**IN THE MATTER** of the Resource Management Act 1991

**AND**

**IN THE MATTER** of an application to the **BAY OF PLENTY REGIONAL COUNCIL** by **NGATI TUWHARETOA GEOTHERMAL ASSETS LIMITED** for a change to the conditions of a resource consent (67151) that authorises the discharge of geothermal water from the eastbank of the Tarawera River

**STATEMENT OF EVIDENCE OF SPENCE LOGAN MCCLINTOCK**

## 1. INTRODUCTION

1.1 My full name is Spence Logan McClintock. I am the Tumuaki (Chief Executive Officer) of Tuwharetoa mai Kawerau ki te Tai, which comprises Ngati Tuwharetoa (Bay of Plenty) Settlement Trust ("NTST") and its subsidiaries:

(a) Ngati Tuwharetoa Holdings Limited ("NTHL").

(b) Ngati Tuwharetoa Geothermal Assets Limited ("NTGA").

(c) Ngati Tuwharetoa Electricity Limited ("NTEL").

1.2 As the Tumuaki, my primary responsibility is to oversee and manage the successful and sustainable performance of NTHL, NTGA, and NTEL.

### Qualifications and experience

1.3 I have a Bachelor of Forestry Science from the University of Canterbury (1993 year) and a Diploma in Business Administration from Henley Management College (2007 year).

1.4 I have over twenty two years' experience in senior management roles in the forestry, energy, and primary production sectors. For the last twelve years, I have been in senior management roles focusing on resource management, specifically the management of geothermal resources.

1.5 Prior to my current role (held for five years), I was the manager of the Technical Resources Group for Mighty River Power (now Mercury Energy).

1.6 Prior to my employment with Mighty River Power, I was employed by Norske Skog Tasman as the Supply and Logistics Manager at Kawerau from 2003 to 2008.

1.7 Although I have set out my qualifications and experience, I am presenting this evidence as the Tumuaki, not as an expert witness.

**Purpose and scope of evidence**

1.8 In 2016, NTGA accepted conditions on Resource Consent 67151 requiring the overall discharge volume of geothermal fluid to the Tarawera River to be significantly reduced and discharges from the company's East Bank discharge point to cease by 1 January 2021. NTGA has now applied to have these conditions changed so that the East Bank discharge can continue until 2035.

1.9 The rationale for the change application is that there are (at least) two important factors that apply now that did not apply at the time the decision was made to accept those restrictions. These factors are:

(a) Economic / commercial – a number of factors, including the likely closure of the Norske Skog Tasman mill in the near future, would have adverse commercial effects on NTGA which would then have broader adverse economic consequences for the local and regional economy and adverse social, cultural, and economic effects on the beneficiaries of the NTST.

(b) Increased scientific knowledge in relation to the need for and benefits and potential disbenefits of reinjection. Reinjection is not required for reservoir sustainability and NTGA analyses and reservoir monitoring have shown that reinjection benefits are uncertain and injection has to be carefully managed to mitigate increased risk of reservoir cooling.

1.10 Moreover:

(a) Recent scientific investigations confirm earlier investigations and demonstrate that there are minimal adverse effects on the water quality of the Tarawera River as a result of the ongoing discharge; and

(b) The cultural effects of the ongoing discharge are considered to be acceptable by two of the Iwi that have recognised interests in the Tarawera River – Ngati Tuwharetoa ki Kawerau (via the NTST) and Ngati Rangithi.

1.11 Given the above, NTGA has sought amendment of the conditions requiring that the Eastern Bank discharge be discontinued on the basis that better resource management outcomes are achieved than if the discharge is required to cease.

1.12 Against that background, the focus of my evidence is to address corporate issues relevant to NTGA's application to change the conditions of consent to enable the continued discharge of geothermal water to the Tarawera River until 2035.

1.13 I am neither an economist nor a scientist. My 'corporate' evidence needs to be read alongside:

(a) The evidence of Mr Osborne in terms of economic issues; and

(b) The evidence of Dr. Hickey, Mr Chilton and, in particular, Dr. Burnell in relation to scientific issues.

**Scope of evidence**

1.14 My evidence is structured as follows:

(a) Overview of NTGA's operations (Section 3).

(b) Commercial and economic considerations and potential consequences (Section 4).

(c) Scientific considerations (Section 5).

(d) Consultation since filing of the present application (Section 5).

(e) Comments on issues raised in the officer's report (Section 6).

1.15 A summary of my evidence is set out in Section 2 below.

## 2. SUMMARY OF EVIDENCE

2.1 NTGA is a wholly owned subsidiary of NTHL. NTHL is owned by the NTST, which is governed by seven elected Trustees. NTGA owns and operates production wells, injection wells, and related infrastructure on the KGF for the purpose of abstracting and supplying geothermal energy to end users for uses in industrial applications, particularly process heat, timber drying, and electricity generation.

**NTGA infrastructure**

2.2 NTGA purchased the business and its assets from the Crown. The purchase of this business and its assets was highly significant insofar as it enabled Ngati Tuwharetoa to reconnect with the geothermal resource which it had lost control

of, to participate in the development of that resource, and to foster social and economic growth for the benefit of Ngati Tuwharetoa and the wider Kawerau community. NTGA's operations are a direct result of the trustees' vision and commitment to utilise geothermal energy from the KGF to encourage local industry and generate more employment and business opportunities.

2.3 The infrastructure owned and operated by NTGA comprises ten production wells, six reinjection wells, pipelines, geothermal separators, a clean steam plant, and a 26.6MW (gross) binary cycle power plant (TOPP1). Geothermal energy is extracted and residual geothermal water from the operations is reinjected into the reservoir and discharged to the East Bank and the West Bank of the Tarawera River. NTGA has resource consents to take a maximum of 98,280 tonnes of geothermal water per day from the reservoir.

**Discharges to the Tarawera River**

2.4 Consent No. 67151 authorises discharges to the Tarawera River from both the eastern and western banks of the Tarawera River. That consent contains conditions that require the East Bank discharge to cease by 1 January 2021, with a commensurate reduction in the discharge quantity. The purpose of the condition is to require reinjection of geothermal water rather than the discharge to the river.

