Te Arotake i ngā Whakahaere o Te Waiariki ki Rotorua

Reviewing Management of the Rotorua Geothermal System

Ngā Take me Ngā Whiringa - Issues and Options
August 2019

BAY OF PLENTY REGIONAL COUNCIL
TOI MOANA

Rārangi Ūpoko Kōrero

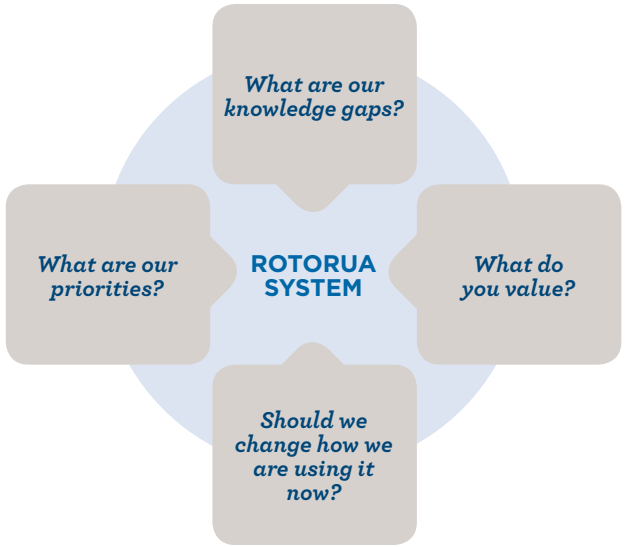
Contents

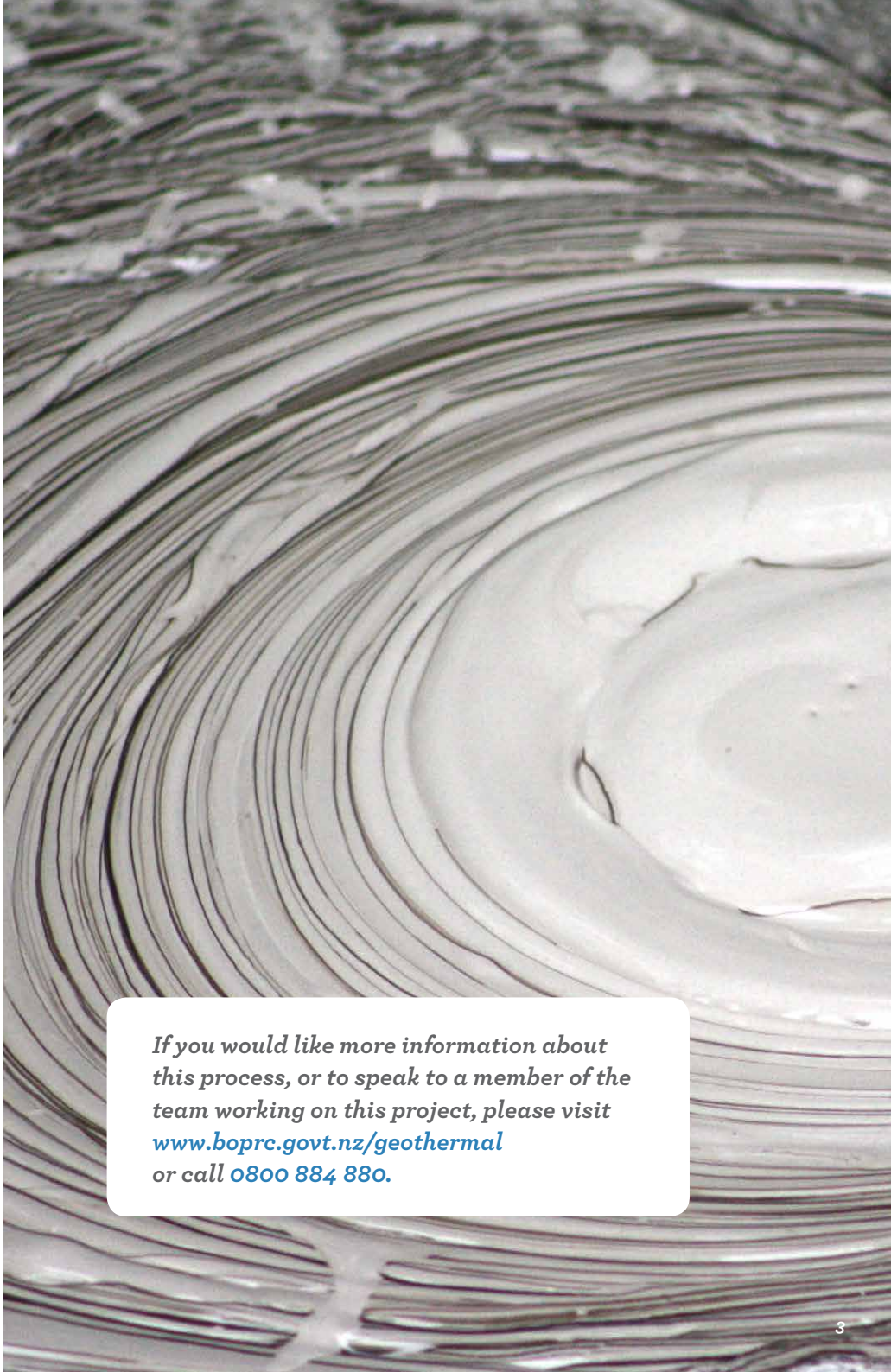
Ō Tirohanga
Your Views

Bay of Plenty Regional Council Toi Moana wants to hear the community's views on management of the Rotorua Geothermal System.

We are reviewing how the system is managed through a regional plan review and want to know what you think.

This document gives you some background on the Rotorua Geothermal System, how we look after it now, and possible future management options. There are some questions for you to think about. You may also have some other comments or questions for us.





If you would like more information about this process, or to speak to a member of the team working on this project, please visit www.boprc.govt.nz/geothermal or call 0800 884 880.

Tīmatanga Kōrero
Introduction

GEOTHERMAL IN THE BAY OF PLENTY

The geothermal resource in the Bay of Plenty is made up of many geothermal systems. Most are in the Taupō Volcanic Zone (TVZ), which extends south into the Waikato Region and offshore to Whakaari/White Island to the north.

These systems are part of our region's economy, culture and heritage. Some systems, such as the Rotorua Geothermal System, are known for their unique geothermal surface features (surface features), while others such as Kawerau are used for electricity generation and industrial use.

Learn more about our region's geothermal systems in this short video at www.boprc.govt.nz/geothermal

ROTORUA GEOTHERMAL SYSTEM

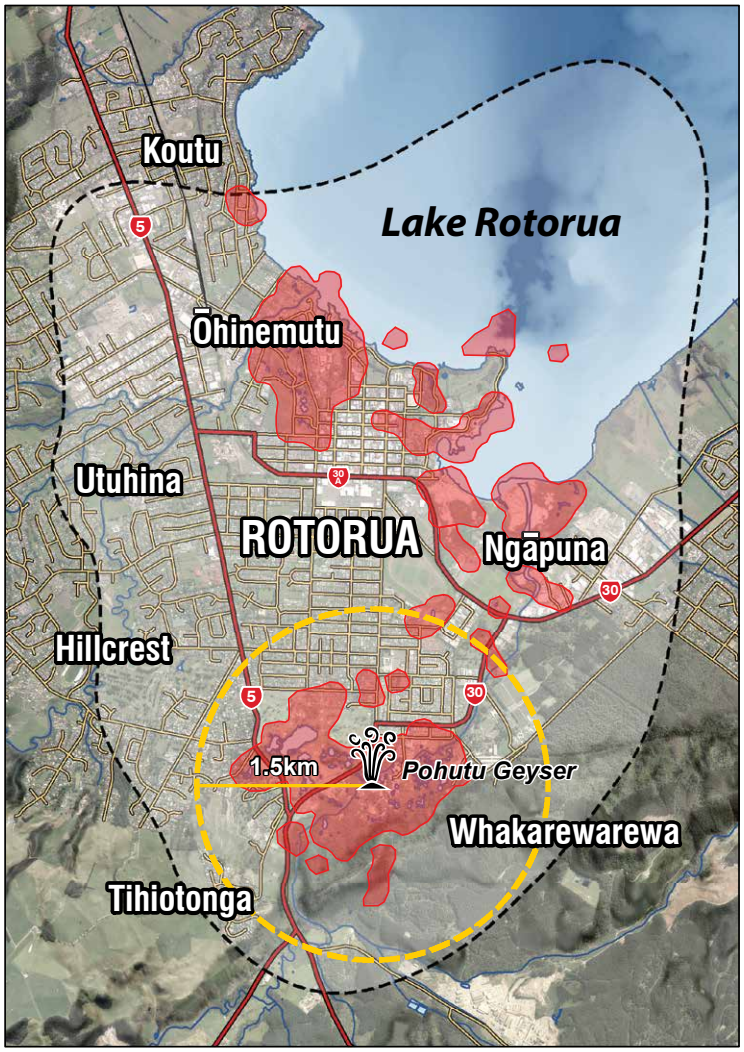
The Rotorua Geothermal System is under part of Rotorua City, from the southwestern end of Lake Rotorua to the Whakarewarewa Valley. It has hundreds of surface features and some of New Zealand's last remaining geysers. Many visitors to Rotorua come to see these geothermal wonders.

