IN THE MATTER OF	the Resource Management Act 1991
AND	
IN THE MATTER OF	17 applications by various persons, collectively referred to as the Motutangi-Waiharara Water Users Group, to Northland Regional Council under section 88 of the Resource Management Act 1991 for the purpose of taking groundwater from the Houhora, Motutangi and Waiparera aquifer management sub-units of the Aupouri Aquifer.

Decision following the hearing of an application by 17 persons, collectively referred to as the Motutangi-Waiharara Water Users Group, to Northland Regional Council for discretionary activity water resource consents under the Resource Management Act 1991, heard in Kaitaia 26-28 March 2018.

APPLICATION NO.:	**REQ.581172**	
SUB APPLICATIONS:	**APP.038328.01.01**	Bernard Kim & Sheryl Dianne Shine
	APP.039332.01.01	L J King Limited
	APP.038471.01.01	Honeytree Farms Limited, C/- Tony Hayward
	APP.038589.01.01	Neil & Alma Violet Thompson and Steven & Josephine Suzanne Thompson
	APP.039345.01.01	Ongare Trust, C/- Ian McLarnon & Jason McLarnon
	APP.038610.01.01	Mapua Avocados Limited, C/- Murray Forlong
	APP.038591.01.01	Cypress Hills Limited C/- Alan Anderson & Carolyn Dawn Smith
	APP.038650.01.01	Tony Hewitt
	APP.027391.01.02	Ivan Anthony Stanisich
	APP.038454.01.01	Elbury Holdings Limited, C/- Kevin & Fiona King
	APP.038380.01.01	Daimen & Katherine Holloway
	APP.039381.01.01	Jonathan Brien & Carol Carr (Lamb Road)
	APP.039244.01.01	Kevin Thomas & Danielle O'Connor

	APP.038420.01.01	Largus Orchard Limited Partnership, C/- Murray Forlong
	APP.038513.01.01	Te Rūnanga o Ngai Takoto, C/- Rangitane Marsden
	APP.038410.01.01	Georgina Tui & Mate Nickolas Covich
	APP.038732.01.01	Kathy Valadares
NATURE OF ACTIVITY:	Groundwater abstraction.	
LOCATION OF TAKES:	Refer Table 2 of "Groundwater Take Consent Application – Motutangi-Waiharara Water User Group" dated 30 August 2017.	

Proposal

To extract groundwater from new takes (excepting IA Stanisich which is an increase on existing consented allocation) as follows:

Application	Name	Zone	Canopy Area (ha)	Daily Volume (m^3)	Annual Volume (m^3)	Seasonal Application Depth (mm)
APP.039244.01.01	Kevin Thomas & Danielle O'Connor	Houhora	16	400	59,600	373
APP.039381.01.01	Jonathan Brien & Carol Carr (Lamb Road)	Houhora	4	100	14,900	373
APP.039345.01.01	Ongare Trust, C/-Ian McLarnon & Jason McLarnon	Houhora	6	200	29,800	497
APP.038732.01.01	Kathy Valadares	Houhora	8	150	22,350	279
APP.038610.01.01	Mapua Avocados Limited, C/- Murray Forlong		53	1,667	248,333	469
Houhora	*Total*			*2,517*	*374,983*	*87*
APP.038610.01.01	Mapua Avocados Limited, C/- Murray Forlong	Motutangi/ Houhora	107	3,333	496,667	464
APP.039332.01.01	L J King Limited	Motutangi	20	540	80,000	400
APP.038589.01.01	Neil & Alma Violet Thompson and Steven & Josephine Suzanne Thompson	Motutangi	9	320	47,680	530
APP.038591.01.01	Cypress Hills Limited, C/- Alan Anderson & Carolyn Dawn Smith	Motutangi	9	280	41,720	464
Motutangi	*Total*			*4,473*	*666,067*	
APP.038410.01.01	Georgina Tui & Mate Nickolas Covich	Waiparera	70	1,500	223,500	319
APP.038471.01.01	Honeytree Farms Limited, C/- Tony Hayward	Waiparera	70	3,500	200,000	286
APP.038513.01.01	Te Rūnanga o Ngai Takoto, C/-Rangitane Marsden	Waiparera	60	1,300	193,700	323
APP.038380.01.01	Damien & Katherine Holloway	Motutangi	4	100	14,900	373
APP.038328.01.01	Bernard Kim & Sheryl Dianne Shine	Motutangi	10	268	40,000	400
APP.038454.01.01	Elbury Holdings Limited, C/- Kevin and Fiona King	Motutangi	30	763	113,700	379
APP.038650.01.01	Tony Hewitt	Waiparera	10	270	40,230	402
APP.038420.01.01	Largus Orchard Limited Partnership	Waiparera	60	1,300	193,700	323
APP.027391.01.02	Ivan Anthony Stanisich	Motutangi	17	430	64,070[1]	377
Waiparera	*Total*			*9,431*	*1,083,800*	

Prior to the hearing Honeytree Farms Ltd sought a reduction of its annual volume applied for, and as notified, from 521,000m^3 to 200,000m^3 (the latter being recorded in the above Table).

[1] Note: this figure is not correct as no increase in the annual volume is sought, merely an increase in the daily and weekly maximum volume.

The abstractions proposed are from the deep shell bed layer of the Aupouri aquifer for the purpose of servicing avocado orchards in the Houhora, Motutangi and Waiharara aquifer management sub-units. The combined maximum allocation rate sought was 380 L/s, 16,418 m^3/day and 2,446,350 m^3/yr.

The application by I A Stanisich is for a s127 RMA change to an existing consent condition to increase the daily take volume from 720m^3/d to 1,150m^3/day and the weekly volume from 3,000m^3/week to 8,000m^3/week without changing the consented annual volume of 120,000m^3/yr (but including a new, second bore).

The resource consents sought are **GRANTED**. The reasons are set out below.

Hearing Commissioners:	David Hill (Chairperson) Peter Callander
Application numbers:	REQ.581172
Applicants:	Various (as above)
Site addresses:	Within the Houhora, Motutangi and Waiparera management sub-units of the Aupouri Aquifer
Initial lodgement:	Variously between 5 April 2016 – 28 June 2017[2]
S92 Hold	Variously between 14 June 2016 and 28 June 2017
S92 hold removed	11 October 2017
Limited notification:	27 October 2017
Submissions closed:	24 November 2017
Hearing commenced:	26 March 2018
Hearing closed:	7 May 2018
Appearances:	The Applicant: Jon Williamson (Hydrologist, Director - Williamson Water Advisory). Martell Letica (Planner, WSP-Opus) Submitters: Lisa te Heuheu – Te Runanga o Te Aupouri Gabriele Pfaender Donna Stanisich for George Stanisich Catherine Murupaenga-Ikenn for Judith Wright Paul Sucich for Richard Sucich Norman Bryan Katherine Valadares Ivan Buselich Albert Burgoyne and Hoane Karekare Eric Wagener Robert Campbell Antony Delaney Kathleen Kerr

[2] Letica, Statement of Evidence, Table 1 para 4.14

	Karen Nikora-Kerr Sandra Simpkin Alan Macrae and Theresa Burkhardt <u>For the Department of Conservation</u> May Downing (Counsel) James Blyth (Wetland hydrology) Timothy Baker (Wetland hydrogeology) Shona Myers (Wetland ecology) Jacob Williams (Planning) Graeme Silver <u>Tabled:</u> Donald Woodcock <u>For Council:</u> Brydon Hughes (Consultant Hydrogeologist) Catherine Reaburn (Consultant Planner) Alissa Sluys (Hearings Administrator)

Summary Decisions:

1. Pursuant to section 37 and section 37A of the Resource Management Act 1991, the late submission from Kathleen Kerr, 16 Whalers Road, Pukenui is accepted.

2. Pursuant to section 104 and 104B of the Resource Management Act 1991, the individual discretionary activity water abstraction consents sought by those under the collective Motutangi-Waiharara Water Users Group are granted.

3. Pursuant to s127 RMA, the change of condition sought by I A Stanisich is granted.

Introduction

4. This decision is made on behalf of the Northland Regional Council (NRC) by Independent Hearings Commissioners Mr David Hill (Chairperson) and Mr Peter Callander appointed and acting under delegated authority under sections 34 and 34A of the Resource Management Act 1991 (the RMA).

5. This decision contains the findings from our deliberations on the application for resource consent and has been prepared in accordance with section 113 of the RMA.

6. While the application relates to 17 separate water abstractions (one of which is for a change of existing consent condition), NRC preferred the applications to be managed as a single entity and therefore placed each application into a s92 RMA holding pattern pending further information about the wider aquifer – which encouraged the formation of the MWWUG in mid-2016 to rationalise and share the costs of the further investigation required. Once that s92 RMA information was to hand all applications were taken off hold and processing recommenced as a composite bundle.

7. In similar vein, we adopt the approach of issuing one composite decision for the 17 “sub-applications” – albeit we recognise that each application formally stands alone in terms of consent conditions and appeal rights.

8. The applications were limited notified to 1047 identified owners/occupiers of adjacent properties on 26 October 2017 and to 9 iwi groups on 27 October 2017, with submissions closing on 24 November 2017. It was agreed (there being some earlier confusion on the matter) that 57 submissions were received in time – 42 in opposition; 7 neutral; 8 in support.

9. One late submission was recorded from Kathleen Kerr (completed on-line but misplaced). There was no objection to accepting that submission and, having considered the relevant matters under s37A(1) RMA, we agree to accept that submission.

10. The s42A RMA hearing report was prepared by Mr Brydon Hughes and Ms Catherine Reaburn, hydrogeological and planning consultants respectively to NRC, and grouped the key issues raised in submissions under the following topic effect areas:

- Volume of water take;
- Effect on existing bores;
- Water quality;
- Ecological;
- Salt water intrusion;
- Lack of consultation;
- Inadequacy of assessment and monitoring; and
- Cultural.

11. The report then assessed the application under the following topic headings:

- Adequacy of assessment;
- Demonstrated need for water;
- Water conservation and efficiency measures (efficiency of use);
- Effects in relation to long-term aquifer storage;
- Effects on other users of the resource;
- Likelihood of saline intrusion;
- Other water quality effects;
- Ground subsidence;
- Social and economic;
- Cultural heritage and archaeological;
- Ecological (including recharge of wetlands from aquifer) and natural character; and
- The effects of climate change.

12. The report's overall conclusion was that the proposed take(s) would have no significant adverse effect on the environment, and recommended granting the consent(s) sought for a 15 year duration (for consistency of expiry date with other existing consented takes from the Aupouri Aquifer so as to enable a comprehensive review at that time) subject to conditions (including ones based on adaptive management). A number of annual take reductions were recommended including:

    (a) Mapua Avocados Ltd from 745,000m^3 to 624,000m^3;

(b) Thompson and Thompson from 47,680m^3 to 39.350m^3;

(c) Ongare Trust from 29,800m^3 to 23,370m^3.

13. Mr Hughes and Ms Reaburn provided a supplementary written statement in opening, and orally in response, confirming their overall recommendation with further recommendations on the revised annual volumes sought by some applicants post-lodgement, being:

(a) Mapua Avocados Ltd, an increase back to its "original" 745,000m^3;

(b) Honeytree Farms Ltd, an increase from its 200,000m^3 reduction to 372,000m^3;

(c) Kim and Shine, an increase from 40,000m^3 to 50,184m^3;

(d) Ongare Trust an increase from Council's recommended 23,370m^3 to 24,000m^3;

(e) Valadares an increase from 22,350m^3 to 48,000m^3.

14. The supplementary report provided further discussion and conclusions on:

(a) Changes to water allocation limits and legal descriptions for applicants;

- Scope;
- Water demand and efficiency of use;
- Comments on individual applications;

(b) Water meter conditions;

(c) Effects on existing water users;

(d) Community liaison group;

(e) Monitoring Plan conditions;

- Monitoring Plan approval;
- Complaint procedures;
- Water quality monitoring; and
- Cost of monitoring and data ownership; and

(f) Advice notes.

15. The matter was heard in Kaitaia on 26-28 March 2018, and adjourned for further consideration of conditions between applicant and Council and the Department of Conservation (which was particularly concerned about potential adverse effects on the Kaimaumau wetland). Following receipt of a finalised set of draft conditions and written reply, the hearing was finally closed on 7 May 2018.

Site description

16. A comprehensive site description (geology, climate, hydrogeology, and recharge and discharge characteristics) is contained in section 2 of the s42A report and summarised in section 4 (Physical Setting – landform, soils, land use, hydrogeology, wetlands, surface waterways, and drainage schemes) of Mr Williamson's statement of evidence. Those broad descriptions were not challenged and, for present purposes, we adopt and cross-refer to them. In doing so we acknowledge that not all parties necessarily agreed with the inferences drawn by the applicant from those descriptions.

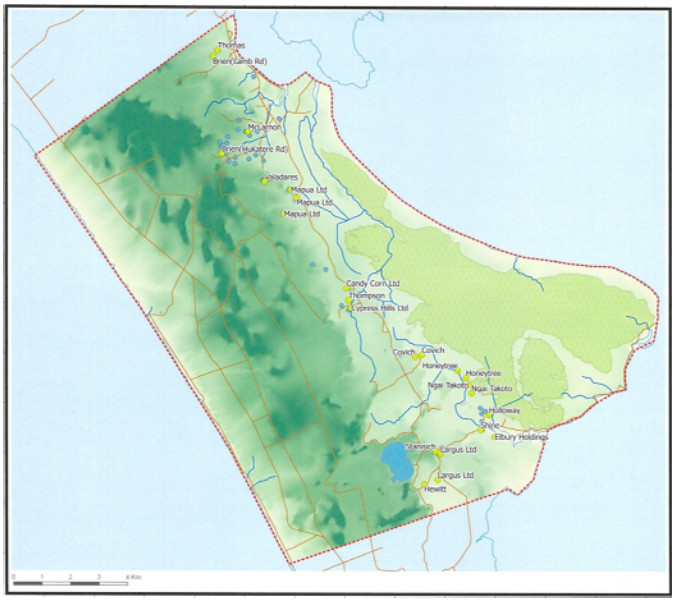
17. Current abstractions occur from within two layers of the aquifer, an upper, shallow sand layer (at approximately 40m to 70m BGL) and a deeper shellbed layer – the present applications are to abstract from the deeper shellbed layer – between which is a very low permeability, but discontinuous iron pan layer of varying thickness and extent interspersed with peat, lignite and silt.

18. Two discrete shellbed units have been identified[3] separated by a thin fine sand or silt layer, the upper being from approximately 80-90 mBGL, averaging in thickness from 5m to 10m, the lower typically between 100 -115 mBGL, averaging in thickness from 5m to 15m.

19. Mr Williamson characterised[4] the aquifer as one exhibiting "leaky confinement" – being progressively confined at depth – and this attribute was conservatively adopted for modelling purposes.

20. The Kaimaumau wetland – characterised by Williamson[5] as primarily a bog system[6] (i.e. recharged by rainfall rather than surface / groundwater) with fens – lies to the southeast and northeast of the proposed takes.

21. The general location of the applications is shown in the following figure:



Summary of proposal and activity status

22. In short, the proposal is to abstract water for the purpose of avocado horticulture at varying daily rates and annual amounts by 17 applicants (including one application to vary an existing condition to abstract an increased volume) from the three management sub-units of the Aupouri Aquifer – being the Houhora, Motutangi and Waiparera sub-units. As sought the daily rates range from 100m^3/d to 5,000m^3/d, with corresponding annual volumes ranging from 14,900m^3/yr to 745,000m^3/yr.

23. Resource consent is required under the operative Regional Water and Soil Plan for Northland 2004 - updated 2016 (RWSP) as follows:

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[3] Williamson, Statement of evidence, para 32
[4] Williamson, Statement of evidence, para 33
[5] Williamson, Statement of evidence, para 35
[6] Also described by Ms Myers as a peat bog system dominated by oligotrophic peat forming bog and fen vegetation - Statement of evidence, paras 16 and 21

Rule 25.3.1 states:

The taking, use or diversion of groundwater from an aquifer, and any associated discharge of groundwater onto or into land or into water, which does not meet the requirements of the permitted, controlled or non-complying activity rules is a discretionary activity.

