BEFORE THE NORTHLAND REGIONAL COUNCIL

IN THE MATTER	of the Resource Management Act 1991 (**RMA**)
AND	
IN THE MATTER	22 resource consent applications for new Water Permits for the taking and use of groundwater and 2 applications for changes to consent conditions of current Water Permits from the Waihopo, Houhora, Other, Motutangi, Waiparera, Paparore, Waipapakauri, Ahipara, and Sweetwater aquifer management sub-units of the Aupōuri Aquifer, Northland (Aupōuri Aquifer Water Permit Applications (**AAWPA**))

REPLY EVIDENCEOF MARTELL LETICA ON BEHALF OF THE APPLICANTS

DATED 21 JUNE 2021

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1. INTRODUCTION

1.1. This reply evidence is structured to address matters under the following headings in response to the residual concerns stated by the Department of Conservation (**DoC**);

(a) Assessment of Effects on the Environment;

(b) Avoidance of Adverse Effects;

(c) Groundwater Monitoring and Contingency Plans (**GCMPs**);

(d) Resource Management (National Environmental Standard for Freshwater Management) Regulations 2020 (**NESFM2020**);

(e) National Policy Statement for Freshwater Management 2020 (**NPSFM2020**);

(f) Summary of Consultation Outcomes with Waiora Marae; and

(g) Conclusion.

2. ASSESSMENT OF EFFECTS ON THE ENVIRONMENT

Sufficiency of analysis of potential adverse effects on an individual and cumulative basis

2.1 In the General Statement[1] of DoC Planners it is suggested[2] that the proposed GMCPs seek to fulfil Schedule 4 RMA[3] requirements of an assessment of the actual or potential adverse effects on the environment of an activity. The closing legal submissions on behalf of DOC also make similar claims[4].

2.2 Alongside the individual application Assessments of Environmental Effects (**AEE**) reports, an assessment of hydrological effects (WWLA, 2020a)[5], over a domain area extending north-northeast from Ahipara to Ngataki and across to Houhora, was prepared using a transient groundwater flow model that assesses the degree of impact on hydrological systems that is likely to occur if the consents were to be

1 *General Statement by Tom Christie and Herb Familton to be considered alongside the GMCP's and Conditions resulting from Planning Conferencing with Stephanie Kane and Martell Letica*, dated 20 May 2021 (**Christie/Familton**).
2 At [6]-[7] Christie/Familton.
3 Clause 6(1)(b).
4 Legal submissions on behalf of the Director-General of Conservation 4 June 2021 at [8A & C].
5 Williamson Water and Land Advisory Limited (2020*). Aupouri Aquifer Groundwater Take Consent Applications: Assessment of Environmental Effects* (Project No. WWLA0184, Rev 1).

granted. Complete documentation of model development and calibration is provided in the WWLA factual model report (WWLA, 2020b)[6].

2.3 As part of this assessment, three predictive model scenarios were run and are summarised as follows:

(a) **Scenario 1: Naturalised** – the calibration model with no groundwater pumping included in the simulation.

(b) **Scenario 2: Proposed Extraction** – includes all current and proposed groundwater totalling 14.4 million m3 /year.

(c) **Scenario 3: Low Permeability-Proposed Extraction** – Groundwater extraction is the same as in Scenario 2 with horizontal hydraulic conductivity of Model Layer 2 decreased to 1x10-7 m/s to simulate a hard pan extending over the model area.

2.4 The WWLA 2020a report outlines the many layers of conservatism applied in the model simulations.

2.5 Responses to Section 92(1) RMA requests also contained further assessments or clarifications on the assessment provided[7].

2.6 The assessments provided to the Northland Regional Council (**NRC**) were found to be complete and sufficient to make a decision, pursuant to Section 95A RMA, that the effects of the activities on the environment would be minor, but not more than minor.

2.7 DoC's expert advises[8] that the absence of individual bore aquifer pump tests in relation to the proposed takes is an assessment matter which adds to the uncertainty of predicted effects in the model. Bore drilling and development has not been committed to by some Applicants yet due to the delays in the processing of their applications to take and use water.

2.8 Rule C.8.5.3(1) of the Proposed Regional Plan for Northland 2017 (updated appeal version, May 2021) (**PRP**) provides NRC with the capability to impose pump testing requirements on bore consents so that they are informed that, amongst other things,

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6 Williamson Water and Land Advisory Limited (2020*). Aupouri Aquifer Groundwater Model: Factual Technical Report - Modelling* (Project No. WWLA0184, Rev 3).

7 Accessible https://www.nrc.govt.nz/consents/notified-resource-consents/limited-notification-24-groundwater-takes-from-the-aupouri-aquifer/

8 Reply Evidence of Timothy Michael Baker for DoC, dated 11 June 2021 at [25-26].

the bore has been screened and displays parameters consistent with the target aquifer for which an associated Water Permit has been granted, in this instance, the Aupouri shellbed aquifer. Therefore, there is a mechanism available to NRC to ensure that the assessment of the groundwater take effects at this point will be applicable to the production bore.

2.9 The GMCPs have been promoted as a means of responding to the inherent uncertainty that exists with modelling. The monitoring contained in the GMCPs will confirm the magnitude of predicted effects. Contingency measures however seek to restrict, reduce, or require cessation of development of the resource if monitoring does not confirm predicted effects. Furthermore, should the effects of the exercise of the consents be so significantly different and adverse from what was assessed at the time of considering the applications, Section 128 RMA reviews are available to the consenting authority. Under the review process NRC has the power to seek a change of conditions of a resource consent or they may cancel a resource consent.

3. AVOIDANCE OF ADVERSE EFFECTS

3.1 DoC rightly points out the statutory obligations which apply to resource consenting under the various planning documents and ultimately Part 2 of the RMA. The policies and objectives as identified by NRC and DoC are agreed as being relevant to these applications. However, contrary to the conclusions drawn in the case for DoC, it can instead be concluded that the proposals are consistent with the relevant provisions of the New Zealand Coastal Policy Statement 2010 (**NZCPS**), NPSFM2020, Regional Policy Statement for Northland 2016 (**RPS**), and the PRP as was assessed in the applications and examined in the subsequent Officer's reports and planning evidence. The following provides my response to those topics raised in closing submissions only.

Assessment of Effects on Surface Waterbodies

3.2 Policy H.5 directs applicants not to turn their attention to Policies H.4.1-H.4.3 if an assessment of the calculated depletion effects is less than 40% of the abstraction rate. WWLA has undertaken stream depletion analysis on a global flow budget scale as well as at individual catchment levels.

3.3 WWLA (2020a) analysed the impact on baseflow discharges in surface waterbodies using Scenario 2[9] under annual minimal flow conditions from a global flow budget for all combined drain cells within the potential area of impact. According to this assessment, the mean annual low flow could be reduced by 4.3% under Scenario 2 compared to Scenario 1 (naturalised conditions). Furthermore, in response to a direction [10] by the Hearings Commissioners, Mr Williamson submitted supplementary evidence[11] containing an assessment of each application in terms of their "Hydraulic Connection Category" concluding in that assessment that up to a maximum of 25% stream depletion could be attributable to an individual bore and that this was still well below the threshold at which a groundwater take would need to be subjected to the allocation and minimum flow/level regimes at Policy H.4.1-H.4.3 PRP.

3.4 In all assessments, the conclusion reached was in accordance with Policy H.5 and that was merely to point out that the Policies at H.4.1-H.4.3 PRP do not apply to the taking of groundwater.

3.5 The conclusions from both WWLA's and NRC's expert Hydrogeologists is that the risk of an effect on surface waterbodies is low and therefore can be avoided through monitoring and responding to water level changes in the deep and shallow aquifers in accordance with the three-tier trigger level regime. There was general consensus [12] between the hydrogeological experts that reduction in surface waterbody flows or levels would be observable as water level reductions in the underlying aquifers first and that monitoring as proposed is a pragmatic means of identifying the potential for effect on surface waterbodies before the effect was to promulgate.

3.6 If exceedances of groundwater level triggers were to occur, suspension of taking is available to enable full studies to be undertaken. It has also been previously stated

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9 Scenario 2 is a simulation under the calibrated model for the current and proposed groundwater abstractions. Scenario 2 errs on the side of over-simulation of vertical leakage.

10 Minute and Direction #2.

11 Statement of Supplementary Evidence of Jon Williamson for the Aupouri Water Permit Applicants 28 September 2020.

12 Attachment 3 of Reply Evidence of David William West for the Director-General of Conservation, dated 4 June 2021 entitled, "*RE: Aupouri - 24 applications by the Aupouri Aquifer Water User group to the Northland Regional Council to take groundwater from the deep shell bed aquifer of the Aupouri Peninsula (REQ.596300). Prepared by: DOC experts – Dave West, Tom Drinan & James Blyth Date: 16 December 2020*"

that suspension or reductions in abstraction would result in reversal of water level reductions[13].

3.7 If exceedance of Trigger Level 2 (TL2) were to result in adverse effects on the matters identified in Objective 1 then, based on the expertise of Mr Hughes and Mr Williamson and to some extent Mr Baker, this would be of such an inaccuracy so as to require immediate review of the consents. This is due to the purpose of the Trigger Level 1 (TL1) response which ultimately seeks to prevent further decline of water level or quality in the deep and shallow aquifers to avoid adverse effects on the matters identified in Objective 1 through scientific review and analysis of the monitoring data. Furthermore, if the response of TL2 is not sufficient to avoid adverse effects on the Objective 1 matters, Trigger Level 3 (TL3) provides for complete cessation of taking but with the potential for resurrection of abstraction under the guidance of the robust evidential tests to be applied under the Groundwater Trigger Level Exceedance Report (GTER). TL3 is therefore not a complete cancellation of the consents. Instead, Section 132 RMA provides the NRC with the ability to cancel a resource consent in the event that significant adverse effects on the environment result from the exercise of the consent – which in this case has been specified by NRC as a condition of consent to be applicable on both an individual or collective basis (Condition 30 of the Proposed Draft Conditions[14]).

Effects on Indigenous Biodiversity

3.8 There is unequivocal scientific evidence across the board that reductions in flow and levels of surface waterbodies can be significantly adverse on the values which rely on certain flow regimes, particularly during times of low flows/levels. Such values include indigenous taxa and their habitats.

3.9 The adaptive management regime as has been presented as three GMCPs on this matter, follows the same principles as were accepted as being appropriate for meeting the requirements of the Supreme Court[15], NZCPS, NPSFM2014 and the RMA in relation to ensuring the avoidance of adverse effects on significant

13 At [50] 2019 NZEnvC 028 *A Burgoyne & Te Taumatua o Ngati Kuri Research Unit v Northland Regional Council*

14 At Appendix A of the Supplementary s42A Report.

15 *Sustain Our Sounds Inc v New Zealand King Salmon Company Ltd* [2014] NZSC 40.

indigenous vegetation, freshwater ecosystem processes and on significant indigenous habitats and fauna in the Environment Court's Burgoyne decision [16].

3.10 The changes made to the GMCPs through Planning conferencing, the Supplementary s42A Report, and as attached at **Appendix A**, have improved areas of potential ambiguity but not changed the fundamental premise upon which the *Burgoyne* decision was made that adaptive management was available through the GMCP framework.

4. GMCPS

Staged increases in abstraction

4.1 Both DoC and NRC have put forward hypothetical events[17] where the taking of water increases significantly as result of a Staged Implementation Monitoring Programme Review (**SIMPR**) that authorises taking of the next Stage's allocable annual volumes. The primary issue with this scenario for NRC and DoC is that it does not allow for the entirety of effects of abstraction at those initial stages to have been realised and monitored prior to allowing increases in abstraction both on a cumulative (i.e., SAMU wide percentage of staged volumes) and individual basis (i.e., staged volumes per Consent).

4.2 While it is agreed that staggering of staged abstraction volumes will occur, it would be highly unlikely that the exponential increases as suggested would occur. Practical advice from avocado orchardist, Ian Broadhurst, was sought to respond to this perceived issue (see **Appendix B**). Mr. Broadhurst confirms that in practice, staged implementation requires staged ordering and planting. This effectively means that one simply cannot increase the amounts of water as suggested above if the Irrigation Scheduling Plan (**ISP**) objectives are to be achieved given the constraints that exist with the timing to order, receive, and plant trees.

4.3 Mr. Broadhurst advises that it is best to start planting avocados when there is no risk of frost, usually around November. Orchard establishment is then able to be completed by late December before the higher temperatures of summer occur. It is noted however that larger orchards can still be planting into March.

4.4 Mr. Broadhurst advises that the 'rule of thumb' is that tree orders need to be confirmed and a deposit paid 18 months in advance of planting. In his own

16 Paragraph [51] 2019 NZEnvC 028
17 Supplementary s42A Report at [15]; Christie/Familton at [14].

experience, Mr. Broadhurst approached two nurseries to enquire whether trees would be available this spring and they both responded that the first available trees would be spring 2022 if orders were placed now.

4.5 It is also documented by Horticulture New Zealand Ahumara Kai Aotearoa that COVID-19 will continue to add disruption to domestic and international distribution and importation of orchard materials and product, the export of the crop produced, and the availability of labour[18] to support the growth of the number and scale of orchard developments.

4.6 In summation, if operating in accordance with the objectives of the ISP under the SIMPR process, a jump of such magnitudes would be highly unlikely because;

(a) Young trees require less water than those flowering or fruiting so additional plantings would not require a huge increase in irrigation supply;

(b) The delay in ordering and receiving trees means that the water requirements of a stage are likely to extend over multiple irrigation seasons and therefore would need to be progressively increased in accordance with the ISP overlay objectives that drive efficient use of the resource.

GMCP Consultation Processes

Changes to the GMCP (Section 1.3 GMCP)

4.7 A minor amendment has been included as it is expected that the scope of alteration of monitoring and associated trigger levels as expressed in this section should only be available as a result of the processes and final recommendations of the SIMPR, and Annual Environmental Monitoring Report (AEMR), and GTER. The SIMPR has a 'change-management' process established within it and this should take precedence over the change-management process established in this section.

4.8 Removal of the paragraph implying tacit approval in this section poses no issue to the construct of the GMCP nor the Consent conditions (further discussion below at Paragraph [4.18]).

[18] https://www.hortnz.co.nz/assets/About-Us/Corporate-documents/2020-07-15-Horticulture-Post-COVID-Recovery-Strategy-July-2020.pdf

SIMPR (Section 2.1.1 GMCP)

4.9 The SIMPR currently contains the following timeframes for NRC to consult with DoC and the Consent Holders before making a decision on whether progress to the next stage of abstraction volume may occur:

(a) NRC is to provide the Consent Holders and DoC with a copy of the SIMPR a minimum of three (3) months prior to the anticipated commencement of the subsequent irrigation season. Given the irrigation season for established orchards on the Aupouri Peninsula can start as early as September, this would require NRC to have undertaken the SIMPR in the month of July.

(b) DoC and the Consent Holders have 20 working days to provide a response to the Council on the recommendations of the SIMPR received.

(c) An additional 10 working days from the date the SIMPR was sent to the party is then allowed for a consulted party to respo with any disagreement on the conclusion and recommendations of the SIMPR.

4.10 As was noted above [4.8], the NRC has recommended removing the following passage from a number of the sections “If no response is received from a party within the stated timeframe, then the Council will consider that the party has no concerns with the conclusions of the review”, including at Section 2.1.1 of the GMCPs as relates to the SIMPR process. It is understood that NRC’s recommendation is a response to Christie/Familton [16] where they note that “[w]e do not support the practice of default approval of GMCP changes with restrictive timeframes and do not consider this to represent best practice.”

4.11 The removal of the passage as recommended by NRC essentially has the consequence of making the SIMPR consultation process 30 working days long as, irrespective of agreement or disagreement from the consulted parties, the final decision on the recommendations of the SIMPR rests with the NRC as the consenting authority once that 30 working day period has elapsed.

4.12 Through further review, I have found that the SIMPR process does not contain any timeframe within which the NRC provides its report which details its decision and the reasons for it, or at the very least it is unclear if there is a timeframe attributed to this act. The only subsequent timeframe specified as part of the SIMPR is in relation to any changes to the GMCP where it is stated that the NRC must supply

any changes to the GMCP to the Consent Holders and DoC within five (5) working days of the change being authorised as final. Therefore, my reading is that if no change is required, then a decision can be issued under a different timeframe but whether that is longer or shorter than the given five working days is unclear.

4.13 Minor amendment to specify that a timeframe of five (5) working days applies to the final decision on the SIMPR recommendation to be released is recommended for inclusion in the GMCPs (see Section 2.1.1 of the GMCPs attached at Appendix A). This effectively makes the consultation process for the SIMPR thirty-five (35) working days long if no change is required or forty (40) working days long if changes to the GMCP are required to give effect to the decision on the SIMPR recommendation.

4.14 Minor amendment has also been suggested to clarify that the changes anticipated in the SIMPR provisions of the GMCP (Section 2.1.1) are only changes attributable to the SIMPR recommendations.

4.15 To be clear, no subsequent change is considered necessary to either the Master or Individual Consent Conditions as a result of these suggested minor amendments as the changes are procedural improvements to the adaptive management regime and do not affect the trigger and response performance measures of consent conditions.

4.16 As an indication as to whether the amended timeframe may be considered reasonable or not (Christie/Familton at [16]), the following should be noted:

(a) NRC has to wait for the prior year's water use data to be submitted before the SIMPR can be fully initiated – the end date of a water year is 30 June;

(b) NRC would then require time to carry out the review – say 5 to 10 working days is allowed;

(c) The review report is issued to the Consent Holders and DoC who then have 30 working days to respond if they have an issue with the review recommendations, or 20 working days to respond if they approve of the review recommendations;

(d) As per the proposed insertion, the NRC then has 5 working days to consider the report submitted for any disagreement with their review; and

(e) They then have a further 5 working days to issue any changes to the GMCP as a result of the SIMPR.

4.17 Working off that scenario, this would mean the SIMPR decision would not be known until mid-September – as noted above, irrigation of established orchards on the Aupōuri Peninsula can occur as early as September, if not earlier.

4.18 Even with the inclusion of the passage implying tacit approval, the timeframe for the SIMPR has always been a very narrow window for NRC to review, consult, and decide on for irrigators as they are making decisions on orchard expansions, and therefore increases in abstraction volume, at least a year in advance (see Paragraphs [4.4] above). Given the narrow window associated with the review and consultation process, the feedback we have received from the MWWUG irrigators is that they have been proactive in tracking the environmental monitoring to anticipate the timing and likelihood of increases as part of the SIMPR process – some have undertaken temporary transfers of existing unused allocations in order to supplement their needs as a result of delayed decision-making. Therefore, while it is not ideal timing theoretically, in practice it has been working for the MWWUG Consent Holders if the SIMPR consultation process starts as early in the new water year as is possible.

Annual Environmental Monitoring Report (**AEMR**) (Section 3.6 GMCP)

4.19 The AEMR is meant to be a summary document of the previous year's monitoring and any changes which were required through other processes contained in the GMCP. It is essentially a comprehensive summary of the previous year's monitoring activities supported by recommendations to monitoring that could be incorporated as part of the change management facility available through the SIMPR.

4.20 As such, to be abundantly clear, the purpose of the AEMR is not to initiate change itself as this would have overlapping functions with the SIMPR and GTER hence why the AEMR section has no change-management process.

Nominated Technical Panel

4.21 At [37] and [38] of the s42A Supplementary Report, it is noted that "[e]*fficiency may be advanced through the nomination of an independent technical expert or experts"*. The s42A Officer has included reference to a nominated technical expert/panel being available for the processes established at Sections 1.3 'Change to GMCP',

2.1.1 ‘SIMPR’, 3.6 ‘AMER’, 4.1 ‘GTER TL1’, and 4.2 ‘GTER TL2’ of the GMCPs (contained in Appendix B of her report).

4.22 Hydrogeological and Ecological experts have been commissioned to undertake the tasks established under the MWWUG GMCP processes. I am not aware of any of these experts being unqualified or lacking the knowledge to be able to provide the services sought by the NRC. As such, it is questionable what value a technical panel or nomination process would add if the qualifiers were currently being met by the current experts anyway.

Formation of a Panel

4.23 If a selection process is to be imposed for the engagement of a panel from a nomination process, then evaluation criteria are necessary for the selection process, as are the parameters including the type of expertise and the number of experts who would sit on this panel.

4.24 The NRC *User Fees and Charges 2020/21 Kaupapa Here a Utu 2020/21* document contains guiding principles that charges must be fair, reasonable, uniformly applied, transparent and predictable and certain. Therefore, if NRC is administering the consents in accordance with its financial policies, the cost structure for such a panel will need to be derived as part of the selection process in order to achieve the principles it has set.

4.25 It is expected that no more than two experts in the same field should be selected, therefore, if multiple nominees are promoted for the same field of expertise, a weighting of the various criteria should apply for fair and transparent selections to be made. This is usually available via Council procurement policies however upon enquiry, the NRC [19] advised that there is no compulsory procurement policy applicable for services of a technical expert, or panel, of this scale and nature.

Alternative Nomination Process

4.26 If the process were as simple as one nominee of the Applicants and one of DoC’s being assigned to the tasks at hand, then no evaluation of suitability is required as there is then no selection to be made. As a minimum under this option, NRC should be advising the cost of others’ experts to the Applicants who will ultimately be charged for their services however.

[19] S. Kane, pers. comm, 8 June 2021.

Decision making framework and mechanisms under the GMCPs

4.27 Christie/Familton consider the GMCPs are "being relied upon too heavily" [11] and that they are "based heavily on a high-trust model with a large scope for amendment through processes sitting entirely internal to Council and outside of a formal s127/8 review" [12]. NRC, at [39] of the Supplementary s42A Report responds that they retain the ability to "initiate review of one or more consents and that deferral of trigger levels to the GMCPs is not only appropriate but necessary for adaptive management".

4.28 Upon review of some of the wording in the GMCP, there remains some ambiguity in wording that could suggest that "*wholescale amendments*"[20] are available through the GMCP that would otherwise not have been fully assessed and therefore outside of the scope of the activity for which resource consent was granted. I agree that this circumstance does not "*represent best practice*" as stated by Christie/Familton [16].

4.29 Suggested amendments to clarify the scope available for changes as part of the GMCP have been proposed (see [4.7] above and tracked changed GMCPs at **Appendix A**) as a means of closing off the potential for wholescale amendments through the change-processes originally included in the GMCP. The proposed changes maintain the necessary balance between enabling change based upon evidence-based recommendations generated under the GMCP review and response mechanisms that provide flexibility to Consent Holders whilst still retaining certainty that changes serve the purpose of maintaining or improving the achievement of Objective 1.

4.30 Christie/Familton have stated that "*[t]he objective and performance standards detail should be established prior to possible granting of consents and contained within conditions*" [11] and provide reference material in relation to their position.

4.31 The GMCP contains an adaptive management framework which contains an objective (Objective 1(a)-(g)), establishes performance measures in the form of trigger levels set at three tier thresholds, and imposes hold-points on the taking of water based on the ability to comply with performance measures.

4.32 All sentinel monitoring bores must be installed prior to exercise of the consents. For all monitoring sites that have no trigger levels established at the time of grant of the

[20] At [16] Christie/Familton.

resource consents, interim trigger levels for salinity and groundwater levels will be established using the method set out in Sections 2.1.2.1 of the GMCPs. The GMCP clearly sets out how the interim levels are to be measured and applied and then furthermore, contains the process within which those trigger levels are reviewed and amended based on data collected during the first 12 months of monitoring.

4.33 The GMCP contains tiered trigger and response conditions scaled to suit the magnitude of effect picked up through monitoring. These tiers are summarised at [16] of the Supplementary s42A Report.

4.34 At all tiers, the key tenet is ensuring that Objective 1 is upheld. Furthermore, the consenting authority can also withhold the scaling up of abstraction at the point of the SIMPR as a basis of upholding Objective 1. Other mechanisms are available to the NRC should it be evident that Objective 1 cannot be achieved under any of the tiers as the ultimate back-stop.

4.35 The GMCP contains clear expectations that the AEMR will be a document which, amongst other things, contains an evaluation of whether the observed effects of the groundwater takes are consistent with the predictions of the modelling. A rerun of the model is not necessary if the monitoring is proving the predictions of the model to be true because this was the basis of the assessment and consideration of the AAWPAs. Obviously if the monitoring is not proving the predictions of the effects of the AAWPAs to be true, then a review should be initiated by the consenting authority.

5. NESFM2020

5.1 The NESFM2020 contains requirements for carrying out certain activities that pose risks to freshwater and freshwater ecosystems. The standards are designed to:

(a) protect existing inland and coastal wetlands;

(b) protect urban and rural streams from in-filling;

(c) ensure connectivity of fish habitat (fish passage);

(d) set minimum requirements for feedlots and other stockholding areas;

(e) improve poor practice intensive winter grazing of forage crops;

(f) restrict further agricultural intensification until the end of 2024; and

(g) limit the discharge of synthetic nitrogen fertiliser to land, and require reporting of fertiliser use.

5.2 The NESFM2020 is one of four pieces of national direction for managing New Zealand's freshwater. Local authorities are also required to give effect to the following in order to deliver on the outcomes anticipated as a result of the freshwater reform package:

(a) The NPSFM2020;

(b) Resource Management (Stock Exclusion) Regulations 2020;

(c) The amendments to the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010.

5.3 At [26]-[29] of the Supplementary s42A Report it is suggested that resource consents pursuant to regulations of the NESFM2020 be considered as part of, or additional to, the applications currently being considered and that the general conditions in Regulation 55 of the NESFM2020 apply should the NESFM2020 be applied in this manner. While it is agreed that the effects of the take and use of groundwater on environments such as natural wetlands have been assessed in accordance with Schedule 4 RMA[21], the closing submissions made on behalf of the Applicants explain why applications for resource consent under Regulation 54 NES2020 need not be made nor considered as part of these current applications.

5.4 The NPSFM2020 provides the most relevant policy framework for decision making associated with the consenting process for regulated activities under the NES2020. However, aside from the Regulations themselves, the NES2020 contains no other relevant provisions that are required to be assessed[22] and had regard to in accordance with Section 104(1)(b) of the RMA. Further discussion on the relevant provisions of the NPSFM2020 are provided at Section 6 below.

5.5 Should resource consent be considered a necessary step pursuant to the NESFM2020, the general conditions in regulation 55 of the NESFM2020 cannot be applied as Regulation 54 does not refer to the compliance of an activity with the general conditions in it. This is evident in the nature of the general conditions which are primarily aligned with managing the effects of discharges, earthworks, structures, and vegetation clearance activities in and adjacent to natural wetlands.

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21 Supplementary s42A Report at [27].

22 as directed by Schedule 4, Clause 2(1)(g) RMA.

However, the Consent conditions and GMCPs establish the necessary consenting framework for monitoring effects of deep and shallow aquifer water levels to avoid potential adverse effects on natural wetlands and values which may be associated with them.

6. NPSFM2020

6.1 The NPSFM 2020 replaced the National Policy Statement for Freshwater Management 2014 (as amended in 2017) (NPSM2014) on 3 September 2020. Evidence was presented verbally on the NPSFM2020 at the hearing held between 1-3 September 2020. While that evidence is still relevant, issues raised by DoC[23] related to the NPSFM2020 are quite broad. Consequently, commentary on the NPSFM2020 as a whole is considered to be warranted through this reply.

6.2 The key purpose of the NPSFM2020 is to direct how regional councils are to manage fresh water through their regional policy statements and regional plans. The NPSFM2020 contains one objective (at Part 2) and fifteen policies (at Part 2) supported by a non-exhaustive list of approaches (Part 3) that local authorities must implement to give effect to the objective and policies.

6.3 The objective of the NPSFM2020, which reflects the hierarchy of obligations in Te Mana o te Wai, is:

> (1) …to ensure that natural and physical resources are managed in a way that prioritises:
>
> (a) first, the health and well-being of water bodies and freshwater ecosystems
>
> (b) second, the health needs of people (such as drinking water)
>
> (c) third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.

6.4 The first policy of the NPSFM2020 is that fresh water is managed in a way that gives effect to Te Mana o te Wai. It is considered that the AAWPA will be consistent with the hierarchy of obligations in Te Mano o te Wai because:

(a) The ecological values of surface waterbodies and quality of the aquifer will be given priority by ensuring that adverse effects on flows or levels and intrusion of seawater are avoided through monitoring and responding to

[23] Particularly at [5] & [8] of Christie/Familton.

changes in baseline hydraulic properties of the deep and shallow aquifers at production and Sentinel bore sites;

(b) Similarly, the actual or potential adverse effects on existing water users will be avoided through the same monitoring and response management mechanisms. Careful scientific evidence-based assessment of the actual effects of pumping from the deep aquifer on people's ability to access water from the shallow aquifer will be addressed as part of the GTER due to dependency on rainfall for the recharge of shallow aquifer systems; and

(c) As part of the Te Hiku Development Trust strategic project on land use change on the Peninsula, industry partner T&G Fresh has verbally expressed that as a 'rule of thumb' 1 – 1.5 full time staffers per 10 ha is required for horticultural land use[24]. The top end of this range would include some packing/sorting staff. Additional to permanent onfarm staff is the significance of support roles created in local communities including in Contracting (i.e., FNR Consulting Ltd), Business (i.e., accounting, legal, administrators), and Farm Supplies. Other associated social benefits resulting from productive landuse change include higher school enrolments and a greater sense of community with people engaging more in community and school events. The AAWPA proposals are therefore an opportunity for improvement of social and economic wellbeing in the Far North through the sustainable use of water.

6.5 The second policy of the NPSFM2020 is that tangāta whenua are actively involved in freshwater management (including decision-making processes), and Māori freshwater values are identified and provided for. It is understood that the policies in Chapter D.1 of the PRP go some way towards achieving the direction in the NPSFM2020. In this instance, one perspective of Māori freshwater values and the actual or potential effects of the AAWPA was put forward through analysis against Iwi Resource Management Plans under the guidance of the board Chair of Te Aupōuri Commercial Development Limited (TACDL), the General Manager of Te Rarawa Farming Limited, and the Company Director of Te Make Farms Limited. Consultation with Waiora marae during the hearing adjournment also informed the process of Te Mana o te Wai/ o te Taiao (discussed further at Section 7 below).

[24] Pers. Conv., M Butler (RCP Strategic Advisory Consultant to Te Hiku Development Trust) with Tom Chamberlain, Northland Manager T&G Fresh, based at Kapiro Road Kerikeri between 12-18 March 2021.

6.6 The third policy is that freshwater is managed in an integrated way that considers the effects of the use and development of land on a whole-of-catchment basis, including the effects on receiving environments. The AAWPA will enable land use change mainly from pastoral farming activities to horticulture (avocado, berries, and potentially commercial vegetable production) through the supply of water. The design of productive land use activities will be diverse across the use areas to suit the soil type, climate, location and the community. The conversion of pastoral agriculture to horticultural land uses is not controlled by the NESFW2020, or the PRP. However, the PRP contains rules for horticulture related activities, such as earthworks, cultivation, discharges of vegetable wash water and wastewater from greenhouses while the Far North District Plan (FNDP) contains performance standards for land use activities such as earthworks, impermeable surfacing and crop protection structures. The Government has also amended the RMA to provide for compulsory freshwater farm plans for farms that have more than five or more hectares of horticultural land use. The farm plans must specify requirements that are appropriate for the purposes of avoiding, remedying, or mitigating the adverse effects of horticultural activities on freshwater and freshwater ecosystems.[25]

6.7 Given the above mechanisms available for integrated catchment management, it is understood that Policy 3 of the NPSFM2020 guides decisions regarding land use and discharge activities under the RMA. The policy is less relevant when it comes to the taking and use of water. Considering the end use of abstracted water on water quality would appear to duplicate management decisions about the use and development of land and would be an indirect means of addressing potential issues.

6.8 The fourth policy of the NPSFM2020 is that freshwater is managed as part of New Zealand's integrated response to climate change. DoC has made references to the potential impacts of climate variability on surface waterbodies and baseline data. Out of an abundance of caution, these statements have been viewed in the context of a climate change scenario which requires analysis against Policy 4 of the NPSFM2020.

6.9 Climate change predictions for Northland were assessed by NIWA [26] and summarised as follows:

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25 Section 217F of the RMA.

26 Petra Pearce, et al. September 2016. *Climate Change Projections and Implications for Northland*. Prepared for Northland Regional Council. NIWA Client Report No: 2016072AK

(a) between 0.7°C and 3.1°C by 2090.

(b) On average, the number of hot days (>25°C) is projected to increase from 25 days per year to between 55 and 99 days per year.

(c) Future precipitation projections indicate slightly less rainfall by 2040, with up to 10% less rainfall for some areas in spring.

(d) By 2090, more significant spring rainfall reductions and autumn/summer increases.

(e) There is an increased risk of drought.

(f) There will be longer growing seasons for crops in Northland due to higher mean temperatures, but higher temperatures and lower availability of water may lead to decreasing yields.

6.10 Such effects may have flow on effects for water supply and significant ramifications for local food production and associated social and economic effects in the absence of sufficient and reliable water availability.

6.11 Groundwater systems are susceptible to the effects of climate change though aquifers, such as the shellbed, will respond slower to effects experienced at the surface. The PRP allocations are reflective of a precautionary approach in the face of predicted effects of climate change on the Aupōuri Peninsula. Furthermore, the collection of baseline information through this consenting process would not likely have been obtained through other means and so provides an opportunity for the collection of information on the resource to continue to make decisions on sustainable use and development as a further adaptation to climate change effects.

6.12 The proposed AAWPA will improve resilience to climate change, including through the diversity available in land use and production which would otherwise be difficult to achieve without water (refer Section 1.2).

6.13 Policy 5 is a keystone policy of the NPSFM2020 for future freshwater management plans as it directs regional councils to manage freshwater through the National Objectives Framework (Part 3). That involves regional councils setting environmental outcomes, target attribute states, environmental flows and levels, and other criteria to support the achievement of environmental outcomes, setting limits and preparing action plans to achieve environmental outcomes. The policy is not relevant to the AAWPA as the AAWPA shall be assessed and considered

against the objectives as exist in operative plans (PRP, and where under appeal, those contained in the Regional Water and Soil Plan for Northland 2004).

6.14 DoC[27] considers that the AAWPA have not given effect to Policy 6 which is that there is no further loss of extent of natural wetlands, their values are protected, and their restoration is promoted. Through adherence to the GMCPs, the avoidance of further loss of the extent of natural wetlands is achieved. The individual AAWPAs contained assessments of effects on proximal surface waterbodies to the abstractions while the WWLA 2020a report contains assessment of effects on drainage as a cumulative response to pumping. These assessments were not specific with regard to unmapped natural wetlands however. Due to the uncertainty about the existence or extent of natural inland wetlands in the area of assessed effect, the AOI's were prepared to identify areas that will need further investigation to overcome this uncertainty. The experts were also tasked[28] with advising whether a plan to address this uncertainty could be developed and implemented as part of an adaptive management condition or if it could be completed and results confirmed before final decisions are made on the AAWPAs.

6.15 Experts were not able to agree a plan to address the uncertainty and only resolved the AOI mapping. As part of Planning conferencing, the Hearing Commissioners in Minute #5 directed that "[Planning] *conferencing is to focus on the latest set of draft conditions to be provided by the Applicant and as agreed with NRC"*. A plan to address the 'wetland issue' as part of the GMCP's (see Section 3.5 of the Northern and South-Western GMCP's, and Section 3.6 of the Middle GMCP) was included as part pf the set of draft conditions forwarded in accordance with Minute #5. Collection of baseline information on values is proposed for sites delineated as natural wetland followed by a repeat survey of those values within five (5) years from the date of the original survey. Ongoing surveying would then be required only if technical assessment carried out in accordance with the GMCP (Section 2.1.1) confirms that temporal groundwater level variations in the Sentinel bores are not meeting Objective 1 in respect of alteration of hydrological functioning and the extents of natural wetlands, amongst other freshwater systems. The plan included in the GMCP is therefore considered to be consistent with Policy 6, and Clause 3.22 and 3.23 of the NPSFM2020.

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27 Christie/Familton at [5].

28 Hearing Commissioner's Direction #3 16 September 2020.

6.16 Policy 7 is that the loss of river extent and values is avoided to the extent practicable while Policies 8 and 9 require that significant values of outstanding water bodies and the habitats of indigenous freshwater species are protected. DoC has only made reference[29] to Policy 9 as having not been given effect to through the AAWPAs. For the reasons as explained throughout this reply evidence, the risk of adverse impacts of abstracting deep groundwater to rivers, outstanding water bodies and the habitats of indigenous freshwater species is low and that the GMCP is a tool for managing the uncertainty of the predictions that such impacts are low. In this way, a decision to grant the AAWPAs can maintain the position that these values will be protected.

6.17 Given the broad scope of DoC's issues with regard to surface waterbodies, Policy 10 is mentioned here but is not considered relevant as neither trout nor salmon are known to be present on the Peninsula (though they are known to have been introduced to dune lakes in Northland).

6.18 Policy 11 is that freshwater is allocated and used efficiently, all existing over-allocation is phased out, and future over-allocation is avoided. DoC refers to possible issues with surface water resource management[30], such as allocations, as a consequence of these groundwater takes. The AAWPAs will not result in over-allocation as defined in the NPSFM2020 because they will not exceed the relevant take limits set in Policy H.4.4 (Table 29) PRP nor are they included in the surface water allocation regime set in Policy H.4.4 in accordance with Policy H.5. Avoidance of adverse effects on surface waterbodies through an impact on allocation is available through the GMCP 'trigger and response' consent conditions. There are also multiple measures available to NRC to allocate freshwater efficiently, including:

(a) A lapsing condition on the consents (as has been included on the Proposed Draft Consent Conditions); and

(b) Section 128 RMA review of abstraction volumes; or

(c) Section 126 RMA cancellation of a resource consent which has not been exercised during a preceding 5 year period.

29 At [5] of Christie/Familton.

30 Legal submissions on behalf of DoC 4 June 2021 at [12]; Reply Evidence of David William West on behalf of DoC at [19-20]; and Reply Evidence of Timothy Michael Baker on behalf of DoC at [22-24].

6.19 DoC has not raised an issue with regard to Policy 12 of the NPSFM2020, and in any instance, it is not relevant to the AAWPA's because it is about national targets for primary contact recreation.

6.20 It is considered that the focus of Policies 13 and 14 is on regional council monitoring and reporting requirements in the NPSFM (e.g., Clauses 3.19, 3.20, and 3.30). Under the GMCPs, the exercise of the AAWPAs must not result in the degradation of water quality in the aquifer nor surface waterbodies. Through the GMCPs, monitoring of salinity indicators in the Sentinel bores and production bores is proposed while monitoring of aquifer water levels will be used as the catalyst for determining whether an impact on surface waterbody flow or levels (and therefore possible degradation in condition), is possible.

6.21 Policy 15 of the NPSFM2020 is that communities are enabled to provide for their social, economic and cultural well-being in a way that is consistent with the policy statement. For the reasons as detailed above, the AAWPAs will give effect to this policy.

7. SUMMARY OF OUTCOMES OF CONSULTATION WITH WAIORA MARAE

7.1 WWLA discussed the approach to consultation with Waiora marae with trustees of Te Runanga Nui o Te Aupouri Iwi given the application (APP.039859.01.01) made by their commercial arm TACDL was the closest to Waiora marae and because of shared whakapapa.

7.2 The initial plan was for WWLA, the chair and deputy chair of TRNoTA, and matua Waitai Petera to attend the meeting with Waiora marae on the matter. Unfortunately, a bereavement occurred in the whanau and TRNoTA and matua Petera were unable to attend the agreed meeting date/time. As such, WWLA[31] attended the meeting with representatives of Waiora Marae on 15 October 2020 where the following items were discussed:

(a) Presentation of hydrogeology work;

(b) The adaptive management regime proposed;

(c) NPSFM2020;

(d) NESFM2020;

[31] Mr Jon Williamson and Ms Martell Letica.

(e) Mana whakahono a rohe provisions of the RMA.

7.3 The main outcomes from this discussion were documented in a Consultation record prepared by Ms Tracey Ashby on behalf of Waiora Marae, which was agreed by WWLA as a correct representation of the consultation (**Appendix C**). This Consultation record was submitted to the NRC (Ms Sluys) on 4 November 2020.

7.4 WWLA forwarded the Consultation record to TACDL (**Appendix D**) who advised WWLA that they acknowledge the perspective of Waiora marae around whakapapa and Te mana o te Wai / o te Taiao, but that TACDL have the collective responsibility of creating generational change for whanau by carefully investing in their asset base which was returned through treaty settlement. One such investment includes developing and using groundwater to implement land use change for economic return and employment.

7.5 TACDL felt that the biggest concern for Waiora marae was whether the abstractions were sustainable. They felt the abstractions were sustainable given the scientific modelling that has been put forward as the basis of the application lodged by TACDL.

7.6 TACDL agree that continued conversations with Waiora marae about how and what the Consent Holders are doing with the water is necessary for whanau to be able to exercise kaitiakitanga, though they were careful to note that this is the exercise of kaitiakitanga as recognised within the constraints of the RMA framework as opposed to that exercised in Te Ao Māori.

7.7 The exercise of kaitiakitanga by Waiora marae, within the capabilities of an RMA process, could be implemented as a Master Consent condition on all of the consents as follows:

x. The Consent Holder shall, for the purpose of discussing the results of monitoring required under the most recent revision of the GMCP , form and maintain (including providing all administrative support) a Kaitiaki Liaison Group. The Kaitiaki Liaison Group shall comprise the Consent Holders, Waiora marae, NgāiTakoto Iwi, Te Aupōuri Iwi, and Te Rarawa Iwi, and the Northland Regional Council. The Consent Holder shall hold a meeting of the Kaitiaki Liaison Group not less than once every year in September following the preparation of the Annual Environmental Monitoring Report required to be prepared in accordance with Section 3.6 of the GMCPs.

xx. The meeting shall be held at a time convenient for the majority of the Kaitiaki Liaison Group members.

