) and definition of Actual and Reasonable Use in section 15.6.17 (Page 253 – 256).

78. The Winegrower submission points applicable to these provisions are 29.3, 29.19, 29.20, 29.21, 29.22, 29.23, 208.9, 238.9, 29.50, 194.2, 194.44, 194.45, 194.47, 194.48, 194.49, 194.59, 194.64, 194.65 and 194.113.

Background to changes to definition of Actual and Reasonable

79. The definition of "Actual and Reasonable" at the time of notification of the plan change PC9 was as follows:

> **Actual and Reasonable** in relation to applications to take and use water means;

a) no more than the quantity specified on the permit due for renewal or any lesser amount applied for; and the least of either;

b) the maximum annual amount as measured by accurate water meter data in the ten years preceding 1 August 2017 for groundwater takes in the Heretaunga Plains Water Management Unit or in the preceding ten years preceding the 2 May 2020 as applicable elsewhere if accurate water meter data is available. (If insufficient or no accurate data is available either clause a) or c) will apply)

or

c) for irrigation takes, the quantity required to meet the modelled crop water demand for the irrigated area with an efficiency of application of no less than 80% as specified by the IRRICALC water demand model (if it is available for the crop and otherwise with an equivalent method), and to a 95% reliability of supply where the irrigated area is;

(i) no more than in the permit due for renewal, or any lesser amount applied for, and in the case of Heretaunga Plains Water Management Unit, is not more than the amount irrigated in the ten years preceding 1 August 2017; and

(ii) evidence is supplied to demonstrate that the area has, and can continue to be, irrigated and the permit substantially given effect to.

80. I note that the above definition set out that the water take volume was the least of either the maximum annual actual recorded water take for the 10 year period prior to 1 August 2017 or the quantity of water derived from the IRRRICALC water demand model.

81. The change to the definition, recommended by Officers, is as follows:

Actual and Reasonable in relation to applications to take and use water means;

a) no more than the quantity specified on the permit due for renewal or any lesser amount applied for; and the least of either;

b) the ~~maximum~~ average consequential annual amount as measured by accurate water meter data in the ten years preceding 2 May 2020 ~~1 August 2017 for groundwater takes in the Heretaunga Plains Water Management Unit or in the preceding ten years preceding the 2 May 2020 as applicable elsewhere~~[82.4] if accurate water meter data is available. (If insufficient or no accurate data is available either clause a) or c) will apply)

or

c) for irrigation takes, the quantity required to meet the modelled crop water demand for the irrigated area with an efficiency of application of no less than 80% as specified by the IRRICALC water demand model (if it is available for the crop and otherwise with an equivalent method), and to a 95% reliability of supply where the irrigated area is;

(i) no more than in the permit due for renewal, or any lesser amount applied for, and in the case of Heretaunga Plains ~~W~~Groundwater Quantity Area ~~Management Unit~~, is not more than the amount

irrigated in the ten years preceding 2 May 2020 ~~1 August 2017~~[82.5];and

(ii) evidence is supplied to demonstrate that the area has, and can continue to be, irrigated and the permit substantially given effect to.

82. This recommended change maintains the "least of either" structure to the definition, but amends the "annual actual recorded water take for the 10 year period prior", by changing "maximum" to "average"[33] and the date from "1 August 2017" to "2 May 2020" [34].

83. In terms of my evidence below, I firstly address the amendments to the definition in relation to the date change and the wording "average vs maximum", and secondly I turn to the "least of either" issue.

Changes to definition "Actual and Reasonable"

84. The first change within the definition is to the date, with a shift from the date from the ten years preceding 1 August 2017, to the ten years preceding 2 May 2020. I consider the reasoning for this amendment to have been thoroughly examined through submissions, and I concur with the assessment of the Officers in the section 42A Hearing Report that amendment to the date provides clarity for plan users, and aligns with the period of enforced water metering under the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 resulting in more accurate records of water use in recent years[35].

85. The second change is from the *"maximum annual amount"* to the *"annual average amount"* as measured by accurate water meter data. This is a consequential amendment recommend by Officers. The change is not supported by Dr Dark, with the averaging approach seriously constraining water use in dry years.[36] For reasons explained in Dr Dark's evidence, I support retention of the "maximum annual amount" within the definition to ensure reliable water supply for viticulture. I note that I could not readily locate any submission point seeking this change to an "averaging" approach. The consequential change will be addressed in legal submissions of Ms Johnston.

[33] Officer's s42A Hearing Report for PC9, para 2064.
[34] Officer's s42A Hearing Report for PC9, para 2063.
[35] Officer's s42A Hearing Report for PC9, para 2063.
[36] EIC, Dr A Dark, Para 27(f).

86. Further to the definition of actual and reasonable, the structure of the definition is in summary, "the least of either", the annual average of the previous 10 years of actual use or the quantity for the crop calculated using the IRRICALC water demand model.

87. Relying on the evidence of Ms Taylor[37] and Dr Dark[38], the "least of either" approach would result in reduced volumes of water relative to the volume required by existing vineyards in the TANK catchments.

Interim allocation limit

88. Before examining the 'averaging' change, it is important to revisit the interim 90Mm^3 allocation limit for the Heretaunga Plains Water Management Unit (HPWMU). The interim 90Mm^3 allocation limit is a modelled number based on irrigation area and an assessment of water use in 2012/2013, of which 90Mm^3 "*is considered to be sustainable in terms of the ability of the resource to recharge and maintain equilibrium"*.[39]

89. The policy intent of PC9 in terms of restricting the amount to be taken to the maximum annual water use in any one year within the 10 years preceding the notification of PC9 was to reduce the total allocated volume of 180 Mm^3 [40] to what is actual and reasonable, thereby creating a 'sinking lid' for total water allocation[41].

90. The definition of actual and reasonable, as notified, was measured on the basis of water meter records for the ten years' preceding 1 August 2017. This effective date set the standard for which future sustainable use was to be managed, with this data for the ten years' proceeding used as an input to groundwater model calculations[42].

91. However, since the publication of these reports, a further five years of data, overlapping with the period of enforced measurement and reporting, is now available. I refer to Figure 12 in Appendix 11 to the s42A Report which illustrates total groundwater pumping (Mm^3/year) per water cycle year between 2010/11 to 2019/2020. The data in the figure demonstrates that for the years 2010/2011 through to 2018/2019 inclusive, that total groundwater pumping is at or below 90Mm^3.

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[37] EIC, Ms E Taylor, Paras 52-56.
[38] EIC, Dr A Dark, Paras 16 and 27(h).
[39] Section 32 Report, Page 274.
[40] Appendix 11 of the S42A Report, Page 3.
[41] Section 32 Report, Page 267.
[42] Appendix 11 of the Section 42A Report, Page 20.

92. Total groundwater pumping for 2019/2020 is indicated to be above 105Mm^3. It is notable that the 2019/2020 drought event was longer and resulted in lower rainfall than the 2012-2013 event, and as a result, modelled and water meter data show a significant increase in water use during the 2019-2020 water year.[43] Dr Dark notes that there are no details in the Water Quantity memo,[44] as to how the 105Mm^3 was derived.[45]

93. As noted in the section 42A Hearing Report as justification for the change to 2 May 2020, there is now a minimum of four years actual use water data which is considered to be a better indicator of existing use than IRRICALC for irrigators.[46]

94. While I acknowledge that there are other factors that the Panel are required to consider, including environmental and cultural effects, in my view the s32 report has not provided adequate justification as to why 90Mm^3 was adopted as the interim limit, for the following reasons:

(a) the policy directive of POL TANK 36(g) - 'reducing existing levels of water use' fails to recognise that for the HPGQA the policy intent should focus on reduction of the allocation limit rather than water use, as the approach to groundwater allocation is evidentially based on cumulative consented volume rather than the cumulative consented actual and reasonable use.

(b) it is not apparent why POL TANK 37(a) references adoption of 'an interim allocation limit of 90Mm^3 based on actual and reasonable water use', given that this is a modelled number (i.e. not based on actual and reasonable use).