That rule is explained as follows:

Explanation: *This rule applies to any new groundwater (including geothermal) takes from any aquifer and any existing but unlawful takes from those aquifers. The requirement for a water meter will be determined at the time of application. Rule 25.03.01 applies to all new applications and to any application for the replacement of an existing resource consent. The average annual recharge on the aquifer will be estimated using information collected from groundwater investigations from the Aupouri, Kaikohe, Maunu-Maungatapere-Whatitiri aquifers and using a simple water balance/model for other aquifers.*

24. Overall the applications are to be assessed as a discretionary activity under s88A RMA because the individual applications were lodged before the proposed Regional Plan for Northland (PRP) was notified in September 2017 – and under which the relevant activity status under Rule C5.1.12 is non-complying. Furthermore, as further submissions on the PRP only closed on 26 March 2018, that protected status remains live. That "protected" activity status was not in dispute.

25. The s42A report records[7] that Lincoln Environmental (2015) reported the estimated total annual recharge to the Aupouri Aquifer to be approximately 374 million m^3/yr (or equivalent to 4,968m^3/ha/yr) covering an area of approximately 75,000 ha.

26. The relevant aquifer sub-management units (10) are identified in Table 12 of the PRP, with proposed maximum allocation limits for each of the three sub-units as follows:

    (a) Houhora 2,141,300m^3/yr = 11% of annual average recharge;

    (b) Motutangi 1,069,600m^3/yr = 10% of annual average recharge;

    (c) Waiparera 2,312,200m^3/yr = 10% of annual average recharge.

27. Those limits are considered policies rather than rules under the PRP, and are relevant as Council's current best scientific assessment of what it conservatively considers sustainable abstraction limits. We understand that appeals have been lodged seeking *increases* to those limits, and therefore we must be careful regarding how much weight to place on them. However, we were advised by Council that there are no appeals specifically seeking to *reduce* those limits, therefore they remain valid as a threshold for our purpose.

28. One of the difficulties Commissioners had was determining what the actual application volumes were.

29. In the applicant's evidence[8], the percentage of the annual allocation limit that would be consumed, in addition to currently allocated volumes, if all the notified allocations were granted as sought, was advised as follows:

    (a) Houhora 374,983m^3/yr = from 49% to 66% of allocation limit;

[7] s42A Hearing report, section 2.4 para 21

[8] Williamson, Statement of evidence, Table 2 para 17

(b) Motutangi 666,067m^3/yr = from 35% to 97% of allocation limit;

(c) Waiparera 1,405,300m^3/yr = from 12% to 73% of allocation limit.

30. The s42A report provided slightly different quanta[9] and percentages as follows:

(a) Houhora 374,983m^3/yr = from 49% to 70% of allocation limit;

(b) Motutangi 666,067m^3/yr = from 35% to 98.7% of allocation limit;

(c) Waiparera 1,083,800m^3/yr = from 12% to 61.1% of allocation limit.

31. That difference reflects different numerical values for the current allocation status – Council's current values for all sub-units being higher than Williamson's – as well as the difference in the value for the proposed Waiperera take volume arising from the reduction advised by Honeytree Farms Limited from 521,500m^3/yr to 200,000m^3/yr.

32. We were told that Council includes an allocation for s14(3)(b) RMA permitted activity uses in their current allocation figure, and that this allowance explains the higher value difference.

33. The s42A recommendation was to reduce those proportions as follows:

(a) Houhora 328,220m^3/yr = from 49% to 67.9% of allocation limit;

(b) Motutangi 577,070m^3/yr = from 35% to 90.4% of allocation limit;

(c) Waiparera 1,083,800m^3/yr = from 12% to 61.1% of allocation limit.

34. By the end of the hearing the applicant had amended[10] the sub-unit allocations sought as follows:

(a) Houhora 394,833m^3/yr = from 49% to 67% of allocation limit;

(b) Motutangi 657,737m^3/yr = from 35% to 97% of allocation limit;

(c) Waiparera 1,265,984m^3/yr = from 12% to 67% of allocation limit.

Overall, including existing allocations, this represents 73% of the annual allocation limits for the three sub-units combined – i.e. 4,026,989m^3/yr of the available 5,523,100m^3/yr – an overall reduction from the 75% sought per paragraph 23.

35. Council's final position was to recommend an increase of 3,000m^3/yr for Mapua Avocados Limited over its initial recommendation, and 85,000m^3/yr for Honeytree Farms Limited over its reduced volume, which results as follows:

(a) Houhora 329,220m^3/yr = from 49% to 67.9% of allocation limit;

(b) Motutangi 579,070m^3/yr = from 35% to 90.6% of allocation limit;

(c) Waiparera 1,168,800m^3/yr = from 12% to 64.7% of allocation limit.

36. We return to this matter later in this decision.

Procedural and other matters

37. No directly relevant procedural matters were raised for consideration.

[9] s42A Hearing Report, Table 4 para 92

[10] Williamson, Supplementary evidence, Table 1 para 4

38. A number of submitters raised concerns with respect to Council's earlier decision to only *limited* notify the application(s), contending that was inappropriate in light of wider interests in the matter of water allocation and the Aupouri Aquifer in particular. Those submitters generally sought an adjournment for the purpose of publicly notifying the application(s).

39. As explained at the hearing, that is not a matter that falls within the jurisdiction of a first instance hearing decision-maker once that notification decision has been made. Rather, that is a matter for judicial review by the High Court should parties wish to exercise that option. We did not understand any party to have taken that option.

40. For the record, we also note that the evidence given and representations made at the hearing left us in little doubt that the issues of concern to the community were fully and ably expressed, and understood by us. Regardless of the jurisdictional point, we express the provisional opinion that it is unlikely that wider notification would have produced new or different information relevant to our consideration. As has been repeated often, the RMA is not a numbers game in terms of parties involved.

41. We also sought information about the lawful status of any existing water takes as we understood that a number of applicants have existing avocado orchard developments. That information would be relevant in the event that we determined that prudent allocation limits were such that either some but not all of the applications should be granted or that lesser levels of take should be considered. Council has advised us that there are none such. Therefore, there are no existing use rights, relevant consents or unimplemented consents for us to take into consideration – other than that of Mr Stanisich as already noted.

42. Finally, we extended the s115(2) RMA statutory period for decision under s37(1)(a) RMA, having taken into consideration the matters required of us under s37A RMA, on Friday 25 May 2018, for a period of 10 working days to Monday 11 June 2018 to enable Council to finalise the complete the schedule of consents for each of the 17 applicants following receipt of our Decision.

Relevant statutory provisions considered

43. In accordance with section 104 of the RMA we have had regard to the relevant statutory provisions, including the relevant provisions of Part 2 and sections 104 and 104B.

Relevant standards, policy statements and plan provisions considered

44. In accordance with section 104(1)(b)(i)-(vi) of the RMA, we have had regard to the relevant policy statement and plan provisions of the documents noted below – the relevant provisions of which are assessed in section 8 of Ms Letica's evidence and throughout section 4 of the s42A hearing report. The identification of these provisions was largely agreed.

45. Having reviewed those provisions and particularly the objectives and policies, we confirm and adopt them. Therefore, there is no need to repeat the details in this decision. Those provisions are contained in the following statutory documents:

- Regional Policy Statement for Northland 2016 (the RPS);
- Consolidated Regional Water and Soil Plan – Updated 2016 (the RWSP);
- Proposed Regional Plan for Northland (NRP) 2017 (the PRP).

46. The Resource Management (Measurement and Reporting of Water Takes) Regulations 2010 also apply. The regulations require a permit holder that exceeds specified pumping rate thresholds to keep records that provide a continuous measurement of the water taken under a water permit, including water taken in excess of what the permit allows.

47. While the National Policy Statement for Freshwater Management 2014 (NPSFM) (amended 2017) and the New Zealand Coastal Policy Statement 2010 (NZCPS) were referenced – and are clearly relevant – the key provisions of those documents are fully encapsulated in those more recent regional documents.

48. No other national policy statements or environmental standard were identified as being relevant to this consent and we accept that to be the case. In that regard we note that a number of submitters sought to engage issues contingent upon the eventual proposed horticultural activity of avocado production – namely, the use of pesticide sprays. For the record, we note that such are not matters that are directly engaged by the present applications for water abstraction. Accordingly, we have no present jurisdiction to consider those putative effects. If resource (or other) consent is subsequently required, then such will need to be applied for and considered at the appropriate time. Regardless, we acknowledge the sincerity of the concerns expressed regarding the need to safeguard the aquifer from sources of potential contamination.

49. We do not consider any other matter to be relevant and reasonably necessary to determine the application in accordance with section 104(1)(c) of the RMA. While a number of submitters made reference to other non-statutory documents we were not persuaded that those added materially to the relevant provisions of those national and regional documents cited above.

Permitted baseline / existing environment

50. There is no particularly relevant permitted baseline, including known unimplemented resource consents, which might have a bearing on this matter. Current allocation rights have been taken into account in the modelling and other work undertaken and, subject to appropriate limits and conditions, would not be adversely affected by the granting of consent.

51. In passing we note, as we did above, that the issue of potential contamination of air, water and ground from the use of horticultural / agrichemical sprays was raised by a number of submitters. One of the responses Ms Letica made to that matter was to refer to the permitted activity standards and rules of various regional plans (the Regional Air Quality Plan, RWSP and PRP)[11]. She expressed her opinion that it would be for applicants to decide whether their subsequent activities complied with those permitted activity rules or required additional resource consents. That was not a matter required to be determined under the present groundwater take application.

52. We agree that is the correct position on the question. Granting consent to the groundwater abstraction, should that be the outcome, is independent of any inputs that the land use might subsequently require. Nor would it constitute a precedent for approving any subsequently required resource consent application. If an air or land discharge consent is required, the fact of having a groundwater take consent would not be a determining consideration.

[11] Letica, Supplementary evidence, Annexure 1 – Permitted activity rules for use of agrichemicals

Summary of evidence / representations / submissions heard

53. The s42A Hearing report by Council's reporting officers, Mr Hughes and Ms Reaburn, was circulated prior to the hearing and taken as read. That report attached a peer review letter report[12] of the hydrogeology undertaken by Mr Brydon Hughes for NRC, and a water use assessment by Ms Angela Stride, NRC Water & Wastes Management Officer.

54. The evidence presented at the hearing responded to the particular issues and concerns identified in the s42A recommendation report and submissions.

55. The evidence, all of which had been pre-circulated, presented by the applicant's witnesses at the hearing are summarised below:

    Mr Jon Williamson, owner / director of Williamson Water Advisory, provided background to his involvement with the applicants. Among other matters he described the water allocation framework, the scope of investigative work undertaken, the key features of the MODFLOW-USG model developed and the predictive simulations run, addressed concerns relating to potential drawdown and/or interference effects, allocation amounts and limits, climate change, aquifer contamination and saline intrusion risk, and reviewed the s42A report and recommended amendments to conditions – raising particular concerns about the necessity and cost of some of the reporting and monitoring provisions.

    Ms Martell Letica, a consultant planner with WSP-Opus Limited, gave planning evidence in support of granting the application. Ms Letica provided a detailed assessment against what she considered the relevant planning framework and statutory documents; addressed submissions and the s42A hearing report; and evaluated the key effects in light of those provisions in terms of: the receiving environment, aquifer sustainability and saline intrusion, efficient use of water, drawdown and ecological, water quality, cultural, socio-economic, climate change, and scientific uncertainty effects. Ms Letica concluded that the applications were consistent with the relevant planning documents and could be adaptively managed.

56. We received extensive representations from the submitters identified at the head of this Decision – both in support of the applications and in opposition.

57. Submitters in support generally emphasised the local employment and economic value that would be achieved from the abstractions sought and the contribution that avocado production would have more widely. They relied upon the work of MWWUG's professional advisers for the conclusion that the adverse effects would not be significant on or for the aquifer, the domestic user community, or the Kaimaumau wetlands.

58. Submitters in opposition elaborated on their concerns, particularly about the potential effect on their existing consented bores, downstream changes to the landscape, potential effects on the Kaimaumau wetland, risks of saline intrusion, aquifer collapse, future uses, the sustainability of avocado production, chemical leaching, and perceived errors in the application documentation and evidence. Many of those submissions were critical of both the applicant and Council with respect to the consultation and submission process followed – even though it was not evident to us that either process fell outside of the RMA's requirements.

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[12] LWP Water permit application – Motutangi-Waiharara Water Users Group (MWWUG), Aupouri Peninsula, dated 19 September 2017

59. The Department of Conservation filed evidence and appeared as follows:

Ms May Downing, Counsel, made legal submissions opposing a grant of consent and, in particular, submitted that the adaptive management approach proposed fell short of the Supreme Court's threshold factors identified in the well-known King Salmon case. Ms Downing concluded that, on the basis of her witnesses' evidence, as there was an insufficient evidential foundation, the approach proposed could not respond to the uncertainties and data gaps identified. Ms Downing was also critical of the draft conditions proposed which, she submitted, failed the relevant legal criteria. In view of the fact that the higher order documents establish "a clear message" with respect to the adoption of precaution and avoidance of adverse effects with respect to the Kaimaumau wetland, she sought a decline of consent. In the alternate, Ms Downing offered the Department's assistance with refining a suitable suite of conditions.

Mr James Blyth, consultant hydrologist with Jacobs NZ Limited, gave evidence on wetland hydrology, discussed his Company's present work on hydrological monitoring of the Kaimaumau wetland, raised concerns regarding Mr Williamson's assumptions regarding the wetland's isolation from groundwater inputs, and gave his concluding opinion that sufficient uncertainty existed about the connectivity that further investigation was required, including additional radon sampling, water balance modelling and local groundwater investigations within the wetland, and the applications should be declined.

Mr Timothy Baker, consultant hydrogeologist with Jacobs NZ Limited, gave evidence and a supplementary statement on groundwater in which he was critical of what he considered the limited amount of baseline data, reliance on anecdotal evidence, inappropriateness of applying a regional model to local scale effects, interpretation issues relating to radon and groundwater connectivity across the large wetland, the spatial distribution of calibration points in the model, and shortcomings in the draft GMCP. Mr Baker concluded that, given those concerns, the level of uncertainty was such that a presumption of minor or less adverse effect on the wetland was premature and the applications should be declined.

Ms Shona Myers, self-employed consultant ecologist, gave evidence and a supplementary statement on the Kaimaumau wetland ecology, its values and national significance. She described the vegetation types, it's rare and threatened plant species, the importance of hydrology to the wetland function, the existing threats from drainage, fire and weeds, and outlined concerns that any drawdown of greater than normal variations would have for those species and the wetland's function. Ms Myers concluded that the application was currently deficient in any detailed analysis of potential ecological effects from the proposed water takes.

Mr Jacob Williams, planner, gave evidence on the policy requirements that apply with respect to the Kaimaumau wetland focussing his evidence on the Reserves Act 1977, the Northland Conservation Management Strategy, the NZ Coastal Policy Statement (and policies 3 and 11 in particular), and the Northland RPS (policies 4.4.1(1) and (4)(b) and PRP (policy D.2.8), concluding that the applications should be declined unless no adverse effect on the Kaimaumau wetland could be demonstrated.

Principal issues in contention

60. In terms of section 104(1)(a) of the RMA, the actual and potential effects of allowing the activity on the environment, we note that there was little agreement regarding the nature and significance of related effects and whether those could be managed.

61. The principal matters in contention were as follows:

(a) The physical nature of the aquifer - is it one or two?

(b) Whether the sub-units provide an appropriate scale of management for a local "effects" level assessment;

(c) Whether existing lawful bore owners will be compensated should levels drop below their pumping head, requiring deepened bores;

(d) Recharge;

(e) Whether the abstraction quantum applied for (individually, collectively or by sub-unit) is likely to have an adverse effect on the protected Kaimaumau wetland scientific / conservation reserve;

(f) The spatial basis on which the volumetric calculations are made – i.e. general land area or canopy area;

(g) Whether daily or weekly volume limits are appropriate;

(h) Whether the proposed abstraction risks the well-being of present and future communities on the Aupouri peninsula by damaging the only reasonably available groundwater supply;

(i) Whether an appropriate adaptive management regime can be implemented; and

(j) Whether a more formal co-ordinating structure is required.

62. These issues are discussed in the following section.

The aquifer

63. We received and heard extensive evidence on the nature and characteristics of the Aupouri Aquifer from Mr Williamson and Mr Hughes – and additional commentary from Mr Baker and Mr Blyth with respect to the Kaimaumau wetland. We were also apprised of the fact that the aquifer had been investigated and reported on for NRC by Lincoln Agritech[13] in 2015 – which report was a foundation technical document for present purposes.

64. While there was disagreement regarding the extent to which connectivity between the various layers of the aquifer and surface features occurs, and the role of rain/surface water, there was general agreement that the aquifer should be considered a single entity. Certainly, that was the structural basis upon which Mr Williamson developed his model, which he described and summarised in evidence (supported by his more detailed technical report[14] submitted with the applications) as covering an area of 203 km^2 and consisting of 90,048 active Voronoi (or polygonal) cells and 6 layers.