The geothermal (ngāwha) resource has been used sustainably by Māori for many hundreds of years. It is still part of Māori culture and daily living, and is used for cooking, washing, bathing, heating, preserving, ceremonial purposes and healing. The ongoing use of this taonga must be protected.

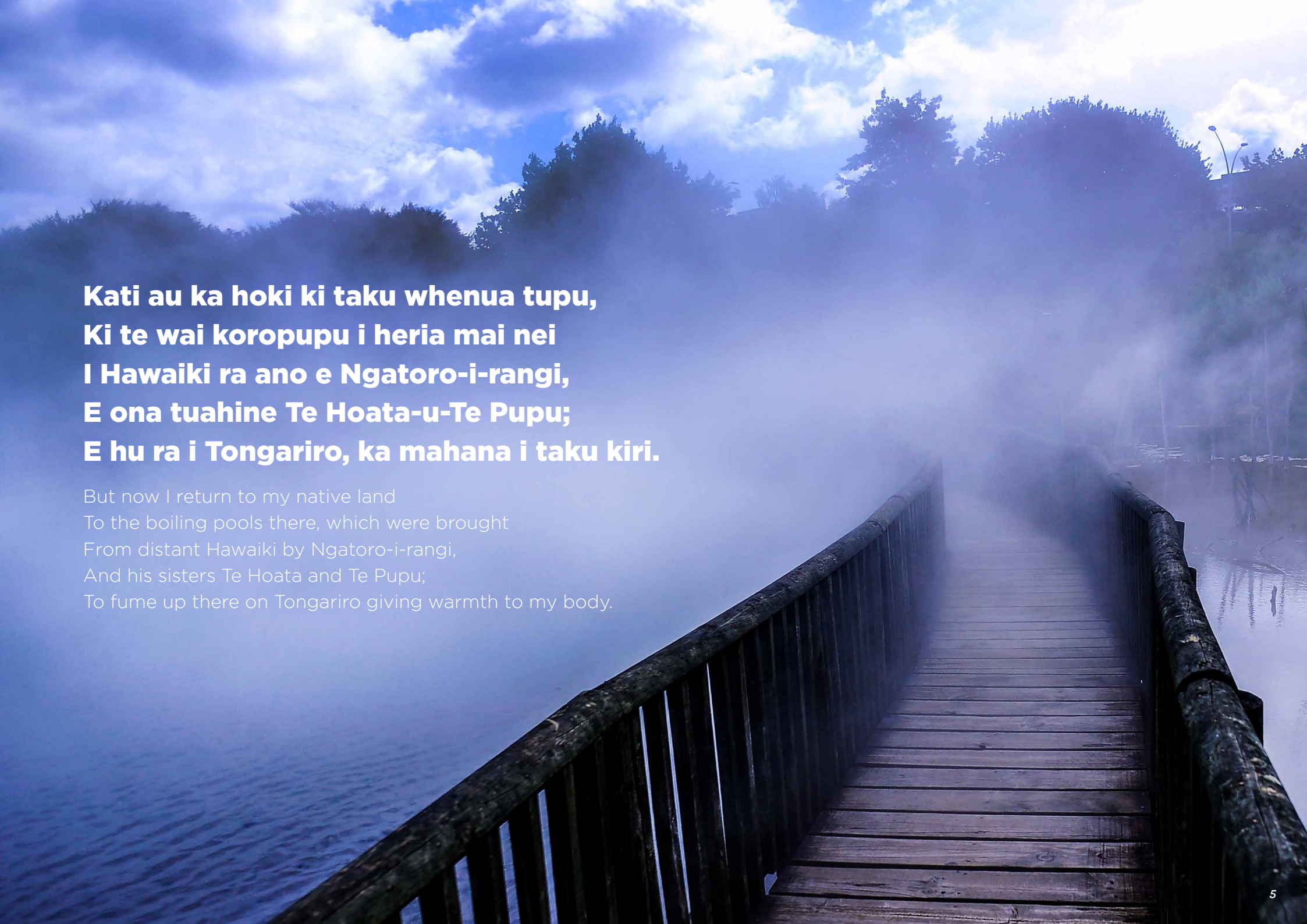
While initially the use of the resource was low impact, this changed with European settlement. Increased and uncontrolled extraction in the 1960s and 1970s led to a drop in the geothermal water levels and a decline or loss of surface features.

By the mid-1980s, due to concern over loss of surface features, a number of Government directives resulted in what is now termed the 'bore closures'. This led to controls within a 1.5km radius of Pohutu Geyser in the Whakarewarewa Valley, and a requirement for reinjection of geothermal water. These controls are in the current Rotorua Geothermal Regional Plan (page 8).

We know from this experience that the Rotorua Geothermal System cannot meet unlimited and wasteful demand for heat energy. Ongoing careful allocation of the resource is needed for sustainable management of the system and surface features, so that we can continue to enjoy them for generations.



Geothermal System Indicative Area
Geothermal Surface Features Indicative Area
Rotorua Geothermal Exclusion Zone



Kati au ka hoki ki taku whenua tupu,
Ki te wai koropupu i heria mai nei
I Hawaiki ra ano e Ngatoro-i-rangi,
E ona tuahine Te Hoata-u-Te Pupu;
E hu ra i Tongariro, ka mahana i taku kiri.

But now I return to my native land
To the boiling pools there, which were brought
From distant Hawaiki by Ngatoro-i-rangi,
And his sisters Te Hoata and Te Pupu;
To fume up there on Tongariro giving warmth to my body.

Ngā Whakahaere o Te Waiariki ki Rotorua

Managing the Rotorua Geothermal System

The geothermal resource is managed under the Resource Management Act 1991 (RMA).

The RMA gives regional councils the role of managing the taking, use, damming and diversion of geothermal water, discharges of geothermal water and gas, and the taking or use of geothermal energy. Regional councils also manage discharges of geothermal water to land, air and water. The Council does this through the Bay of Plenty Regional Policy Statement (RPS) and regional plans.

BAY OF PLENTY REGIONAL POLICY STATEMENT

The RPS sets the overall direction for geothermal management in our region. It classifies geothermal systems into management groups based on their unique values, current uses and development potential. A management purpose is set for each system (i.e. some systems are developed, some are protected).

The RPS has policies directing how the geothermal resource should be managed, such as:

- Development of system management plans
- Getting and using the right information
- Managing takes and discharges, for example, through a discharge strategy
- Assessing and protecting significant surface features
- Managing hazards
- Recognising and providing for the relationship of tangata whenua with their resources, taonga.

The Regional Policy Statement has already been reviewed recently.

THE MANAGEMENT PURPOSE FOR THE ROTORUA SYSTEM UNDER THE REGIONAL POLICY STATEMENT IS BELOW:

Geothermal management group	*Management purpose*	*Potential for extractive use*
Rotorua system group 2	Surface feature values that rely on pressure and temperature maintenance override extractive values. System management that limits extractive uses to avoid, remedy or mitigate adverse effects on the outstanding natural, intrinsic, scenic, cultural, heritage and ecological values.	Limited potential for further extractive use.

REGIONAL PLANS

Regional plans must give effect to the RPS. This means that they must follow the direction set in the RPS – basically, they must do what the RPS says, following the steps it sets out. We do have some flexibility in how we do this, so we can add detail and look at different options to achieve what the RPS requires. And we can identify new issues that are not covered in the RPS.

Regional plans set the rules for use of the geothermal resource. They include objectives, policies, rules on activities, allocation of resource use within limits, and things that must be considered in resource consent applications.

Geothermal policies and rules for all geothermal systems in the region (except Rotorua) are currently included in the Regional Natural Resources Plan, while the Rotorua Geothermal Regional Plan only covers the Rotorua System. Council is reviewing the geothermal parts of both of these regional plans, starting with the Rotorua Geothermal Regional Plan.

Arotake i te Māhere o Te Waiariki ki Rotorua

Review of the Rotorua Geothermal Regional Plan

The first step in the plan review is developing a Rotorua Geothermal System Management Plan which is a whole system approach to management.

It will contain all of the broad principles for managing the system. After that, we will develop a draft regional plan for public comment, before publicly notifying a formal proposed regional plan change for formal submissions and hearings under the RMA.

The RPS has already identified the management purpose for the system that we need to work towards (our end goal). We now need to check that the issues and objectives in the regional plan are still relevant, and the policies and rules are still the best way to achieve the objectives, as shown in the diagram below.

It is a good idea to keep the parts of the plan that are working. But we do need your ideas about whether we need to change or improve anything.

PROCESS AND TIMEFRAMES

We're still in the early stages of this process, and we don't expect to notify a plan change until late 2020. There will be several chances for people to tell us what they think before we get to the end.

NOW

Community values
Draft issues, objectives and options
Stock take of information

Key opportunity for input

EARLY 2020

Refine issues, objectives and options (eg. principles for use)
Modelling and testing

THEN

Rotorua System Management Plan

Key opportunity for input

THEN

Draft regional plan provisions

Key opportunity for input

THEN

Publicly notify Proposed Regional Plan Change

LATER

Submissions, hearings and appeals
Adopt Operative Plan

Key opportunity for input

Ngā Whakahoki o te Māhere o Te Waiariki ki Rotorua

What the Rotorua Geothermal Regional Plan says now

The Rotorua Geothermal Regional Plan promotes integrated and sustainable management of the Rotorua geothermal system by:

- Limiting the net loss of geothermal water by requiring reinjection of geothermal water back into the geothermal aquifer in most cases to support pressure (and reduce cold inflows).
- Maintaining a 1.5 kilometre mass abstraction exclusion zone around Pohutu Geyser where taking of water from bores is prohibited and the level of heat to be abstracted is capped at current use.
- Limiting use if the geothermal water levels drop below a minimum level.
- Promoting low effect, non-extractive methods of resource use, such as down hole heat exchangers and the use of surface outflow sources.
- Ensuring careful and continuous monitoring of the field.

