

# Ruataniwha Aquifer

## Summary of Values

For Proposed Plan Change 7: Hawke's Bay Regional  
Resource Management Plan

(Outstanding Water Bodies Plan Change)

## **Ruataniwha Aquifer - Summary of Values**

### **For Proposed Plan Change 7: Hawke's Bay Regional Resource Management Plan (Outstanding Water Bodies Plan Change)**

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## Purpose of Report

1. This report is a compilation of information previously documented on the values associated with the Ruataniwha Aquifer during preparation of Proposed Plan Change 7 prior to its notification on 31 August 2019. It is one of a series of similar reports compiled for each of the respective proposed outstanding water bodies (OWB) identified in Plan Change 7.
2. The approach used by Hawke's Bay Regional Council to identify OWB in Hawke's Bay followed a process that began with a high level review documenting the values associated with 130 water bodies across the region. A short explanation is provided at the beginning of each section which discusses the relevant phase and whether the Ruataniwha Aquifer was considered during that part of the process.
3. Not all OWB identified in Proposed Plan Change 7 were considered during each phase of the process. For clarity, an index table (Table 1) has been included in this report which sets out the relevant phases, report names, values and page numbers for the Ruataniwha Aquifer.
4. No new research or further information was commissioned for the purposes of compiling this report.
5. For further information on the Outstanding Water Body Identification Methodology and each of these phases, see the Plan Change 7 Section 32 Evaluation Report<sup>1</sup>.
6. **Table 1: Ruataniwha Aquifer index**

Phase	Included (yes/no)	Report name /date	Page numbers in associated report
High Level Review (Phase 1 & Phase 2)	Yes	Summary of Cultural Values Associated with Water Bodies in Hawke's Bay (March 2018)	7
		Summary of the Recreation, Landscape and Ecology Values Associated with Water Bodies in Hawke's Bay (March 2018)	N/A
Secondary Assessments (Phase 3)	Yes	Secondary assessment - Ruataniwha Aquifer	All of report
Local Expert Panel (Phase 4)	Yes	Outstanding Water Bodies in Hawke's Bay - Report of the Expert Panel (April 2019)	45 - 49
Final Evaluation (Phase 5)	Yes	Outstanding Water Bodies Plan Change - selecting a list of outstanding water bodies in Hawke's Bay (May 2019)	64, 79 - 85, 94, 96

## Plan Change 7 Overview

7. Hawke's Bay Regional Council has prepared an amendment to the Hawke's Bay Regional Resource Management Plan (RRMP) to include a list of the region's outstanding water bodies, together with a framework which prescribes a high level of protection for these water bodies in future plan making. That change to the RRMP is referred to as 'Proposed Plan Change 7' or the 'Outstanding Water Bodies Plan Change.'
8. The water bodies identified in the Outstanding Water Bodies Plan Change have been proposed as the 'best of the best' within the region, featuring an exceptional cultural, spiritual, recreation, natural character, landscape, geology, or ecology value which is remarkable in Hawke's Bay.
9. Since commencing this OWB plan change project in early 2017, a significant amount of work has been undertaken to build a clearer picture of water bodies within the region and their potential for being classed as outstanding.
10. The Outstanding Water Bodies Plan Change amends the RPS to reflect NPSFM provisions which require the protection of the significant values of outstanding water bodies. This special protection does not lessen the importance of, or value associated with other water bodies, which are managed through other parts of the Regional Resource Management Plan or Council work programme.
11. Further information about the background and purpose of proposed Plan Change 7 is online at [www.hbrc.govt.nz](http://www.hbrc.govt.nz) (search #owb).

<sup>1</sup> <https://www.hbrc.govt.nz/assets/Document-Library/Outstanding-Water-Bodies/1.-Other-supporting-information/Section-32-Evaluation-Report.pdf>

## Phase One & Phase Two: High Level Review & Summary of Values

12. In June 2017, the Council embarked on a high level review documenting the cultural, spiritual, recreation, landscape, geological, natural character and ecology values associated with 130 water bodies across the region.
13. Phase 1 involved a thorough review of over ninety documents being completed. Those documents included Deeds of Treaty Settlements, statutory acknowledgements for Treaty settlements, customary uses reports, Waitangi Tribunal reports, and other documents produced in a national and regional context between 1979 and 2018.
14. This work built a clear picture of values associated with a wide range of water bodies across the region and their potential for being classified as outstanding, prior to short listing. This work culminated in a literature review with the following two tables summarising key values associated with 130 of the region's water bodies:
  - Table C1: Cultural Values Table – Summary of Cultural Values Associated with Water Bodies in Hawke's Bay.
  - Table R2: Recreation, landscape, Ecology Values Table – Summary of the Recreation, Landscape and Ecology Values Associated with Water Bodies in Hawke's Bay
15. Table C1 included all water bodies identified by name in reviewed documents, with a high level summary of the associated 'cultural and spiritual values'. This work was sent out to all Treaty settlement entities in Hawke's Bay in December 2017 for input prior to completion.
16. Table R2 included all water bodies identified by name in reviewed documents, with a high level summary of the associated recreation, landscape, geology and ecology values, and ratings assigned in this document.
17. Appendix 1 sets out the relevant extracts from Table C1 for the Ruataniwha Aquifer. No information regarding the Ruataniwha Aquifer was found for inclusion in Table R2.

## Phase Three: Refine List & Secondary Assessments

18. In 2018, the high level review findings for 130 water bodies, and their associated values, were reported to the Council's Regional Planning Committee (RPC). The RPC selected a list of 22 candidate OWB to proceed forward a more detailed secondary assessment to see if any contained values that were clearly superior to other water bodies in Hawke's Bay.
19. The secondary assessment for Ruataniwha Aquifer is set out in Appendix 2.

## Phase Four: Engagement & Local Expert Panel Process

20. Phase 4 involved wider input from the public, iwi authorities, key stakeholders and territorial local authorities. Feedback from this process featured requests for an additional 20 water bodies to be identified as OWB.
21. In December 2018, Council staff contracted a local expert panel to evaluate, categorise and identify outstanding characteristics, for all value sets, from the list of 22 candidate OWB and the additional 20 water bodies put forward during engagement.
22. The local expert panel was appointed via nominations by key stakeholders, iwi authorities and city and district councils, and comprised six members<sup>2</sup> with good knowledge of the Hawke's Bay region.
23. The recommendations made by the panel were based on existing information, their local knowledge, and a set of assessment criteria they developed at their first meeting. The assessment criteria used by the panel to identify outstanding features is set out at the beginning of each subsection for each value set.
24. The expert panel found the Tukituki River, including the Ruataniwha Aquifer system to have outstanding ecology, landscape and cultural and spiritual values. Their findings are set out in Appendix 3.

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<sup>2</sup> Morry Black (Mauri Protection Agency), Matt Brady (DOC), John Cheyne (Te Taiao Environment), Andrew Curtis (Water Strategies Limited), Bernie Kelly (kayaking rep), Tom Winlove (Fish & Game Hawke's Bay)

## Phase Five: Final Evaluation

25. Phase Five saw a final evaluation carried out to assist the Council's Regional Planning Committee to select a list of outstanding water bodies in Hawke's Bay, for inclusion in Proposed Plan Change 7.
26. This work summarised the key values of 42 water bodies nominated during Phases 3 and 4, and informed by
  - The secondary assessments
  - local expert panel findings
  - the values summary reports, and
  - stakeholder engagement.
27. The summary was presented by value-type, based on the work to date and in a format consistent with the direction given by Council.
28. Appendix 4 sets out the relevant extracts from final evaluation for the Ruataniwha Aquifer.