65. Mr Williamson further described[15] the 4 model scenario assessments undertaken, being:

(a) ***Scenario 1: Base case*** – the calibration model which includes the current 35 consented groundwater takes at a peak abstraction rate of 11,810 m^3/day;

[13] Lincoln Agritech: Aupouri Aquifer Review (2015)

[14] Williamson: Motutangi-Waiharara Groundwater Model, Factual Technical Report – Modelling, Final - Rev 9, 31 August 2017

[15] Williamson, Statement of evidence, para 59

(b) ***Scenario 2: Proposed Extraction*** – includes current and proposed groundwater extraction totalling a combined peak rate of 16,775 m^3/day;

(c) ***Scenario 3: Possible Future Allocation*** - a set of three simulations to assess the effect of potential future groundwater allocation from incrementally increasing levels of development; and

(d) ***Scenario 4: Lower Leakage*** – a set of three simulations using the proposed extraction rates, to assess interference effects in the shellbed aquifer with progressively reduced permeability Layer 2.

66. Mr Williamson noted that Scenarios 2 and 4c were particularly relevant because Scenario 2 produced the largest impact on shallow aquifer water levels and discharges to drains, stream and the wetland, while Scenario 4c produced the largest interference effects. However, he cautioned and concluded that given the conservative nature of the inputs, the predicted effects would be no more than minor[16].

67. Mr Hughes had peer reviewed the modelling for NRC, concluding that overall it was fit for purpose, being "*appropriately constructed and provides a useful tool to assess potential effects associated with groundwater abstraction at a regional scale*."[17]

68. Based on the evidence from the applicant, Council experts and submitters we are well aware that the Aupouri Aquifer has a vulnerability due to its connection to the sea and the variable amounts of rainfall recharge related to climatic changes and the clearing and planting of forestry blocks. The lowering of groundwater levels due to more abstraction poses a risk of seawater intrusion and a risk to the ability of existing users to abstract groundwater and on the health of the Kaimaumau wetland. But all these aspects of the balance between aquifer recharge and abstraction and the risks that may result are inter-related for abstractions at any location and depth within the aquifer.

Finding

69. Regardless of arguments about sub-regional circumstances, we find no sensible basis on which the aquifer should be considered (and managed) as anything but a single integrated unit.

Sub-unit management

70. The Section 32 Report to the PRP (pages 123-124) contains the following explanation for the adoption of the 10[18] sub-unit management approach to the Aupouri Aquifer, reflected in D4.17 Table 12 of the PRP:

Note that we are also proposing specific (that is, tailored) allocation limits for a number of aquifers within the Aupouri Peninsula. We have collected groundwater level and groundwater quality information on the Aupouri aquifer since the 1980's. The information has allowed us to develop an understanding of the system This includes producing reports such as Aupouri Peninsula Water Resource Assessment 1991, Aupouri Aquifer Sustainable Yield Modelling Study 2000, Awanui Modelling Report 2007, and the most recent comprehensive modelling report Aupouri Aquifer Review 2015.

[16] Williamson, Statement of evidence, para 62

[17] Hughes, Water Permit Application [MWWUG]... Aupouri Peninsula, 19 September 2017, para 3.3.12

[18] That is, 9 named sub-units plus 1 "Aupouri - Other".

The 2015 report describes the conceptual understanding of aquifer, the rainfall recharge mechanisms and recharge rates based on soil moisture balance modelling. The report divides the aquifer into nine subzones based on a number of factors including land use, groundwater flow direction, topography and areas of high demand. A numerical model of the aquifer was then used to assess how much water could be taken from each subzone on an annual basis without causing saltwater intrusion into the aquifer along the coast. The levels of uncertainty in the results for each zone were assessed and climate change predictions were also applied.

[Underlining added].

71. While, as already noted, that Table is currently under appeal, we do not understand those appeals to challenge the sub-units themselves, rather the limit values.

72. Other than the summary explanation above we were not provided with a detailed explanation for the determination of sub-unit boundaries – which, of course, come to the fore as the allocation limits are approached.

73. While those sub-unit limits are under appeal, and are therefore not operative, the combined allocation sought from the Motutangi sub-unit approaches the notified limit and, subject to the outcome of the appeal, potentially locks out any further abstraction from that sub-unit if granted. That is an issue of lesser concern for the other two sub-units, which even at the volumes sought would be less than 70% allocated, albeit the 50% increase from the Waiparera sub-unit merits careful consideration.

74. However, we do not infer from the explanation above that those sub-unit boundaries represent hard, non-permeable, physical boundaries such that groundwater flow is prevented across those boundaries – rather they are rational, pragmatic user-management boundaries; an administrative proxy if you will.

75. Having said that, those sub-units are not particularly helpful when it comes to making an assessment of potential effects at a specific point such as an existing bore. For that we need a finer-grained tool to calculate drawdown and other interference effects – which Mr Williamson provided through his modelling.

76. His evidence[19] was that the maximum drawdown effect on a number of specified submitter bores would vary between 0.2m (in shallow aquifer bores) and 1.5m (in deep aquifer bores) – which, in the context of a saturated aquifer of >100m thickness, was a no more than minor effect. He also provided[20] two maps showing more broadly what he considered worst-case drawdown scenarios for the shallow (0.2m – 0.6m) and the deep aquifer (0.6m at the coast – 2.4m).

Finding

77. We find the spatial division of the aquifer into sub-units with disputed annual abstraction limits to be of guidance value only in determining the present applications. As such, the fact that the abstractions sought in any particular sub-unit approach that unit's notified limit is not a matter that should attract exaggerated weight – reminding ourselves that even the 100% limit is still a conservative 10-11% of the "agreed" annual recharge rate.

Lowering of water levels affecting bore yields

78. A number of submitters expressed concern about the implication of drawdown affecting their existing ability to pump from their bores – the pumps being stranded – and sought compensation as a condition of any consent in that circumstance.

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[19] Williamson, Statement of evidence, Table 4 para 71

[20] Williamson, Statement of evidence, Figure 3 para 75

79. In response, the s42A authors noted two matters:

(a) Caselaw[21] has established the principle that where a pump is stranded, the right to access an aquifer for the purpose of abstraction is not frustrated if by using a different pumping system and/or by modifying the bore (e.g.by going deeper into the aquifer) that right can still be exercised (regardless of whether it requires additional consent); and

(b) The relevant current regional policy (Policy 10.5.1 – Sustainable Use and Development - of the RWSP) requires "*efficient bore takes*", which is explained by example to mean that the bore fully penetrates the water bearing layer and takes water from the base of the aquifer, not just from the top of the available lens.

Finding

80. While the modelling suggests that it is unlikely that any existing bores will be affected[22], in the event that they are, the fact that this aquifer is considered technically as one aquifer provides no basis for such a compensation condition as is sought. In that event, access to water through the deepening of bores will satisfy the consented take.

81. Because the cost of deepening bores, certainly if from the bottom of the shallow to the deep aquifer, could be considerable, and is not predicted to be necessary by the applicant, we are not prepared to find that some form of compensation would not then be appropriate. That however is purely speculative and not consistent with the technical evidence presented to us. The model has been found to be appropriate and the predictions follow – and conditions requiring monitoring will provide an early warning system if reality varies from prediction. In that case a review of conditions could be initiated by the Council (s128 RMA), which could include an assessment of mitigation actions to be implemented by the offending abstractor(s). Such mitigation might also consider including a contribution to the deepening of a neighbouring abstraction bore in the event of a significant lowering.

82. However, a further difficulty arises because this is not formally a single application with a single applicant. In order to contemplate some sort of compensatory response it is first necessary to establish a cause and then be able to attribute it to a particular activity or series of activities. It is to be hoped that the predictions made, and accepted by us, render that prospect null and void.

Recharge

83. Mr Williamson used a vadose zone modified Soil Moisture Water Balance Model (SMWBM) for estimating groundwater recharge, identifying three different soil types and land uses as follows:

- **Coastal sand zone** – loose and permeable sand situated on the east and west coast of the model domain. This dune sand has high soil infiltration and percolation rate, medium soil moisture storage, and limited surface runoff.

[21] e.g. Opiki Water Action Group Inc v Manawatu Wanganui Regional Council (W64/2004)

[22] Noting that authorised bore pump depths were provided for consideration

- **Weathered sand zone** – Inland sands are progressively more consolidated with distance from the coast. The weathered sand zone, located in the central part of the model domain, has a relatively high soil infiltration (albeit less than the coastal sands) and moderate soil moisture storage.
- **Plain zone** – the plain zone represents the peat overlaying iron pan surface deposits in Kaimaumau wetland area located at the southeast of the model domain. This zone has low infiltration capacity and medium soil moisture storage, with the iron pan restricting the vertical drainage of water, which leads to saturated soils and a higher surface runoff component.

84. The resultant average annual water mass balance for each recharge zone – based on the Lincoln Agritech modelled annual recharge rate of 540 mm for the dune sand beneath Aupouri Forest, accounting for 43% of annual rainfall and 30% of annual rainfall recharges to the Kaitaia Swamp - was calculated as follows:

Recharge zone	Groundwater recharge	Evapotranspiration	Runoff
Coastal sand zone	43%	52%	5%
Weathered sand zone	38%	54%	8%
Plain zone	10%	56%	34%

85. However, as Mr Williamson noted during the hearing, a significant amount of the recharge comes from the forested areas along the western corridor – and which, we understood, is currently undergoing extensive harvesting. Furthermore, he advised that the removal of larger trees and their replanting will release substantially more recharge rainwater into the aquifer over the next decade or so as those replantings grow to maturity and eventually mirror recent current tree-growth water demand. Mr Williamson did not attempt to quantify the magnitude of that "released" demand, but logic suggests that it would be considerable at the time of harvesting, but would then reduce as the next stage of tree planting starts to mature.

86. We also note Council's response[23] that the Lincoln Agritech report characterised the aquifer as being *discharge-driven* rather than *recharge-driven* because groundwater recharge can only enter the deeper sediments if there is discharge to accommodate it. Discharge by means of pumping from the deep aquifer layer therefore effectively stimulates the movement of recharge into that deeper strata.

87. We agree with those submitters who pointed out the apparent inconsistency between the applicant's assertion that the low permeability layer (including iron pans) between shallow and deep parts of the aquifer would protect the Kaimaumau wetland from the abstraction effects from deep bores, but would not pose an impediment to infiltrating rainfall recharging the deeper aquifer strata. But such uncertainty has been covered off by the range of scenarios simulated by the various groundwater modelling exercises that have been undertaken. We have sought to strengthen the applicant's Groundwater Monitoring and Contingency Plan to ensure measurements are made of the actual effects that result from the new abstractions and that actions can be implemented to avoid or mitigate any unexpected adverse effects.

[23] Reaburn and Hughes, Key points for closing, page 4 of 8

Finding

88. Based on the technical information from the Applicant and Council experts, there is agreement that the amount of recharge to the aquifer can comfortably sustain the level of groundwater abstraction that is proposed. As with many groundwater development scenarios there is a degree of uncertainty about the magnitude of change that might occur, but this can be adequately addressed through an adaptive management strategy as set out in the Groundwater Monitoring and Contingency Plan.

Kaimaumau Wetland

89. We understood that the "Kaimaumau wetland" has three administrative / regulatory statuses: Scientific Reserve (955 ha) under the Reserves Act 1977, Conservation Area (part of a wider 2,312 ha wetland and dune system) under the Conservation Act 1987, and "general" wetland.

90. The Department of Conservation (DoC), in particular, provided legal submissions and expert evidence of its concerns that, in essence, the applicant's characterisation of the groundwater relationship outside, between and within the wetland system, and the prediction of the magnitude of effects left sufficient uncertainty, in terms of the potential risk of irreversible effects to and on the wetland and its nationally important ecosystem, that consents should be refused. Alleged inadequacies in the Kaimaumau baseline data set were of particular concern.

91. Mr Baker expressed caution about the hydrogeological inferences drawn by Mr Williamson for the following summary reasons[24]:

    (a) Use of a regional scale model to assess effects at a local scale;

    (b) Use of a quantitative assessment of drawdown and reduction of flows based on anecdotal and uncalibrated data;

    (c) A poor distribution of calibration heads;

    (d) A lack of hydrological and hydrogeological data in and around the nationally significant Kaimaumau wetland, resulting in the inability to assess and report on baseline conditions; and

    (e) A lack of proposed monitoring of groundwater water levels and drain/stream flows in and around the wetland.

92. Mr Blyth[25] expressed caution about the hydrological inferences drawn by Mr Williamson, considering that further specific investigations would be required to confirm the conclusions drawn on the matter of groundwater connectivity. Specifically he suggested that those investigations would include at least the following:

    - Additional radon sampling at a number of locations within the standing water body, which would be necessary due to the uncertainty around where the groundwater upwelling could be occurring.

[24] Baker, Statement of evidence, para 62

[25] Blyth, Statement of evidence, para 58

- Water balance modelling of the wetland, using accurate LIDAR survey information to develop stage storage data (coupled with ground truthing). This model would need to be calibrated to water levels and flow at KM1 (drain) and water levels at KM4 and KM7. Flow gauging would need to be undertaken to develop rating curves at KM1 and potentially KM8, to develop daily flow time series of inflows and outflows. This model could help verify if rainfall recharge is sufficient to maintain the water levels at KM4 and the large standing water body present throughout the year.
- Local groundwater investigations around and within the wetland.

93. Various provisions of the key statutory documents (NZCPS, RPS and PRP) were enlisted in support of the conclusion that avoidance of adverse effects on the wetland was required – which in the opinion of Mr Williams required the applicant to "conclusively demonstrate"[26] that such was the case rather than rely upon what DoC contended was an inadequate evidential foundation for the applicant's proposed adaptive management regime.[27]

94. Those concerns were addressed by both Mr Williamson and Ms Letica as part of their Reply.

95. Mr Williamson responded by disagreeing with the conclusions drawn by DoC because, as he expressed it, "*the evidence was lacking situational, temporal and spatial context*". Summarising his detailed rebuttal, we understood him to mean, among other things, that:

- Not all parts of the wetland have equivalent high conservation or scientific value;
- The wetland itself clearly depends upon a low-permeability geology;
- The modelled drawdown was based upon very conservative assumptions – including as regards the leakiness of the aquifer;
- There is not a simple linear relationship between aquifer drawdown and surface standing waterbody effect because of aquifer effective porosity;
- The modelled drawdown across the wetland falls within normal seasonal variation parameters – and reached its maximum at the end of the driest season in the 60-year historical climate simulation;
- Sample radon concentrations outside the wetland are considerably higher than those within or at the point of exit from the wetland;
- the standing water in the wetland is more likely due to the high storage capacity and low drainage characteristics of the peat itself, rather than groundwater inputs; and
- The conditions of consent and in particular the Groundwater Monitoring and Contingency Plan (GMCP) provides a robust tool to monitor and mitigate any effects greater than those predicted in the Modelling Report and AEE.

[26] Williams, Statement of evidence, paras 16 and 20
[27] Downing, Legal submissions, para 20

96. Mr Williamson also disagreed with the thrust of the 5-years of baseline monitoring conditions recommended by DoC, preferring the staged adaptive management approach advanced in the applicant's revised draft conditions. That proposed approach establishes a priority schedule of pumping reductions subject to information from the sentinel piezometer monitoring bores located between the production bores and the wetland, which he considered sufficient as an early alert system ahead of any downstream effect on the wetland.

97. Ms Letica responded to the planning issues raised.

98. She stated that the wetland is not generally within the coastal environment as that is mapped in the RPS – which was developed and made operative some 6 years after NZCPS 2010 and consequently is presumed to satisfy NZCPS Policy 1, which required recognition of the extent and characteristics of the coastal environment (including, we would add, Policy 1(2)(c) " *areas where coastal processes, influences or qualities are significant, including coastal lakes, lagoons, tidal estuaries, saltmarshes, coastal wetlands, and the margins of these*."). That policy is clearly identified in the RPS (Appendix 1 - Mapping Methods, page 158 of 178) as a coastal environment assessment criterion.

99. Ms Letica also disagreed with Ms Downing's submissions regarding any statutory imperative to avoid adverse effects, noting that there are no relevant policies in either the RPS, the RWSP or the PRP that specifically require a precautionary approach, nor in the NPSFM. Certainly "protection" is enjoined, but not avoidance – which appears to be reserved to the NZCPS (variously policies 11 [biodiversity], 13 [natural character] and 15 [natural features and natural landscapes] and which, Ms Letica, opined, do not apply because the RPS has not included the wetland as part of the mapped coastal environment.