2.5 NTGA agreed to these limitations back in 2016 when the consent was granted. At that time, NTGA made a pragmatic decision to accept the limitations even though there was no real benefit to the reservoir from reinjection and potential adverse water quality effects were minimal.

2.6 NTGA has applied to change the conditions of that consent to enable continued discharge of geothermal water from the East Bank of the Tarawera River until 2035. I acknowledge that that is inconsistent with the decision that was made in 2016 but that is because circumstances and our state of knowledge has changed from both a commercial / economic and a scientific perspective.

**Commercial, economic, and consequential social considerations**

2.7 A major difference between now and when Consent No. 67151 was granted is the very real likelihood that Norske Skog Tasman ("NST") will cease operations in the very near future. NTGA's supply contract with NST is NTGA's second largest supply contract and a very significant source of revenue for NTGA.

2.8 If NST ceases operations, constructing two new reinjection wells and an extensive pipeline system at a cost of approximately $35-45M to reinject the

East Bank discharge would potentially have significant adverse financial impacts for no environmental gain. The cost of servicing the debt associated with two new injection wells and a pipeline would be approximately $2.5M per annum over 20 years based on capital expenditure of $35M, and more if the capital expenditure was $45M.

2.9 That cost is on top of the costs that NTGA incurred in 2013 for two new reinjection wells and pipelines and in 2018 for a reinjection pumping station. The cost of that infrastructure was $35.2M and NTGA is still servicing the debt and will be until 2033. The reinjection wells, pipelines, and reinjection pumping station enabled additional reinjection capacity that is now fully utilised.

2.10 NST ceasing operations creates a significant risk regarding the viability of NTGA's operations in the short term. If the costs associated with servicing the debt for two new injection wells and pipelines are also imposed, then NTGA would be under increased financial pressure at a time when it faces significant risk with respect to the viability of its operations. These matters are addressed in Mr Osborne's evidence. In turn, the dividend we pay to the NTST to enable it to make grants to Beneficiaries of Ngati Tuwharetoa would be at significant risk.

2.11 Grants made by the NTST equated to approximately $300K in 2020. Tuwharetoa mai Kawerau ki te Tai had planned, via the NTST, to significantly increase the level of distributions to beneficiaries over the coming years. In that regard, part of the NTST's strategic plan is to begin assisting beneficiaries that require help with housing. Access to "healthy homes" was deemed the number one priority in a series of workshops conducted by Trustees. In a recent (March 2021) survey of beneficiaries, 37% of respondents identified as living in "unsatisfactory housing." Assisting beneficiaries with housing would be a very expensive exercise.

**Scientific considerations**

2.12 As regards advances in our scientific understanding of NTGA operations, I note that:

(a) Dr. Burnell has now quantified the effects on the reservoir and the potential for subsidence as also being negligible so there is no need for the East Bank discharge quantity to be reinjected.

(b) Dr. Hickey has confirmed that there are minimal adverse effects with respect to water quality and that there were once greater geothermal inputs to the Tarawera River prior to development of the KGF in the 1950s and thereafter.

2.13 The evidence of Amorangi Te Rire and Ms Adlam regarding the decline of geothermal features after development of the KGF and historical inputs of geothermal water to the Tarawera River prior to that development is consistent with the evidence of Dr. Hickey.

2.14 Monitoring since Consent No. 67151 was granted has shown that reinjection is having a cooling effect, as seen in NTGA's production well KA47 - the well most-affected by Mercury's large KA44 and KA59 injection wells. Reinjection is therefore not without risk in terms of cooling of the reservoir.

2.15 While reinjection cooling effects to production can be modelled, actual reservoir effects of cooling from reinjection, in any particular case, cannot be fully determined until after the reinjection well has been constructed, reservoir characteristics are confirmed, and reservoir response to reinjection is observed. If a more than minimal cooling effect occurred, NTGA would have to drill further reinjection wells at additional significant cost. It could take up to five years to see a significant reservoir response and then identify new injection locations and construct new reinjection wells and pipelines.

2.16 In other words, if we knew in 2016 what we know now, NTGA would not have agreed to the limitations on the East Bank discharge / discharge quantity.

**Engagement with Te Runanga o Ngati Awa since filing the application**

2.17 NTGA wishes to address the differences between us / Ngati Tuwharetoa and Te Runanga o Ngati Awa ("TRONA") and has made its best endeavours to engage with TRONA since the application was lodged.

2.18 The summary of consultation post lodgement of the application attached to my evidence as Appendix 4 records the ongoing engagement with TRONA. As the summary of consultation records:

(a) At a meeting on 8 July 2020, with many TRONA representatives a lot of questions were asked about the effect of the geothermal fluid on water quality and fish life. NTGA believed that by the end of the meeting the TRONA representatives had a better understanding that the true effects of the activity were as per the scientific report from Dr Hickey.

(b) On 31 July 2020, a CIA was provided to NTGA by TRONA.

(c) A meeting was held between NTGA management and TRONA management on 9 November 2020 to discuss the TRONA CIA.

(d) Following the meeting, a hui was proposed to address technical issues in light of the outcomes of the 9 November 2020 meeting.

2.19 In light of the meeting on 8 July 2020, NTGA was surprised that the CIA maintained the same position as the TRONA submission in opposition to the NTGA application. NTGA had hoped that the 9 November 2020 meeting and the proposed hui would resolve issues. Unfortunately, the hui was called off by TRONA. The upshot is that no resolution with TRONA has been achieved to date.

**Comments on the officer's report**

2.20 Two issues have been raised in the reporting officer's section 42A report that I disagree with and wish to address, namely:

(a) The driver behind the application being of a commercial nature for NTGA.[1]

(b) Reinjection being in line with what the Kawerau Steamfield Management Plan is trying to achieve.[2]

*NTGA's major drivers*

2.21 NTGA's position is not simply commercial in nature. Our concern is that adverse commercial consequences for NTGA will have broader adverse economic (and therefore social and cultural) effects, both for NTST beneficiaries and the local economy. Given that the east Bank discharge has minimal effects on water quality and the fluid is not required for the KGF, NTGA's position is that the costs, negligible/minimal benefits, and risks associated with reinjection of the East Bank discharge are simply not justified.