# Appendix 1: Table C1 - Ruataniwha Aquifer

*Note: Appendix 1 contains extracts only - for further information please refer to the full report.*



## Summary of cultural values associated with water bodies in Hawke's Bay

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## Summary of cultural values associated with water bodies in Hawke's Bay

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Prepared By:  
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### Referencing

When referencing in another report any of the values contained in this document, the author of that report must include the following text as a footnote to the referenced material:

"There are numerous water bodies in the Hawke's Bay region where two or more iwi groups have agreed, shared interests and/or contested overlapping claims. By referring to these values it is not intended to imply any exclusive rights over a particular water body for one or more iwi group, nor does it confirm the validity of the claims of any group(s) over that water body. This information is being referred to solely for the purpose of identifying the important cultural and spiritual values identified by iwi groups in the region".

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Waterbody / Region / Catchment	Treaty settlement entity	Commentary		Key values
		<p><u>Key</u>            DOS = Deed of settlements, SA = statutory acknowledgements, TSL = Treaty settlement legislation, CUR = customary usage reports, WTR = Waitangi tribunal reports, OTHER = any other relevant documents</p> <p>No = waterbody not referred in document            N/A = No such document exists.</p> <p><b>NOTE 1:</b> The 'Key Values' column sets out a pool of eight key values, identified by the tāngata whenua representatives on the Council's Regional Planning Committee, which broadly reflect the most significant cultural values associated with water bodies. The relevant key values for each water body is listed in this column.</p> <p>See commentary column for further explanation about the identified key value for each waterbody.</p> <p><b>NOTE 2:</b> The HBRC is aware there are numerous areas, including waterbodies, where two or more iwi groups have agreed, shared interests and/or contested overlapping claims within the HBRC region. The information presented in The Table is not intended to imply any exclusive rights over particular waterbodies for one or more iwi groups, nor does it confirm the validity of the claims of any group over that waterbody. The information is solely for the purpose of recording important cultural</p>		<p>Note: key values as follows:</p> <p>Wāhi Tapu, Wāhi taonga            Wai Tapu            Acknowledged in korero tuku iho, pepeha, whakatauki, waiata            Mahinga kai, Pa tuna            Pa, kāinga            Tauranga waka            Rohe Boundary            Battle site</p>
Ruataniwha Aquifer  Hawke's Bay Tukituki	Heretaunga Tamatea	DOS	The Ruataniwha Aquifer is part of Heretaunga Tamatea's traditional rohe.	Wāhi Tapu, Wāhi taonga
		SA	N/A	
		TSL	N/A	
		CUS		
		WTR		
		OTHER		
Ruataniwha Aquifer  Hawke's Bay Tukituki	Ngāti Kahungunu Iwi Incorporated	DOS		Wāhi Tapu, Wāhi taonga
		SA		
		TSL		
		CUS		
		WTR		
		OTHER		
		OTHER		
		OTHER		





## Outstanding Water Bodies Plan Change

### **Candidate List of Outstanding Water Bodies in Hawke's Bay – Secondary Assessments for:**

Heretaunga Aquifer, Karamu Stream, Lake Whakakī, Lake Whatumā, Lake Waikaremoana, Lake Tūtira (including Aropaoanui River + Papakiri Stream), Lake Waikareiti, Lower Ngaruroro River (below Whanawhana), Mangahauanga Stream, Makirikiri River, Porangahau River, Ruakituri River, Ruataniwha Aquifer, Taruarau River, Te Whanganui a Orotū (Ahuriri Estuary), Tukituki River, Tutaekuri River, Upper Mohaka River, Upper Ngaruroro River (above Whanawhana), Waipawa River, Waipunga River, Wairoa River.

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## Outstanding Water Bodies Plan Change

### **Candidate List of Outstanding Water Bodies in Hawke's Bay – Secondary Assessments for:**

Heretaunga Aquifer, Karamu River, Lake Whakakā , Lake Whatumā, Lake Waikaremoana, Lake Tūtira (including Aropaoanui River + Papakiri Stream), Lake Waikareiti, Lower Ngaruroro River (below Whanawhana), Mangahauanga Stream, Makirikiri River, Porangahau River, Ruakituri River, Ruataniwha Aquifer, Taruarau River , Te Whanganui a Orotū (Ahuriri Estuary), Tukituki River, Tutaekuri River, Upper Mohaka River, Upper Ngaruroro River (above Whanawhana), Waipawa River, Waipunga River, Wairoa River.

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# Ruataniwha Aquifer



## Key Values

Cultural

Ecology

Natural characteristics

**Table 1: List of publications reviewed**

Year	Name	Author
2004	Lightless, Not Lifeless: New Zealand's Subterranean Biodiversity	NIWA
2009	A Review of Current Groundwater Management in Hawke's Bay and Recommendations for Protection of Groundwater Ecosystems	NIWA
2010	Cultural Impact Assessment of the Tukituki Proposed Water Storage Dams	Te Manga Māori Eastern Institute and Technology
2012	Groundwater Flow Pattern in the Ruataniwha Plains as Derived from the Isotope and Chemistry Signature of the Water	GNS science
2012	The Extent and Depth of Known East Coast Aquifers, North Island, New Zealand	NIWA
2012	Comments from Ngāti Kahungunu Iwi Incorporated on HBRC's Draft Change 5	Ngāti Kahungunu Iwi Incorporated
2012	Submission from Ngāti Kahungunu Iwi Incorporated on HBRC's Proposed Change 5	Ngāti Kahungunu Iwi Incorporated

2012	Submission from Te Taiwhenua o Heretaunga on Proposed Plan Change 5 to the RPS	Te Taiwhenua o Heretaunga
2014	Statement of Evidence by Stephen Swabey ENV-2013-WLG-000050	Hawke's Bay Regional Council
2015	Heretaunga Plains Groundwater Management and Investigations	Hawke's Bay Regional Council
2015	Location and extent of NZ's aquifers	Ministry for the Environment
2016	Groundwater Quality State of Environment: State and Trends	Hawke's Bay Regional Council
2017	Location and extent of New Zealand's Aquifers	Ministry for the Environment, Stats New Zealand
2017	Modelling Effects of Increased Groundwater Allocation on Stream Flows in the Heretaunga Plains	Hawke's Bay Regional Council
2018	Brief of Evidence of Graham David Fenwick (application for a water conservation order at Te Waikoropupu Springs)	NIWA
2018	Wetland Info Page – Aquifers and Caves	Queensland Government
2018	Cultural Values Table	Hawke's Bay Regional Council

## Discussion

### *Purpose of report*

1. The purpose of this report is to assist the RPC members to determine whether any of the values of the Ruataniwha aquifer are outstanding for the purposes of the National Policy Statement for Freshwater Management (NPSFM).
2. This report presents the summarised findings of the values attributed to the Ruataniwha aquifer in those documents referred to in Table 1, above. In accordance with decisions made by the RPC in June 2017, economic and consumptive use values have not been discussed in detail in this report.
3. The report will focus on the cultural values associated with the aquifer system, its groundwater ecosystem and its natural characteristics, not its productive qualities.