Discussion and Finding

100. Starting with the statutory documents, we have some difficulty with the argument that key policies of the NZCPS do not apply because the RPS has, it appears, not defined the Kaimaumau wetlands as being within the coastal environment. As is clear from the introductory preamble to the NZCPS, amplified in that Board of Inquiry's own report on the matter, the coastal environment is a problematic concept. While the RPS may have deliberately withheld that classification from the wetland, it may equally have overlooked that prospect for reasons that were not disclosed in evidence. Of course, under the *King Salmon* decision, repeated in *Davidson* (on which the Court of Appeal judgement is awaited with interest by the resource management community), consideration of the higher order documents under Part 2 RMA is "permissible" where there is reason to hold that there is *invalidity, incomplete coverage or uncertainty of meaning within the planning documents*. While *uncertainty of meaning* is not in play in this instance, *invalidity* and *incomplete coverage* arguably may be.

101. It seems evident that the NZCPS narrative policy on the coastal environment includes both saline and freshwater bodies in that it *includes* coastal lakes, lagoons, tidal estuaries, saltmarshes, coastal wetlands, and their margins. In the same way in which the Court has found that the determination of an outstanding landscape or feature is a matter of fact, not limited by whether it is classified as such in a district plan, so too with the coastal environment.

102. However, Ms Myers, while noting[28] that "*It* [the Kaimaumau swamp*] is contiguous with and has an unbroken transition from seawater to freshwater, and contains sequences from freshwater to brackish wetland*", did not argue that it was coastal wetland and does not reference the NZCPS in her discussion of its protection status. That appears to have been Mr Williams' interpretation.[29]

103. If Part 2 of the RMA and the NZCPS are in play, then we would need to make a finding on the issue of "avoidance" of adverse effects, rather than the lesser NPS threshold regarding minor adverse effects.[30]

104. Mr Williamson's rebuttal evidence addresses the criticisms and conclusions of Mr Baker and Mr Blyth, and includes a new updated figure showing in finer detail the modelled drawdown at 0.05 and 0.1m intervals (*Figure 2 – Drawdown in the shallow aquifer assuming leaky conditions at end of worst drought in 60-year historical record*).

105. Mr Williamson also notes[31] that there is a live Crown Mining License 35156 over a large part of the wetland in the south-west corner, and a recent consent has been issued by NRC for commercial kauri resin and wax extraction from the area of the Kaimaumau wetland adjacent to Norton Road to depths of 6m. This adds to a number of significant impacts on the wetland of which the most notable appears to be the impact of surface water drainage activities. Consequently, our impression is that the level of groundwater abstraction if all the consents become operative (less than 11% of recharge) abstracting from a deep aquifer is expected to have a very small (potentially immeasurable) impact on the wetland.

106. On balance, we are persuaded that on the basis of the conservative modelling and with the GMCP in place, including the sentinel piezometers, priority staging and review conditions proposed, any adverse effect on the wetland that threatens to be more than minor will be intercepted, anticipated and can be appropriately managed. We discuss conditions later in this decision but, at this point, note that we are not persuaded that complete and certain avoidance of effects is required, and that to do so to the requisite standard of proof would be impossible for the practical technical reasons stated by Mr Williamson and Mr Hughes, given extraneous inputs.

Land area or canopy area?

107. There was initial confusion regarding how applicants had calculated the volumes of water required, some basing their calculations on total land (orchard) area, others on actual or proposed orchard canopy area.

108. By the end of the hearing that matter had been resolved essentially in favour of a canopy area metric – and we discuss this further below in our conclusion section.

Daily or weekly limits

109. As noted above, the applications are based on the assumption of 149 days of irrigation per year.

110. The applicants' preference was for a weekly allocation limit rather than the daily allocation limit proposed by council. Both agreed that the annual volume should not change.

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[28] Myers, Statement of evidence, para 19
[29] Williams, Statement of evidence, paras 24-26
[30] Williams, Statement of evidence, para 20
[31] Williamson, Right of reply, para 14

111. Other than the obvious flexibility that a weekly limit provides, no other reason was advanced for departing from the standard daily limit approach.

Finding

112. We heard no compelling reason as to why a daily limit as applied for, and which is standard practice, should not be applied in this instance.

113. The one exception is the s127 RMA application by Mr Stanisich whose existing consent (CON20102739101) contains both daily and weekly maxima. Mr Stanisich also sought a change to the weekly maxima since the existing 3,000m^3/wk is impractical in terms of the new daily rate of 1,150m^3/d sought. For consistency with that existing consent we have agreed to that change.

Present and future domestic users

114. As the aquifer is the sole source of groundwater for the local communities submitters expressed a reasonable concern that the safety and security of supply of that source of potable water be safeguarded. That concern for the health of the supply was expressed in both social and cultural terms - noting that, with respect to the latter, while Te Runanga o Ngai Takoto (an applicant) indicated its acceptance of the applications, others, such as Te Runanga Nui o Te Aupouri Trust, did not.

115. It goes without saying that such a concern is fundamental to both policy and decision making considerations under the RMA. Indeed, the NPSFM, NPS and other plans underscore that essential s5(2)(c) RMA sub-purpose of safeguarding the life-supporting capacity of water in the context of enabling those people and communities to provide for their social, economic, and cultural wellbeing, and for their health and safety.

116. Without being confident that consent could be granted in such a way that it would not detract from that purpose, we would have no option but to decline consent.

Finding

117. We agree with submitters that their concerns in this matter are properly and appropriately raised, are fundamental to our decision, and is a matter on which we must be satisfied.

Adaptive Management

118. By the close of the hearing the applicant had refined its version of the adaptive management regime proposed (the GMCP), with assistance from both Mr Hughes and, albeit not in final agreement, DoC. Comments have also been received (and taken into consideration) from Mr Simpson, a hydrogeologist, advising the submitter Mr Richard Sucich).

119. DoC's final position, confirmed post-hearing in an email from Ms Downing dated 24 April 2018, was to maintain its opposition to a grant of consent. A key part of that opposition relates to the disagreement over the extent of baseline monitoring, and uncertainty around procedural aspects of the GMCP – i.e. particularly around the timetable, approval and review process.

120. Mr Williamson's proposed adaptive management framework recognises that the applicant orchards will develop at different rates based on the level of current development, their rate of development, and tree maturity. He proposes specific monitoring checks against predictions for:

- Groundwater drawdown predictions in both shallow and deep layers of the aquifer;
- Impacts on wetland water levels by inference from shallow ground monitoring adjacent to the wetland; and
- Salinity at key coastal locations.

For baseline monitoring purposes a 3-tier staging uptake is proposed for new orchards (it is assumed that existing orchards require full uptake immediately:

- Years 1-3 – 50% uptake;
- Years 4-6 – 80% uptake; and
- Years 7-9 – 100% uptake.

Based on the sentinel monitoring bores, a 2-tier trigger level alert is then proposed; tier 1 being an alert (limit approaching); tier 2 being an alarm (significant departure). These trigger levels will be specified after the first 12 months of monitoring has been completed.

An annual Environmental Monitoring Report will be prepared detailing information on groundwater quantities abstracted and the response of the aquifer in terms of any changes in groundwater levels and groundwater quality. This report will be submitted to the Northland Regional Council each year and will be available to all submitters.

In response to trigger level 2 exceedances two priority rankings are proposed (dependent on distance from the wetland) requiring either an immediate 50% or a 25% pumping reduction in daily maximum take rate.

A review is proposed at the end of each of the three staged tiers of groundwater abstraction, with passage to the next stage dependent on Council approval. Further details are provided in the GMCP.

121. Mr Hughes subsequently proposed some additional amendments, the more important of which proposed a modification to the 3-tier stage for baseline monitoring in the first year:

- Year 1 (baseline monitoring) – 25% uptake
- Years 2-3 – 50% uptake;
- Years 4-6 – 80% uptake; and
- Years 7+ – 100% uptake.

Mr Hughes also recommends that the interim pumping restriction Table is amended to include saline intrusion monitoring bores in addition to the sentinel bores.

122. DoC provided additional comment on this matter, noting (as above) that it had fundamental concerns because it did not consider the baseline monitoring adequate or of sufficient breadth, wanting to see at least 3 shallow aquifer monitoring bores established within the wetland itself.

Finding

123. While we acknowledge DoC's quite proper concerns about the value and importance of the Kaimaumau wetland – and its national status – we have concluded that the hydrological and hydrogeological evidence is sufficiently persuasive that additional baseline monitoring within the wetland is not warranted at this time and that the adaptive management approach that we have arrived at is capable of delivering an appropriately cautious and responsive regulatory regime. We agree with Mr Williamson that the modelling undertaken is sufficiently conservative for that purpose, and we agree with Mr Hughes that additional conservatism in the conditions is appropriate, and have imposed such accordingly.

Co-ordinating Structure

124. The present co-ordinating structure (the MWWUG) is an unincorporated, informal grouping that has served the purpose of bringing disparate applications together so that they can be jointly assessed and determined. However the consents to be issued are disaggregated, which means that the aquifer monitoring conditions must apply to all equally regardless of location and distance from the key sentinel bores (for example). It is not apparent to us that such a loose structure is entirely practical or appropriate – especially in light of expressed community and DoC concerns about the aquifer, and the need for appropriate and timely responses in the event that any of those concerns show signs of materialising.

125. During the hearing, there was discussion about constituting some form of liaison group with Council – either based upon existing examples such as the catchment groups that operate in parts of the region or models further afield. Submitters were asked to comment on that general proposal and, to the extent that such was efficient and effective, was broadly supported (noting that this was without prejudice to respective fundamental positions on the applications). In that regard we note that Mr Buselich corrected, by email dated 4 May 2018, an observation made by Ms Letica in her reply that he opposed such a group. He was not opposed, merely expressed the "hope" that any such group did not repeat the mistakes of other groups (by which we understood, from his submissions at hearing, that such not lapse into irrelevance or fatigue because not effective).

126. We enquired of Council as to whether it intended to establish a catchment group for the aquifer and learned, subsequently[32], that this was not intended, relying generally instead upon the provisions contained in the PRP.

127. The draft conditions presented require the on-going maintenance of a group such as the MWWUG (renamed in the conditions as the Motutangi-Waiharara Water Liaison Group). While we remain concerned that such an informal arrangement across multiple consents may prove problematic should prediction not match reality, in the absence of a more structured proposition we simply note that concern and, having raise it, leave it to the Council and the consent holders to manage the interface as necessary.

[32] Email Colin Dall to Catherine Reaburn, 6 April 2018

Summary Conclusion

128. Variable information throughout the course of the hearing was presented by representatives for the Applicant, the NRC and some of the Submitters. We have tried to rationalise this information to determine a consistent approach to allocation for each of the 17 applications.

129. We were advised by both Ian Broadhurst (orchard adviser) and Tony Snushall (Honeytree Farms Ltd) that 25m^3/ha/day, based on the Total Orchard Area, was a generous allocation Furthermore, a written submission from another avocado grower, Ian Fulton, advised that 25m^3 per canopy area per day could meet all water requirements based on peak evaporation of 4.0mm/day and mature avocados having a crop factor of 0.6.

130. On the other hand the NRC assessment of allocation rates in Attachment 2 of the S42A report concluded that, "*there appears to be justification for a higher application rate than the general "rule of thumb" of 25m^3/ha/day, particularly around the Motutangi area and Paparore area*", although the reason for those higher water use rates was unclear - being based on water use records from some existing users with apparently no assessment as to whether or not their water use was operating efficiently.

131. We were told that avocado trees are typically irrigated by an under-tree sprinkler or dripper system, which represents a very efficient means of irrigation applied to each tree. For that reason it seems sensible for irrigation rates to be based on canopy area. What was evident, however, is that there was some uncertainty as to the exact area specified in the applications. We also acknowledge that some allowance in daily rates to allow for extreme hot weather events is reasonable – but agree with Council that those rates should not be set against the direst credible event.

132. Balancing these variable sources of information, we have applied a maximum rate of 25m^3/ha/day to the Total Orchard Area. Whilst we agree that allocations should be based on canopy area (and have used that approach for the annual volumes discussed below), we recognise there are particularly hot days when extra water may be required and the Total Orchard Area, which can be up to 20% greater than the canopy area, provides an allowance for extremely high water demand days. This should be a generous allocation to cover all situations, recognising also the high water application efficiencies that can be achieved on avocado orchards. Based on the information provided by Mr Williamson, the daily rates we intend to impose (and the annual volumes discussed below) are within the range evaluated by his modelling exercise.

133. Consequently, we have determined the following to be an appropriate approach for setting respective daily allocations:

- Applicants should not receive an allocation that is more than is within the scope of what they applied for - and which are the individual notified quantities provided by NRC;

- The 25m^3/ha/day metric is adopted as an appropriate volumetric, noting that we accept as both reasonable and proper Council's recommendation[33] that daily limits not be set based on relatively rare extreme drought occurrences (for which prudent and efficient management alternatives such as on-site storage exist);
- For the purpose of calculating a maximum daily allocation we define the Total Orchard Area as the smaller of:
  - The total property area, or
  - The area within which the tree canopy occupies 80%.

The Total Orchard Area multiplied by 25m^3/ha/day thereby defines the maximum *daily* volume for any orchard, with smaller daily volumes being applied to applicants who requested less, based on their notified daily volumes.

134. For annual volumes, we noted the following information:

- The written submission from avocado orchardist Ian Fulton who stated that he would be surprised if any orchard used more than 2,500m^3 per canopy area per ha;
- The written submission from applicant Ivan Stanisich who stated that he used between 2,090m^3 – 3,049m^3 per canopy area per ha; and
- The NRC assessment which reported existing users during a drought year having takes ranging from 2,151m^3 – 4,830m^3/ha.

135. Ian Broadhurst described how irrigation typically occurs from October to February (a total of around 150 days). The notified annual takes correspond to the notified daily volumes being utilised for 149 days, which represents a typical irrigation season.

136. We were also told that Mapua Avocados Ltd reduced its annual volume request to an amount equivalent to 392mm per annum, based on canopy area.

137. Taking all this information into account, we have adopted and applied the following limit principles to the annual volumes:

- Applicants should not receive an allocation for more than is within the scope of what they applied for – and which are the individual notified quantities provided by NRC;
- The annual volume should not be more than the maximum daily rate taken for 149 days; and
- The fully developed orchard annual volume should not exceed 3,920m^3/canopy area in ha (equivalent to 392mm).

An allocation table is presented in Appendix 1 to this decision that shows the allocations determined for each of the MWWUG consents.

[33] NRC Supplementary Staff Report, dated 26-03-2018, para 12

138. This approach does not give all users what they asked for and in extreme drought years (around 1 in 10 years) it may not be all the water they require. However the water resource has a limited capacity and in the interests of a fair allocation to existing and future users it is important that the water is used in an efficient manner. To this end, we also impose a condition for all consents requiring water audits to be undertaken at 5 yearly intervals to ensure that appropriate water management measures are in place.

Part 2 RMA

139. Section 6 RMA matters of national importance (generally (a-c) and (e)) and section 8 Treaty of Waitangi principles were identified as being engaged by these applications. We are satisfied, as discussed above, that those matters have been addressed appropriately as far as there is jurisdiction to do so.

140. With respect to many of the matters raised by Ms Murupaenga-Ikenn, and adopted by many other submitters, we repeat the observation made at the hearing that they raise constitutional and/or procedural issues that transcend our operating jurisdiction. We acknowledge that those matters are closely held and were not raised vexatiously or disrespectfully. Matters that were raised that fall within our jurisdiction to determine have been given very careful consideration.

141. Of the section 7 other matters to which particular regard is to be had, we consider the following relevant:

    (a) Kaitiakitanga;

    (b) The efficient use and development of natural ... resources;

    (c) The maintenance and enhancement of amenity values; and

    (f) Maintenance and enhancement of the quality of the environment.

142. Those matters were rehearsed in the respective documentation, evidence and representations made, and regard to them has been had in this decision. With respect to s7(a), we acknowledge the representation made by Ben Waitai on behalf of Te Taumata Kaumātua o Ngāti Kuri and are satisfied that those stated concerns have been reflected in our decision – to the extent that falls within our jurisdiction.

143. When put into the wider context of the Part 2 sustainable management purpose of the RMA and the s30 RMA functions of regional Councils, we are satisfied that both the aquifer and the relevant ecological and aquatic interests can sustain the abstractions that we are prepared to grant. While we heard much concern about the potential for things to go awry, the technical evidence – including the ability to place significant monitoring and allied conditions around those takes - does not support that concern.