Ngā Āhuatanga Naianei o Te Waiariki ki Rotorua

Current state of the system

Science informs the way we manage the geothermal resource. From our monitoring, we know that the Rotorua Geothermal Regional Plan is working quite well.

Since it has been in place, the geothermal water level beneath the ground has risen over 2 metres. Some surface features have recovered well (e.g. in Kuirau Park), but others have only partly improved (e.g. Papakura Geyser), are fluctuating, or have not changed much over time (e.g. Waikite Geyser). These variations show how complex the geothermal system is. While we know that there is less change in the system now (it has 'settled down' and is in equilibrium), it is difficult to predict future long term changes.

You can find out more about our monitoring and our current understanding of the Rotorua system in our science snapshot report – Rotorua Geothermal System Science Summary

We also have information gaps so a future focus will be on improved monitoring and research. For example, we don't currently use mātauranga Māori to help us understand how the system was created, its characteristics and the changes that we observe. Nor do we use it to manage the system, and we have no cultural monitoring programmes. However mātauranga associated with Ngāwha of Te Arawa has historical significance, is site specific and for Māori informs how we should behave.

In the meantime a precautionary approach (i.e. where we are cautious in how we allocate the resource if our data is limited); will avoid us making the mistakes of the past.

Waikite Geyser, Whakarewarewa. Ref: 1/2-001487-G. Alexander Turnbull Library, Wellington, New Zealand. /records/23132297

Overuse of the geothermal resource resulted in the loss of many surface features. A significant example was Waikite Geyser shown above in 1908 and as it is today. Waikite's last recorded eruption was in 1969.

He aha ngā mahi kua otia e hāngai ana ki ngā take me ngā whiringa?

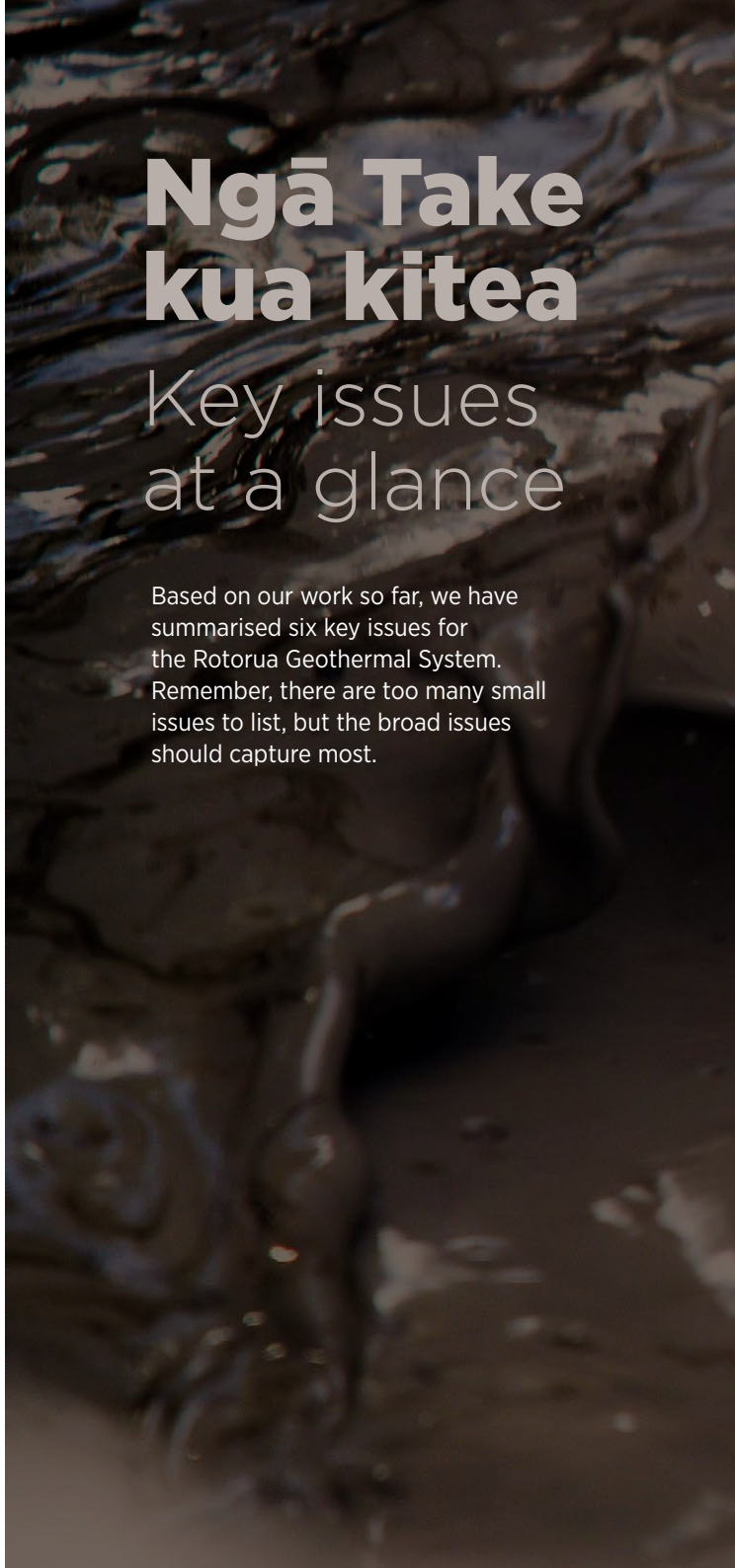
What work have we done so far to identify issues and options?

Council has been gathering information for this process for some time. We have:

- Looked at what the RPS is telling us to do.
- Reviewed how the current plan is working under section 35 of the RMA.
- Checked what our monitoring is telling us about the health of the system.
- Identified the areas where we don't think we have enough certainty yet and need to do more work.
- Assessed how the system is being used, including data on resource consents.

A review of Iwi Management Plans to identify geothermal interests that we need to take account of is underway. Early discussions with tangata whenua have also helped us start to build a picture of what is important to them.

We have summarised what we have learnt so far in this discussion document. We have included some ideas on issues, objectives and options that could be included in the new plan. We want to know whether you think this is on the right track.



Ngā Take kua kitea

Key issues at a glance

Based on our work so far, we have summarised six key issues for the Rotorua Geothermal System. Remember, there are too many small issues to list, but the broad issues should capture most.

ISSUES

1 *Taking geothermal water and heat from the geothermal system can cause adverse effects on its long term sustainability and on geothermal surface features.*

2 *Land uses near geothermal surface features can cause adverse and irreversible effects on these features, and increase the risk of geothermal hazards to people.*

3 *The discharge of geothermal water to land air and water can cause adverse effects on the receiving environment.*

4 *There are limits to resource use and current allocation of the resource may not reflect the needs, values and aspirations of tangata whenua and the local community.*

5 *Understanding of the geothermal resource, the effects of use and its sustainable limits is incomplete, does not use mātauranga Māori; and creates uncertainty for the management of the resource.*

6 *The drilling and use of geothermal wells can lead to harmful effects on people and the environment.*

Q *Are these the most important issues to address when we manage the Rotorua Geothermal System?*

Ngā Whainga

Possible Objectives

Remember, the system management purpose in the RPS (page 6) is that surface feature protection takes priority over use of water. Under the current plan we have moved a long way towards achieving this, but features are still vulnerable to overuse of the resource.

Our thinking so far is that our objectives should focus on:

- Sustainable management of the geothermal system (energy for future generations).
- Integrated management (managing the complex system as a whole, not in parts and using matauranga Māori).
- Protection of surface features (as our first priority).
- Ongoing uninterrupted use and access by tangata whenua of their Waiariki / Ngāwha.
- Avoiding or reducing effects of discharges (caring for the receiving environment).
- Being precautionary or careful (building knowledge, adaptive management).
- Maximising benefit from the resource (best use for most and equitability).
- Keeping people safe from geothermal hazards.

Ngā Whiringa o ngā Whakahaere

Possible Management Options

1 ***Taking geothermal water and heat from the geothermal system can cause adverse effects on its long term sustainability and on geothermal surface features.***

EXPLANATION

Using geothermal water and heat (energy) has an effect on the water levels (pressure) and temperature of a geothermal system. Pressure changes can travel through a system quickly and can be followed over time by changes in chemistry of the water and in temperature. So if too much water is lost from the aquifer the water levels will drop. If too much heat is taken (e.g. hot water out, cool water back in) the system can potentially cool. Pressure and temperature drive surface features, so overuse can damage or destroy these features and their values.

For this reason, the current plan requires the reinjection of water in most cases (see issue 3). We know this is working, because the aquifer levels have recovered. So a big change in this approach is not recommended. The plan also has an exclusion zone around the geysers (a 1.5 mass abstraction exclusion zone) where the total amount of heat taken can't be increased and taking geothermal water from wells is prohibited. While this could potentially be tweaked, to make large changes or remove it completely would be very risky.