### *Overview*

4. The Ruataniwha aquifer is a major aquifer system located in the Ruataniwha basin, in Central Hawke's Bay. The aquifer system is an extremely valuable resource, underlying the Ruataniwha Plains, and is well known due to its productive qualities. Around 28.5 million m<sup>3</sup> of water is extracted from the aquifer system each year, for domestic, horticulture and agriculture use.
5. The Ruataniwha aquifer is a multi-layered alluvial system comprising a relatively shallow unconfined layer, and several deeper confined aquifers. The Ruataniwha aquifer covers an area of approximately 260 km<sup>2</sup>, reaching depths of 200 metres at some locations. Travel time of water through the aquifer varies and in some parts it can take 25 years, whereas in others it can take more than 100 years.
6. The Waipawa River, Tukituki River and Makaretu Stream are the three major waterways which flow over the Ruataniwha basin. All rivers and streams which flow over the basin, merge into the Waipawa and Tukituki Rivers at its eastern edge, around 10 km east of Waipawa and Waipukurau towns.
7. The Ruataniwha aquifer is a living ecosystem which is hydraulically connected with a number of surface water bodies which flow over the Ruataniwha basin. These surface water ecosystems, as well as the aquifer ecosystems itself, have intrinsic value, are biologically diverse, and provide important ecosystem functions, such as water purification and flood control.

### *Location*

8. The Ruataniwha aquifer system is located in Central Hawke's Bay, approximately 60 km south of Napier and Hastings. The boundaries of the Ruataniwha Basin are the foothills of the Ruahine Range in the west, Turiri Range and Raukawa Range in the east and rolling hills in the north.
9. Figures 1 and 2 below show the extent of the Ruataniwha aquifer and the main rivers and streams which flow through the Ruataniwha basin.

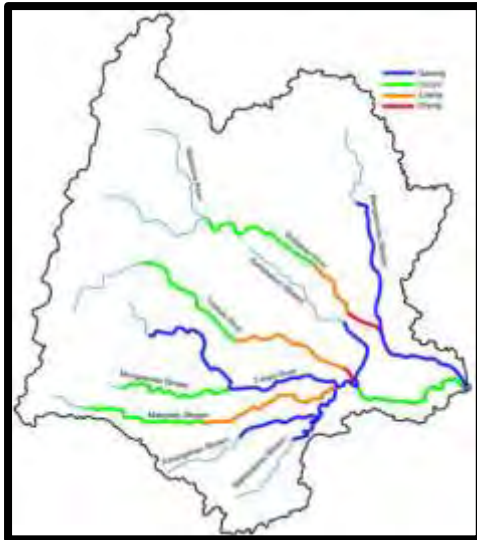


Figure 1: Ruataniwha Basin - Rivers and Streams



Figure 2: Ruataniwha aquifer system extent

### Cultural values \*

10. The Ruataniwha Aquifer is part of the traditional rohe of Heretaunga Tamatea, one of six large natural groups negotiating the settlement of Ngāti Kahungunu Treaty of Waitangi claims.
11. Ngāti Kahungunu has made submissions to the regional council requesting that the Ruataniwha Aquifer be identified and provided for as an outstanding waterbody. This is due to its exceptional water quality and significant contribution to the Hawke's Bay economy.
12. While no direct customary linkages have been established back to the Ruataniwha Aquifer in the documents reviewed in Table 1, it is recognised that all fresh water bodies have special cultural, spiritual, historical and traditional associations with freshwater. The relationship between Tāngata whenua and freshwater is founded in whakapapa, which is the foundation for an inalienable relationship between Māori and freshwater that is recorded, celebrated and perpetuated across generations. Freshwater is recognised by Māori as a taonga of paramount importance, and as such, all waterbodies have important spiritual, physical and customary value.
13. Attachment 1 contains further information on the cultural values associated with the Ruataniwha Aquifer.

### Aquifer characteristics

14. The Ruataniwha Basin has an age of approximately 1.5 million years, making it relatively young in geological terms. The basin is composed mainly of alluvial gravel with intermittent clay layers, which vary in thickness from a few metres to around 200 metres in the middle of the basin.
15. The Ruataniwha aquifer system comprises a relatively shallow, unconfined aquifer and several deeper confined aquifers which are recharged in the Ruahine Ranges. None of the aquifer systems are completely isolated, however the basin itself is hydrologically closed to groundwater inputs due to the hard rock geology of its margins.
16. The aquifer is predominately recharged by rainfall in the Ruahine Ranges, with some recharge occurring indirectly from the Waipawa and Tukituki rivers. The groundwater flow is almost parallel to river flow, with the bulk of the groundwater leaving the aquifer along its eastern boundary through rivers and streams.

### Recreation values

17. There are no recreational values associated with the Ruataniwha aquifer system itself, however the aquifer system does provide an important supporting function to recreational activities undertaken on rivers and streams hydraulically connected to the aquifer system.

\* The HBRC and authors of this report are aware there are numerous areas, including waterbodies, where two or more iwi groups have agreed, shared interests and/or contested overlapping claims within the Hawke's Bay region. The information presented in this report is not intended to imply any exclusive rights over particular waterbodies for one or more iwi groups, nor does it confirm the validity of the claims of any group(s) over that waterbody. The information is solely for the purpose of recording important cultural and spiritual values identified by iwi groups in the region as sourced from existing published documents.

## *Ecology values*

18. Aquifers are living ecosystems which are dependent on the subterranean presence of water. Aquifer ecosystems provide a diversity of habitats, such as sand, gravel, fractured rock and karst systems that are home to various unseen ecological communities. Attachment 2 contains a diagram of a naturally functioning groundwater ecosystem.
19. These ecosystems include all of the life present in the physical space of the aquifer system, from microorganisms, such as bacteria, fungi and archaea, to primitive invertebrate animals (protozoa, nematoda stygofauna and troglofauna) and advanced invertebrates. These communities interact with each other and their non-living environment and perform natural ecological processes in the absence of light.
20. Groundwater life is rarely seen. This is because access is difficult and bores are usually designed to exclude all but water. This means there is limited understanding of aquifer ecosystems. Despite this, literature suggests that most aquifers support significant biodiversity with complex life persisting to substantial depths.
21. The different components of the Ruataniwha aquifer's ecosystem are discussed in more detail below.

### **Microorganisms**

22. Microscopic organisms are commonly known as microorganisms or microbes and are an important part of an aquifer's ecosystem. The microbial communities generally have significant biodiversity and can adapt to living in nutrient-poor and anaerobic conditions found in deep and/or confined aquifer systems. Because of this, some microbial communities found in aquifers grow slowly and have a low tolerance to rapid changes.