144. Specifically, we find that the applications do not conflict with the promotional sustainable management purpose of the RMA, in particular as that is expressed through the relevant regional planning provisions, and can be granted.

Conditions

145. The conditions are attached as **Appendix 2** to this Decision and are based upon the sets of conditions provided (but not agreed) by the applicant in reply, Council and DoC.

146. As noted above, we have modified the individual water takes based on the principles set out in paragraphs 133 and 137. We have also further tightened the monitoring and reporting requirements – but not to the extent sought by DoC. In that regard we are satisfied that the regime put in place will provide sufficient warning of matters should they trend in the direction of concern to DoC – at which point conditions of consent can be reviewed and, as necessary, further action pursued. In that respect we have accepted the placement of the litmus sentinels between the abstraction bores and the wetland.

147. As a further matter, we note that the condition change sought by Mr Stanisich is an increase of a similar magnitude to some of the new consent applicants and therefore should fall under the more general condition requirements that will apply to all other applicants, including the GMCP. However, because his annual volume is not changing, he has been excluded from the staged implementation Tables within the GMCP and the consent conditions.

The Groundwater Monitoring and Contingency Plan

148. The Applicant and Council produced an early draft of what they termed the Groundwater Management and Contingency Plan – and which we have renamed the Groundwater *Monitoring* and Contingency Plan since that is the more appropriate function of the vehicle.

149. While that Plan requires further elaboration, and the conditions provide for that final Council-certification step, we have marked up (and attached as **Appendix 3**) a copy of the Plan to indicate areas of changes that we consider necessary. We have based our marked-up version on Attachment 4 to the memorandum from Catherine Reaburn dated 27th April 2018 which incorporates comments from Council's hydrogeological consultant Brydon Hughes. His modifications take into account points raised by submitters, in particular a range of comments provided by DOC.

150. **Section 2** sets out the framework for adaptive management and identifies six of the orchards as being already well established. One of these, operated by Ivan Stanisich, was identified during the hearing as an existing orchard with a consent that required a variation to its daily volume, with no change to his annual allocated volume. However, the changes he is seeking will, in practice, increase the *actual* annual volume that is being taken (albeit still within the consented volume) by a similar magnitude to some of the new consent applications. We received no information about the other five applicants having existing consents for their current orchard activities and therefore assume they have no existing use or renewal rights. Consequently, they should not be treated differently in the staged allocation framework compared to other members of the MWWUG.

151. We have favoured the Council officer's recommendation for a four-stage approach to the development of the abstractions, which will allow an initial 12 month period with a low level of abstraction to establish a monitoring baseline. This was also identified as an important requirement by DoC.

152. Our approach to the staging recognises the difference in effects between small abstractors and larger abstractors and therefore we have favoured a staged implementation based on a maximum annual volume at each stage rather than a percentage increase on the maximum annual volume. This is on the basis that the drawdown effects from a wider distribution of smaller abstractions is less than a distribution of larger abstractions. Such an approach should enable a useful implementation of an initial 12 month baseline monitoring period whilst maintaining existing orchard developments that may have historically been lawfully established, even if they have no current consented abstraction. The allocation stages are applied to the location of each orchards bores within each water allocation zone. The proposed stages and volume limits are set out in our modified version of the GMCP.

153. DOCs submission on the GMCP requested a Baseline Monitoring Plan, but the required monitoring is adequately set out in the GMCP and the requirements for that plan and certification by Northland Regional Council are specified in the consent conditions that we are recommending. DOC have also recommended detailed monitoring of the Kaimaumau wetland however our view is that there are many influences on the wetland that are far greater than the MWWUG abstractions and any effect from these abstractions will best be identified from the groundwater level monitoring that is proposed in the GMCP. If that monitoring shows greater drawdown effects in the shallow groundwater near the Kaimaumau wetland than predicted in the assessment that has been undertaken for the consent applications, then that could trigger the need for more detailed assessments and monitoring at the wetland if that is deemed to be an appropriate response at that time.

154. **Section 2.1** of the GMCP sets out the trigger level approach with an initial warning level (TL1) followed by a trigger indicating a significant departure from the anticipated effects (TL2). We agree with that approach, but also agree with DOC that the suggested approach for TL1 of “median ±3 times the standard deviation” may not necessarily be appropriate and some discretion will need to be applied (via the NRC) once the baseline data becomes available.

155. Table 2 in the GMCP specifies the monitoring suite which will be used for the trigger levels. We agree with the suites for groundwater levels and salinity monitoring and saline intrusion monitoring, however the suggested monitoring for general water quality are outside the scope of these groundwater take and use consents. The proposed water quality monitoring relates to effects arising from application of agrichemicals and fertilisers. Whilst we acknowledge this was a concern for many of the submitters, those activities are governed by separate sections of the planning documents that are not part of the consideration of these groundwater takes and use consents. Specifically, the Consolidated Regional Water and Soil Plan deals with Agrichemicals in chapter 18 and fertiliser applications in chapter 23. The Proposed Regional Plan deals with agrichemicals in section C.6.5 and fertilisers in section C.6.9. Any monitoring or trigger level requirements for agrichemical or fertiliser use would need to be based on the rules and consenting requirements of those sections of the planning documents and are outside the scope of our current considerations. Consequently, section 3.4 of the GMCP has also been deleted.

156. **Section 2.2.1** describes the timeframe for setting trigger levels. DOC have submitted that the trigger levels should be set in consent conditions, however that is not practical given that the setting of trigger levels will need to take place after the initial 12 months of baseline monitoring has been completed. Furthermore, for the adaptive management regime that is proposed, we consider it acceptable for the trigger levels to be defined in the management plan and to be reviewed through revisions to that plan as more monitoring data and better understanding of the effects becomes available. We have specified the purpose of the GMCP in the consent conditions and that specification along with NRC certification of any updates to the plan should provide the certainty that many of the submitters require.

157. **Table 3** sets out the monitoring purpose for the various bores that are to be monitored. We have modified this slightly to remove the requirement for N and P monitoring (which as noted previously is outside the scope of our consideration) and added in groundwater level and electrical conductivity monitoring for all production bores. Saline intrusion is a significant risk to all users so it is very much in their interests to be vigilant to this, with the greatest risk arising from the largest abstractions.

158. **Table 4** sets out the sentinel monitoring bores and will be completed with trigger level values. In our view, all these bores need to be monitored for both groundwater levels and electrical conductivity to indicate signs of saline intrusion and the relationship between groundwater levels and electrical conductivity changes. Trigger levels should be set for both groundwater levels and electrical conductivity.

159. **Section 3.2.1** describes the shallow groundwater monitoring as primarily being to assess effects on Kaimaumau wetland and if a hydraulic connection seems unlikely it will be discontinued. However, our view is that this monitoring also contributes to the overall understanding of the aquifer system and should be continued to aid in that understanding. As a result, we have modified the wording of section 3.2.1.

160. **Table 5** sets out the monitoring requirements in production bores. This table has been amended to reflect the approach to electrical conductivity monitoring described above in relation to Table 3.

161. **Section 4** describes the Contingency Plan if trigger levels are exceeded. The proposal from the applicant defines restrictions that apply to different users depending on their proximity to the monitoring bores in which the triggers have been breached, but we find such a demarcation quite arbitrary, particularly for large abstractions that create more extensive drawdown effects. There are no hydrogeologic barriers between the sub-zones of the Aupōuri aquifer, so we favour a default arrangement whereby all of the MWWUG consents must reduce by an equal amount. This 50% reduction applies to the daily volumes and, as far as practicable should also reduce the annual volume. However, we recognise that if the restriction occurs late in the irrigation season a large part of the annual allocation might have already been used and it would not be possible to achieve a 50% reduction in the annual volume. We also provide the option of an alternative restriction regime based on the MWWUG consent holders working together to apportion the reductions between them in a way that better meets their needs at the time of restriction, provided that achieves the same overall outcome for the resource and has the approval of the NRC.

162. There are still some information updates required in the GMCP (including the flow diagram on the last page) and we have allowed for that to occur in our consent conditions.

Decisions

163. **Decision 1**: In exercising delegated authority under sections 34 and 34A of the RMA and having regard to the foregoing matters, sections 104, 104B and Part 2 of the RMA, the applications represented by the Motutangi-Waiharara Water Users Group for various quantities of water take from the Houhora, Motutangi and Waiparera aquifer management sub-units of the Aupouri Aquifer is granted for the reasons discussed in this Decision and as summarised below.

164. **Decision 2**: Under s127 of the RMA, the change to the daily and weekly maximum water take consent condition applied for by I A Stanisich – i.e. an increase of 430m^3/d from 720m^3/d to 1,150m^3/d and 5,000 m^3/week from 3,000 m^3/week to 8,000 m^3/week – (with partial abstraction from a new second bore), is granted, and:

    (a) Condition 1(a) of consent CON20102739101 granted on 13 December 2010, is changed accordingly to read: "*1,150 cubic metres within any continuous 24-hour period*"; and

    (b) Condition 1(b) of consent CON20102739101 granted on 13 December 2010, is changed accordingly to read: "*8,000 cubic metres within 7 continuous days: nor*".

    In addition to those current consent conditions we impose the same suite of consent conditions as apply to the other MWWUG consent holders, with the exception of the requirement for staged implementation.

Summary reasons for the decision

165. After having regard to the actual and potential effects on the environment of allowing the proposed activity, and taking into account the relevant statutory provisions, we find that consent for the proposed activities should be granted for the reasons discussed throughout this decision and, in summary, because:

    (a) The proposed activity is consistent with the provisions of the relevant statutory document(s) and, with the conditions imposed, will avoid, remedy or mitigate the adverse effects that might otherwise be created;

    (b) Any risk to or potential effect on the Kaimaumau wetland can be averted and avoided through the adaptive management conditions imposed;

    (c) The amount of water to be abstracted is well within the parameters established by the best information currently available;

    (d) Granting consent is consistent with the sustainable management purpose and principles of Part 2 of the RMA and Council's integrated management functions under section 30 of the RMA; and

    (e) Granting consent better meets the purpose of the RMA.

166. Overall, we find that granting consents for the application is appropriate.

David Hill
Independent Hearings Commissioner (Chair)

Date: 1 June 2018

Appendix 1: Allocation Table

Allocation Table

Application	Name	Zone	Application date (Letica para 4.14)	Total Area for Orchard ha[1]	Canopy Area ha	Notified Area ha	Notified Daily Volume m^3	**Decision on Daily Volume m^3**	Daily application rate[2] m^3/ha/day	Notified Annual Volume m^3	**Decision on Annual Volume m^3**	No of days at peak rate	mm per annum
Houhora Zone													
APP.038610.01.01	Mapua Avocados Limited	1/3 Houhora	21/07/2016	66.7	53.3	53.3	1667	**1667**	25.0	248,333	**209,000**	125.4	392
APP.38732.01.01	Kathy Valadares	Houhora	13/09/2016	10	8	8	150	**150**	15.0	22,350	**22,350**	149	279
APP.39244.01.01	Kevin & Dani Thomas	Houhora	5/05/2017	16.6		16	400	**400**	24.1	59,600	**59,600**	149	373
APP.039345.01.01	Ian McLarnon & Jason McLarnon of Ongare Trust	Houhora	19/06/2017	7.5		6	200	**188**	25.0	29,800	**23,520**	125	392
APP.0398381	Johno & Carol Brien (Lamb Rd)	Houhora	28/06/2017	4.8	4	4	100	**100**	20.8	14,900	**14,900**	149	373
									Total for Houhora Zone		*329,370*		
Motutangi Zone													
APP038589.01.01	N & AV Thompson and S & JS Thompson	Motutangi	19/07/2016	9.6		9	320	**240**	25	47,680	**35,280**	147	392
APP.038591.01.01	Cypress Hills Ltd	Motutangi	19/07/2016	10	9	9	280	**250**	25	41,720	**35,280**	141.1	392
APP.38610.01.01	Mapua Avocados Limited	2/3 Motutangi	21/07/2016	133.3	106.7	106.7	3333	**3333**	25	496,667	**418,000**	125.4	392
APP.039332.01.01	Candy Corn Ltd (Logan King)	Motutangi	8/06/2017	25.0	21.5	20	537	**537**	21.5	80,000	**78,400**	146	392
									Total for Motutangi Zone		*566,960*		
Waiparera Zone													
APP.038328.01.01	BK & SD Shine	Waiparera	5/04/2016	12.25	10	10	268	**268**	21.9	40,000	**39,200**	146	392
APP.038380.01.01	Daimen & Katherine Holloway	Waiparera	28/04/2016	5	4	4	100	**100**	20.0	14,900	**14,900**	149	373
APP.038410.01.01	GT & MT Covich	Waiparera	16/05/2016	87.5	70	70	1500	**1500**	17.1	223,500	**223,500**	149	319
APP.038420.01.01	Largus Orchard Limited Partnership	Waiparera	20/05/2016	75	60	60	1300	**1300**	17.3	193,700	**193,700**	149	323
APP.038454.01.01	Elbury Holdings Ltd (Kevin & Fiona King)	Waiparera	2/06/2016	37.5	30	30	763	**763**	20.3	113,700	**113,700**	149	379
APP.038471.01.01	Honeytree Farms Ltd	Waiparera	14/06/2016	93		110	3500	**2325**	25.0	521,500	**346,425**	149	315
APP.038513.01.01	Te Runanga o Ngai Takoto	Waiparera	24/06/2016	75	60	60	1300	**1300**	17.3	193,700	**193,700**	149	323
APP.038650.01.01	Tony & Dianne Hewitt	Waiparera	10/08/2016	11.2	10	10	270	**270**	24.1	40,320	**39,200**	145	392
									Total for Waiparera Zone		*1,164,325*		

Notes

Change from Williamson

Total Orchard Area adjusted so that Canopy Area is no more than 80%of Total Orchard Area

Daily Rate adjusted so that it does not exceed 25m^3/ha/day based on Total Orchard Area

1. Based on the lesser of the total area or the canopy area being 80% of the total orchard area

2. Based on Total Orchard Area

Appendix 2: Conditions of Consent

Consent is granted subject to the following Conditions:

REQ.581172

CONDITIONS APPLICABLE TO ALL CONSENTS:

To take groundwater for the purpose of horticultural irrigation on the below properties:

<Note: each consent approved by the commissioners will be individually issued and linked to the legal description(s) listed in the relevant application>

Water Extraction Volumes

1 The rate of taking shall not exceed the limits set out in the following table:

Consent	Holder	Annual Limit (m^3), being 1 July to 30 June:	Daily rate of taking (m^3/day), being any 24 consecutive hours:
AUT.038328.01.01	Bernard Kim & Sheryl Dianne Shine	39,200	268
AUT.039332.01.01	LJ King Limited	78,400	537
AUT.038471.01.01	Honeytree Farms Limited, C/- Tony Hayward	346,425	2,325
AUT.038589.01.01	Neil & Alma Violet Thompson and Steven & Josephine Suzanne Thompson	35,280	240
AUT.039345.01.01	Ongare Trust, C/- Ian McLarnon & Jason McLarnon	23,520	188
AUT.038610.01.01	Mapua Avocados Ltd, C/- Murray Forlong	627,000	5,000
AUT.038591.01.01	Cypress Hills Ltd, C/- Alan Anderson & Carolyn Dawn Smith	35,280	250
AUT.038650.01.01	Tony Hewitt	39,200	270
AUT.038454.01.01	Elbury Holdings Limited, C/- Kevin and Fiona King	113,700	763
AUT.038380.01.01	Damien & Katherine Holloway	14,900	100
AUT.039381.01.01	Jonathan Brien & Carol Carr	14,900	100
AUT.039244.01.01	Kevin Thomas & Danielle O'Connor	59,600	400
AUT.038420.01.01	Largus C/- Murray Forlong (Changed from Matijevich) Orchard Ltd Partnership,	193,700	1,300
AUT.038513.01.01	Te Rūnanga o Ngai Takoto, C/- Rangitane Marsden	193,700	1,300
AUT.038410.01.01	Georgina Tui and Mate Nickolas Covich	223,500	1,500
AUT.038732.01.01	Kathy Valadares	22,350	150
S127 Change AUT.027391.01.02	Ivan Anthony Stanisich	120,000	1,150

1A Notwithstanding Condition 1, and with the exception of I A Stanisich (APP.027391.01.02), the annual rate of taking shall not exceed the limits set out in the following table for the following periods:

(a) Stage one shall apply from the date of commencement of this consent to the first full irrigation season of water use after the grant of this consent;

(b) Stage two shall apply to the 2nd and 3rd irrigation seasons of water use after the grant of this consent;

(c) Stage three shall apply to the 4th to 6th irrigation seasons of water use after the grant of this consent;

(d) Stage four shall apply from the 7th irrigation season of water use after the grant of the consent, through to the date of expiry of consent.