Also, we don't know exactly how much heat can be safety taken from the system without affecting the surface features. This means we need to be careful (precautionary) and any application to substantially increase taking of heat from the system should be supported by robust science.

Efficient use is also important and this is something we have not done so well in the past. Some people think the resource is 'free' and 'limitless' while in fact it is vulnerable to overuse. Better efficiency means only allocating what is needed, monitoring actual use, using efficient technology and discouraging waste so that more people can benefit.

While some limits to use will always be necessary this will have impacts on availability of the resource and will limit certain uses in some areas meaning that some people miss out.

Q ***Does the management purpose for the system in the RPS need further explanation or refining?***

What should being precautionary mean in terms of how we manage the system?

A limit on the net loss of geothermal to the system will always be necessary. Should this loss be decreased over time (i.e. sinking lid)? How should this limited resource be allocated and to who?

Should we be maintaining pressure and temperature of the system at current levels or enhancing it to seek further recovery of surface features?

How can we improve efficiency in use?

Would putting a monetary value on the resource help improve efficiency (i.e. a charge for its use)?

Broad approach	*Possible Policy Options*
Classification of the Rotorua Geothermal System to give effect to the RPS	**1a)** To retain the classification of the Rotorua System from the RPS **1b)** Look at whether we can and should refine this for more direction
An integrated management approach	**1c)** Develop a whole system management plan that identifies and incorporates the values that the community has for the geothermal resource
Maintain (or enhance) pressure and temperature in the system to protect surface features	**1d)** Continue to require reinjection of geothermal water **1e)** Continue to limit the net loss of geothermal water to the system (and continue to seek a decline in this net loss over time) **1f)** Maintain the 1.5 mass abstraction exclusion zone in its current form OR Refine the zone (if possible) to provide greater flexibility (e.g. decrease it if this is shown to be sustainable) **1g)** Identify other areas of the system that are vulnerable to use and consider limits on taking of heat from these areas (i.e. refine areas where heat can be taken) **1h)** Continue to allow taking of heat (including from geothermal water) where it is demonstrated that this does not affect surface features **1i)** Identify a cap/limit for the total heat/volume that can be taken from the system **1j)** Develop a discharge strategy (e.g. where geothermal water is reinjected, at what depth and temperature)
Efficient use in allocation of the resource (ie. best use for most people)	**1k)** Allocate (i.e. issue a right to use heat or fluid) only what is required for a particular use and monitor this **1l)** Enable efficient uses and technology and proven methodologies (i.e. discourage less efficient uses) **1m)** Enable transfer of allocation across the field only where this is more efficient (does not increase use or lead to adverse effects) **1n)** Enable collective uses such as group heating schemes **1o)** Efficiency assessments for all consent applications **1p)** Assessment of environmental impacts from use and discharge for all consent applications that reflects the scale of the activity **1q)** Better reporting on efficiency in use **1r)** Principles (underpinned by values) for allocation that include (and prioritise?) efficiency, equity and the protection and enhancement of the mauri of our natural environment

2

Land uses near geothermal surface features can cause adverse and irreversible effects to these features, and increase the risk of geothermal hazards to people.

EXPLANATION

Surface features are rare and are valued for their ecological, landscape, and cultural values, especially in areas like Whakarewarewa Valley, Arikikapakapa, Kuirau, Ōhinemutu and Ngāpuna. In the past we have lost many features impacting on these values, in particular for tangata whenua.

Surface features are still vulnerable to land use activities such as earthworks, damming and diversion, building and infrastructure development. While crucial to the economy, growing pressure from tourism is one example where access, tracking and structures can lead to cumulative loss of features in sensitive areas (e.g. vegetation clearance).

While all surface features are important, we need to understand which sites are most significant and the effects that they are most vulnerable to. For example Geysers are vulnerable to changes in temperature and pressure (see issue 1), while geothermal vegetation is vulnerable to clearance, and small features like mud pools are vulnerable to mining of 'mud', rubbish dumping, infill and stormwater discharges. Some of these effects are irreversible and are cumulative (i.e. lots of small losses over time).

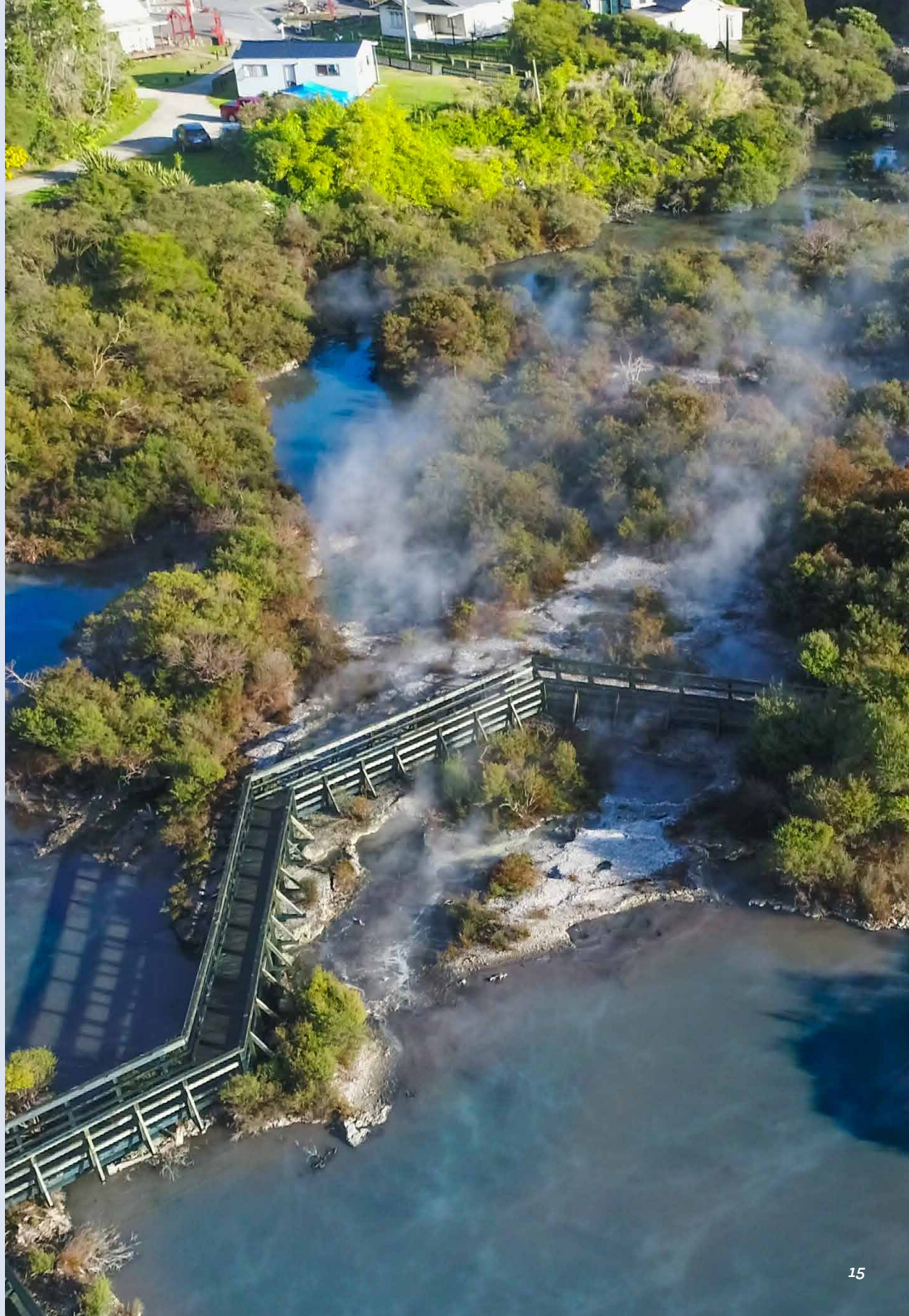
We need strong policies to avoid effects on our most significant surface features, while for less important features remediation or mitigation might be a better option. Mapping significant surface features in these plans, with rules about their protection, is one way of providing greater certainty to users about the sites and values that need protecting. Regional rules and consents can manage the effects of activities like large scale earthworks and damming and diversion of features. Other land uses such as roads, building, small scale earthworks, tracking and vegetation clearance are better dealt with through the district plan and district consents. Development setbacks from mapped features also minimises effects on those features and reduces risks to life and property.