2.22 Further, the continued discharge from the East Bank is consistent with Ngati Tuwharetoa's tikanga and the historical and current situation with respect to natural discharges of geothermal water into the Tarawera River.

*Relevance of the Kawerau Steamfield Management Plan*

2.23 The Kawerau Steamfield Management Plan ("KSMP") was put in place to guide management decisions in relation to the Kawerau geothermal resource in light of the latest science, including monitoring results and modelling. I am thoroughly familiar with the KSMP.

1 Section 42A report, page 41.
2 Section 42A report, page 39.

2.24 I do not consider that any aspect of the NTGA proposal is inconsistent with the objective or principles of the KSMP, particularly insofar as reinjecting the geothermal fluid that currently comprises the East Bank discharge is not needed to maintain the sustainability of the reservoir – the KGF will continue to provide for the geothermal needs of present and future generations and potential subsidence effects will be negligible.

## 3. OVERVIEW OF NTGA OPERATIONS

### Background

3.1 NTGA is a wholly owned subsidiary of NTHL, which company is, in turn, owned by the seven trustees of NTST. Ngati Tuwharetoa purchased the Crown's steamfield assets on the KGF in June 2005 after the Crown transferred wells, steamfield equipment and contracts to (then) Mighty River Power Limited, now Mercury. Mercury transferred the majority of the wells, steamfield equipment, and contracts to NTGA as a result of negotiations that involved a balancing of Government commitments, Treaty of Waitangi obligations, and commercial interests.

3.2 The infrastructure and contracts transferred to NTGA were not as redress under the settlement with the Crown. NTGA paid for the acquisition of the assets and contracts.

3.3 The purchase of these assets was a highly significant development insofar as it enabled Ngati Tuwharetoa to reconnect with the geothermal resource which it had lost control of, to participate in the development of that resource, and to foster social and economic growth for the benefit of Ngati Tuwharetoa and the wider Kawerau community[3].

### Operations

3.4 NTGA extracts geothermal energy from the KGF and provides it to end users for use in industrial applications in Kawerau, particularly process heat, timber drying, and electricity generation. The product supplied to industry is mainly steam, which is generally sold on a tonne per hour basis. Some geothermal energy is provided to industry in the form of pressurised hot water for use in electricity generation.

[3] This is addressed in more detail in the evidence of Rae Beverley Adlam.

3.5 NTGA's operations are a direct result of the trustees' vision and commitment to utilise geothermal energy from the KGF to encourage local industry and generate more employment and business opportunities.

**Existing infrastructure**

3.6 NTGA's business operations are supported by a range of assets that enable the generation of electricity and the infrastructure (mainly production and reinjection wells and pipelines) to enable the product to be delivered to NTGA's customers. The initial assets initially purchased in 2005 comprised a number of wells, existing contracts for supply, pipelines, and other infrastructure. Since June 2005, those assets have been expanded by further development.

3.7 The assets comprise:

(a) Ten production wells - KA19, KA27, KA30, KA35, KA36, KA37a, KA47, KA54, KA57, and KA60.

(b) Six reinjection wells:

(i) KAM1, KA38, KA39, and KA40, which are shallow in-field wells.

(ii) KA49 and KA53, which are deep edge-of-field wells.

(c) The pipelines that connect the production wells and injection wells, including geothermal separators, and a clean steam plant.

(d) A 26.6MW (gross) binary cycle power plant (TOPP1).

3.8 The production and reinjection wells are shown on the aerial **attached** as **Appendix 1** along with all other production, reinjection, and monitoring wells on the KGF.

3.9 The flow of fluids and steam is controlled by a sophisticated computer system.

3.10 Residual geothermal water from NTGA's operations is discharged to ground via NTGA's reinjection wells and to the Tarawera River via a cooling channel on the East Bank and a lagoon on the West Bank. Approximately 53% of separated geothermal water (864 tonnes per hour) is presently reinjected back into the KGF and the remainder (764 tonnes per hour) is discharged to the Tarawera River. It is the discharge from the East Bank discharge point of up to 470 tonnes per hour that we wish to continue until 2035. The reinjection system is currently at capacity.

3.11 A process flow diagram of the key components of the infrastructure is **attached** as **Appendix 2.**

**Main resource consents**

3.12 The main resource consents that NTGA holds to authorise the take and discharge of geothermal water in relation to its geothermal operations at Kawerau:

(a) Consent No. 24598 - Take and discharge up to a maximum of 53,280 tonnes of geothermal water per day, with an annual average limit of 44,400 tonnes per day.

(b) Consent No. 66862 - Take and discharge up to a maximum of 45,000 tonnes of geothermal water per day.

(c) Consent No. 67151 – Discharge geothermal water from the East Bank and the West Bank of the Tarawera River into the Tarawera River.

3.13 Consent No. 67151 contains conditions of consent that:

(a) Limit the discharge to the Tarawera River to 20,880 cubic metres per day and 870 cubic metres per hour until 1 January 2021;

(b) Limit the discharge to the Tarawera River to 9,600 cubic metres per day and 400 cubic metres per hour from 1 January 2021;

(c) Provide that from 1 January 2021 the discharge shall only be from the West Bank discharge point; and

(d) Make exceptions to the above in relation to contingency discharges if specified requirements are met (e.g. there is a failure of an injection well).

3.14 The proposed conditions of consent included with the original application and supporting assessment of environmental effects for Consent No. 67151 did not contain the limitations in 3.12(a) to (c) above. Those limitations were ultimately agreed to by NTGA:

(a) On the basis of the BOPRC's view that reinjection back into the KGF was preferable to discharge to the Tarawera River and was supported by the relevant planning documents;

(b) To avoid the need for a hearing;

(c) On the understanding at that time that the cost of constructing new reinjection wells and pipelines to supply those wells would not create any significant financial issues for NTGA; and

(d) Without the knowledge NTGA now has regarding the cooling effects we are seeing from reinjection.