### **Stygofauna and troglofauna**

23. Subterranean life is divided into two classes of animals, stygofauna and troglofauna. Stygofauna refers to all aquatic fauna in a groundwater environment, and troglofauna are associated with caves and spaces above the water table, but still part of the aquifer system. There are no known cave or karst systems associated with the Ruataniwha aquifer system so it is unknown if troglofauna are present in this aquifer system.
24. Stygofauna are aquatic animals which live in groundwater. They have adapted to life underground (i.e. no body pigments, no or very small eyes, elongated bodies, elongated antennae), survive on a limited food supply and are extremely energy efficient. Stygofauna feed on plankton, bacteria and plants found in streams and are thought to live longer than other terrestrial species.
25. Stygofauna are important for several reasons. They are intrinsically significant as individual species, particularly where they have a restricted geographical range. These species are known as short-range endemics, which provide insights into evolutionary processes. Stygofauna also cycle nutrients within groundwater systems, and assist with keeping the finer pore spaces in the aquifer open, by ingesting and digesting bacteria, allowing water to flow through these tiny spaces.
26. While few studies have been undertaken looking into aquifer ecosystems in New Zealand, it is believed that New Zealand's stygofauna is widespread and diverse, with high endemism. This is largely because New Zealand's geological past has led to long term separation of habitats and populations, which drives high diversity particularly when many species are confined to very restricted geographical ranges.
27. In isolated aquifers and geological units stygofauna have no opportunity to migrate to another location which results in high diversity. In the Ruataniwha aquifer system, none of the aquifers appear to be totally isolated, which suggests stygofauna species distributions, including any short range endemics, will be relatively widespread through the whole aquifer system.

### **Karst and spring systems**

28. Studies indicate that major karst and spring systems associated with underground aquifers generally provide a very large habitat for complex, interconnected interstices ideal for the bacteria and invertebrates.
29. Notable examples, include the major karst systems under Mounts Owens and Arthur in Tasman, which are the longest and deepest cave systems in the southern hemisphere, and the Te Waikoropupū Springs which are the largest and clearest freshwater springs in New Zealand. Both areas have significant hydro-geological features which provide for extremely high and unique biodiversity values in these areas.



30. While, a number of rivers, streams, springs and wetlands are hydraulically connected to the Ruataniwha aquifer system, there are no known large freshwater 'blue' springs, such as the Te Waikoropupū Springs, or major karst systems in this area.

### **Water age**

31. Groundwater generally moves from a recharge area to a discharge area. The course taken by water moving through the aquifer is called a flow path and varies depending on the thickness and the spatial extent of the aquifer system. The age and flow path of groundwater plays an important ecological role in supporting the aquifer's ecosystem.
32. Groundwater gets older along a flow path, with groundwater quality varying with depth. In most aquifer systems, groundwater flows faster horizontally than vertically. This means groundwater typically flows more rapidly through the upper parts of an aquifer, and groundwater gets older with depth.
33. Monitoring indicates that groundwater in the Ruataniwha aquifer system is mostly over 25 years, getting progressively older with depth. The south east area of the Ruataniwha plains has groundwater older than 100 years, indicating slow movement and slow recharge of groundwater in this area.

### *Groundwater dependant ecosystems (rivers, streams, wetlands and springs)*

34. Groundwater dependent ecosystems are those ecosystems which need inputs of groundwater to maintain their current structure and functions and can include rivers, streams, wetlands and springs.
35. Three main rivers flow over the Ruataniwha basin from west to east. The Waipawa River in the north, Tukituki River in the middle, and the Makaretu Stream in the south. In addition, there are a number of small streams which cross the basin, such as the Makaroro, Tukipo, and Mangaonuku Rivers and the Porangahau and Kahahakuri Streams. All rivers merge into the Waipawa and Tukituki Rivers at the basins eastern edge.
36. There is clear interaction between the groundwater and surface water bodies in the Ruataniwha basin, with flow patterns varying according to a loss gain relationship between aquifers and streams. Of note, are the Waipawa and Tukituki Rivers which lose water for most of their riverbed across the Ruataniwha Plains. Groundwater rises again to the east of the basin, discharging as surface water in the Tukituki River.
37. The water quality and quantity and the ecology of the Ruataniwha aquifer system is important to the ecological health of those surface water bodies with strong hydraulic connections to the aquifer system. i.e. poor aquifer health, or decreased water quantity, may impact on water levels or water quality in highly connected surface water bodies.

### *Water Quality*

38. Groundwater quality in aquifers across New Zealand varies, and depends on a range of factors such as nearby land uses, the soil composition above the water table, the geology of the aquifer and the groundwater residence time.
39. Hawke's Bay Regional Council regularly monitors the quality of groundwater in the Ruataniwha aquifer at eight sites. The primary aim of this monitoring is to ensure the groundwater meets health and aesthetic based standards, as opposed to protecting biodiversity values of the aquifer ecosystems.
40. The water quality of the Ruataniwha aquifer system with regard to 'health and aesthetics' and 'ecosystem health' is discussed further below.

### **Water quality – health and aesthetics**

41. The quality of groundwater in the Ruataniwha aquifer system is measured against the New Zealand Drinking water standards to ensure the water is suitable for human consumption.
42. Overall, most monitoring sites comply with the New Zealand drinking water standards (DWSNZ) for the key chemical water quality parameters<sup>1</sup>. The exceptions are elevated concentrations of manganese and iron, which appear to be naturally occurring, and nitrite-nitrogen which is exceeded at one monitoring site.

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<sup>1</sup> HBRC does not monitor for all chemical water quality parameters in the NZDWS.

Additionally, one monitoring site had microbiological non-compliance for *E.coli* in the 5-year monitoring period between 2009 and 2014.

43. Each of the water quality parameters measured as part of HBRC's programme are summarised in more detail in Table 2, below. This data was obtained directly from the 5 yearly State of the Environment Report 2009 – 2014.

**Table 2: Water Quality data– Ruataniwha aquifer (2009 – 2014)**

Water quality parameter	Compliance /non-compliance with DWSNZ guidelines
pH	Groundwater at all sites falls within the optimum guideline pH range of 7 to 8
Total Dissolved Solids (TDS)	The TDS concentrations at all sites are below the guideline value of 1000 mg/L.
Total Hardness	All sites have total hardness levels below the guideline value of 200 mg/L.
Iron and Manganese	Fifty percent of the sites comply with the guideline value for manganese, and seventy five percent of sites comply with the guideline value for iron. Those sites with elevated concentrations of manganese and iron are thought to be naturally occurring.  Elevated iron and manganese levels are a characteristic of aquifer systems where reducing (oxygen-poor) conditions exist naturally. The combined effects of reducing conditions and a long residence time of the groundwater in the aquifer encourage dissolution of iron and manganese present in aquifer materials.  Monitoring indicates that most of the deeper groundwater has mean residence times of greater than 25 years, with longer residence times of 100+ years existed at sites in the southern area of the Ruataniwha aquifer system. These age distributions are consistent with elevated manganese and iron concentrations.  Those sites which have elevated iron and manganese levels, also have water age residence times ranging from 57 to over 210 years.
Nitrate-Nitrogen	The majority of sites have low to moderate levels of nitrate-N. One site has elevated nitrite-N, which exceeds the long-term exposure standard.
Ammoniacal-N	All sites comply with the aesthetic guideline of 1.5 mg/L in the DWSNZ.
Phosphorus (Soluble Reactive Phosphorus - SRP)	Phosphorus levels at sites are generally less than 0.05 mg/L. However, several monitoring bores have elevated phosphorus, which is likely to be related to the area geology, because the groundwater at this depth has a mean residence time of 149 years.
Sulphate	All sites have sulphate levels below guideline levels of 200 mg/L.
Sodium and Chloride	All sites have sodium and chloride levels below guideline levels for sodium and chloride.
Microbiological Indicator ( <i>E. coli</i> )	87.5% of monitoring sites complied with the DWSNZ level. One site monitoring bore had 1 cfu/100 mL in the 5-year period of monitoring.