Application Number	**Consent Holder**	**Allowable Annual Volume (m^3)**			
		Stage 1 (Year 1)*	**Stage 2 (Year 2-3)***	**Stage 3 (Year 4-6)***	**Stage 4 (Year 7 - 9)***
Maximum Annual Volume for Each Orchard within each aquifer management sub-unit (m^3)		34,000	96,000	198,000	418,000
APP.038610.01.01	Mapua Avocados Ltd, C/o Murray Forlong Houhora Zone	34,000	96,000	198,000	209,000
APP.038610.01.01	Mapua Avocados Ltd, C/o Murray Forlong Motutangi Zone	34,000	96,000	198,000	418,000
APP.038471.01.01	Honeytree Farms Limited, C/o Tony Hayward	34,000	96,000	198,000	346,425
APP.038410.01.01	Georgina Tui and Mate Nickolas Covich	34,000	96,000	198,000	223,500
APP.038420.01.01	Largus Orchard Ltd Partnership, C/o Murray Forlong (Changed from Matijevich)	34,000	96,000	193,700	193,700
APP.038513.01.01	Te Runanga o Ngai Takoto, C/o Rangitane Marsden	34,000	96,000	193,700	193,700
APP.038454.01.01	Elbury Holdings Limited, C/o Kevin and Fiona King	34,000	96,000	113,700	113,700
APP.039332.01.01	L J King Limited	34,000	78,400	78,400	78,400
APP.039244.01.01	Kevin Thomas & Danielle O'Connor	34,000	59,600	59,600	59,600
APP.038589.01.01	Neil & Alma Violet Thompson and Steven & Josephine Suzanne Thompson*	34,000	35,280	35,280	35,280
APP.038591.01.01	Cypress Hills Ltd, C/o Alan Anderson & Carolyn Dawn Smith*	34,000	35,280	35,280	35,280
APP.038650.01.01	Tony Hewitt*	34,000	39,200	39,200	39,200
APP.038328.01.01	Bernard Kim & Sheryl Dianne Shine	34,000	39,200	39,200	39,200
APP.039345.01.01	Ian McLarnon & Jason McLarnon*	23,520	23,520	23,520	23,520
APP.038732.01.01	Kathy Valadares	22,350	22,350	22,350	22,350
APP.038380.01.01	Daimen & Katherine Holloway*	14,900	14,900	14,900	14,900
APP.039381.01.01	Jonathan Brien & Carol Carr	14,900	14,900	14,900	14,900
TOTAL		517,670	1,034,630	1,655,730	2,060,655
% of Total		**25%**	**50%**	**80%**	**100%**

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

The staged implementation does not apply to the S127 change by I A Stanisich.

Prior to the exercise of Conditions 1A(b), 1A(c) and 1A(d) the Consent Holder shall, on each occasion, provide to the Council's Compliance Manager for approval an environmental assessment of the effects of the Consent Holder's activities to date (individually and cumulatively) prepared by a suitably qualified and experienced expert. The assessment shall include, but not be limited to, the following:

- A review of all monitoring data required in accordance with the conditions of this consent;
- Appropriate State of the Environment Monitoring results, and meteorological data;
- Appropriate water quality standards and definition of groundwater level and quality trigger levels that will be used to manage future effects created by the abstraction;
- Comparison to the effects modelled in the Assessment of Effects on the Environment submitted in support of the application, prepared by Williamson Water Advisory dated 19th May 2017;

Progress to the next stage shall only be undertaken following prior written approval from the Council's Monitoring Manager.

Notification of Irrigation

2 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 days beforehand.

Metering and Abstraction Reporting

3 The Consent Holder shall install a meter to measure the volume of water taken, in cubic metres, from each production bore. Each meter shall:

(a) Be able to provide data in a form suitable for electronic storage;

(b) Be sealed and as tamper-proof as practicable;

(c) Be installed at the location from which the water is taken; and

(d) Have an accuracy of +/-5%.

The Consent Holder shall, at all times, provide safe and easy access to each meter installed for the purposes of undertaking visual inspections and water take measurements.

4 The Consent Holder shall verify that the meter required by Condition 3 is accurate. This verification shall be undertaken prior to 30 June:

(a) Following the first taking of water from each production bore; 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 by 31 July following the date of each verification.

5 The Consent Holder shall, using the meter required by Condition 3, keep a record of the daily volume of water taken from each production bore in cubic metres, including all nil abstractions.

6 If the instantaneous rate of taking is equal to or greater than 10 litres per second, then the water meter required by Condition 3 shall have an electronic datalogger for automatic logging of meter data. A copy of the electronic data records shall be forwarded to Council's assigned Monitoring Officer by the 7th of the following month, and immediately on written request from the assigned monitoring officer.

7 The Consent Holder shall measure, and keep a record of, the static water level in each production bore at least once each month. This measurement shall be taken at least eight hours after cessation of pumping. The Consent Holder shall also monitor electrical conductivity at least once a month during any irrigation season when the bore is in use.

8 A copy of the records required to be kept by Conditions 5, 6 and 7 for the period 1 July to 30 June (inclusive) shall be forwarded each year to the Council's assigned Monitoring Officer by the following 31 July. In addition, a copy of these records shall be forwarded immediately to the Council's Compliance Manager on written request. The records shall be in an electronic format that has been agreed to by the Council.

Advice Note: *If no water is taken during the period 1 July to 30 June (inclusive) then the Consent Holder is still required to notify the Council's Monitoring Manager in writing of the nil abstraction. Water use record sheets in an electronic format are available from the Council's website at www.nrc.govt.nz/wur.*

9 Easy access for a water level probe shall be provided and maintained at the production bore wellhead to enable the measurement of static water levels in the bore.

Water Use Efficiency

10 The Consent Holder shall prepare an Irrigation Scheduling Plan (ISP) that outlines how irrigation decisions will be made. The ISP shall be prepared by a suitably qualified and experienced person and submitted to the Council's Compliance Manager for written approval. The ISP shall, as a minimum, address:

- Water balance and crop water requirements;
- Subsurface drainage; and
- Overall irrigation strategy.

For each irrigation area, the ISP should include:

(a) A description of how water requirement for each irrigation cycle is calculated;

(b) Method(s) for assessing current soil moisture levels;

(c) Method(s) for assessing potential evapotranspiration (PET) and rainfall to date;

(d) Assessment of other inputs such as effluent irrigation and effect on irrigation requirement;

(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; and

(g) A description of proposed method(s) for remaining within consent limits at each borehole or group of boreholes.

Advice Note: *The ISP seeks to ensure that an irrigation efficiency of a minimum 80% is achieved.*

11 The Consent Holder shall not exercise this consent until the ISP required by Condition 10 has been certified by the Council's Compliance Manager.

12 The ISP certified in accordance with Condition 11 shall be implemented prior to the first irrigation season, unless a later date has been approved in writing by the Council's Compliance Manager.

13 The Consent Holder shall, within six months of the first exercise of this consent, undertake an audit of the irrigation system and the ISP described in Condition 10 using 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), including recommendations on any improvements that should be made to the system to increase water efficiencies. 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. A follow-up audit shall occur at five yearly intervals throughout the term of this consent, with a focus on the efficiency of water use.

14 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 13.

15 The reticulation system and components shall be maintained in good working order to minimise leakage and wastage of water.

16 There shall be no significant ponding of irrigated water within any irrigated area, or significant runoff from either surface or subsurface drainage to a water body, as a result of the exercise of this consent.

Monitoring and Contingency Measures

17 This consent shall be exercised in accordance with the requirements of the most recent council certified version of the Motutangi – Waiharara Water Users Group Groundwater Monitoring and Contingency Plan (GMCP). The purpose of the GMCP shall be to monitor and mitigate any effects of the abstraction on:

- Saline intrusion into the aquifer;
- Decline in groundwater levels adversely impacting on Kaimaumau wetland;
- Decline in groundwater levels adversely impacting on other bore abstractions that are efficiently utilising the aquifer.

In the event that any of the provisions of the GMCP conflict with the requirements of these conditions of consent, the conditions of consent shall prevail.

Advice Note: *It is anticipated that a single GMCP will be prepared and submitted on behalf of all Consent Holders within the Motutangi-Waiharara Water Users Group.*

18 Prior to the first exercise of this consent, the Consent Holder shall provide an updated version of the GMCP, included as Appendix 3, to the Council's Compliance Manager for certification. This update shall define the following information to aid in achieving the purpose of the GMCP:

- The location and physical details of individual monitoring sites (update to Section 3.1 of the GMCP).
- Specific details of monitoring to be undertaken at each site including the parameters to be measured and the frequency (and/or duration) of monitoring.
- Methods/procedures/standards to be adopted for the collection, management, archiving and reporting of monitoring results.
- Details of any arrangements that may be put in place to collect, analyse and report monitoring results by third parties that will inform the adaptive management of this consent.
- The form, content and frequency at which monitoring results will be reported to the Council.
- Requirements for the reporting of trigger level exceedances to the Council.
- Specific details of mitigation to be initiated in the event of a trigger level exceedance including:
  - Review/evaluation of monitoring data (particularly with respect to the magnitude of anticipated environmental effects).
  - Increases in the frequency and location of monitoring.
  - Changes to parameters being monitored.
  - Further hydrogeological, hydrological or water quality investigations to identify the potential causes of the trigger level exceedance.
  - Specific reductions in the rate/volume of groundwater abstraction.
- Development of strategies to avoid future trigger level exceedances.
- A process for reviewing and summarising monitoring results to support the staged development approach.
- A timeline and procedure for periodic review and updating of the GMCP to account for future water use, variations to prevailing environmental conditions and changes in access to monitoring sites.

19 Prior to exercising stage two of the "Annual Allowable Volume", as defined by Condition 1A, the Consent Holder shall provide a further update of the GMCP to the Council's Compliance Manager for certification to define the specific TL1 and TL2 triggers level values for groundwater level and/or groundwater quality at each individual monitoring site (update to Section 2.2 of the GMCP anticipated), with each trigger level linked to a specific set of mitigation options.

20 Any updating of the GMCP shall be undertaken by a suitably qualified and experienced person as determined by the Council's Compliance Manager.

21 In the event that the monitoring results demonstrate non-compliance with any condition of this consent, the Consent Holder shall notify the Council's Compliance Manager as soon as is practicable after the results are received by the Consent Holder.

22 The Consent Holder shall provide Council staff and/or their agents with adequate and safe access to all sites covered by these consents, including sampling sites identified in the GMCP certified under Condition 17, to enable monitoring of the conditions of the consent.

23 New bores required to be installed for the purposes of monitoring the baseline effects in accordance with the GMCP certified under Condition 17 shall be constructed, and all required equipment installed, prior to the exercise of this consent.

Advice Note: *The construction of new bores will require a bore permit from the Council*.

24 The Consent Holder may request that any part of the monitoring programme be amended. Any such request shall be in writing and shall include supporting assessment, including all necessary supporting information and/or calculations, for the amendment. No amendment to the Groundwater Monitoring and Contingency Plan shall take effect until written confirmation of the amendment from the Council has been obtained.

25 Should any of the TL2 trigger levels in the GMCP be breached, either:

(a) The Consent Holder shall immediately reduce their daily abstraction to 50% of the quantity specified in Condition 1 and aim to achieve a similar reduction to their annual volume specified in condition 1A as far as practical. If the TL2 trigger levels are still exceeded after 21 days, then abstraction must reduce further to the minimum quantity required to achieve root stock survival; or

(b) As an alternative to the restrictions in Condition 25(a), the MWWUG Consent Holders, with the agreement of Council, may come to an alternative distribution of their allocations that achieves compliance with TL2 trigger values and avoids adverse effects.

26 To prevent saline contamination, the Council may require the Consent Holder to cease the exercise of this consent at all such times as the trigger levels specified in the approved GMCP are exceeded.

Water User Group Meetings

27 The Consent Holder shall, for the purpose of discussing matters relating to this consent, form and maintain a water user liaison group (hereafter referred to as the Motutangi-Waiharara Water Liaison Group (MWWLG). The purpose of the liaison group is to provide a means for water users to be informed of the monitoring results, the need for any restrictions, and to consider the development of alternative restriction regimes across the group, in consultation with Council.

28 The Consent Holder shall hold a meeting of the MWWLG not less than once every year in August. The location and time of the meeting shall be advised by writing directly to all members of the MWWLG at least four weeks prior to the meeting being held. The first such meeting shall be co-ordinated by Council.

29 At least two weeks prior to the meeting, the Consent Holder shall provide a copy of the Annual Environmental Monitoring Report required to be prepared in accordance with Condition 30 and a summary of the water use records and static water level monitoring result for the same period to each member of the MWWLG.

Reporting

30 The Consent Holder shall prepare an Annual Environmental Monitoring Report (AEMR) for the period 1 July to 30 June (inclusive) and forwarded a copy to the Council's assigned Monitoring Officer by the following 31 July. The AEMR shall include, but not be limited to, the results, update and summary report of the monitoring undertaken as required by the GMCP, a comparison with the trigger levels and an interpretation of any trends, adverse effects and mitigation required.

Advice Note: *It is anticipated that a single Annual Environmental Monitoring Report will be prepared and submitted on behalf of all Consent Holders within the Motutangi-Waiharara Water Users Group.*

Review Condition

31 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 annually during the month of June 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 review the allocation of the resource.

The Consent Holder shall meet all reasonable costs of any such review.

Lapsing Condition

32 This consent shall lapse on the **30 April 2023**, unless before this date the consent has been given effect to.

Advice Note: *An application can be made to the Council in accordance with Section 125 of the Act to extend the date after which the consent lapses. Such an application must be made before the consent lapses.*

EXPIRY DATE: 30 NOVEMBER 2033

This consent was issued by David Hill who has signed the decision as Hearings Commissioner on Friday the First day of June 2018, being the date of the Hearings Commissioners' decision.

Appendix 3: Groundwater Monitoring and Contingency Plan

Note: Figure 3 will need to be updated to reflect these and any final changes made before certification.

Motutangi-Waiharara Water Users Group

Groundwater Monitoring and Contingency Plan

Contents

1. Introduction

This document comprises a groundwater monitoring and contingency plan (GMCP) for the operation and management of the groundwater takes. The GMCP has the purpose of monitoring and mitigating any effects of the abstraction on:

- Saline intrusion into the aquifer;
- Decline in groundwater levels adversely impacting on Kaimaumau wetland;
- Decline in groundwater levels adversely impacting on other bore abstractions that are efficiently utilising the aquifer.

Extensive environmental monitoring is required to ensure the effects on the environment are no greater than those anticipated in the AEE, and to support the proposed 'adaptive management' approach including a staged implementation of groundwater extraction. The purpose of the GMCP is to formalise specific monitoring requirements, establish groundwater level and groundwater quality monitoring triggers and outline a process for implementation of appropriate mitigation measures in the event that nominated trigger values are exceeded.

The GMCP is intended to allow the early detection of any impact to the Motutangi-Waiharara groundwater system associated with the exercise of groundwater take consent(s), by:

- Ensuring regular monitoring of the groundwater system both on and off-site;
- Setting monitoring criteria to indicate potential impact on the groundwater system;
- Informing the Council when changes in the pumping regime are required;
- Reviewing monitoring data after a step level increase in pumping rate;
- Ensuring that the monitoring data is available for regular review by the Council; and
- Detailing a Contingency Plan to be implemented if an unanticipated impact(s) is identified.

The GMCP also provides information as to the actual effects of the abstraction on the groundwater resource and will enable validation of the numerical model by the Consent Holders for any replacement groundwater take consent applications.

1.1 Scope and Purpose of the GMCP

The GMCP addresses the potential effects on groundwater, saline intrusion, and water levels within the Aupōuri aquifer and the Kaimaumau wetland. Specifically, the GMCP is aimed at:

(a) Providing procedures to avoid, remedy and mitigate changes in groundwater and wetland water levels, and salinity concentrations in the aquifer at the coast;

(b) Ensuring the owners and operators of the consents understand their legal responsibility and how to go about implementing their consents within the legal limits; and

(c) Providing all stakeholders and the Council assurance that the consent will be exercised in compliance with the conditions.