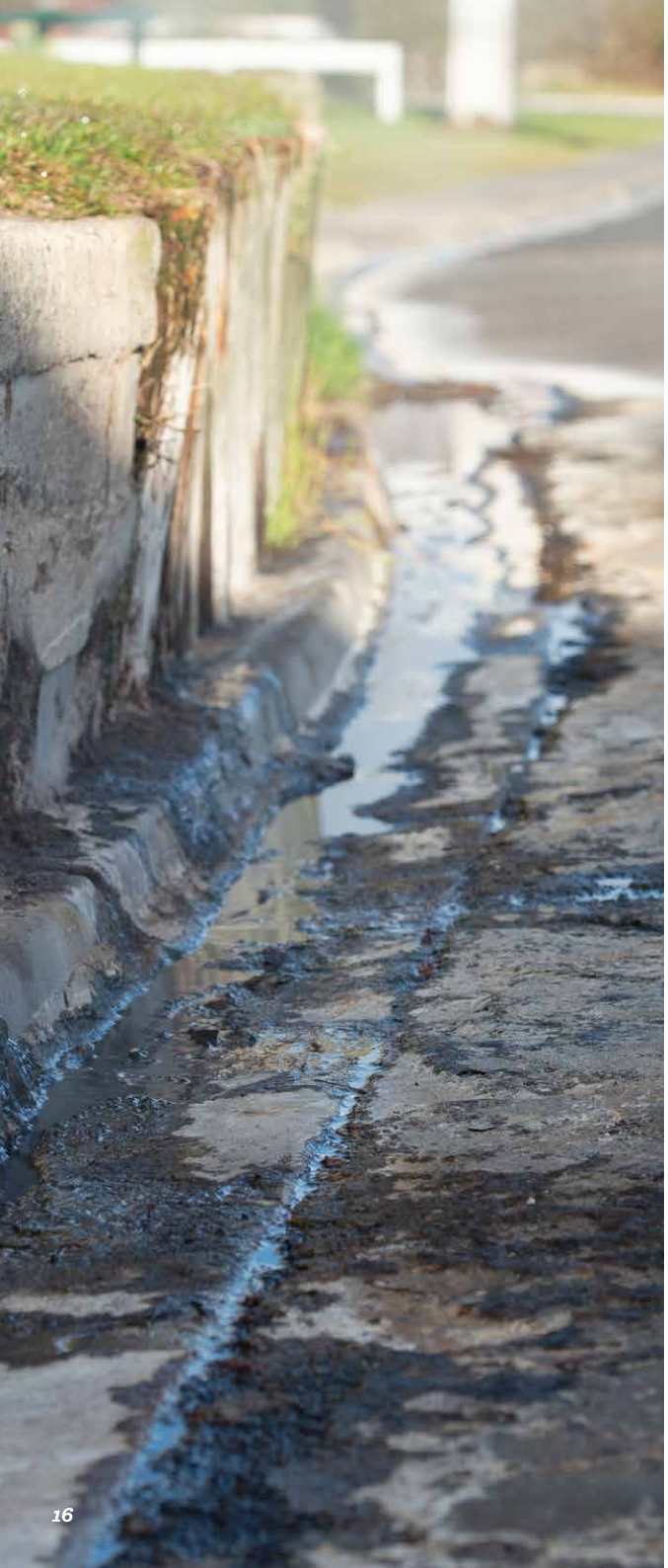
Q Are the rules protecting significant surface features currently working? Are there any gaps?

Should council include a list and maps of significant surface features with specific rules about their protection in its regional plan?

How can we make sure that sites of significance to Māori are identified and protected?

Broad approach	*Possible Policy Options*
Identify and map all significant geothermal surface features in the Rotorua System	**2a)** Use a consistent method of assessing the significance of surface features **2b)** Identify and map (where possible) significant surface features on Councils GIS systems and make this information publicly available **2c)** Include these sites on regional and/or district planning maps
Assess and manage adverse effects on all surface features, with a focus on significant geothermal surface features	**2d)** Control land use activities that affect significant surface features through regional and district plans **2e)** Assessment criteria for resource consents that address effects on all surface features in regional and district plans **2f)** Seek first to avoid adverse effects on significant surface features, then remedy or mitigate **2g)** Consider cumulative effects on all surface features through resource consents and protect features from these effects
Reduce risks from geothermal hazards	**2h)** Promote that setbacks from all surface features (and wells) are retained in district plans **2i)** Best practice guidelines for developments close to any surface feature (e.g. to reduce risk from gas) **2j)** Allow alternatives to reinjection of geothermal water where this may significantly increase risk of hydrothermal eruptions **2k)** More education/best practice guidance about features and risks to and from features





3 *The discharge of geothermal water to land, air and water can cause adverse effects on the receiving environment.*

EXPLANATION

Under the current plan most geothermal water must be reinjected to the aquifer to maintain pressure support for surface features, except where this is not 'technically feasible' or is unsafe. We'll probably need to retain this system wide requirement, but we could make some small changes to our approach.

For example, we could define what is not 'technically feasible' or include criteria to assess this (e.g. are costs considered?). Also, reinjection is not required for water that has been bathed in, as this may not be culturally acceptable. Usually this water goes to the sewer (which puts pressure on this system), but some is discharged to land soakage, or lakes and streams, leading to adverse effects. For example water that is bathed in may contain contaminants, and shallow soakage of this water can lead to slumps or subsidence. We could revisit best practice for dealing with bathed in water through the review, and firm up the best approach.

We can also look at how we deal with discharges through a system-wide discharge strategy. For example principles around the ideal location and depth of reinjection, how to address localised cooling, cascade (downstream) uses, ways to maximise pressure, avoiding subsidence, culturally acceptable treatment and disposal of bathed in water etc.

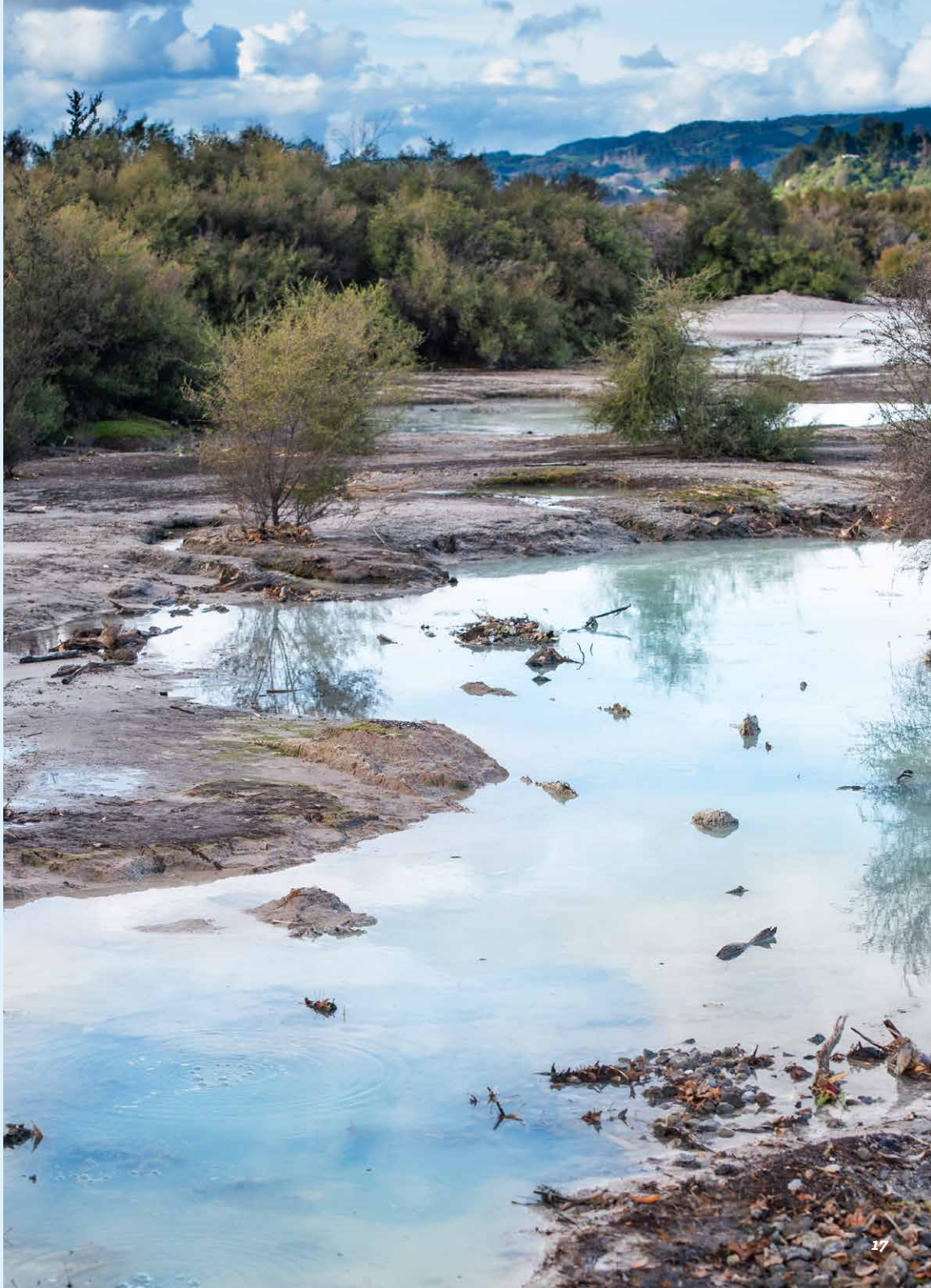
Q *How should we best dispose of geothermal water that has been bathed in?*

How do we address cultural concerns about dealing with bathed in water (e.g. reinjection of bathed in water to the geothermal aquifer)?

Are there any other disposal issues that should be dealt with?

What discharge principles should be included in the plan?