(c) it is noted in the s32 Report itself that "There is uncertainty that 90 million m^3 is reflective of actual and reasonable use until existing takes have been reviewed and quantified".[47]

Evaluation of changes to provisions

95. Returning to the consequential amendment from 'maximum' to 'average', I consider that this change should have been accompanied by s32 evaluation. The definition of

[43] Officer's s42A Hearing Report for PC9, Para 2064.
[44] Officer's s42A Hearing Report for PC9, Appendix 11.
[45] EIC, Dr A Dark, Paras 85-86.
[46] Officer's s42A Hearing Report for PC9, Para 2063.
[47] Section 32 Report, Page 274.

actual and reasonable has been inconsistently applied, and is not, in my view justified by s32AA analysis. This is a statutory requirement under the Act. Rather, the Officers appear to rely the requirement to give effect to the higher order documents, particularly in relation to the ability for the Council to phase out over-allocation.[48]

96. Section 32 and 32AA of the Act requires an evaluation of costs and benefits anticipated from the implementation of the provisions to determine which policy option is the most appropriate based on that evaluation. In terms of the provisions as notified, that evaluation is set out at section 8.75, Table 53 of the section 32 Report.[49] This section 32(2) and s32(1)(b) evaluation does not appear to have been updated as to any economic or social evaluation of the implications of setting an allocation limit below what is evidenced actual and reasonable use as per the 2019/2020 data. The existing evaluation in Table 53 is also at a high level only, with a focus on differences between allocation options as to actual and reasonable using the 2013 takes.

97. Relying on the evidence of Ms Taylor as to effects of lack of water for vines[50] and the evidence of Dr Dark as to the effect of the averaging in relation to the accessing the quantity of water required,[51] I understand that viticultural operations, including future intensification or development would be negatively impacted by the consequential averaging change. This evidence is supported by the views of Mr Yukich for the Winegrowers.[52] In my opinion, it is difficult to draw the conclusion that the consequential amendment is justified and in line with actual and reasonable water use, which applies to both groundwater and surface water takes.

98. In this case, it is my opinion that the section 32 analysis is too broad and that insufficient regard has been had to the cost and benefits to viticulture, particularly in terms of the approach to the reduction in the allocation water, which Dr Dark[53] and Ms Taylor[54] consider significant in terms of its impacts on viticulture. In part the reason for reaching this view, is that viticulture being a very efficient user of water means that its ability to

[48] Officer's s42A Hearing Report for PC9, Para 2064.
[49] Section 32 Report, Pages 288 – 293.
[50] EIC, Ms E Taylor, Paras 43-46.
[51] EIC, Dr A Dark, Paras 19-28.
[52] EIC, Mr F Yukich, Paras 29-46.
[53] EIC, Dr A Dark, Para 27(d).
[54] EIC, Ms E Taylor, Para 62.

improve its efficiency is limited. As such, it is an industry that is potentially more affected by uniform reductions across all users, with little room to change or adjust.

99. My concerns as to the adequacy of the section 32 analysis as set out above, is equally applicable in relation to the "least of either" structure of the definition of "Actual and Reasonable".

100. As identified in paragraph 94 above, the consequential change from "maximum" to "average" has not, as far as I have been able to ascertain, being the subject of a s32AA analysis.

101. I also observe that the section 32 analysis does not assess the differences between water users in relation to efficiency. Where all water users are treated equally in terms of actual and reasonable use, I would have anticipated the s32 assessment to address this matter as the provisions lock in the most efficient users, such as viticulture, with no opportunity for intensification on existing sites.

102. If the Panel were of the mind to amend the definition of "Actual and Reasonable" to address the issues I have identified above, then the following amendment may assist (my amendments to the notified version of PC9 in blue):

> **Actual and Reasonable** in relation to applications to take and use water means;
>
> d) no more than the quantity specified on the permit due for renewal or any lesser amount applied for; and ~~the least of~~ either;
>
> e) the maximum annual amount as measured by accurate water meter data in the ten years preceding 2 May 2020 [82.4] if accurate water meter data is available. (If insufficient or no accurate data is available either clause a) or c) will apply)
>
> or
>
> f) for irrigation takes, the quantity required to meet the modelled crop water demand for the irrigated area with an efficiency of application of no less than 80% as specified by the IRRICALC water demand model (if it is available for the crop and otherwise with an equivalent method), and to a 95% reliability of supply where the irrigated area is;
>
> (i) no more than in the permit due for renewal, or any lesser amount applied for, and in the case of Heretaunga Plains ~~W~~Groundwater Quantity Area ~~Management Unit~~, is not more than the amount irrigated in the ten years preceding 2 May 2020 ~~1 August 2017~~ [82.5]; and
>
> (ii) evidence is supplied to demonstrate that the area has, and can continue to be, irrigated and the permit substantially given effect to.

103. In **Appendix B** to my evidence, I have set out a section 32AA evaluation assessment in relation to this proposed change.

104. In addition, Ms Taylor, in evidence, raises the issue that the definition of "Actual and Reasonable" does not clarify when and how an alternative water demand model to IRIRCALC will be considered an adequate substitute.[55] I observe that the definition of "Actual and Reasonable", states *"… specified by the IRRICALC water demand model (if it is available for the crop and otherwise with an equivalent method*),". I also observe that Officers have recommended amendments to POL TANK 47 b) to clarify that alternative models to IRRICALC may be used.[56] POL TANK 47 b) is recommended by Officers to be amended to read as follows:

> b) using the IRRICALC water demand model ~~if available for the land use being applied for (~~or ~~otherwise by~~ a suitable equivalent approved by Council~~)~~[192.13] that utilises crop type, soil type and climatic conditions[8.44] to determine efficient water allocations for irrigation uses;

105. I note that the purpose of POL TANK 47 in relation to consideration of resource consent applications is to ensure water is allocated and used efficiently. It does not relate to, and has no direct linkage to, the definition of 'Actual and Reasonable Use'. In my view there is the potential to address the issue identified by Ms Taylor, through an amendment to the term 'Actual and Reasonable Use' that includes similar wording to the amendments recommended for POL TANK 47 b). This would include wording with reference to 'suitable equivalent approved by Council' and 'that utilises crop type, soil type and climatic conditions'.

M. OTHER MATTERS ON WATER QUANTITY

Storage and Controlled Release

106. In relation to OBJ TANK 18, submission point 29.8 sought explicit reference to controlled release from storage. OBJ TANK 18, as amended by Officers states:

> **OBJ TANK 18** The current and foreseeable water needs for mauri and ecosystem health and of future generations ~~and for mauri and ecosystem health~~[58.12] are secured through:

[55] EIC, Ms E Taylor, Para 56.
[56] Officer's s42A Hearing Report for PC9, Para 1580.

a) avoiding future over-allocation and phasing out existing over-allocation[123.39, 233.9]
b) ~~a)~~water conservation, water use efficiency, and innovations in technology and management;
c) ~~b)~~flexible water allocation and management regimes;
d) ~~c)~~water reticulation;
e) ~~d)~~aquifer recharge and flow enhancement;
f) ~~e)~~water harvesting and storage.

107. The Officers considered that the controlled release of stored water was implicit and did not require specific reference.[57] While I agree with the Officers that the water storage and harvesting would, all things being equal, include the release of any such water, I note that section 14 of the RMA states in summary, that no person may take, use, dam, or divert any water in a manner that a regional rule, unless expressly allowed for by way of a resource consent. While in this case the matter is in relation to an objective, relying on implicit interpretation is not in my view good plan drafting practice.