Advice Note: The aim of the Kaitiaki Liaison Group shall be to share information relevant to the management of the Aupōuri aquifer and to make recommendations to the Northland Regional Council on any actions required under their review authority to address any identified adverse effects. Such recommendations may be incorporated into the adaptive management plan. The minutes of the meeting shall be made available to all interested parties.

7.8 The proposed condition is applicable to the Master Consent as the Master binds the individual consent holders to responsibilities that need to be carried out as a collective.

7.9 While Waiora marae is the only party to have expressed a desire to be involved in a kaitiaki capacity at the monitoring and compliance stage of the consenting, their concerns relate to wai as a connected taonga so in this respect all GMCP activities (Northern, Middle, and South-Western) would need to be brought to their attention to fulfill one of the consultation outcomes sought.

7.10 In proposing this condition, TACDL, Te Make Farms Limited and Te Rarawa Farming Limited assert that in making these applications they will utilise te Taiao in a sustainable manner for the purpose of providing for their people which achieves the necessary balance with their obligations as kaitiaki.

8. SUMMARY OF OUTCOMES OF CONSULTATION WITH MWWUG

8.1 The s42A hearing report of 7 August 2020 proposed to absorb the Middle group takes into the current MWWUG GMCP to consolidate the management and monitoring of takes proximate to the Kaimaumau-Motutangi wetland [206]. At [207] the recommending Officer pays attention to the need for any new consents not to impede the rights of existing consent holders while at [208] attempts to address the possible impediment, or derogation of grant, by giving priority to MWWUG consent holders to recommence abstraction in the unlikely event that a TL2 50% (see Section 4.2(b) of the Middle GMCP **Appendix A**) or TL2 25% (see Section 4.2(f) of the Middle GMCP **Appendix A**) were to occur.

8.2 At the adjournment of the hearing the Commissioners indicated that they required further information on consent conditions and respective GMCPs if the “new” applications within the AAWPA are to be included without priority being “saved” for

existing MWWUG consent holders. This arrangement was presented to the MWWUG consent holders in a memorandum circulated on 16 September 2020 and further discussed at a meeting held at Waiharara Hall on 18 September 2020**,** attendance at which was logged (see **Appendix E)**. Participants at the meeting confirmed that their preference for their resource consents was to place the AAWPAs in a separate GMCP to theirs rather than grouping them altogether as they felt this would 'open up' their resource consents in a way that differs to how they were initially granted. The proposal to prioritise recommencement of MWWUG consent holders' abstraction above the AAWPAs in the unlikely event that a TL2 50% (see Section 4.2(b) of the Middle GMCP **Appendix A**) or TL2 25% (see Section 4.2(f) of the Middle GMCP **Appendix A**) were to occur was deemed acceptable at the meeting.

8.3 The Closing Submissions on behalf of the AAWPA address the case law relevant to what constitutes a derogation. It relies on the evidence of Mr Williamson and Mr Hughes that a decision to grant the AAWPAs would not amount to an over-allocation of the groundwater resource and therefore no derogation of the rights of MWWUG is available.

9. CONCLUSION

9.1 The GMCP's contain monitoring and trigger levels which will utilise available and collected information on the environment as a baseline across three distinct sub-sectors of the Aupouri Peninsula – referred to as the Northern, Middle, and South-western sub-sectors. Interim trigger levels will be set, where none exist, prior to the exercise of resource consents in those sub-sector GMCP areas.

9.2 The GMCPs support the premise that as data is collected from the monitoring over-time, review and amendment of trigger levels can be implemented for the purposes of maintaining or improving achievement of Objective 1. However, minor amendments to the GMCPs contained in the Supplementary s42A Report have been proposed in order to remove potential for wholesale amendments.

9.3 Regard to the NES2020 may be had only to the extent of its relevance as opposed to it imposing duties or restrictions that would require resource consents to be made and considered as part of this process.

9.4 The AAWPAs are consistent with the NPSFM2020 and I conclude that the AAWPAs can be granted, subject to the Proposed Draft Consent Conditions (**Appendix F**)

DATED this 21st day of June 2021

Martell Letica
Planner for the Applicants

Groundwater Monitoring and Contingency Plan for the Other, Paparore, Motutangi and Houhora sub-aquifers of the Aupōuri Aquifer Management Unit

~~May~~ June 2021

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GLOSSARY OF TERMS

Saline/saltwater intrusion	For the purposes of this Groundwater Monitoring and Contingency Plan, saline/saltwater intrusion refers to changes in salinity at nominated monitoring locations that exceed thresholds established to indicate elevated potential for adverse effects on groundwater quality for potable supply and/or irrigation use, and effects on freshwater ecosystems
Efficient bore takes	An efficient bore take is when a bore fully penetrates the water bearing layer and takes water from the base of the aquifer.
Sub-aquifer	The Aupōuri Aquifer system is divided into 12 separate sub-aquifer units for the purposes of setting tailored aquifer-specific allocation limits.[1]
First in-first served	Under the Resource Management Act 1991, applications for water take are processed in the order in which they are lodged. The rights of parties associated with this Groundwater Monitoring and Contingency Plan are prioritised according to the order in which their permits are granted and added to this Plan.
Stage 1	The period up to the point that trigger levels have been set and irrigation has occurred for one full irrigation season, as applied for each individual take/consent
Full irrigation season	Irrigation that occurs within the entire period of a water year, being 1 July to 30 June, when irrigation is required, whether or not the full allocation for a stage is irrigated during a water

[1] Policy H.4.4 of the Proposed Regional Plan for Northland (Appeals Version) June 2020.

	year.
Sentinel bore	A monitoring bore specifically established to monitor groundwater levels and salinity indicators in a specified location. For the purposes of this Groundwater Monitoring and Contingency Plan, sentinel bores are those established and/or proposed monitoring bores (not production bores) in which piezometers are installed to measure groundwater levels and salinity indicators in the deep shellbed aquifer and/or the shallow sand aquifer.

1. INTRODUCTION

1.1 Scope and Objective of the GMCP

This document comprises a groundwater monitoring and contingency plan for the Motutangi, Paparore, and Houhora sub-aquifers of the Aupōuri aquifer management unit ("the GMCP"). Much of the approach outlined in this GMCP has been informed by the technical assessment presented in the *Motutangi*-[Waiparera]*Waiharara Groundwater Model, Factual Technical Report – Modelling. Motutangi*-[Waiparera]*Waiharara Water User Group. WWA0026: Final – Rev. 9*, dated 31 August 2017 (hereon referred to as the **MWWUG ~~Model~~ Report**) and the *Aupouri Aquifer Groundwater Model, Factual Technical Report – Modelling – Aupouri Aquifer Water User Group. WWLA0184, Rev 3*, dated 5 February 2020 (hereon referred to as the **AAGW ~~M~~ Report**~~Model Report~~). Both reports were prepared by Williamson Water & Land Advisory Ltd.

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The GMCP covers the implementation and monitoring of the groundwater take consents listed in **Table 1** (hereafter referred to as the Consent Holders) and is a programme of adaptive management that is suitable to provide a platform for the implementation of these abstractions.

The Consent Holders listed in **Table 1** are a group of consents that have been jointly granted subsequent to the previous tranche of consents granted to other consent holders within the Motutangi-Waiharara Water User Group (MWWUG), which are subject to separate conditions and a separate GMCP. The MWWUG consents, and the AAWUG consents to which this GMCP applies, are distributed across a similar geographic area, abstracted from (generally) the same sub-aquifers, and share a similar radius of potential effects.

In accordance with the first in-first served approach to water allocation under the Resource Management Act 1991, applications for a resource are considered in the order in which they are lodged with Council. To ensure that the subsequent grant and exercise of these AAWUG consents does not derogate from the ability of the MWWUG consent holders to exercise their existing consents to their full authorisation, the conditions and this GMCP include clauses designed to retain the primacy of the MWWUG consents where remedial measures, including reductions, cessations, and staggered reactivation of takes, are required.

An adaptive management regime requires reasonably clear objectives against which the effects and management progress may be evaluated. The objective of this GMCP is that:

Objective 1: **The abstractions must, individually and cumulatively, avoid:**

- **(a) adverse effects of saltwater intrusion into the Aupouri aquifer;**
- **(b) adverse effects on the hydrological functioning, including changes to water levels[2], of natural wetlands, springs and dune lakes;**
- **(c) alteration to the extents of rivers, natural wetlands, springs and/or dune lakes;**
- **(d) adverse effects on the significant indigenous vegetation and habitats in (terrestrial and freshwater environments of) dune lakes, springs and natural wetlands; and**
- **(e) adverse effects on the significant indigenous vegetation and significant habitats of indigenous fauna in terrestrial and freshwater environments of the Kaimaumau-Motutangi wetland; and**

Commented [SK1]: Council is comfortable with the inclusion of 'adverse effects' and notes that there are discrete locations within the area of interest where groundwater has shown increased salinity. The inclusion of "adverse effects of" provides for these anomalies.

[2] Avoiding "change" means that as a result of the abstraction of water; median water levels, mean annual water level fluctuations and patterns of water level seasonality (relative summer vs winter) remain unchanged.

(f) Adverse effects on the flow levels and flow variability of rivers and streams and springs so that their habitat quality and sustainable mahinga kai, recreational, and other social and cultural values, are maintained (including sufficient flows and flow variability to maintain their habitat quality, including to flush rivers of deposited sediment and nuisance algae and macrophytes and support the natural movement of indigenous fish and valued introduced species such as trout; and

(g) lowering of the groundwater levels of the Aupōuri aquifer such that existing efficient bore takes operating as a permitted activity or in accordance with resource consent conditions cannot access the authorised volume of groundwater.

Extensive environmental monitoring is required to achieve avoidance of the effects listed above, and to support the proposed 'adaptive management' approach including a staged implementation of groundwater extraction. The purpose of the GMCP is to provide a framework that meets the requirements and principles of adaptive management. The GMCP provides a methodology for implementing adaptive management and prescribes specific monitoring requirements, establishes groundwater level and groundwater quality monitoring triggers and outlines a process for implementation of appropriate mitigation and remediation measures if nominated trigger values are exceeded.

The GMCP is intended to allow the early detection of any impact to the Other, Motutangi, Paparore, and (southern) Houhora sub-aquifers of the Aupōuri aquifer management unit, the Kaimaumau-Motutangi wetland (Kaimaumau Wetland) and surface water bodies associated with the exercise of groundwater take consent(s), by:

- Requiring regular monitoring of the groundwater system both on and off-site;
- Setting monitoring criteria to indicate potential impact(s) on the groundwater system, Kaimaumau Wetland and surface water bodies;
- Implementing mitigation measures including changes to the pumping regime if trigger levels are reached to ensure that Objective 1 continues to be met;
- Reviewing monitoring data before and after a step level increase in pumping rate;
- Ensuring that the monitoring data is available for regular review by the Council;
- Detailing a Contingency Plan to be implemented if an unanticipated impact(s) is identified;
- Providing information to quantify the actual effects of the abstraction on the groundwater resource; and
- Enabling validation of the numerical model by the Consent Holders for any replacement groundwater take consent applications.

1.2 Parties Associated with this GMCP

The parties who have been deemed to be associated with this GMCP at its inception are Northland Regional Council ("the Council"), the Consent Holders in **Table 1**, and the Director-General of Conservation.

The following sections provide a brief description of the roles and responsibilities of each party associated with this GMCP.

Should any of these parties change during the implementation of this GMCP, either through addition or removal, the process as set out in **Section 1.3** below shall be applied.

The rights of Consent Holders associated with this GMCP are prioritised according to the order in which their permits are granted and added to this GMCP, in accordance with the first in-first served approach to water allocation under the Resource Management Act 1991.

1.2.1 Northland Regional Council

The Council will undertake the ongoing monitoring requirements of the GMCP on behalf of the Consent Holders. The actual and reasonable cost of undertaking the ongoing monitoring of these consents for the Consent Holders will be charged in accordance with Council's Charging Policy.

The installation of sentinel bores and monitoring equipment is the responsibility of the Consent Holders.

1.2.2 Consent Holders

The Consent Holders identified in **Table 1** of this GMCP are required to exercise their consents in accordance with this GMCP.

The exercise of the consents will be in accordance with Council initiated instructions which will be issued once the actions and process established through this GMCP have been undertaken.

The Consent Holders may seek changes to the GMCP through either of the processes set out in **Section 1.3**.

1.2.3 Director-General of Conservation

The Director-General of Conservation is responsible for administering land and waterbodies subject to reserve status under the Reserves Act 1977 and conservation or stewardship area status under the Conservation Act 1987, along with native fish and functions relating to protected species under the Wildlife Act 1953. Within the Other, Motutangi, Paparore and (southern) Houhora sub-aquifers of the Aupōuri Aquifer management unit these areas include:

- Kaimaumau Wetland

The Director-General of Conservation is a party to this GMCP to ensure that the relevant provisions of these Acts, which the Director-General of Conservation administers, in particular that matters identified in Objective 1 of the GMCP are to be met.

It is also relevant to note that the Ngāti Kuri Claims Settlement Act 2015, Te Aupōuri Claims Settlement Act 2015, NgāiTakoto Claims Settlement Act 2015, and the Te Rarawa Claims Settlement Act 2015 all contain provisions relating to a 'korowai redress' which set-out co-governance arrangements for conservation land known as the 'Korowai for Enhanced Conservation'. The Korowai for Enhanced Conservation recognises the historical, spiritual and cultural association NgāiTakoto, Te Aupōuri, Te Rarawa and Ngāti Kuri iwi have with conservation land and the roles that the hapū and marae of each undertake as kaitiaki of the whenua and taonga of the conservation estate.

1.3 Changes to the GMCP

This GMCP may be amended at any time to:

- Incorporate new or replacement water permits, or remove water permits, in the Other, Motutangi, Paparore, or (northern) Houhora sub-aquifers of the Aupōuri aquifer management unit that have overlapping and/or additional monitoring requirements or which are subject to different trigger levels or trigger levels based on monitoring described in this GMCP:
- Alter the nature and scope of the required monitoring (i.e. monitoring frequency and intensity (type and number of samples)) and associated trigger levels as is determined from final decisions of the Council under the Staged Implementation Monitoring Programme Review, Annual Environment Monitoring Report, and Groundwater Trigger-Level Exceedance Report;
- Incorporate or remove parties who are, or may need to be, a part of this GMCP to ensure Objective 1 is met.

If either the Council or a Consent Holder wishes to amend the GMCP, then it must provide notice in writing of the proposed changes, along with any supporting technical documents, to the other Consent Holders, and the Director-General of Conservation.

A suitably qualified and experienced hydrogeologist (and ecologist if required) shall be nominated by Council to act as an independent technical expert for the purpose of peer reviewing proposed changes to the GMCPs. The nominated technical expert shall, within ~~Parties, given notice by Council of a change to the GMCP, have~~ 20 working days, ~~to~~ provide a ~~response~~ report to the Council, the Consent Holders and the Director-General of Conservation on the proposed changes to the GMCP.

~~If no response is received from a party within the stated timeframe, then Council will consider that the party has no concerns with the conclusion of the report.~~

If any party does not agree with the outcome of the report on the proposed change, that party shall ~~engage a suitably qualified hydrogeologist and/or an ecologist to prepare a report detailing~~ notify the Council of the reasons for the disagreement ~~which shall be provided to Council~~ within 2~~3~~0 working days from the date that the ~~written notice of the proposed changes was sent to the party~~review report was received.

Any change to the GMCP will only be authorised by Council if the ~~technical or administrative assessment~~review of the proposed change clearly indicates that the change will meet Objective 1 of the GMCP.

The Council will ~~provide a report~~notify ~~to~~ the Consent Holders and the Director-General of Conservation of the decision, detailing the reasons for its decision, including the identification and discussion of areas of agreement and disagreement. ~~The report will also be provided to the Director-General of Conservation.~~

If any changes are made to the GMCP, then a copy of the amended GMCP will be provided to the Consent Holders and the Director-General of Conservation.

Commented [SK2]: These changes have been made to address the suggestion of a technical review panel/peer reviewer for changes to the GMCP.

2. FRAMEWORK FOR ADAPTIVE MANAGEMENT

In summary, the following adaptive management techniques are applied in this GMCP:

(a) Baseline monitoring – a monitoring programme has been developed for Stage 1 of the **Table 1** abstractions to establish robust existing environment baseline. This monitoring programme is contained in this GMCP, however, some monitoring detail is still required and this is indicated by the acronym 'TBC'.

(b) Early warning systems – Trigger levels (TLs) will be established to set up an early warning system that provides a response mechanism when differences between predicted and actual water levels and/or salinity concentrations occur. A trigger level is an environmental criterion that if, reached or met, requires a certain response to be actioned.

(c) Staged development – Abstraction volumes will progressively be increased in a staged manner, with expansion contingent on compliance with yet to be established trigger levels and on regular reviews of groundwater level, freshwater and wetland ecology, hydrology, and salinity monitoring results. It is noted that the consent documentation requires that all development starts at Stage 1 volumes whether or not others have progressed to Stage 2 or further. This is an essential mechanism for staging as an adaptive management response.

(d) Management of consents being exercised immediately after commencement – Until such time as there is adequate data to base the adaptive management on actual data and for Objective 1 of this GMCP to be achieved, the abstractions that will occur immediately after commencement (i.e. in the first year) will be subject to interim wetland water level and saline trigger levels and Trigger Exceedance Report procedures; and

(e) Tiered approach to monitoring – Monitoring requirements will increase if and when site trigger levels are approached or exceeded. Likewise, monitoring intensity may decrease with evidence of sustained compliance and stability and only by way of the process outlined in **Section 1.3** of this GMCP; and

(f) Ongoing adaptive management – The abstractions will be managed adaptively within the term of consent, in the event of trigger level exceedance through the implementation of the recommendations of a Groundwater Trigger Exceedance Report prepared by Council.

(g) Suspension of abstractions – Should compliance with Objective 1 of this GMCP not be achieved, then the exercise of the consents to abstract and use groundwater will be suspended until such time as Council confirms in writing that compliance can be achieved.

(h) Consent review – this GMCP does not override the ability for consents and/or consent conditions to be reviewed in circumstances stipulated in section 128 of the Resource Management Act 1991.

The following sections provide detailed information relating to the adaptive management framework to be imposed for the exercise of the consents.

2.1 Staged Implementation

The uptake of water by the Consent Holders will be over four (4) stages in accordance with the following factors:

- ~~***Level of current orchard development* – the following orchards are already well established:**~~
- A number of orchards that will be irrigated under these consents are already well-established and have been irrigating their trees under temporary consents issued by the Council.~~-~~

- ***Rate of orchard development*** – will occur at differing rates depending on the owner's cashflow and access to plants; and
- ***Tree maturity*** – approximately nine years to full maturity and plant water usage, hence irrigation requirements commensurately increase with tree growth.

The progressive increase in irrigation requirements on developing orchards, provides an opportunity to apply an adaptive management approach that establishes a baseline and allows the original hypotheses of avoidance of effects to be periodically re-evaluated to ensure Objective 1 of this GMCP continues to be met as development occurs.

The management approach provides a series of responses to be taken based on the monitoring results, including where monitoring shows that Objective 1 of this GMCP is not being met, as discussed in **Section 2.2**.

The uptake by Consent Holders of the consented total allowable water volumes will be permitted in four stages over nine years, as shown in **Table 1** below, unless the outcome of the Staged Implementation and Monitoring Programme Review detailed in 2.1.1 shows that there should be a delay in moving to the next stage, or that the next stage should not occur.

Table 1. Summary of staged implementation annual volumes

Application Number	Consent Holder	Indicated year of irrigation start	Allowable Annual Volume (m3)			
			Stage 1 (Year 1)[1]	Stage 2 (Year 2-3)[1]	Stage 3 (Year 4-8)[1]	Stage 4 (Year 9- full consent term)[1]
Houhora sub area management unit						
APP.040919.01.01	NA BRYAN ESTATE, SG BRYAN, CL BRYAN, KY BRYAN VALADARES &D BRYAN (1)	2022/2023	20,000	40,000	60,000	80,000
		Total (m^3/year)	**20,000**	**40,000**	**60,000**	**80,000**
		Total (% allocated per stage)	**25%**	**50%**	**75%**	**100%**
Motutangi sub area management unit						
APP.040130.01.01[2]	TUSCANY VALLEY AVOCADOS LTD (M BELLETTE)	2020/2021	16,200	22,680	29,160	36,000
APP.040918.01.01	NA BRYAN ESTATE, SG BRYAN, CL BRYAN, KY BRYAN VALADARES &D BRYAN (2)	2023/2024	40,000	80,000	120,000	160,000
APP.008647.01.06[3]	AVOKAHA LTD	2020/2021	600	1,600	3,600	4,800
APP.008647.01.06 is an increase to current consented volume of 26,400 m^3/year to totals as specified here.			*27,000*	*28,000*	*30,000*	*31,200*
APP.039628.01.04[3]	KSL LTD	2020/2021	3,600	3,600	3,600	3,600
APP.039628.01.04 is an increase to current consented volume of 26,400 m^3/year to totals as specified here.			*30,000*	*30,000*	*30,000*	*30,000*
		Total (m^3/year)	**60,400**	**107,880**	**156,360**	**204,400**
		Total (% allocated per stage)	**30%**	**53%**	**76%**	**100%**
Paparore sub area management unit						
APP.040361.01.01[2]	TIRI AVOCADOS LTD	2020/2021	290,625	377,813	435,938	581,250
APP.040362.01.01[2]	VALIC NZ LTD	2020/2021	43,425	88,850	130,275	173,700

Application Number	Consent Holder	Indicated year of irrigation start	Allowable Annual Volume (m3)			
			Stage 1 (Year 1)[1]	Stage 2 (Year 2-3)[1]	Stage 3 (Year 4-8)[1]	Stage 4 (Year 9- full consent term)[1]
APP.040363.01.01[2]	WATAVIEW ORCHARDS (GREEN CHARTERIS FAMILY TRUST)	2020/2021	8,438	16,875	25,313	33,750
		Total (m^3/year)	**342,488**	**481,538**	**591,525**	**788,700**
		Total (% allocated per stage)	**43%**	**61%**	**75%**	**100%**
Aupōuri - Other sub area management unit						
APP.039841.01.02[4]	MATE YELAVICH & CO LTD	2020/2021	13,000	26,000	39,000	52,000
APP.040368.01.01	ROBERT PAUL CAMPBELL TRUST	2022/2023	90,000	180,000	270,000	360,000
		Total (m^3/year)	**103,000**	**206,000**	**309,000**	**412,000**
		Total (% allocated per stage)	**25%**	**50%**	**75%**	**100%**

Notes:

[1]The staged implementation is based on years when irrigation occurs following the granting of the consents. This differs between individual consent holders.

[2]Well established orchards with existing consented allocation which now requires further water. The applicant of APP.040361.01.01 indicates that they have an existing consent to take and use surface water but that this expires in 2021 and will not replace it if they have consent to take groundwater of sufficient amount in the first years to irrigate their established crop.

[3]These consents are for variations to increase volumes of existing consented allocation and may be exercised up to their current consented annual volumes meaning that Stage 1 (Year 1) for these consents occurs when the takes exceed their current consented annual volumes.

[4] Trees were planted in 2019/2020 or have to be planted in the 2020/2021 period due to ordering system.

2.1.1 Staging: Implementation and Monitoring Programme Review

A Staged Implementation and Monitoring Programme Review ("the SIMPR") will be required for Council to decide whether Consent Holders proceed to the next allocation stage. At the following times, the volume of abstraction authorised will be reviewed against the staged implementation outlined in Section 2.1 at the minimum intervals of:

- **End of Stage 1:** ~~——~~A period where all or part abstraction of the Stage 1 annual volume is taken after commencement of the consent and after which a full 12 months of baseline monitoring data has been collected;
- **End of Stage 2:** Three (3) irrigation seasons following date of commencement of the consents; and
- **End of Stage 3:** Six (~~—~~6) irrigation seasons following date of commencement of the consents.

The main purpose of the SIMPR is to assess whether proceeding to the next stage would comply with Objective 1 of the GMCP.

The SIMPR will be commissioned by the Council and shall be prepared by ~~a suitably qualified hydrogeologist and~~ the nominated technical expert and, in relation to monitoring of the Kaimaumau Wetland, a suitably qualified wetland ecologist. The Council will endeavour to ensure that both the ~~hydrogeologist~~nominated technical expert~~ ~~and the ecologist will have experience and knowledge of the locality.

The SIMPR will include a detailed assessment of all environmental monitoring data including groundwater levels, salinity indicators, and water quality, and include consideration of spatial and temporal trends including potential effects of groundwater abstraction on water levels in dune lakes and natural wetlands. The SIMPR will assess whether Objective 1 of this GMCP is being met at the current level of abstraction, and whether Objective 1 will be met at the next stage level of abstraction. The SIMPR may also consider the nature and scope of continued monitoring (i.e. monitoring frequency and intensity (type and number of samples)) and associated trigger levels.

The SIMPR will provide recommendations based on the assessment of the environmental monitoring data to date on:

- the setting or alteration of the trigger levels;
- whether any changes to the monitoring programme are required; and
- whether to advance to the next stage of abstraction or to remain at the current level of abstraction, or to reduce the level of abstraction.

A copy of the SIMPR will be provided to the Consent Holders and the Director-General of Conservation a minimum of three (3) months prior to the anticipated commencement of the subsequent irrigation season utilising volumes defined for the subsequent development stage as stated in **Table 1**. The Consent Holders and Director-General of Conservation have 20 working days to provide a response to the Council on the conclusions and recommendations of the SIMPR.

~~If no response is received from a party within the stated timeframe, then the Council will consider that the party has no concerns with the conclusions of the review.~~

If any party does not agree with the conclusions and recommendations of the SIMPR, then a report by a suitably qualified hydrogeologist and/or an ecologist, both with experience and knowledge of the

locality if possible, detailing the reasons for the disagreement shall be provided to Council within 30 working days from the date that the ~~review~~ copy of the SIMPR was sent to the party.

An increase in the volume of abstraction to the next development stage and any change to the monitoring programme will only be authorised by Council if the technical assessment of the monitoring data clearly indicates that the increase in the allocation and any necessary change to the GMCP would meet Objective 1 of this GMCP.

Council will provide a report to the Consent Holders and the Director General of Conservation detailing the reasons for its decision, including the identification and discussion of areas of agreement and disagreement within thirty-five (35) working days from the date the copy of the SIMPR was sent to the party.

If any changes are made to the GMCP as a result of the SIMPR, then a copy of the amended GMCP will be provided to the Consent Holders and the Director General of Conservation within five (5) working days of the change being authorised as final.

A summary of the above process is also included in the conditions of each consent that is covered by this GMCP.

2.1.2 Stage 1 (Year 1) Management Regime

Stage 1, from a management and perspective, is the initial development stage following first commencement of a consent listed in **Table 1**. This adaptive management plan recognises that the level of Stage 1 development occurring immediately upon commencement will be much lower, volumetrically, than is indicated above in **Table 1** but that interim trigger levels will still be required prior to exercise of consents where levels have not been established through the minimum baseline monitoring timeframe.

Much of the relevant trigger levels in Sentinel bores have already been established through the implementation of the MWWUG GMCP and these established triggers will be utilised to manage the takes in **Table 1**. It is a requirement of this GMCP that any changes to trigger levels in the MWWUG GMCP initiated through the Annual Environmental Monitoring Report process in that GMCP be equally applied in this GMCP using the process set out in **Section 3.7** during Stage 1.

All trigger level exceedance measures are those which sit in **Section 4** below.

The interim management regime established for Stage 1 (Year 1) will be superseded by the Monitoring and Trigger Level Setting components set out in **Section 2.2** of this GMCP.

2.1.2.1 *Paparore Sentinel Bore Saline Intrusion & Groundwater Level: Monitoring and Triggers*

Interim trigger levels for minimum groundwater levels and salinity indicators will need to be set in the new Paparore Sentinel bore identified in **Table 4 and Table 6** for Stage 1. Ongoing monitoring will be required to ensure that Objectives 1(a), (b), and (c) are met by implementing trigger level exceedance measures.

Once the Paparore Sentinel bore is drilled, groundwater level and salinity indicators will be measured and recorded. This information will be used to set interim trigger levels for these parameters as per the methodology established in **Section 2.2** below and shall be inserted into the GMCP through the process set out in **Section 1.3**. Interim trigger levels must be set prior to exercise of consents[3] located within the Paparore sub-aquifer unit.

[3] APP.04361.01.01, APP.040362.01.01, APP.040363.01.01.

2.1.2.2 Trigger Level Responses

In the event of an exceedance of a trigger level in the Paparore Sentinel bore applicable in Stage 1 (Year 1), the Trigger Level Exceedance response plan contained in **Section 4** of this GMCP shall apply.

2.1.2.3 Ceasing Interim Stage 1 (Year 1) Management Regime

This interim management regime shall remain in place until such time as the setting of trigger levels as per **Section 2.2** below has been given effect to through amendment to this GMCP in accordance with the change process established in **Section 1.3** of this GMCP.

2.2 Trigger Level System

2.2.1 Timeframe for setting of trigger levels

The setting of trigger level values for each parameter (where TBC is indicated in the monitoring plan tables in **Section 3**) will be undertaken during the first implementation stage after 12 months of monitoring data has been collected and within 15 months of the date of commencement of these consents. This approach recognises that:

- There is historical monitoring data available for most parameters;
- In some areas, no baseline data has been established by the Consent Holders or any of the key stakeholders in the area; and
- The manifestation of any effects from the exercising of these consents will steadily progress with time in accordance with the stages of orchard developments and age of the crop. The scale of abstraction during the baseline data collection period (i.e. generally 12 months following commencement of consent) will not vary significantly from existing conditions.

2.2.2 Method for setting of trigger levels

A two-tier trigger level system will be implemented on the consents:

- TL1 – The first-tier trigger level establishes whether the parameter of concern is approaching outer limits of baseline data (e.g. Median ±2 times the standard deviation, or some other criteria determined with agreement of Council). If this trigger level is breached, then additional monitoring will be undertaken by the Council. This additional monitoring will assist characterisation of the nature and significance of changes to the baseline condition of the groundwater resource.
- TL2 – The second-tier trigger level is set at a threshold defining a 'significant' departure from baseline conditions and/or conditions where the risks of adverse environmental effects are increased. If this trigger level is breached, then the Consent Holders will be required to reduce their daily water take volume in a staged manner over a set period of time.

The trigger level parameters required under this GMCP for the various suites are summarised in **Table 2**.

Table 2: Summary trigger level parameters by monitoring suite

Monitoring Suite	Parameters
Groundwater level and salinity monitoring	Groundwater level, electrical conductivity
Saline intrusion monitoring	Electrical conductivity, chloride, sodium, total dissolved solids.
Kaimaumau-Motutangi Wetland	Groundwater level in shallow sand aquifer.

	Kaimaumau Wetland surface water levels.

2.2.3 Response to exceeding trigger levels

The actions required should trigger levels be exceeded are set out in **Section 4** (Contingency Plan).

3. MONITORING PROGRAMME & TRIGGER LEVEL SETTING

3.1 Bore Locations and Details

A consolidated summary of the schedule of bores that are required to be monitored as part of this GMCP is provided in **Table 3**. Along with the bores identified for monitoring, the table provides key details relating to the bores' physical attributes and parameters to be monitored. The resultant wetland monitoring location is to be hydrologically connected with the full range of water levels in the open water habitat of the Kaimaumau Wetland. The following sections of the GMCP provide the monitoring schedules (frequency and trigger levels) for the bores.

The locations of the production bores in **Table 3** are shown in Figure 1

Table 3: Schedule of monitoring facility and production bore details.

Bore Name		Bore Owner	Coordinates (NZTM 2000)		Depth (m)	Dia. (mm)	Piezo. No.	Target aquifer	Purpose*
Generic	NRC ref.		Easting	Northing					
MONITORING BORES									
Fishing Club	LOC.200250	NRC	1611411	6146928	79			Deep shellbed	SI; MI
Waterfront	LOC.200210	NRC	1611712	6146689	19	32	1	Shallow sand	GLc, ECc
			1611712	6146689	74	32	4	Deep shellbed	GLc, ECc
Motutangi	TBC	NRC	1615677	6139811	<10	50	1	Shallow sand	GLc; ECc
			1615676	6139821	80-100 (TBC)	50	2	Deep shellbed	GLc; ECc
Norton Road	TBC	NRC	1619875	6134377	80-100 (TBC)	50	2	Deep shellbed	GLc; ECc
Kaimaumau	LOC.316222	NRC	1622445	6134482	20		1	Shallow sand	GLc; ECc; SI; MI
	LOC.315766	NRC	1622426	6134466	72		2	Deep shellbed	GLc; ECc; SI; MI
Kaimaumau Wetland	TBC	NRC	1616379	6140758	<1.5	50	1	Standing water in wetland	GLc
Honeytree	TBC	NRC	1618911	6136120	6	50	2	Shallow sand	GLc
Paparore	TBC	NRC	1619100	6130600	<10			Shallow sand	GLc; ECc
	TBC	NRC	1619100	6130600	80-100 (TBC)			Deep shellbed	GLc; ECc
Kaimaumau Settlement	TBC	NRC	1624250	6135897	<20		1	Shallow sand	GLm, SI
	TBC	NRC	1624250	6135897	>50 (TBC)		2	Deep shellbed	GLm, SI

Bore Name		Bore Owner	Coordinates (NZTM 2000)		Depth (m)	Dia. (mm)	Piezo. No.	Target aquifer	Purpose*
Generic	NRC ref.		Easting	Northing					
PRODUCTION BORES									
Bryan Estate 1	TBC	NA Bryan Estate, SG Bryan, CL Bryan, KY Bryan Valdares & D Bryan (1)	1613415	6143424	TBC		1	Deep shellbed	GLm, ECm
Bryan Estate 2	TBC	NA Bryan Estate, SG Bryan, CL Bryan, KY Bryan Valdares & D Bryan (1)	1613901	6142132	TBC		1	Deep shellbed	GLm, ECm
KSL	TBC	KSL Ltd	1614333	6138477	TBC		1	Deep shellbed	GLm, ECm
Tuscany Avocados	TBC	Tuscany Valley Avocados Ltd	1614490	6138367	TBC		1	Deep shellbed	GLm, ECm
Robert Campbell	TBC	Robert Paul Campbell Trust	1615813	6135787	TBC		1	Deep shellbed	GLm, ECm
Yelavich	TBC	Mate Yelavich & Co Ltd	1616833	6133996	TBC		1	Deep shellbed	GLm, ECm
Wataview	TBC	Wataview Orchards (Green Charteris Family Trust)	1619441	6132282	TBC		1	Deep shellbed	GLm, ECm
Tiri 1	TBC	Tiri Avocados Ltd	1618056	6130290	TBC		1	Deep shellbed	GLm, ECm
Tiri 2	TBC	Tiri Avocados Ltd	1618856	6130196	TBC		2	Deep shellbed	GLm, ECm
Valic 4	TBC	Valic NZ Ltd	1617589	6129130	TBC		1	Deep shellbed	GLm, ECm

Notes:

TBC = to be confirmed within 15 months of the date of commencement of these consents.

* Purpose key:

GLc = Continuous Groundwater Level;

GLm = Manual (monthly) Groundwater Level;

ECc = Continuous Electrical Conductivity;

ECm = Manual (monthly) Electrical Conductivity;

SI = Salinity Indicators (quarterly);

MI = Major Ions (quarterly).

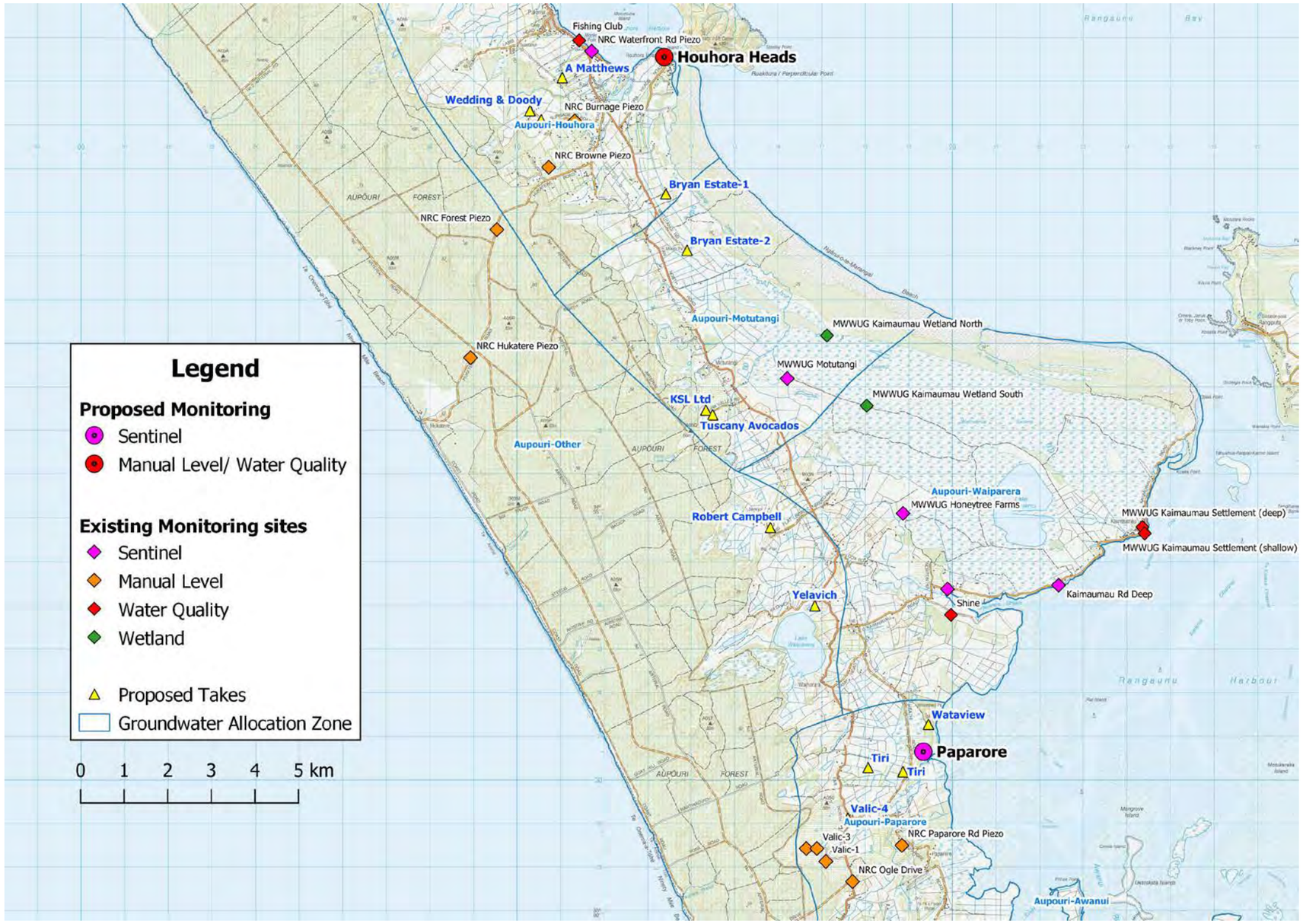

Figure 1. **Monitoring and Production Bore Location Map.**

3.2 Groundwater Level Monitoring & Establishment of Trigger Levels

3.2.1 Continuous Groundwater Level Monitoring

Sentinel bores will collect data continuously for water levels and electrical conductivity in individual piezometers and will be utilised as the primary reference sites for regional monitoring of potential effects associated with saline intrusion. Data will be telemetered to the Council.

Groundwater levels will be monitored in the shallow sand and deep shellbed aquifers to quantify the magnitude of drawdown resulting from the proposed abstraction in the deep shellbed and unconfined shallow sand aquifers to ensure it is within the magnitude anticipated in the AEE and meets Objective 1 of this GMCP.

These bores will provide early detection or warning of:

- Groundwater levels around the coastal margin approaching a threshold that could indicate a greater risk of saline intrusion; and
- Any reduction in water quality that could indicate the landward migration of the saline interface; and
- Groundwater levels in the shallow sand aquifer lowering and having a potential adverse effect on surface water bodies, springs, dune lakes or natural wetlands.

Details of the sentinel bores are summarised in Table 4 below. All sentinel monitoring bores listed in **Table 4** will be installed prior to the exercise of the consents.

Checking of the sensors required for continuous monitoring will be undertaken on a monthly basis, and any faults will be recorded and remedied immediately. Data will be collected, processed and managed in accordance with the Council's quality standards.

3.2.2 Schedule of Groundwater Level Monitoring & Trigger Levels

The two-tier trigger level system (TL1 and TL2) for groundwater levels in all Sentinel bores, excluding the new Paparore Sentinel bore, is set-out in **Table 4**. Electrical conductivity trigger levels for these bores are contained in **Table 6**.

Groundwater level triggers will be established in the deep shellbed aquifer in the new Paparore sentinel bore as follows:

- Using the baseline groundwater level data gathered during the initial 12 months following the commencement of consents in **Table 1**, allowing for the predicted magnitude of drawdown resulting from existing and proposed abstraction outlines in the AAGW Model Report.

As a general guide TL2 for the shallow sand aquifer should be no less than 1.0 mAMSL and 1.5 mAMSL for deep shell bed groundwater levels (noting that changes in electrical conductivity are also a key indicator of saline intrusion). If necessary, water level records for individual sentinel bores will be correlated with existing monitoring sites to provide historical context for estimating the trigger levels in the new Paparore Sentinel bore.

Table 4. Monitoring & Trigger Levels – Groundwater Levels.