### **Water quality – ecosystem health**

44. The geology of an aquifer has a significant effect on the natural water chemistry within an aquifer system. This means the 'natural water quality' within each aquifer system varies. For example, if dominant rock types present in the aquifer have soluble materials, such as limestone, the groundwater will have higher concentrations of ions, than in aquifers with less soluble materials such as insoluble quartz pebbles. Additionally, the chemical makeup of groundwater with longer residence time will be completely different to that of water with low residence time.
45. Over a period of time the fauna and microbial communities living in an aquifer become highly adapted to its living space and its quality of water. This means the 'optimal' state of water quality required to protect each aquifer system is different, and might not necessarily correlate with the New Zealand Drinking Water Standards. For example, the water quality parameters for ecosystems with aquifers with brackish water will be completely different to that of freshwater aquifers.
46. To date, no monitoring or investigations have taken place looking into the standard of water quality required to protect the biodiversity value of the ecosystems living within the Ruataniwha aquifer system.

*Values Summary*

<b>Overarching Value</b>	<b>Sub-value</b>	<b>Description</b>	<b>Outstanding Yes/no</b>	<b>Comments</b>
Cultural	TBC	TBC	TBC	TBC
Recreational	TBC	TBC	TBC	TBC
Ecological	TBC	TBC	TBC	TBC
Landscape	TBC	TBC	TBC	TBC
Natural Character	TBC	TBC	TBC	TBC

# Attachment 1

## Ruataniwha Aquifer - Cultural Values Report



**Table 1: List of documents reviewed**

Year	Name	Author
2004	Lightless, not lifeless: New Zealand's subterranean biodiversity	NIWA
2012	Initial comments on HBRC's Draft Change 5, NKII	Ngāti Kahungunu Iwi Incorporated
2012	Submission from NKII on HBRC's Proposed Change 5, NKII	Ngāti Kahungunu Iwi Incorporated
2012	Submission from Te Taiwhenua o Heretaunga on Proposed Plan Change 5 to the RPS	Te Taiwhenua o Heretaunga
2012	Tukituki River Catchment Cultural Values and Uses	Te Taiwhenua O Tamatea & Te Taiwhenua O Heretaunga for HBRC
2015	Heretaunga Plains Groundwater Management and Investigations	Hawke's Bay Regional Council
2016	Groundwater Quality State of Environment: State and Trends	Hawke's Bay Regional Council
2016	Heretaunga Tamatea deed of settlement documents	Heretaunga Tamatea and the Crown
2018	Brief of Evidence of Graham David Fenwick (application for a water conservation order at Te Waikoropupu Springs)	NIWA
2018	Cultural Values Table	Hawke's Bay Regional Council

### 1. Overview \*

#### Purpose

The purpose of this report is to assist the RPC members to determine whether any of the cultural values associated with the Ruataniwha aquifer are outstanding for the purposes of the National Policy Statement for Freshwater Management (NPSFM).

This report presents the summarised findings of the cultural values attributed to the Ruataniwha aquifer in those documents referred to in Table 1, above.

The report summarises the cultural values associated with the Ruataniwha aquifer into a series of categories. It is recognised that isolating the values into categories can be problematic from a Māori worldview and many of the values are part of a narrative that doesn't fit neatly into categories. However, the intention is not to take a reductionist or isolated approach to cultural values but to try and gain an appreciation of their significance and the level of detail available to progress a plan change. In preparing the reports, it became obvious that all

\* The HBRC and authors of this report are aware there are numerous areas, including waterbodies, where two or more iwi groups have agreed, shared interests and/or contested overlapping claims within the Hawke's Bay region. The information presented in this report is not intended to imply any exclusive rights over particular waterbodies for one or more iwi groups, nor does it confirm the validity of the claims of any group(s) over that waterbody. The information is solely for the purpose of recording important cultural and spiritual values identified by iwi groups in the region as sourced from existing published documents.

water bodies are part of a wider cultural landscape that weaves people and the environment into a rich history of cultural and spiritual association.

Ultimately, the Regional Planning Committee will need to decide what the appropriate threshold is for outstanding cultural values. Any objectives, policies or rules that are proposed to support outstanding waterbodies will be subject to scrutiny and potential challenges by those who may be affected by a plan change.

### Importance

The Ruataniwha Aquifer is part of the traditional rohe of Heretaunga Tamatea, one of six large natural groups negotiating the settlement of Ngāti Kahungunu Treaty of Waitangi claims.

Ngāti Kahungunu has made submissions to the regional council requesting that the Ruataniwha Aquifer be identified and provided for as an outstanding waterbody. This is due to its exceptional water quality and significant contribution to the Hawke’s Bay economy.

While no direct customary linkages have been established back to the Ruataniwha Aquifer in the documents reviewed in Table 1, it is recognised that all fresh water bodies have special cultural, spiritual, historical and traditional associations with freshwater. The relationship between Tāngata whenua and freshwater is founded in whakapapa, which is the foundation for an inalienable relationship between Māori and freshwater that is recorded, celebrated and perpetuated across generations. Freshwater is recognised by Māori as a taonga of paramount importance, and as such, all waterbodies have important spiritual, physical and customary value.

## 2. Archaeology



Figure 1: Archaeological sites around the northern Ruataniwha Basin



Figure 2: Archaeological sites around the southern Ruataniwha Basin

### 3. Statutory Acknowledgement Area of Interest



Figure 3: Heretaunga Tamatea Area of Interest

#### 4. *Resource Management Plans*

The following tables list any relevant resource management plans developed by iwi/hapū, the regional council or territorial authorities. The tables include any specific provisions that apply to the Ruataniwha Aquifer. They do not include all of the general policies or rules that may apply. Water quality and water quantity provisions have been included as it is recognised that these aspects can significantly impact on cultural values.