2. Framework for Adaptive Management

The uptake of water under the MWWUG consents will steadily increase over time in accordance with the following factors:

Level of current orchard development – noting the following orchards are already well established:

APP.038650.01.01 – Hewitt;

APP.039345.01.01 – McLarnon;

APP.038380.01.01 – Huanui Orchards (Holloway);

APP.038589.01.01 – Thompson;

APP.038591.01.01 – Cypress Hills Ltd.

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 steady progressive development of the orchards, particularly the new large developments, provides an opportunity to apply an adaptive management approach that establishes a baseline and allows potential groundwater, wetland and coastal salinity effects to be checked against the predictions made in the AEE, specifically the following:

- The groundwater drawdown predictions in both the shallow and deep aquifer;
- Impacts on wetland water levels by inference from shallow ground monitoring adjacent to the wetland; and
- Salinity at key coastal locations.

The management approach provides a series of responses to be taken should effects develop or trends outside those predicted in the AEE, as discussed in **Section 2.2**.

2.1 Staged Implementation

To allow for the establishment of baseline monitoring conditions the uptake of the water volumes granted under these consents will be permitted in four stages over nine years, as follows:

Year 1 – 25% uptake (baseline monitoring);

Years 2-3 – 50% uptake;

Years 4-6 – 80% uptake; and

Year 7-9 – 100% uptake.

The annual allocations for each of these four stages are set out in (Table 1).

Table 1. Summary of staged implementation annual volumes.

Application Number	Consent Holder	Allowable Annual Volume (m^3)			
		Stage 1 (Year 1)*	Stage 2 (Year 2-3)*	Stage 3 (Year 4-6)*	Stage 4 (Year 7 - 9)*
Maximum Annual Volume for Each Orchard within each aquifer management sub-unit (m^3)		34,000	96,000	198,000	418,000
APP.038610.01.01	Mapua Avocados Ltd, C/o Murray Forlong Houhora Zone	34,000	96,000	198,000	209,000
APP.038610.01.01	Mapua Avocados Ltd, C/o Murray Forlong Motutangi Zone	34,000	96,000	198,000	418,000

Application Number	Consent Holder	Allowable Annual Volume (m^3)			
		Stage 1 (Year 1)*	Stage 2 (Year 2-3)*	Stage 3 (Year 4-6)*	Stage 4 (Year 7 - 9)*
APP.038471.01.01	Honeytree Farms Limited, C/o Tony Hayward	34,000	96,000	198,000	346,425
APP.038410.01.01	Georgina Tui and Mate Nickolas Covich	34,000	96,000	198,000	223,500
APP.038420.01.01	Largus Orchard Ltd Partnership, C/o Murray Forlong (Changed from Matijevich)	34,000	96,000	193,700	193,700
APP.038513.01.01	Te Runanga o Ngai Takoto, C/o Rangitane Marsden	34,000	96,000	193,700	193,700
APP.038454.01.01	Elbury Holdings Limited, C/o Kevin and Fiona King	34,000	96,000	113,700	113,700
APP.039332.01.01	L J King Limited	34,000	78,400	78,400	78,400
APP.039244.01.01	Kevin Thomas & Danielle O'Connor	34,000	59,600	59,600	59,600
APP.038589.01.01	Neil & Alma Violet Thompson and Steven & Josephine Suzanne Thompson*	34,000	35,280	35,280	35,280
APP.038591.01.01	Cypress Hills Ltd, C/o Alan Anderson & Carolyn Dawn Smith*	34,000	35,280	35,280	35,280
APP.038650.01.01	Tony and Diane Hewitt*	34,000	39,200	39,200	39,200
APP.038328.01.01	Bernard Kim & Sheryl Dianne Shine	34,000	39,200	39,200	39,200
APP.039345.01.01	Ian McLarnon & Jason McLarnon*	23,520	23,520	23,520	23,520
APP.038732.01.01	Kathy Valadares	22,350	22,350	22,350	22,350
APP.038380.01.01	Daimen & Katherine Holloway*	14,900	14,900	14,900	14,900
APP.039381.01.01	Jonathan Brien & Carol Carr	14,900	14,900	14,900	14,900
TOTAL		517,670	1,034,630	1,655,730	2,060,655
% of Total		**25%**	**50%**	**80%**	**100%**
Note: *The staged implementation is based on years when irrigation occurs following the granting of the consents					

2.2 Trigger Level System

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.

A two-tier trigger level system will be implemented in this GMCP:

- **TL1** - The first-tier trigger level establishes whether the parameter of concern is approaching outer limits of baseline data (e.g. Median ±3 times the standard deviation, or some other criteria determined with agreement of Council);
- **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 such as saline intrusion are increased.

The TL 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.

2.2.1 Timeframe for setting of trigger levels

The setting of TL1 and TL2 trigger levels values for each parameter (where TBC is indicated in the monitoring plan tables in the **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 granting of the consents. This approach recognises that:

- In some areas, no baseline data has been established by the consent holder(s) or any of the key stakeholders in the area; and that
- 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. 12 months following granting of consent) will not vary significantly from existing conditions.

2.2.2 Response to monitoring results

The monitoring results are to be compared against the TLs after each round of monitoring by a suitably qualified expert approved by NRC. The actions required should TLs be exceeded are summarised in **Section** 4 (Contingency Plan) and shown in **Figure 3**.

2.3 Environmental Monitoring Report

The MWWUG must commission the preparation of an Annual Environmental Monitoring Report (AEMR) by a suitably qualified Hydrogeologist approved by NRC at the end of each irrigation season and this must be submitted to the Council by 31 July each year.

The AEMR must provide an analysis and interpretation of the results of bore water meter (use) records, groundwater level and water chemistry monitoring data, and compare the monitoring data to predicted impacts within the AEE.

2.4 Staged Implementation and Monitoring Programme Review

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 – 1 year following granting of the consents;

End of Stage 2 - 3 years following granting of the consents;

End of Stage 3 - 6 years following granting of the consents; and

End of Stage 4 - 9 years following granting of the consents.

The Staged Implementation and Monitoring Programme Review will be prepared by a suitably qualified expert approved by Council and 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. The report will be provided to Council a minimum of three months prior to the anticipated commencement of the subsequent irrigation season utilising volumes defined for the subsequent development stage. An increase in the volume of abstraction to the next development stage will only occur upon receipt of written approval of the Council's Compliance Manager monitoring manager indicating the Council is satisfied that environmental effects resulting from abstraction are no more than those anticipated in the AEE.

The review may also consider the nature and scope of continued monitoring (i.e. Monitoring frequency, intensity (type and number of samples)) and associated trigger levels. No changes shall be undertaken or implemented without the prior written approval of the NRC monitoring manager. The report and recommendations for any changes shall be provided to the NRC for review and approval at least three months prior to the irrigation season that the requested changes are required to be implemented.

Review of the monitoring programme may also occur to incorporate new or replacement water permits in the Waiharara, Motutangi or Houhora sub-areas of the Aupouri 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.

2.5 Timeline of Management Actions

Figure 1 provides a timeline indicating when reporting and management decisions are required.

Figure 1. Timeline of reporting and management decisions.

3. Monitoring Plan

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 monitoring to be undertaken. The following sections provide monitoring schedules (frequency and trigger levels) for the relevant bores under each suite of monitoring bore.

The locations of the bores are show in **Figure 2**, which also shows the location of the MWWUG bores for reference.

Table 3. Schedule of bores and monitoring details.

Bore Name		Bore Owner	Coordinates (NZTM 2000)		Depth (m)	Dia. (mm)	Piezo. No.	Target aquifer	Purpose*
Generic	NRC ref.		Easting	Northing					
Fishing Club	LOC.200250	NRC	1611411	6146928	79			Deep shellbed	SI; MI
Waterfront	LOC.200210	NRC	1611712	6146689	19	32	1	Shallow sand	GL, EC
			1611712	6146689	37	32	2	Intermediate	GL, EC
			1611712	6146689	57	32	3	Intermediate	GL, EC
			1611712	6146689	74	32	4	Deep shellbed	GL, EC
Motutangi	TBC	TBC	1615707	6139818	<10	50	1	Shallow sand	GL; EC
			1615707	6139818	80-100 (TBC)	50	2	Deep shellbed	GL; EC
Norton Road	TBC	TBC	1619772	6134408	<10	50	1	Shallow sand	GL; EC
	TBC	TBC	1619772	6134408	80-100 (TBC)	50	2	Deep shellbed	GL; EC
Kaimaumau	LOC.316222	NRC	1622445	6134482	20		1	Shallow sand	GL; EC; SI; MI
	LOC.315766	NRC	1622426	6134466	72		2	Deep shellbed	GL; EC; SI; MI
Kaimaumau Settlement	LOC.200097	Private (Wilson Kaimaumau)	1624293	6135696	<20 (12)		1	Shallow sand	GL, SI
	TBC	TBC	1624253	6135897	>50 (TBC)		2	Deep shellbed	GL, SI
Lamb Road	TBC	J. Brien & C. Carr	1610222	6147542	TBC		1	Deep shellbed	GL, EC
Valadares	TBC	K. Valadares	1611284	6144679	TBC		1	Deep shellbed	GL, EC
McLarnon	TBC	I. & J. McLarnon	1610058	6147313	TBC		1	Deep shellbed	GL, EC
Elbury Holdings	TBC	Elbury Holdings Limited	1611872	6142927	TBC		1	Deep shellbed	GL; SI
Holloway	TBC	Huanui Avocados Ltd	1610366	6143906	TBC		1	Deep shellbed	GL, EC
Ngai Takoto	TBC	Te Runanga o Ngai Takoto	1611284	6144679	TBC		1	Deep shellbed	GL, EC
			1619904	6133984	TBC		1	Deep shellbed	GL, EC
Cypress Hills	TBC	Cypress Hills Ltd	1619097	6135520	TBC		1	Deep shellbed	GL, EC
Stanisich	TBC	I.A. Stanisich	1618987	6135795	95	104	1	Deep shellbed	GL, EC
Honeytree	TBC	Honeytree Farms Limited	1617128	6136793	112	310	1	Deep shellbed	GL, EC
			1617128	1617128	6	50	2	Shallow sand	GL
			1614898	6138495	111	310	3	Deep shellbed	GL, EC
Thompson	TBC	N. & A. V. Thompson and S. & J.S. Thompson	1617846	6133480	TBC		1	Deep shellbed	GL, EC

Bore Name		Bore Owner	Coordinates (NZTM 2000)		Depth (m)	Dia. (mm)	Piezo. No.	Target aquifer	Purpose*
Generic	NRC ref.		Easting	Northing					
L J King Ltd	TBC	L J King Limited	1618903	6136060	TBC		1	Deep shellbed	GL, EC
Mapua	TBC	Mapua Avocados Ltd	1618611	6136321	111	100	1	Deep shellbed	GL, EC
			1614798	6138773	122	100	2	Deep shellbed	GL, EC
			1614723	6139203	97	100	3	Deep shellbed	GL, EC
Hewitt	TBC	T. Hewitt	1612541	6141795	TBC		1	Deep shellbed	GL, EC
Shine	TBC	B. K. & S. D. Shine	1612979	6142360	TBC		1	Deep shellbed	GL, EC
Largus	TBC	Largus Orchard Ltd Partnership	1612784	6142645	94	100	1	Deep shellbed	GL, EC
			1617436	6132318	TBC	100	2	Deep shellbed	GL, EC
Covich	TBC	G.T. & M. N. Covich	1619411	6134224	TBC		1	Deep shellbed	GL, EC
			1619702	6134754	TBC		1	Deep shellbed	GL, EC
Thomas	TBC	K. Thomas & D. O'Connor	1618003	6133379	TBC		1	Deep shellbed	GL, EC

* Purpose key: GL = Groundwater Level; EC = Electrical Conductivity; SI = Salinity Indicators; MI = Major Ions.

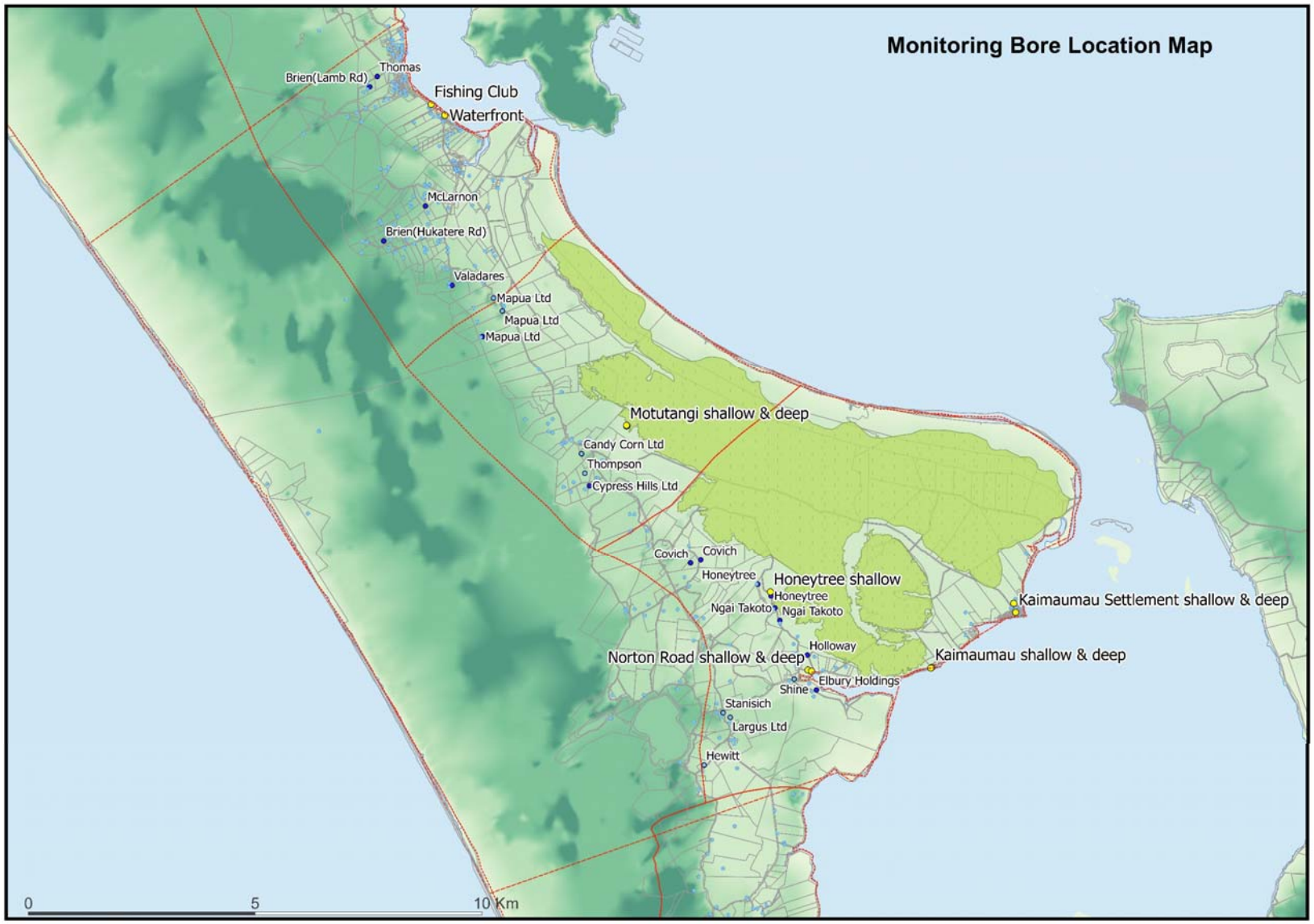

Figure 2. Monitoring Bore Location Map.

3.2 Groundwater Level and Salinity Monitoring

Sentinel bores (shown with yellow dots on Figure 2) are monitoring bores located near a discharge boundary or in close proximity to a discharge receptor, and therefore provide early detection or warning of potential concerns. In this GMCP sentinel bores will be utilised as the primary reference sites for regional groundwater levels and salinity monitoring.

Sentinel bores will collect data continuously (daily basis) for water levels and electrical conductivity in individual piezometers to provide an indication of:

- Drawdown in shallow groundwater levels in the vicinity of Kaimaumau Wetland attributable to abstraction of deeper groundwater authorised by MWWUG consents;
- Groundwater levels around the coastal margin lowering and approaching a threshold that could indicate a greater risk of saline intrusion;
- Groundwater level declines that may impact on the ability of efficient groundwater bores to abstract groundwater; and
- Any reduction in water quality that could indicate the landward migration of the saline interface.

Checking of the datalogging sensors required for continuous monitoring shall be undertaken during the irrigation season on a monthly basis. The data will be reviewed and any faults shall be reported to the Council and remedied immediately, and TL exceedances should follow the procedures in the Contingency Plan described in **Section** 4.