Bore Name	Depth (m)	Piezo. No.	Target aquifer	Parameter*	Units	Frequency	Trigger Levels	
							TL1	TL2
Waterfront (LOC.200210)	21	4	Shallow sand	GL	mAMSL	Continuous	0.75	0.65

Bore Name	Depth (m)	Piezo. No.	Target aquifer	Parameter*	Units	Frequency	Trigger Levels	
							TL1	TL2
	72	1	shellbed	GL	mAMSL	Continuous	2.20	2.00
Motutangi (LOC.323721)	8	1	unconfined	GL	mAMSL	Continuous	5.95	5.85
				EC	µS/cm		400	485
Motutangi (LOC.323720)	83	2	shellbed	GL	mAMSL	Continuous	5.70	5.50
				EC	µS/cm		540	650
Norton Road (LOC.323722)	80-100 (TBC)	1	shellbed	GL	mAMSL	Continuous	3.10	2.90
				EC	µS/cm		590	710
Paparore	<20	1	unconfined	GL	mAMSL	Continuous	TBC	TBC
				EC	µS/cm		TBC	TBC
	80-100	2	shellbed	GL	mAMSL	Continuous	TBC	TBC
				EC	µS/cm		TBC	TBC
Kaimaumau Road (LOC.316222)	20	1	unconfined	GL	mAMSL	Continuous	1.10	1.00
				EC	µS/cm		290	345
Kaimaumau Road (LOC.315766)	72	2	shellbed	GL	mAMSL	Continuous	1.70	1.50
				EC	µS/cm		435	520

Notes:

* Parameter key: GL = Groundwater Level; EC = Electrical Conductivity;

TBC = to be confirmed within 15 months of the date of commencement of these consents.

GL TL1s (where provided) have been calculated from long term monitoring data.

GL TL2s (where provided) have been interpolated from Table F1, WWA Groundwater Modelling Report.

3.3 Kaimaumau Wetland

3.3.1 Water Level Monitoring and Trigger Levels

Available data indicate significant spatial and temporal variability in water levels both in the Kaimaumau Wetland and the underlying shallow sand aquifer. This variability makes it very difficult (if not impossible) to establish an appropriate reference against which departure from 'relative water level' can be assessed on the basis of the current water level monitoring.

As a proxy measure, the relative rate of decline in static water levels in Kaimaumau Wetland was adopted for the interim wetland water level triggers that would indicate hydrological function of the wetland is departing from 'natural' conditions. Given the lack of a suitable alternative, this approach has been retained for setting trigger levels, with the magnitude of water level recession amended to reflect data collected over the 2019-20 summer, which was an extreme drought event.

Table 5: Kaimaumau Wetland Water Level Triggers

Monitoring site	TL1	TL2
Kaimaumau Wetland - North	n/a*	n/a*
Kaimaumau Wetland - South	7-day moving average water level recession exceeding 7 mm/day	7-day moving average water level recession exceeding 8 mm/day

NOTES

* Due to access constrains at the northern site (helicopter access only), interim wetland water level triggers are proposed for the Kaimaumau Wetland - South monitoring site only. Available data indicates temporal response at both sites are virtually identical. If TL1 is exceeded at the Kaimaumau Wetland – South monitoring site, data will be collected from the Kaimaumau

Wetland – North site to confirm trigger exceedance.

3.3.2 Vegetation Survey

An initial survey of the Kaimaumau Wetland was carried out in April 2020.

This GMCP requires that Council commission, in consultation with the Director-General of Conservation and the Consent Holders, a suitably qualified and experienced ecologist to undertake wetland vegetation survey and subsequent reporting every five (5) years from the original date of survey at around the same time of year as the original survey. The repeat survey(s) must be designed in a way that enables ecologically meaningful and statistically robust scoring of the wetland condition in order to analyse changes to the wetlands condition resulting from the groundwater abstraction.

This repeat survey must be completed once after the initial vegetation survey (to provide an accurate baseline) but thereafter will only take place where technical assessment carried out according to **Section 2.1.1** confirms that there is a decline in standing water level of the Kaimaumau Wetland resulting from groundwater abstraction.

A decline in standing water level of the Kaimaumau Wetland attributable to groundwater abstraction will be determined from the monitoring and analysis of temporal groundwater level variations in the shallow Motutangi piezometer in relation to the Kaimaumau Wetland Standing Wetland Water Level facilities as described in **Table 5** above.

3.4 Saline Intrusion Monitoring & Establishment of Trigger Levels

Sentinel bores will be utilised as the primary reference sites for monitoring of potential effects associated with saline intrusion. These bores are/will be positioned between existing/proposed abstraction and the coastline to provide early detection or warning of:

- Groundwater levels around the coastal margin approaching a threshold that could indicate a greater risk of saline intrusion; and
- Any reduction in water quality that could indicate the landward migration of the saline interface.

Details of the sentinel bores are summarised in **Table 6** below.

3.4.1 Stage 1 Monitoring

During the initial 12-month monitoring period, sampling for the following salinity indicators in the new sentinel bore at Paparore will be undertaken at 6-weekly intervals[4]:

- Electrical conductivity;
- Chloride;
- Sodium;
- Total Dissolved Solids.

3.4.2 Ongoing Monitoring

Ongoing monitoring of groundwater and electrical conductivity levels will be undertaken continuously via individual piezometers in sentinel monitoring bores. Monitoring data will be telemetered to the

[4] This frequency applies to the initial 12-month monitoring period for the establishment of baseline information. The frequencies specified in Table 6 are for ongoing monitoring specifications.

Council on a twice-daily basis. Sampling at the frequencies specified for the following salinity indicators will take place in the bores listed in **Table 6** below:

- Electrical conductivity;
- Chloride;
- Sodium;
- Total Dissolved Solids.

3.4.3 Schedule of Saline Intrusion Monitoring & Trigger Levels

The monitoring and trigger level as discussed in this section are provided in **Table 6** below. Data will be collected, processed and managed in accordance with the Council's quality standards and *A National Protocol for State of the Environment Groundwater Sampling in New Zealand* (Ministry for the Environment, 2006).

A two-tier trigger level system (TL1 and TL2) for groundwater levels and electrical conductivity will be set in these bores.

As an initial guide, trigger levels for individual determinants will be established as follows:

- TL1 – Median concentration from the baseline monitoring period +25%.
- TL2 – Median concentration from the baseline monitoring period + 50%.

For the existing Sentinel bores, where trigger levels have been set as part of the MWWUG GMCP, these trigger levels will be utilised for the purposes of this GMCP as shown in **Table 6**.

The setting of TL1 and TL2 trigger levels for the remaining piezometers will be undertaken during the first implementation stage after 12 months of monitoring data has been collected and within 15 months of the date of commencement of these consents and replace the interim trigger levels outlined in **Section 2.1.2.1** above.

All sentinel monitoring bores listed in **Table 6**, with the exception of the Elbury Holdings bore, will be installed prior to the exercise of the consents.

Checking of the sensors required for continuous monitoring will be undertaken on a monthly basis, and any faults will be recorded and remedied immediately. Data will be collected, processed and managed in accordance with the Council's quality standards.

Table 6: Monitoring & Trigger Levels – Saline Intrusion.

Bore Name	Depth (m)	Piezo. No.	Target aquifer	Parameter*	Units	Frequency	Trigger Levels	
							TL1	TL2
Fishing Club	79	1	shellbed	EC	mS/m	Quarterly	56	67
				Chloride	mg/L	Quarterly	78	94
				Sodium	mg/L	Quarterly	63	75
				TDS	mg/L	Quarterly	344	413
Kaimaumau Road (LOC.316222)	20	1	unconfined	EC	µS/cm	Continuously	36	43
				Chloride	mg/L	Quarterly	70	84
				Sodium	mg/L	Quarterly	44	53
				TDS	mg/L	Quarterly	225	270

Bore Name	Depth (m)	Piezo. No.	Target aquifer	Parameter*	Units	Frequency	Trigger Levels	
							TL1	TL2
Waterfront (LOC.200210)	21	4	unconfimed	EC	µS/cm	Continuous	740	890
	72	1	shellbed	EC	µS/cm	Continuous	560	670
Kaimaumau Road (LOC.315766)	72	2	shellbed	EC	µS/cm	Continuous	435	520
				Chloride	mg/L	Quarterly	65	78
				Sodium	mg/L	Quarterly	71	85
				TDS	mg/L	Quarterly	294	353
	20	1	unconfined	EC	µS/cm	Continuous	290	345
Kaimaumau Settlement (ID TBC)	<20 (12)	1	unconfined	EC	mS/m	Quarterly	59	71
				Chloride	mg/L	Quarterly	83	100
				Sodium	mg/L	Quarterly	56	68
				TDS	mg/L	Quarterly	381	458
	>50 (TBC)	2	shellbed	EC	mS/m	Quarterly	NA**	
				Chloride	mg/L	Quarterly		
				Sodium	mg/L	Quarterly		
				TDS	mg/L	Quarterly		
Motutangi (LOC.323721)	8	1	unconfined	EC	µS/cm	Continuous	400	485
Motutangi (LOC.323720)	83	2	shellbed	EC	µS/cm	Continuous	540	650
Norton Road (LOC.323722)	80-100	1	shellbed	EC	µS/cm	Continuous	590	710
Paparore (Sentinel) (ID TBC)	<20	1	unconfined	EC	µS/cm	Continuously	TBC	TBC
				Chloride	mg/L	Quarterly	TBC	TBC
				Sodium	mg/L	Quarterly	TBC	TBC
				TDS	mg/L	Quarterly	TBC	TBC
	80-100	2	shellbed	EC	µS/cm	Continuously	TBC	TBC
				Chloride	mg/L	Quarterly	TBC	TBC
				Sodium	mg/L	Quarterly	TBC	TBC
				TDS	mg/L	Quarterly	TBC	TBC
Elbury Holdings*** (ID TBC)	TBC	1	shellbed	EC	mS/m	Quarterly	TBC	TBC
				Chloride	mg/L	Quarterly	TBC	TBC
				Sodium	mg/L	Quarterly	TBC	TBC
				TDS	mg/L	Quarterly	TBC	TBC

Bore Name	Depth (m)	Piezo. No.	Target aquifer	Parameter*	Units	Frequency	Trigger Levels	
							TL1	TL2

Notes:

* Parameter key: GL = Groundwater Level; EC = Electrical Conductivity; SI = Salinity Indicators; TDS = Total Dissolved Solids.

**As part of the trigger level review for the MWWUG GMCP, no trigger levels were proposed for this piezometer. This is because the existing groundwater quality at this site is almost identical to sea water. While reasons for the presence of groundwater with significantly elevated salinity at depth below Kaimaumau Settlement are (at present) uncertain, observed concentrations of indicator parameters at this site are unlikely to change as a result of seawater ingress, given current water quality.

*** No trigger levels have been set in this bore as it is a private bore (production) therefore the timing of drilling will be at the owners discretion.

TBC = to be confirmed within 15 months of the date of commencement of these consents.

3.5 Production Bores - Monitoring & Trigger Level Establishment

3.5.1 Stage 1 Monitoring

During the initial 12-month monitoring period, sampling for salinity indicators in the bores as set out in **Table 7** below will be undertaken at 6-weekly intervals[5] for those production bores drilled during this period.

3.5.2 Ongoing monitoring

Monthly water level monitoring will be undertaken in the production bores listed in **Table 7**. During the winter months (nominally May to September) this monitoring will provide information to identify any inter-annual variations in aquifer storage which may be anomalous compared to regional trends. During the irrigation season, water level measurements will be undertaken a minimum of eight hours following the cessation of pumping.

Electrical conductivity ("EC") values will also be measured at monthly intervals from the production bores during the irrigation season to check on any changes in salinity induced by the pumping.

Continuous water level monitoring is required in a shallow observation bore adjacent to the production bore for AUT.038471.01.01 to quantify any localised drawdown effects in the shallow sand aquifer in the vicinity of a relatively large abstraction proximal to Kaimaumau Wetland. This shallow sand aquifer monitoring will enable comparison between the shallow sand aquifer impact as modelled in the AAGM Report and the data from the shallow piezometers in the sentinel bores listed in **Table 7**.

3.5.3 Schedule of Production Bore Monitoring & Trigger Levels

The schedule of monitoring and trigger levels as discussed in this section are provided in **Table 7** below. Data will be collected, processed and managed in accordance with Council's quality standards and *A National Protocol for State of the Environment Groundwater Sampling in New Zealand* (Ministry for the Environment, 2006).

EC trigger levels will be established in the production bores listed in **Table 7** below.

During the initial 12-month monitoring period EC trigger levels will be no greater than:

[5] This frequency applies to the initial 12-month monitoring period for the establishment of baseline information. The frequencies specified in Table 6 are for ongoing monitoring specifications.

- **TL1** – Departure exceeding 25% of the EC value from the initial monitoring round
- **TL2** – Departure exceeding 50% of the EC value from the initial monitoring round

Long-term EC triggers for individual production bores will be established following the initial 12-month monitoring period based on an assessment of spatial and temporal variation in EC observed during the initial period, in a manner consistent with EC trigger levels established in the sentinel monitoring bores.

For the existing production bores, where trigger levels have been set as part of the MWWUG GMCP, these trigger levels will be utilised for the purposes of this GMCP to provide a consistent approach to managing the potential adverse effects of groundwater abstraction within the central part of the Aupōuri Aquifer, as shown in **Table 7**. This approach also recognises that the MWWUG consents were granted prior to these consents.

No trigger levels will be established for groundwater levels in the production bores as water levels in the production bores can be impacted by well efficiency and pumping schedules so are not necessarily representative of groundwater levels in the surrounding aquifer.

Table 7: Monitoring & Trigger Levels – Production Bores.

Commented [SK3]: This table has been reformatted to split parameters and will need further input/review from technical experts

Bore Name	Depth (m)	Piezo. No.	Target aquifer	Parameter*	Units	Frequency	Trigger Levels	
							TL1	TL2
Thomas and O'Connor	TBC	1	Deep shellbed	GL	mAMSL	Monthly	600	720
				EC		Monthly	TBC	TBC
Valadares	TBC	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	TBC	TBC
McLarnon	TBC	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	TBC	TBC
Elbury Holdings	TBC	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	TBC	TBC
Huanui	TBC	1	Deep shellbed	GL	mAMSL	Monthly	610	730
				EC		Monthly	TBC	TBC
Ngāi Takoto	TBC	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	TBC	TBC
	TBC	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	TBC	TBC
Cypress Hills	TBC	1	Deep shellbed	GL,	mAMSL	Monthly	TBC	TBC
				EC		Monthly	490	590
Stanisich	95	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	610	730
Honeytree	112	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	560	670
	6	2	Shallow sand	GL	mAMSL	Continuous	TBC	TBC
				EC		Continuous	TBC	TBC
	111	3	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	TBC	TBC
Watson	TBC	1	Deep shellbed	GL	mAMSL	Monthly	490	590
				EC		Monthly	TBC	TBC
L J King	TBC	1	Deep	GL	mAMSL	Monthly	TBC	TBC

Bore Name	Depth (m)	Piezo. No.	Target aquifer	Parameter*	Units	Frequency	Trigger Levels	
							TL1	TL2
Limited			shellbed	EC		Monthly	TBC	TBC
Mapua	111	1	Deep shellbed	GL	mAMSL	Monthly	420	500
				EC		Monthly	TBC	TBC
	122	2	Deep shellbed	GL	mAMSL	Monthly	360	430
				EC		Monthly	TBC	TBC
	97	3	Deep shellbed	GL	mAMSL	Monthly	480	580
				EC		Monthly	TBC	TBC
Hewitt	TBC	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	TBC	TBC
Shine	TBC	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	TBC	TBC
Largus	94	1	Deep shellbed	GL	mAMSL	Monthly	610	740
				EC		Monthly	TBC	TBC
Covich	TBC	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC				
	TBC	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	TBC	TBC
Thomas	TBC	1	Deep shellbed	GL	mAMSL	Monthly	600	720
				EC		Monthly	TBC	TBC
Bryan Estate 1	TBC	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	TBC	TBC
Bryan Estate 2	TBC	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	TBC	TBC
KSL	TBC	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	TBC	TBC
Tuscany Avocados	TBC	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	TBC	TBC
Robert Campbell	TBC	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	TBC	TBC
Yelavich	TBC	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	TBC	TBC
Wataview	TBC	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	TBC	TBC
Tiri 1	TBC	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	TBC	TBC
Tiri 2	TBC	2	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	TBC	TBC
Valic 4	TBC	1	Deep shellbed	GL	mAMSL	Monthly	TBC	TBC
				EC		Monthly	TBC	TBC

Notes:

* Purpose key: GL = Groundwater Level; EC = Electrical Conductivity.

All trigger limit values in this Table to be confirmed by Council.

3.6 Unmapped Natural Wetlands

Natural wetland means a wetland (as defined in the RMA) that is not:

(a) a wetland constructed by artificial means (unless it was constructed to offset impacts on, or restore, an existing or former natural wetland); or

(b) a geothermal wetland; or

(c) any area of improved pasture that, at the commencement date, is dominated by (that is more than 50% of) exotic pasture species and is subject to temporary rain derived water pooling.

Some wetlands in this area have been mapped from prior studies and surveys[6], however, there are sites that may be classified as natural wetland that are currently unmapped.

In cases of uncertainty or dispute about the existence or extent of a natural inland wetland, the National Policy Statement for Freshwater Management 2020 directs that regard must be had to the Wetland Delineation Protocols[7] as a robust method for delineating wetlands based on the United States delineation system. This protocol uses three criteria for identifying and delineating wetlands: vegetation, soils, and hydrology. The vegetation and soils components have been adapted to New Zealand conditions and the hydrological component is currently under development.

3.6.1 Unmapped Wetland Delineation Procedure

The Wetland Delineation Procedure is deemed appropriate for identifying whether three Areas of Interest (AoI) (**Appendix A**) contain natural inland wetland areas in the Ahipara and Sweetwater sub-aquifers. The Wetland Delineation Procedure is therefore replicated in below in **Table 8.**

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Procedures which were completed prior to the commencement of the consent are referenced as having been completed and no further action is required against those particular procedures.

For all other procedures which were not completed prior to commencement of the consents, **Table 8** contains the steps that shall be taken to complete that procedure within this adaptive management regime.

[6] Northland Regional Council top wetland study, Protected Natural Areas Programme survey reports.
[7] https://www.mfe.govt.nz/sites/default/files/media/Fresh%20water/wetland-delineation-protocols.pdf

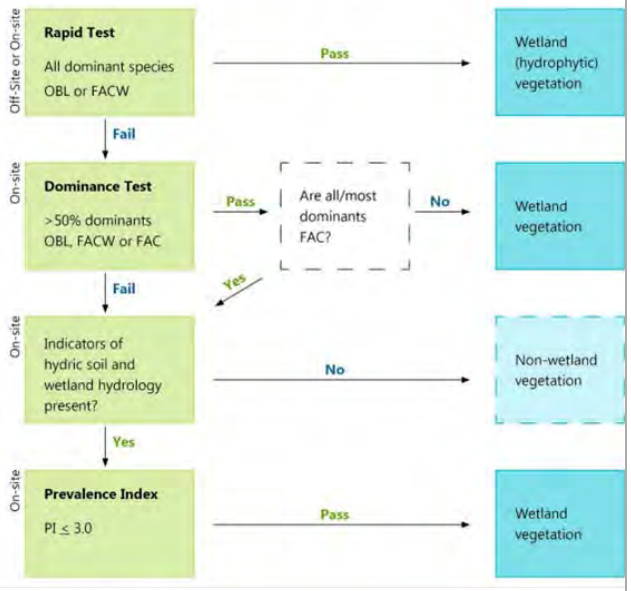
Table 8: Unmapped wetland delineation procedure.

No.	Delineation Procedure	Completed Prior to Commencement of Consents (Yes/No)	Comment
1.	Determine the project area (the putative wetland).	Yes	See Areas of Interest map attached (Appendix A).
2.	Decide if 'normal circumstances' are present, ie, typical climatic/hydrologic conditions, and no recent disturbances or modifications to the project area. If yes, proceed to step 3. If no, proceed to step 7.	Yes	Area N contains three high-risk sites~~, as generally shown in the aerial below~~. ~~Area~~ The northern-most area~~(N)1~~ has been allocated to the Northern GMCP group.  ~~Area N2 extends~~ The mid-point site extends over privately owned orchard and residential properties. All residential development has been in place on the properties since 2007 however clearance of some hedging is visible between 2016-2018. No major modifications are observable on the orchard property. All sites shall be considered to be in 'normal circumstance' based on the land use activities which have been in existence at this site since at least 2007.

Commented [ML4]: Feedback on the necessity of oblique imagery was inconclusive. It is therefore recommended that they are removed and that imagery collected at the time of survey be relied upon. Subsequent minor amendments were necessary as a result of the removal of the imagery.

No.	Delineation Procedure	Completed Prior to Commencement of Consents (Yes/No)	Comment
			 ~~Area N3~~The southern site is on a generally undeveloped property with built development sporadically disbursed across the property joined by a primary access road. According to aerial imagery, ~~T~~the high risk area mapped in the AoI is located in an area that was transitioned from viticulture crop (or other form of vine crop) to grass paddock between 2009-2013. No further modifications are visible in this environment. ~~ADD OBLIQUES~~
3.	Identify and map the major vegetation types using aerial photographs, maps, contours, inventory reports, other data, and, if necessary, on-site field verification.	No	Within one month of commencement of the consents, the Council, in consultation with the Director-General of Conservation and the Consent Holders, will commission a suitably qualified and experienced ecologist to undertake the desktop and field analysis established under Procedures ~~4, 5 and~~3~~-~~6. A Wetland Delineation Report (WDR) containing details of the assessment approach and outcomes shall be prepared by the same ecologist commissioned to undertake the desktop and field analysis. The WDR shall be circulated to the Consent Holders listed in **Table 1** and the Director-General of Conservation a
4.	**Off-site methods** to identify wetland presence and sketch approximate boundaries. Wetlands may be confirmed without an on-site inspection depending on: i. the amount and quality of data (vegetation, soils, hydrology, topography)	No	

No.	Delineation Procedure	Completed Prior to Commencement of Consents (Yes/No)	Comment
	ii. wetland ecological expertise to interpret the data.		minimum of 40 working days prior to the anticipated commencement of the subsequent irrigation season. The Consent Holders and Director-General of Conservation have 20 working days to provide a response to the Council on the conclusions and recommendations of the WDR. ~~If no response is received from a party within the stated timeframe, then Council will consider that the party has no concerns with the conclusions of the WDR.~~ If any party does not agree with the conclusions and recommendations of the WDR, then a report by a suitably qualified hydrogeologist and/or an ecologist, both with experience and knowledge of the locality, detailing the reasons for the disagreement shall be provided to Council within 30 working days from the date that the assessment was sent to the party. Council has the final authority over the delineation of a natural wetland and will provide a report to the Consent Holders and the Director-General of Conservation detailing the reasons for its decision, including the identification and discussion of areas of agreement and disagreement within ~~5~~ 10 working days of receipt of the disagreeing parties report.
5.	**On-site methods** to delineate wetland presence and accurate boundaries: i. for small areas (≤2 ha), establish a representative plot in each major vegetation type and record the plot vegetation in three strata: tree, sapling/shrub, herb ii. for larger areas, establish representative plots along transects (as per Clarkson 2014) and sample the vegetation in three strata: tree, sapling/shrub, herb.	No	
6.	**Hydrophytic vegetation determination**. Based on the data gathered, conduct a hydrophytic vegetation determination using the following flow chart (figure 1).	No	

No.	Delineation Procedure	Completed Prior to Commencement of Consents (Yes/No)	Comment
	Figure 1: Flow chart of steps for hydrophytic (wetland) vegetation determination. Wetland indicator status abbreviations: FAC= facultative; FACW = facultative wetland; OBL = obligate wetland.  Wetland indicator status ratings for species are in Clarkson et al. 2013 and subsequent updates.		

3.6.2 Repeat Survey

For sites delineated as natural wetland from the procedure set out at **Section 3.6.1**, the Council shall commission, in consultation with the Director-General of Conservation and the Consent Holders, a suitably qualified and experienced ecologist to undertake wetland vegetation survey and subsequent reporting within five (5) years from the original date of survey at around the same time of year as the original delineation survey. The repeat surveys must be designed in a way that enables ecologically meaningful and statistically robust scoring of the wetland condition in order to analyse changes to the wetland's condition resulting from the groundwater abstraction.

This repeat survey must be completed once after the initial delineation Wetland Delineation Procedure (to provide an accurate baseline) but thereafter will only take place every five (5) years where technical assessment carried out according to **Section 2.1.1** confirms that there is an adverse decline in wetland levels resulting from groundwater abstraction.

A decline in wetland water level attributable to groundwater abstraction will be determined from the monitoring and analysis of temporal groundwater level variations in the sentinel bores set out in **Table 4**.

3.7 Environmental Monitoring Report

At the end of each irrigation season, the Council will commission the preparation of an Annual Environmental Monitoring Report (AEMR) by the nominated technical expert~~a suitably qualified hydrogeologist~~ and, in relation to monitoring of the Kaimaumau Wetland, a suitable qualified wetland ecologist. The Council will endeavour to ensure that, if possible, both the ~~hydrogeologist~~ nominated technical expert and the ecologist will have experience and knowledge of the locality. A copy of the AEMR will be provided to the Consent Holders and the Director-General of Conservation by 31 July each year.

The purposes of the AEMR are :

- To provide a summary of the monitoring results for the previous year, including trends, against Objective 1 of the GMCP;
- To assess the monitoring undertaken over the previous year against the standards set out in Objective 1;
- To identify any changes/amendments to monitoring locations/parameters/frequencies that could be incorporated in future SIMPR;
- To report on any issues apparent with the monitoring; and
- To identify any improvement that could be made with respect to the monitoring.

The AEMR will also contain an evaluation of whether the observed effects of the groundwater takes are consistent with the predictions of environmental response contained in the the AAGWM and MWWUG Reports ~~*Aupouri Aquifer Groundwater Model, Factual Technical Report – Modelling – Aupouri Aquifer Water User Group. WWLA0184, Rev 3*~~, ~~dated 5 February 2020~~. ~~Both reports were prepared by Williamson Water & Land Advisory Ltd.~~

The AEMR's primary function is to provide a summary of the monitoring information from the prior year's monitoring. The AEMR may contain recommendations for changes to monitoring but the SIMPR is the point at which these recommendations will be decided on by Council.

4. CONTINGENCY PLAN

Exercise of the consents is subject to compliance with Objective 1 of this GMCP.

As described in **Section 2**, a trigger level system is used to define environmental criteria that signal changes may be occurring outside of what is normal (TL1) or at a point where remedial action is required to avoid Objective 1 not being met (TL2).

This section details the responses that will be undertaken where trigger levels are exceeded under any of the monitoring suites discussed in this GMCP.

Where a trigger level is exceeded the Council will commission a Groundwater Trigger Exceedance Report (GTER). The objective of the GTER is to establish the cause of a trigger level exceedance and to determine a programme of action to end the exceedance.

A GTER shall include:

- Review of the monitoring results collected and establish why the breach has occurred;
- Set out requirements for more intense monitoring of the breach;
- Set out environmental monitoring to detect effects of breach, such as changes in extent of rivers, natural wetlands, springs and/or dune lakes;
- Update the report on a regular basis as more data becomes available; and
- Recommend actions to end the breach, this could include;
  - A staged reinstatement of abstraction levels to pre-breach levels,
  - Reduced levels of abstraction for all or some of the consent holders covered by the GMCP, or
  - Suspension of abstraction by all or some of the consent holders covered by the GMCP.

4.1 Exceedance of TL1

In the event of a TL1 exceedance, which may represent declining groundwater levels, Kaimaumau Wetland water levels, or rising salinity indicators, the following actions must be undertaken:

(a) The Council will notify the Consent Holders within ~~two (2) working days~~24 hours of when the TL1 exceedance became known.

Commented [SK5]: Changed to reflect that information will be telemetered and a swift response should be able to be initiated

(b) If the exceedance is of a salinity indicator in the bores listed in **Table 6**, then sampling of the monitoring bore(s) in exceedance shall immediately be upgraded to a weekly frequency for four (4) weeks following the first exceedance of the TL1. Weekly monitoring shall continue until sample results are consistently below TL1 values for a period of four weeks or as directed by Council.

(c) If after four (4) weeks following the first exceedance of the TL1, the initiation of seawater intrusion and/or water level decline cannot be discounted to the satisfaction of the Council, then a Groundwater Trigger Exceedance Report ("the GTER") by ~~a suitably qualified hydrogeologist~~the nominated technical expert (and ecologist if the exceedance concerns the Kaimaumau Wetland) shall be commissioned by the Council.

(d) The GTER shall assess the significance of the exceedance against the requirements of Objective 1 of the GMCP. The GTER shall assess why trigger levels have been breached,

identify the pumping bores in the area(s) of effect and will review all of the available data collected in the affected area(s), in particular the data collected pursuant to this GMCP.

4.2 Exceedance of TL2

In the event of a TL2 exceedance, which represents significant departure from normal groundwater and/or Kaimaumau Wetland conditions, with either continuously declining groundwater levels and/or Kaimaumau Wetland water levels, or rising salinity indicators:

(a) The Council will ~~immediately~~ inform the Consent Holders in writing ~~upon~~ within 24 hours of a TL2 exceedance becoming known.

(b) Consent Holders must reduce their abstraction to 50% of the current average daily quantity, as calculated using the previous months water use records required to be kept in accordance with the conditions of its groundwater take consent. If the exceedance occurs within one month of a Consent Holder first taking water for irrigation purposes within an irrigation season, then the average shall be calculated using the water use records for this period only. The Council will advise the Consent Holder in writing of ~~any breach and~~ the required reduction in the daily water take volume.

(c) A GTER by ~~a suitably qualified hydrogeologist~~the nominated technical expert (and ecologist if the exceedance concerns the Kaimaumau Wetland) shall be commissioned by Council. The GTER shall assess why the TL2 has been breached, identify the pumping bores in the area of effect, and include a review of all available data collected for the affected area(s), in particular, the data collected under this GMCP.

(d) Once (b) above has been complied with, a Consent Holder may apply to the Council's Compliance Manager for an alternative reduction in its daily water take volume. The Council's approval for an alternative reduction value will only be given if it is satisfied that relevant TL2 values will not be exceeded. Approval for an alternative reduction will be given to MWWUG Consent Holders first. The Council will use the GTER to inform its decision on any alternative reduction value for a Consent Holder.

(e) If the TL2 exceedance is in a bore(s) that is/are not continuously monitored, then weekly groundwater level measurements and/or sampling of saline intrusion (depending on which trigger level is breached) in all bores where TL2 trigger levels are breached will commence within one week of the TL2 trigger level exceedance. Monitoring will continue until such time as:

- Three consecutive samples in an individual monitoring bore are below all TL2 thresholds established for that piezometer; or
- As directed by the Council.

(f) If salinity indicators continue to increase or groundwater levels continue to decline after 21 days following the implementation of (b), then Consent Holders' abstraction must be reduced to 25% of the current average daily quantity, as calculated for (b) above. The Council will advise the Consent Holder in writing of this further reduction and the required reduction in the daily water take volume.

(g) If (f) is implemented, then the Council will commission a review and update of the GTER report by ~~a suitably qualified hydrogeologist~~the nominated technical expert (and ecologist if the exceedance concerns the Kaimaumau Wetland) with a longer-term programme of recommended responses incorporating observed responses to interim pumping rate reductions. The updated GTER will include a specific programme (including timeframes) of actions which would achieve compliance with Objective 1 of this GMCP. The actions may

include, but not be limited to incremental reductions in the daily quantity of groundwater taken as a percentage of the allowable daily pumped volume, as well as testing of domestic/stock water supplies in bores that are efficiently utilising the aquifer and are potentially impacted by saline intrusion, and if necessary, the provision of temporary water supplies to any affected parties (excluding any of the Consent Holders) in the event that Chloride concentrations exceed 250 mg/L (being the guideline value for taste prescribed in New Zealand Drinking Water Standards for New Zealand 2005 (Revised 2008)). The GTER will also identify a methodology which the Council will utilise to increase abstraction back to the volumes applicable to the relevant stage of taking (see Section 2.1), where this can be done such that Objective 1 of this GMCP will be met. If it is not possible to increase abstraction back to the relevant stage of taking, then the GTER will identify a methodology to increase abstraction to a lesser volume such that Objective 1 of the GMCP will be met. ~~Any increase in abstraction will be provided to MWWUG Consent Holders first.~~

(h) Actions from the GTER shall continue as long as the issue continues.

(i) Implement additional remedial measures as directed by Council, including of the suspension of taking.

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APPENDIX A – Areas of Interest for Wetland Delineation

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Groundwater Monitoring and Contingency Plan for the Other, Waihopo and (northern) Houhora sub-aquifers of the Aupōuri Aquifer Management Unit

~~May~~ June 2021

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GLOSSARY OF TERMS

Saline/saltwater intrusion	For the purposes of this Groundwater Monitoring and Contingency Plan, saline/saltwater intrusion refers to changes in salinity at nominated monitoring locations that exceed thresholds established to indicate elevated potential for adverse effects on groundwater quality for potable supply and/or irrigation use and effects on freshwater ecosystems.
Efficient bore takes	An efficient bore take is when a bore fully penetrates the water bearing layer and takes water from the base of the aquifer.
Sub-aquifer	The Aupōuri Aquifer system is divided into 12 separate sub-aquifer units for the purposes of setting tailored aquifer-specific allocation limits.[1]
First in-first served	Under the Resource Management Act 1991, applications for water takes are processed in the order in which they are lodged. The rights of parties associated with this Groundwater Monitoring and Contingency Plan are prioritised according to the order in which their permits are granted and added to this Plan.
Stage 1	The period up to the point that trigger levels have been set and irrigation has occurred for one full irrigation season, as applied for each individual take/consent
Full irrigation season	Irrigation that occurs within the entire period of a water year, being 1 July to 30 June, when irrigation is required, whether or not the full

[1] Policy H.4.4 of the Proposed Regional Plan for Northland (Appeals Version) June 2020.

	allocation for a stage is irrigated during a water year.
Sentinel bore	A monitoring bore specifically established to monitor groundwater levels and salinity indicators in a specified location. For the purposes of this Groundwater Monitoring and Contingency Plan, sentinel bores are those established and/or proposed monitoring bores (not production bores) in which piezometers are installed to measure groundwater levels and salinity indicators in the deep shellbed aquifer and/or the shallow sand aquifer.

1. INTRODUCTION

1.1 Scope and Objective of the GMCP

This document comprises a groundwater monitoring and contingency plan for the Other, Waihopo and (northern) Houhora sub-aquifers of the Aupōuri aquifer management unit ("the GMCP"). Much of the approach outlined in this GMCP has been informed by the technical assessment presented in the *Aupouri Aquifer Groundwater Model, Factual Technical Report – Modelling – Aupouri Aquifer Water User Group. WWLA0184, Rev 3*, dated 5 February 2020 and prepared by Williamson Water & Land Advisory Ltd (hereafter referred to as the AAGWM Report).

The GMCP covers the implementation and monitoring of the groundwater take consents listed in **Table 1** (the Consent Holders) and is a programme of adaptive management that is suitable to provide a platform for the implementation of the abstractions listed in **Table 1**.

An adaptive management regime requires reasonably clear objectives against which the effects and management progress may be evaluated. The objective of this GMCP is that;

Objective 1: **The abstractions must, individually and cumulatively, avoid:**

(a) **adverse effects of saltwater intrusion into the Aupōuri aquifer;**

(b) **adverse effects on the hydrological functioning, including changes to water levels[2], of natural wetlands, springs and dune lakes;**

(c) **alterations to the extents of rivers, natural wetlands, springs and/or dune lakes;**

(d) **adverse effects on the significant indigenous vegetation and habitats in (terrestrial and freshwater environments of) dune lakes, springs and natural wetlands;**

(e) **Adverse effects on the flow levels and flow variability of rivers and streams and springs so that their habitat quality and sustainable mahinga kai, recreational, and other social and cultural values, are maintained (including sufficient flows and flow variability to maintain their habitat quality, including to flush rivers of deposited sediment and nuisance algae and macrophytes and support the natural movement of indigenous fish and valued introduced species such as trout; and**

(f) **lowering of the groundwater levels of the Aupouri aquifer such that existing efficient bore takes operating as a permitted activity or in accordance with resource consent conditions cannot access the authorised volume of groundwater.**

Extensive environmental monitoring is required to confirm avoidance of the effects listed above, and to facilitate an 'adaptive management' approach including the staged implementation of groundwater extraction. The purpose of the GMCP is to provide a framework that meets the requirements and principles of adaptive management. The GMCP provides a methodology for implementing adaptive management and prescribes specific monitoring requirements, establishes groundwater level and groundwater quality monitoring triggers and outlines a process for implementation of appropriate

Commented [SK1]: Council is comfortable with the inclusion of 'adverse effects' and notes that there are discrete locations within the area of interest where groundwater has shown increased salinity. The inclusion of "adverse effects of" provides for these anomalies.

[2] Avoiding "change" means that as a result of the abstraction of water; median water levels, mean annual water level fluctuations and patterns of water level seasonality (relative summer vs winter) remain unchanged.

mitigation and remediation measures if nominated trigger values are exceeded.

The GMCP is intended to allow the early detection of any impact to the Other, Waihopo and (northern) Houhora sub-aquifers of the Aupōuri aquifer management unit and surface water bodies associated with the exercise of groundwater take consent(s), by:

- Requiring regular monitoring of the groundwater system both on and off-site;
- Setting monitoring criteria to indicate potential adverse impacts on the groundwater system and surface water bodies;
- Implementing mitigation measures including changes to the pumping regime if trigger levels are reached to ensure that Objective 1 continues to be met;
- Reviewing monitoring data before and after a step level increase in pumping rate;
- Ensuring that the monitoring data is available for regular review by the Council;
- Detailing a Contingency Plan to be implemented if an unanticipated impact(s) is identified;
- Providing information to quantify the actual effects of the abstraction on the groundwater resource; and
- Enabling validation of the numerical model by the Consent Holders for any replacement groundwater take consent applications.

1.2 Parties Associated with this GMCP

The parties who have been deemed to be associated with this GMCP at its inception are the Northland Regional Council ("the Council"), the Consent Holders in **Table 1**, and the Director-General of Conservation.

The following sections provide a brief description of the roles and responsibilities of each party associated with this GMCP.

Should any of these parties change during the implementation of this GMCP, either through addition or removal, the process as set out in **Section 1.3** below shall be applied.

The rights of Consent Holders associated with this GMCP are prioritised according to the order in which their consents are granted and added to this GMCP, in accordance with the first in-first served approach to water allocation under the Resource Management Act 1991.

1.2.1 Northland Regional Council

The Council will undertake the ongoing monitoring requirements of the GMCP on behalf of the Consent Holders. The actual and reasonable cost of undertaking the ongoing monitoring of these consents will be charged to each Consent Holder in accordance with Council's Charging Policy.

The installation of sentinel bores and monitoring equipment is the responsibility of the Consent Holders.

1.2.2 Consent Holders

The Consent Holders identified in **Table 1** of this GMCP are required to exercise their consents in accordance with this GMCP.

The exercise of the consents will be in accordance with Council-initiated instructions which will be issued once the actions and process established through this GMCP have been undertaken.

The Consent Holders may seek changes to the GMCP through either of the processes set out in **Section 1.3**.

1.2.3 Director-General of Conservation

The Director-General of Conservation is responsible for administering land and waterbodies subject to reserve status under the Reserves Act 1977 and conservation or stewardship area status under the Conservation Act 1987, along with native fish and functions relating to protected species under the Wildlife Act 1953. Within the Other, Waihopo and (northern) Houhora sub-aquifers of the Aupōuri Aquifer management units these areas include:

- The Te Ramanuka Conservation Area.

The Director-General of Conservation is a party to this GMCP to ensure that the relevant provisions of these Acts, which the Director-General of Conservation administers, in particular that matters identified in Objective 1 of the GMCP are to be met.

It is also relevant to note that the Ngāti Kuri Claims Settlement Act 2015, NgāiTakoto Claims Settlement Act 2015, and the Te Aupōuri Claims Settlement Act 2015 all contain provisions relating to a 'korowai redress' which set-out co-governance arrangements for conservation land known as the 'Korowai for Enhanced Conservation'. The Korowai for Enhanced Conservation recognises the historical, spiritual and cultural association NgāiTakoto, Te Aupōuri, Te Rarawa and Ngāti Kuri iwi have with conservation land and the roles that the hapū and marae of each undertake as kaitiaki of the whenua and taonga of the conservation estate.

1.3 Changes to the GMCP

This GMCP may be amended at any time to:

- Incorporate new or replacement water permits, or remove water permits, within the Other, Waihopo and (northern) Houhora sub-aquifers of the Aupōuri aquifer management unit that have overlapping and/or additional monitoring requirements or which are subject to different trigger levels or trigger levels based on monitoring described in this GMCP;
- Alter the nature and scope of the required monitoring (i.e. monitoring frequency and intensity (type and number of samples)) and associated trigger levels as is determined from final decisions of the Council under the Staged Implementation Monitoring Programme Review, Annual Environment Monitoring Report, and Groundwater Trigger-Level Exceedance Report;
- Incorporate or remove parties who are, or may need to be, a part of this GMCP to ensure Objective 1 is met.

If either the Council or a Consent Holder wishes to amend the GMCP, then it must provide notice in writing of the proposed changes, along with any supporting technical documents, to the other Consent Holders, and the Director-General of Conservation.