Broad approach	*Possible Policy Options*
Manage discharges to land and water through a system-wide discharge strategy	**3a)** Continue to require reinjection of geothermal water back to source except where not technically feasible **3b)** Continue to seek increased reinjection of geothermal water over time where this is not yet happening and is technically feasible **3c)** Include best practice principles for all discharges to maximise pressure support and minimise adverse effects on the environment (e.g. depth, temperature, location, efficiency, treatment)
To recognise the cumulative effects of discharges on the environment	**3d)** Manage the effects of discharges through resource consents **3e)** Encourage best practice by enabling group consents for multiple small discharges **3f)** Work with tangata whenua and resource consent holders to determine the best method to dispose of bathed in water **3g)** Work with the community to reduce cumulative effects (e.g. reduce use of bathing products) **3h)** Enable discharges that have a minor effect and that are for customary uses such as community baths, subject to standards (e.g. finding easy ways to treat water that has been bathed in before it is discharged) **3i)** Monitor all discharges to the environment, including permitted discharges



4 *There are limits to resource use and current allocation of the resource may not reflect the needs, values and aspirations of tangata whenua and the local community.*

EXPLANATION

During the bore closures of the 1980s many people lost access to the resource. This was not only commercial users, but also Māori who had used geothermal for generations. In some cases (where bores were in use) baths were closed down, and communal buildings such as whare kai (marae kitchens) lost access to heat and steam traditionally used for cooking. This has had an impact on the relationship of tangata whenua with this taonga.

Today there are still a variety of uses, including customary, domestic and commercial. There are no industrial uses or electricity generation. Each of these uses adds value to the economy and access to the resource is crucial to many business ventures in Rotorua. At the moment demand for the resource is fairly consistent, but this could increase over time, especially as we move to a low carbon economy.

Competing demands for a limited resource is something that is difficult to deal with, as the RMA operates on a 'first in first served' basis. Ideally all users would have unlimited access to the resource, but in some areas (e.g. close to the geysers) we have to be more careful. Also, some uses such as discharging geothermal water to waste i.e. ground soakage, lake or sewer discharge, have to be limited to protect the surface features, but also to avoid effects on the surrounding environment or infrastructure. Within these limits we need to consider whether some uses should get priority.

To address some of these issues we need better information on what is being used and by whom and to consider allocation principles that better reflect the needs, values and aspirations of the local community, and prioritise or protect customary Māori use rights and values.

Q Within sustainable limits, should certain uses have priority (be enabled) over others?

Should we enable more efficient uses, and be more restrictive on uses that are inefficient?

How do we best ensure that tangata whenua always have access to the resource?

CASE STUDY: *Obstacles exist for people to access the resource equitably*

Access to the resource is affected by many different things. The cost of building and maintaining geothermal wells is not affordable for all and this means that some people miss out. These costs can't be addressed by a regional plan, but we can think about being more efficient such as sharing of wells, or community consents, or enabling some activities more than others (eg a permitted or controlled activity for some uses as opposed to a discretionary activity). We can also improve things operationally. For example, Council is currently working with well owners to upgrade their wells to safe best practice standards, and to keep maintaining them over time.

CASE STUDY: *Protecting the relationship of Māori with Waiariki/ Ngāwha*

The RMA[1] does not control the use of geothermal water and heat when it is:

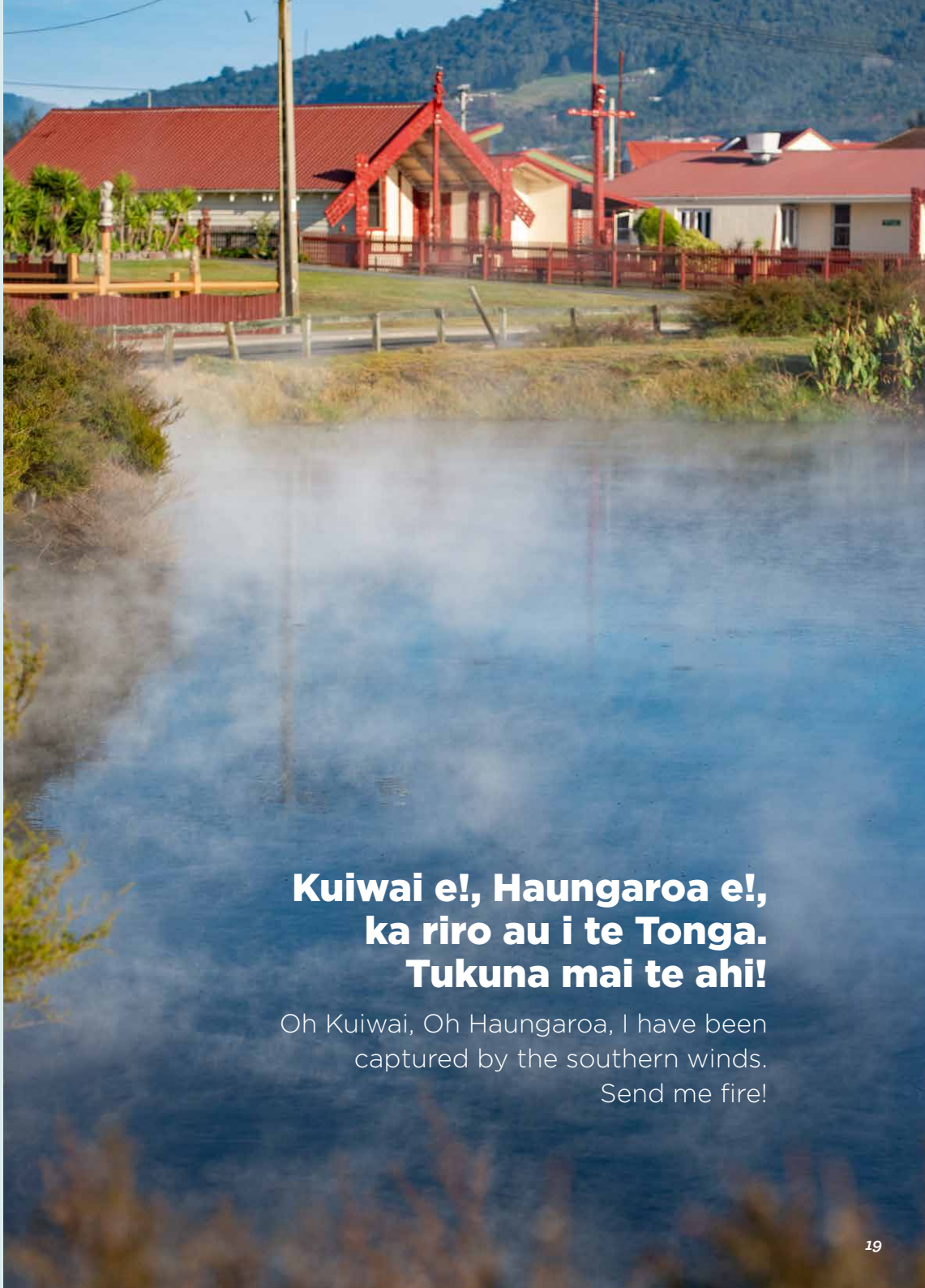
> *... used in accordance with tikanga Māori for the communal benefit of the tangata whenua of the area and does not have an adverse effect on the environment*

For this reason no consent is required under the current regional plan for uses such as cooking, taking of water from surface features for communal baths, spiritual practices etc. However the plan says that taking geothermal water or heat from a well can have a potential adverse effect on the environment (because it can affect surface features). So using a geothermal well to abstract water for a communal bath, for example, still requires a consent.

We must keep protecting these uses and values under the regional plan, but there are some things we could improve. More clarity about what is 'customary' (under the RMA) would be helpful. Also, while most of these takes are small, understanding what is being used will help us account for total use and effects of this. Maybe we should also look at making it easier to use the wells for communal benefit to tangata whenua.

[1] Section 14(3)(c)

Broad approach	*Possible Policy Options*
Protect customary use and access of tangata whenua with Waiariki/Ngāwha	**4a)** No resource consents for customary cultural uses **4b)** Clearer definition of what is a customary cultural use **4c)** Less strict rules for the use of wells for the communal benefit of tangata whenua
Allocation principles that prioritise uses to maximise value gained from resource use (i.e. efficient uses); that are more equitable; and reflect the needs, values and aspirations of the local community	**4d)** Allocation principles that ensure that sustainable customary cultural use rights are provided for first **4e)** Allocation principles that prioritise certain uses over other uses (as opposed to first in first served) **4f)** Making it easier to access the resource for uses that are efficient or have community benefit
Information about who is accessing the resource and for what purpose	**4g)** Improved monitoring and accounting of resource use (total amount and end uses)
Decision making frameworks that better represent the relationship of tangata whenua with Waiariki/Ngāwha	**4h)** Resource consent processes and decision making frameworks that better represent the relationship of tangata whenua with Waiariki/ Ngāwha (e.g. consultation processes that make sure we talk to the right people, standard operating procedures for dealing with consents) **4i)** Assessment criteria for all consents that reflect the importance of cultural values and effects on these values



Kuiwai e!, Haungaroa e!, ka riro au i te Tonga. Tukuna mai te ahi!

Oh Kuiwai, Oh Haungaroa, I have been captured by the southern winds. Send me fire!

5

Understanding of the geothermal resource, the effects of use and its sustainable limits is incomplete, does not use mātauranga Māori; and creates uncertainty for the management of the resource.

EXPLANATION

Geothermal systems are complex. While the Rotorua system has been researched for many decades, there are gaps in our knowledge. We broadly know how the system works, and we have monitored trends in the system's health for many years. This tells us about the overall state of the system and helps us predict system wide trends, which in turn can help us decide our broad management approach (e.g. we know we need to reinject most geothermal water to keep the system healthy).