3.15 I address the cooling effects from reinjection further below in Section 5.

## 4. COMMERCIAL AND ECONOMIC CONSIDERATIONS AND POTENTIAL CONSEQUENCES

4.1 In order to fully understand the commercial consequences of the discontinuation of the East Bank discharge, it is necessary to understand the commercial / contractual context within which NTGA is operating.

**Contracts and end users**

4.2 NTGA has supply contracts with the following organisations:

(a) Norske Skog Tasman ("NST") – 2,000,000 tonnes per annum ("tpa") of steam.

(b) Asaleo Care NZ Limited – 228,000 tpa of steam.

(c) OJI Fibre Solutions – 175,000 tpa of steam.

(d) Kawerau Dairy Plant (Waiu) – 25,000 tpa of steam.

(e) Carter Holt Harvey Wood Products ("CHH") – 368,000 tpa of steam.

(f) Ngati Tuwharetoa Electricity (TOPP1 Power Plant) – 1,000,000 tpa of steam and 5,260,000 tpa of brine.

(g) Sequal Lumber – 150,000 tpa of steam.

4.3 The location of each of the above organisations is shown on the photograph **attached** as **Appendix 3**.

4.4 NTGA also has an agreement to supply 2,190,000 tpa of two-phase geothermal fluid from KA24 to the Eastland Generation Geothermal Development Limited power plant under an operating lease arrangement that relies on shallow reinjection by Eastland Generation.

4.5 The steam supply contract with NST is a "legacy contract" in that it was entered into by the Crown in 1998 and NTGA succeeded to it when it acquired the

interests and assets in the KGF in 2005. The legacy contract provides for fixed pricing until 2035. When this contract was entered into it was envisaged that the discharge of geothermal water from both the East Bank and West Bank discharge points would continue until at least 2035.

4.6 As noted in the introduction to my evidence, I was the Supply and Logistics Manager at Kawerau for NST from 2003 to 2008. I am therefore very familiar with NST's operations. In my view, the continued operation of NST at Kawerau is very doubtful due to the continued decline in demand for newsprint (NST's primary product at Kawerau) and the lower level of profitability that can be achieved by manufacturing other products with the equipment that NST has. Against a backdrop of rising electricity costs, the global competitiveness of the NST mill is very low. NST is currently undertaking consultation with its workers regarding the likely closure of NST operations at Kawerau.[4]

**The commercial and economic consequences of discontinuing the Eastern Bank discharge, including on the Beneficiaries of NTST**

4.7 Ceasing the discharge from the East Bank and reducing the volume of the discharge would result in the need to reinject the geothermal water back into the geothermal reservoir.

4.8 Reinjection would require two new reinjection wells and an extensive pipeline at a cost of around $35-45M. NTGA would have to obtain that amount from the bank and would have to pay it off over a period of up to 20 years. The cost of servicing the debt associated with two new injection wells and a pipeline would be approximately $2.5M per annum over 20 years based on capital expenditure of $35M, and more if the capital expenditure was $45M.

4.9 That cost is on top of the costs that NTGA incurred in 2013 for two new reinjection wells and pipelines and in 2018 for a reinjection pumping station. The cost of that infrastructure was $35.2M and NTGA is still servicing the debt and will be until 2033. The reinjection wells, pipelines, and reinjection pumping station enabled additional reinjection capacity that is now fully utilised.

4.10 NST ceasing operations creates a significant risk regarding the viability of NTGA's operations in the short term. If the costs associated with servicing the debt for two new injection wells and pipelines are also imposed, then NTGA

[4] See https://www.nzherald.co.nz/business/kaweraus-norske-skog-tasman-mill-community-in-shock-over-potential-closure/R4WA4QMXXM32MTXVCE2CPP3PKE/; https://www.nzherald.co.nz/business/kaweraus-norske-skog-tasman-mill-future-of-160-jobs-to-be-decided/JVUOOZGBPMOLUQBBC3QLT7BQ5Q/?ref=readmore

would be under increased financial pressure at a time when it faces significant risk with respect to the viability of its operations. These matters are addressed in Mr Osborne's evidence. In turn, the dividend we pay to the NTST to enable it to make grants to Beneficiaries of Ngati Tuwharetoa would be at significant risk.

4.11 Grants made by the NTST equated to approximately $300K in 2020. Tuwharetoa mai Kawerau ki te Tai had planned, via the NTST, to significantly increase the level of distributions to beneficiaries over the coming years. Currently, the main categories of Grants made are for:

(a) School fees (including preschool).

(b) Tertiary training.

(c) Pakeke.

(d) Regional and national sporting representation.

(e) Marae.

4.12 Part of the NTST's strategic plan is to begin assisting Beneficiaries that require help with housing. In that regard, access to "healthy homes" was deemed the number one priority in a series of workshops conducted by Trustees. In a recent (March 2021) survey of Beneficiaries, 37% of respondents identified as living in "unsatisfactory housing." Assisting Beneficiaries with housing would be a very expensive exercise.

## 5. SCIENTIFIC CONSIDERATIONS

5.1 While it was known at the time of the 2016 application that reinjection to the reservoir of the East Bank discharge was not necessary for the sustainability of the reservoir, Dr. Burnell has now quantified how insignificant the impact of reinjection would be in terms of the sustainability of the KGF based on his modelling.

5.2 In that regard, Dr. Burnell's evidence is that the continued discharge of geothermal water to the Tarawera River from the East Bank discharge point until 1 January 2035, rather than reinjection to the reservoir, will have a negligible effect on the sustainability of the reservoir:

> *"…less than 0.1% for the extracted energy of all developers over 50 years."*[5]

[5] Burnell evidence, paragraph 5.1.