A suitably qualified and experienced hydrogeologist (and ecologist if required) shall be nominated by Council to act as an independent technical expert for the purpose of peer reviewing proposed changes to the GMCPs. The nominated technical expert shall, within ~~Parties, given notice by Council of a change to the GMCP, have~~ 20 working days, ~~to~~ provide a ~~response~~report to the Council, the Consent Holders and the Director-General of Conservation on the proposed changes to the GMCP.

~~If no response is received from a party within the stated timeframe, then Council will consider that the party has no concerns with the conclusion of the written notice.~~

If any party does not agree with the outcome of the report on the proposed change, that party shall ~~engage a suitably qualified hydrogeologist and/or an ecologist to prepare a report detailing~~notify the Council of the reasons for the disagreement ~~which shall be provided to Council, the other Consent Holders, and the Director-General of Conservation~~ within ~~3~~20 working days from the date that the ~~written notice of the proposed changes was sent to the party~~review report was received.

Any change to the GMCP will only be authorised by Council if the ~~technical or administrative assessment~~review of the proposed change clearly indicates that the change will meet Objective 1 of the GMCP.

The Council will ~~provide a report to~~notify the Consent Holders and the Director-General of Conservation of the decision, detailing the reasons for its decision, including the identification and discussion of areas of agreement and disagreement. ~~The report will also be provided to the Director-General of Conservation.~~

If any changes are made to the GMCP, then a copy of the amended GMCP will be provided to the Consent Holders and the Director-General of Conservation.

Commented [SK2]: These changes have been made to address the suggestion of a technical review panel/peer reviewer for changes to the GMCP.

2. FRAMEWORK FOR ADAPTIVE MANAGEMENT

In summary, the following adaptive management techniques are applied in this GMCP;

(a) Baseline monitoring – a monitoring programme has been developed for Stage 1 of the **Table 1** abstractions to establish a robust existing environment baseline. This monitoring programme is contained in this GMCP, however, some monitoring detail is still required and this is indicated by the acronym 'TBC'.

(b) Early warning systems – trigger levels (TLs) will be established to set up an early warning system that provides a response mechanism when differences between predicted and actual water levels and/or salinity concentrations occur. A trigger level is an environmental criterion that, if reached or met, requires a certain response to be actioned.

(c) Staged development – abstraction volumes will progressively be increased in a staged manner, with expansion contingent on compliance with yet to be established trigger levels and on regular reviews of groundwater level, freshwater and wetland ecology, hydrology, and salinity monitoring results. It is noted that the consent documentation requires that all development starts at Stage 1 volumes whether or not others have progressed to Stage 2 or further, and that takes must be implemented for the minimum period of Stage 1 before progressing to Stage 2. This is an essential mechanism for staging as an adaptive management response.

(d) Management of consents being exercised immediately after commencement – until such time as there is adequate data to base the adaptive management on actual data and for Objective 1 of this GMCP to be achieved, the abstractions that will occur immediately after commencement (i.e., in the first year) will be subject to interim groundwater level and saline trigger levels and Trigger Exceedance Report procedures;

(e) Tiered approach to monitoring – monitoring requirements will increase if trigger levels are exceeded. Likewise, monitoring intensity may decrease with evidence of sustained compliance and stability or to reflect improved characterisation of the hydrogeological environment by way of the process outlined in **Section 1.3** of this GMCP; and

(f) Ongoing adaptive management – the abstractions will be managed adaptively within the term of consent and, in the event of trigger level exceedance, through the implementation of the recommendations of a Groundwater Trigger Exceedance Report ("GTER") prepared by Council.

(g) Suspension of abstractions – should compliance with Objective 1 of this GMCP not be achieved, then the exercise of some or all of the consents to abstract and use groundwater will be suspended until such time as Council confirms in writing that compliance can be achieved.

(h) Consent review – this GMCP does not override the ability for consents and/or consent conditions to be reviewed in circumstances stipulated in section 128 of the Resource Management Act 1991.

The following sections provide detailed information relating to the adaptive management framework to be imposed for the exercise of the consents listed in **Table 1**.

2.1 Staged Implementation

The uptake of water by the Consent Holders will be over four (4) stages in accordance with the following factors:

- ***Level of current orchard development*** – where existing consents authorising the take and use of water are proposed to be replaced or varied.
- ***Rate of orchard development*** – will occur at differing rates depending on the owner's cashflow and access to plants; and
- ***Tree maturity*** – approximately nine years to full maturity and plant water usage, hence irrigation requirements commensurately increase with tree growth.

The progressive increase in irrigation requirements on developing orchards provides an opportunity to apply an adaptive management approach that establishes a baseline and allows the original hypotheses of avoidance of effects to be periodically re-evaluated to ensure Objective 1 of this GMCP continues to be met as development occurs.

The management approach provides a series of responses to be taken based on the monitoring results, including where monitoring shows that Objective 1 of this GMCP is not being met, as discussed in **Section 2.2**.

The uptake by Consent Holders of the consented total authorised water volumes will be permitted in four stages over nine years, as shown in **Table 1** below, unless the outcome of the Staged Implementation and Monitoring Programme Review detailed in **Section 2.1.1** shows that there should be a delay in moving to the next stage, or that the next stage should not occur.

The development stages reflect:

- A combination of horticultural and pasture irrigation development for APP.039859.01.01
- Anticipated planting schedules and resultant increases in water demand for horticultural irrigation associated with remaining water permit applications.

Table 1. Summary of staged implementation annual volumes

Application Number	Consent Holder	Indicated year of irrigation start	Allowable Annual Volume (m^3)			
			Stage 1 (Year 1)[1]	Stage 2 (Year 2-3)[1]	Stage 3 (Year 4-8)[1]	Stage 4 (Year 9- full consent term)[1]
Other sub-aquifer						
APP.039859.01.01	TE AUPŌURI COMMERCIAL DEVELOPMENT LTD	2021/2022	43,750	96,500	152,350	175,000
		Total (m^3/year)	**43,750**	**96,500**	**152,350**	**175,000**
		Total (% allocated per stage)	**25%**	**50%**	**75%**	**100%**
Waihopo sub aquifer						
APP.039859.01.01	TE AUPŌURI COMMERCIAL DEVELOPMENT LTD	2021/2022	120,000[2]	120,000	120,000	120,000
APP.040601.01.01	WAIKOPU AVOCADOS LTD	2020/2021	20,840	41,680	62,520	83,360
APP017428.02.01[3]	HENDERSON BAY AVOCADOS LTD	2020/2021	6,840	11,780	14,250	19,000
APP.040600.01.01[3]	FAR NORTH AVOCADOS LTD	2021/2022	8,000	16,000	24,000	32,000
APP.041211.01.01[4]	P MCLAUGHLIN	2022/2023	19,600	39,200	58,800	78,400
		Total (m^3/year)	**175,280**	**228,660**	**279,570**	**332,760**
		Total (% allocated per stage)	**53%**	**69%**	**84%**	**100%**
Houhora sub-aquifer						
APP.039859.01.01	TE AUPŌURI COMMERCIAL DEVELOPMENT LTD	2021/2022	218,750	437,500	656,250	875,000
APP.040121.01.01	NE EVANS TRUST & WJ EVANS & J EVANS	2021/2022	40,000	80,000	160,000	160,000
APP 040231.01.01[4]	P & G ENTERPRISES (PJ & GW MARCHANT)	2023/2024	7,000	14,000	21,000	28,000
APP 040652.01.01	SE & LA BLUCHER	2020/2021	24,000	48,000	72,000	96,000
APP.039644.01.01	MP DOODY & DM WEDDING	2021/2022	76,000	152,000	228,000	304,000
APP.040397.01.01	A MATTHEWS	2020/2021	2,400	6,000	9,000	12,000
APP.040558.01.01[4]	MV EVANS (1)	2020/2021	22,000	26,000	36,400	36,400
APP040979.01.01	MV EVANS (2)	2020/2021	31,500	63,000	93,500	126,000
		Total (m^3/year)	**442,250**	**866,500**	**1,297,150**	**1,717,400**
		Total (% allocated per stage)	26%	50%	76%	100%

Application Number	Consent Holder	Indicated year of irrigation start	Allowable Annual Volume (m^3)			
			Stage 1 (Year 1)[1]	Stage 2 (Year 2-3)[1]	Stage 3 (Year 4-8)[1]	Stage 4 (Year 9- full consent term)[1]

Notes:

[1]The staged implementation is based on years when irrigation occurs following the granting of the consents. This differs between individual consent holders.

[2]The allocation from these bores is intended for a mixture of pasture and market gardening which will require the full amount of allocation dependent on the areas planted in each crop.

[3]Well-established orchards.

[4] Trees were planted in 2019/2020 or have to be planted in the 2020/2021 period due to ordering system.

2.1.1 Staging: Implementation and Monitoring Programme Review

A Staged Implementation and Monitoring Programme Review ("the SIMPR") will be required for Council to decide whether Consent Holders proceed to the next allocation stage. At the following times, the volume of abstraction authorised will be reviewed against the staged implementation outlined in **Section 2.1** at the minimum intervals of:

- **End of Stage 1:** A period where all or part abstraction of the Stage 1 annual volume is taken after commencement of the consent and after which a full 12 months of baseline monitoring data has been collected;
- **End of Stage 2:** Three (3) irrigation seasons following date of commencement of the consents; and
- **End of Stage 3:** Six (6) irrigation seasons following date of commencement of the consents.

The main purpose of the SIMPR is to assess whether proceeding to the next stage would comply with Objective 1 of the GMCP.

The SIMPR will be commissioned by the Council and shall be prepared by the nominated technical expert ~~a suitably qualified hydrogeologist~~ with experience and knowledge of the locality.

The SIMPR shall include a detailed assessment of all environmental monitoring data including groundwater levels, salinity indicators, and water quality, and include consideration of spatial and temporal trends including potential effects of groundwater abstraction on water levels in a dune lake or natural wetland. If the potential for more than minor effects on a dune lake or natural wetland is identified, then the SIMPR will also include assessment of the likely significance of those effects prepared by a suitably qualified ecologist. The SIMPR shall assess whether Objective 1 of this GMCP is being met at the current level of abstraction, and whether Objective 1 will be met at the next stage level of abstraction. The SIMPR may also consider the nature and scope of continued monitoring (i.e. monitoring frequency and intensity (type and number of samples)) and associated trigger levels.

The SIMPR will provide recommendations based on the assessment of the environmental monitoring data to date on:

- the setting or alteration of the trigger levels;
- whether any changes to the monitoring programme are required; and
- whether to advance to the next stage of abstraction or to remain at the current level of abstraction, or to reduce the level of abstraction.

A copy of the SIMPR will be provided to the Consent Holders listed in **Table 1** and the Director-General of Conservation a minimum of three (3) months prior to the anticipated commencement of the subsequent irrigation season utilising volumes defined for the subsequent development stage as stated in **Table 1**.

The Consent Holders and Director-General of Conservation have 20 working days to provide a response to the Council on the conclusions and recommendations of the SIMPR.

~~If no response is received from a party within the stated timeframe, then the Council will consider that the party has no concerns with the conclusions of the review.~~

If any party does not agree with the conclusions and recommendations of the SIMPR, then a report by a suitably qualified hydrogeologist and/or ecologist, both with experience and knowledge of the locality if possible, detailing the reasons for the disagreement shall be provided to Council within 30 working days from the date that the ~~review~~ copy of the SIMPR was sent to the party.

An increase in the volume of abstraction to the next development stage and any change to the monitoring programme will only be authorised by Council if the technical assessment of the monitoring data clearly indicates that the increase in the allocation and any necessary change to the GMCP would meet Objective 1 of this GMCP.

Council will provide a report to the Consent Holders and the Director-General of Conservation detailing the reasons for its decision, including the identification and discussion of areas of agreement and disagreement within thirty-five (35) working days from the date the copy of the SIMPR was sent to the party.

If any changes are made to the GMCP~~,~~ as a result of the SIMPR, then a copy of the amended GMCP will be provided to the Consent Holders and the Director General of Conservation within five (5) working days of the change being authorised as final.

A summary of the above process is also included in the conditions of each consent that is covered by this GMCP.

2.1.2 Stage 1 (Year 1) Management Regime

Stage 1, from a management perspective, is the initial development stage following commencement of the consents listed in **Table 1**. During this development stage abstraction will be less than the full volume sought while baseline information is collected to enable monitoring of groundwater levels and quality (at monitoring sites not already established) to enable setting of trigger levels. It is important to note that while Stage 1 volumes in **Table 1** slightly exceed 25% in Stage 1 in some sub-aquifers, actual uptake by consent holders will occur at different times as some consent holders are not looking to develop their land and/or orchards immediately upon commencement of their consents. As such, actual abstraction during the first 12 months of the consents being granted will be much less than that stated in **Table 1**.

During Stage 1 interim triggers for groundwater levels and salinity indicators will be established at all monitoring sites following the methodology outlined in Section 2.1.2.1 (for new monitoring bores) as well as those trigger levels that have already been established in existing monitoring bores **(Table 6**).

The Council is to notify the Consent Holders and the Director-General of Conservation of the interim trigger levels (and default management parameters) for Stage 1 (Year 1) three (3) months prior to the commencement of abstraction. The Consent Holders and Director-General of Conservation have 10 working days to provide responses to the Council on the default management parameters once notified.

The monitoring specified in Section 2.1.2 will be undertaken during Stage 1 to ensure interim triggers are not exceeded (i.e., to ensure compliance with Objectives 1(a), (b), and (c)). Exceedance of interim trigger levels during Stage 1 will result in the implementation of the trigger level exceedance measures outlined in **Section 4** below.

2.1.2.1 Saline Intrusion & Groundwater Level: Monitoring and Triggers

Saline intrusion monitoring for Stage 1 (Year 1) is proposed within the sentinel and monitoring bores identified in **Table 5** of this GMCP. As each sentinel or monitoring bore is drilled, groundwater level and salinity indicators will be measured and recorded. This information will be used to set interim trigger levels for these parameters as per the methodology established in **Section 2.2** below. Interim trigger levels must be set prior to exercise of any of the consents subject to this GMCP.

The saline intrusion and groundwater level monitoring trigger levels for Stage 1 (Year 1) shall be inserted into the GMCP through the process set out in **Section 1.3** of this GMCP prior to the exercise of any consents.

2.1.2.2 Trigger Level Responses

In the event of an exceedance of a trigger level applicable in Stage 1 (Year 1), the Trigger Level Exceedance response plan contained in **Section 4** of this GMCP shall apply.

2.1.2.3 Ceasing Interim Stage 1 (Year 1) Management Regime

This interim management regime shall remain in place until such time as the setting of trigger levels as per **Section 2.2** below has been given effect to through amendment to this GMCP in accordance with the change process established in **Section 1.3** above.

2.2 Trigger Level System

2.2.1 Timeframe for setting of trigger levels

The setting of trigger level values for each parameter (where TBC is indicated in the monitoring plan tables in **Section 3** Monitoring Programme) will be based either on current baseline data (for sites with existing monitoring) or data collected during the first implementation stage after 12 months of monitoring data has been collected and within 15 months of the date of commencement of these consents. This approach recognises that:

- There is historical monitoring data available for some parameters to characterise the response of groundwater levels and quality to current levels of abstraction.
- In some areas, no baseline data has been established by the Consent Holders or any of the key stakeholders in the area; and
- The manifestation of any effects from the exercising of these consents will steadily progress with time in accordance with the staged development process outlined in **Table 1**. The scale of abstraction during the baseline data collection period (i.e. generally 12 months following commencement of consent) will not vary significantly from existing conditions.

2.2.2 Method for setting of trigger levels

A two-tier trigger level system will be implemented on the consents:

- **TL1** – The first-tier trigger level establishes when an individual monitoring parameter is exhibiting a departure from baseline conditions (e.g. median ±2 times the standard deviation, or some other criteria determined with agreement of the Council). If this trigger level is breached, then additional monitoring will be undertaken by the Council. This additional monitoring will assist characterisation of the nature and significance of changes to the baseline condition of the groundwater resource.
- **TL2 –** The second-tier trigger level is set at a threshold defining a 'significant' departure from baseline conditions and/or conditions where the risks of adverse environmental effects are increased. If this trigger level is breached, then the Consent Holders will be required to reduce their daily water take volume in a staged manner over a set period of time.

The trigger level parameters required under this GMCP for the various suites are summarised in **Table 2.**

Table 2: Summary trigger level parameters by monitoring suite

Monitoring Suite	Parameters
Groundwater level and salinity monitoring	Groundwater level, electrical conductivity
Saline intrusion monitoring	Electrical conductivity, chloride, sodium, total dissolved solids.

2.2.3 Response to exceeding trigger levels

The actions required should trigger levels be exceeded are set out in **Section 4** (Contingency Plan).

3. MONITORING PROGRAMME & TRIGGER LEVEL SETTING

3.1 Bore Locations and Details

A consolidated summary of the schedule of bores that are required to be monitored as part of this GMCP is provided in **Table 3.** Along with the bores identified for monitoring, the table provides key details relating to the bores' physical attributes and parameters to be monitored. The locations of the monitoring bores are shown on **Figure 1.** The following sections of the GMCP provide the monitoring schedules (frequency and trigger levels) for the bores. The monitoring schedule comprises three components:

- Two sentinel monitoring sites along the coastal margin, seaward of areas where abstraction is concentrated. The sentinel bores will provide the primary reference sites for monitoring and management of potential saline intrusion effects. Each sentinel bore will comprise two piezometers, accessing the shallow unconfined aquifer and the deep shellbed aquifer respectively. Instrumentation in each piezometer will enable continuous monitoring of groundwater levels and electrical conductivity (EC), and provide for telemetry of monitoring data to the Council.
- Manual monitoring of groundwater levels in the unconfined and shellbed aquifers on a monthly basis at selected locations inland of Pukenui and in the Waihopo area. This monitoring will be undertaken either in existing bores (if suitable sites can be identified and access obtained) or in new piezometers. These sites will enable ongoing monitoring of groundwater levels and provide data to characterise both localised and cumulative drawdown in response to abstraction and be used to inform the staged implementation process.
- Measurement of salinity indicators on a quarterly basis in each piezometer at the two sentinel bores, augmented by an additional monitoring bore in the Waihopo area. These sites will be monitored on a quarterly basis for the parameters listed in **Table 2** and provide a secondary baseline to characterise any changes in aquifer salinity along the coastal margin.

The locations of the production bores in **Table 3** are also shown in **Figure 1**. An error accuracy level of +/- 50 metres is applicable to these bore locations. Any differentiation in the location by greater than 50 metres will result in a requirement for an application to the Council for a change of consent condition pursuant to Section 127 of the Resource Management Act 1991 (RMA). Assessment of the effects on the environment of the change will be required pursuant to Schedule 4 of the RMA.

Table 3: Schedule of monitoring facility and production bore details.

MONITORING BORES									
Bore Details		**Bore Owner**	**Coordinates (NZTM 2000)**		**Depth (m)**	**Dia. (mm)**	**Piezo. No.**	**Target aquifer**	**Purpose***
Name (Fig 1)	**NRC ref.**		**Easting**	**Northing**					
Fishing Club	LOC.200250	NRC	1611411	6146928	79			Shellbed	SI;
Waterfront	LOC.200210	NRC	1611712	6146689	19	32	1	Unconfined	GL_c, EC
Waterfront	LOC.200210	NRC	1611712	6146689	74	32	4	Shellbed	GL_c, EC_c
Houhora Sentinel (shallow)	TBC	NRC	1609900	6149600	<10	50	1	Unconfined	GL_c; EC_c, SI
Houhora Sentinel (deep)	TBC	NRC	1609900	6149600	80-100 (TBC)	50	2	Shellbed	GL_c; EC_c, SI
Lamb Road (shallow)[a]	TBC	NRC	1609750	6147300	<20	50	1	Unconfined	GL_m
Lamb Road (deep)[a]	TBC	NRC	1609750	6147300	80-100	50	2	Shellbed	GL_m
Burnage Road	LOC.200209	NRC	1611325	6145090	17	50	1	Unconfined	GL_m
			1611325	6145090	97	50	4	Shellbed	GL_m
Browne	LOC.200208	NRC	1610733	6144031	16	50	1	Unconfined	GL_m
			1610733	6144031	59	50	4	Shellbed	GL_m
Waihopo Level/Quality[a]	TBC	TBC	1606950	6153600	TBC	TBC		Shellbed	GL_m, SI
Houhora Heads[b]	LOC.200068	Private	1613368	6146558	21.3	100		Unconfined	GL_m, SI
PRODUCTION BORES									
Bore Details		**Bore Owner**	**Coordinates (NZTM 2000)**		**Depth (m)**	**Dia. (mm)**	**Piezo No.**	**Target**	**Purpose**
Name (Figure 1)	**NRC Ref.**		**Easting**	**Northing**					
Henderson Bay Avocados	TBC	Henderson Bay Avocados	1605623	6154872				Shellbed	GL_m, EC_m
Far North Avocados	TBC	Far North Avocados	1605981	6154581				Shellbed	GL_m, EC_m

Waikopu Avocados	TBC	Waikopu Avocados	1603347	6153388				Shellbed	GL_m, EC_m
Te Raite Station - Other	TBC	Te Aupōuri commercial development ltd	1603898	6151179				Shellbed	GL_m, EC_m
Te Raite Station - Waihopo 1	TBC		1605333	6151462				Shellbed	GL_m, EC_m
Te Raite Station - Waihopo 2	TBC		1607102	6150752				Shellbed	GL_m, EC_m
McGlaughlin	TBC	McGlaughlin	1606049	6150294				Shellbed	GL_m, EC_m
P&G Enterprises	TBC	P & G Enterprises (PJ & GW Marchant)	1609182	6148952				Shellbed	GL_m, EC_m
Te Raite Station - Houhora 1	TBC	Te Aupōuri Commercial Development Ltd	1608383	6148854				Shellbed	GL_m, EC_m
Te Raite Station - Houhora 2	TBC		1607182	6148084				Shellbed	GL_m, EC_m
Te Raite Station - Houhora 3	TBC		1609287	6148271				Shellbed	GL_m, EC_m
Te Raite Station - Houhora 4	TBC		1609016	6147852				Shellbed	GL_m, EC_m
Te Raite Station - Houhora 5	TBC		1607771	6147949				Shellbed	GL_m, EC_m
Te Raite Station - Houhora 6	TBC		1609655	6147078				Shellbed	GL_m, EC_m
Te Raite Station - Houhora 7	TBC		1609296	6147373				Shellbed	GL_m, EC_m
Evans Trust	TBC	NE Evans Trust & WJ Evans & J Evans	1609492	6148850				Shellbed	GL_m, EC_m
S&L Blucher	TBC	S. & L. Blucher	1610145	6148091				Shellbed	GL_m, EC_m
A. Matthews	TBC	A. Matthews	1611038	6146087				Shellbed	GL_m, EC_m
Wedding & Doody	TBC	MP Doody & DM Wedding	1610297	6145328				Shellbed	GL_m, EC_m

M Evans 1 & 2	TBC	MV Evans	1610554	6145121				Shellbed	GL_m, EC_m

Notes:

[a] Nominal location only

[b] Private bore subject to access agreements

TBC = to be confirmed within 15 months of the date of commencement of these consents.

* Purpose key:

GL_c = Continuous Groundwater Level;

GL_m = Manual (monthly) Groundwater Level;

EC_c = Continuous Electrical Conductivity;

EC_m = Manual (monthly) Electrical Conductivity;

SI = Salinity Indicators (quarterly);

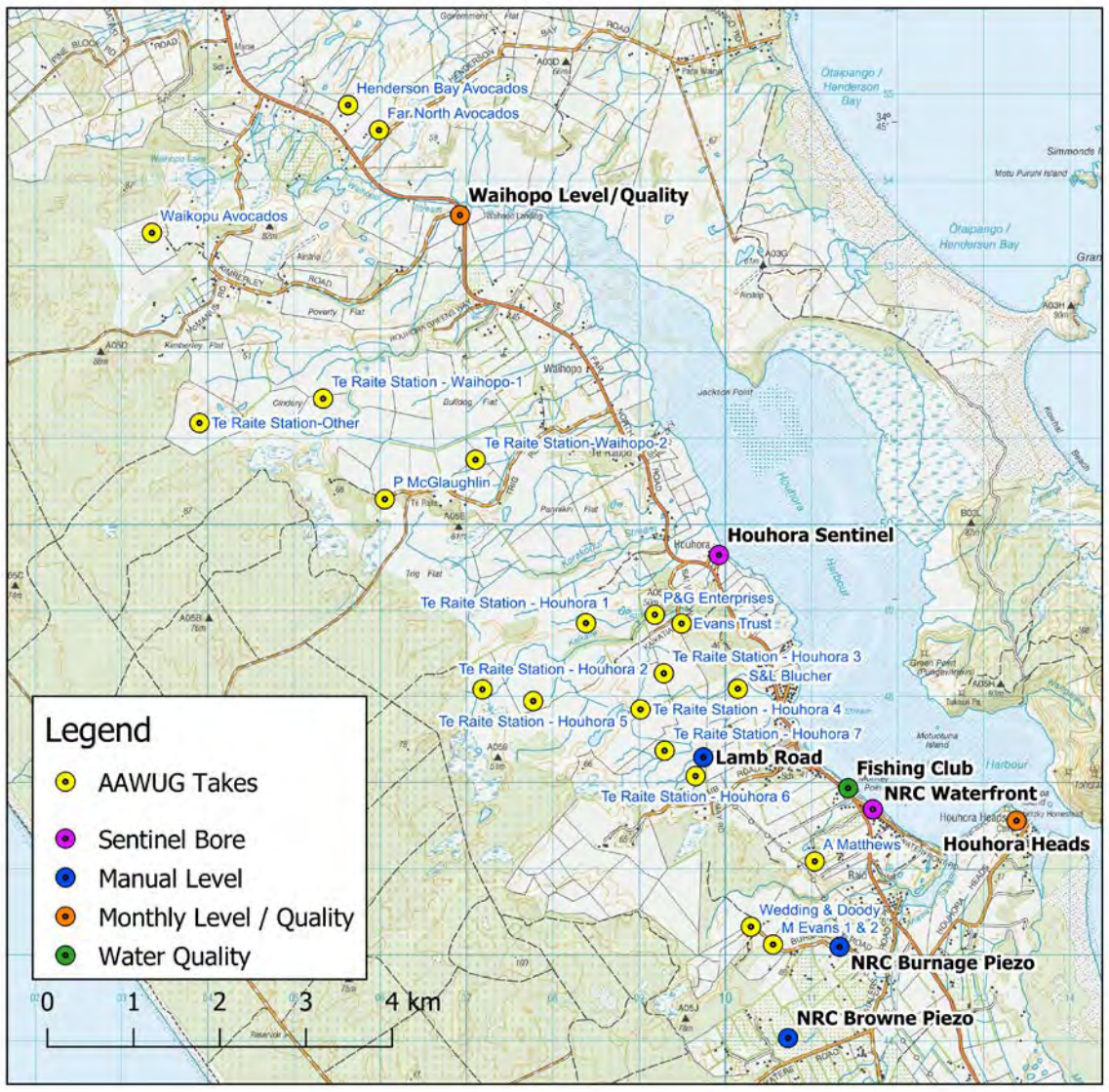

Figure 1. **Monitoring and Production Bore Location Map**

3.2 Groundwater Level Monitoring & Establishment of Trigger Levels

3.2.1 Continuous Groundwater Level Monitoring

Sentinel bores will collect data continuously for water levels and electrical conductivity in individual piezometers and will be utilised as the primary reference sites for regional monitoring of potential effects associated with saline intrusion. Data will be telemetered to the Council.

Groundwater levels will be monitored in the shallow sand and deep shellbed aquifers to quantify the magnitude of drawdown resulting from the proposed abstraction in the deep shellbed and unconfined shallow sand aquifers to ensure it is within the magnitude anticipated in the AEE and meets Objective 1 of this GMCP.

These bores will provide early detection or warning of:

- Groundwater levels around the coastal margin approaching a threshold that could indicate a greater risk of saline intrusion; and
- Any reduction in water quality that could indicate the landward migration of the saline interface; and
- Groundwater levels in the shallow sand aquifer lowering and having a potential adverse effect on surface water bodies, springs, dune lakes or natural wetlands.

Details of the sentinel bores are summarised in **Table 4** below.

All sentinel monitoring bores listed in **Table 4** will be installed prior to the exercise of the consents.

Checking of the sensors required for continuous monitoring will be undertaken on a monthly basis, and any faults will be recorded and remedied immediately. Data will be collected, processed and managed in accordance with the Council's quality standards.

3.2.2 Manual Groundwater Level Monitoring

Groundwater levels will be monitored manually in the shallow sand and deep shellbed aquifers to:

- Quantify the magnitude of drawdown resulting from the proposed abstraction in the deep shellbed and shallow sand aquifers to ensure it is within the magnitude anticipated in the AEE and does not result in adverse effects on surface water environments, existing groundwater users and long-term aquifer storage volumes.
- Ensure coastal groundwater levels are not adversely affected by the proposed abstractions.

Details of the groundwater level monitoring bores are listed in **Table 4**. The bores include two existing NRC piezometer installations (Burnage Road (LOC.200209) and Browne (LOC.200208)) plus new piezometers to be installed at Lamb Road and Waihopo. An existing private bore at Houhora Heads is also included (subject to access agreement).

No trigger levels will be established for manual groundwater level monitoring sites. The primary value of data collected from manual groundwater level monitoring will be to establish medium to longer-term variations in groundwater levels in response to groundwater abstraction. This information will be utilised to inform the SIMPR (Section **2.1.1**) and the Annual Environmental Monitoring Report (**Section 3.6**).

Table 4: Schedule of Manual Groundwater Monitoring Bores.

Sentinel Bore Name	NRC ID	Depth (m)	Piezo. No.	Target aquifer	Units	Frequency
NRC Burnage Road	LOC.200209	17	-	Unconfined	mAMSL	Monthly
		97	-	Shellbed	mAMSL	Monthly
NRC Browne piezo	LOC.200208	16	-	Unconfined	mAMSL	Monthly
		59	-	Shellbed	mAMSL	Monthly
Lamb Road	TBC	<20	-	Unconfined	mAMSL	Monthly
	TBC	80-100	-	Shellbed	mAMSL	Monthly
Houhora Heads	LOC.200068	21.3	-	Unconfined	mAMSL	Monthly
Waihopo	TBC	TBC	-	Shellbed	mAMSL	Monthly

Notes:

TBC = to be confirmed within 15 months of the date of commencement of these consents.

GL TL1s (where provided) have been calculated from long term monitoring data.

GL TL2s (where provided) have been interpolated from Table F1, WWA Groundwater Modelling Report

3.2.3 Schedule of Groundwater Level Monitoring & Trigger Levels

A two-tier system for trigger level 1 ("TL1") and trigger level 2 ("TL2") for groundwater levels will be set in the bores identified in **Table 5**. Electrical conductivity trigger levels for these bores are contained in **Table 6**.

The Council will set trigger levels for groundwater levels in the shallow sand aquifer in each of the sentinel bores. TL1 and TL2 trigger levels for groundwater level in the NRC Waterfront piezometers are specified in **Table 5** below as sufficient data has been collected from these facilities for this purpose. As a general guide TL2 for the shallow sand aquifer should be no less than 1.0 mAMSL at sentinel monitoring sites (noting that changes in electrical conductivity ("EC") are also a key indicator of saline intrusion and are provided for below in **Section 3.3**). If necessary, water level records for individual sentinel bores will be correlated with existing monitoring sites to provide historical context for estimating the trigger levels.

Groundwater level triggers at the Lamb Road monitoring site will be based on measured static water levels prior to exercise of the water permits listed in **Table 1** minus the maximum magnitude of cumulative drawdown calculated to result from the proposed abstraction outlined in the AAGWM Report. As a general guide TL2 for deep shellbed groundwater levels should be no less than 1.5 mAMSL (noting that changes in EC are also a key indicator of saline intrusion).

Table 5: Continuous Monitoring & Trigger Levels – Groundwater Levels.

Sentinel Bore Name	Depth (m)	Piezo. No.	Target aquifer	Units	Frequency	Trigger Levels	
						TL1	TL2
Waterfront (LOC.200210)	21	4	Unconfined	mAMSL	Continuous	0.75	0.65
	72	1	Shellbed	mAMSL	Continuous	2.20	2.00
Houhora (TBC)	<10	1	Unconfined	mAMSL	Continuous	TBC	TBC
	80-100 (TBC)	2	Shellbed	mAMSL	Continuous	TBC	TBC

Notes:

TBC = to be confirmed within 15 months of the date of commencement of these consents.

GL TL1s (where provided) have been calculated from long term monitoring data.

GL TL2s (where provided) have been interpolated from Table F1, WWA Groundwater Modelling Report

The setting of TL1 and TL2 trigger levels values for remaining piezometers will be undertaken during Stage 1 after 12 months of monitoring data has been collected and within 15 months of the date of commencement of these consents and will replace the interim trigger levels established through the process described at **Section 2.1.2.1** above.

3.3 Saline Intrusion Monitoring & Establishment of Trigger Levels

Sentinel bores will be utilised as the primary reference sites for monitoring of potential effects associated with saline intrusion. These bores will be positioned between existing/proposed abstraction and the coastline to provide early detection or warning of:

- Groundwater levels around the coastal margin approaching a threshold that could indicate a greater risk of saline intrusion; and
- Any reduction in water quality that could indicate the landward migration of the saline interface.

Details of the sentinel bores are summarised in **Table 6** below.

3.3.1 Stage 1 Monitoring

During the initial 12-month monitoring period, sampling for the following salinity indicators in the bores listed in **Table 6** below will be undertaken at 6-weekly intervals[3]:

- Electrical conductivity;
- Chloride;
- Sodium;
- Total Dissolved Solids.

3.3.2 Ongoing Monitoring

Ongoing monitoring of groundwater and electrical conductivity levels will be undertaken continuously via individual piezometers in sentinel monitoring bores. Monitoring data will be telemetered to the

[3] This frequency applies to the initial 12-month monitoring period for the establishment of baseline information. The frequencies specified in Table 6 are for ongoing monitoring specifications.

Council on a twice-daily basis. Sampling at the frequencies specified for the following salinity indicators will take place in the bores listed in **Table 6** below:

- Electrical conductivity;
- Chloride;
- Sodium;
- Total Dissolved Solids.

3.3.3 Schedule of Saline Intrusion Monitoring & Trigger Levels

The monitoring and trigger levels as discussed in this section are provided in **Table 6** below. Data will be collected, processed and managed in accordance with the Council's quality standards and *A National Protocol for State of the Environment Groundwater Sampling in New Zealand* (Ministry for the Environment, 2006).

A two-tier trigger level system (TL1 and TL2) for groundwater levels and electrical conductivity will be set in these bores.

As an initial guide, trigger levels for individual determinants will be established as follows:

- **TL1** – Median concentration from the baseline monitoring period +25%.
- **TL2** – Median concentration from the baseline monitoring period + 50%.

The setting of TL1 and TL2 trigger levels for the piezometers listed in **Table 6** will be undertaken during the first implementation stage after 12 months of monitoring data has been collected and within 15 months of the date of commencement of these consents and replace the interim trigger levels outlined in **Section 2.1.2.1** above.

All sentinel monitoring bores listed in **Table 6** will be installed prior to the exercise of the consents.

Table 6: Monitoring & Trigger Levels – Saline Intrusion.

Bore Name	Depth (m)	Piezo. No.	Target aquifer	Parameter*	Units	Frequency	Trigger Levels	
							TL1	TL2
Fishing Club (LOC.200250)	79	1	Shellbed	EC	µS/cm	Quarterly	56	67
				Chloride	mg/L	Quarterly	78	94
				Sodium	mg/L	Quarterly	63	75
				TDS	mg/L	Quarterly	344	413
Waterfront	21	4	Unconfined	EC	µS/cm	Continuous	740	890
(LOC.200210)	72	1	Shellbed	EC	µS/cm	Continuous	560	670
Houhora Sentinel (TBC)	<20	1	Unconfined	EC	µS/cm	Continuously	TBC	TBC
				Chloride	mg/L	Quarterly	TBC	TBC
				Sodium	mg/L	Quarterly	TBC	TBC
				TDS	mg/L	Quarterly	TBC	TBC
	80-100	2	Shellbed	EC	µS/cm	Continuously	TBC	TBC
				Chloride	mg/L	Quarterly	TBC	TBC
				Sodium	mg/L	Quarterly	TBC	TBC
Waihopo (TBC)	TBC	1	TBC	EC	mS/m	Quarterly	TBC	TBC
				Chloride	mg/L	Quarterly	TBC	TBC
				Sodium	mg/L	Quarterly	TBC	TBC

Bore Name	Depth (m)	Piezo. No.	Target aquifer	Parameter*	Units	Frequency	Trigger Levels	
							TL1	TL2
				TDS	mg/L	Quarterly	TBC	TBC
Houhora Heads (LOC.200068)	21.3	1	Unconfined	EC	mS/m	Quarterly	TBC	TBC
				Chloride	mg/L	Quarterly	TBC	TBC
				Sodium	mg/L	Quarterly	TBC	TBC
				TDS	mg/L	Quarterly	TBC	TBC

Notes:

* Parameter key: GL = Groundwater Level; EC = Electrical Conductivity; SI = Salinity Indicators; TDS = Total Dissolved Solids.

TBC = to be confirmed within 15 months of the date of commencement of these consents.

3.4 Production Bore Monitoring

3.4.1 Stage 1 Monitoring

During the initial 12-month monitoring period, sampling for salinity indicators in the bores listed in **Table 7** below will be undertaken at 6-weekly intervals[4].

3.4.2 Ongoing monitoring

Monthly water level monitoring will be undertaken in the production bores listed in **Table 7** during the winter months (nominally May to September). This monitoring will provide information to identify any inter-annual variations in aquifer storage which may be anomalous compared to regional trends.

Electrical conductivity ("EC") values will also be measured at monthly intervals from the production bores during the irrigation season to check on any changes in salinity induced by the pumping. Requirements to continue monitoring of groundwater levels and electrical conductivity in individual production bores after Stage 1 will be addressed in the SIMPR (**Section 2.1.1**).

3.4.3 Schedule of Production Bore Monitoring & Trigger Levels

The schedule of monitoring and trigger levels as discussed in this section are provided in **Table 7** below. Data will be collected, processed and managed in accordance with Council's quality standards and *A National Protocol for State of the Environment Groundwater Sampling in New Zealand* (Ministry for the Environment, 2006).

EC trigger levels will be established in the production bores listed in **Table 7** below.

During the initial 12-month monitoring period EC trigger levels will be no greater than:

- **TL1** – Departure exceeding 25% of the EC value from the initial monitoring round
- **TL2** – Departure exceeding 50% of the EC value from the initial monitoring round

Long-term EC triggers for individual production bores will be established following the initial 12-month monitoring period based on an assessment of spatial and temporal variation in EC observed during the initial period, in a manner consistent with EC trigger levels established in the sentinel monitoring bores.

No trigger levels will be established for groundwater levels in the production bores as water levels in the production bores can be impacted by well efficiency and pumping schedules so are not necessarily representative of groundwater levels in the surrounding aquifer.

[4] This frequency applies to the initial 12-month monitoring period for the establishment of baseline information. The frequencies specified in Table 6 are for ongoing monitoring specifications.

Table 7: Monitoring & Trigger Levels - Production Bores.

Bore Name (NRC ID)	Depth (m)	Target aquifer	Parameter*	Units	Frequency	EC Trigger Levels	
						TL1	TL2
Henderson Bay Avocados	TBC	Shellbed	EC	mS/m	Monthly	TBC	TBC
			GL	mAMSL	Monthly	TBC	TBC
Far North Avocados	TBC	Shellbed	EC	mS/m	Monthly	TBC	TBC
			GL	mAMSL	Monthly	TBC	TBC
Waikopu Avocados	TBC	Shellbed	EC	mS/m	Monthly	TBC	TBC
			GL	mAMSL	Monthly	TBC	TBC
Te Raite Station - Other	TBC	Shellbed	SI	mS/m	Monthly	TBC	TBC
			GL	mAMSL	Monthly	TBC	TBC
Te Raite Station - Waihopo 1	TBC	Shellbed	EC	mS/m	Monthly	TBC	TBC
			GL	mAMSL	Monthly	TBC	TBC
Te Raite Station - Waihopo	TBC	Shellbed	EC	mS/m	Monthly	TBC	TBC
			GL	mAMSL	Monthly	TBC	TBC
McGlaughlin	TBC	Shellbed	EC	mS/m	Monthly	TBC	TBC
			GL	mAMSL	Monthly	TBC	TBC
P&G Enterprises	TBC	Shellbed	EC	mS/m	Monthly	TBC	TBC
			GL	mAMSL	Monthly	TBC	TBC
Te Raite Station - Houhora 1	TBC	Shellbed	EC	mS/m	Monthly	TBC	TBC
			GL	mAMSL	Monthly	TBC	TBC
Te Raite Station - Houhora 2	TBC	Shellbed	GL, EC	mAMSL	Monthly	TBC	TBC
				mS/m	Monthly	TBC	TBC
Te Raite Station - Houhora 3	TBC	Shellbed	SI	?	Continuous	TBC	TBC
			EC	mS/m	Monthly	TBC	TBC
			GL	mAMSL	Monthly	TBC	TBC
Te Raite Station - Houhora 4	TBC	Shellbed	EC	mAMSL	Monthly	TBC	TBC
			GL	mS/m	Monthly	TBC	TBC
Te Raite Station - Houhora 5	TBC	Shellbed	EC	mAMSL	Monthly	TBC	TBC
			GL	mS/m	Monthly	TBC	TBC
Te Raite Station - Houhora 6	TBC	Shellbed	EC	mAMSL	Monthly	TBC	TBC
			GL	mS/m	Monthly	TBC	TBC
Te Raite Station - Houhora 7	TBC	Shellbed	EC	mAMSL	Monthly	TBC	TBC
			GL	mS/m	Monthly	TBC	TBC
Evans Trust	TBC	Shellbed	EC	mAMSL	Monthly	TBC	TBC
			GL	mS/m	Monthly	TBC	TBC
S&L Blucher	TBC	Shellbed	EC	mAMSL	Monthly	TBC	TBC
			GL	mS/m	Monthly	TBC	TBC
A. Matthews	TBC	Shellbed	EC	mAMSL	Monthly	TBC	TBC
			GL	mS/m	Monthly	TBC	TBC
Wedding & Doody	TBC	Shellbed	EC	mAMSL	Monthly	TBC	TBC
			GL	mS/m	Monthly	TBC	TBC
M Evans 1	TBC	Shellbed	EC	mAMSL	Monthly	TBC	TBC
			GL	mS/m	Monthly	TBC	TBC
M Evans 2	TBC	Shellbed	EC	mAMSL	Monthly	TBC	TBC
			GL	mS/m	Monthly	TBC	TBC

Commented [ML3]: This was from the original table but not aware of the reasoning of its inclusion and whether it replaces monthly EC?