108. I recommend that OBJ TANK 18 be amended to include reference to controlled release of stored water. In my view this amendment does not require a s32AA evaluation beyond that published at the notification of the plan change. The objective would be worded as follows (amendment shown in blue):

OBJ TANK 18 The current and foreseeable water needs for mauri and ecosystem health and of future generations ~~and for mauri and ecosystem health~~[58.12] are secured through;

a) avoiding future over-allocation and phasing out existing over-allocation[123.39, 233.9]
b) ~~a)~~water conservation, water use efficiency, and innovations in technology and management;
c) ~~b)~~flexible water allocation and management regimes;
d) ~~c)~~water reticulation;
e) ~~d)~~aquifer recharge and flow enhancement;
f) ~~e)~~water harvesting ~~and~~, storage and controlled release.

[57] Officer's s42A Hearing Report for PC9, para 1308.

Frost Protection – POL TANK 53, RULE 11 and Schedule 31

109. In relation to POL TANK 53, submission point 194.47 sought an amendment to POL TANK 53 to recognise that takes for frost protection are excluded from the total allocation limits in Schedule 31. POL TANK 53, as amended by Officers states:

POL TANK 53 When considering applications to take water for frost protection, the Council will avoid, remedy or mitigate actual and potential effects of the take on its own or in combination with other water takes;

a) from groundwater in the Heretaunga Plains Groundwater Quantity Area ~~Water Management Unit~~ on;
   (i) neighbouring bores and existing water users;.
   (ii) connected surface water bodies;
   (iii) water quality as a result of any associated application of the water onto the ground where it might enter water;

b) from surface water on;
   (i) instantaneous flow in the surface water body;
   (ii) fish spawning and existing water users;
   (iii) applicable minimum flows during November to April;
   (iv) water quality as a result of any associated application of the water onto the ground where it might enter water;

By;

c) requiring applicants to demonstrate non-water reliant alternatives have been investigated and provide evidence as to why they are not appropriate; [8.45]

d) ~~c)~~taking into account any stream depletion effects of groundwater takes;
   ~~d)~~imposing limits in relation to minimum flows or groundwater levels;

110. The Officers' response to submission point 194.74, was as follows:

> 1695. One submission point highlights that there is a discrepancy between this policy and Rule 11, where this policy requires the application of minimum flows and Rule 11 excludes consideration of allocation limits and minimum flows in Schedule 31. I recommend consequential amendments to Rule 11 to rectify this discrepancy.

111. The Officers' consequential amendment to the relevant part of RULE TANK 11, Conditions/Standards/Terms; is as follows:

> The activity does not comply with the conditions of Rules TANK 7, TANK 8, [203.23] TANK 9 or TANK 10 where relevant. [129.15]
>
> Either
>
> (a) The application is either for the continuation of a water take and use previously authorised in a permit that was issued before 2 May 2020

or is a joint or global application that replaces these existing water permits previously held separately or individually~~ in the following Management Units (quantity);~~

~~(i) Ahuriri~~

~~(ii) Poukawa~~

~~(iii) Ngaruroro groundwater~~

~~(iv) Tūtaekurī groundwater~~

~~(v) Heretaunga Plains~~

~~(vi)~~

Or

(b) The total amount taken, either by itself or in combination with other authorised takes in the same water quantity area ~~management unit~~ does not cause the total allocation limit in the relevant quantity area ~~management unit~~ as specified in Schedule 31 to be exceeded~~ except this clause does not apply to takes for:~~

or

(c) The take is for:

(i) frost protection; or[194.74]

(ii) takes of water ~~associated with and~~ from or[123.106] dependant on release of water from a water storage impoundment, or managed aquifer recharge scheme[29.42]~~.~~; or

Water takes that are non-consumptive.[129.16, 203.23]

112. I see the policy to rule framework differently in this case. POL TANK 53 at b)(iii) refers to the applicable minimum flows during November to April. I understand that this drafting was specific so as to not include the frost season which is August to October and a time at which minimum flows do not usually occur. In addition, POL TANK 53 only applies to the Council in consideration of any resource application. POL TANK 53 does not direct the allocation framework. Rather that framework is provided through Schedule 31 and the definition of 'Allocation limit for Groundwater' which excludes frost protection from allocation limits. The definition of 'Allocation limit for Groundwater' states (as amended by Officers):

> **Allocation limit for ~~G~~groundwater** means the maximum quantity that is able to be allocated in water permits and abstracted during each year, expressed in cubic metres per year, and is calculated as the sum of maximum water permit allocations for the groundwater zone. Allocations for irrigation will be calculated on the basis of the irrigation period of November- May. The Heretaunga Plains Water Management Unit groundwater allocation limit will be addition to water taken and used for frost protection which is expressed as an instantaneous take in litres per second and calculated as the sum of water permit allocations.

113. If the Panel were of the mind to amend the proposed plan to address this issue, then the RULE TANK 11, Conditions/Standards/Terms in relation to the exclusion of frost

protection could be amended as follows (no amendment reverts closer to notified version, hence no additions shown in blue):

> (b) The total amount taken, either by itself or in combination with other authorised takes in the same water quantity area ~~management unit~~ does not cause the total allocation limit in the relevant quantity area ~~management unit~~ as specified in Schedule 31 to be exceeded except this clause does not apply to takes for:
>
> (i) frost protection; or
>
> (ii) takes of water ~~associated with and~~ from or dependant on release of water from a water storage impoundment, or managed aquifer recharge scheme; or
>
> (iii) water takes that are non-consumptive.

N. Land Use Change

114. PC9, as amended by Officers' recommended changes, through POL TANK 21 seeks to regulate changes in production land use, to manage the potential impacts of increases in the diffuse discharges of nitrogen. That policy is implemented by RULES TANK 5 and 6 which, require resource consent application as a controlled and restricted discretionary activity for land use changes greater than 10Ha. Associated with RULES TANK 5 and 6 is Schedule 29, which, following Officers' recommended amendments, sets out a table of land uses from high N leaching to low N leaching. The section 42A Hearing Report addresses these provisions at paragraphs 763 – 825.

115. The Winegrower submission points applicable to these provisions are 29.12, 29.15, 29.26, 29.4, 29.48, 29.62, 194.39, 194.79 - 194.82, 194.105, 194.106 and 238.8, 238.12 and 238.13.

116. As I understand the submissions of the Winegrowers, the concern of the industry is that as a low risk N leaching land use activity,[58] land used for that purpose is unable to change to a use that is of a higher leaching rate. This issue has been responded to in part by Officers recommending that grapes be included at the same level as other horticultural crops in the amended Schedule 29.[59] As an example, the change to Schedule 29 means that a change from an irrigated vineyard to irrigated horticulture (excluding commercial vegetable growing) would not require consent under RULE TANK 5 or 6. I understand that this change is supported by HBWG.[60]

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[58] EIC, Ms E Taylor, Paras 41-42.
[59] Officer's s42A Hearing Report for PC9, para 816.
[60] EIC, Ms E Taylor, Para 69.

117. The limiting factor for winegrowers contemplating such a land use change would be access to water. A change from grapes to pip-fruit (apples) would, I understand, require more water than grapes. Therefore, as set out in section L Water Allocation – Actual and Reasonable Use and, Heretaunga Aquifer and Surface Water Allocations of my evidence, it is the limit set by the actual and reasonable use of water that would constrain any such change. This reinforces viticulture concerns around limit setting.

Mark St.Clair

11 May 2021

O. APPENDIX A

Appendix A – Qualifications and Relevant Experience

- New Zealand Certificate in Town and Country Planning Draughting 1984;
- Bachelor of Resource and Environmental Planning, First class honours, Massey University 1994.

Professional Membership

- Full member of the New Zealand Planning Institute 1996.
- New Zealand Planning Institute Distinguished Service Award 2018.