Sentinel bores will be installed within three months of the issue of consents for the MWWUG. Trigger levels (TL1 and TL2) for groundwater level will be determined once individual piezometers are constructed and level surveyed. TL1 will be based on the baseline data, while TL2 will be no less than 0.5 mAMSL in the shallow aquifer and 1.0 mAMSL in the deep aquifer (noting that changes in EC are also a key indicator).

Electrical conductivity triggers for the sentinel bores will be no greater than:

- **TL1** - Median (weekly rolling average) EC from baseline monitoring period +25%
- **TL2** - Median (weekly rolling average) EC from baseline monitoring period + 50%

For both water level and electrical conductivity values, the trigger limits will be set with agreement from Council.

Details of the sentinel bores to be used as groundwater level and salinity reference points are summarised in **Table 4**.

Table 4. Schedule of sentinel monitoring bores for groundwater level and salinity indicators.

Bore Name	Depth (m)	Piezo. No.	Target aquifer	Units	Frequency	Trigger Levels	
						TL1	TL2
Waterfront	19	4	Shallow sand	mAMSL	Continuous	2.3maMSL EC TBC	0.5 maMSL EC TBC
	37	3	Intermediate	mAMSL	Continuous	2.9 maMSL EC TBC	0.6 maMSL EC TBC
	57	2	Intermediate	mAMSL	Continuous	4.5 maMSL EC TBC	1.1 maMSL 1.2 EC TBC
	74	1	Deep shellbed	mAMSL	Continuous	4.4 maMSL EC TBC	1.8 maMSL EC TBC
Motutangi	<10	1	Shallow sand	mAMSL	Continuous	TBC	TBC

Bore Name	Depth (m)	Piezo. No.	Target aquifer	Units	Frequency	Trigger Levels	
						TL1	TL2
sentinel				µS/cm	Continuous	TBC	TBC
	80-100 (TBC)	2	Deep shellbed	mAMSL	Continuous	TBC	TBC
				µS/cm	Continuous	TBC	TBC
Norton Road sentinel	<10	1	Shallow sand	mAMSL	Continuous	TBC	TBC
				µS/cm	Continuous	TBC	TBC
	80-100 (TBC)	2	Deep shellbed	mAMSL	Continuous	TBC	TBC
				µS/cm	Continuous	TBC	TBC
Kaimaumau sentinel	20	1	Shallow sand	mAMSL	Continuous	TBC	TBC
				µS/cm	Continuous	TBC	TBC
	72	2	Deep shellbed	mAMSL	Continuous	TBC	TBC
				µS/cm	Continuous	TBC	TBC

* The purpose of all these sentinel bores will be to monitor and establish trigger levels for both Groundwater Level and Electrical Conductivity values. All trigger limit values in this Table to be confirmed by NRC.

Notes:

TBC = to be confirmed within 15 months of granting of the consents.

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

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

3.2.1 Shallow Groundwater Levels

The purpose of shallow groundwater level monitoring in sentinel bores is to specifically address concerns related to water level reductions in shallow groundwater and potential effects on the Kaimaumau wetland and groundwater level declines that may impact on the ability of efficient bore takes to abstract groundwater. It is also useful for understanding the overall response of the groundwater system to abstraction effects and to saline intrusion risks

The existing conceptual understanding in the shallow groundwater regime is that groundwater levels within the wetland are higher than groundwater levels in the shallow aquifer outside of the wetland, due to land drainage of adjacent farm land.

Following installation of the sentinel bores, groundwater levels around the wetland margin (at the Motutangi, Norton Road and Honeytree Farms monitoring sites) will be compared to the wetland water and ground levels in the wetland to assess any difference in relative water levels. If comparison of relative groundwater levels indicate standing water levels in the wetland are close to, or below the regional piezometric surface, it will be assumed the potential for hydraulic connection between the wetland and aquifer exists. In this case, assessment of localised and sub-regional trends in shallow groundwater (including groundwater levels recorded by DOC in the Kaimaumau Wetland) will be provided in the Environmental Monitoring Report (**Section 2.3**), and evaluation of the potential magnitude and significance of effects will be a consideration for the review and approval of the proposed staged development (outlined in **Section 2.4**).

If the regional groundwater levels are significantly below the wetland levels such that the wetland is unlikely to be hydraulically connected to the underlying groundwater then shallow groundwater level monitoring shall continue, to provide an overall understanding of the aquifer response to pumping, but a specific assessment of wetland impacts will not be required.

3.2.2 Production Bore Groundwater Levels

Monthly water level monitoring is required in all MWWUG production bores during the winter months (nominally May to September) to provide information to identify any inter-annual variations in aquifer storage which may be anomalous compared to regional trends (**Table 5**). Water levels will also be measured in all production bores at nominal monthly intervals during the summer months, with measurements undertaken a minimum of eight hours following the cessation of pumping. Electrical conductivity values should also be measured at monthly intervals from the productions bores during the irrigation season as a check on any changes in salinity induced by the pumping.

Electrical conductivity trigger levels will be established in the production bores where monitoring for that parameter occurs. However, no specific trigger level 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.

Continuous water level monitoring is also required in a shallow observation bore adjacent to the AUT.038471.01.01 production bore (Honeytree Farms) 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 aquifer monitoring will enable comparison between the area of maximum shallow aquifer impact modelled in the AEE, with the shallow piezometers in the four sentinel bores (**Table 4**) distributed across the wider Aupōuri Aquifer.

Table 5. Proposed Monitoring Schedule – Production Bore Water Levels.

Bore Name	Depth (m)	Piezo. No.	Target aquifer	Parameter*	Units	Frequency	Trigger Levels	
							TL1	TL2
Lamb Road	TBC	1	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC
Valadares	TBC	1	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC
McLarnon	TBC	1	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC
Elbury Holdings	TBC	1	Deep shellbed	GL, SI	mAMSL	Monthly	EC TBC	EC TBC
Holloway	TBC	1	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC
Ngai Takoto	TBC	1	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC
	TBC	1	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC
Cypress Hills	TBC	1	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC
Stanisich	95	1	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC
Honeytree	112	1	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC
	6	2	Shallow sand	GL, EC	mAMSL	Continuous	EC TBC	EC TBC
	111	3	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC
Thompson	TBC	1	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC
L J King Limited	TBC	1	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC
Mapua	111	1	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC
	122	2	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC
	97	3	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC
Hewitt	TBC	1	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC
Shine	TBC	1	Deep shellbed	GL; EC	mAMSL	Monthly	EC TBC	EC TBC
Largus	94	1	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC
Covich	TBC	1	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC

Bore Name	Depth (m)	Piezo. No.	Target aquifer	Parameter*	Units	Frequency	Trigger Levels	
							TL1	TL2
	TBC	1	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC
Thomas	TBC	1	Deep shellbed	GL, EC	mAMSL	Monthly	EC TBC	EC TBC

* Purpose key: GL = Groundwater Level; EC = Electrical Conductivity; SI = Salinity Indicators; MI = Major Ions.

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

3.3 Saline Intrusion Monitoring

Quarterly monitoring of key salinity indicators in new or existing bores at key locations around the northern margin of Rangaunu Harbour is required. This area is adjacent to the largest concentration of proposed abstraction, in an area where the potential for saline intrusion is elevated due to a flat hydraulic gradient (particularly toward Kaimaumau settlement where groundwater is used for potable and farm water supply). Reference to the existing Council state of the environment monitoring sites at Houhora and Kaimaumau which are monitored quarterly is also required.

Proposed monitoring sites include:

- The existing Fishing Club bore at Houhora (monitored quarterly by Council);
- The existing shallow and deep Kaimaumau sentinel bores (monitored quarterly by Council);
- A new or existing bore in or near the Kaimaumau settlement accessing the shallow sand aquifer (<20 metres);
- A new or existing bore in or near the Kaimaumau settlement accessing the shellbed aquifer (>50 metres);
- Production bores in the Norton Road area located within 1 km of the coastal marine area.

Salinity indicators and major ions monitored shall include:

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

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)

Trigger levels for individual determinants will be established as follows:

- **TL1** - Median concentration from the baseline monitoring period +25%, or an alternative criterion determined with agreement from Council.
- **TL2** - Median concentration from the baseline monitoring period + 50%, or an alternative criterion determined with agreement from Council.

During the initial baseline period (12 months), sampling for salinity indicators will be undertaken at 6 weekly intervals. Subsequent monitoring will be undertaken following the schedule set out in **Table 6**.

Table 6. Proposed Monitoring Schedule – Saline Intrusion.

Bore Name	Depth (m)	Piezo. No.	Target aquifer	Parameter*	Units	Frequency	Trigger Levels	
							TL1	TL2
Fishing Club	79	1	Deep shellbed	EC	µS/cm	Quarterly	TBC	TBC
				Chloride	mg/L	Quarterly	TBC	TBC
				Sodium	mg/L	Quarterly	TBC	TBC
				TDS	mg/L	Quarterly	TBC	TBC
Kaimaumau	20	1	Shallow sand	EC	µS/cm	Quarterly	TBC	TBC
				Chloride	mg/L	Quarterly	TBC	TBC
				Sodium	mg/L	Quarterly	TBC	TBC
				TDS	mg/L	Quarterly	TBC	TBC
	72	2	Deep shellbed	EC	µS/cm	Quarterly	TBC	TBC
				Chloride	mg/L	Quarterly	TBC	TBC
				Sodium	mg/L	Quarterly	TBC	TBC
Kaimaumau Settlement	<20 (12)	1	Shallow sand	EC	µS/cm	Quarterly	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	Quarterly	TBC	TBC
				Chloride	mg/L	Quarterly	TBC	TBC
				Sodium	mg/L	Quarterly	TBC	TBC
				TDS	mg/L	Quarterly	TBC	TBC
Elbury Holdings	TBC	1	Deep shellbed	EC	µS/cm	Quarterly	TBC	TBC
				Chloride	mg/L	Quarterly	TBC	TBC
				Sodium	mg/L	Quarterly	TBC	TBC
				TDS	mg/L	Quarterly	TBC	TBC

* Parameter key: GL = Groundwater Level; EC = Electrical Conductivity; SI = Salinity Indicators; MI = Major Ions.

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

4. Contingency Plan

Exercising of the consents is subject to maintenance of aquifer conditions that do not indicate on-going unsustainable groundwater level decline or increase in salinity at the coastal margins (saline intrusion).

As described in **Section 2.2**, a trigger level system is used to define environmental criteria that signals changes may be occurring outside of what is normal (TL1) or at a point where mitigation is required (TL2). This section details the responses that that will be undertaken where TLs are exceeded under any of the monitoring suite discussed in **Sections 3.2** and **3.3**.

Figure 3 provides an overview diagram of the contingency plan.

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) Notify the Council within two working days of when the TL1 exceedance became known.

(b) Sampling of the monitoring bore(s) in exceedance shall immediately be upgraded to a weekly frequency for four weeks following the first exceedance of the TL1 and results reported to the Council at weekly intervals. 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 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 within six weeks of the initial breach, the MWWUG shall prepare and submit to the Council a Groundwater Trigger Exceedance Report (GTER).

(d) The GTER shall assess the significance of the exceedance in terms of saline intrusion of the aquifer, effects on the Kaimaumau wetland or on-going declining groundwater levels (including effects on existing groundwater users). The GTER shall assess why TLs have been breached, identify the pumping bores in the area of effect, and include a review of all of the available data, including groundwater levels, groundwater use and groundwater quality, and shall be completed by a suitably qualified Hydrogeologist approved by Council.

4.2 Exceedance of TL2

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

(a) Inform Council immediately upon TL2 exceedance becoming known.

(b) All MWWUG Consent Holders must reduce by 50%, or an alternative restriction regime agreed to by the water users and the Council.

(c) Commence 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 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 Council.

(d) If salinity indicators continue to increase or groundwater levels continue to decline after 21 days following the implementation of the interim pumping restrictions, abstraction all MWWUG water

users will reduce to volumes required for rootstock protection, or an alternative restriction regime agreed to by the water users and the Council. Root stock protection is defined as the minimum amount of water required to keep root stock alive for production in future seasons.

(e) Review and update the GTER report within 20 working days with a longer-term programme of recommended responses incorporating observed response to interim pumping rate reductions. The updated GTER will include a specific programme (including timeframes) of remedial actions to mitigate saline intrusion risk over the medium and long term. The remedial 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 potentially impacted by saline intrusion and, if necessary, provision of temporary water supplies to effected parties outside of the MWWUG in the event water quality exceeds MAVs or aesthetic guidelines prescribed in NZDWS (potable supplies).

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

(g) Implement additional mitigation measures as directed by Council.

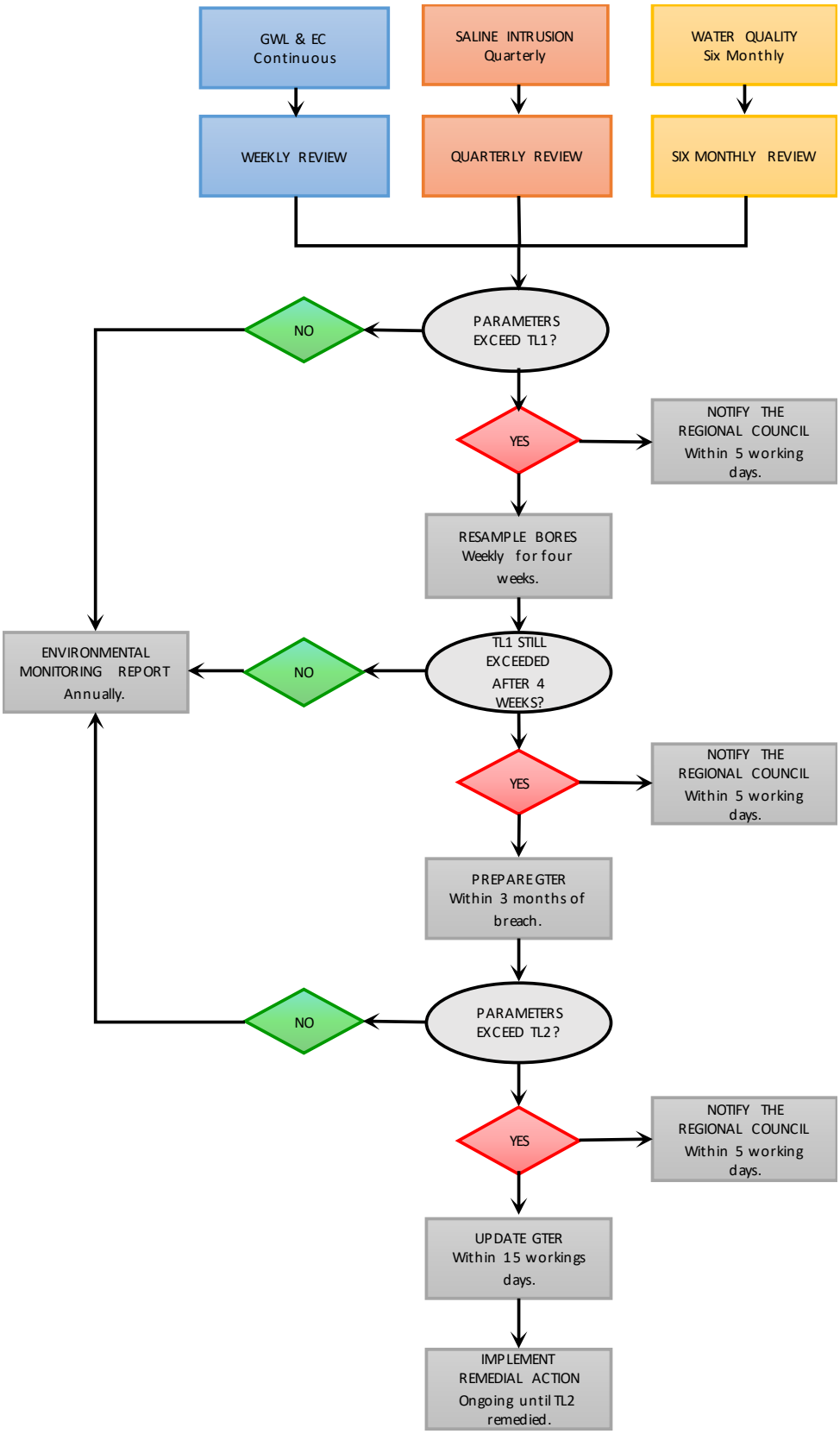

Figure 3. Overview diagram of the Contingency Plan.