Bore Name (NRC ID)	Depth (m)	Target aquifer	Parameter*	Units	Frequency	EC Trigger Levels	
						TL1	TL2
Notes: * Purpose key: GL = Groundwater Level; EC = Electrical Conductivity; SI = Salinity Indicators All trigger limit values in this Table to be confirmed by Council.							

3.5 Unmapped Natural Wetlands

Natural wetland means a wetland (as defined in the RMA) that is not:

(a) *a wetland constructed by artificial means (unless it was constructed to offset impacts on, or restore, an existing or former natural wetland); or*

(b) *a geothermal wetland; or*

(c) *any area of improved pasture that, at the commencement date, is dominated by (that is more than 50% of) exotic pasture species and is subject to temporary rain derived water pooling.*

Some wetlands in this area have been mapped from prior studies and surveys[5], however, there are sites that may be classified as natural wetland that are currently unmapped.

In cases of uncertainty or dispute about the existence or extent of a natural inland wetland, the National Policy Statement for Freshwater Management 2020 directs that regard must be had to the Wetland Delineation Protocols[6] as a robust method for delineating wetlands based on the United States delineation system. This protocol uses three criteria for identifying and delineating wetlands: vegetation, soils, and hydrology. The vegetation and soils components have been adapted to New Zealand conditions and the hydrological component is currently under development.

3.5.1 Unmapped Wetland Delineation Procedure

The Wetland Delineation Procedure is deemed appropriate for identifying whether three Areas of Interest (AoI) (**Appendix A**) contain natural inland wetland areas in the Waihopo, Other, and (northern) Houhora sub-aquifers. The Wetland Delineation Procedure is therefore replicated in **Table 8** below.

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Procedures which were completed prior to the commencement of the consent are referenced as having been completed and no further action is required against those particular procedures.

For all other procedures which were not completed prior to commencement of the consents, **Table 8** contains the steps that shall be taken to complete that procedure within this adaptive management regime.

[5] Northland Regional Council top wetland study, Protected Natural Areas Programme survey reports.
[6] https://www.mfe.govt.nz/sites/default/files/media/Fresh%20water/wetland-delineation-protocols.pdf

Table 8: Unmapped wetland delineation procedure.

No.	Delineation Procedure	Completed Prior to Commencement of Consents (Yes/No)	Comment
1.	Determine the project area (the putative wetland).	Yes	See Areas of Interest map attached (**Appendix A**).
2.	Decide if 'normal circumstances' are present, ie, typical climatic/hydrologic conditions, and no recent disturbances or modifications to the project area. If yes, proceed to step 3. If no, proceed to step 7.	Yes	Area N contains three high-risk sites~~, as generally shown in the aerial below~~. However, only one of the sites ~~Areas (N)2 and 3 have~~ has been allocated to the Middle Aupōuri Aquifer Consent Holder group in accordance with the boundary definitions of this GMCP.  ~~Area N1 is~~is The AoI at this location is on a Recreation Reserve administered by the Far North District Council. Modification occurred between 2007-2009 to clear an area which is now visible as a grassed paddock (see below). Given the time that has elapsed since this last modification, this area is considered to be in 'normal circumstance'.

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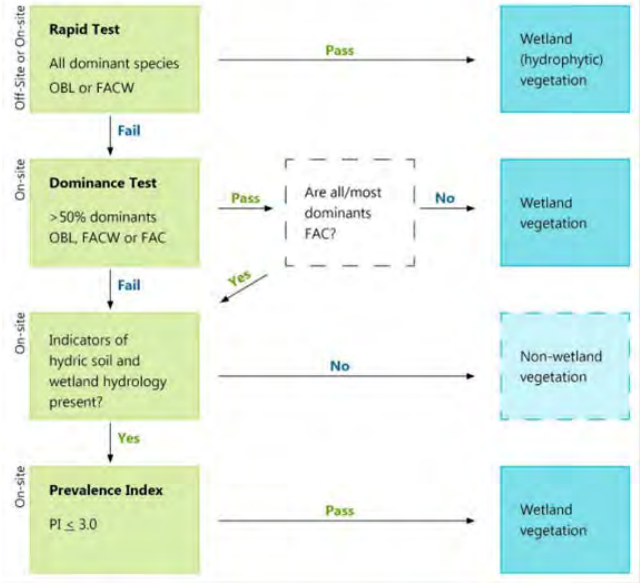
Commented [ML4]: Feedback on the necessity of oblique imagery was inconclusive. It is therefore recommended that they are removed and that imagery collected at the time of survey be relied upon. Subsequent minor amendments were necessary as a result of the removal of the imagery.

No.	Delineation Procedure	Completed Prior to Commencement of Consents (Yes/No)	Comment
			
3.	Identify and map the major vegetation types using aerial photographs, maps, contours, inventory reports, other data, and, if necessary, on-site field verification.	No	Within one month of commencement of the consents, the Council, in consultation with the Director-General of Conservation and the Consent Holders, will commission a suitably qualified and experienced ecologist to undertake the desktop and field analysis established under Procedures ~~4, 5 and~~3~~-~~6. A Wetland Delineation Report (WDR) containing details of the assessment approach and outcomes shall be prepared by the same ecologist commissioned to undertake the desktop and field analysis. The WDR shall be circulated to the Consent Holders listed in Table 1 and the Director-General of Conservation a minimum of 40 working days prior to the anticipated commencement of the subsequent irrigation season. The Consent Holders and Director-General of Conservation have 20 working days to provide a response to the Council on the conclusions and recommendations of the WDR. ~~If no response is received from a party within the stated timeframe, then Council will consider that the party has no concerns with the conclusions of the WDR.~~ If any party does not agree with the conclusions and recommendations of the WDR, then a report by a suitably qualified hydrogeologist and/or an ecologist, both
4.	**Off-site methods** to identify wetland presence and sketch approximate boundaries. Wetlands may be confirmed without an on-site inspection depending on: i. the amount and quality of data (vegetation, soils, hydrology, topography) ii. wetland ecological expertise to interpret the data.	No	
5.	**On-site methods** to delineate wetland presence and accurate boundaries: i. for small areas (≤2 ha), establish a representative plot in each major vegetation type and record the plot vegetation in three strata: tree, sapling/shrub, herb ii. for larger areas, establish representative plots along transects (as per Clarkson 2014) and sample the vegetation in three strata: tree, sapling/shrub, herb.	No	

No.	Delineation Procedure	Completed Prior to Commencement of Consents (Yes/No)	Comment
6.	**Hydrophytic vegetation determination**. Based on the data gathered, conduct a hydrophytic vegetation determination using the following flow chart (figure 1). **Figure 1: Flow chart of steps for hydrophytic (wetland) vegetation determination. Wetland indicator status abbreviations: FAC= facultative; FACW = facultative wetland; OBL = obligate wetland.**  Wetland indicator status ratings for species are in Clarkson et al. 2013 and subsequent updates.	No	with experience and knowledge of the locality, detailing the reasons for the disagreement shall be provided to Council within 30 working days from the date that the assessment was sent to the party. Council has the final authority over the delineation of a natural wetland and will provide a report to the Consent Holders and the Director-General of Conservation detailing the reasons for its decision, including the identification and discussion of areas of agreement and disagreement within ~~5~~10 working days of receipt of the disagreeing parties report.

3.5.2 Repeat Survey

For sites delineated as natural wetland from the procedure set out at **Section 3.5.1**, the Council shall commission, in consultation with the Director-General of Conservation and the Consent Holders, a suitably qualified and experienced ecologist to undertake wetland vegetation survey and subsequent reporting within five (5) years from the original date of survey at around the same time of year as the original delineation survey. The repeat surveys must be designed in a way that enables ecologically meaningful and statistically robust scoring of the wetland condition in order to analyse changes to the wetland's condition resulting from the groundwater abstraction.

This repeat survey must be completed once after the initial delineation Wetland Delineation Procedure (to provide an accurate baseline) but thereafter will only take place every five (5) years where technical assessment carried out according to **Section 2.1.1** confirms that there is an adverse decline in wetland levels resulting from groundwater abstraction.

A decline in wetland water level attributable to groundwater abstraction will be determined from the monitoring and analysis of temporal groundwater level variations in the sentinel bores set out in **Table 5**.

3.6 Environmental Monitoring Report

At the end of each irrigation season, the Council will commission the preparation of an Annual Environmental Monitoring Report (AEMR) by the nominated technical experta ~~suitably qualified hydrogeologist with experience and knowledge of the locality~~. A copy of the AEMR will be provided to the Consent Holders and the Director-General of Conservation by 31 July each year.

The purposes of the AEMR are:

- To provide a summary of the monitoring results for the previous year, including trends, against Objective 1 of the GMCP;
- To assess the monitoring undertaken over the previous year against the standards set out in Objective 1;
- To identify any changes/amendments to monitoring locations/parameters/frequencies that could be incorporated in future SIMPRs;
- To report on any issues apparent with the monitoring; and
- To identify any improvement that could be made with respect to the monitoring.

The AEMR will also contain an evaluation of whether the observed effects of the groundwater takes are consistent with the predictions of environmental response contained in the AAGWM Report.

The AEMR's primary function is to provide a summary of the monitoring information from the prior year's monitoring. The AEMR may contain recommendations for changes to monitoring but the SIMPR is the point at which these recommendations will be decided on by Council.

4. CONTINGENCY PLAN

Exercise of the consents is subject to compliance with Objective 1 of this GMCP.

As described in **Section 2**, a trigger level system is used to define environmental criteria that signal changes may be occurring outside of what is normal (TL1) or at a point where remedial action is required to avoid Objective 1 not being met (TL2).

This section details the responses that will be undertaken where trigger levels are exceeded under any of the monitoring suites discussed in **Sections 2.1.2.1, 3.2, 3.3, and 3.4**.

Where a trigger level is exceeded, the Council will commission a Groundwater Trigger Exceedance Report ("GTER"). The objective of the GTER is to establish the cause of a trigger level exceedance and to recommend a programme of action to end the exceedance.

A GTER shall include:

- Review of the monitoring results collected and establish why the exceedance has occurred;
- Set out requirements for increased monitoring of the exceedance;
- Set out environmental monitoring to detect effects of the exceedance, such as changes in extent of rivers, natural wetlands, springs or dune lakes;
- Update the report on a regular basis as more data becomes available; and
- Recommend actions to end the trigger level exceedance, which could include:
    - A staged reinstatement of abstraction to pre-exceedance rates and volumes;
    - Reduced levels of abstraction for all or some of the consent holders covered by the GMCP;
    - Suspension of abstraction by all or some of the consent holders covered by the GMCP.

4.1 Exceedance of TL1

In the event of a TL1 exceedance, which may represent declining groundwater levels or rising salinity indicators, the following actions must be undertaken:

(a) The Council will notify the Consent Holders in writing within ~~two (2) working days~~24 hours of when the TL1 exceedance became known.

Commented [SK5]: Changed to reflect that information will be telemetered and a swift response should be able to be initiated

(b) If the exceedance is of a salinity indicator in the bores listed in **Table 6**, then sampling of the monitoring bore(s) in exceedance shall immediately be upgraded to a weekly frequency for four (4) weeks following the first exceedance of the TL1. Weekly monitoring shall continue until sample results are consistently below TL1 values for a period of four (4) weeks or as directed by Council.

(c) If after four (4) weeks following the first exceedance of the TL1, the initiation of seawater intrusion and/or water level decline cannot be discounted to the satisfaction of the Council, then a GTER by ~~a suitably qualified hydrogeologist~~the nominated technical expert (and ecologist if the exceedance concerns a surface water body) shall be commissioned by the Council.

(d) The GTER shall assess the significance of the exceedance against the requirements of Objective 1 of the GMCP. The GTER shall assess why trigger levels have been breached, identify the pumping bores in the area(s) of effect and will review all of the available data collected in the affected area(s), in particular the data collected pursuant to this GMCP.

4.2 Exceedance of TL2

In the event of a TL2 exceedance, which represents a significant departure from normal groundwater conditions, with either continuously declining groundwater levels or rising salinity indicators:

(a). The Council will ~~immediately~~ inform the Consent Holders in writing within 24 hours of ~~upon~~ a TL2 exceedance becoming known.

(b). Consent Holders must reduce their abstraction to 50% of the current average daily quantity, as calculated using the previous month's water use records required to be kept in accordance with the conditions of its groundwater take consent as directed by Council. If the exceedance occurs within one month of a Consent Holder first taking water for irrigation purposes within an irrigation season, then the average shall be calculated using the water use records for this period only. The Council will advise the Consent Holder in writing of ~~any breach and~~ the required reduction in the daily water take volume.

Given the geographic distribution of water permits included in this GCMP, direction by Council for individual Consent Holders to reduce their abstraction will include consideration of:

- The location, nature and extent of the trigger level exceedance;
- State and trends in the same or related indicator parameters at other monitoring sites listed in **Table 5, Table 6,** and **Table 7**; and
- The location, rate, and volume of abstraction by individual Consent Holders.

(c). A GTER by ~~a suitably qualified hydrogeologist~~the nominated technical expert (and ecologist if the exceedance concerns a dune lake or natural wetland) shall be commissioned by Council. The GTER shall assess why the TL2 has been breached, identify the pumping bores in the area of effect, and include a review of all available data collected for the affected area(s), in particular, the data collected under this GMCP.

(d). Once (b) above has been complied with, the Consent Holder may apply to the Council's Compliance Manager for an alternative reduction in its daily water take volume. The Council's approval of an alternative reduction value will only be given if it is satisfied that relevant TL2 values will not be exceeded. The Council will use the GTER to inform its decision on any alternative reduction value for a Consent Holder.

(e). If the TL2 exceedance is in a bore(s) that is/are not continuously monitored, then weekly groundwater level measurements and/or sampling of saline intrusion (depending on which trigger level is breached) in all bores where TL2 trigger levels are breached will commence within one week of the TL2 trigger level exceedance. Monitoring will continue until such time as:

- Three consecutive samples in an individual monitoring bore are below all TL2 thresholds established for that piezometer; or
- As directed by the Council.

(f). If salinity indicators continue to increase or groundwater levels continue to decline after 21 days following the implementation of (b), then the Consent Holder's abstraction must be reduced to 25% of the current average daily quantity, as calculated for (b) above. The Council will advise the Consent Holder in writing of this further reduction and the required reduction in the daily water take volume.

(g). If (f) is implemented, then the Council will commission a review and update of the GTER report by ~~a suitably qualified hydrogeologist~~the nominated technical expert with a longer-term programme of recommended responses incorporating observed responses to interim

pumping rate reductions. The updated GTER will include a specific programme (including timeframes) of actions which would achieve compliance with Objective 1 of this GMCP. The actions may include, but not be limited to incremental reductions in the daily quantity of groundwater taken as a percentage of the allowable daily pumped volume, as well as testing of domestic/stock water supplies in bores that are efficiently utilising the aquifer and are potentially impacted by saline intrusion, and if necessary, the provision of temporary water supplies to any affected parties (excluding any of the Consent Holders) in the event that Chloride concentrations exceed 250 mg/L (being the guideline value for taste prescribed in New Zealand Drinking Water Standards for New Zealand 2005 (Revised 2008)). The GTER will also identify a methodology which the Council will utilise to increase abstraction back to the volumes applicable to the relevant stage of taking (see **Section 2.1**), where this can be done such that Objective 1 of this GMCP will be met. If it is not possible to increase abstraction back to the relevant stage of taking, then the GTER will identify a methodology to increase abstraction to a lesser volume such that Objective 1 of the GMCP will be met.

(h). Actions arising from the GTER shall continue as long as the issue continues.

(i). Implement additional remedial measures as directed by Council, including the suspension of taking.

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APPENDIX A – Areas of Interest for Wetland Delineation

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Groundwater Monitoring and Contingency Plan for the Sweetwater and Ahipara sub-aquifers of the Aupōuri Aquifer Management Unit

~~May~~ June 2021

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GLOSSARY OF TERMS

Saline/saltwater intrusion	For the purposes of this Groundwater Monitoring and Contingency Plan, saline/saltwater intrusion refers to changes in salinity at nominated monitoring locations that exceed thresholds established to indicate elevated potential for adverse effects on groundwater quality for potable supply and/or irrigation use and effects on freshwater ecosystems.
Efficient bore takes	An efficient bore take is when a bore fully penetrates the water bearing layer and takes water from the base of the aquifer.
Sub-aquifer	The Aupōuri Aquifer system is divided into 12 separate sub-aquifer units for the purposes of setting tailored aquifer-specific allocation limits.[1]
First in-first served	Under the Resource Management Act 1991, applications for water takes are processed in the order in which they are lodged. The rights of parties associated with this Groundwater Monitoring and Contingency Plan are prioritised according to the order in which their permits are granted and added to this Plan.
Stage 1	The period up to the point that trigger levels have been set and irrigation has occurred for one full irrigation season as applicable to each individual take/consent.
Full irrigation season	Irrigation that occurs within the entire period of a water year, being 1 July to 30 June, when irrigation is required, whether or not the full allocation for a stage is irrigated during a water year.

[1] Policy H.4.4 of the Proposed Regional Plan for Northland (Appeals Version) June 2020.

Sentinel bore	A monitoring bore specifically established to monitor groundwater levels and salinity indicators in a specified location. For the purposes of this Groundwater Monitoring and Contingency Plan, sentinel bores are those established and/or proposed monitoring bores (not production bores) in which piezometers are installed to measure groundwater levels and salinity indicators in the deep shellbed aquifer and/or the shallow sand aquifer.

1. INTRODUCTION

1.1 Scope and Objective of the GMCP

This document comprises a groundwater monitoring and contingency plan for the Sweetwater and Ahipara sub-aquifers of the Aupōuri aquifer management unit (GMCP). Much of the approach outlined in this GMCP has been informed by the technical assessment presented in the *Aupouri Aquifer Groundwater Model, Factual Technical Report – Modelling – Aupouri Aquifer Water User Group. WWLA0184, Rev 3, prepared by Williamson Water & Land Advisory Ltd, and dated 5 February 2020 (*hereafter referred to as the AAGWM Report*)*.

The GMCP covers the implementation and monitoring of the groundwater take consents listed in Table 1 (the Consent Holders) and is a programme of adaptive management that is suitable to provide a platform for the implementation of the abstractions listed in Table 1.

An adaptive management regime requires reasonably clear objectives against which the effects and management progress may be evaluated. The objective of this GMCP is that;

Objective 1: **The abstractions must, individually and cumulatively, avoid:**

(a) **adverse effects of saltwater intrusion into the Aupōuri aquifer;**

(b) **adverse effects on the hydrological functioning, including changes to water levels[2], of natural wetlands, springs and dune lakes;**

(c) **alterations to the extents of rivers, natural wetlands, springs and/or dune lakes;**

(d) **adverse effects on the significant indigenous vegetation and habitats in (terrestrial and freshwater environments of) dune lakes, springs and natural wetlands;**

(e) **Adverse effects on the flow levels and flow variability of rivers and streams and springs so that their habitat quality and sustainable mahinga kai, recreational, and other social and cultural values, are maintained (including sufficient flows and flow variability to maintain their habitat quality, including to flush rivers of deposited sediment and nuisance algae and macrophytes and support the natural movement of indigenous fish and valued introduced species such as trout; and**

(f) **lowering of the groundwater levels of the Aupouri aquifer such that existing efficient bore takes operating as a permitted activity or in accordance with resource consent conditions cannot access the authorised volume of groundwater.**

Extensive environmental monitoring is required to confirm avoidance of the effects listed above, and to facilitate an 'adaptive management' approach including a staged implementation of groundwater extraction. The purpose of the GMCP is to provide a frameworks that meets the requirements and principles of adaptive management. The GMCP provides a methodology for implementing adaptive management and prescribes specific monitoring requirements, establishes groundwater level and

Commented [SK1]: Council is comfortable with the inclusion of 'adverse effects' and notes that there are discrete locations within the area of interest where groundwater has shown increased salinity. The inclusion of "adverse effects of" provides for these anomalies.

[2] Avoiding "change" means that as a result of the abstraction of water; median water levels, mean annual water level fluctuations and patterns of water level seasonality (relative summer vs winter) remain unchanged.

groundwater quality monitoring triggers and outlines a process for implementation of appropriate mitigation and remediation measures in the event that nominated trigger values are exceeded.

The GMCP is intended to allow the early detection of any impact to the , Sweetwater and Ahipara sub-aquifers of the Aupōuri aquifer management unit and surface water bodies associated with the exercise of groundwater take consent(s), by:

- Requiring regular monitoring of the groundwater system both on and off-site;
- Setting monitoring criteria to indicate potential adverse impacts on the groundwater system and surface water bodies;
- Implementing mitigation measures including changes to the pumping regime if trigger levels are reached to ensure that Objective 1 continues to be met;
- Reviewing monitoring data before and after a step level increase in pumping rate;
- Ensuring that the monitoring data is available for regular review by the Council;
- Detailing a Contingency Plan to be implemented if an unanticipated impact(s) is identified;
- Providing information to quantify the actual effects of the abstraction on the groundwater resource; and
- Enabling validation of the numerical model by the Consent Holders for any replacement groundwater take consent applications.

1.2 Parties Associated with this GMCP

The parties who have been deemed to be associated with this GMCP at its inception are the Northland Regional Council ("the Council"), the Consent Holders in **Table 1**, and the Director-General of Conservation.

The following sections provide a brief description of the roles and responsibilities of each party associated with this GMCP.

Should any of these parties change during the implementation of this GMCP, either through addition or removal, the process as set out in **Section 1.3** below shall be applied.

The rights of Consent Holders associated with this GMCP are prioritised according to the order in which their consents are granted and added to this GMCP, in accordance with the first in-first served approach to water allocation under the Resource Management Act 1991.

1.2.1 Northland Regional Council

The Council will undertake the ongoing monitoring requirements of the GMCP on behalf of the Consent Holders. The actual and reasonable cost of undertaking the ongoing monitoring of these consents will be charged to each consent holder in accordance with Council's Charging Policy.

The installation of sentinel bores and monitoring equipment is the responsibility of the Consent Holders.

1.2.2 Consent Holders

The Consent Holders identified in **Table 1** of this GMCP are required to exercise their consents in accordance with this GMCP.

The exercise of the consents will be in accordance with Council initiated instructions which will be issued once the actions and process established through this GMCP have been undertaken.

The Consent Holders may seek changes to the GMCP through either of the processes set out in **Section 1.3**.

1.2.3 Director-General of Conservation

The Director-General of Conservation is responsible for administering land and waterbodies subject to reserve status under the Reserves Act 1977 and conservation or stewardship area status under the Conservation Act 1987, along with native fish and functions relating to protected species under the Wildlife Act 1953. Within the Sweetwater and Ahipara sub-aquifers of the Aupōuri Aquifer these areas[3] include:

- The Sweetwater Dune Lakes Conservation Area;
- Lake Ngatu Recreation Reserve;
- Waipapakauri Beach Scenic Reserve;
- Scenic Reserve.

The Director-General of Conservation is a party to this GMCP to ensure that the relevant provisions of these Acts, which the Director-General of Conservation administers, in particular that matters identified in Objective 1(b) and 1(c) of the GMCP are met.

It is also relevant to note that the Ngāti Kuri Claims Settlement Act 2015, Te Aupōuri Claims Settlement Act 2015, NgāiTakoto Claims Settlement Act 2015, and the Te Rarawa Claims Settlement Act 2015 all contain provisions relating to a 'korowai redress' which set-out co-governance arrangements for conservation land known as the 'Korowai for Enhanced Conservation'. The Korowai for Enhanced Conservation recognises the historical, spiritual and cultural association NgāiTakoto, Te Aupōuri, Te Rarawa and Ngāti Kuri iwi have with conservation land and the roles that the hapū and marae of each undertake as kaitiaki of the whenua and taonga of the conservation estate.

1.3 Changes to the GMCP

This GMCP may be amended at any time to:

- Incorporate new or replacement water permits, or remove water permits, within the Sweetwater and Ahipara sub-aquifers of the Aupōuri aquifer management unit that have overlapping and/or additional monitoring requirements or which are subject to different trigger levels or trigger levels based on monitoring described in this GMCP;
- Alter the nature and scope of the required monitoring (i.e. monitoring frequency and intensity (type and number of samples)) and associated trigger levels as is determined from final decisions of the Council under the Staged Implementation Monitoring Programme Review, Annual Environment Monitoring Report, and Groundwater Trigger-Level Exceedance Report;

[3] Parts of the NgāiTakoto Claims Settlement Act 2015 and Te Rarawa Claims Settlement Act 2015 contain provisions which identify areas that will cease to be a conservation area under the Conservation Act 1987.

- Incorporate or remove parties who are, or may need to be, a part of this GMCP to ensure Objective 1 is met.

If either the Council or a Consent Holder wishes to amend the GMCP, then it must provide notice in writing of the proposed changes, along with any supporting technical documents, to the other Consent Holders, and the Director-General of Conservation.

A suitably qualified and experienced hydrogeologist (and ecologist if required) shall be nominated by Council to act as an independent technical expert for the purpose of peer reviewing proposed changes to the GMCPs. The nominated technical expert shall, within 20 working days, ~~to~~ provide a ~~response~~ report to the Council, the Consent Holders and the Director-General of Conservation on the proposed changes to the GMCP.

~~If no response is received from a party within the stated timeframe, then Council will consider that the party has no concerns with the written notice of proposed change(s).~~

If any party does not agree with the outcome of the report on the proposed change~~(s)~~, that party shall ~~engage a suitably qualified hydrogeologist and/or an ecologist to prepare a report detailing~~notify the Council of the reasons for the disagreement ~~which shall be provided to Council, the other Consent Holders and the Director-General of Conservation~~ within 230 working days from the date that the ~~written notice of the proposed changes was sent to the party~~review report was received.

Any change to the GMCP will only be authorised by Council if the ~~technical or administrative assessment~~review of the proposed change clearly indicates that the change will meet Objective 1 of the GMCP.

The Council will ~~provide a report to~~notify the Consent Holders and the Director-General of Conservation of the decision, detailing the reasons for its decision, including the identification and discussion of areas of agreement and disagreement. ~~The report will also be provided to the Director-General of Conservation.~~

If any changes are made to the GMCP, then a copy of the amended GMCP will be provided to the Consent Holders and the Director-General of Conservation.

2. FRAMEWORK FOR ADAPTIVE MANAGEMENT

In summary, the following adaptive management techniques are applied in this GMCP;

(a) Baseline monitoring – existing environmental and resource consent compliance monitoring in the Sweetwater sub-aquifer provides a baseline for evaluating the potential effects of the proposed abstraction. The monitoring programme developed for Stage 1 of the Table 1 abstractions is intended to continue key components of the existing monitoring programme while also providing greater focus on monitoring and management of groundwater levels and quality along the coastal margin. This monitoring programme is contained in this GMCP, however, some monitoring detail is still required and this is indicated by the acronym 'TBC'.

(b) Early warning systems – trigger levels (TLs) will be established to set up an early warning system that provides a response mechanism when differences between predicted and actual water levels and/or salinity concentrations occur. A trigger level is an environmental criterion that if reached or met, requires a certain response to be actioned.

(c) Staged development – abstraction volumes will progressively be increased in a staged manner, with expansion contingent on compliance with yet to be established trigger levels and on regular reviews of groundwater level, freshwater and wetland ecology, hydrology, and salinity monitoring results. The proposed staging recognises that a significant portion of the abstraction covered by this GCMP is already authorised by existing water permit AUT.020995.01.03.

It is noted that the consent documentation requires that all development starts at Stage 1 volumes whether or not others have progressed to Stage 2 or further, and that takes must be implemented for the minimum period of Stage 1 before progressing to Stage 2. This is an essential mechanism for staging as an adaptive management response.

(d) Management of consents being exercised immediately after commencement – until such time as there is an adequate monitoring record to establish trigger levels in new monitoring bores, the abstractions that will occur immediately after commencement (i.e., in the first year) will be subject to interim groundwater level and saline trigger levels and Trigger Exceedance Report procedures; and

(e) Tiered approach to monitoring –monitoring requirements will increase if site trigger levels are approached or exceeded. Likewise, monitoring intensity may decrease with evidence of sustained compliance and stability or to reflect improved characterisation of the hydrogeological environment by way of the process outlined in **Section 1.3** of this GMCP; and

(f) Ongoing adaptive management – the abstractions will be managed adaptively within the term of consent and, in the event of trigger level exceedance, through the implementation of the recommendations of a Groundwater Trigger Exceedance Report ("GTER") prepared by Council.

(g) Suspension of abstractions – should compliance with Objective 1 of this GMCP not be achieved, then the exercise of some or all of the consents to abstract and use groundwater may be suspended until such time as Council confirms in writing that compliance can be achieved.

(h) Consent review – this GMCP does not override the ability for consents and/or consent conditions to be reviewed in circumstances stipulated in section 128 of the Resource Management Act 1991.

The following sections provide detailed information relating to the adaptive management framework to be imposed for the exercise of the consents listed in **Table 1**.

2.1 Staged Implementation

The uptake by Consent Holders of the consented total allowable water volumes will be permitted in four (4) stages over nine (9) years, in accordance with the following factors:

- ***Level of current orchard development*** – where existing consents authorising the take and use of water are proposed to be replaced or varied, or where existing authorised abstraction will be subject to the provisions of this GMCP.
- ***Rate of orchard/horticultural development*** – will occur at differing rates depending on the owner's cashflow and access to plants; and
- ***Tree/crop maturity*** – approximately nine years to full maturity and plant water usage, hence irrigation requirements commensurately increase with tree growth.

The progressive increase in irrigation requirements provides an opportunity to apply an adaptive management approach that establishes a baseline and allows the original hypotheses of avoidance of effects to be periodically re-evaluated to ensure Objective 1 of this GMCP continues to be met as development occurs.

The management approach provides a series of responses to be taken based on the monitoring results, including where monitoring shows that Objective 1 of this GMCP is not being met, as discussed in **Section 2.2**.

The uptake by Consent Holders of the consented total authorised water volumes will be permitted in four stages over nine years as shown in Table 1 below, unless the outcome of the Staged Implementation and Monitoring Programme Review detailed in Section 2.1.1 shows that there should be a delay in moving to the next stage, or that the next stage should not occur.

The development stages reflect:

- A combination of existing allocation (2,317,000 m^3/year) and proposed future development of pastoral and horticultural irrigation activity for APP.020995.01.04; and
- The progressive increase in water requirements for the proposed orchard associated with AUT.040364.01.01.

The Stage 1 process applies to any new or additional take beyond that already authorised prior to the granting of these consents. As such, the existing volume of take (2,317,000 m^3/year) at Sweetwater Station authorised by AUT.020995.01.03 is excluded from the requirements of Stage 1.

Table 1. Summary of staged implementation annual volumes.

Application Number	Consent Holder	Allowable Annual Volume (m3)			
		Stage 1 (Year 1)*	Stage 2 (Year 2-3)*	Stage 3 (Year 4-8)*	Stage 4 (Year 9 - full consent term)*
Sweetwater sub-aquifer management unit					
AUT.040364.01.01	ELBURY HOLDINGS LTD (C/- KJ & FG KING)	50,000	100,000	150,000	200,000
AUT.020995.01.04	TE RARAWA FARMING LTD	321,000**	321,000	321,000	321,000

	AND TE MAKE FARMS LTD	(Consent Total 3,093,000)	(Consent Total 3,093,000)	(Consent Total 3,093,000)	(Consent Total 3,093,000)
	TOTAL (m3/year)***	**371,000**	**421,000**	**471,000**	**521,000**
	Total (% allocated per stage)	**71**%	**81**	**90**	**100**
Ahipara sub-aquifer management unit					
AUT.020995.01.04	TE RARAWA FARMING LTD AND TE MAKE FARMS LTD	455,000** (Consent Total 3,093,000)	455,000 (Consent Total 3,093,000)	455,000 (Consent Total 3,093,000)	455,000 (Consent Total 3,093,000)
	TOTAL (m3/year)***	**3,093,000**	**3,093,000**	**3,093,000**	**3,093,000**
	Total (% allocated per stage)	**100**%	**100**%	**100**%	**100**%

Notes:

*The staged implementation is based on years when irrigation occurs following the commencement of the consents.

** APP.020995.01.04 may be exercised up to the current consented volume of 2,317,000 m3/year without staging meaning that Stage 1 (Year 1) for this consent occurs when the take exceeds 2,317,000 m3/year.

*** Given that APP.020995.01.04 includes existing un-staged allocation, and that timing of the first exercise of APP.040364.01.01 is not yet known, totals are indicative only.

2.1.1 Staging: Implementation and Monitoring Programme Review

A Staged Implementation and Monitoring Programme Review ("the SIMPR") will be required for Council to decide whether Consent Holders proceed to the next allocation stage. At the following times, the volume of abstraction authorised will be reviewed against the staged implementation outlined in Section 2.1 at the minimum intervals of:

End of Stage 1: A period where all or part abstraction of the Stage 1 annual volume is taken after commencement of the consent and after which a full 12 months of baseline monitoring data has been collected;

End of Stage 2: 3 irrigation seasons following date of commencement of the consents; and

End of Stage 3: 6 irrigation seasons following date of commencement of the consents;

The main purpose of the SIMPR is to assess whether abstraction increasing to the subsequent development stage would remain compliant with Objective 1 of the GMCP.

The SIMPR will be commissioned by the Council and shall be prepared by ~~a suitably qualified hydrogeologist~~the nominated technical expert with experience and knowledge of the locality.

The SIMPR shall include a detailed assessment of all environmental monitoring data including groundwater levels, salinity indicators, and water quality, and include consideration of spatial and temporal trends including potential effects of groundwater abstraction on water levels in dune lakes and natural wetlands. If the potential for more than minor effects on a surface water body is identified, then the SIMPR will also include assessment of the likely significance of those effects prepared by a suitably qualified ecologist. The SIMPR shall assess whether Objective 1 of this GMCP is being met at the current level of abstraction, and whether Objective 1 will be met at the next stage level of abstraction. The SIMPR may also consider the nature and scope of continued monitoring (i.e. monitoring frequency and intensity (type and number of samples)) and associated trigger levels.

The SIMPR will provide recommendations based on the assessment of the environmental monitoring data to date on:

- the setting or alteration of the trigger levels;

- whether any changes to the monitoring programme are required; and
- whether to advance to the next stage of abstraction or to remain at the current level of abstraction, or to reduce the level of abstraction.

A copy of the SIMPR will be provided to the Consent Holders listed in **Table 1** and the Director-General of Conservation a minimum of three (3) months prior to the anticipated commencement of the subsequent irrigation season utilising volumes defined for the subsequent development stage as stated in **Table 1**. The Consent Holders and Director-General of Conservation have 20 working days to provide a response to the Council on the conclusions and recommendations of the SIMPR.

~~If no response is received from a party within the stated timeframe, then the Council will consider that the party has no concerns with the conclusions of the review.~~

If any party does not agree with the conclusions and recommendations of the SIMPR, then a report by a suitably qualified hydrogeologist and/or ecologist, both with experience and knowledge of the locality if possible, detailing the reasons for the disagreement shall be provided to Council within 30 working days from the date that the ~~review~~ copy of the SIMPR was sent to the party.

An increase in the volume of abstraction to the next development stage and any change to the monitoring programme will only be authorised by Council if the technical assessment of the monitoring data clearly indicates that the increase in the allocation and any necessary change to GMCP would meet Objective 1 of this GMCP.

Council will provide a report to the Consent Holders and the Director-General of Conservation detailing the reasons for its decision, including the identification and discussion of areas of agreement and disagreement within thirty-five (35) working days from the date the copy of the SIMPR was sent to the party.

If any changes are made to the GMCP as a result of the SIMPR, then a copy of the amended GMCP will be provided to the Consent Holders and the Director General of Conservation within five (5) working days of the change being authorised as final.

A summary of the above process is also included in the conditions of each consent that is covered by this GMCP.

2.1.2 Stage 1 (Year 1) Management Regime

Stage 1, from a management perspective, is the initial development stage following commencement of the consents listed in **Table 1**. This stage is intended to maintain abstraction at similar levels to those currently authorised while trigger levels are established for all sentinel monitoring bores. The Stage 1 process applies to any new or additional take beyond that already authorised prior to the commencement of these consents.

The Council is to notify the Consent Holders and the Director-General of Conservation of the default management parameters for Stage 1 (Year 1) three (3) months prior to the commencement of abstraction. The Consent Holders and the Director-General of Conservation have 10 working days to provide responses to the Council on the default management parameters once notified.

Ongoing monitoring will be required to ensure that Objectives 1(a), (b), and (c) are met by implementing trigger level exceedance measures. These trigger level exceedance measures are identified in **Section 4** below.

The interim management regime established for Stage 1 (Year 1) will be superseded by the Monitoring and Trigger Level Setting components set out in **Section 2.2** of this GMCP.

2.1.2.1 Saline Intrusion & Groundwater Level: Monitoring and Triggers

To ensure that Objective 1 is met during Stage 1 (Year 1) interim trigger levels for minimum groundwater levels and salinity indicators will be established in all new sentinel bores identified in **Table 3**.

These trigger levels will be established either based on existing baseline data (for existing compliance monitoring bores associated with Water Permit AUT.020995.01.03) or determined from preliminary data once each new sentinel bore is installed, following the methodology established in **Section 2.2** below. Interim trigger levels must be set prior to the exercise of any of the consents and apply to Stage 1 (Year 1) only.

The saline intrusion and groundwater level monitoring trigger levels for Stage 1 (Year 1) shall be inserted into the GMCP through the process set out in **Section 1.3** of this GMCP prior to the exercise of any consents subject to this GMCP.

For clarity, the unmapped wetlands, delineated through the procedure set out in **Section 3.5.1,** do not require interim trigger levels, as identification of adverse effects on the hydrological functioning of these wetlands, and therefore their ecological integrity, because of the exercise of these consents, will be provided for through the interim trigger levels for minimum groundwater levels.

2.1.2.2 Trigger Level Responses

In the event of an exceedance of a trigger level applicable in Stage 1 (Year 1), the Trigger Level Exceedance response plan contained in **Section 4** of this GMCP shall apply.

2.1.2.3 Ceasing Interim Stage 1 (Year 1) Management Regime

This interim management regime shall remain in place until such time as the setting of trigger levels as per **Section 2.2** below through amendment to this GMCP in accordance with the change process established in **Section 1.3** of this GMCP.

2.2 Trigger Level System

2.2.1 Timeframe for setting of trigger levels

The setting of trigger level values for each parameter (where TBC is indicated in the monitoring plan tables in **Section 3** (Monitoring Programme)) will be undertaken based either on current baseline data (for sites with existing monitoring) or data collected during Stage 1. This approach recognises that:

- There is significant historical monitoring data available to characterise the response of groundwater levels and quality (salinity) to current levels of abstraction;
- The manifestation of any effects from the exercising of these consents will steadily progress with time in accordance with the staged development process outlined in **Table 1**. The scale of abstraction during Stage 1 (i.e. generally 12 months following commencement of consent) will not vary significantly from what is currently considered as the existing environment[4].

2.2.2 Method for setting of trigger levels

A two-tier trigger level system will be implemented on the consents:

[4] The Stage 1 process applies to any new or additional take beyond that already authorised prior to the granting of these consents. As such, the existing volume of take (2,317,000 m^3/year) at Sweetwater Station authorised by AUT.020995.01.03 is excluded from the requirements of Stage 1.

- **TL1** – The first-tier trigger level establishes when an individual monitoring parameter is exhibiting a departure from baseline conditions. If this trigger level is breached, then additional monitoring will be undertaken by the Council. This additional monitoring will assist characterisation of the nature and significance in changes to the baseline condition of the groundwater resource;
- **TL2** – The second-tier trigger level is set at a threshold defining a 'significant' departure from baseline conditions and/or conditions where the risks of adverse environmental effects are increased. If this trigger level is breached, then the Consent Holders will be required to reduce their daily water take volume in a staged manner over a set period of time.

The trigger level parameters required under this GMCP for the various suites are summarised in **Table 2**.

Table 2: Summary trigger level parameters by monitoring suite.

Monitoring Suite	Parameters
Groundwater level and salinity monitoring	Groundwater level, electrical conductivity
Saline intrusion monitoring	Electrical conductivity, chloride, sodium, total dissolved solids.

2.2.3 Response to exceeding trigger levels

The actions required should trigger levels be exceeded are set out in **Section 4** (Contingency Plan).

3. MONITORING PROGRAMME & TRIGGER LEVEL SETTING

3.1 Bore Locations and Details

A consolidated summary of the schedule of bores that are required to be monitored as part of this GMCP is provided in **Table 3**. Along with the bores identified for monitoring, the table provides key details relating to the bores' physical attributes and parameters to be monitored. The locations of the monitoring bores are shown on **Figure 1**[5].