My relevant past experience includes:

- Special Advisor – Environment Court of New Zealand – Plan Chances 1, 7 and 8 Otago Regional Plans (2020 - 2021);
- Commissioner (Sole) – Palmerston North City Council and Manawatū Whanganui Regional Council – Hoult Quarry (2020 - 2021);
- Expert Witness – Hawkes Bay Winegrowers Association, Gimblett Gravels Winegrowers Association and Pernod Ricard Winemakers New Zealand Limited – Water Conservation Order Ngaruroro and Clive Rivers (2018 – 2020);
- Policy Advisor – Manawatū Whanganui Regional Council – NPS-FM 2020 Implementation Programme Farming (2020);
- Expert Witness - Pernod Ricard Winemakers New Zealand Limited – Hawkes Bay Regional Council proposed Plan Change 7, Outstanding Water Bodies (2020);
- Providing planning and resource management services to Winegrowers and individual winegrowing entities such as Pernod Ricard Winemakers New Zealand Limited, Dry River Wines, Schubert Wines – Preparation of resource consent applications for water take and use, discharge permits and activities in the beds of lakes and rivers;
- Section 87F Reporting officer, Manawatu Wanganui Regional Council for Waka Kotahi NZ Transport Agency for Te Ahu a Turanga: Manawatū-Tararua Highway (2019-2020);
- Expert Witness – Golden Bay Cement – Submissions on Marlborough Environmental Management Plan (2018);
- Commissioner (Chair) – Greater Wellington Regional Council – Proposed Natural Resources Plan (2017-19);
- Policy Advisor – Manawatū Wanganui Regional Council - Section 35: Intensive Farming (2018);
- Expert Witness – PEPANZ – South Taranaki District Council, District Plan Appeals (2018-2020);
- Section 87F officer – Manawatū Wanganui Regional Council for Horowhenua District Council Foxton Wastewater Treatment Plant applications (2017-19);
- Commissioner (Chair) – Nelson City Council – Calwell Slipway Remediation Project (2016);

- Commissioner (Chair) – Gisborne District Council – Makauri Aquifer Recharge Project (2016);
- Section 42A officer – Horizons Regional Council for Manawatū Wanganui Regional Council Lake Horowhenua Weed Harvesting, Fish Pass and Sediment Trap applications (2015);
- Section 42A officer – Manawatū Wanganui Regional Council for Midwest Disposals Ltd Bonny Glen Landfill Extension applications (2014/15);
- Facilitator Pre-hearing meeting – Manawatū Wanganui Regional Council, s128 review of Palmerston North City Council, Wastewater Treatment Plant (2014);
- Advisor/Expert Witness – Planner to Board of Inquiry for Tukituki Catchment Proposal (HBRC Plan Change 6 and the Ruataniwha Water Storage Project) (2013/14);
- Friend of Submitter – Environmental Protection Authority, NZTA Basin Bridge Proposal – Notice of Requirements and Resource Consent (2013/14);
- Commissioner (Chair) – Manawatū Wanganui Regional Council, Hunterville Wastewater Treatment Plant discharge permit application (2013);
- Advisor – Environmental Protection Authority, completeness check for RMA applications for Ruataniwha Water Storage Scheme (2012/13).

P. APPENDIX B

Appendix B – Section 32AA evaluation

Provision	Evaluation
The 32(1)(a) The evaluation report must examine the extent to which the objectives of the proposed changes are the most appropriate way to achieve the purpose of the RMA;	The proposed changes to the definition of "Actual and Reasonable Use" do not conflict with the objectives (OBJ TANK 16, 17 and 18) of PC9 and they remain the most appropriate way to achieve the purpose of the RMA, as well as the NPSFM 2020.
32(1)(b) The evaluation report must examine whether the proposed provisions are the most appropriate way to achieve the objectives by reference to other reasonably practicable options and assessing the efficiency and effectiveness of the proposed changes in achieving the objective;	I consider the proposed change to the definition is the most efficient and effective to achieve the objectives (OBJ TANK 16, 17 and 18) of PC9. The relevant policies being POL TANK 37, 43, 44, 46 and 50 with reference to actual and reasonable use. The change provides a practical option for the maintenance of viticultural operations through the access to water required for that industry, while providing for the continuation of reducing over allocation through minimum flows for surface water and, an interim limit and review for groundwater. When considered against the recommended amendment in the s42A Hearing Report, it is my view that the change is the most practicable option.
32(1)(c) The evaluation report must contain a level of detail that corresponds to the scale and significance of the environmental, economic, social, and cultural effects that are anticipated from implementation of the proposed changes;	The change to the definition addresses the matters raised in my evidence as to the broad approach of the s32 evaluation and the lack of specificity in terms of the impacts on viticulture[61] relying on the evidence of Ms Taylor and Dr Dark. The change maintains the economic and cultural benefits of the winegrowing industry while providing for progress to be made on the over allocation of water.

[61] Paragraphs 92-98

32(2)(a) –(c) The assessment under (1)(b)(ii) must identify and assess the benefits and costs of the environmental, economic, social, and cultural effects that are anticipated from implementation of the proposed changes, including opportunities for economic growth that are anticipated and employment; quantify the benefits and costs identified (if practicable); and assess the risk of acting or not acting if there is uncertain or insufficient information about the subject matter of the proposed changes;	The commentary above is also relevant to this aspect of the s32 evaluation. The change to the definition addresses the matters raised in my evidence as to the broad approach of the s32 evaluation and the lack of specificity in terms of the impacts on viticulture[62] relying on the evidence of Ms Taylor and Dr Dark. The change maintains the economic and cultural benefits of the winegrowing industry while providing for progress to be made on the over allocation of water.

[62] Paragraphs 92-98

19, 238, 194, 208 / 3

BEFORE THE HEARINGS PANEL

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	Proposed Plan Change 9 – Tūtaekurī, Ahuriri, Ngaruroro and Karamū Catchments (TANK)
BETWEEN	**HAWKES BAY WINEGROWERS ASSOCIATION LIMITED; GIMBLETT GRAVELS WINEGROWERS ASSOCIATION; VILLA MARIA ESTATE LIMITED; PERNOD RICARD WINEMAKERS NEW ZEALAND LIMITED** (**collectively "THE WINEGROWERS"**)
AND	**HAWKES BAY REGIONAL COUNCIL**

LEGAL SUBMISSIONS FOR THE WINEGROWERS

9 June 2021

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A. INTRODUCTION

[1] These legal submissions are provided in relation to proposed Plan Change 9 ("**PPC9**") to the Hawke's Bay Regional Resource Management Plan ("**RRMP**"). They made on behalf of Hawkes Bay Winegrowers Association ("**HBWA**"), Gimblett Gravels Winegrowers Association ("**GGWA**"), Pernod Ricard Winemakers New Zealand Limited ("**Pernod Ricard**") and Villa Maria Estate Limited ("**Villa Maria**"), who are collectively referred to as the "**Winegrowers**".

[2] Together the Winegrowers seek the same fundamental outcomes from the hearing process – that viticulture activities have sufficient water allocation to enable them to continue to operate and develop in a sustainable and viable manner, with a compliance framework that is appropriate at an industry level utilising existing programmes.

[3] PPC9 proposes a package of objectives, policies and rules that reform land and water use in the TANK Catchments. It includes changes relating to water quality and water quantity. The Winegrowers are primarily concerned with those provisions that seek to reduce the over allocation of water takes within the TANK Catchments. Under the PPC9 water allocation framework, new water take applications are prohibited and existing water takes will be limited to the user's "Actual and Reasonable" water use.

[4] Winegrowers are responsible water users. In many respects, the water quantity objectives of PPC9 to reduce the overallocation of water takes and effects of groundwater takes on stream depletion align with viticulture industry best practice.

[5] The Winegrowers are therefore, generally supportive of the overall intent of the notified version of PPC9 as it relates to management of the overallocated TANK Catchments. However, they are also seeking a number of amendments to either better reflect that intent or improve its workability for viticulture operations in Hawkes Bay.

[6] Accordingly, these submissions focus on the key legal issues relevant to the Winegrowers arising out of PPC9's proposed provisions, the section 42A reports and subsequent reply evidence of Council officers ("**Officers**") and technical experts.

[7] These issues are:

(a) The conservative approach to allocation limits and minimum flows, particularly given the limited section 32 analysis justifying those restrictions with respect to the impact of PPC9 on viticulture in the Hawke's Bay.