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##### **Iwi and Hapū Resource Management Plans**

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Kahungunu ki Uta, Kahungunu ki Tai: Marine & Freshwater Fisheries Strategic Plan

Mana Ake - An Expression of Kaitiakitanga, Te Taiwhenua o Heretaunga

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##### **Regional Resource Management Plan**

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Schedule 4: Known Productive Aquifer Systems in the Hawke's Bay Region

Schedule 6: Ground Water Management Zones

Schedule 6b: Catchments sensitive to animal effluent discharges

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## Attachment 2: Typical Groundwater Ecosystem

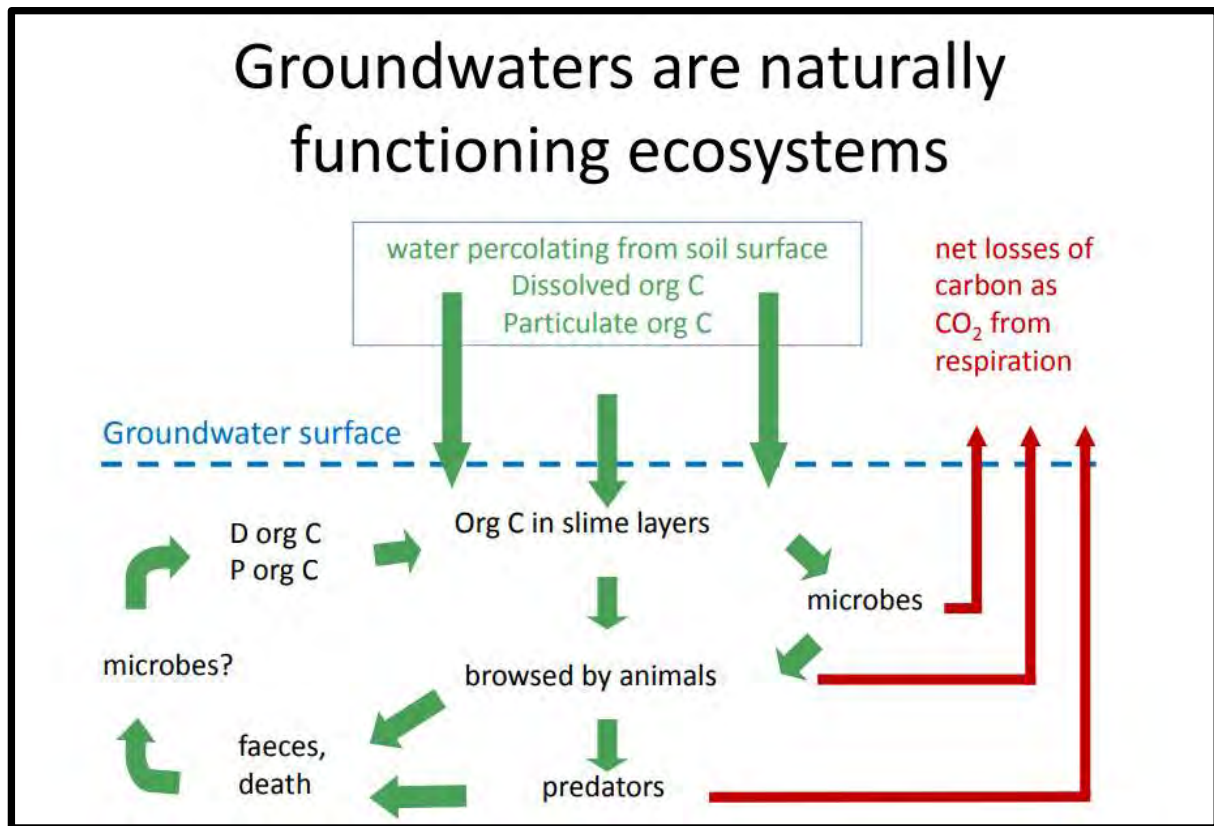


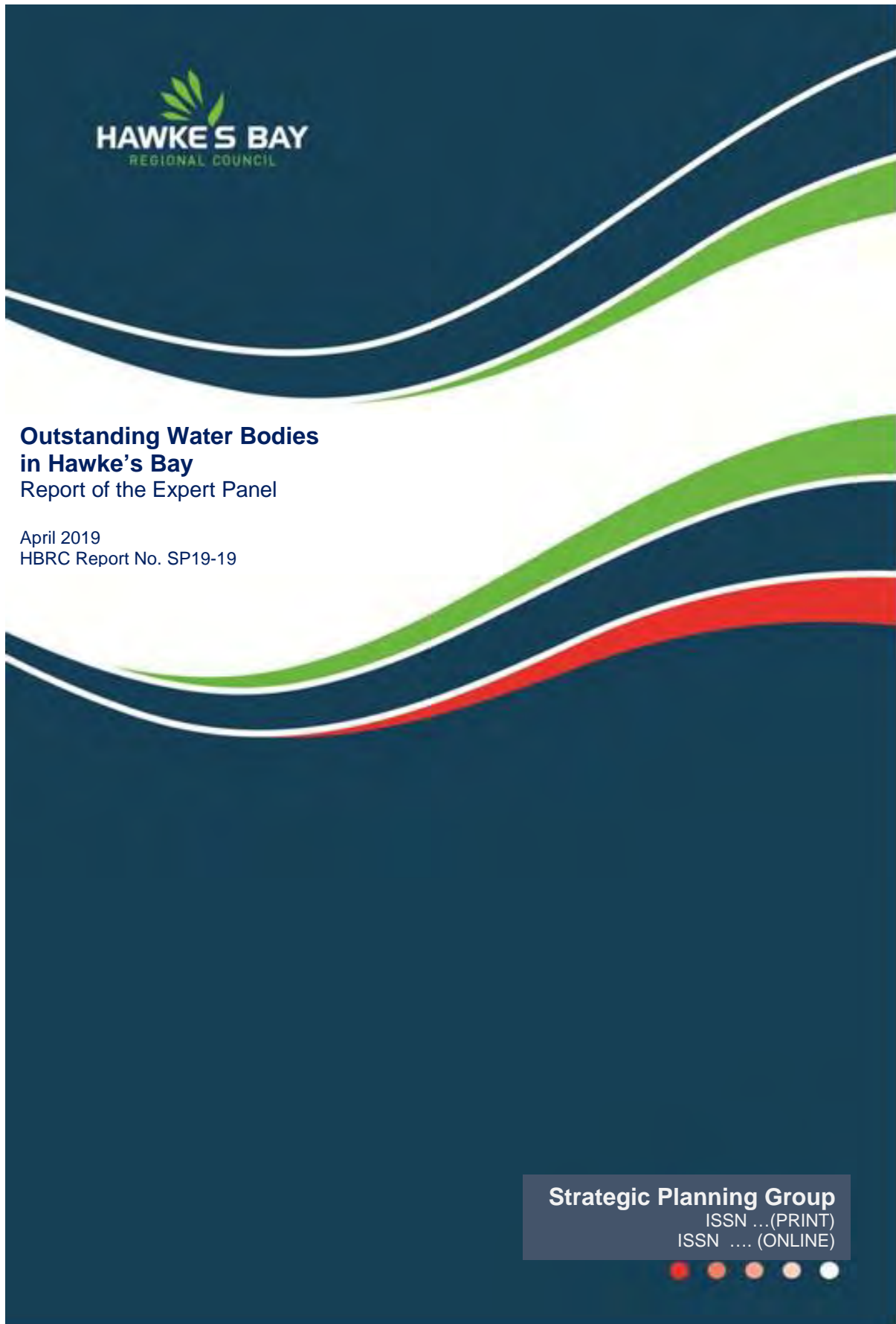
Figure 1: Typical groundwater ecosystem



# Appendix 3: Expert Panel Findings - Ruataniwha Aquifer

*Note: Appendix 3 contains extracts only - for further information please refer to the full report of the expert panel.*

Outstanding Water Bodies in Hawke's Bay: Report of the Expert Panel





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## **Outstanding Water Bodies in Hawke's Bay** Report of the Expert Panel

April 2019  
HBRC Report No. SP19-19



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## Outcome 2: OWB Assessment Criteria

The Panel considered the criteria for what makes the selected values regionally ‘Outstanding’. The Gisborne District Council OWB criteria provided a useful framework but needed both simplification and some additional criteria.