The following sections of the GMCP provide the monitoring schedules (frequency and trigger levels) for the bores.

The monitoring schedule comprises four components:

- Three sentinel bores located along the coastal margin seaward of areas where abstraction is concentrated. The sentinel bores will provide the primary reference sites for monitoring and management of potential saline intrusion effects. Each sentinel bore will comprise two piezometers accessing the shallow unconfined aquifer and the deep shellbed aquifer respectively. Instrumentation in each piezometer will enable continuous monitoring of groundwater levels and electrical conductivity (EC), and provide for telemetry of monitoring data to the Council. All sentinel monitoring bores listed in **Table 6** will be installed prior to the exercise of the consents.
- An existing NRC piezometer with a long monitoring record (Lake Heather No. 1 (105 m)) will be the primary reference site for management of cumulative well interference effects. Instrumentation in the piezometer will enable continuous monitoring of groundwater levels and provide for telemetry of monitoring data to NRC.
- Manual monitoring of groundwater levels on a monthly basis in existing compliance monitoring bores on Sweetwater Station, along with an existing NRC piezometer at Lake Heather (Lake Heather No. 1 (29 m)) and a private bore at Sweetwater Nursery (LOC.201424). These sites will provide ongoing monitoring of groundwater levels and provide data to characterise both localised and cumulative drawdown in response to abstraction and be used to inform the staged implementation process.
- Measurement of salinity indicators on a quarterly basis in each piezometer at the three sentinel bores, augmented by an additional monitoring bore at Waipapakauri Beach (if access to a suitable existing bore can be established). These sites will be monitored on a quarterly basis for the parameters listed in **Table 2** and provide a secondary baseline to characterise any changes in aquifer salinity along the coastal margin.

The locations of the production bores in **Table 3** are also shown in **Figure 1**. An error accuracy level of +/- 50 metres is applicable to these bore locations. Any differentiation in their locations by greater than 50 metres will result in a requirement for an application to the Council for a change of consent condition pursuant to Section 127 of the Resource Management Act 1991 (RMA). Assessment of the effects on the environment of the change will be required pursuant to Schedule 4 of the RMA.

[5] Note: the locations shown for the two new sentinel bores are indicative. Final locations may depend on physical access available for piezometer installation.

Table 3: Schedule of monitoring bore details.

MONITORING BORES								
Bore Details		Bore Owner	COORDINATES (NZTM 2000)		Depth (m)	Dia. (mm)	Target Aquifer	Purpose*
Name (Fig 1)	NRC Ref.		Easting	Northing				
MW1a	LOC.210522	Sweetwater Station	1617843	6119772	13.3		Unconfined	GLm
MW1b	LOC.209755	Sweetwater Station	1617597	6119793	94.0		Shellbed	GLm
MW2a	LOC.210523	Sweetwater Station	1620419	6120014	15.0		Unconfined	GLm
MW2b	LOC.210524	Sweetwater Station	1620422	6120015	59.0		Shellbed	GLm
MW4a	LOC.210527	Sweetwater Station	1616386	6119031	25.0		Unconfined	GLc, ECc, SI
MW4b	LOC.209753	Sweetwater Station	1616404	6119040	92.0		Shellbed	GLc, ECc, SI
MW5a		Sweetwater Station	1617811	6114690	6.0		Unconfined	GLm
MW5b	LOC.209759	Sweetwater Station	1617644	6114898	61.0		Shellbed	GLm
MW6	LOC.320452	Sweetwater Station	1617451	6118946	14.4		Unconfined	GLm
Lake Heather No 1 (29 m)	LOC.200226	NRC	1617605	6121325	29		Unconfined	GLm
Lake Heather No 1 (105 m)		NRC			105.5		Shellbed	GLc
Waipapapakauri Sentinel (shallow)	TBC	NRC	1616020	6121100	TBC		Unconfined	GLc, ECc, SI
Waipapapakauri Sentinela (deep)	TBC	NRC	1616020	6121100	TBC		Shellbed	GLc, ECc, SI
Waipapakauri Quality[a]	TBC	Private?	1615500	6122500	TBC		Shellbed	SI
Ahipara Sentinel (shallow)	TBC	NRC	1615750	6112150	TBC		Unconfined	GLc, ECc, SI
Ahipara Sentinel (deep)	TBC	NRC	1615750	6112150	TBC		Shellbed	GLc, ECc, SI
Sweetwater Nursery[a]	LOC.201424	Private	1618734	6122288	82		Shellbed	GLm
a Monitoring site equivalent to that specified in Schedule 1 to AUT.25683.01.03								

* Purpose Key

GLc = Continuous Groundwater Level (Telemetered)

GLm = Manual (monthly) groundwater level

ECc = Continuous Electrical Conductivity (Telemetered)

SI = Salinity Indicatory (Quarterly)

MI = Major Ions (Quarterly)

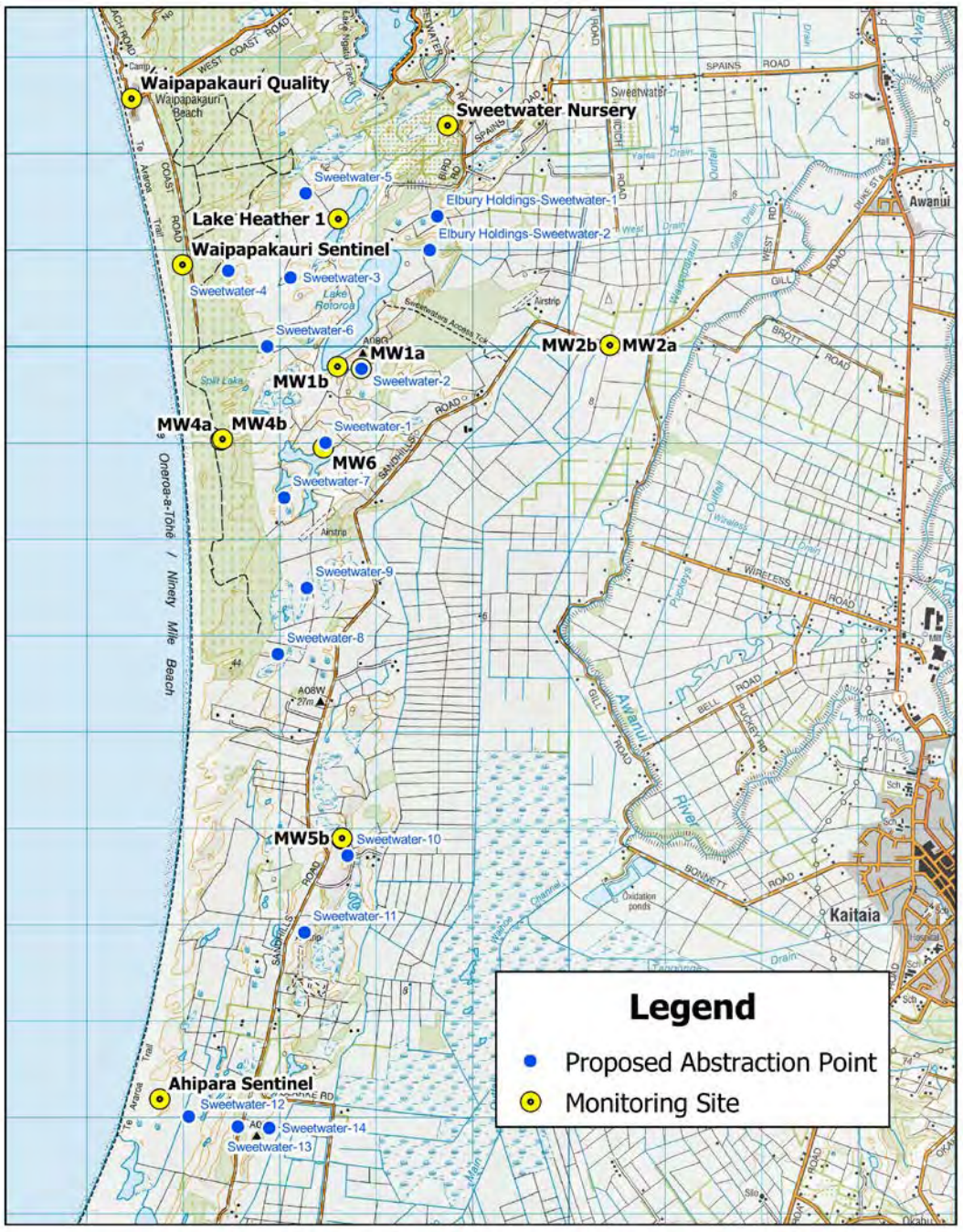

Figure 1. **Groundwater Monitoring and Production Bore Location Map**

3.2 Groundwater Level Monitoring & Establishment of Trigger Levels

3.2.1 Continuous Groundwater Level Monitoring

Sentinel bores as described in **Table 5** will collect data continuously for water levels and electrical conductivity in individual piezometers and will be utilised as the primary reference sites for regional monitoring of potential effects associated with saline intrusion. Data will be telemetered to the Council.

Groundwater levels will be monitored in the shallow sand and deep shellbed aquifers to quantify the magnitude of drawdown resulting from the proposed abstraction in the deep shellbed and unconfined shallow sand aquifers to ensure it is within the magnitude anticipated in the AEE and meets Objective 1 of this GMCP.

These bores will provide early detection or warning of:

- Groundwater levels around the coastal margin approaching a threshold that could indicate a greater risk of saline intrusion; and
- Any reduction in water quality that could indicate the landward migration of the saline interface; and
- Groundwater levels in the shallow sand aquifer lowering and having a potential adverse effect on surface water bodies, springs, dune lakes or natural wetlands.

Details of the sentinel bores are summarised in **Table 5** below. The existing NRC Lake Heather No.1 (105 m) piezometer will be utilised as the primary reference site to determine the magnitude of cumulative well interference effects. Groundwater levels will be monitored on a continuous basis and telemetered to the Council.

All sentinel monitoring bores listed in **Table 5** will be installed prior to the exercise of the consents.

Checking of the sensors required for continuous monitoring will be undertaken on a monthly basis, and any faults will be recorded and remedied immediately. Data will be collected, processed and managed in accordance with the Council's quality standards.

3.2.2 Manual Groundwater Level Monitoring

Groundwater levels will be monitored manually in the shallow sand and deep shellbed aquifers to:

- Ensure groundwater abstraction does not result in a reduction in the reliability of supply for AUT.025683.01.03; and
- Quantify the magnitude of drawdown resulting from the proposed abstraction in the deep shellbed and shallow sand aquifers to ensure it is within the magnitude anticipated in the AEE and does not result in adverse effects on the surface water environment, existing groundwater users and long-term aquifer storage volumes.

Details of the groundwater level monitoring bores are listed in **Table 4** below. The majority of the bores listed (MW1a to MW6) are existing compliance monitoring bores on Sweetwater Station that have been monitored manually on a monthly basis since 2013 as part of consent compliance for Water Permit AUT.020995.01.03. It is proposed to continue the existing monitoring regime for these bores, with the addition of the existing NRC Lake Heather No 1 (29 m) piezometer and a private bore at Sweetwater Nursery.

No trigger levels will be established for manual groundwater level monitoring sites. The primary value of data collected from manual groundwater level monitoring will be to establish medium to longer-term variations in groundwater levels in response to groundwater abstraction. This information will be utilised to inform the SIMPR (**Section 2.1.1**) and Annual Environmental Monitoring Report (**Section 3.6**).

Table 4. Schedule of Manual Groundwater Monitoring Bores.

Monitoring Bore	NRC ID	Easting	Northing	Depth (m)	Aquifer	Units	Frequency
MW1a	LOC.210522	1617843	6119772	13.3	Unconfined	mAMSL	Monthly
MW1b	LOC.209755	1617597	6119793	94.0	Shellbed	mAMSL	Monthly
MW2a	LOC.210523	1620419	6120014	15.0	Unconfined	mAMSL	Monthly
MW2b	LOC.210524	1620422	6120015	59.0	Shellbed	mAMSL	Monthly
MW5a		1617811	6114690	6.0	Unconfined	mAMSL	Monthly
MW5b	LOC.209759	1617644	6114898	61.0	Shellbed	mAMSL	Monthly
MW6	LOC.320452	1617451	6118946	14.4	Unconfined	mAMSL	Monthly
Lake Heather No. 1 (29 m)	LOC.200226	1617605	6121325	29.0	Unconfined	mAMSL	Monthly
Sweetwater Nursery	LOC.201424	1618734	6122288	82.0	Shellbed	mAMSL	Monthly

3.2.3 Continuous Groundwater Level Monitoring & Trigger Levels

A two-tier system for trigger level 1 ("TL1") and trigger level 2 ("TL2") for groundwater levels will be set in the bores identified in **Table 5**. Electrical conductivity trigger levels for these bores are contained in **Table 6**.

Trigger levels for cumulative drawdown will be established and, if required, utilised to manage cumulative pumping rates to ensure priority access to the groundwater resource by existing groundwater users is not impeded by the proposed abstraction. Trigger levels will be established subject to agreement between parties to this GCMP and FNDC (holders of water permit AUT.25683.01.03).

The Council will set trigger levels for groundwater levels in the shallow sand aquifer in each of the three sentinel bores. As a general guide TL2 for the shallow sand aquifer should be no less than 1.0 mAMSL and 1.5 mAMSL for deep shell bed groundwater levels (noting that changes in electrical conductivity ("EC") are also a key indicator of saline intrusion and are provided for below in **Section 3.3**). If necessary, water level records for individual sentinel bores will be correlated with existing monitoring sites to provide historical context for estimating the trigger levels.

In the three sentinel bores, TL1 and TL2 will be based on historical groundwater levels, allowing for the predicted magnitude of drawdown resulting from existing and proposed abstraction outlined in the

AAWUG Model Report. If necessary, water level records for individual sentinel bores will be correlated with existing monitoring sites to provide historical context for estimating the trigger levels.

Table 5: Continuous Monitoring & Trigger Levels – Groundwater Levels

Bore Name	Depth (m)	Piezo. No.	Target aquifer	Units	Frequency	Trigger Levels	
						TL1	TL2
MW4	25	a	Unconfined	mAMSL	Continuous	TBC	TBC
	92	b	Deep shellbed	mAMSL	Continuous	2.5	2.0
Waipapakauri Sentinel	TBC	1	Unconfined	mAMSL	Continuous	TBC	TBC
	>50 (TBC)	2	Deep shellbed	mAMSL	Continuous	TBC	TBC
Ahipara Sentinel	TBC	1	Unconfined	mAMSL	Continuous	TBC	TBC
	> 50 TBC	2	Deep Shellbed	mAMSL	Continuous	TBC	TBC
TBC = to be confirmed within 15 months of the date of commencement of these consents.							
GL TL1s (where provided) have been calculated from long term monitoring data.							
GL TL2s (where provided) have been interpolated from Table F1, WWA Groundwater Modelling Report							

The setting of TL1 and TL2 trigger levels values for remaining piezometers will be undertaken during Stage 1 after 12 months of monitoring data has been collected and within 15 months of the date of commencement of these consents and will replace the interim trigger levels established through the process described at **Section 2.1.2.1** above.

3.3 Saline Intrusion Monitoring & Establishment of Trigger Levels

Sentinel bores will be utilised as the primary reference sites for monitoring of potential effects associated with saline intrusion. These bores will be positioned between existing/proposed abstraction and the coastline to provide early detection or warning of:

- Groundwater levels around the coastal margin approaching a threshold that could indicate a greater risk of saline intrusion; and
- Any reduction in water quality that could indicate the landward migration of the saline interface.

Details of the sentinel bores are summarised in **Table 6** below.

3.3.1 Stage 1 Monitoring

During the initial 12-month monitoring period, sampling for the following salinity indicators in the bores listed in **Table 6** below will be undertaken at quarterly intervals[6]:

- Electrical conductivity;
- Chloride;
- Sodium;
- Total Dissolved Solids.

[6] This frequency applies to the initial 12-month monitoring period for the establishment of baseline information. The frequencies specified in Table 6 are for ongoing monitoring specifications.

The samples will be collected in accordance with A National Protocol for State of the Environment Groundwater Sampling in New Zealand (Ministry for the Environment, 2006).

3.3.2 Ongoing Monitoring

Ongoing monitoring of groundwater and electrical conductivity levels will be undertaken continuously via individual piezometers in sentinel monitoring bores. Monitoring data will be telemetered to the Council on a twice-daily basis. Sampling at the frequencies specified for the following salinity indicators will take place in the bores listed in **Table 6** below:

- Electrical conductivity;
- Chloride;
- Sodium;
- Total Dissolved Solids.

3.3.3 Schedule of Saline Intrusion Monitoring & Trigger Levels

The monitoring and trigger levels as discussed in this section are provided in **Table 6** below. Data will be collected, processed and managed in accordance with the Council's quality standards and *A National Protocol for State of the Environment Groundwater Sampling in New Zealand* (Ministry for the Environment, 2006).

A two-tier trigger level system (TL1 and TL2) for groundwater levels and electrical conductivity will be set in these bores.

As an initial guide, trigger levels for individual determinants will be established as follows:

- **TL1** – Median concentration from the Stage 1 monitoring period +25%.
- **TL2** – Median concentration from the baseline monitoring period + 50%.

TL1 and TL2 trigger levels for groundwater level and EC in MW4b are specified in **Table 6** below. The setting of TL1 and TL2 trigger levels for the remaining piezometers will be undertaken during the first implementation stage after 12 months of monitoring data has been collected and within 15 months of the date of commencement of these consents, and will replace the interim trigger levels outlined in **Section 2.1.2.1** above. The current trigger levels that are shown in **Table 6** are based on existing data and will be reconfirmed by the Council when the other trigger levels are confirmed.

All sentinel monitoring bores listed in **Error! Reference source not found.**Table 6 will be installed prior to the exercise of the consents.

Table 6: Monitoring Schedule – Saline Intrusion.

Bore Name	Depth (m)	Piezo. No.	Target aquifer	Parameter*	Units	Frequency	Trigger Levels	
							TL1	TL2
MW4	25	a	Unconfined	EC	µS/cm	Continuously	TBC	TBC
				Chloride	mg/L	Quarterly	TBC	TBC
				Sodium	mg/L	Quarterly	TBC	TBC
				TDS	mg/L	Quarterly	TBC	TBC
	92	b	Deep shellbed	EC	µS/cm	Continuously	500	600
				Chloride	mg/L	Quarterly	TBC	TBC

Bore Name	Depth (m)	Piezo. No.	Target aquifer	Parameter*	Units	Frequency	Trigger Levels	
							TL1	TL2
				Sodium	mg/L	Quarterly	TBC	TBC
Waipapakauri Sentinel	TBC	1	Unconfined	EC	µS/cm	Continuous	TBC	TBC
				Chloride	mg/L	Quarterly	TBC	TBC
				Sodium	mg/L	Quarterly	TBC	TBC
				TDS	mg/L	Quarterly	TBC	TBC
	>50 (TBC)	2	Deep shellbed	EC	µS/cm	Continuous	TBC	TBC
				Chloride	mg/L	Quarterly	TBC	TBC
				Sodium	mg/L	Quarterly	TBC	TBC
				TDS	mg/L	Quarterly	TBC	TBC
Ahipara Sentinel	TBC	1	Unconfined	EC	µS/cm	Continuous	TBC	TBC
				Chloride	mg/L	Quarterly	TBC	TBC
				Sodium	mg/L	Quarterly	TBC	TBC
				TDS	mg/L	Quarterly	TBC	TBC
	> 50 TBC	2	Deep Shellbed	EC	µS/cm	Continuous	TBC	TBC
				Chloride	mg/L	Quarterly	TBC	TBC
				Sodium	mg/L	Quarterly	TBC	TBC
				TDS	mg/L	Quarterly	TBC	TBC
Waipapakauri Quality	TBC	1	Deep shellbed	EC	µS/cm	Continuous	TBC	TBC
				Chloride	mg/L	Quarterly	TBC	TBC
				Sodium	mg/L	Quarterly	TBC	TBC
				TDS	mg/L	Quarterly	TBC	TBC

Notes:

* Parameter key: GL = Groundwater Level; EC = Electrical Conductivity; SI = Salinity Indicators; TDS = Total Dissolved Solids.

TBC = to be confirmed within 15 months of the date of commencement of these consents.

3.4 Production Bore Monitoring

3.4.1 Stage 1 Monitoring

During the initial 12-month monitoring period, sampling for the following salinity indicators in the bores listed in **Table 7** below will be undertaken at 6-weekly intervals[7].

3.4.2 Ongoing monitoring

Monthly water level monitoring will be undertaken in the production bores listed in **Table 7**. During the winter months (nominally May to September) this monitoring will provide information to identify any inter-annual variations in aquifer storage which may be anomalous compared to regional trends. During the irrigation season, water level measurements will be undertaken for a minimum of eight hours following the cessation of pumping.

Electrical conductivity ("EC") values will also be measured at monthly intervals from the production bores during the irrigation season to check on any changes in salinity induced by the pumping. Requirements to continue monitoring of groundwater levels and electrical conductivity in individual production bores after Stage 1 will be addressed in the SIMPR (**Section 2.1.1**).

[7] This frequency applies to the initial 12-month monitoring period for the establishment of baseline information. The frequencies specified in Table 6 are for ongoing monitoring specifications.

3.4.3 *Schedule of Production Bore Monitoring & Trigger Levels*

The schedule of monitoring and trigger levels as discussed in this section are provided in **Table 7** below. Data will be collected, processed and managed in accordance with Council's quality standards and *A National Protocol for State of the Environment Groundwater Sampling in New Zealand* (Ministry for the Environment, 2006).

EC trigger levels will be established in the production bores listed in **Table 7** below.

During the initial 12-month monitoring period EC trigger levels will be no greater than:

- **TL1** – Departure exceeding 25% of the EC value from the initial monitoring round
- **TL2** – Departure exceeding 50% of the EC value from the initial monitoring round

Long-term EC triggers for individual production bores will be established following an initial 12-month monitoring period, based on an assessment of observed spatial and temporal variation in EC in baseline and sentinel bore monitoring data, in a manner consistent with EC trigger levels established in the sentinel monitoring bores.

No trigger levels will be established for groundwater levels in the production bores as water levels in the production bores can be impacted by well efficiency and pumping schedules so are not necessarily representative of groundwater levels in the surrounding aquifer.

Table 7: Monitoring & Trigger Levels – Production Bores

Bore Name (NRC ID)	Depth (m)	Target aquifer	Parameter*	Units	Frequency	Trigger Levels	
						TL1	TL2
Sweetwater 1	TBC	Shellbed	GL	mASL	Monthly	NA	NA
			EC	mS/m	Monthly	NA	NA
Sweetwater 2	TBC	Shellbed	GL	mASL	Monthly	NA	NA
			EC	mS/m	Monthly	NA	NA
Sweetwater 3	TBC	Shellbed	GL	mASL	Monthly	NA	NA
			EC	mS/m	Monthly	NA	NA
Sweetwater 4	TBC	Shellbed	GL	mASL	Monthly	NA	NA
			EC	mS/m	Monthly	NA	NA
Sweetwater 5	TBC	Shellbed	GL	mASL	Monthly	NA	NA
			EC	mS/m	Monthly	NA	NA
Sweetwater 6	TBC	Shellbed	GL	mASL	Monthly	NA	NA
			EC	mS/m	Monthly	NA	NA
Sweetwater 7	TBC	Shellbed	GL	mASL	Monthly	NA	NA
			EC	mS/m	Monthly	NA	NA
Sweetwater 8	TBC	Shellbed	GL	mASL	Monthly	NA	NA
			EC	mS/m	Monthly	NA	NA
Sweetwater 9	TBC	Shellbed	GL	mASL	Monthly	NA	NA
			EC	mS/m	Monthly	NA	NA
Sweetwater 10	TBC	Shellbed	GL	mASL	Monthly	NA	NA
			EC	mS/m	Monthly	NA	NA
Sweetwater 11	TBC	Shellbed	GL	mASL	Monthly	NA	NA
			EC	mS/m	Monthly	NA	NA
Sweetwater 12	TBC	Shellbed	GL	mASL	Monthly	NA	NA
			EC	mS/m	Monthly	NA	NA
Sweetwater 13	TBC	Shellbed	GL	mASL	Monthly	NA	NA

Bore Name (NRC ID)	Depth (m)	Target aquifer	Parameter*	Units	Frequency	Trigger Levels	
						TL1	TL2
			EC	mS/m	Monthly	NA	NA
Sweetwater 14	TBC	Shellbed	GL	mASL	Monthly	NA	NA
			EC	mS/m	Monthly	NA	NA
Elbury Holdings Sweetwater-1	TBC	Shellbed	GL	mASL	Monthly	NA	NA
			EC	mS/m	Monthly	NA	NA
Elbury Holdings	TBC	Shellbed	GL	mASL	Monthly	NA	NA
			EC	mS/m	Monthly	NA	NA

Notes:

* Purpose key: GL = Groundwater Level; EC = Electrical Conductivity.

All trigger limit values in this Table to be confirmed by Council.

3.5 Unmapped Natural Wetlands

Natural wetland means a wetland (as defined in the RMA) that is not:

(a) a wetland constructed by artificial means (unless it was constructed to offset impacts on, or restore, an existing or former natural wetland); or

(b) a geothermal wetland; or

(c) any area of improved pasture that, at the commencement date, is dominated by (that is more than 50% of) exotic pasture species and is subject to temporary rain derived water pooling.

Some wetlands in this area have been mapped from prior studies and surveys[8], however, there are sites that may be classified as natural wetland that are currently unmapped.

In cases of uncertainty or dispute about the existence or extent of a natural inland wetland, the National Policy Statement for Freshwater Management 2020 directs that regard must be had to the Wetland Delineation Protocols[9] as a robust method for delineating wetlands based on the United States delineation system. This protocol uses three criteria for identifying and delineating wetlands: vegetation, soils, and hydrology. The vegetation and soils components have been adapted to New Zealand conditions and the hydrological component is currently under development.

3.5.1 Unmapped Wetland Delineation Procedure

The Wetland Delineation Procedure is deemed appropriate for identifying whether three Areas of Interest (AoI) (**Appendix A**) contain natural inland wetland areas in the Ahipara and Sweetwater sub-aquifers. The Wetland Delineation Procedure is therefore replicated in **Table 8** below.

Procedures which were completed prior to the commencement of the consent are referenced as having been completed and no further action is required against those particular procedures.

For all other procedures which were not completed prior to commencement of the consents, **Table 8** contains the steps that shall be taken to complete that procedure within this adaptive management regime.

[8] Northland Regional Council top wetland study, Protected Natural Areas Programme survey reports.

[9] https://www.mfe.govt.nz/sites/default/files/media/Fresh%20water/wetland-delineation-protocols.pdf

Table 8: Unmapped wetland delineation procedure.

No.	Delineation Procedure	Completed Prior to Commencement of Consents (Yes/No)	Comment
1.	Determine the project area (the putative wetland).	Yes	See Areas of Interest map attached (**Appendix A**).
2.	Decide if 'normal circumstances' are present, ie, typical climatic/hydrologic conditions, and no recent disturbances or modifications to the project area. If yes, proceed to step 3. If no, proceed to step 7.	Yes	Area D is a back-beach area behind a foredune to Te Onerohe a Tohe. Area E is farmland which according to historic aerial imagery has been in this state for some time. Parts of Area Q are identified as swamp in Topo250/50 maps and have not been altered according to aerial imagery. Historical aerial imagery shows that the orchard within Area Q was developed between December 2002 to December 2003. ~~Area D is a back-beach area behind a foredune to Te Onerohe a Tohe and is in a state of 'normal circumstance'.~~  ~~Area E is on farmland but has been in this state for some period of time and is therefore deemed to be in a state of 'normal circumstance'.~~

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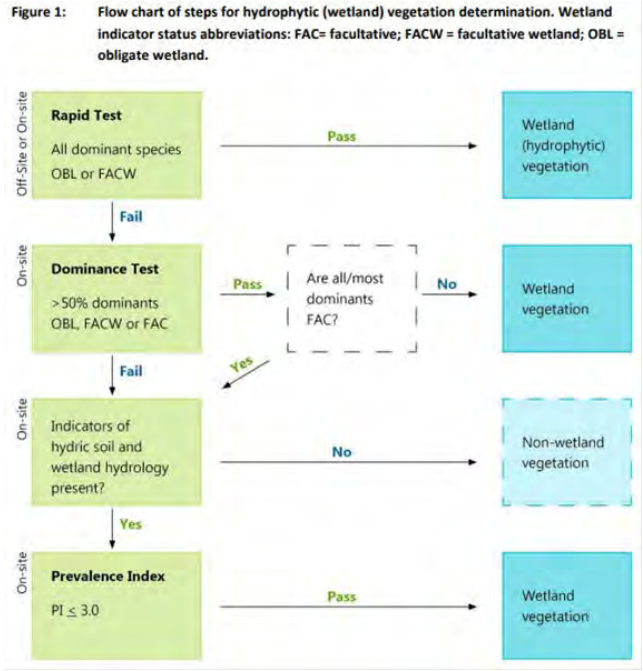
Commented [ML2]: Feedback on the necessity of oblique imagery was inconclusive. It is therefore recommended that they are removed and that imagery collected at the time of survey be relied upon. Subsequent minor amendments were necessary as a result of the removal of the imagery.

No.	Delineation Procedure	Completed Prior to Commencement of Consents (Yes/No)	Comment
			  ~~Area Q~~
3.	Identify and map the major vegetation types using aerial photographs, maps, contours, inventory reports, other data, and, if necessary, on-site field verification.	No	Within one month of commencement of the consents, the Council, in consultation with the Director-General of Conservation and the Consent Holders, will commission a suitably qualified and experienced ecologist to undertake the desktop and field analysis established under Procedures ~~4, 5~~
4.	**Off-site methods** to identify wetland presence and sketch approximate boundaries. Wetlands may be confirmed without an on-site inspection depending	No	

Commented [ML3]: Add oblique imagery

No.	Delineation Procedure	Completed Prior to Commencement of Consents (Yes/No)	Comment
	on: i. the amount and quality of data (vegetation, soils, hydrology, topography) ii. wetland ecological expertise to interpret the data.		~~and~~3 ~~-~~ 6. A Wetland Delineation Report (WDR) containing details of the assessment approach and outcomes shall be prepared by the same ecologist commissioned to undertake the desktop and field analysis. The WDR shall be circulated to the Consent Holders listed in Table 1 and the Director-General of Conservation a minimum of 40 working days prior to the anticipated commencement of the subsequent irrigation season. The Consent Holders and Director-General of Conservation have 20 working days to provide a response to the Council on the conclusions and recommendations of the WDR. ~~If no response is received from a party within the stated timeframe, then Council will consider that the party has no concerns with the conclusions of the WDR.~~ If any party does not agree with the conclusions and recommendations of the WDR, then a report by a suitably qualified hydrogeologist and/or an ecologist, both with experience and knowledge of the locality, detailing the reasons for the disagreement shall be provided to Council within 30 working days from the date that the assessment was sent to the party. Council has the final authority over the delineation of a natural wetland and will provide a report to the Consent Holders and the Director-General of Conservation detailing the reasons for its decision, including the identification and discussion of areas of agreement and disagreement within ~~5~~ 10 working days of receipt of the disagreeing parties report.
5.	**On-site methods** to delineate wetland presence and accurate boundaries: i. for small areas (≤2 ha), establish a representative plot in each major vegetation type and record the plot vegetation in three strata: tree, sapling/shrub, herb ii. for larger areas, establish representative plots along transects (as per Clarkson 2014) and sample the vegetation in three strata: tree, sapling/shrub, herb.	No	
6.	**Hydrophytic vegetation determination**. Based on the data gathered, conduct a hydrophytic vegetation determination using the following flow chart (figure 1).	No	

No.	Delineation Procedure	Completed Prior to Commencement of Consents (Yes/No)	Comment
	Figure 1: Flow chart of steps for hydrophytic (wetland) vegetation determination. Wetland indicator status abbreviations: FAC= facultative; FACW = facultative wetland; OBL = obligate wetland.  Wetland indicator status ratings for species are in Clarkson et al. 2013 and subsequent updates.		

3.5.2 Repeat Survey

For sites delineated as natural wetland from the procedure set out at **Section 3.5.1**, the Council shall commission, in consultation with the Director-General of Conservation and the Consent Holders, a suitably qualified and experienced ecologist to undertake wetland vegetation survey and subsequent reporting within five (5) years from the original date of survey at around the same time of year as the original delineation survey. The repeat surveys must be designed in a way that enables ecologically meaningful and statistically robust scoring of the wetland condition in order to analyse changes to the wetland's condition resulting from the groundwater abstraction.

This repeat survey must be completed once after the initial delineation Wetland Delineation Procedure (to provide an accurate baseline) but thereafter will only take place every five (5) years where technical assessment carried out according to **Section 2.1.1** confirms that there is an adverse decline in wetland levels resulting from groundwater abstraction.

A decline in wetland water level attributable to groundwater abstraction will be determined from the monitoring and analysis of temporal groundwater level variations in the sentinel bores set out in **Table 6**.

3.6 Environmental Monitoring Report

At the end of each irrigation season, the Council will commission the preparation of an Annual Environmental Monitoring Report (AEMR) by ~~a suitably qualified hydrogeologist~~the nominated technical expert~~. The Council will endeavour to ensure that, if possible, both the hydrogeologist and the ecologist have experience and knowledge of the locality~~. A copy of the AEMR will be provided to the Consent Holders and the Director General of Conservation by 31 July each year.

The purposes of the AEMR are;

- To provide a summary of the monitoring results for the previous year, including trends, against Objective 1 of the GMCP;
- To assess the monitoring undertaken over the previous year against the standards set out in Objective 1;
- To Identify any changes/amendments to monitoring locations/parameters/frequencies that could be incorporated in future SIMPRs;
- To report on any issues apparent with the monitoring; and
- To identify any improvement that could be made with respect to the monitoring.

The AEMR will also contain an evaluation of whether the observed effects of the groundwater takes are consistent with the predictions of environmental response contained in the AAGWM Report.

The AEMR's primary function is to provide a summary of the monitoring information from the prior year's monitoring. The AEMR may contain recommendations for changes to monitoring but the SIMPR is the point at which these recommendations will be decided on by Council.

4. CONTINGENCY PLAN

Exercise of the consents is subject to compliance with Objective 1 of this GMCP. It is however noted that the exercise of AUT.020995.01.04 is not subject to the measures set out in this Contingency Plan up until the point at which their annual take exceeds 2,317,000 m^3/year.

As described in **Section 2**, a trigger level system is used to define environmental criteria that signal changes may be occurring outside of what is normal (TL1) or at a point where remedial action is required to avoid Objective 1 not being met (TL2).

This section details the actions that will be undertaken where trigger levels are exceeded under any of the monitoring suites discussed in **Sections 2.1.2.1, 3.3,** and **3.4**.

Where a trigger level is exceeded the Council will commission a Groundwater Trigger Exceedance Report (GTER). The objective of the GTER is to establish the cause of a trigger level exceedance and to recommend a programme of action to end the exceedance.

A GTER shall include:

- Review of the monitoring results collected established why the exceedance has occurred;
- Set out requirements for increased monitoring of the exceedance;
- Set out environmental monitoring to detect effects of the exceedance, such as changes in extent of rivers, natural wetlands, springs or dune lakes;
- Update the report on a regular basis as more data becomes available; and
- Recommend actions to end the trigger exceedance, which could include;
    - A staged reinstatement of abstraction levels to pre-exceedance levels,
    - Reduced levels of abstraction for all or some of the consent holders covered by the GMCP, or
    - Suspension of abstraction by all or some of the consent holders covered by the GMCP.

4.1 Exceedance of TL1

In the event of a TL1 exceedance, which may represent declining groundwater levels or rising salinity indicators, the following actions must be undertaken:

(a) The Council will notify the Consent Holders in writing within ~~two (2) working days~~24 hours of when the TL1 exceedance became known.

Commented [SK4]: Changed to reflect that information will be telemetered and a swift response should be able to be initiated

(b) If the exceedance is of a salinity indicator in the bores listed in **Table 6**, then sampling of the monitoring bore(s) in exceedance shall immediately be upgraded to a weekly frequency for four (4) weeks following the first exceedance of the TL1. Weekly monitoring shall continue until sample results are consistently below TL1 values for a period of four (4) weeks or as directed by Council.

(c) If after four (4) weeks following the first exceedance of the TL1, the initiation of seawater intrusion and/or water level decline cannot be discounted to the satisfaction of the Council, then a GTER by a ~~suitably qualified hydrogeologist~~the nominated technical expert (and ecologist if the exceedance concerns a surface water body) shall be commissioned by the Council.

(d) The GTER shall assess the significance of the exceedance against the requirements of Objective 1 of the GMCP. The GTER shall assess why trigger levels have been breached, identify the pumping bores in the area(s) of effect and will review all of the available data collected in the affected area(s), in particular the data collected pursuant to this GMCP.

4.2 Exceedance of TL2

In the event of a TL2 exceedance, which represents a significant departure from normal groundwater conditions, with either continuously declining groundwater levels or rising salinity indicators:

(a). The Council will ~~immediately~~ inform the Consent Holders in writing within 24 hours of ~~upon~~ a TL2 exceedance becoming known.

(b). All Consent Holders must reduce their abstraction to 50% of the current average daily quantity, as calculated using the previous month's water use records required to be kept in accordance with the conditions of its groundwater take consent. If the exceedance occurs within one month of a Consent Holder first taking water for irrigation purposes within an irrigation season, then the average shall be calculated using the water use records for this period only. The Council will advise the Consent Holder in writing of ~~any breach and~~ the required reduction in the daily water take volume.

(c). A GTER by ~~a suitably qualified hydrogeologist~~the nominated technical expert (and ecologist if the exceedance concerns dune lakes or natural wetlands) shall be commissioned by Council. The GTER shall assess why the TL2 has been breached, identify the pumping bores in the area of effect, and include a review of all available data collected for the affected area(s), in particular, the data collected under this GMCP.

(d). Once (b) above has been complied with, the Consent Holder may apply to the Council's Compliance Manager for an alternative reduction in its daily water take volume. The Council's approval of an alternative reduction value will only be given if it is satisfied that relevant TL2 values will not be exceeded. The Council will use the GTER to inform its decision on any alternative reduction value for a Consent Holder.

(e). If the TL2 exceedance is in a bore(s) that is/are not continuously monitored, then weekly groundwater level measurements and/or sampling of saline intrusion (depending on which trigger level is breached) in all bores where TL2 trigger levels are breached will commence within one week of the TL2 trigger level exceedance. Monitoring will continue until such time as:

- Three consecutive samples in an individual monitoring bore are below all TL2 thresholds established for that piezometer; or
- As directed by the Council.

(f). If salinity indicators continue to increase or groundwater levels continue to decline after 21 days following the implementation of (b), then the Consent Holder's abstraction must be reduced to 25% of the current average daily quantity, as calculated for (b) above. The Council will advise the Consent Holder in writing of this further reduction and the required reduction in the daily water take volume.

(g). If (f) is implemented, then the Council will commission a review and update of the GTER report by ~~a suitably qualified hydrogeologist~~the nominated technical expert (and ecologist if the exceedance concerns a dune lake or natural wetland) with a longer-term programme of recommended responses incorporating observed responses to interim pumping rate reductions. The updated GTER will include a specific programme (including timeframes) of

actions which would achieve compliance with Objective 1 of this GMCP. The actions may include, but not be limited to incremental reductions in the daily quantity of groundwater taken as a percentage of the allowable daily pumped volume, as well as testing of domestic/stock water supplies in bores that are efficiently utilising the aquifer and are potentially impacted by saline intrusion, and if necessary, the provision of temporary water supplies to any affected parties (excluding any of the Consent Holders) in the event that Chloride concentrations exceed 250 mg/L (being the guideline value for taste prescribed in New Zealand Drinking Water Standards for New Zealand 2005 (Revised 2008)). The GTER will also identify a methodology which the Council will utilise to increase abstraction back to the volumes applicable to the relevant stage of taking (see **Section 2.1**), where this can be done such that Objective 1 of this GMCP will be met. If it is not possible to increase abstraction back to the relevant stage of taking, then the GTER will identify a methodology to increase abstraction to a lesser volume such that Objective 1 of the GMCP will be met.

(h). Actions arising from the GTER shall continue as long as the issue continues.

(i). Implement additional remedial measures as directed by Council, including the suspension of taking.

5. REFERENCES

Clarkson, B.R., Sorrell, B.K., Reeves, P.N., Champion, P.O., Partridge, T.R., Clarkson, B.D. (2003). Handbook for monitoring wetland condition (Revised October 2004).