(b) The need for any "Actual and Reasonable" approach to accurately represent viticulture water use, so as to:

(i) avoid a substantial reduction (less than recent years) in the water available to grape growing operations; and

(ii) ensure sufficient allocation to meet current and future irrigation needs of viticulture operations within the Hawkes Bay.

(c) The need for the policy approach to have regard to efficiency of water users within the TANK Catchments, with the net result that not all users will necessarily be treated the same and a consenting pathway is available where efficient water use may not necessarily result in reduced water demand.

(d) The workability of requirements for farm plans, industry programmes and catchment collectives when having regard to existing national programmes such as Sustainable Winegrowing New Zealand ("**SWNZ**"), and the need for alignment (equivalence) between those programmes and the requirements within Schedule 30 of PPC9.

(e) Greater clarity around:

(i) the application of minimum flows and/or cease take restrictions, including with respect to groundwater; and

(ii) requirements to cease groundwater abstraction when a stream maintenance trigger was reached or engage in a streamflow maintenance and habitat enhancement scheme.

[8] It is acknowledged that some of these submission points have been addressed wholly or in part through the section 42A collective response to submissions. They are identified so as to ensure that the Hearing Panel is aware of the importance of these matters to the Winegrowers. In other instances, changes sought by the Winegrowers

through original submissions have not been accepted or addressed substantively by Officers. Some of these matters will be canvassed further in these submissions.

[9] The Winegrowers submissions and further submissions cover a range of matters which are the subject of this hearing process. Notwithstanding that the evidence and legal submissions focus on some of the more critical issues for the Winegrowers – principally water allocation limits – unless otherwise stated, the Winegrowers maintain the relief sought within the original and further submissions.

Evidence

[10] The Winegrowers have provided the following evidenced in support of its submissions:

(a) Fabian Yukich, who provides evidence on Hawke's Bay as a winegrowing region in the regional, national and international setting, and future opportunities.

(b) Emma Taylor, Viticulturist. Ms Taylor gives evidence on viticulture in the Hawkes Bay, the use of water, including irrigation on vineyards, and the implications of water shortage to grape growing and winemaking practices.

(c) Dr Edwin Massey, who is employed as the General Manager, Sustainability at New Zealand Winegrowers. Dr Massey gives evidence on SWNZ, its role within, and benefits for, the viticulture industry and its interplay with PPC9.

(d) Dr Andrew Dark, Water Resource Engineer. Dr Dark provides expert evidence on the water allocation regime in PPC9 including the definition of "Actual and Reasonable" use and its reliance on measured and modelled water demands.

(e) Mark St Clair, Planner. Mr St Clair provides a planning assessment of some of the key changes sought by the Winegrowers.

B. BACKGROUND

[11] Before turning to the issues set out above, by way of background, it is useful to refer to the evidence of Mr Yukich, Dr Massey and Ms Taylor, which explains that:

(a) Grapes within Hawke's Bay are typically grown on the free-draining lighter soils found closer to rivers, including the Ngaruroro. The Gimblett Gravels and

Bridge Pa, by way of example, are located on alluvial plains and remain closely connected to the Ngaruroro river system.

(b) Because vineyards within the TANK Catchments are located on lighter free draining soils, irrigation is an essential tool in the Hawke's Bay viticulturalist's toolbox to maintain vine health and productivity.

(c) Adequate water is critical to the Winegrowers operations. Because new vines have limited production, significant upfront investment and time is required before a vineyard is commercially viable. Damage to vines due to water stress has the potential not only to affect the current year's production (in the case of producing vines), but to have longer term consequences for future years.

(d) Viticulture operations run efficient systems, particularly irrigation systems, which sees low water use by viticulture relative to other land uses;

(e) Significant investment has already (voluntarily) been made by the viticulture industry in increasing the efficiency of its irrigation infrastructure and soil moisture monitoring. On-vineyard management is in many cases already at industry agreed 'best practice'.

(f) Given the above, it will typically be very difficult for viticulture to further reduce water consumption without significant implications for its vineyard operations.

[12] The Winegrowers are concerned that PPC9's method of allocating water takes for irrigation has the potential to impact the present viability of vineyards given heavy reliance on irrigation regimes, particularly during drought years, and effectively lock vineyards into already existing low levels of water use. A consequence of this is that growth and investment in Hawke's Bay's important wine industry will be discouraged.

[13] With that backdrop, the Winegrowers also have specific interest in several other changes made by PPC9 concerning Schedule 30, Source Protection Zones, management of Zone 1 activities and land use changes. Along with the allocation limits, all of these proposed regulatory changes directly impact day to day viticulture operations.

C. SCOPE OF SUBMISSIONS

[14] These submissions are structured as follows:

(a) Statutory Framework;

(b) Water Allocation;

(c) Interim Limit;

(d) Industry Programmes;

(e) Other Matters; and

(f) Conclusion.

D. STATUTORY FRAMEWORK

[15] The Panel will be familiar with the statutory framework for plan changes in Schedule 1 and Part 5 of the Resource Management Act 1991 ("**RMA**" or "**Act**").[1] This framework is well traversed in the Regional Council's opening legal submissions.

[16] For completeness, under section 66 RMA, when changing a regional plan, a regional council must consider its functions under section 30 and Part 2. Under section 67, a regional plan must give effect to the New Zealand Coastal Policy Statement ("**NZCPS**"), any national policy statement and any regional policy statement ("**RPS**").

[17] The approach has been described as essentially a two-step process involving, first, a consideration of whether the plan addresses all the relevant mandatory requirements in the RMA, followed by a section 32 evaluation of the provisions.

[18] The purpose of PPC9 is to provide a regulatory decision-making framework for the TANK Catchments in conjunction with existing provisions in the regional plan component of the RRMP. No changes are proposed to the RPS sections of the RRMP.

[19] The Section 32 Evaluation Report[2] describes the need to respond to Plan Change 5 to the RRMP by inserting provisions relating to a catchment wide integrated management approach for the Greater Heretaunga / Ahuriri Catchment[3] area so as to recognise and

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[1] The relevant provisions being ss 63 – 70 RMA, because PPC9 does not propose any amendments to the Hawke's Bay Regional Policy Statements.

[2] Section 32 Evaluation Report, TANK Catchments Plan Change to Regional Resource Management Plan, dated 28 March 2020.

[3] This catchment area incorporates the Tūtaekurī River, Ahuriri Estuary, Ngaruroro River and Karamū River catchments now known collectively as TANK; see page 21 of the Section 32 Evaluation Report, TANK Catchments Plan Change to Regional Resource Management Plan, dated 28 March 2020.

provide for the values of that catchment as identified in Table 1.[4] A primary purpose of PPC9 is therefore to give effect to policies LW1 and LW2 of the RPS.[5] It is also recognised that, LW3, a further new objective resulting from PC5, must also be given effect to by PPC9, along with all other relevant objectives set out in Chapter 3.[6]

[20] In terms of evaluating PPC9 provisions, it is submitted that the focus ought to be on section 32 and which provisions best achieve the stated objectives. A critical factor is determining what is the "most appropriate" method to achieve the purpose of the RMA. This does not need to be the superior method.[7] "Appropriate" means suitable.[8]

[21] Also relevant is the "*effectiveness and efficiency*" of the provisions (policies, rules and methods) of PPC9 in achieving the objectives of the plan change and RPS:

(a) "*Effectiveness*" assesses the "contribution new provisions make towards achieving the objective, and how successfully they are likely to be in solving the problem they were designed to address."[9]

(b) "*Efficiency*" involves a broad range of costs and benefits, many intangible and non-monetary. A wider holistic exercise of judgment is required, weighing market and non-market impacts of proposed provisions.[10] Economic efficiency involves a comparison of the net social benefits of the objective in question with the social benefits of the best alternative (often the status quo or the "do nothing" or "do minimum" scenarios).[11]

[22] When considering these factors, "if the purpose of the Act and the objectives of the Plan can be met by a less restrictive regime than that regime should be adopted."[12]

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[4] Now Table 2A of the operative RRMP. There is also a need to have regard to have regard to the values of those TANK waterbodies identified as outstanding in Proposed Plan Change 7.