Both quantitative and qualitative (descriptive) measures were selected and are set out below in Table 4. ‘Outstanding’ values could also be variable, for example, customary values can be dependent on the season or time of year.

TABLE 4: CRITERIA FOR ASSESSING ‘OUTSTANDING’ VALUES

‘OUTSTANDING’ VALUE	CRITERIA	INDICATOR
Ecology	Threatened Species	4 or more threatened species
	% of Population	<ul style="list-style-type: none"> <li>• &gt;2% of a national population of a native species</li> <li>• &gt;15% of a regional population of a native species</li> </ul>
	Ecological Distinctiveness	Presence of a unique or distinctive characteristic/ habitat or species at the regional level
	Ecological Function	Presence of a critical or outstanding: <ul style="list-style-type: none"> <li>• Breeding site</li> <li>• Ecosystem component</li> <li>• Assemblage</li> <li>• Kohanga ika/ nursery</li> <li>• Fish passage/ fish spawning</li> </ul>
Landscape	A water body that contains a unique hydrological, geological or culturally significant feature  A water body that is widely recognised at the regional level for its scenic values	
Natural Character	A water body that is highly natural with little or no human modification, including to the flow, bed and riparian margins, water quality, flora and fauna, within a largely indigenous landscape	
Amenity/ Recreation	A recreational experience that is exceptional in or on the water An exceptional location for angling or customary food gathering A unique historical or heritage site	
Cultural & Spiritual	Preliminary and high level comments only are provided using the following framework:  For understanding and assessing the outstanding values, attributes and uses of water bodies from a cultural and spiritual perspective, the following concepts have been applied:	

	<p><i>Wairuatanga</i></p> <ul style="list-style-type: none"> <li>Mauri</li> <li>Mana</li> <li>Tapu</li> <li>Taonga tuku iho</li> </ul> <p><i>Rangatiratanga</i></p> <ul style="list-style-type: none"> <li>Mana whenua – mana moana</li> <li>Kaitiakitanga</li> <li>Mahinga kai (as a place, action or practice)</li> </ul> <p><i>Whakapapa</i></p> <ul style="list-style-type: none"> <li>O te whenua</li> <li>O te wai</li> <li>O te tangata</li> <li>Ki uta ki tai</li> </ul> <p><i>Matauranga Maori</i></p> <ul style="list-style-type: none"> <li>Tikanga Maori knowledge systems</li> <li>Traditional uses and values</li> <li>Origins of cultural knowledge</li> </ul> <p><i>Cultural Natural Character</i></p> <ul style="list-style-type: none"> <li>Spiritual condition</li> <li>Mana o te wai</li> <li>Connectivity between ground and surface water</li> <li>Cleansing properties as water passes through the whenua</li> <li>Spring / aquifer sources – water recharge systems</li> </ul> <p><b>SPECIAL NOTE:</b></p> <p>Tangata whenua will provide locally relevant assessments through separate input to the process (Refer to Appendix 4: Maori cultural and spiritual values, and see Diagram 1).</p>
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# Tukituki River

Including Waipawa River, Ruataniwha Aquifer & Estuary



Lower Tukituki near Black Bridge



### TUKITUKI RIVER: DESCRIPTION OF OUTSTANDING VALUES

#### SUMMARY

TYPE	NAME	OUTSTANDING VALUE				
		ECOLOGY	LANDSCAPE	NATURAL CHARACTER	AMENITY & RECREATION	CULTURAL & SPIRITUAL
River, Aquifer, Estuary	TUKITUKI RIVER					

#### ECOLOGY

Description	Notes	Reference
<p><i>Threatened Species:</i></p> <p>9 bird species - Grey duck, white heron, bittern, black-billed gull, black-fronted tern, reef heron, blue duck, banded dotterel, Caspian tern</p> <p>1 native fish species: lamprey</p>		<p>Bird list in Appendix 2</p> <p>Fish list in Appendix 3</p> <p>HBRC 2018</p>
<p><i>% of Population:</i></p>		Bird list in

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Banded dotterel - 35% regional population 6-10% national population		Appendix 2 HBRC 2018 BirdsNZ 1986 Census
<i>Ecological Function:</i> Provides a range of diverse habitats for fish & bird species from the upper river in the Ruahines, the braided lower section and the estuary Braided river habitat is a rare habitat type internationally Fish passage Nationally significant for native birds Nationally significant for native fish		Birds NZ Winter & Summer Wader Census HBRC 2018 Parrish G, 1988 Native birds RiVAS 2012 Native fish RiVAS 2012

### LANDSCAPE

Description	Notes	Reference
Waipawa river alluvial terraces - one of the best examples in the region (regionally important)	Waipawa River alluvial terrace	NZ Geopres. Inventory
Ruataniwha Aquifer – distinctive hydrological feature that is integral to the Tukituki river system	Ruataniwha Aquifer	HBRC 2018
Te Mata Peak limestone ridge - iconic Hawke's Bay river landscape (regionally important)	Vicinity of Te Mata peak ridge	NZ Geopres. Inventory

### AMENITY & RECREATION

Description	Notes	Reference
<i>Trout Fishery:</i> Nationally significant trout fishery Ranked 3 <sup>rd</sup> for Salmonid Angling in Hawkes Bay RiVAS report The most used trout fishery in the Hawkes Bay Region receiving 9,650 angler days in the 2015-16 season The Tukituki River was identified as having exceptional overall importance for its access, large	Includes Waipawa River	Fish & Game HBRC 2018 Salmonid Angling RiVAS 2012

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area of fishable water and being close to home		
Whitebait & smelt: Important fishery Inanga spawning areas	Lower Tukituki River	Fish & Game HBRC 2018 Native Fish RiVAS 2012 Brown J. Rook H 2017

CULTURAL & SPIRITUAL

Description	Notes	Reference
The Tukituki awa was used extensively for mahinga kai, and for transporting people and goods. It was once a 'river of villages' and a 'highway' connecting whānau to their mahinga kai, to other whānau, and to trade and prosperity  All along the Tukituki River are signs of occupation and sites that record key events in tribal history. Wahi tapu (Specific sites)		HBRC 2018
Significant for Heretaunga Tamatea – natural resources and inland access - Wahi tapu (Specific sites)	Waipawa River	HBRC 2018
<i>Wairuatanga:</i> Mauri, Mana, Tapu, Taonga tuku iho  <i>Rangatiratanga:</i> Mana Whenua - Mana Moana, Kaitiakitanga, Mahinga kai (place/action/practice)  <i>Matauranga Maori:</i> Tikanga Maori, knowledge systems and origins	Ruataniwha Aquifer	BOI 2013
<i>Wairuatanga:</i> Mauri, Mana, Wahi Tapu, Taonga tuku iho  <i>Whakapapa:</i> o te whenua, o te wai, o te tangata, ki uta ki tai, Kohanga ika  <i>Matauranga Maori:</i> Tikanga Maori, knowledge systems and origins	Tukituki River	He Toa Takitini DoS 2015
<i>Matauranga Maori:</i> Tikanga Maori, knowledge systems and origins	Waipawa River	He Toa Takitini DoS