However, understanding sustainable allocation limits and the effects of uses on surface features is an inexact and incomplete science. Our surface feature monitoring tells us the system has improved, but we don't know why recovery trends across the system are inconsistent. We can use our geothermal numerical reservoir model to predict changes in the system over time, but all models have limitations, and will never provide complete certainty. It is especially hard to predict small scale cumulative changes, or to link these changes to individual uses. This creates uncertainty for management decisions and makes it harder to 'fine tune' decisions around individual consents. We also know that we have knowledge gaps including mātauranga Māori, and data, such as data on the actual use of the resource by consent holders.

While we don't want to limit use unreasonably, we need to allocate the resource within constraints of our knowledge. If we have knowledge gaps a precautionary approach would be best. This could include more information requirements to support some large consent applications, more monitoring, staged development, and more independent peer review of some consent applications and/or a cap on total allocation that is precautionary.

Q

How can we weave mātauranga Māori into management of the system?

Should Council take a precautionary approach in managing the resource?

Are the monitoring requirements on consents adequate at the moment? What additional data should we be seeking?

Broad approach	*Possible Policy Options*
Integrated whole system understanding of the resource	**5a)** The development of a system management plan
Mātauranga Māori to inform management	**5b)** Inclusion of the full range of knowledge and indictors on the health of the system, including cultural indicators and mātauranga Māori
Continuing to build our knowledge	**5c)** Regular review of state of the environment programme **5d)** The establishment of Peer Review Panel (a panel of independent technical experts) to provide regular annual reporting on the overall state of the system **5e)** Ongoing investment in research
Evidence and risk based decision making	**5f)** Information requirements for consents that reflect scale and effect of the activity (i.e. small takes require less information) **5g)** Activity status that reflects scale and significance of potential effect (i.e. big takes have higher policy test than small takes) **5h)** Standard Operating Procedures for consents for consistent interpretation and implementation of policy **5i)** More monitoring requirements on consents, including more regular monitoring of pressure and temperature and actual use of the resource
A precautionary approach in the allocation of the resource	**5j)** Retain (and review) the trigger/alert levels in the current plan which give early warning about geothermal water levels and potential risk to the surface features **5k)** Allocation principles that constrain allocation based on the current level of understanding

6

The drilling and use of geothermal wells can lead to harmful effects on people and the environment.

EXPLANATION

Geothermal wells in Rotorua are mostly fairly shallow, and most are less than 120 metres deep. They include production and injection wells that bring water to the surface (where heat is taken) and then put the water back into the same aquifer. Down hole heat exchangers don't take geothermal water, but pump town water down a well, which is then hot when it comes to the surface. The construction of all wells requires a resource consent from the Council, and this is separate to the resource consent to take the geothermal water and heat.

It is important that wells are drilled to avoid effects on the geothermal resource, and on groundwater and surface features. This includes managing where wells are drilled, how deep, and how materials are disposed of (e.g. drilling fluid).

We also need to make sure that wells are maintained in good condition and abandoned properly when no longer needed, to keep people safe from uncontrolled discharges of gas or hot water and steam and protect buildings (e.g. from well blow outs). Uncontrolled discharge of geothermal water can also lead to contamination of groundwater, damage to surface features and loss of water from the aquifer.

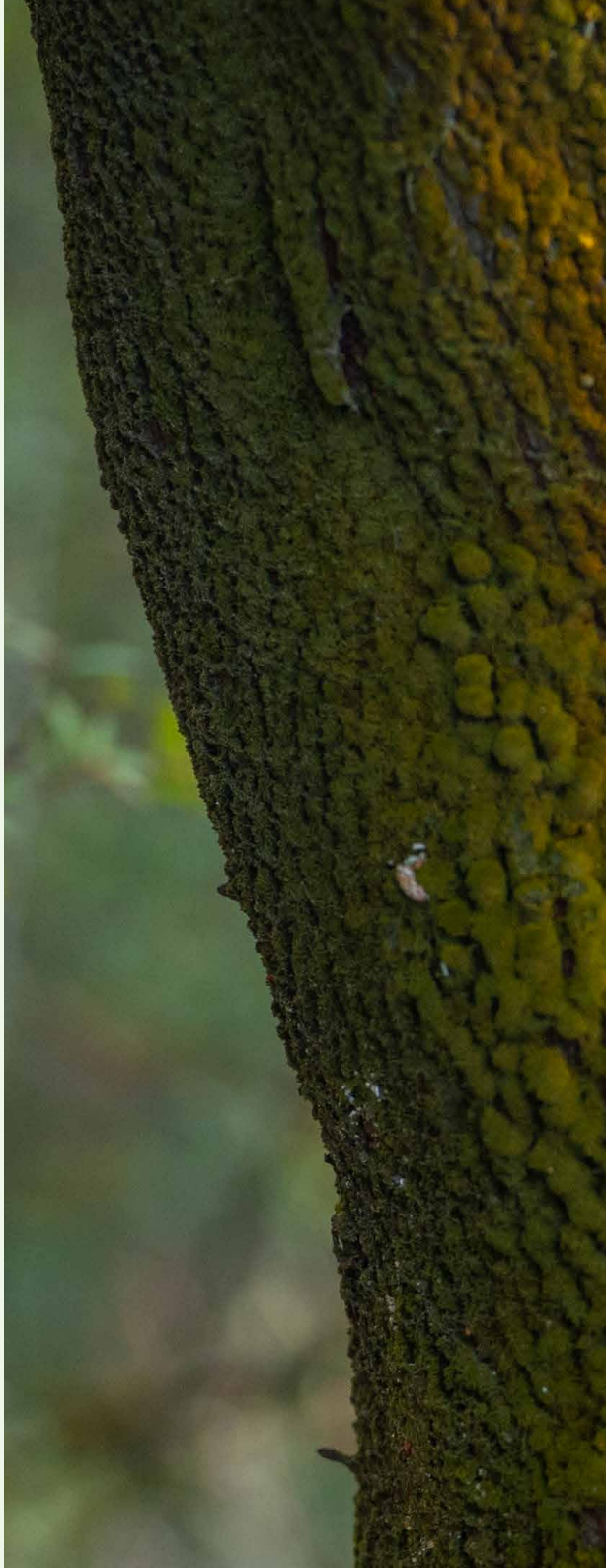
Broad approach	*Possible Policy Options*
Best practice construction, maintenance and abandonment of wells	**5l)** **5l**Require drilling standards to be followed for new geothermal wells **5m)**Consent conditions for best practice maintenance and abandonment of wells
Efficiency and reduced risk	**5n)** Enable or encourage group schemes to reduce the number of wells constructed **5o)** Continue requiring setbacks from all geothermal wells, including those no longer in use **5p)** Information and education to well owners

Q

What are the obstacles to building and keeping wells safe?

Should Council consider the use of bonds on resource consents to make sure wells are abandoned correctly when no longer needed?

What other ideas do you have?



Whakakapinga Kōrero
Summary

Bay of Plenty Regional Council is reviewing how the Rotorua Geothermal System is managed. We know that to protect our unique and vulnerable surface features we need to manage the resource carefully so we don't repeat past mistakes.

We are in the early stages of the review. This discussion document pulls together past work to identify possible issues, objectives and management options for the system that will be included in a System Management Plan and then a Draft Regional Plan. We want your views about whether you think we have these right and are heading in the right direction.

Tikanga o ngā kupu
Definitions

Caldera: A volcanic depression formed by the collapse of the ground above a magma chamber, which empties during very large volcanic eruptions.

Discharge: The volume of flow of a moving liquid or gas. Examples include a river, a spring, a gas blow from a hydrothermal vent or flow from an artificial channel or pipe.

Efficiency: Efficiency includes the comparison of the overall benefit to society (economic efficiency) of competing uses (allocative efficiency), productive efficiency, and the ability of productive efficiency to increase over time through technology improvements and better understanding of the resource (dynamic or innovative efficiency).

Equilibrium: A stable state of a system. Once equilibrium has been reached, no further net change in the physical or chemical state of materials in the system, or in their proportions, will occur without some external interference.

Geothermal system: The natural transfer of heat within a confined volume of the Earth's crust where heat is transported from a 'heat source' to a 'heat sink', usually the ground surface. Types of geothermal systems include hydrothermal systems and magmatic-hydrothermal systems.

Geyser: An eruption of hot water and steam from a hydrothermal system. It is usually of cyclic occurrence and ejects only small amounts of solid material. The ejection mechanism is volume change due to boiling, as opposed to ejection of water because of artesian pressure alone.

Groundwater: Subsurface water contained in pores and fissures in rock beneath soil, most of which is beneath the water table.

Hydrothermal activity: Manifestations seen at the surface of geothermal systems. Hydrothermal activity may include hydrothermal eruptions, fumaroles, gas/steam emissions, steaming ground, geysers, hot springs and streams, and hot pools (including mud pools).

Issue: A matter of concern to the region's communities regarding an activity affecting some aspect of natural and physical resources and the environment of the region.

Mātauranga Māori: Directly translates to Māori knowledge but not only refers to the knowledge that Māori have, but encompasses the Māori way of knowing and the connectedness that knowledge has with the environment out of which it was derived.

Method: The procedures or courses of action to be followed, in accordance with the policies, to achieve the objectives, including rules.

Ngā Puna: The pools.

Ngāwha: Geothermal bath and pools.

Objective: A desirable and achievable condition or position towards which effort is to be directed.

Policy: Policies guide the development of courses of action directed towards the accomplishment of objectives.