[5] As required by section 65(6) RMA.

[6] The Section 32 Evaluation Report, TANK Catchments Plan Change to Regional Resource Management Plan, 28 March 2020, sets out the relevant objectives, including LW3, at pages 41-44

[7] A value judgment is required as to what, on balance, is the most appropriate when measured against the relevant objective(s).

[8] *Rational Transport Society Incorporated v New Zealand Transport Agency* [2012] NZRMA 298 (HC), 45.

[9] Ministry for the Environment, 2017: *A guide to section 32 of the Resource Management Act: incorporating changes as a result of the Resource legislation Amendment Act 2017*, at 18.

[10] See for example, *Carter Holt Harvey Limited v Waikato Regional Council* [2011] NZEnvC 380, pages 59-67.

[11] *Self Family Trust v Auckland Council* [2018] NZEnvC 49, [311]-[313], citing with approval *Federated Farmers of New Zealand Inc (MacKenzie Branch) v MacKenzie District Council* [2017] NZEnvC 53, at [458].

[12] *Royal Forest & Bird Protection Society of New Zealand Incorporated v Whakatane District Council* [2017] NZ EnvC 051 at [59].

[23] It is submitted that the refinements proposed in submissions and evidence for the Winegrowers', including changes providing greater flexibility for the efficient and sustainable use of water, represent the least restrictive regime, and best achieve the purpose of the RMA and the objectives of the higher order documents, including the RPS.

Application to PPC9

[24] The Winegrowers' original submissions collectively raised concerns regarding the substantive content of the section 32 evaluation for PPC9 as notified – particularly with respect to the setting of allocation limits. Evidence for the Winegrowers has since also raised concerns with supporting 32AA analysis (or the lack of it) for changes later proposed through the section 42A reporting process or submitter evidence.

[25] On the basis of the statutory matters described above:

(a) The NPSFM 2020 must be given effect to where scope exists in PPC9. We agree with the approach taken in legal submissions for the Regional Council in this regard.[13] Any decisions on submissions that are within the scope of PPC9 must give effect to the NPS-FM 2020. The question of scope is determinative.

(b) PPC9 must give effect to any other relevant National Policy Statement, the NZCPS (where applicable), and the RPS.

(c) The section 32 analysis is submitted to have failed to:

(i) Adequately consider other reasonably practicable options for achieving the objectives for viticulture as a sustainable and efficient (low) water user in the region. To the contrary, PPC9 proposes to make all activities involving water takes subject to the same allocation requirements, regardless of the character, intensity, or scale of effects. In this sense, it fails to provide the appropriate flexibility to account for efficiencies between water users, land use suitability or other environmental factors

[13] Opening Legal Submissions for Hawkes Bay Regional Council, section 4, at page 4,

which could lead to better outcomes from an environmental effect perspective.

(ii) Adequately consider or quantify[14] the benefits and costs of implementing PPC9, in particular the economic and social effects on the viticulture industry, including the costs to grape growers who are already operating efficiently having invested significantly in systems and practices that are highly efficient and reflect "best practice";

(iii) Have sufficient regard to the "effectiveness and efficiency" of the provisions (policies, rules and methods) of PPC9 in achieving the objectives of the plan change and broader planning framework. Further, as notified, PPC9 (and the supporting section 32 analysis) failed to recognise that in practice efficiency gains may not always be possible. The evidence of Ms Taylor and Dr Massey support the view that viticulture has already adopted, indeed taken a lead in, sustainable environmental practices, with considerable effort invested to date at a national, local and property scale. It is acknowledged that Officers have since taken steps to partly address this issue through changes to Policy 52(b)(ii).[15] For completeness, those changes are supported by the Winegrowers.

(iv) Have sufficient regard when considering the efficiency of the provisions to whether the least restrictive regime in meeting the purpose of the RMA and the objectives of the RRMP has been adopted;[16] which, in turn, fails to promote the RMA through provisions that best enable people to provide for their well-being, while addressing the effects of their activities.

(v) Consider opportunities for economic growth and employment that might be provided or reduced for viticulture as a consequence of PPC9.

[26] In light of the above circumstances it is questionable whether the PPC9 provisions have been shown to be the "most appropriate way" of achieving the objectives; or that they

[14] To the extent reasonably practicable.
[15] This issue is traversed in the EIC of Mr Gerard Willis for Lowe Corporation, 7 May 2021, at 107-111.
[16] *Royal Forest and Bird Protection Society of New Zealand Inc v Whakatane District Council* [2017] NZEnvC 51, [59].

are the most "efficient or effective" and the "least restrictive" provisions for achieving the objectives of the plan change and higher order planning documents.

[27] The Winegrowers' evidence also raised concerns with the absence of any section 32/32AA analysis regarding the consequential amendments made to the definition of 'Actual and Reasonable' via the Section 42A Hearing Report (i.e. the change from "maximum" to "average" annual amount). In the absence of any evidential basis or section 32AA quantifying the costs to the community of the suggested consequential change, the amended definition would have been readily open to challenge. The decision of Officers to reinstate the "maximum" approach is therefore submitted to be the preferable (and lawful) option in those circumstances.

E. WATER ALLOCATION – ACTUAL AND REASONABLE USE

[28] The Winegrowers generally support the intent of PPC9, which is to address concerns regarding the quantity of water available for use within the TANK catchments and proposes a management response to over-allocation of the water resource.

[29] The further changes sought by the Winegrowers through submissions and evidence are intended to provide more certainty for the industry concerning the continued viability of viticulture within Hawke's Bay, and to ensure that environmental outcomes sought by PPC9 are achieved at the lowest cost to the industry, as well as the wider community.

"Actual and Reasonable"

[30] In implementing a staged approach to addressing overallocation of the Heretaunga Plains Aquifer, POL TANK 37 provides for an interim water allocation limit based on the Regional Council's best estimates of current levels of Actual and Reasonable use.

[31] The definition of Actual and Reasonable use is therefore critical. Water takes that come up for renewal will be assessed against rules TANK 9 and 10,[17] which limit an allocation for a take and use to the "Actual and Reasonable" amount. The definition therefore directly impacts on the volume of water a vineyard can seek under the rules of PPC9.[18]

[17] If the permitted activity conditions of rule TANK 8 are not met.
[18] Rules TANK 9, 10 and 11.

[32] "Actual and Reasonable" is defined in Chapter 9, and has been subject to iteration through the various version of PPC9 from the notified version through to the version attached to Addendum section 42A Report.

[33] Key components of the definition of "Actual and Reasonable" use include:

(a) Firstly, "Actual and Reasonable" use cannot be greater than the quantity specified on the consent for renewal or any lesser amount applied for. This establishes a "sinking lid" approach to water allocation.

(b) Secondly, the definition relies on a 10 year reference period when determining the "maximum" water use over those years from actual water quantity data;

(c) Finally, "Actual and Reasonable" use for irrigation takes is the least of either:[19]

> b) the ~~maximum~~ ~~average~~ ~~consequential~~ maximum annual amount as measured by accurate water meter data in the ten years preceding 2 May 2020 ~~1 August 2017 for groundwater takes in the Heretaunga Plains Water Management Unit or in the preceding ten years preceding the 2 May 2020 as applicable elsewhere~~ if accurate water meter data is available. (If insufficient or no accurate data is available either clause a) or c) will apply);
>
> or
>
> c) for irrigation takes, the quantity required to meet the modelled crop water demand for the irrigated area with an efficiency of application of no less than 80% as specified by the IRRICALC water demand model (if it is available for the crop and otherwise with an equivalent method), and to a 95% reliability of supply where the irrigated area is;
>
> (i) no more than in the permit due for renewal, or any lesser amount applied for, and in the case of Heretaunga Plains ~~W~~Groundwater Quantity Area ~~Management Unit~~, is not more than the amount irrigated in the ten years preceding 2 May 2020 ~~1 August 2017~~; and
>
> (ii) evidence is supplied to demonstrate that the area has, and can continue to be, irrigated and the permit substantially given effect to.