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(Kōhanga ika/Kōhanga manu)		2015
<i>Spiritual condition:</i> Connectivity, cleansing properties, spring source Aquifer recharge and springflows		BOI 2013
<i>Cultural Ecology:</i> Supported by intact/healthy mauri of the water Braided river, water quality, fish and bird habitat	Tukituki River	TToH Values and Uses Report 2012



# Appendix 4: Final Evaluation - Ruataniwha Aquifer

*Note: Appendix 4 contains extracts only - for further information please refer to the full report.*



## Outstanding Water Bodies Plan Change Selecting a list of outstanding water bodies in Hawke's Bay

HBRC Report Number: SD19-18  
Publication Number: 5400

## Outstanding Water Bodies Plan Change

### Selecting a list of outstanding water bodies in Hawke's Bay

HBRC Report Number: SD19-18  
Publication Number: 5400



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# Heretaunga & Ruataniwha Aquifer Systems

The following section discusses the key features associated with the Ruataniwha or Heretaunga aquifer systems, with the exception of their cultural and spiritual values which are discussed in the cultural and spiritual values section of this report.

The information discussed in this section has been sourced from literature reviewed during the secondary assessment phase of this plan change. This section simply restates the information contained in literature. It does not attempt to re-assess the features of the aquifer systems and determine their importance. Staff do not have the expertise to do this.

## Stygofauna

Stygofauna are aquatic animals which live in groundwater. They provide important ecosystem functions and have intrinsic value themselves.

Literature suggests that New Zealand's stygofauna is widespread and diverse. Due to New Zealand's geological past, stygofauna is also thought to be highly endemic as a result of the long term separation of habitats and populations.

To date, there have been no collections or investigations into the communities of stygofauna in the Ruataniwha or Heretaunga aquifer systems. However, literature indicates short-range endemics are likely to be present throughout both aquifer systems.

## Natural state

The term natural character is used to describe the naturalness of environments, with generally the highest degree of natural character (the greatest naturalness) occurring where there is least modification.

No studies to date have looked into the natural character associated with the Heretaunga and Ruataniwha aquifer systems. However, given that millions of cubic metres of water are extracted from the aquifers annually, and large areas of intensified land uses exist over both aquifer systems, staff think it is unlikely that either aquifer system will be in a highly natural state.

## Aquifer size

Aquifer sizes are difficult to compare without a methodology and clearly defined scope, which states exactly what parts of the aquifer system are being measured and compared, and why the size of an aquifer makes it outstanding. For example, is it the size of the aquifer system, the composition of the aquifer system, the number or size of the groundwater dependant surface water bodies or their associated recreation uses, which make its size superior to other aquifer systems?

Aquifer systems are made up of a number of different interconnected layers. They are complex and hard to delineate. Further, aquifer systems sizes vary depending on what part of the aquifer system is being discussed and mapped. For example, the Heretaunga aquifer system has been broadly delineated as comprising of four principal aquifer systems<sup>3</sup>.

Information reviewed during the secondary assessments assigned various sizes to the aquifer systems. For example, HBRC's website states the size of the Heretaunga and Ruataniwha aquifer systems are 460 km<sup>2</sup> and 800 km<sup>2</sup>, respectively, with other publications placing the size of the Heretaunga at 510 km<sup>2</sup> and Ruataniwha aquifer 260 km<sup>2</sup>.

## Water quality - health and aesthetics

Water quality for the purposes of drinking is a consumptive use value. As discussed earlier in the report, consumptive and economic use values are not within the scope of Plan Change 7. Drinking water will be considered during future catchment based plan changes.

Notwithstanding, the Council regularly monitors the water quality of the Heretaunga and Ruataniwha aquifer systems. Overall, most monitoring sites in the Heretaunga and Ruataniwha aquifer systems comply with the New Zealand drinking water standards (DWSNZ) for the key chemical water quality parameters. There are several exceptions which are referred to in the secondary assessments.

## Water quality - aquifer ecosystem

To date, no monitoring or investigations have taken place looking into the standard of water quality required to protect the biodiversity value of the Heretaunga and Ruataniwha aquifer ecosystems. As such, it is unknown whether the aquifer's water quality is optimal for their ecosystems to thrive.

It cannot be assumed that just because the water quality within the aquifer systems generally complies with the NZDWS that it is suited to the aquifer's ecosystem. For example, some ecosystems have an extremely low tolerance and may be sensitive to small chemical changes. This means despite water quality meeting drinking water standards, a slight change to the water chemistry but still within the NZDWS, may have a detrimental effect on sensitive parts of the ecosystem.

Additionally, the 'optimum' water quality for an aquifers ecosystem may not correlate at all with the NZDWS which has been developed to ensure water is safe for drinking, not for the requirements of the aquifers ecosystem which will differ throughout New Zealand.

### Groundwater age

Travel time of water through the aquifer varies. In deeper parts it can take decades to hundreds of years. Whereas in the unconfined section of the aquifer system water can be fast moving and in the order of hundreds of metres per day towards the coast.

Literature does not identify an optimal age for groundwater.

### Hydrogeology & interaction with surface water bodies

The hydrological characteristics of aquifer systems are difficult to compare without a methodology and clearly defined scope, which states what parts of an aquifer system are being assessed and why the hydrogeology features of an aquifer system make it outstanding. For example, is it the composition of the aquifer system which makes its hydrogeological features superior, or the number of connected surface water bodies, the volume of water or the length of the surface water bodies, or their associated recreation uses and ecology?

While, the Ruataniwha and Heretaunga aquifers are large systems which have a strong hydraulic connection with the surface water bodies that flow across them, they are complex and hard to delineate, with some parts of the aquifer system having a more direct 'hydrologic connection' with surface water bodies than others.

The local expert panel found the Heretaunga aquifer system to be outstanding for its landscape features, specifically noting the hydrological features of the aquifer are regionally unique. The local expert panel's report is attached in Appendix 6.

The local expert panel's report does not discuss the Ruataniwha aquifer system on a standalone basis, however when discussing the Tukituki River, the report notes that the Ruataniwha Aquifer is a distinctive hydrological feature that is integral to the Tukituki River.

## Cultural and Spiritual values

### Ruataniwha Aquifer

The Ruataniwha Aquifer is part of Heretaunga Tamatea's traditional rohe.

Information reviewed indicates the water body contains the following key values:

- Wāhi Tapu, Wāhi taonga.

The local expert panel found the Ruataniwha Aquifer system to have known outstanding cultural and spiritual values, specifically noting Wairuatanga, Rangatiratanga, Whakapapa, Mātauranga Māori and Cultural Natural Character. The panel recommended its inclusion with the Tukituki River because of the system connections between the two water bodies.

At the time of writing, iwi authorities had not provided any comment specific to the Ruataniwha Aquifer.

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<sup>3</sup> Dravid 1997