5.3 Dr. Burnell's evidence is also that there will be negligible impact on subsidence.[6]

5.4 In Section 3 of my evidence, I commented that one of the reasons that NTGA accepted the limitations regarding the East Bank discharge that were ultimately imposed on the consent was that we were not aware at that time of any cooling effects arising from reinjection. Monitoring since that time has shown that reinjection is having a cooling effect, as seen in NTGA's production well KA47 - the well most affected by Mercury's large KA44 and KA59 injection wells.

5.5 Reinjection is therefore not without risk in terms of cooling of the reservoir. While reinjection cooling effects to production can be modelled, actual reservoir effects of cooling from reinjection, in any particular case, cannot be fully determined until after the reinjection well has been constructed, reservoir characteristics are confirmed, and reservoir response to reinjection is observed.

5.6 If monitoring shows a cooling effect, use of the reinjection wells may have to cease – depending on how significant the cooling is. If that occurred, new reinjection wells would have to be drilled in a different location which, with associated pipework, would cost approximately $12M per well plus pipeline costs, if not from a current well pad location. It could take up to five years to see a significant reservoir response and then identify new injection locations and construct new reinjection wells and pipelines.

5.7 Dr. Hickey's evidence is that the Tarawera River had, and still has, significant natural inputs of geothermal water, but many geothermal surfaces features have disappeared as a result of development of the KGF from the 1950s.[7] The evidence of Amorangi Te Rire and Ms Adlam regarding the decline of geothermal features after development of the KGF and historical inputs of geothermal water to the Tarawera River prior to that development is consistent with the evidence of Dr. Hickey.

5.8 My understanding of Dr. Hickey's evidence is that there are minimal adverse water quality effects arising from the East Bank and West Bank discharges of geothermal water to the Tarawera River. Dr. Hickey's analysis and assessment in that regard has built on earlier analysis and assessment that was undertaken as part of obtaining the consent for the current discharges.

6 Burnell evidence, paragraph 6.32.
7 Hickey evidence, Section 3.

**Dr. Hickey's recommendations**

5.9 Dr. Hickey has made a number of recommendations that he summarised in his evidence as follows:

> *"2.10 I provide the following recommendations for monitoring of the NTGA discharges:*
>
> *(a) that an additional algal toxicity testing be undertaken on both East and West discharges or a combined discharge sample;*
>
> *(b) that a 5 yearly multispecies toxicity testing be undertaken on a representative combined sample of the East and West bank geothermal discharges;*
>
> *(c) that a 5 yearly multisite eel and marine shellfish monitoring programme be incorporated into the consent;*
>
> *(d) that future eel monitoring should include additional monitoring sites in the regions of diffuse geothermal input and downstream of the reasonable mixing zone of the NTGA discharges;*
>
> *(e) that an additional sediment sites be included with 5 yearly eel monitoring to include sites immediately upstream and below the reasonable mixing zone;*
>
> *(f) that an additional information on harvest quantities and locations (both commercial and recreational) should be collected on eels from the Tarawera River (and local reference rivers); and*
>
> *(g) that a health risk assessment for recreational consumers – particularly focusing on local Māori populations and their consumption of mahinga kai species – should be undertaken using the data obtained from the next 5 yearly eel survey."*

5.10 NTGA accepts those recommendations; Mr McLean's evidence includes proposed amendments to the conditions of consent to incorporate those recommendations.

5.11 Dr. Hickey has also recommended in paragraphs 2.11(a) and (b) of his evidence that consideration be given to:

(a) Construction of a silica terrace for the East Bank discharge to flow over before entering the Tarawera River; and

(b) Some level of baseline monitoring of geothermal contaminants be undertaken to obtain reliable reference data for the Tarawera River.

5.12 NTGA is happy to accept these recommendations.

## 6. ENGAGEMENT SINCE FILING OF THE PRESENT APPLICATION

6.1 The consultation undertaken with potentially affected persons prior to lodgement of the application is addressed in part 7.1 and 7.2 of the assessment of environmental effects lodged in support of the application. The consultation that has occurred since then is summarised in the table **attached** as **Appendix 4**.

6.2 As regards TRONA, I note that the summary of consultation post lodgement of the application records the ongoing engagement with TRONA. As the summary of consultation records:

(a) At a meeting on 8 July 2020, with many TRONA representatives a lot of questions were asked about the effect of the geothermal fluid on water quality and fish life. NTGA believed that by the end of the meeting the TRONA representatives had a better understanding that the true effects of the activity were as per the scientific report from Dr Hickey.

(b) On 31 July 2020, a CIA was provided to NTGA by TRONA.

(c) A meeting was held between NTGA management and TRONA management on 9 November 2020 to discuss the TRONA CIA.

(d) Following the meeting, a hui was proposed to address technical issues in light of the outcomes of the 9 November 2020 meeting.

6.3 In light of the meeting on 8 July 2020, NTGA was surprised that the CIA maintained the same position as the TRONA submission in opposition to the NTGA application. NTGA had hoped that the 9 November 2020 meeting and the proposed hui would resolve issues. Unfortunately, the hui was called off by TRONA. The upshot is that no resolution with TRONA has been achieved to date.

## 7. COMMENTS ON ISSUES RAISED IN THE OFFICER'S REPORT

7.1 Two issues have been raised in the reporting officer's section 42A report that I disagree with and wish to address, namely:

(a) The driver behind the application being of a commercial nature for NTGA.[8]

[8] Section 42A report, page 41.

(b) Reinjection being in line with what the Kawerau Steamfield Management Plan is trying to achieve.[9]

7.2 I comment on each of these below.

**NTGA's major drivers**

7.3 I do not agree with the reporting officer that the driver behind the application is of a commercial nature. That is one of the reasons for the application and $35-45M is a very significant amount of money to spend on reinjection wells and pipelines. Those are very significant costs that NTGA would have to finance via debt at a cost of at least $2.5M per annum over 20 years.