The "Sinking Lid"

[34] A significant concern for the Winegrowers relates to the "sinking lid" approach to water allocation. This approach is established through provisions that limit water takes to the

[19] As per the definition included in the Addendum Section 42A Hearing Report, dated 19 May 2021.

quantity specified on the permit up for renewal. The "sinking lid" means over time a vineyard's water allocation limit can go down, but will never return to a previous level.

[35] The Winegrowers are concerned that the "sinking lid" approach:

(a) locks in existing viticultural activities to already low water usage, without regard to atypical events that may impact on water use on a vineyard over any period of time, (most likely) including environmental events (droughts, disease, etc), changes in markets and changes to personal circumstances (farmers ill-health, death etc). Dr Dark also discusses similar constraints in his evidence.[20]

(b) does not enable any increase in water for irrigation even if that could be shown to be 'reasonable' in terms of IRRICALC (or any equivalent method), including in terms of variables such as increased row spacing (intensification) or different grape varieties.[21]

(c) significantly restricts intensification of existing operations, with restrictions particularly acute for low water users, such as viticulture, who have a low water allocation from which to intensify. As noted by Ms Taylor, the current provisions restrict (by example) an increase in crop density, the re-establishment of vines, and growth of new vines, and places real limitations on the ability of winegrowers to expand/grow their businesses.[22] This is despite the evidence of Ms Taylor and Dr Massey confirming that viticulture can be intensified in a sustainable manner within the Hawke's Bay.

(d) significantly restricts any change in land use from viticulture to a more water intensive land use.[23]

[36] In turn, questions arise over whether a "sinking lid" approach is consistent with the efficient allocation of water resources under OBJ TANK 17 and 18. Those objectives require efficient water use at agreed reliability of supply standards[24] and flexible water

[20] EIC, Dr Dark, Section K, at page 19.
[21] Submission of Pernod Ricard (Submitter 194), submission reference 101, at pg 61 of Part 5 Submitters 151-200.
[22] EIC, Emma Taylor, at paragraph 62.
[23] EIC, Emma Taylor, at paragraph 48.
[24] OBJ TANK 17 (b) and (c).

allocation and management regimes that use water efficiently through innovations in technology and management.[25]

[37] It is acknowledged that TANK Rule 11 is intended to preserve some flexibility as to whether the sinking lid might be appropriate in any individual case (enabling applications to be considered as discretionary activities even though they exceed Actual and Reasonable use limits). In reality however, this is a difficult consenting pathway when viewed against directive objectives and policies which require overallocation to be avoided and phased out over time. Any section 104 assessment would need to have regard to the suite of objectives and policies which allocate water according to Actual and Reasonable use and require management of activities within those limits.

[38] Failure to comply with TANK Rule 11 results in the activity becoming prohibited.[26] Therefore, should the provisions (policies and methods) not accurately capture the "Actual and Reasonable" use of water for activities, there is the potential for significant effects on individual vineyards. Further, depending on the scale of viticulture operations impacted, implementation of the provisions would likely have adverse social and economic impacts for wider communities throughout the Hawke's Bay.

[39] Given viticulture is an efficient water user, with significant investment already in irrigation and on-vineyard practices, an outcome which sees vineyard operations unable to intensify and develop in a sustainable manner would not, in our submission, achieve the sustainable management of natural and physical resources. Nor would the provisions giving rise to that outcome be an appropriate or effective method of achieving the objectives of PPC9 and the broader higher order planning framework.

[40] Therefore, in our submission, while an approach to water allocation based on Actual and Reasonable use can be appropriate, there is a need for the definition and related planning framework to allow sufficient water to address dry years, climate change (and variability), and to enable increases in intensification (e.g. reduction in vineyard row spacing) where this can be shown to represent a more efficient use of water.[27]

[41] The Winegrowers remain of the view that definition of "Actual and Reasonable", and related policies which rely on that definition, should be amended to provide for the

[25] OBJ TANK 18 (b) and (c).
[26] TANK Rule 12.
[27] Submission of Pernod Ricard (Submitter 194), submission reference 12, at pg 4 of Part 5 Submitters 151-200.

efficient allocation and use of water as per OBJ TANK 17.[28] This will ensure that the provisions are able to properly account for the social and economic costs to viticulture where it is already operating at good environmental practice (or better) to optimise efficient water use, and to protect fresh water resources from quality and quantity degradation. Mr St Clair will be available to discuss these points at the hearing.

[42] These changes have not supported by Officers to date. To the contrary, the reply evidence of Officers supports the "least of either" approach, on the basis that the "lesser of measured water use and estimated water use predicted by demand modelling" is a "robust and transparent mechanism to promote water use efficiency".[29]

[43] Putting aside the limitations in actual and modelled data (discussed by Dr Dark, and later in these submissions), a "lesser than" approach could also have the opposite effect and discourage efficiency where it results in limits being set too low. In that case consent holders are likely to view these as "targets" rather than as "limits". In the worst case people may be incentivised not to voluntarily reduce water consumption below Actual and Reasonable use limits for fear of getting ratcheted back and losing the ability to return to the baseline in the future. In other words, a "use it or lose it" scenario may arise in implementation.

10 year reference period

[44] As notified PPC9 provided for Actual and Reasonable use by reference to a maximum annual amount measured in the ten years preceding 1 August 2017. Many submitters sought a longer timeframe linked to the notification date of PPC9 in order to account for the particularly dry summer of 2019-2020, as well as more recent improvements in water quality data held by consent holders. Without accommodating these recent developments, the Winegrowers (and others) were of the view that the allocation limits proposed in PPC9 was neither actual nor reasonable.

[45] The section 42A Report addressed these shortcomings by extending the ten year period through to the notification date of 2 May 2020. The Winegrowers support this change.

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[28] Submission of Pernod Ricard (Submitter 194), submission reference 113; 89; 84; 73; 65; 59; and 46, at pg 4 of Part 5 Submitters 151-200

[29] Statement in reply, Mr Rajanayaka, 19 May 2021, at 4.12.

Reliance on the "maximum"

[46] The Winegrowers strongly oppose the calculation of Actual and Reasonable use based on an average, rather than a maximum, annual use over the ten year period. This change, as initially proposed by Officers in response to submissions, would have resulted in there being insufficient water allocated for the current irrigation needs of viticulture, thereby restricting their ability to access water during drier years and to account for climate change and any other atypical factors outside of their control.

[47] Ms Taylor's evidence explains in detail the effects of insufficient water on vines and the importance of irrigation to viticulture, which occupies often otherwise unproductive free draining soils within the Hawke's Bay with associated environmental benefits.[30]

[48] Therefore, the recommendation in the Addendum Section 42A Report to revert back to the notified definition, with the later cut-off date of 2 May 2020, is therefore strongly supported. This is also an entirely appropriate response to the evidence of Dr Dark and others, including Mr Waldron's section 42A reply[31] to submitter evidence.

[49] Reinstatement of the "maximum" also addresses concerns that would have otherwise been raised in these submissions regarding the lawfulness of a proposed consequential change which had the effect of fundamentally altering the approach to "Actual and Reasonable" use limits, with wide ranging implications (with water users unable to access the peak volume of water required for their operations) which had not been the subject of any cost-benefit analysis as required under the RMA.

"Least of either" approach

[50] While recognising some improvements to the definition, the Winegrowers remain concerned with the "least of either" approach to "Actual and Reasonable". The evidence of Dr Dark and Ms Taylor set out the shortcomings of this approach, with Mr St Clair's planning evidence having recommended changes to address this issue.[32]

[51] The Addendum Section 42A Report does not directly address Winegrower concerns with the "least of either" approach. However, through reply evidence Officers support:

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[30] EIC, Emma Taylor, at paragraph [39].
[31] Evidence in reply, Robert Waldron, undated, 3.4
[32] EIC, Emma Taylor, at paras 52 - 56; EIC, Dr Dark at paras 15, 16, and 27(h); EIC, Mark St Clair, at para 102.