Retrieved from

https://www.landcareresearch.co.nz/publications/researchpubslhandbook_wetland_condition.pdf

Ministry for the Environment. (2006). *A National Protocol for State of the Environment Groundwater Sampling in New Zealand*. Retrieved from http://www.mfe.govt.nz/sites/default/files/national-protocol-groundwater-dec06-updated.pdf

APPENDIX A – Areas of Interest for Wetland Delineation

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Area of Interest - Overview
Land Cover and Wetland Risk - Excluding High Producing Grassland

N

WILLIAMSON WATER & LAND ADVISORY

Houhora
Lamb
Waterfront
Waterfront
NRC Waterfront Rd Piezo
Houhora Heads
Burnage
Browne
NRC Forest Piezo
N
M
Wetland
MWWUG Kaimaumau Wetland North
Motutangi
NRC Hukatere Piezo
MWWUG Kaimaumau Wetland South
Honeytree
Kaimaumau Settlement
K
Kaimaumau
Shine
P
J
Paparore
Valic-2
Valic-3
NRC Paparore Rd Piezo
H
Valic-1
NRC Ogle Drive
G
Q
NRC Lake Heather No.2
NRC Lake Heather No.3
Lake
NRC Lake Heather No.1
Waipapakauri
Sweetwater MW1
MW1a
MW2a
Sweetwater MW2
D
MW4a
MW6
E
Sweetwater MW5
MW5a
Ahipara
AUPOURI FOREST

Legend

- Shallow Monitoring Bore
- Deep Monitoring Bore
- Production Bore
- Wetlands (FENZ/NRC/LUCAS/LCDB5)
- Coastline
- Area of Interest

Land cover
- High Producing Exotic Grassland

Risk
- High
- Moderate

Data Provenance
Freshwater Ecosystems geo-database (FENZ)
Known Wetlands (Northland Regional Council)
Wetlands (LUCAS NZ Land Use Map)
NZ Top 50 Gridless Map (Land Information New Zealand)
1m Lidar Survey Dataset (Northland Regional Council)
Land cover database-5.0 (IRIS)

0 5 10 km

Land Cover and Wetland Risk-Excluding High Producing Grassland - Area D

N

WILLIAMSON
WATER & LAND ADVISORY

D

Legend

- Shallow Monitoring Bore
- Deep Monitoring Bore
- Lake
- Wetlands (FENZ/NRC/LUCAS/LCDB5)
- Coastline
- Area of Interest

Land cover

- High Producing Exotic Grassland

Risk

- High
- Moderate

Data Provenance
Freshwater Ecosystems geo-database (FENZ)
Known Wetlands (Northland Regional Council)
Wetlands (LUCAS NZ Land Use Map)
NZ Top 50 Gridless Map (Land Information New Zealand)
1m Lidar Survey Dataset (Northland Regional Council)
Land cover database-5.0 (IRIS)

0 0.5 1 km

Land Cover and Wetland Risk-Excluding High Producing Grassland - Area E

N

WILLIAMSON
WATER & LAND ADVISORY

E

Legend

- State Highway
- River / Stream
- Lake
- Wetlands (FENZ/NRC/LUCAS/LCDB5)
- Coastline
- Area of Interest

Land cover

- High Producing Exotic Grassland

Risk

- High
- Moderate

Data Provenance
Freshwater Ecosystems geo-database (FENZ)
Known Wetlands (Northland Regional Council)
Wetlands (LUCAS NZ Land Use Map)
NZ Top 50 Gridless Map (Land Information New Zealand)
1m Lidar Survey Dataset (Northland Regional Council)
Land cover database-5.0 (IRIS)

0 0.5 1 km

Land Cover and Wetland Risk-Excluding High Producing Grassland - Area G

N

H

G

WILLIAMSON
WATER & LAND ADVISORY

Legend

- State Highway
- River / Stream
- Wetlands (FENZ/NRC/LUCAS/LCDB5)
- Coastline
- Area of Interest

Land cover

- High Producing Exotic Grassland

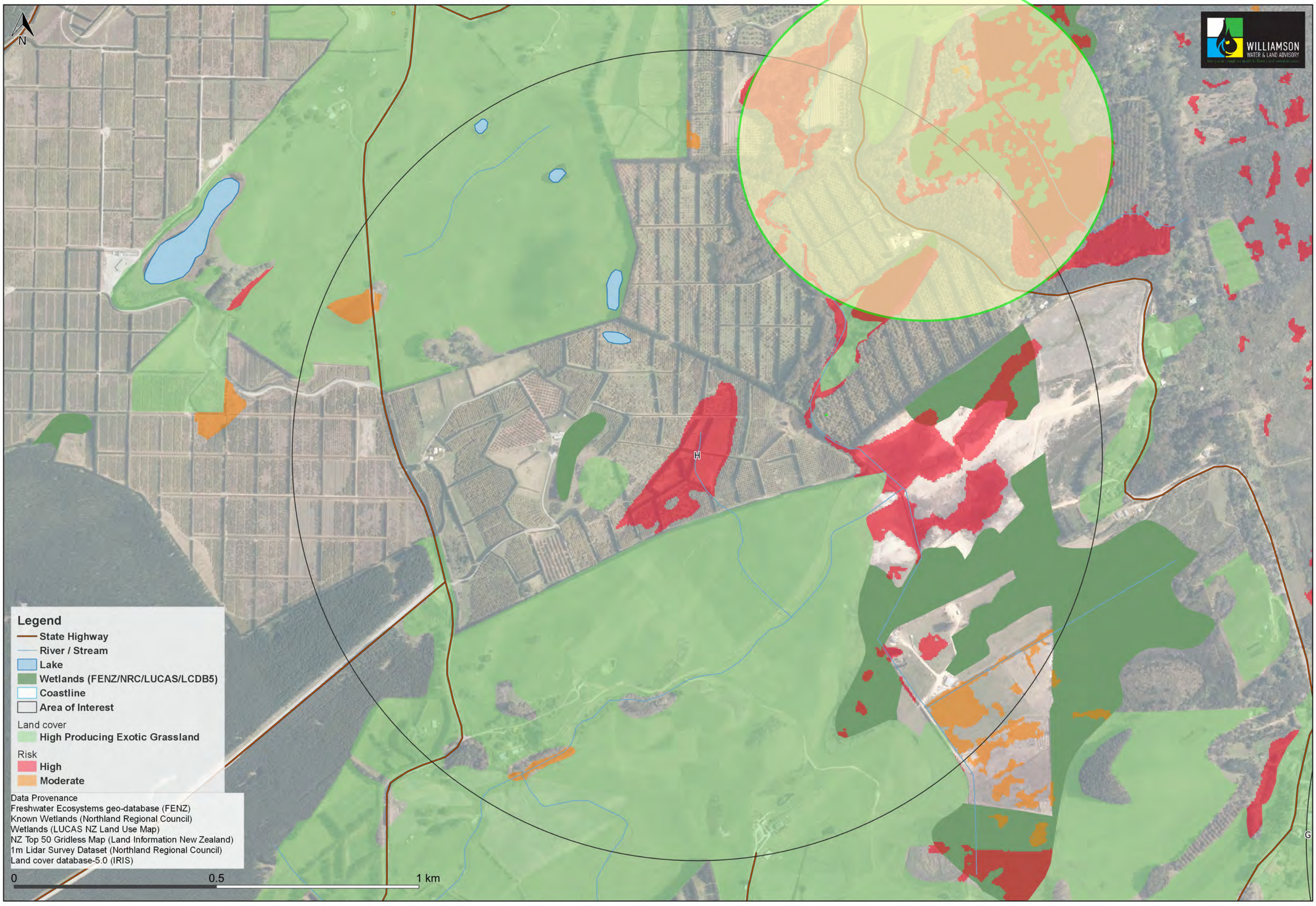
Risk

- High
- Moderate

Data Provenance
Freshwater Ecosystems geo-database (FENZ)
Known Wetlands (Northland Regional Council)
Wetlands (LUCAS NZ Land Use Map)
NZ Top 50 Gridless Map (Land Information New Zealand)
1m Lidar Survey Dataset (Northland Regional Council)
Land cover database-5.0 (IRIS)

0 0.5 1 km

Land Cover and Wetland Risk-Excluding High Producing Grassland - Area H



Land Cover and Wetland Risk-Excluding High Producing Grassland - Area J

N

K

P

J

I

WILLIAMSON
WATER & LAND ADVISORY

Legend

- Production Bore
- Deep Monitoring Bore
- State Highway
- River / Stream
- Lake
- Wetlands (FENZ/NRC/LUCAS/LCDB5)
- Coastline
- Removed Area of Interest
- Area of Interest

Land cover

- High Producing Exotic Grassland

Risk

- High
- Moderate

Data Provenance
Freshwater Ecosystems geo-database (FENZ)
Known Wetlands (Northland Regional Council)
Wetlands (LUCAS NZ Land Use Map)
NZ Top 50 Gridless Map (Land Information New Zealand)
1m Lidar Survey Dataset (Northland Regional Council)
Land cover database-5.0 (IRIS)

0 0.5 1 km

Land Cover and Wetland Risk-Excluding High Producing Grassland - Area K

N

WILLIAMSON
WATER & LAND ADVISORY

K

P

J

Legend

- Shallow Monitoring Bore
- Production Bore
- State Highway
- River / Stream
- Wetlands (FENZ/NRC/LUCAS/LCDB5)
- Coastline
- Area of Interest

Land cover

- High Producing Exotic Grassland

Risk

- High
- Moderate

Data Provenance
Freshwater Ecosystems geo-database (FENZ)
Known Wetlands (Northland Regional Council)
Wetlands (LUCAS NZ Land Use Map)
NZ Top 50 Gridless Map (Land Information New Zealand)
1m Lidar Survey Dataset (Northland Regional Council)
Land cover database-5.0 (IRIS)

0 0.5 1 km

Land Cover and Wetland Risk-Excluding High Producing Grassland - Area M

N

WILLIAMSON
WATER & LAND ADVISORY

M

L

Legend

- Production Bore
- State Highway
- River / Stream
- Lake
- Wetlands (FENZ/NRC/LUCAS/LCDB5)
- Coastline
- Removed Area of Interest
- Area of Interest

Land cover

- High Producing Exotic Grassland

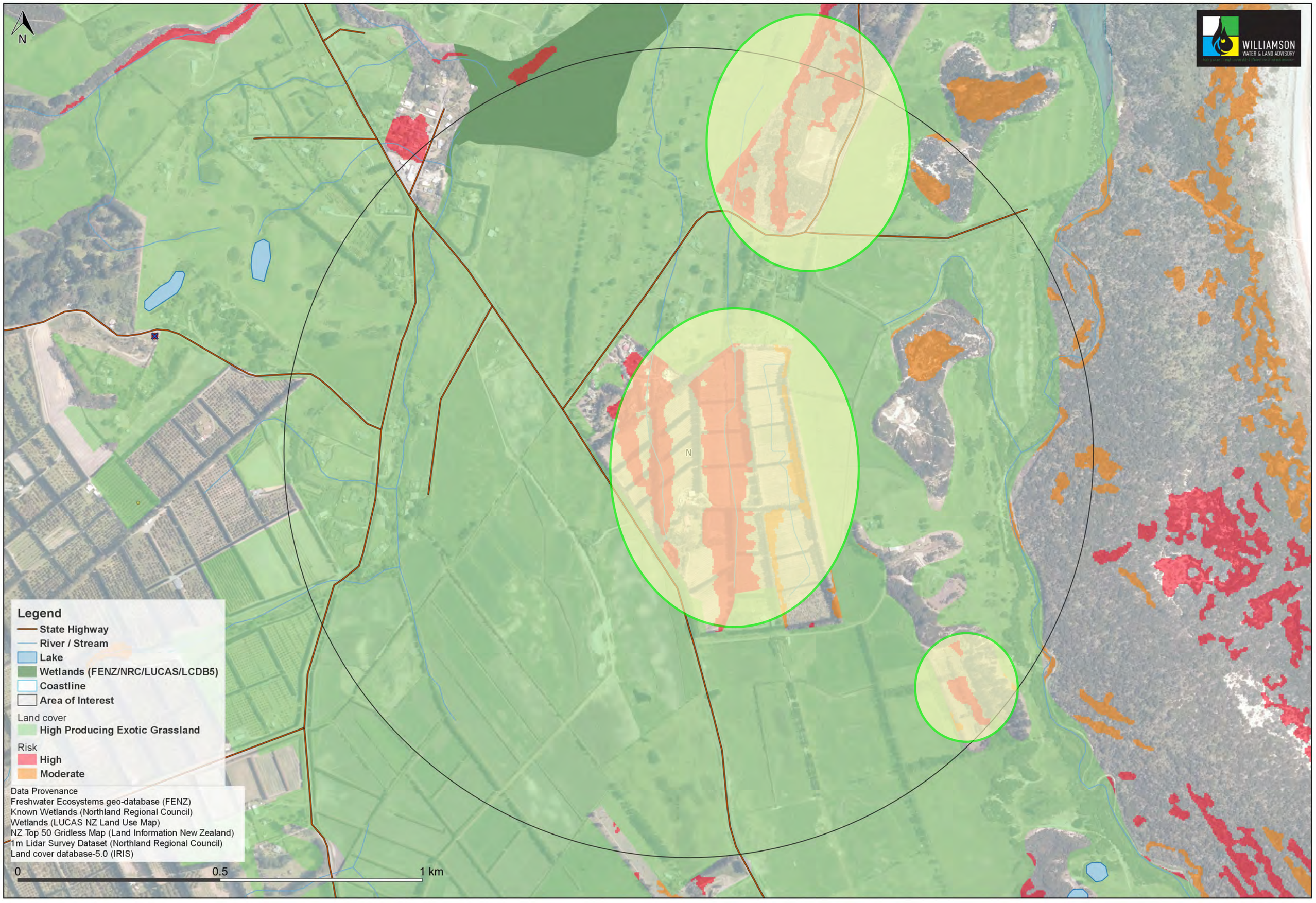
Risk

- High
- Moderate

Data Provenance
Freshwater Ecosystems geo-database (FENZ)
Known Wetlands (Northland Regional Council)
Wetlands (LUCAS NZ Land Use Map)
NZ Top 50 Gridless Map (Land Information New Zealand)
1m Lidar Survey Dataset (Northland Regional Council)
Land cover database-5.0 (IRIS)

0 0.5 1 km

Land Cover and Wetland Risk-Excluding High Producing Grassland - Area N



Land Cover and Wetland Risk-Excluding High Producing Grassland - Area P

N

K

P

J

I

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Legend

- Production Bore
- State Highway
- River / Stream
- Lake
- Wetlands (FENZ/NRC/LUCAS/LCDB5)
- Coastline
- Removed Area of Interest
- Area of Interest

Land cover

- High Producing Exotic Grassland

Risk

- High
- Moderate

Data Provenance
Freshwater Ecosystems geo-database (FENZ)
Known Wetlands (Northland Regional Council)
Wetlands (LUCAS NZ Land Use Map)
NZ Top 50 Gridless Map (Land Information New Zealand)
1m Lidar Survey Dataset (Northland Regional Council)
Land cover database-5.0 (IRIS)

0 0.5 1 km

Land Cover and Wetland Risk-Excluding High Producing Grassland - Area Q

N

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F

Q

Legend

- State Highway
- River / Stream
- Lake
- Wetlands (FENZ/NRC/LUCAS/LCDB5)
- Coastline
- Removed Area of Interest
- Area of Interest

Land cover
- High Producing Exotic Grassland

Risk
- High
- Moderate

Data Provenance
Freshwater Ecosystems geo-database (FENZ)
Known Wetlands (Northland Regional Council)
Wetlands (LUCAS NZ Land Use Map)
NZ Top 50 Gridless Map (Land Information New Zealand)
1m Lidar Survey Dataset (Northland Regional Council)
Land cover database-5.0 (IRIS)

0 0.5 1 km

WILLIAMSON
WATER & LAND ADVISORY

Martell Letica <martell.letica@wwla.kiwi>

Ordering avocado trees

3 messages

Martell Letica <martell.letica@wwla.kiwi> 2 June 2021 at 13:04
To: Ian Broadhurst <ianavos@outlook.com>

Kia ora Ian

Quick question for you - with the staged implementation of take volumes under the GMCP, what does the timing of ordering and planting trees within the staged implementation look like in practise and what would it be under an ideal scenario?

For example is it;
Ideal? Stage 1: Start taking in September finish in April; Order trees in April, plant in July on expectation that will have Stage 2 allocation available?
or
In practice ? Stage 1: Start taking in September finish in April; Order trees in April, plant next April as unsure if Stage 2 available?

Just trying to add some practical advice in our right of reply of how staged implementation works for how orders are managed and how timing of planting takes place!

Cheers

Martell Letica | Principal Planner

Williamson Water & Land Advisory

Phone | +64 20 4135 0589
Email | Martell.Letica@wwla.kiwi
Web | https://www.wwla.kiwi/

Ian Broadhurst <ianavos@outlook.com> 4 June 2021 at 12:57
To: Martell Letica <martell.letica@wwla.kiwi>

Kia Ora Martell,

Good to hear from you, hope you are well!

In terms of best practice it is best to start planting early November(or when you happy there will be no frost events) and if possible be finished by late December, this will give you the best results , in reality on the big developments we generally are still planting in March.

Trees are very hard to source and depends on the root stocks that are required as well, but rule of thumb is if we want to be sure of supply then in reality the trees orders need to be confirmed and a deposit paid 18 months before planting. For example I had a meeting with Lynwood today and asked if they had trees available for planting this spring, answer was no and nor does Riversun so first available trees would be available spring 2022 if we placed an order now.

Hope this helps.

Cheers Ian

[Quoted text hidden]

Martell Letica <martell.letica@wwla.kiwi> 9 June 2021 at 14:45
To: Ian Broadhurst <ianavos@outlook.com>

Nga mihi nui Ian!! Just what I was after.

Martell Letica | Principal Planner

Williamson Water & Land Advisory

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[Quoted text hidden]

Consultation 15 October 2020 (Te Manawa o Ngāti Kuri offices)

Present: Tracey Ashby, Wayne Petera, Mei Petera, Martell Letica (Williamson Water & Land Advisory Ltd, on behalf of the applicants), Jon Williamson, Kerry Petera

The following agenda items were discussed:

- Presentation of hydrogeology work
- The adaptive management regime proposed
- National Policy Statement for Freshwater Management 2020
- National Environmental Standards for Freshwater Management Regulations 2020
- Mana whakahono a rohe provisions of the RMA

Main outcomes from these discussions:

- That stygofauna should be added to management plans as an adverse effect that needs to be part of the management plan. They have a natural filtration effect and maintain water quality. We also require more research about what is found in the aquifer and how this ecosystem works. We need to know what is there that needs protection.

- Whakapapa was discussed as a cultural connection to water and all that is part of this eco system and that our whakapapa needs to be protected and acknowledged. If there is limited knowledge around what this is or looks like, then further consultation needs to take place in order for this to be established. The current timeframe is too short, we have been consulted after the fact and we feel our concerns are not being addressed with the opportunity to make necessary changes to the current resourcing process. The current consents are basically signed off and going to happen - our remaining opportunity looks to be in being part of the monitoring process.

- Possibility of the marae asking for the opportunity to have a designated person that is part of the monitoring group was discussed and that this person is resourced by the council. Or a second option would be to seek approval for Waiora Marae to be directly updated about monitoring and data findings and decisions made on a regular and timely basis. That they would also be able to have an opportunity to provide feedback on this information.

- Martell to send to Waiora Marae GMCP and examples of adaptive management plans.

- Waiora Marae trustees are to discuss these matters further as a committee and with the Taumata Kaumatua Kuia o Ngāti Kuri and to feedback their final comments regarding this consultation in the next couple of weeks.

3.11.2020: Waiora Marae's reply following the consultation discussion in regard to the 24 applications by the Aupouri Aquifer Water User Group (REQ.596300):

He taonga te reo, he taonga hoki ngā tikanga.

Kia tātou Te Mana o Te Wai, Kia tātou hoki Te Mana o Te Tai Ao?

Tui Tui Tui Tuia.

At the Taumata Kaumatua Kuia O Ngāti Kuri hui held on 19 October 2020, the following resolutions were passed and we, the trustees of Waiora Marae, support the stance that is shared.

Te Mana o Te Wai/ Te Mana o Te Tai Ao

At the Taumata Kaumatua Kuia o Ngati Kuri hui convened at Te Manawa 19 October 2020 the following resolution was unanimously agreed upon:

> "That a claim be lodged with urgency to the Waitangi Tribunal by the Ngati Kuri Trust Board for and on behalf of the Ngati Kuri people in relation to Te Mana o Te Te Wai/Te Mana o Te Tai Ao on the "Te Hiku o Te Ika (Aupouri) Peninsular".

In respect to the matters raised regarding Te Mana o Te Wai/Te Mana o Te Tai Ao the Taumata Kaumatua Kuia:

> "Support a moratorium on further resource consents being accepted or issued by Councils in relation to the "Te Hiku o Te Ika (Aupouri aquifer)" noting that resource consent processes and procedures severely impact on the cultural, social, environmental, and economic wellbeing of Ngati Kuri whanau, hapu, and Iwi."

To ensure transparency, it is requested that any reporting back on matters relating to Te Mana o Te Wai/ Te Mana o Te Tai Ao and with particular regard to the lodging an application of Urgency with the Waitangi Tribunal be directed to the Taumatua Kaumatua Kuia o Ngati Kuri and both the Wai Ora and Te Hiku o Te Ika Marae.

Ruia Ruia

Opea Opea

Whiria Whiria

Tahia Tahia

Ngā mihi
Tracey Ashby
On behalf of the Waiora Marae Trustees

WILLIAMSON
WATER & LAND ADVISORY

Martell Letica <martell.letica@wwla.kiwi>

Follow up letter from consultation

Martell Letica <martell.letica@wwla.kiwi> 21 June 2021 at 09:16
To: Martell Letica <martell.letica@wwla.kiwi>

Martell Letica | Principal Planner

Williamson Water & Land Advisory

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Email | Martell.Letica@wwla.kiwi
Web | https://www.wwla.kiwi/

------- Forwarded message -------
From: **Vivienne Scott** <viv@teaupouri.iwi.nz>
Date: Mon, 16 Nov 2020 at 13:02
Subject: RE: Follow up letter from consultation
To: Martell Letica <martell.letica@wwla.kiwi>
Cc: Peter-Lucas Jones <peterlucas@teaupouri.iwi.nz>, Rhonda Kite ONZM <rhonda@teaupouri.iwi.nz>

Kia ora Martell

Answering your original query:

- We acknowledge their perspective around whakapapa & te mana o te wai, but suggests whether all of this is necessary or whether the necessity is just to continue on going conversations about how & what this company is doing with the water
- The biggest concern is that the water is going to run out, although fauna & flora issues are important, the points of being able to pipe water to the community & horticulture purposes - creating jobs for our people take priority
- Suggest a kaitiakitanga plan, not just about one fauna but all flora & fauna -
    - as a part of this plan we take into account decisions regarding/using our principles
        - example: does this decision reflect & express mana motuhake? Manaakitanga?

Please let me know if you need anything else.

Kia pai to noho hei oranga mau,

Viv

Book an online meeting with me HERE

From: Martell Letica <martell.letica@wwla.kiwi>
Sent: Thursday, 5 November 2020 9:57 AM
To: Vivienne Scott <viv@teaupouri.iwi.nz>
Cc: Peter-Lucas Jones <peterlucas@teaupouri.iwi.nz>; Rhonda Kite ONZM <rhonda@teaupouri.iwi.nz>
Subject: Re: Follow up letter from consultation

Morena Viv

No rush on the response as we are still trying to work through DOC's issues with them.

Nga mihi,

Martell Letica | Principal Planner

Williamson Water & Land Advisory

Phone | +64 20 4135 0589
Email | Martell.Letica@wwla.kiwi
Web | https://www.wwla.kiwi/

On Wed, 4 Nov 2020 at 16:11, Vivienne Scott <viv@teaupouri.iwi.nz> wrote:

> Many thanks Martell.
>
> I will get back to you soon. When do you need our response by?
>
> Nga mihi nui,
>
> Viv
>
> **Book an online meeting with me HERE**
>
> **From:** Martell Letica <martell.letica@wwla.kiwi>
> **Sent:** Wednesday, 4 November 2020 3:36 PM
> **To:** Vivienne Scott <viv@teaupouri.iwi.nz>
> **Cc:** Peter-Lucas Jones <peterlucas@teaupouri.iwi.nz>; Rhonda Kite ONZM <rhonda@teaupouri.iwi.nz>
> **Subject:** Fwd: Follow up letter from consultation
>
> Kia ora Viv,
>
> Just forwarding the letter from Waiora marae to the Commissioners.
>
> The consenting process cannot give effect to the moratorium as requested but I think it would be worthwhile developing some of the points we discussed with them (page 1 of the letter).

What are your thoughts on the stygofauna monitoring? From a biophysical perspective, the effect on stygofauna from the takes is managed through the adaptive management regime as known effects of abstraction on stygofauna are associated with water level and quality - all of which are monitored and have triggers. However, from a cultural perspective, it seems to be important to Waiora marae to find out what stygofauna are present and the effect of the abstraction on them. This also seemed to be a matter better placed with the Te Hiku Water Study?

If you are able to provide some commentary on their requests at page 1 of the letter would be awesome (i.e., are they reasonable to Te Aupouri?).

Nga mihi,

Martell Letica | Principal Planner

Williamson Water & Land Advisory

Phone | +64 20 4135 0589
Email | Martell.Letica@wwla.kiwi
Web | https://www.wwla.kiwi/

-------- Forwarded message --------
From: **Waiora Marae** <waioramarae@gmail.com>
Date: Wed, 4 Nov 2020 at 11:54
Subject: Follow up letter from consultation
To: Alissa Sluys <alissas@nrc.govt.nz>
Cc: Martell Letica <martell.letica@wwla.kiwi>

Kia ora Alissa

Please find attached the reply letter from Waiora Marae at the conclusion of the consultation hui as directed by the commissioners at the hearing (24 applications by the Aupouri Aquifer Water User group (REQ.596300).

I am assuming that this letter will be shared with the hearing commissioners.

Can we also ask to have direct feedback as to the outcome after receipt of this letter.

Nga mihi

Tracey Ashby

Vivienne Scott
Director of Te Aupouri Commercial Development Company and
Te Aupōuri Fisheries Management Limited
Te Runanga Nui O Te Aupouri

p: (+64) 9 409 8006
m: 0278070718

e: viv@teaupouri.iwi.nz
w: teaupouri.iwi.nz
a: 24 Te Ahu Road, Kaitaia 0484

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Vivienne Scott
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Waiharara Hall 18th September 2020.

NAME	NUMBER
Tom Male	021 0222 3732
Kathy Valadares	021 066 7723
Duane Wedding	4098590.
Mandy Dowdy	
MALCOLM BELLETTE	406-8551
Bob Campbell	0273841966.
Ian Broadhurst	021-395 926
Kevin Thomas	0274384539.
Tony Hayward	027 5372373.
G+S Kokich	0212587301
Alan Anderson	0273195268
MERVYN [illegible]	0272308497.
MIKE [illegible]	0210525813
Lennon Shine	02102569544
Sheryl Shine	4068807
JOE KING	0274 988123
Mate Lovich	027 255 7008
Shane Blucher	021 156 6428
Ivan Stanisich	021 0887 3333.

Proposed Draft Conditions – Northern Group

This framework comprises proposed draft conditions applicable to the following applications:

APP.017428.02.01	Henderson Bay Avocados
APP.040600.01.01	Far North Avocados Ltd
APP.041211.01.01	P McGlaughlin
APP.039859.01.01	Te Aupōuri Commercial Development Ltd
APP.040121.01.01	NE Evans Trust & WJ Evans & J Evans
APP.040231.01.01	P&G Enterprises (PJ & GW Marchant)
APP.040652.01.01	SE & LA Blucher
APP.039644.01.01	MP Doody & DM Wedding
APP.040397.01.01	A. Matthews
APP.040558.01.01	MV Evans (Property 1)
APP.040979.01.01	MV Evans (Property 2)

Note: *Pursuant to Section 116 of the Resource Management Act 1991, the date of commencement of this consent is* ***XX XX 20XX****.*

[CONSENT HOLDER]

AUT.XX **To take and use groundwater from the Waihopo, Houhora and Other sub-aquifers of the Aupōuri Aquifer for horticultural irrigation purposes.**

LOCATION

Address of Site

[Insert address reference]

Legal Description of Site

Site of take: [Insert legal descriptions]

Sites of use: [Insert legal descriptions]

Map Reference (New Zealand Transverse Mercator Projection)

[Bore 1:XXE XXN]

[Bore 2:XXE XXN]

Note: An error accuracy of +/- 50 metres applies to these map references.

CONSENT DURATION

This consent is granted for a period expiring on **30 November 2033.**

CONDITIONS OF AUT.XX

1 The consent holder shall pay all charges relating to the recovery of cost for the administration, monitoring and supervision of this consent fixed by Council under Section 36 of the Resource Management Act 1991.

2 The exercise of this consent is bound by the Master Consent conditions **attached** as Appendix A. The Master Consent uses an alternate numbering system '1MC, 2MC, 3MC…'.

3 Subject to compliance with the conditions of this consent, the activity authorised by this consent shall be carried out in accordance with the application and documents submitted as part of the application, including the following documents:

(a) Assessment of Environmental Effects prepared by Williamson Water & Land Advisory Ltd: *Aupōuri Aquifer Groundwater Take Consent Applications, Assessment of Environmental Effects – Aupōuri Aquifer Water User Group. WWLA0184: Rev. 2*, dated 27 February 2020;

(b) Model Report prepared by Williamson Water & Land Advisory Ltd: *Aupōuri Aquifer Groundwater Model, Factual Technical Report – Modelling – Aupōuri Aquifer Water User Group. WWLA0184: 3*, dated 5 February 2020.

For the avoidance of doubt, where information contained in the application documents is contrary to the conditions of this consent and those in the Master Consent (Appendix A), or where the information contained in the application documents is internally inconsistent, the conditions of this consent and the Master Consent shall prevail.

4 This consent operates under an adaptive management regime. The detail of that adaptive management regime is set out in the Groundwater Monitoring and Contingency Plan for the Waihopo, Other, and (northern) Houhora sub-aquifers of the Aupōuri Aquifer Management Unit, **Dated: [XX XX 2021] ("GMCP")**. The primary purpose of the GMCP is to set out the procedures by which the abstraction will be monitored and managed to ensure compliance with Condition 1MC. For the purpose of this consent, the GMCP is the most recent version of the GMCP which may be changed under Condition 8MC.

5 In the event that any of the provisions of the GMCP conflict with the requirements of these conditions of consent, these conditions of consent shall prevail. The consent holder must comply with the GMCP at all times.

6 The consent shall be exercised in a staged manner as follows:

(a) Stage 1, which shall be a minimum period of 12 months after the commencement of the consent and must include all or part abstraction of the Stage 1 annual volume as set out in Condition 9;

(b) Stage 2, which shall be for the minimum period of two consecutive irrigation seasons;

(c) Stage 3, which shall be for the minimum period of two consecutive irrigation seasons;

(d) Stage 4 which shall be from the irrigation season immediately following written approval to progress from Stage 3 until the expiry of the consent, unless Conditions 11-16 apply.

7 The combined daily volume of water taken across all bores shall not exceed the following:

(a) [XX] cubic metres in any 24 consecutive hours unless Conditions 11(b), 13, 15 or 16 of this consent apply; and

(b) That required to replace soil moisture depleted by evapotranspiration over the irrigated area.

8 The consent holder shall take all practicable steps to ensure that:

(a) The volume of water used for irrigation does not exceed soil field capacity of the irrigated areas;

(b) The irrigation does not cause surface runoff that would discharge into natural waterbodies;

(c) There is no leakage from pipes and structures;

(d) The use of water is confined to targeted areas;

(e) Irrigation induced soil erosion and soil pugging does not occur;

(f) Soil quality is not degraded as a consequence of irrigation; and

(g) Loss of water, nutrients, and agrichemicals by percolation to groundwater is minimised.

9 The annual volume of water taken from Bore [xx] for each stage shall not exceed the following, unless Conditions 11-16 apply:

(a) Stage 1: [XX] cubic metres between 1 July in a year and 30 June in the following year;

(b) Stage 2: [XX] cubic metres between 1 July in a year and 30 June in the following year;

(c) Stage 3: [XX] cubic metres between 1 July in a year and 30 June in the following year;

(d) Stage 4: [XX] cubic metres between 1 July in a year and 30 June in the following year.

10 Progress to the next stage shall only occur where written approval is given by the Council's Compliance Manager; and

(a) This written approval will only be given if the council is satisfied that the Staged Implementation and Monitoring Review prepared in accordance with the GMCP confirms that the groundwater abstraction complies with Condition 1MC; and

(b) A decision on whether written approval will be given or not will not be made until the Council has consulted with the Consent Holder and the Director-General of Conservation over the Staged Implementation and Monitoring Review; and

(c) Notwithstanding Condition 10(b), written approval to progress from Stage 1 to Stage 2 will not be considered unless all the monitoring trigger levels required by the GMCP have been set; and

(d) A report detailing the reasons for the Council's decision in regard to progressing to the next stage, including the identification and discussion of any matters raised during the consultation described in Condition 10(b), will be provided to the Consent Holder and the Director-General of Conservation.

Breaching of Trigger Levels

11 In the event of a Trigger Level 2 (TL2) in the GMCP being exceeded, the following actions and requirements shall be initiated;

(a) The Council will advise the Consent Holder in writing that a TL2 has been breached within 24 hours of the breach being realised;

(b) Upon receipt of this notice, the Consent Holder shall immediately reduce their daily

abstraction to 50% of the current average daily quantity, as advised by the Council in the notice. The current average daily quantity will be calculated using the previous month's water use records required by Condition 21. If the exceedance occurs within one month of a Consent Holder first taking water for irrigation purposes within an irrigation season, then the average shall be calculated using the water use records for this period only;

(c) As required by the GMCP, the Council will commission a Groundwater Trigger Exceedance Report to assess why the trigger level has been breached, identify the pumping bores in the area of effect and review all of the available data collected in the affected area(s).

12 Once Condition 11(b) has been complied with, the Consent Holder may apply to the Council's Compliance Manager for an alternative reduction in its daily water take volume. Council's approval of an alternative reduction value will only be given if it is satisfied, based on the results of the Groundwater Trigger Exceedance Report, that a TL2 exceedance that is attributable to this consent will not occur. The applicable alternative reduction value is the value that is contained in the recommendations made in the Groundwater Trigger Exceedance Report required to be prepared by Condition 11(c).

13 If the TL2 trigger levels are still exceeded after 21 days, then the Consent Holder shall reduce their daily abstraction to 25% of the current average daily quantity calculated for Condition 11(b). The Council will advise the Consent Holder in writing of any continued exceedance and the required further reduction in the daily water take volume.

14 Once Condition 13 has been complied with, the Consent Holder shall also comply with the recommendations contained in the revised and updated Groundwater Trigger Exceedance Report commissioned by the Council which will be prepared for the purpose of specifying a programme of actions to achieve compliance with Condition 1MC.

15 If the TL2 trigger levels continue to be exceeded after the implementation of the remedial measures required under Conditions 11-14, the Council will require the Consent Holder to suspend the exercise of this consent, or continue their daily abstraction at a specified rate, until such time as the Council issues written notice that the Consent may be exercised again in accordance with the requirements of the revised and updated Groundwater Trigger Exceedance Report.

16 Any abstraction that results in non-compliance with Condition 1MC shall be suspended.

Notification of Irrigation

17 The Consent Holder shall advise the Council's assigned Monitoring Officer in writing five working days prior to the exercise of this consent when irrigation is to commence for the first time each season.

Backflow Prevention

18 Prior to the first exercise of this consent, a backflow prevention system shall be installed on irrigation systems used to apply animal effluent, agrichemical or nutrients to prevent the backflow of contaminants to groundwater.

Metering and Abstraction Reporting

19 Prior to the first exercise of this consent, a meter and datalogger(s) with at least 12 months data storage to record the rate and volume of take, and the date and time this water was taken

shall be installed and maintained to measure at least every 15 minutes the volume of water taken, in cubic metres, from each production bore. Each meter shall:

(a) Be telemetered to the Northland Regional Council; and

(b) Be sealed and as tamper-proof as practicable; and

(c) Be installed at the location from which the total volume of water is taken; and

(d) Have an accuracy of +/-5%, and

(e) Have an international accreditation or NZ equivalent calibration endorsement, and

(f) Be installed and maintained throughout the duration of the consent in accordance with the manufacturer's instructions to ensure the meter is fully functional at all times.

The Consent Holder shall, at all times, provide safe and practical access to each meter installed for Council to undertake visual inspections, data retrieval, and record water take measurements.

20 The Consent Holder shall verify that the meter required by Condition 19 is accurate. This verification shall be undertaken prior to 30 June:

(a) Following the first taking of water from each production bore in accordance with this consent; and

(b) At least once in every five years thereafter.

Each verification shall be undertaken by a person, who in the opinion of the Council's Compliance Manager, is suitably qualified. Written verification of the accuracy shall be provided to the Council's assigned Monitoring Officer no later than 31 July following the date of each verification.

21 A copy of the records logged under Condition 19 shall be forwarded to the Council's assigned Monitoring Officer annually by the 31 July, for the previous period 1 July to the 30 June.

In addition, a copy of these records shall be forwarded immediately to the Council's assigned Monitoring Officer on written request. The records shall be in an electronic format that has been agreed to by the council.

Water Use Efficiency

22 The Consent Holder shall prepare an Irrigation Scheduling Plan (ISP) that outlines how irrigation decisions will be made. The purpose of the ISP is to set out how the irrigation will be undertaken to ensure that at least 80 percent of the annual volume of water applied to the irrigable area is retained in the soil in the root zone of the crop, compared to the average gross depth of water applied to the crop. The ISP shall be prepared by a suitably qualified and experienced person and submitted to the Council's Compliance Manager for written certification that it will achieve the purpose of the ISP. The ISP shall, as a minimum, address:

- Water balance and crop water requirements;
- Subsurface drainage;
- Measures for continuous improvement in water efficiency; and
- Overall irrigation strategy.

For each irrigation area, the ISP should include:

(a) A map of the irrigation area;

(b) A description of how water requirements for each irrigation cycle are calculated;

(c) Method(s) for assessing current soil moisture levels;

(d) Method(s) for assessing potential evapotranspiration (PET) and rainfall to date;

(e) Soil moisture target to be maintained in each zone by irrigation;

(f) How measured data will be used to assess irrigation requirements over the next irrigation cycle;

(g) A description of proposed method(s) for remaining within consent limits at each borehole or group of boreholes; and

(h) Continuous improvement in water efficiency.

23 The Consent Holder shall not exercise this consent until the ISP required by Condition 24 has been certified by the Council's Compliance Manager.

24 The ISP certified in accordance with Condition 25 shall be implemented prior to the first irrigation season, unless a later date has been approved in writing by the Council's Compliance Manager.

25 The Consent Holder must comply with the ISP at all times.

26 The Consent Holder shall, within six months of the first exercise of this consent, undertake an audit of the irrigation system and of the certified ISP. The audit shall be undertaken by a suitably qualified and experienced person. The irrigation system audit shall be prepared in accordance with Irrigation New Zealand's "Irrigation Evaluation Code of Practice" (dated 12 April 2010), and shall include recommendations on any improvements that should be made to the system to increase water efficiencies or any amendments to the ISP. The results of the audit and its recommendations shall be submitted in writing to the Council's assigned Monitoring Officer within one month of the audit being undertaken. Any recommended amendments to the ISP shall be submitted to the Council's Compliance Manager for written certification that it will achieve the purpose of the ISP before they take effect. A follow-up audit shall occur at five yearly intervals throughout the term of this consent with the intent of confirming an irrigation efficiency of at least 80 percent.

27 The Consent Holder shall, within three months of notification in writing by the Council's Compliance Manager, implement any recommendations of the audit referred to in Condition 28.

28 The reticulation system and its component parts shall be maintained in good working order to minimise leakage and wastage of water.

29 The rate at which water is applied to the irrigated area shall not result in ponding of irrigated water within any irrigated area, or runoff from either surface or subsurface drainage to a water body, as a result of the exercise of this consent.

Advice Note: *The ISP seeks to ensure that at least 80 percent of the annual volume of water applied to the irrigable area is retained in the soil in the root zone of the crop, compared to the average gross depth of water applied to the crop.*

Review Condition

30 The Council may, in accordance with Section 128 of the Resource Management Act 1991, serve notice on the Consent Holder of its intention to review the conditions of this consent for any one or more of the following purposes:

(a) To deal with any adverse effects on the environment that may arise from the exercise of the consent and which it is appropriate to deal with at a later stage; or

(b) To insert trigger level thresholds established in accordance with the GMCP as conditions of consent; or

(c) To review the allocation of the resource; or

(d) In response to any other relevant reason for review identified in Section 128 of the Resource Management Act

A review of this consent may be carried out separately or together with reviews of other consents for the purpose of managing the effects of the activities carried out under those resource consents.

The Consent Holder shall meet all reasonable costs of any such review.

Lapsing Condition

31 This consent shall lapse five years after the date that the consent commences in accordance with section 116(1) of the Resource Management Act 1991, unless the consent has been given effect to before this date.

APPENDIX A – MASTER CONSENT CONDITIONS

General

1MC. The consented activity must not, individually or cumulatively, result in:

(a) adverse effects of saltwater intrusion into the Aupōuri aquifer;

(b) adverse effects on the hydrological functioning, including changes to water levels[1], of natural wetlands, springs and dune lakes;

(c) alterations to the extents of rivers, natural wetlands, springs and/or dune lakes;

(d) adverse effects on the significant indigenous vegetation and habitats in (terrestrial and freshwater environments of) dune lakes, springs and natural wetlands;

(e) Adverse effects on the flow levels and flow variability of rivers and streams and springs so that their habitat quality and sustainable mahinga kai, recreational, and other social and cultural values, are maintained (including sufficient flows and flow variability to maintain their habitat quality, including to flush rivers of deposited sediment and nuisance algae and macrophytes and support the natural movement of indigenous fish and valued introduced species such as trout; and

(f) lowering of the groundwater levels of the Aupōuri aquifer such that existing efficient bore takes operating as a permitted activity or in accordance with resource consent conditions cannot access the authorised volume of groundwater.

2MC. The Consent Holder shall, for the purpose of discussing the results of monitoring required under the most recent revision of the GMCP , form and maintain (including providing all administrative support) a Kaitiaki Liaison Group. The Kaitiaki Liaison Group shall comprise the Consent Holders, Waiora marae, NgāiTakoto Iwi, Te Aupōuri Iwi, and Te Rarawa Iwi, and the Northland Regional Council. The Consent Holder shall hold a meeting of the Kaitiaki Liaison Group not less than once every year in September following the preparation of the Annual Environmental Monitoring Report required to be prepared in accordance with Section 3.6 of the GMCP's.