Significant geothermal features (SGFs): Geothermal features include active and relic geothermal features and habitats including vegetation and fauna. 'Significant Geothermal Features' are those that have been identified as geothermal features through the use of the feature descriptors of Appendix A – Definitions Annex A, and, then identified as significant through the application of the criteria of Appendix F Set 7 – Geothermal features, in accordance with Method 22 of the Bay of Plenty Regional Policy Statement.

System Management Plan: A plan that manages the geothermal resource on a whole system basis, to ensure integrated management of the system which responds to changes caused by its use.

Taonga: Treasure, property; taonga are prized and protected as sacred possessions of the tribe. The term carries a deep spiritual meaning and taonga may be things that cannot be seen or touched.

Taupo Volcanic Zone: The approximately 100 kilometre wide by 350 kilometre long volcanic region of the central North Island extending north from Ruapehu volcano to beyond Whakaari volcano.

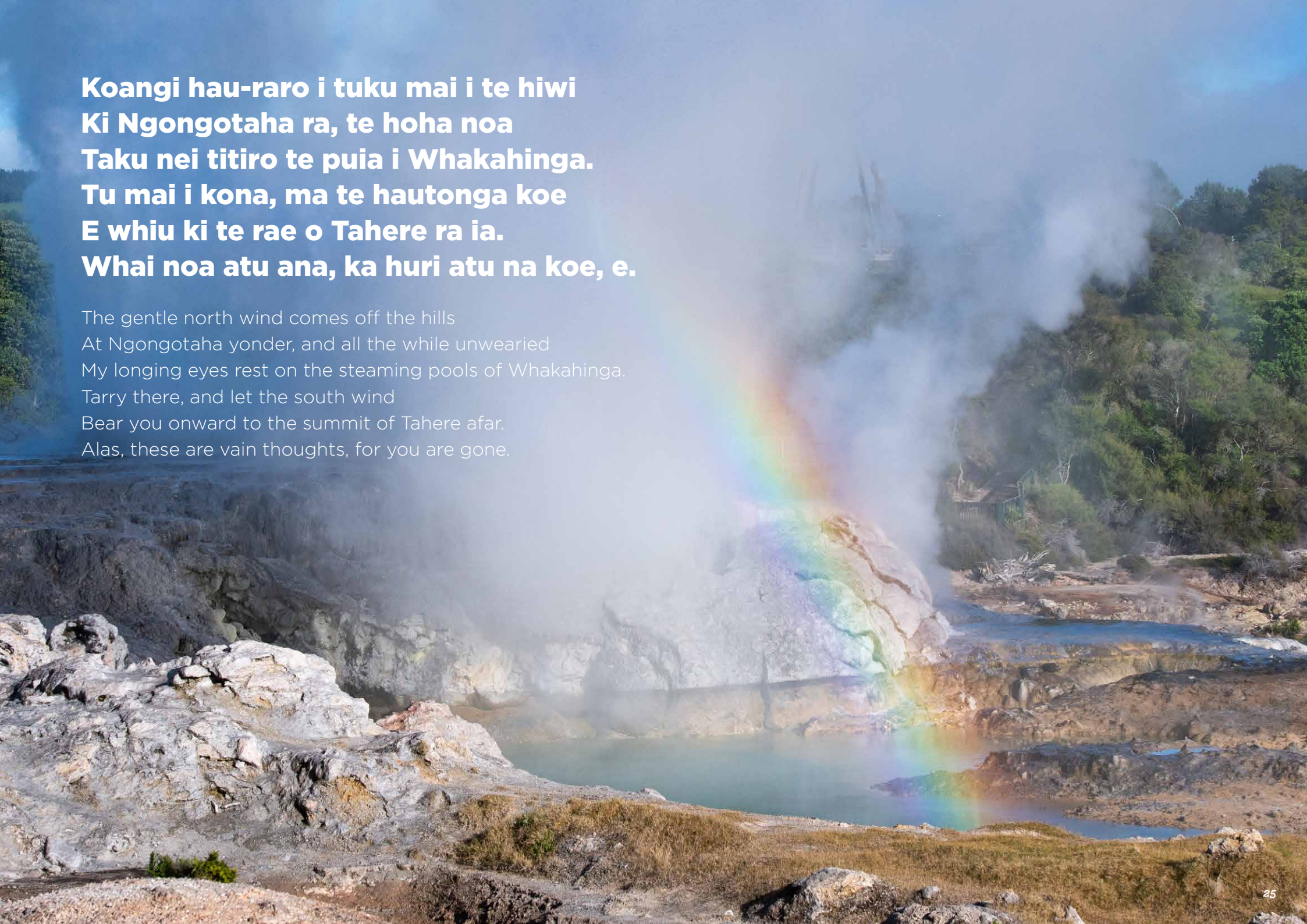
Waiariki: Geothermal, waters from the gods.

Waikite: The seeing pool/water.

Waiora: Healing/life giving water.

Wairua: Spirit streams.

Waiwera: Naturally heated water.



Koangi hau-raro i tuku mai i te hiwi
Ki Ngongotaha ra, te hoha noa
Taku nei titiro te puia i Whakahinga.
Tu mai i kona, ma te hautonga koe
E whiu ki te rae o Tahere ra ia.
Whai noa atu ana, ka huri atu na koe, e.

The gentle north wind comes off the hills
At Ngongotaha yonder, and all the while unwearied
My longing eyes rest on the steaming pools of Whakahinga.
Tarry there, and let the south wind
Bear you onward to the summit of Tahere afar.
Alas, these are vain thoughts, for you are gone.

Rārangi Pānui
Reading List

Bay of Plenty Regional Council. 2014. (October 2014, updated 5 July 2016) Bay of Plenty Regional Policy Statement. Strategic Policy Publication 2013/04. ISSN1173907 (online, http://www.boprc.govt.nz).

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Regional Plan, 1999 Environment Bay of Plenty. Resource Planning Publication 99/02, ISSN 1170 9022.

Rotorua Geothermal Regional Plan Review. 2010. Environment Bay of Plenty. Strategic Policy Publication 2010/01, ISSN 1176 4112

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Scott BJ, Mroczek EK, Burnell JG, Zarrouk SJ, Seward AM, Robson B, Graham DJ. 2016. Rotorua Geothermal Field: an experiment in environmental management. Geothermics, 59B: 294-310.

Scott BJ, Bromley CJ. 2017. Development of Methodology to Assess Significant Geothermal Features. Lower Hutt (NZ): GNS Science. 46 p. (GNS Science consultancy report; 2017/06).

Scott BJ, Bromley CJ. 2018. Assessing significant geothermal features in the Bay of Plenty region – the application and testing of Method 4. Wairakei (NZ): GNS Science. 20p (GNS Science consultancy report, 2018/66)

Wildland Consultants 2016: Bay of Plenty Regional Council significant geothermal features (SGF) assessment: Stages 1 and 2. Wildland Consultants Ltd Contract Report No. 3978a. Prepared for Bay of Plenty Regional Council. 23 pp.

A list of Hapū/Iwi Management Plans lodged with the Bay of Plenty Regional Council and recognised by the relevant iwi authority by Māori Constituency and location can be found at: http://www.boprc.govt.nz/your-council/plans-and-policies/plans/hapūiwi-resource-management-plans/

Whakahokinga Whakaaro
Feedback Form

He aha ou whakaaro? What do you think?

Please return this form to Bay of Plenty Regional Council, Reviewing Management of the Rotorua Geothermal System, PO Box 364, Whakatāne 3158, or email your comments to **geothermal@boprc.govt.nz** or fill out the online form at **www.boprc.govt.nz/geothermal**

Your details

First Name: _____

Surname: _____

Phone Number: _____

Email Address: _____

Suburb: _____

Your gender:

- ◯ Male
- ◯ Female
- ◯ Gender diverse

Your ethnicity:

- ◯ European
- ◯ Māori
- ◯ Pacific Islander
- ◯ Asian
- ◯ Middle Eastern/ Latin American/African
- ◯ Other, please specify:

Your age:

- ◯ 0-17 years
- ◯ 18-24 years
- ◯ 25-34 years
- ◯ 35-44 years
- ◯ 45-54 years
- ◯ 55-64 years
- ◯ 65 or older
- ◯ I'd rather not say

ISSUES AT A GLANCE

1. *Taking geothermal water and heat from the geothermal system can cause adverse effects on its long term sustainability and on geothermal surface features.*
2. *Land uses near geothermal surface features can cause adverse and irreversible effects on these features, and increase the risk of geothermal hazards to people.*
3. *The discharge of geothermal water to land air and water can cause adverse effects on the receiving environment.*
4. *There are limits to resource use and current allocation of the resource may not reflect the needs, values and aspirations of tangata whenua and the local community.*
5. *Understanding of the geothermal resource, the effects of use and its sustainable limits is incomplete, does not use matauranga Māori; and creates uncertainty for the management of the resource.*
6. *The drilling and use of geothermal wells can lead to harmful effects on people and the environment.*

Your comments

Q1: What do you value about the Rotorua System?

Q2: Do you think the key issues that we have identified in this document are the correct issues?

Q3: Are any key issues missing?

Q4: Is there anything you think needs changing in the way we currently manage the system?

Q5: Is there anything else you'd like to tell us?

If you require more space please feel free to attach extra pages.

BAY OF PLENTY
REGIONAL COUNCIL
TOI MOANA

For more information visit our website www.boprc.govt.nz or call 0800 884 880