7.4 NTGA's position is not simply commercial in nature. Our concern is that adverse commercial consequences for NTGA will have broader adverse economic (and therefore social and cultural) effects, both for NTST beneficiaries and the local economy. Given that the east Bank discharge has minimal effects on water quality and the fluid is not required for the KGF, NTGA's position is that the costs, negligible/minimal benefits, and risks associated with reinjection of the East Bank discharge are simply not justified.

7.5 Further, the continued discharge from the East Bank is consistent with Ngati Tuwharetoa's tikanga and the historical and current situation with respect to natural discharges of geothermal water into the Tarawera River.

7.6 If NTGA could go back in time to between 2012 (lodgement of the application) and 2016 (granting of the application), NTGA would not agree to the limitations that were imposed with respect to the East Bank discharge. NTGA would go to hearing with those submitters in opposition, as we are now doing.

**Reinjection and the Kawerau Steamfield Management Plan**

7.7 There is a strong theme running through the section 42A report that reinjection is the preferred option based on the various planning documents referred to in the report and the Kawerau Steamfield Management Plan ("KSMP"). I leave it to Mr McLean to comment in detail on the planning documents. However, I note that my understanding of the planning documents is that they encourage reinjection and minimisation of discharges to the Tarawera River, but do not mandate either of those outcomes.

[9] Section 42A report, page 39.

7.8 The KSMP was put in place to guide management decisions in relation to the Kawerau geothermal resource in light of the latest science, including monitoring results and modelling. I am thoroughly familiar with the KSMP.

7.9 As regards the KSMP, it contains the following overall objective and principles:

> *"6.1* ***Overall objective***
>
> *Overall objective:*
>
> *The Kawerau Geothermal System is managed in a manner that:*
>
> - *Provides for the geothermal needs of present and future generations*
> - *Remedies or mitigates significant adverse effects on Significant Geothermal Features, and*
> - *Avoids, remedies or mitigates significant adverse effects on the surface built environment."*

*…*

> *7.4.2* ***Principles***
>
> *To ensure that the Kawerau Geothermal System is sustainably managed, the broad principles for developing and then implementing flexible, adaptive injection strategies are:*
>
> - *The use of numerical reservoir model predictions and reservoir monitoring data*
> - *Management of reservoir fluid and heat recharge while minimising risk of unexpected thermal breakthrough and consequential reductions in reservoir fluid temperature*
> - *Deep injection to maintain pressure support, to avoid contamination of surface or ground water and minimise the risk of hydrothermal eruptions, except where the need for targeted shallow or intermediate injection is demonstrated to be necessary to avoid, remedy or mitigate any significant adverse effects resulting from takes and discharges (e.g. cool down flows, subsidence, effects on SGFs) or to support long term sustainable fluid take*
> - *Identification and implementation of adaptive management responses to optimise the injection of geothermal fluids, including consideration of the quantity, location and depth of injection*
> - *Minimisation of discharge of extracted geothermal fluid to the surface or atmospheric environment (e.g. Tarawera River), while retaining natural discharges*
>
> *Discharge practices in Kawerau have evolved to reflect improved understanding of the system. Due to historical decisions, current discharge practices do not (and cannot*

*easily) reflect all of the principles outlined above. However, the principles will be considered as part of the review of any consent conditions, for new consent applications and to guide decision making in the administration of existing consents. These principles will be reviewed in the event that modelling and monitoring results indicate an alternative approach for the sustainable management of the system."*

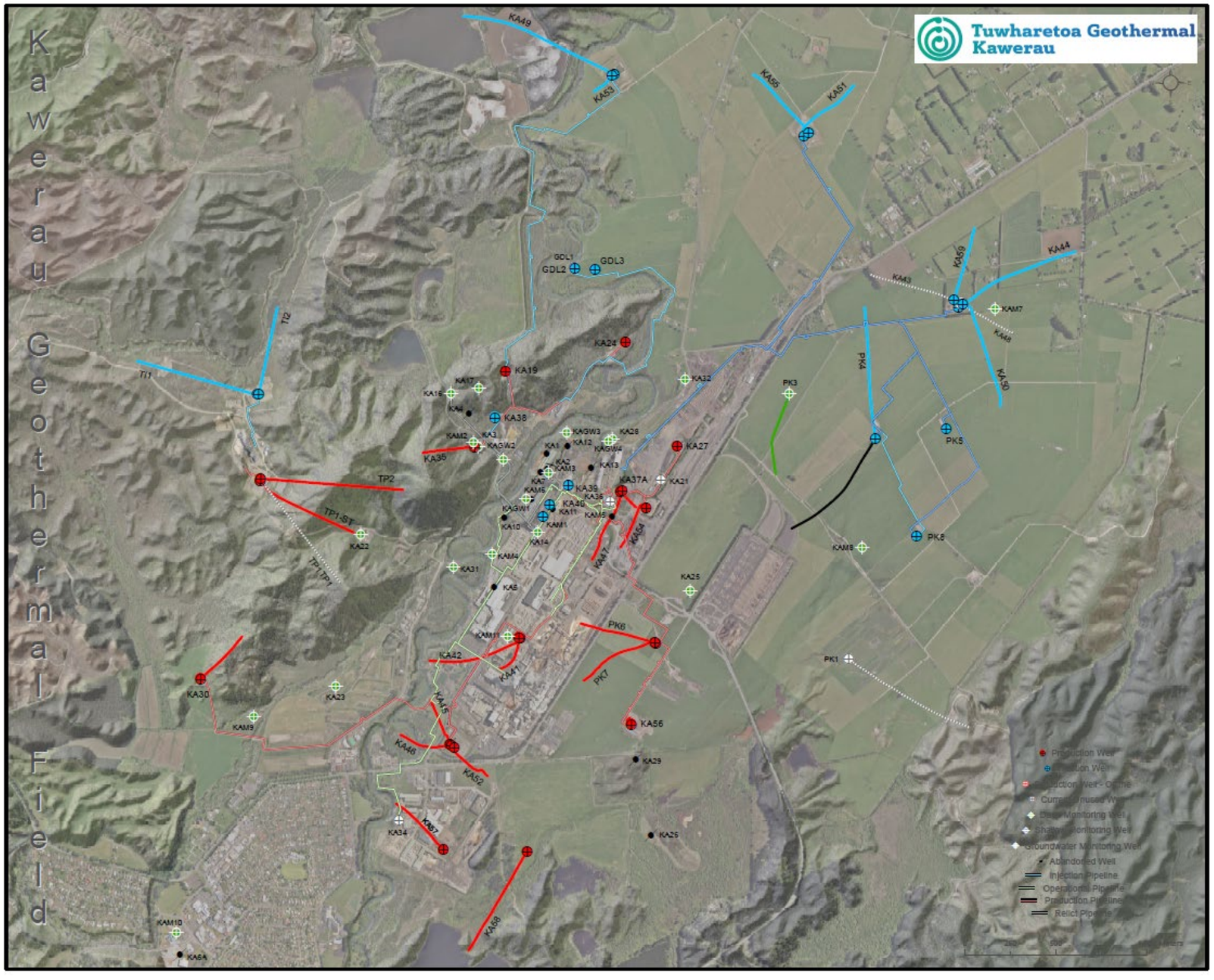
7.10 I do not consider that any aspect of the NTGA proposal is inconsistent with the objective or principles of the KSMP, particularly insofar as reinjecting the geothermal fluid that currently comprises the East Bank discharge is not needed to maintain the sustainability of the reservoir – the KGF will continue to provide for the geothermal needs of present and future generations and potential subsidence effects will be negligible.