(a) the use of both water meter data and crop water demand modelling to determine Actual and Reasonable use due to "inherent limitations with models, and because of practical limitations and costs associated with measurements...".[33]

(b) the "lesser of measured water use and estimated water use predicted by demand modelling" being a "robust and transparent mechanism to promote water use efficiency".[34]

[52] Support for the use of both water meter data and demand modelling implies that both water meter data and water demand modelling can be relied on by water users. However, the "least of either" approach forces a consent holder to adopt the lowest value without regard to the limitations raised in the Regional Council's evidence. This was one of Dr Dark's concerns around the inflexibility of an "least of either" approach which precludes use of measured water data or IRRICALC modelling (or a mixture of both) where necessary for site specific reasons. It is Dr Dark's opinion that the PP9 provisions should enable additional site-specific information to be considered and should not preclude alternatives where growers are able to show that the volumes from IRRICALC are insufficient for their circumstances (for example, based on site specific soil and rainfall data). In other words if accurate data is available to demonstrate a winegrower's water use they should have the option of relying on that limit, regardless of the IRRICALC modelling, particularly if it is lower than the measured outcome.

[53] It is now also better understood that Officers have combined modelled water use data with available measured data to give the best available estimate of water use over time.[35] In that case, similar to the points raised by Dr Dark for the Winegrowers, would the same logic not extend to the definition of "Actual and Reasonable" use on an individual consent-holder basis. For example, if a consent-holder does not have measurements from 2012-2013, should they not be able to compare measured and modelled in the period that measurements exist for, and then use the model results (with adjustment if appropriate) to hind-cast to 2012-2013? As it stands, the "least of either" approach also precludes this option under PPC9.

[33] Statement in Reply, Mr Rajanayaka, 19 May 2021, at para 4.9.
[34] Statement in reply, Mr Rajanayaka, 19 May 2021, at 4.12.
[35] Statement in Reply, Mr Waldron, undated, at 3.4.

F. INTERIM LIMIT

[54] Some submitters have sought a reduction in the interim allocation limit of 90 Mm3. This includes submissions by iwi, with evidence filed on behalf of Ngāti Kahungunu Iwi Incorporated suggesting that "Actual and Reasonable" use should be defined by reference to the lowest annual take in the 10 years prior to 2 May 2020.[36] However, as far as we are aware, there has been no technical expert evidence or any section 32AA analysis provided in support of this reduction in the interim allocation limit.

[55] The absence of any evidential or s32/32AA analysis in support of this position is notable in circumstances where an Actual and Reasonable approach based on the lowest measured value would have significant impacts for a wide range of industries, particularly if the lowest volume on record did not reflect full operation of an irrigation system.[37] It is submitted that the Panel can give little regard to this request in the absence of any evidential basis to undertake the evaluation of a lower allocation limit.

[56] To avoid doubt, the Winegrowers have opposed through submissions the lowering of the interim allocation limit.[38] Further, in Dr Dark's opinion, the 'maximum' approach proposed in PPC9 is much more likely to be representative of the long-term actual and reasonable water use at a 95% reliability level, provided that the measurements are representative of an activities (in this case a vineyards) long term water use.

G. INDUSTRY PROGRAMMES

[57] The Winegrowers support the use of Farm Plans, catchment collectives and industry to deliver farm plans on an individual, industry or collective basis. However, to ensure these methods are as effective as possible, the Winegrowers maintain their view that PPC9 should better recognise current industry programmes which are already managing the impacts of land use and take activities on water quality and quantity.

[58] Dr Massey's evidence explains the approach of SWNZ which aims to ensure good (or best) agricultural practice in the viticulture industry by setting standards often above the regulatory minimums, consistent with UN sustainable development goals.

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[36] EIC, Ngaio Tiuka on behalf of Ngāti Kahungunu Iwi Incorporated, dated 15 May 2021, at para 109.
[37] For example, due to development / re-development.
[38] See for example the further submissions of Hawkes Bay Winegrowers (Submission Point 132.57).

[59] As it stands, Dr Massey reports on an "incredibly high" participation rate in SWNZ across New Zealand[39] as a way to collate, monitor and report on vineyard practices including vineyard and winery water usage. The Winegrowers have sought to ensure that the ability of growers to use SWNZ on an equivalent basis with council requirements (in Hawke's Bay and more broadly, other regions), is recognised through PPC9 so as to gain efficiencies in delivery of farm plans and related environmental outcomes.

[60] Notably, in a very similar way to the approach of NZGAP (as described by Dr Farralley in his evidence for Horticulture NZ[40]), SWNZ supports the Winegrowers (at a national and local level) "in seeking a recognition pathway in PPC9 which delivers the same environmental outcome by recognising the standards assurance framework, systems, and processes of SWNZ as an alternative to the direct Council pathway for the development and implementation of a FWFP". It is understood that this is the equivalence that is queried by Officers in relation to Dr Massey's evidence.[41]

[61] For this reason the more recent changes proposed by Officers, relating to less frequent auditing for low risk land use systems, provision being made for third party auditing and more reporting detail, are considered to be beneficial by the Winegrowers.

[62] However, there is some residual uncertainty over the "adjustments"[42] required for programmes like SWNZ before they are will be an acceptable industry programme under Schedule 30. It is this uncertainty that is of concern to the Winegrowers given the level of investment being made in SWNZ with a view to creating efficiencies for its members and regulatory authorities in meeting environmental outcomes.

H. OTHER MATTERS

[63] The Winegrowers support changes to PPC9 proposed in the Section 42A Hearing Report regarding stream flow maintenance and habitat enhancement schemes; with Mr St Clair's evidence addressing these matters in detail. Since then Officers have also accepted clarified that the requirement that consent holders must cease takes (including within Zone 1) unless they contributed to the flow maintenance and

[39] EIC, Dr Massey, at para 60With 96% of the national vineyard area and over 90% of wine producers presently using SWNZ
[40] EIC, Dr Farralley, on behalf of Horticulture NZ, dated 7 May 2021, at [16] – [20].
[41] Section 42A Hearing Report, 19 May 2021, Table 1A.
[42] Addendum section 42A Report, 19 May 2021, Table 1A.

enhancement schemes is only relevant to the extent such a scheme exists.[43] This was an important recommendation of Mr St Clair given a number of winegrowers who would, on replacement of consents, be subject to TANK Rule 10 and stream depletion calculation and flow enhancement programmes within the Gimblett Gravels area.

[64] Finally, with regard to land use change, the Winegrowers support the changes to Schedule 29, and TANK Rules 5 and 6 recommended by Officers in the Addendum s42A Report for the reasons set out in submissions, Mr St Clair's evidence and in the Addendum Section 42A Report.[44] The limiting factor to land use change would remain water allocation, however. This highlights again the critical definition of Actual and Reasonable use, and the need to account for relative efficiencies between water users.

I. CONCLUSION

[65] The Winegrowers request that the Hearings Panel support through changes to PPC9:

(a) the amendments to the RRMP outlined by Mr St Clair (to the extent not already adopted by Officers); and

(b) further amendments to the definition of Actual and Reasonable in the manner proposed by the original submissions of the Winegrowers,[45] which sought the definition and related policies provide for the efficient allocation and use of water; and

(c) any other amendments sought by the Winegrowers which have been recommended in the Section 42A Hearing Report and Addendum Section 42A Report; and/or

(d) such alternative or consequential relief necessary to address the matters raised in these legal submissions, evidence and submissions for the Winegrowers.

Dated 9 June 2021

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Counsel for the Winegrowers

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[43] Addendum section 42A Report, 19 May 2021, Table 1A.
[44] Addendum section 42A Hearing Report, 19 May 2021, Table 1A.
[45] Submission of Pernod Ricard (Submitter 194), submission reference 113; 89; 84; 73; 65; 59; and 46, at pg 4 of Part 5 Submitters 151-200