3MC. The meeting shall be held at a time convenient for the majority of the Kaitiaki Liaison Group members.

Advice Note: *The aim of the Kaitiaki Liaison Group shall be to share information relevant to the management of the Aupōuri aquifer and to make recommendations to the Northland Regional Council on any actions required under their review authority to address any identified adverse effects. Such recommendations may be incorporated into the adaptive management plan. The minutes of the meeting shall be made available to all interested parties.*

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Prior to the Exercise of Consent

~~2MC.~~4MC. Prior to the exercise of this consent, new bores and all associated monitoring equipment required to be installed for the purposes of monitoring the baseline effects in accordance with the GMCP shall be constructed and installed by a suitably qualified person(s).

[1] Avoiding "change" means that as a result of the abstraction of water; median water levels, mean annual water level fluctuations and patterns of water level seasonality (relative summer vs winter) remain unchanged.

~~3MC.~~5MC. Where the GMCP requires that the frequency of monitoring for a parameter is continuous, then the monitoring equipment shall be installed as follows:

(a) for groundwater level recording, to the requirements of the National Environmental Monitoring Standard Water Level: Water Level Field Measurement Standard, Version 3.0.0, dated July 2019.;

(b) for conductivity sensors they must be able to record "Specific Conductance" (corrected to 25 degrees Celsius), have available software for field calibration, and be able to record across the whole expected conductivity range for the water body measured;

(c) Sensors must be installed in a secure manner to ensure stationarity over time;

(d) Instantaneous reading recorded every five (5) minutes;

(e) Recording to NZ Standard Time (NZST);

(f) Water Level readings compensated for barometric pressure prior to transmission;

(g) Telemetered to Northland Regional Council with a minimum of hourly transmission of data; and

(h) Reference points levelled to One Tree Point datum and New Zealand Vertical Datum.

~~4MC.~~6MC. Prior to the exercise of this consent, the Consent Holder shall provide to the Council's assigned monitoring officer the installation details from the suitably qualified person of all monitoring equipment that has been installed in accordance with Condition 3MC. This information will be used by the Council's Compliance Manager to determine compliance with Conditions 2MC and 3MC.

~~5MC.~~7MC. Prior to the exercise of this consent, a suitable approach to detecting and responding to saline intrusion effects during Stage 1 (Year 1) shall be prepared. The Council's Compliance Manager shall certify that the approach to detecting and responding to saline intrusion will give effect to Condition 1MC. The certified information shall be inserted into the GMCP through the process set out in Condition 8MC prior to the exercise of this consent.

Monitoring and Contingency Measures

~~6MC.~~8MC. This consent shall be exercised and monitored in accordance with the most recent revision of the GMCP.

~~7MC.~~9MC. The Consent Holder shall, at all times, provide safe and easy access to the production bore wellhead(s) for the purpose of undertaking monitoring on the bore(s), as set out in the GMCP.

~~8MC.~~10MC. Excluding the Staged Implementation and Monitoring Programme Review process, the GMCP may be amended at any time by the following process:

(a) Subject to Condition 8MC(d), the Council may amend the GMCP by providing notice in writing to the Consent Holder that the GMCP has been amended and providing a copy of the amended GMCP to the Consent Holder.

(b) Subject to Condition 8MC(d), the Consent Holder may submit a request for an amendment by giving written notice to the Council of the proposed amendment along with any supporting technical documents.

(c) Prior to making any decision to amend the GMCP or not, the Council will seek input on any proposed amendment from the Consent Holder and from the Director-General of Conservation.

(d) The Council will not approve any amendment to the GMCP unless the technical assessment of the proposed change clearly indicates that the change will not result in a breach of Condition 1MC.

Proposed Draft Conditions – South-western Group

This framework comprises proposed draft conditions applicable to the following applications:

APP.040364.01.01	Elbury Holdings Ltd
APP.020995.01.04	Te Rarawa Farming Ltd and Te Make Farms Ltd

Note: *Pursuant to Section 116 of the Resource Management Act 1991, the date of commencement of this consent is* ***XX XX 20XX****.*

[CONSENT HOLDER]

AUT.XX **To take and use groundwater from the Sweetwater and Ahipara sub-aquifers of the Aupōuri-Aquifer management unit for horticultural irrigation purposes.**

LOCATION

Address of Site

[Insert address reference]

Legal Description of Site

Site of take: [Insert legal descriptions]

Sites of use: [Insert legal descriptions]

Map Reference (New Zealand Transverse Mercator Projection)

Bore 1: XXE XXN

Bore 2: XXE XXN

Note: An error accuracy of +/- 50 metres applies to these map references.

CONSENT DURATION

This consent is granted for a period expiring on **30 November 2033.**

CONDITIONS OF AUT.XX

1 The consent holder shall pay all charges relating to the recovery of cost for the administration, monitoring and supervision of this consent fixed by Council under Section 36 of the Resource Management Act 1991.

2 The exercise of this consent is bound by the Master Consent conditions **attached** as Appendix A. The Master Consent uses an alternate numbering system '1MC, 2MC, 3MC…'.

3 Subject to compliance with the conditions of this consent, the activity authorised by this consent shall be carried out in accordance with the application and documents submitted as part of the application, including the following documents:

(a) Assessment of Environmental Effects prepared by Williamson Water & Land Advisory Ltd: *Aupōuri Aquifer Groundwater Take Consent Applications, Assessment of Environmental Effects – Aupōuri Aquifer Water User Group. WWLA0184: Rev. 2*, dated 27 February 2020;

(b) Model Report prepared by Williamson Water & Land Advisory Ltd: *Aupōuri Aquifer Groundwater Model, Factual Technical Report – Modelling – Aupōuri Aquifer Water User Group. WWLA0184: 3*, dated 5 February 2020.

For the avoidance of doubt, where information contained in the application documents is contrary to the conditions of this consent and those in the Master Consent (Appendix A), or where the information contained in the application documents is internally inconsistent, the conditions of this consent and the Master Consent shall prevail.

4 This consent operates under an adaptive management regime. The detail of that adaptive management regime is set out in the Groundwater Monitoring and Contingency Plan for the Sweetwater and Ahipara sub-aquifers of the Aupōuri Aquifer Management Unit, Dated: [**XX XX 2021**] **("GMCP")**. The primary purpose of the GMCP is to set out the procedures by which the abstraction will be monitored and managed to ensure compliance with Condition 1MC. For the purpose of this consent, the GMCP is the most recent version of the GMCP which may be changed under Condition 8MC.

5 In the event that any of the provisions of the GMCP conflict with the requirements of these conditions of consent, these conditions of consent shall prevail. The consent holder must comply with the GMCP at all times.

6 The consent shall be exercised in a staged manner as follows:

(a) Stage 1, which shall be a minimum period of 12 months after the commencement of the consent and must include all or part abstraction of the Stage 1 annual volume as set out in Condition 9

(b) Stage 2, which shall be for the minimum period of two consecutive irrigation seasons;

(c) Stage 3, which shall be for the minimum period of two consecutive irrigation seasons;

(d) Stage 4 which shall be from the irrigation season immediately following written approval to progress from Stage 3 until the expiry of the consent, unless Conditions 11-16 apply.

7 The combined daily volume of water taken across all bores shall not exceed the following:

(a) [XX] cubic metres in any 24 consecutive hours unless Conditions 11(b), 13, 15 or 16 of this consent apply; and

(b) That required to replace soil moisture depleted by evapotranspiration over the irrigated area.

8 The consent holder shall take all practicable steps to ensure that:

(a) The volume of water used for irrigation does not exceed soil field capacity of the irrigated areas;

(b) The irrigation does not cause surface runoff that would discharge into natural waterbodies;

(c) There is no leakage from pipes and structures;

(d) The use of water is confined to targeted areas;

(e) Irrigation induced soil erosion and soil pugging does not occur;

(f) Soil quality is not degraded as a consequence of irrigation; and

(g) Loss of water, nutrients, and agrichemicals by percolation to groundwater is minimised.

9 The annual volume of water taken from Bore [xx] for each stage shall not exceed the following unless Conditions 11-16 apply:

(a) Stage 1: [XX] cubic metres between 1 July in a year and 30 June in the following year;

(b) Stage 2: [XX] cubic metres between 1 July in a year and 30 June in the following year;

(c) Stage 3: [XX] cubic metres between 1 July in a year and 30 June in the following year;

(d) Stage 4: [XX] cubic metres between 1 July in a year and 30 June in the following year.

10 Progress to the next stage shall only occur where written approval is given by the Council's Compliance Manager; and

(a) This written approval will only be given if the council is satisfied that the Staged Implementation and Monitoring Review prepared in accordance with the GMCP confirms that the groundwater abstraction complies with Condition 1MC; and

(b) A decision on whether written approval will be given or not will not be made until the Council has consulted with the Consent Holder and the Director-General of Conservation over the Staged Implementation and Monitoring Review; and

(c) Notwithstanding Condition 10(b), written approval to progress from Stage 1 to Stage 2 will not be considered unless all the monitoring trigger levels required by the GMCP have been set; and

(d) A report detailing the reasons for the Council's decision in regard to progressing to the next stage, including the identification and discussion of any matters raised during the consultation described in Condition 10(b), will be provided to the Consent Holder and the Director-General of Conservation.

Breaching of Trigger Levels

11 In the event of a Trigger Level 2 (TL2) in the GMCP being exceeded, the following actions and requirements shall be initiated;

(a) The Council will advise the Consent Holder in writing that a TL2 has been breached

within 24 hours of the breach being realised;

(b) Upon receipt of this notice, the Consent Holder shall immediately reduce their daily abstraction to 50% of the current average daily quantity, as advised by the Council in the notice. The current average daily quantity will be calculated using the previous month's water use records required by Condition 21. If the exceedance occurs within one month of a Consent Holder first taking water for irrigation purposes within an irrigation season, then the average shall be calculated using the water use records for this period only;

(c) As required by the GMCP, the Council will commission a Groundwater Trigger Exceedance Report to assess why the trigger level has been breached, identify the pumping bores in the area of effect and review all of the available data collected in the affected area(s).

12 Once Condition 11(b) has been complied with, the Consent Holder may apply to the Council's Compliance Manager for an alternative reduction in its daily water take volume. Council's approval of an alternative reduction value will only be given if it is satisfied that a TL2 exceedance that is attributable to this consent will not occur. The applicable alternative reduction value is the value that is contained in the recommendations made in the Groundwater Trigger Exceedance Report required to be prepared by Condition 11(c).

13 If the TL2 trigger levels are still exceeded after 21 days, then the Consent Holder shall reduce their daily abstraction to 25% of the current average daily quantity calculated for Condition 11(b). The Council will advise the Consent Holder in writing of any breach and the required reduction in the daily water take volume.

14 Once Condition 13 has been complied with, the Consent Holder shall also comply with the recommendations contained in the revised and updated Groundwater Trigger Exceedance Report commissioned by the Council which will be prepared for the purpose of specifying a programme of actions to achieve compliance with Condition 1MC.

15 If the TL2 trigger levels continue to be exceeded after the implementation of the remedial measures required under Conditions 11-14, the Council will require the Consent Holder to suspend the exercise of this consent, or continue their daily abstraction at a specified rate, until such time as the Council issues written notice that the Consent may be exercised again in accordance with the requirements of the revised and updated Groundwater Trigger Exceedance Report.

16 Any abstraction that results in non-compliance with Condition 1MC shall be suspended.

Notification of Irrigation

17 The Consent Holder shall advise the Council's assigned Monitoring Officer in writing when irrigation is to commence for the first time each season, at least five working days beforehand.

Backflow Prevention

18 Prior to the first exercise of this consent, a backflow prevention system shall be installed on irrigation systems used to apply animal effluent, agrichemical or nutrients to prevent the backflow of contaminants to groundwater.

Metering and Abstraction Reporting

19 Prior to the first exercise of this consent, a meter and datalogger(s) with at least 12 months data storage to record the rate and volume of take, and the date and time this water was taken

shall be installed and maintained to measure at least every 15 minutes the volume of water taken, in cubic metres, from each production bore. Each meter shall:

(a) Be telemetered to the Northland Regional Council; and

(b) Be sealed and as tamper-proof as practicable; and

(c) Be installed at the location from which the total volume of water is taken; and

(d) Have an accuracy of +/-5%, and

(e) Have an international accreditation or NZ equivalent calibration endorsement, and

(f) Be installed and maintained throughout the duration of the consent in accordance with the manufacturer's instructions to ensure the meter is fully functional at all times.

The Consent Holder shall, at all times, provide safe and practical access to each meter installed for Council to undertake visual inspections, data retrieval, and record water take measurements.

20 The Consent Holder shall verify that the meter required by Condition 19 is accurate. This verification shall be undertaken prior to June 30:

(a) Following the first taking of water from each production bore in accordance with this consent; and

(b) At least once in every five years thereafter.

Each verification shall be undertaken by a person, who in the opinion of the Council's Compliance Manager, is suitably qualified. Written verification of the accuracy shall be provided to the Council's assigned Monitoring Officer no later than 31 July following the date of each verification.

21 A copy of the records logged under Condition 19 shall be forwarded to the Council's assigned Monitoring Officer annually by the 31 July, for the previous period 1 July to the 30 June.

In addition, a copy of these records shall be forwarded immediately to the Council's assigned Monitoring Officer on written request. The records shall be in an electronic format that has been agreed to by the council.

Water Use Efficiency

22 The Consent Holder shall prepare an Irrigation Scheduling Plan (ISP) that outlines how irrigation decisions will be made. The purpose of the ISP is to set out how the irrigation will be undertaken to ensure that at least 80 percent of the annual volume of water applied to the irrigable area is retained in the soil in the root zone of the crop, compared to the average gross depth of water applied to the crop. The ISP shall be prepared by a suitably qualified and experienced person and submitted to the Council's Compliance Manager for written certification that it will achieve the purpose of the ISP. The ISP shall, as a minimum, address:

- Water balance and crop water requirements;
- Subsurface drainage;
- Measures for continuous improvement in water efficiency; and
- Overall irrigation strategy.

For each irrigation area, the ISP should include:

(a) A map of the irrigation area;

(b) A description of how water requirements for each irrigation cycle are calculated;

(c) Method(s) for assessing current soil moisture levels;

(d) Method(s) for assessing potential evapotranspiration (PET) and rainfall to date;

(e) Soil moisture target to be maintained in each zone by irrigation;

(f) How measured data will be used to assess irrigation requirements over the next irrigation cycle;

(g) A description of proposed method(s) for remaining within consent limits at each borehole or group of boreholes; and

(h) Continuous improvement in water efficiency.

23 The Consent Holder shall not exercise this consent until the ISP required by Condition 24 has been certified by the Council's Compliance Manager.

24 The ISP certified in accordance with Condition 25 shall be implemented prior to the first irrigation season, unless a later date has been approved in writing by the Council's Compliance Manager.

25 The Consent Holder must comply with the ISP at all times.

26 The Consent Holder shall, within six months of the first exercise of this consent, undertake an audit of the irrigation system and of the certified ISP. The audit shall be undertaken by a suitably qualified and experienced person. The irrigation system audit shall be prepared in accordance with Irrigation New Zealand's "Irrigation Evaluation Code of Practice" (dated 12 April 2010), and shall include recommendations on any improvements that should be made to the system to increase water efficiencies or any amendments to the ISP. The results of the audit and its recommendations shall be submitted in writing to the Council's assigned Monitoring Officer within one month of the audit being undertaken. Any recommended amendments to the ISP shall be submitted to the Council's Compliance Manager for written certification that it will achieve the purpose of the ISP before they take effect. A follow-up audit shall occur at five yearly intervals throughout the term of this consent with the intent of confirming an irrigation efficiency of at least 80 percent.

27 The Consent Holder shall, within three months of notification in writing by the Council's Compliance Manager, implement any recommendations of the audit referred to in Condition 28.

28 The reticulation system and its component parts shall be maintained in good working order to minimise leakage and wastage of water.

29 The rate at which water is applied to the irrigated area shall not result in ponding of irrigated water within any irrigated area, or runoff from either surface or subsurface drainage to a water body, as a result of the exercise of this consent.

Advice Note: *The ISP seeks to ensure that at least 80 percent of the annual volume of water applied to the irrigable area is retained in the soil in the root zone of the crop, compared to the average gross depth of water applied to the crop.*

Review Condition

30 The Council may, in accordance with Section 128 of the Resource Management Act 1991, serve notice on the Consent Holder of its intention to review the conditions of this consent for any one or more of the following purposes:

(a) To deal with any adverse effects on the environment that may arise from the exercise of the consent and which it is appropriate to deal with at a later stage; or

(b) To insert trigger level thresholds established in accordance with the GMCP as conditions of consent; or

(c) To review the allocation of the resource; or

(d) In response to any other relevant reason for review identified in Section 128 of the Resource Management Act.

A review of this consent may be carried out separately or together with reviews of other consents for the purpose of managing the effects of the activities carried out under those resource consents.

The Consent Holder shall meet all reasonable costs of any such review.

Lapsing Condition

31 This consent shall lapse five years after the date that the consent commences in accordance with section 116(1) of the Resource Management Act 1991, unless the consent has been given effect to before this date.

APPENDIX A – MASTER CONSENT CONDITIONS

General

1MC. The consented activity must not, individually or cumulatively, result in:

(a) adverse effects of saltwater intrusion into the Aupōuri aquifer;

(b) adverse effects on the hydrological functioning, including changes to water levels[2], of natural wetlands, springs and dune lakes;

(c) alteration to the extents of rivers, natural wetlands, springs and/or dune lakes;

(d) adverse effects on the significant indigenous vegetation and habitats in (terrestrial and freshwater environments of) dune lakes, springs and natural wetlands; and

(e) adverse effects on the significant indigenous vegetation and significant habitats of indigenous fauna in terrestrial and freshwater environments of the Kaimaumau-Motutangi wetland; and

(f) Adverse effects on the flow levels and flow variability of rivers and streams and springs so that their habitat quality and sustainable mahinga kai, recreational, and other social and cultural values, are maintained (including sufficient flows and flow variability to maintain their habitat quality, including to flush rivers of deposited sediment and nuisance algae and macrophytes and support the natural movement of indigenous fish and valued introduced species such as trout; and

(g) lowering of the groundwater levels of the Aupōuri aquifer such that existing efficient bore takes operating as a permitted activity or in accordance with resource consent conditions cannot access the authorised volume of groundwater.

2MC. The Consent Holder shall, for the purpose of discussing the results of monitoring required under the most recent revision of the GMCP , form and maintain (including providing all administrative support) a Kaitiaki Liaison Group. The Kaitiaki Liaison Group shall comprise the Consent Holders, Waiora marae, NgāiTakoto Iwi, Te Aupōuri Iwi, and Te Rarawa Iwi, and the Northland Regional Council. The Consent Holder shall hold a meeting of the Kaitiaki Liaison Group not less than once every year in September following the preparation of the Annual Environmental Monitoring Report required to be prepared in accordance with Section 3.6 of the GMCP's.

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3MC. The meeting shall be held at a time convenient for the majority of the Kaitiaki Liaison Group members.

Advice Note: *The aim of the Kaitiaki Liaison Group shall be to share information relevant to the management of the Aupōuri aquifer and to make recommendations to the Northland Regional Council on any actions required under their review authority to address any identified adverse effects. Such recommendations may be incorporated into the adaptive management plan. The minutes of the meeting shall be made available to all interested parties.*

[2] Avoiding "change" means that as a result of the abstraction of water; median water levels, mean annual water level fluctuations and patterns of water level seasonality (relative summer vs winter) remain unchanged.

Prior to the Exercise of Consent

~~2MC.~~4MC. Prior to the exercise of this consent, new bores and all associated monitoring equipment required to be installed for the purposes of monitoring the baseline effects in accordance with the GMCP shall be constructed and installed by a suitably qualified person(s).

~~3MC.~~5MC. Where the GMCP requires that the frequency of monitoring for a parameter is continuous, then the monitoring equipment shall be installed as follows:

(a) for groundwater level recording, to the requirements of the National Environmental Monitoring Standards Water Level: Water Level Field Measurement Standard, Version 3.0.0, dated July 2019;

(b) for conductivity sensors they must be able to record "Specific Conductance" (corrected to 25 degrees Celsius), have available software for field calibration, and be able to record across the whole expected conductivity range for the water body measured;

(c) Sensors must be installed in a secure manner to ensure stationarity over time;

(d) Instantaneous reading recorded every five (5) minutes;

(e) Recording to NZ Standard Time (NZST);

(f) Water Level readings compensated for barometric pressure prior to transmission;

(g) Telemetered to Northland Regional Council with a minimum of hourly transmission of data; and

(h) Reference points levelled to One Tree Point datum and New Zealand Vertical Datum.

~~4MC.~~6MC. Prior to the exercise of this consent, the Consent Holder shall provide to the Council's assigned monitoring officer the installation details from the suitably qualified person of all monitoring equipment that has been installed in accordance with Condition 3MC. This information will be used by the Council's Compliance Manager to determine compliance with Conditions 2MC and 3MC.

~~5MC.~~7MC. Prior to the exercise of this consent, a suitable approach to detecting and responding to saline intrusion effects during Stage 1 (Year 1) shall be prepared. The Council's Compliance Manager shall certify that the approach to detecting and responding to saline intrusion will give effect to Condition 1MC. The certified information shall be inserted into the GMCP through the process set out in Condition 8MC prior to the exercise of this consent.

Monitoring and Contingency Measures

~~6MC.~~8MC. This consent shall be exercised and monitored in accordance with the most recent revision of the GMCP.

~~7MC.~~9MC. The Consent Holder shall, at all times, provide safe and easy access to the production bore wellhead(s) for the purpose of undertaking monitoring on the bore(s), as set out in the GMCP.

~~8MC.~~10MC. Excluding the Staged Implementation and Monitoring Programme Review process, the GMCP may be amended at any time by the following process:

(a) Subject to Condition 8MC(d), the Council may amend the GMCP by providing notice in writing to the Consent Holder that the GMCP has been amended and providing a copy of the amended GMCP to the Consent Holder.

(b) Subject to Condition 8MC(d), the Consent Holder may submit a request for an amendment by giving written notice to the Council of the proposed amendment along with any supporting technical documents.

(c) Prior to making any decision to amend the GMCP or not, the Council will seek input on any proposed amendment from the Consent Holder and from the Director-General of Conservation.

(d) The Council will not approve any amendment to the GMCP unless the technical assessment of the proposed change clearly indicates that the change will not result in a breach of Condition 1MC.

Proposed Draft Conditions – Middle Group

This framework comprises proposed draft conditions applicable to the following applications:

APP.040919.01.01	NA Bryan Estate, SG Bryan, CL Bryan, KY Bryan, Valdares and D Bryan (Property 1)
APP.040130.01.01	Tuscany Valley Avocados Ltd
APP.040918.01.01	NA Bryan Estate, SG Bryan, CL Bryan, KY Bryan, Valadares & D Bryan (Property 2)
APP.008647.01.06	Avokaha Ltd
APP.039628.01.02	KSL Ltd
APP.040361.01.01	Tiri Avocados Ltd
APP.040362.01.01	Valic NZ Ltd
APP.040363.01.01	Green Charteris Family Trust
APP.039841.01.02	Mate Yelavitch & Co Ltd
APP.040386.01.01	Robert Paul Campbell Trust

AUT.XX **To take and use groundwater from the Paparore, Waiparera, Motutangi, and Houhora sub-aquifers of the Aupōuri-Aquifer management unit for horticultural irrigation purposes.**

LOCATION

Address of Site

[Insert address reference]

Legal Description of Site

Site of take: [Insert legal descriptions]

Sites of use: [Insert legal descriptions]

Map Reference (New Zealand Transverse Mercator Projection)

Bore 1: XXE XXN

Bore 2: XXE XXN

Note: An error accuracy of +/- 50 metres applies to these map references.

CONSENT DURATION

This consent is granted for a period expiring on **30 November 2033.**

CONDITIONS OF AUT.XX

1 The consent holder shall pay all charges relating to the recovery of cost for the administration, monitoring and supervision of this consent fixed by Council under Section 36 of the Resource Management Act 1991.

2 The exercise of this consent is bound by the Master Consent conditions **attached** as Appendix A. The Master Consent uses an alternate numbering system '1MC, 2MC, 3MC…'.

3 Subject to compliance with the conditions of this consent, the activity authorised by this consent shall be carried out in accordance with the application and documents submitted as part of the application, including the following documents:

(a) Assessment of Environmental Effects prepared by Williamson Water & Land Advisory Ltd: *Aupōuri Aquifer Groundwater Take Consent Applications, Assessment of Environmental Effects – Aupōuri Aquifer Water User Group. WWLA0184: Rev. 2*, dated 27 February 2020;

(b) Model Report prepared by Williamson Water & Land Advisory Ltd: *Aupōuri Aquifer Groundwater Model, Factual Technical Report – Modelling – Aupōuri Aquifer Water User Group. WWLA0184: 3*, dated 5 February 2020.

For the avoidance of doubt, where information contained in the application documents is contrary to the conditions of this consent and those in the Master Consent (Appendix A), or where the information contained in the application documents is internally inconsistent, the conditions of this consent and the Master Consent shall prevail.

4 This consent operates under an adaptive management regime. The detail of that adaptive management regime is set out in the Groundwater Monitoring and Contingency Plan for the Paparore, Waiparera, Motutangi and (southern) Houhora sub-aquifers of the Aupōuri aquifer management unit, **Dated: [XX XX 2021] ("GMCP")**. The primary purpose of the GMCP is to set out the procedures by which the abstraction will be monitored and managed to ensure compliance with Condition 1MC. For the purpose of this consent, the GMCP is the most recent version of the GMCP which may be changed under Condition 8MC.

5 In the event that any of the provisions of the GMCP conflict with the requirements of these conditions of consent, these conditions of consent shall prevail. The Consent Holder must comply with the GMCP at all times.

6 The consent shall be exercised in a staged manner as follows:

(a) Stage 1, which shall be a minimum period of 12 months after the commencement of the consent and must include all or part abstraction of the Stage 1 annual volume as set out in Condition 9;

(b) Stage 2, which shall be for the minimum period of two consecutive irrigation seasons;

(c) Stage 3, which shall be for the minimum period of two consecutive irrigation seasons;

(d) Stage 4 which shall be from the irrigation season immediately following written approval to progress from Stage 3 until the expiry of the consent, unless Conditions 11-16 apply.

7 The combined daily volume of water taken across all bores shall not exceed the following:

(a) [XX] cubic metres in any 24 consecutive hours unless Conditions 11(b), 13, 15 or 16 of this consent apply; and

(b) That required to replace soil moisture depleted by evapotranspiration over the irrigated area.

8 The consent holder shall take all practicable steps to ensure that:

(a) The volume of water used for irrigation does not exceed soil field capacity of the irrigated areas;

(b) The irrigation does not cause surface runoff that would discharge into natural waterbodies;

(c) There is no leakage from pipes and structures;

(d) The use of water is confined to targeted areas;

(e) Irrigation induced soil erosion and soil pugging does not occur;

(f) Soil quality is not degraded as a consequence of irrigation; and

(g) Loss of water, nutrients, and agrichemicals by percolation to groundwater is minimised.

9 The annual volume of water taken from Bore [xx] for each stage shall not exceed the following unless Conditions 11-16 apply:

(a) Stage 1: [XX] cubic metres between 1 July in a year and 30 June in the following year;

(b) Stage 2: [XX] cubic metres between 1 July in a year and 30 June in the following year;

(c) Stage 3: [XX] cubic metres between 1 July in a year and 30 June in the following year;

(d) Stage 4: [XX] cubic metres between 1 July in a year and 30 June in the following year.

10 Progress to the next stage shall only occur where written approval is given by the Council's Compliance Manager; and

(a) This written approval will only be given if the council is satisfied that the Staged Implementation and Monitoring Review prepared in accordance with the GMCP confirms that the groundwater abstraction complies with Condition 1MC; and

(b) A decision on whether written approval will be given or not will not be made until the Council has consulted with the Consent Holder and the Director-General of Conservation over the Staged Implementation and Monitoring Review; and

(c) Notwithstanding Condition 10(b), written approval to progress from Stage 1 to Stage 2 will not be considered unless all the monitoring trigger levels required by the GMCP have been set; and

(d) A report detailing the reasons for the Council's decision in regard to progressing to the next stage, including the identification and discussion of any matters raised during the consultation described in Condition 10(b), will be provided to the Consent Holder and the Director-General of Conservation.

Breaching of Trigger Levels

11 In the event of a Trigger Level 2 (TL2) in the GMCP being exceeded, the following actions and requirements shall be initiated;

(a) The Council will advise the Consent Holder in writing that a TL2 has been breached within 24 hours of the breach being realised;

(b) Upon receipt of this notice, the Consent Holder shall immediately reduce their daily abstraction to 50% of the current average daily quantity, as advised by the Council in the notice. The current average daily quantity will be calculated using the previous months water use records required by Condition 21. If the exceedance occurs within one month of a Consent Holder first taking water for irrigation purposes within an irrigation season, then the average shall be calculated using the water use records for this period only;

(c) As required by the GMCP, the Council will commission a Groundwater Trigger Exceedance Report to assess why the trigger level has been breached, identify the pumping bores in the area of effect and review all of the available data collected in the affected area(s).

12 Once Condition 11(b) has been complied with, the Consent Holder may apply to the Council's Compliance Manager for an alternative reduction in its daily water take volume. Council's approval of an alternative reduction value will only be given if it is satisfied that a TL2 exceedance that is attributable to this consent will not occur. The applicable alternative reduction value is the value that is contained in the recommendations made in the Groundwater Trigger Exceedance Report required to be prepared by Condition 11(c). Approval for an alternative reduction will be given to Priority A Consent Holders first, as identified in the GMCP.

13 If the TL2 trigger levels are still exceeded after 21 days, then the Consent Holder shall reduce their daily abstraction to 25% of the current average daily quantity calculated for Condition 11(b). The Council will advise the Consent Holder in writing of any breach and the required reduction in the daily water take volume.

14 Once Condition 13 has been complied with, the Consent Holder shall also comply with the recommendations contained in the revised and updated Groundwater Trigger Exceedance Report commissioned by the Council which will be prepared for the purpose of specifying a programme of actions to achieve compliance with Condition 1MC.

15 If the TL2 trigger levels continue to be exceeded after the implementation of the remedial measures required under Conditions 11-14, the Council may require the Consent Holder to suspend the exercise of this consent, or continue their daily abstraction at a specified rate, until such time as the Council issues written notice that the Consent may be exercised again in accordance with the requirements of the revised and updated Groundwater Trigger Exceedance Report. Any increase in abstraction will be provided to Priority A Consent Holders first, as identified in the GMCP.

16 Any abstraction that results in non-compliance with Condition 1MC shall be suspended.

Notification of Irrigation

17 The Consent Holder shall advise the Council's assigned Monitoring Officer in writing when irrigation is to commence for the first time each season, at least five working days beforehand.

Backflow Prevention

18 Prior to the first exercise of this consent, a backflow prevention system shall be installed on irrigation systems used to apply animal effluent, agrichemical or nutrients to prevent the backflow of contaminants to groundwater.

Metering and Abstraction Reporting

19 Prior to the first exercise of this consent, a meter and datalogger(s) with at least 12 months data storage to record the rate and volume of take, and the date and time this water was taken shall be installed and maintained to measure at least every 15 minutes the volume of water taken, in cubic metres, from each production bore. Each meter shall:

(a) Be telemetered to the Northland Regional Council; and

(b) Be sealed and as tamper-proof as practicable; and

(c) Be installed at the location from which the total volume of water is taken; and

(d) Have an accuracy of +/-5%, and

(e) Have an international accreditation or NZ equivalent calibration endorsement, and

(f) Be installed and maintained throughout the duration of the consent in accordance with the manufacturer's instructions to ensure the meter is fully functional at all times.

The Consent Holder shall, at all times, provide safe and practical access to each meter installed for Council to undertake visual inspections, data retrieval, and record water take measurements..

20 The Consent Holder shall verify that the meter required by Condition 19 is accurate. This verification shall be undertaken prior to 30 June:

(a) Following the first taking of water from each production bore in accordance with this consent; and

(b) At least once in every five years thereafter.

Each verification shall be undertaken by a person, who in the opinion of the Council's Compliance Manager, is suitably qualified. Written verification of the accuracy shall be provided to the Council's assigned Monitoring Officer no later than 31 July following the date of each verification.

21 A copy of the records required to be kept by Condition 19 shall be forwarded to the Council's assigned Monitoring Officer annually by the 31 July, for the previous period 1 July to the 30 June.

In addition, a copy of these records shall be forwarded immediately to the Council's assigned Monitoring Officer on written request. The records shall be in an electronic format that has been agreed to by the council.

Water Use Efficiency

22 The Consent Holder shall prepare an Irrigation Scheduling Plan (ISP) that outlines how irrigation decisions will be made. The purpose of the ISP is to set out how the irrigation will be undertaken to ensure that at least 80 percent of the annual volume of water applied to the irrigable area is retained in the soil in the root zone of the crop, compared to the average gross depth of water applied to the crop. The ISP shall be prepared by a suitably qualified and experienced person and submitted to the Council's Compliance Manager for written certification that it will achieve the purpose of the ISP. The ISP shall, as a minimum, address:

- Water balance and crop water requirements;
- Subsurface drainage;
- Measures for continuous improvement in water efficiency; and
- Overall irrigation strategy.

For each irrigation area, the ISP should include:

(a) A map of the irrigation area;

(b) A description of how water requirements for each irrigation cycle are calculated;

(c) Method(s) for assessing current soil moisture levels;

(d) Method(s) for assessing potential evapotranspiration (PET) and rainfall to date;

(e) Soil moisture target to be maintained in each zone by irrigation;

(f) How measured data will be used to assess irrigation requirements over the next irrigation cycle;

(g) A description of proposed method(s) for remaining within consent limits at each borehole or group of boreholes; and

(h) Continuous improvement in water efficiency.

23 The Consent Holder shall not exercise this consent until the ISP required by Condition 24 has been certified by the Council's Compliance Manager.

24 The ISP certified in accordance with Condition 21 shall be implemented prior to the first irrigation season, unless a later date has been approved in writing by the Council's Compliance Manager.

25 The Consent Holder must comply with the ISP at all times.

26 The Consent Holder shall, within six months of the first exercise of this consent, undertake an audit of the irrigation system and of the certified ISP. The audit shall be undertaken by a suitably qualified and experienced person. The irrigation system audit shall be prepared in accordance with Irrigation New Zealand's "Irrigation Evaluation Code of Practice" (dated 12 April 2010), and shall include recommendations on any improvements that should be made to the system to increase water efficiencies or any amendments to the ISP. The results of the audit and its recommendations shall be submitted in writing to the Council's assigned Monitoring Officer within one month of the audit being undertaken. Any recommended amendments to the ISP shall be submitted to the Council's Compliance Manager for written certification that it will achieve the purpose of the ISP before they take effect. A follow-up audit shall occur at five yearly intervals throughout the term of this consent with the intent of confirming an irrigation efficiency of at least 80 percent.

27 The Consent Holder shall, within three months of notification in writing by the Council's Compliance Manager, implement any recommendations of the audit referred to in Condition 28.

28 The reticulation system and its component parts shall be maintained in good working order to minimise leakage and wastage of water.

29 The rate at which water is applied to the irrigated area shall not result in ponding of irrigated water within any irrigated area, or runoff from either surface or subsurface drainage to a water body, as a result of the exercise of this consent.

Advice Note: *The ISP seeks to ensure that at least 80 percent of the annual volume of water applied to the irrigable area is retained in the soil in the root zone of the crop, compared to the average gross depth of water applied to the crop.*

Review Condition

30 The Council may, in accordance with Section 128 of the Resource Management Act 1991, serve notice on the Consent Holder of its intention to review the conditions of this consent for any one or more of the following purposes:

(a) To deal with any adverse effects on the environment that may arise from the exercise of the consent and which it is appropriate to deal with at a later stage; or

(b) To insert trigger level thresholds established in accordance with the GMCP as conditions of consent; or.

(c) To review the allocation of the resource; or

(d) In response to any other relevant reason for review identified in Section 128 of the Resource Management Act

A review of this consent may be carried out separately or together with reviews of other consents for the purpose of managing the effects of the activities carried out under those resource consents..

The Consent Holder shall meet all reasonable costs of any such review.

Lapsing Condition

31 This consent shall lapse five years after the date that the consent commences in accordance with section 116(1) of the Resource Management Act 1991, unless the consent has been given effect to before this date.

APPENDIX A –MASTER CONSENT CONDITIONS

General

1MC. The consented activity must not, individually or cumulatively, result in:

(a) adverse effects of saltwater intrusion into the Aupōuri aquifer;

(b) adverse effects on the hydrological functioning, including changes to water levels[3], of natural wetlands, springs and dune lakes;

(c) alterations to the extents of rivers, natural wetlands, springs and/or dune lakes;

(d) adverse effects on the significant indigenous vegetation and habitats in (terrestrial and freshwater environments of) dune lakes, springs and natural wetlands;

(e) Adverse effects on the flow levels and flow variability of rivers and streams and springs so that their habitat quality and sustainable mahinga kai, recreational, and other social and cultural values, are maintained (including sufficient flows and flow variability to maintain their habitat quality, including to flush rivers of deposited sediment and nuisance algae and macrophytes and support the natural movement of indigenous fish and valued introduced species such as trout; and

(f) lowering of the groundwater levels of the Aupōuri aquifer such that existing efficient bore takes operating as a permitted activity or in accordance with resource consent conditions cannot access the authorised volume of groundwater.

2MC. The Consent Holder shall, for the purpose of discussing the results of monitoring required under the most recent revision of the GMCP , form and maintain (including providing all administrative support) a Kaitiaki Liaison Group. The Kaitiaki Liaison Group shall comprise the Consent Holders, Waiora marae, NgāiTakoto Iwi, Te Aupōuri Iwi, and Te Rarawa Iwi, and the Northland Regional Council. The Consent Holder shall hold a meeting of the Kaitiaki Liaison Group not less than once every year in September following the preparation of the Annual Environmental Monitoring Report required to be prepared in accordance with Section 3.6 of the GMCP's.

3MC. The meeting shall be held at a time convenient for the majority of the Kaitiaki Liaison Group members.

Advice Note: *The aim of the Kaitiaki Liaison Group shall be to share information relevant to the management of the Aupōuri aquifer and to make recommendations to the Northland Regional Council on any actions required under their review authority to address any identified adverse effects. Such recommendations may be incorporated into the adaptive management plan. The minutes of the meeting shall be made available to all interested parties.*

Prior to the Exercise of Consent

~~2MC.~~4MC. Prior to the exercise of this consent, new bores and all associated monitoring equipment required to be installed for the purposes of monitoring the baseline effects in accordance with the GMCP shall be constructed and installed by a suitably qualified person(s).

[3] Avoiding "change" means that as a result of the abstraction of water; median water levels, mean annual water level fluctuations and patterns of water level seasonality (relative summer vs winter) remain unchanged.

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~~3MC.~~5MC. Where the GMCP requires that the frequency of monitoring for a parameter is continuous, then the monitoring equipment shall be installed as follows:

(a) for groundwater level recording, to the requirements of the National Environmental Monitoring Standards Water Level: Water Level Field Measurement Standard, Version 3.0.0, dated July 2019.;

(b) for conductivity sensors they must be able to record "Specific Conductance" (corrected to 25 degrees Celsius), have available software for field calibration, and be able to record across the whole expected conductivity range for the water body measured;

(c) Sensors must be installed in a secure manner to ensure stationarity over time;

(d) Instantaneous reading recorded every five (5) minutes;

(e) Recording to NZ Standard Time (NZST);

(f) Water Level readings compensated for barometric pressure prior to transmission;

(g) Telemetered to Northland Regional Council with a minimum of hourly transmission of data; and

(h) Reference points levelled to One Tree Point datum and New Zealand Vertical Datum.

~~4MC.~~6MC. Prior to the exercise of this consent, the Consent Holder shall provide to the Council's assigned monitoring officer the installation details from the suitably qualified person of all monitoring equipment that has been installed in accordance with Condition 3MC. This information will be used by the Council's Compliance Manager to determine compliance with Conditions 2MC and 3MC.

~~5MC.~~7MC. Prior to the exercise of this consent, a suitable approach to detecting and responding to saline intrusion effects during Stage 1 (Year 1) shall be prepared. The Council's Compliance Manager shall certify that the approach to detecting and responding to saline intrusion will give effect to Condition 1MC. The certified information shall be inserted into the GMCP through the process set out in Condition 8MC prior to the exercise of this consent.

Monitoring and Contingency Measures

~~6MC.~~8MC. This consent shall be exercised and monitored in accordance with the GMCP.

~~7MC.~~9MC. The Consent Holder shall, at all times, provide safe and easy access to the production bore wellhead(s) for the purpose of undertaking monitoring on the bore(s), as set out in the GMCP.

~~8MC.~~10MC. Excluding the Staged Implementation and Monitoring Review process, the GMCP may be amended at any time by the following process:

(a) Subject to Condition 8MC(d), the Council may amend the GMCP by providing notice in writing to the Consent Holder that the GMCP has been amended and providing a copy of the amended GMCP to the Consent Holder.

(b) Subject to Condition 8MC(d), the Consent Holder may submit a request for an amendment by giving written notice to the Council of the proposed amendment along with any supporting technical documents.

(c) Prior to making any decision to amend the GMCP or not, the Council will seek input on any proposed amendment from the Consent Holder and from the Director-General of Conservation.

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(d) The Council will not approve any amendment to the GMCP unless the technical assessment of the proposed change clearly indicates that the change will not result in a breach of Condition 1MC.