**Spence McClintock**

**May 2021**

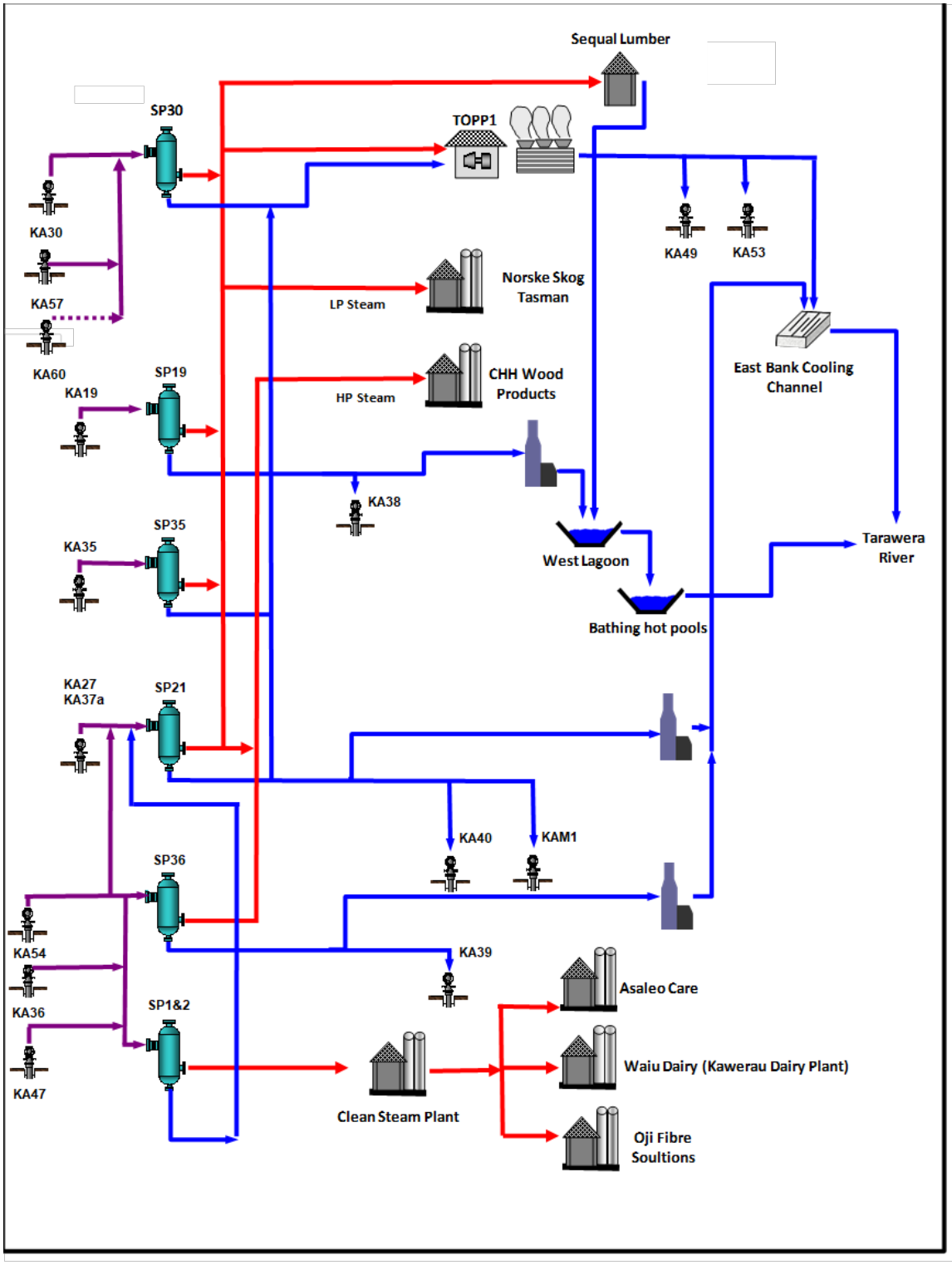
**APPENDIX 1**

**WELL LOCATIONS**



## APPENDIX 2

## PROCESS FLOW DIAGRAM



**APPENDIX 3**

**LOCATION OF ORGANISATIONS**

**APPENDIX 4**

**SUMMARY OF CONSULTATION POST-LODGEMENT OF THE APPLICATION**

| Date | Group | Contact | Reference | Information requested | Actions/outcomes | Person responsible |
|---|---|---|---|---|---|---|
| 13/05/2020 | TRONA | Michal Akurangi | Discussion | Request to undertake Cultural Impact Assessment | Discussion between Elaine August and TRONA representative. Request was made to undertake a CIA which NTGA would pay for. | Elaine August |
| 20/05/2020 | TRONA | Jaymie Wardlaw | Scope for CIA | Response to the scope | TRONA provided a draft scope for the CIA to be undertaken. | Elaine August |
| 21/05/2020 | TRONA | Jaymie Wardlaw | Scope for CIA | CIA in 10 working days | NTGA provided its comments on and approval for the scope for the CIA. It requested that a CIA be provided in 10 working days (4/06/2020). | Elaine August |
| 4/06/2020 | TRONA | Jaymie Wardlaw | Request for CIA extension | n/a | TRONA requested an extension to the date which they would provide the CIA, from the 4th of June to the 10th of June. | Elaine August |
| 5/06/2020 | TRONA | Jaymie Wardlaw | Request for CIA extension | n/a | NTGA declined via email from Ms August the request to extend to the 10th of June, however, accepted an extension until the 8th of June. | Elaine August |
| 9/06/2020 | TRONA | Jaymie Wardlaw | Request for update on CIA | | Further to Ms August's email on Friday the of 5th June, a further email was sent to confirm that NTGA did not receive TRoNA's response by the deadline of Monday the 8th of June. | Elaine August |
| 10/06/2020 | TRONA | Jaymie Wardlaw | Request for meeting | | In an email, TRONA informed NTGA that they had discussed the application with relevant hapū representatives and they requested a hui be held | Elaine August |

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| | | | | | between NTGA, NTST Trustees, and their representatives.<br><br>The main points TRONA wanted to clarify included:<br><br>• What progress has been made since the last variation to consent was requested?<br>• Has a commitment been made to having a process in place to reinject geothermal fluid?<br>• What are the environmental and cultural benefits if a variation to the consent term (additional 14 years) is agreed?<br>• What is being proposed by NTGA to work more efficiently and environmentally friendly? | |
| 29/06/2020 | TRONA | Michal Akurangi | Meeting cancelled | n/a | A meeting was subsequently planned between NTST and TRONA trustees. However, it was cancelled by TRONA. | Robbie Watt |
| 2/07/2020 | Norske, OJI, Asaleo, etc | | Emails and discussion | n/a | NTGA informed the geothermal energy users of the application and Council's position on the subsidence risk. These groups were happy to be covered by existing insurance arrangements and were not willing to provide written support in a resource consent process. | Robbie Watt |
| 3/07/2020 | Eastland Generation (TAOM & GDL) | Ben Gibson | Email statement of Eastland position | n/a | Further to the review of the geoscience and to discussions with NTGA, Eastland noted that it did not wish to make a submission on this application. | Robbie Watt |
| 8/07/2020 | TRONA | Jaymie Wardlaw and TRoNA Trustee representatives | Meeting of NTST, NTGA, and TRONA representatives | TRONA to provide a CIA | A lot of questions were asked about the effect of the geothermal fluid on water quality and fish life. NTGA believed that by the end of the meeting the TRONA representatives had a better | Elaine August, Spence McClintock, Jaime Quinao and NTST trustees |

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| | | | | | understanding that the true effects of the activity were as per the scientific report from Dr Hickey. TRONA to prepare a CIA. | |
| 31/07/2020 | TRONA | Michal Akurangi | Email providing CIA | n/a | TRONA provided a CIA outlining the key concerns with the Proposal. | Elaine August and Robbie Watt |
| 13/08/2020 | MEL | Mark Henry | Email | Provided a response to conclude the consultation undertaken with MEL. | MEL's statement to BOPRC was delivered by email. Mercury remained of the view that properly targeted reinjection remains an important objective to maintain pressure support and the general health of the Kawerau geothermal reservoir. In their view, the application to continue rather than reduce the discharge of separated geothermal water to the Tarawera River does not move towards meeting this objective.<br><br>Mercury concluded by stating they would like the opportunity to submit on the application should Council decide to notify the application. | Robbie Watt |
| 19/08/2020 | TRONA | Michal Akurangi | Response to CIA | Offer to meet to discuss concerns, with technical experts present | NTGA provided a response to the points raised in the CIA back to TRONA.<br><br>Robbie Watt also stated that NTGA and NTST are open to meeting again at either a Trustee level or technical level to further explore the potential to find a middle ground on this matter. | Robbie Watt |
| 9/11/2020 | TRONA | Michal Akurangi & | Meeting at TRONA office | | NTGA Management met with TRONA Management to better understand their concerns outlined in their CIA. | Robbie Watt / Elaine August / Jaime Quinao |

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|---|---|---|---|---|---|---|
| | | Jaymie Wardlaw | | | TRoNA raised the matter of NTGA applying for another extension in the future. NTGA attempted to provide formal closure to this matter however TRoNA did not respond. | |
| 03/12/2020 | TRONA | Michal Akurangi & Jaymie Wardlaw | Meeting at TRONA office | Discuss technical aspects of TRONA submission on NTGA s127 Application. Meeting to follow NTGA's response to TRONA's submission points. | Following the November meeting, a hui was organised between TRONA and NTGA, with technical experts from ESR (for TRONA) and NIWA (for NTGA) to talk through the technical aspects of the application. Meeting was cancelled by TRONA on the 25th of November due to unavailability of ESR expert. | Robbie Watt |
| 15/03/2021 | TRONA | Michal Akurangi & Jaymie Wardlaw | Meeting at TRONA office | Discuss technical aspects of TRONA submission on NTGA s127 Application | Meeting was meant to be held to answer TRONA's questions and concerns with input from Chris Hickey who was meant to speak with a water quality expert from ESR. TRONA cancelled the meeting 10 minutes prior to when it was supposed to begin due to the unavailability of persons who were going to attend for TRONA. Instead, a meeting with Joe Harawira, Chairman of Ngāti Awa, was held. Unfortunately, no technical discussion on the application was possible. No further correspondence has been received from TRONA. | Robbie Watt, Elaine August, Jaime Quinao, Amorangi Graham Kahu Te Rire, Bev Adlam, Chris Hickey, Blair McLean |